

# Technical Information

## Proline Promag D 10

Electromagnetic flowmeter



Highly cost-effective wafer flowmeter with easy-to-use operation concept

### Application

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

### Device properties

- Short installation length and low weight
- Integrated ground disks made of stainless steel
- International drinking water approvals
- System integration with HART, Modbus RS485, IO-Link
- Flexible operation with app and optional display

### Your benefits

- Easy integration into your plant infrastructure with IO-Link protocol
- Easy, fast centering of the sensor – innovative housing construction
- Energy-saving flow measurement – no pressure loss due to cross section constriction
- Maintenance-free – no moving parts
- Optimum usability – operation with mobile devices and SmartBlue app or display with touchscreen
- Simple, time-saving commissioning – guided parameterization in advance and in the field
- Built-in verification – Heartbeat Technology

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## Symbols








### Electronics

-  Direct current
-  Alternating current
-  Direct current and alternating current
-  Terminal connection for potential equalization



### Device communication

-  Communication via a wireless, local area network.
-  Bluetooth is enabled.

### Types of information


-  Preferred procedures, processes or actions
-  Permitted procedures, processes or actions
-  Forbidden procedures, processes or actions
-  Additional information
-  Reference to documentation
-  Reference to page
-  Reference to graphic

### Explosion protection

-  Hazardous area
-  Non-hazardous area

## Related documentation

Technical information	Overview of the device with the most important technical data.
Operating instructions	All the information that is required in the various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal as well as the technical data and dimensions.
Sensor Brief Operating Instructions	Incoming acceptance, transport, storage and mounting of the device.
Transmitter Brief Operating Instructions	Electrical connection and commissioning of the device.
Description of Parameters	Detailed explanation of the menus and parameters.
Safety Instructions	Documents for the use of the device in hazardous areas.
Special Documentation	Documents with more detailed information on specific topics.
Installation Instructions	Installation of spare parts and accessories.

-  The device documentation is available online on the device product page and in the Downloads area: [www.endress.com](http://www.endress.com)

## Ordering information

Detailed ordering information is available from your nearest sales organization [www.addresses.endress.com](http://www.addresses.endress.com) or in the Product Configurator at [www.endress.com](http://www.endress.com):

1. Select the product using the filters and search field.

2. Open the product page.

3. Select **Configuration**.



**Product Configurator - the tool for individual product configuration**

- Up-to-the-minute configuration data
- Depending on the device: direct input of information specific to the measuring point, such as the 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

## Registered trademarks

### **HART®**

Registered trademark of the FieldComm Group, Austin, Texas USA

### **Modbus®**

Registered trademark of SCHNEIDER AUTOMATION, INC.

### **IO-Link®**

Is a registered trademark. It may only be used in conjunction with products and services by members of the IO-Link Community or by non-members who hold an appropriate license. For more specific guidelines on use, refer to the IO-Link Community rules on: [www.io-link.com](http://www.io-link.com).

### **Bluetooth®**

The Bluetooth word mark and Bluetooth logos are registered trademarks of Bluetooth SIG, Inc. and any use of such marks by Endress+Hauser is under license. Other trademarks and trade names are those of their respective owners.

### **Apple®**

Apple, the Apple logo, iPhone, and iPod touch are trademarks of Apple Inc., registered in the U.S. and other countries. App Store is a service mark of Apple Inc.

### **Android®**

Android, Google Play and the Google Play logo are trademarks of Google Inc.

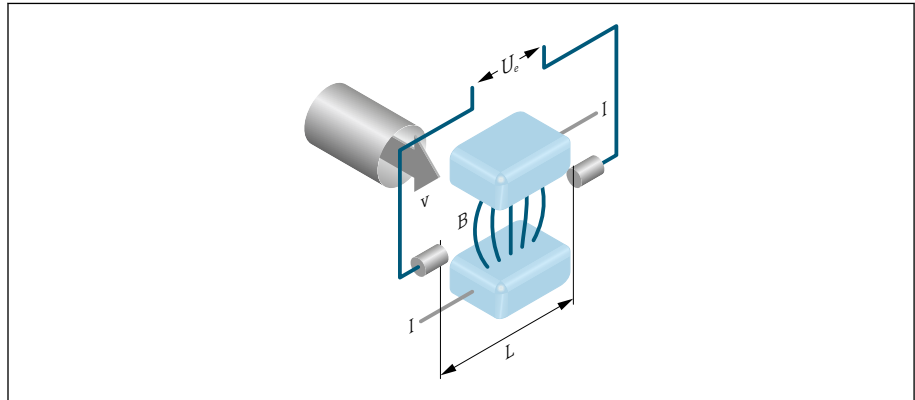
## Function and system design

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## Measuring principle

According to *Faraday's law of magnetic induction*, a voltage is induced in a conductor moving through a magnetic field.



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

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

### Formulae for calculation

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

## Product design

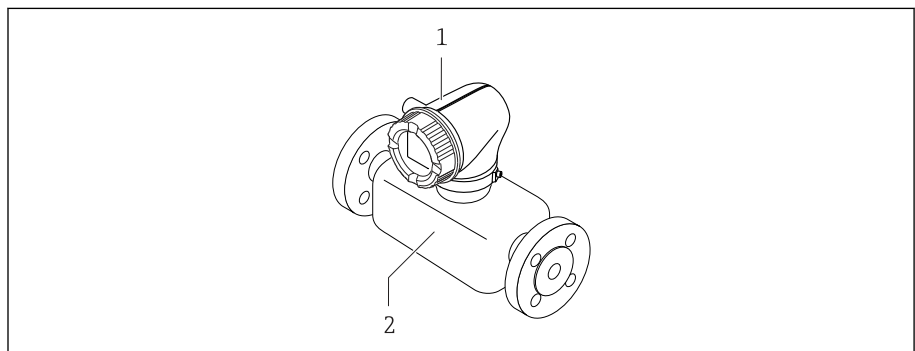
The device consists of a transmitter and a sensor.

Two device versions are available:

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

### Compact version

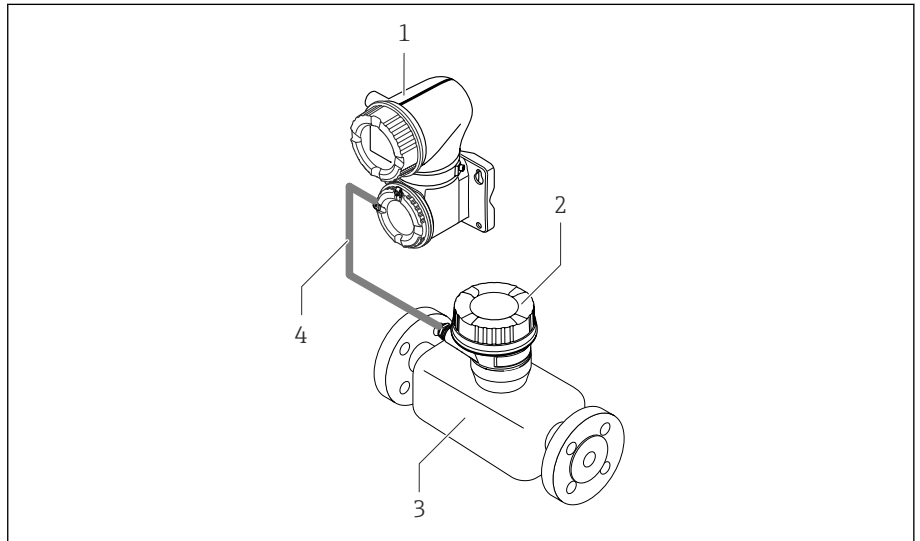
The transmitter and sensor form a mechanical unit.



- 1 Transmitter  
 2 Sensor

**Remote version**

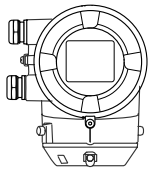
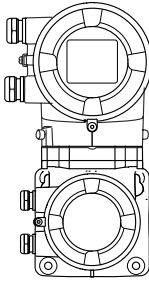
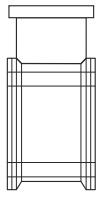
The transmitter and sensor are mounted in physically separate locations.



A0028196

- 1 Transmitter
- 2 Sensor connection housing
- 3 Sensor
- 4 Connecting cable

**Measuring system**

Proline 10 transmitter	Promag D sensor
 <p data-bbox="774 1355 922 1384">Compact version</p>  <p data-bbox="774 1713 922 1742">Remote version</p>	

**IT security**

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

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

## Device-specific IT security

### Access via Bluetooth

Secure signal transmission via Bluetooth uses an encryption method tested by the Fraunhofer Institute.

- Without the SmartBlue App, the device is not visible via Bluetooth.
- Only one point-to-point connection is established between the device and a smartphone or tablet.

### Access via the SmartBlue App

Two access levels (user roles) are defined for the device: the **Operator** user role and the **Maintenance** user role. The **Maintenance** user role is configured when the device leaves the factory.

If a user-specific access code is not defined (in the Enter access code parameter), the default setting **0000** continues to apply and the **Maintenance** user role is automatically enabled. The device's configuration data are not write-protected and can be edited at all times.

If a user-specific access code has been defined (in the Enter access code parameter), all the parameters are write-protected. The device is accessed with the **Operator** user role. When the user-specific access code is entered a second time, the **Maintenance** user role is enabled. All parameters can be written to.



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

### Protecting access via a password

There are a variety of ways to protect against write access to the device parameters:

- User-specific access code:  
Protect write access to the device parameters via all the interfaces.
- Bluetooth key:  
The password protects access and the connection between an operating unit, e.g. a smartphone or tablet, and the device via the Bluetooth interface.

#### General notes on the use of passwords

- The access code and Bluetooth key that are valid when the device is delivered must be redefined during commissioning.
- Follow the general rules for generating a secure password when defining and managing the access code and Bluetooth key.
- The user is responsible for the management and careful handling of the access code and Bluetooth key.

### Write protection switch

The entire operating menu can be locked via the write protection switch. The values of the parameters cannot be changed. Write protection is disabled when the device leaves the factory.

Write protection is enabled with the write protection switch on the back of the display module.

## Input

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### Measured variable

Direct measured variables	Volume flow (proportional to induced voltage)
Calculated measured variables	Mass flow

### Operable flow range

Over 1000 : 1

### Measuring range

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

Electrical conductivity:

- $\geq 5$   $\mu\text{S/cm}$  for liquids in general
- $\geq 20$   $\mu\text{S/cm}$  for demineralized water

#### Flow characteristic values in SI units

Nominal diameter		Recommended flow min./max. full scale value ( $v \sim 0.3/10$ m/s)	Full scale value current output ( $v \sim 2.5$ m/s)	Factory settings	
[mm]	[in]			Pulse value ( $\sim 2$ pulse/s)	Low flow cut off ( $v \sim 0.04$ m/s)
		[dm <sup>3</sup> /min]	[dm <sup>3</sup> /min]	[dm <sup>3</sup> ]	[dm <sup>3</sup> /min]
25	1	9 to 300	75	0.5	1
40	1 ½	25 to 700	200	1.5	3
50	2	35 to 1100	300	2.5	5
65	–	60 to 2000	500	5	8
80	3	90 to 3000	750	5	12
100	4	145 to 4700	1200	10	20

#### Flow characteristic values in US units

Nominal diameter		Recommended flow min./max. full scale value ( $v \sim 0.3/10$ m/s)	Full scale value current output ( $v \sim 2.5$ m/s)	Factory settings	
[in]	[m1m]			Pulse value ( $\sim 2$ pulse/s)	Low flow cut off ( $v \sim 0.04$ m/s)
		[gal/min]	[gal/min]	[gal]	[gal/min]
1	25	2.5 to 80	18	0.2	0.25
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 1250	300	2	4

## Output

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## Output versions

Order code 020: output; input	Output version
Option B	<ul style="list-style-type: none"> <li>▪ Current output 4 to 20 mA HART</li> <li>▪ Pulse/frequency/switch output</li> </ul>
Option F	IO-Link
Option M	<ul style="list-style-type: none"> <li>▪ Modbus RS485</li> <li>▪ Current output 4 to 20 mA</li> </ul>

## Output signal

### Current output 4 to 20 mA HART / 4 to 20 mA HART Ex-i

Signal mode	Choose via terminal assignment: <ul style="list-style-type: none"> <li>▪ Active</li> <li>▪ Passive</li> </ul>
Current range	Can be set to: <ul style="list-style-type: none"> <li>▪ 4 to 20 mA NAMUR</li> <li>▪ 4 to 20 mA US</li> <li>▪ 4 to 20 mA</li> <li>▪ Fixed current</li> </ul>
Max. output current	21.5 mA
Open-circuit voltage	DC < 28.8 V (active)
Max. input voltage	DC 30 V (passive)
Max. load	400 Ω
Resolution	1 μA
Damping	Configurable: 0 to 999.9 s
Assignable measured variables	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Volume flow</li> <li>▪ Mass flow</li> <li>▪ Noise*</li> <li>▪ Coil current shot time*</li> </ul> <p>* Visibility depends on order options or device settings</p>

## IO-Link

Physical interface	Similar to the standard IEC 61131-9
Signal	Digital communication signal IO-Link, 3-wire
IO-Link version	1.1
IO-Link SSP version	Smart Sensor Profile 2nd Edition V1.2
IO-Link device port	IO-Link port class A

## Modbus RS485

Physical interface	RS485 in accordance with EIA/TIA-485 standard
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**Current output 4 to 20 mA <sup>1)</sup>**

<b>Signal mode</b>	Choose via terminal assignment: <ul style="list-style-type: none"> <li>▪ Active</li> <li>▪ Passive</li> </ul>
<b>Current range</b>	Can be set to: <ul style="list-style-type: none"> <li>▪ 4 to 20 mA NAMUR</li> <li>▪ 4 to 20 mA US</li> <li>▪ 4 to 20 mA</li> <li>▪ Fixed current</li> </ul>
<b>Max. output current</b>	21.5 mA
<b>Open-circuit voltage</b>	DC < 28.8 V (active)
<b>Max. input voltage</b>	DC 30 V (passive)
<b>Max. load</b>	400 Ω
<b>Resolution</b>	1 μA
<b>Damping</b>	Configurable: 0 to 999.9 s
<b>Assignable measured variables</b>	<ul style="list-style-type: none"> <li>▪ Off</li> <li>▪ Volume flow</li> <li>▪ Mass flow</li> <li>▪ Noise*</li> <li>▪ Coil current shot time*</li> </ul> <p>* Visibility depends on order options or device settings</p>

**Pulse/frequency/switch output <sup>2)</sup>**

<b>Function</b>	Can be set to: <ul style="list-style-type: none"> <li>▪ Pulse output</li> <li>▪ Frequency output</li> <li>▪ Switching output</li> </ul>
<b>Version</b>	Open collector: Passive
<b>Input values</b>	<ul style="list-style-type: none"> <li>▪ DC 10.4 to 30 V</li> <li>▪ Max. 140 mA</li> </ul>
<b>Voltage drop</b>	<ul style="list-style-type: none"> <li>▪ ≤ DC 2 V @ 100 mA</li> <li>▪ ≤ DC 2.5 V @ max. input current</li> </ul>

<b>Pulse output</b>	
<b>Pulse width</b>	Configurable: 0.05 to 2 000 ms
<b>Max. pulse rate</b>	10 000 Impulse/s
<b>Pulse value</b>	Configurable
<b>Assignable measured variables</b>	<ul style="list-style-type: none"> <li>▪ Volume flow</li> <li>▪ Mass flow</li> </ul>

<b>Frequency output</b>	
<b>Output frequency</b>	Configurable: end value frequency 2 to 10 000 Hz ( $f_{max} = 12\,500$ Hz)
<b>Damping</b>	Configurable: 0 to 999.9 s

1) Only available with Modbus RS485  
 2) Only available with 4 to 20 mA HART

<b>Pulse/pause ratio</b>	1:1
<b>Assignable measured variables</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ Volume flow</li> <li>■ Mass flow</li> <li>■ Noise*</li> <li>■ Coil current shot time*</li> <li>■ Reference electrode potential against PE*</li> </ul> <p>* Visibility depends on order options or device settings</p>
<b>Switch output</b>	
<b>Switching behavior</b>	Binary, conductive or non-conductive
<b>Switching delay</b>	Configurable: 0 to 100 s
<b>Number of switching cycles</b>	Unlimited
<b>Assignable functions</b>	<ul style="list-style-type: none"> <li>■ Off</li> <li>■ On</li> <li>■ Diagnostic behavior: <ul style="list-style-type: none"> <li>■ Alarm</li> <li>■ Warning</li> <li>■ Warning and alarm</li> </ul> </li> <li>■ Limit value: <ul style="list-style-type: none"> <li>■ Off</li> <li>■ Volume flow</li> <li>■ Mass flow</li> <li>■ Flow velocity</li> <li>■ Totalizer 1...3</li> </ul> </li> <li>■ Flow direction monitoring</li> <li>■ Status <ul style="list-style-type: none"> <li>■ <b>Empty pipe detection</b> option (only possible with extended transmitter)</li> <li>■ Low flow cut off</li> </ul> </li> </ul> <p>* Visibility depends on order options or device settings</p>

### Signal on alarm

Output behavior in the event of a device alarm (failure mode)

#### HART

<b>Device diagnostics</b>	Device condition can be read out via HART Command 48
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#### IO-Link

<b>Operating mode</b>	Digital transmission of all failure information
<b>Device status</b>	Readable via cyclic and acyclic data transmission

#### Modbus RS485

<b>Failure mode</b>	Selectable: <ul style="list-style-type: none"> <li>▪ NaN value instead of current value</li> <li>▪ Last valid value</li> </ul>
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#### Current output 4 to 20 mA

<b>4 to 20 mA</b>	Selectable: <ul style="list-style-type: none"> <li>▪ Min. value: 3.59 mA</li> <li>▪ Max. value: 21.5 mA</li> <li>▪ Freely definable value between: 3.59 to 21.5 mA</li> <li>▪ Actual value</li> <li>▪ Last valid value</li> </ul>
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#### Pulse/frequency/switch output

<b>Pulse output</b>	Selectable: <ul style="list-style-type: none"> <li>▪ Actual value</li> <li>▪ No pulses</li> </ul>
<b>Frequency output</b>	Selectable: <ul style="list-style-type: none"> <li>▪ Actual value</li> <li>▪ 0 Hz</li> <li>▪ Defined value: 0 to 12 500 Hz</li> </ul>
<b>Switch output</b>	Selectable: <ul style="list-style-type: none"> <li>▪ Current status</li> <li>▪ Open</li> <li>▪ Closed</li> </ul>

#### Low flow cut off

The switch points for low flow cut off are user-selectable.

#### Galvanic isolation

The outputs are galvanically isolated from one another and from earth.

## Protocol-specific data

### HART

Bus structure	The HART signal is superimposed on the 4 to 20 mA current output.
Manufacturer ID	0x11
Device type ID	0x71
HART protocol revision	7
Device description files (DTM, DD)	Information and files under: <a href="http://www.endress.com">www.endress.com</a>
HART load	At least 250 Ω
System integration	Measured variables via HART protocol

### IO-Link

IO-Link specification	Version 1.1.3
Device ID	9728257
Manufacturer ID	17
Smart Sensor Profile	Smart Sensor Profile 2nd Edition V1.2; supported <ul style="list-style-type: none"> <li>▪ Identification and Diagnosis</li> <li>▪ Digital Measuring and Switching Sensor (as per SSP type 4.3.4)</li> <li>▪ Function Class Sensor Control Wide</li> </ul>
Smart Sensor Profile Type	Measuring profile type 4.3.4 Measuring and Switching Sensor, floating point, 4 channel
SIO mode	No
Speed	COM2 (38.4 kBaud)
Minimum cycle time	12 ms
Process data width	Input: 18 bytes (as per SSP 4.3.4) Output: 2 bytes (as per SSP 4.3.4)
OnRequestdata	8 bytes
Data storage	Yes
Block configuration	Yes
Device operational	The device is operational 6 s after the supply voltage has been applied
System integration	Cyclic input measured variables: <ul style="list-style-type: none"> <li>▪ Volume flow [m<sup>3</sup>/h]</li> <li>▪ Conductivity [S/m], depending on order options or device settings</li> <li>▪ Temperature [°C], depending on the sensor option selected</li> <li>▪ Totalizer 1 [m<sup>3</sup>]</li> </ul> Cyclic output measured variables: <ul style="list-style-type: none"> <li>▪ <b>Totalizer</b> submenu – <b>Totalize</b> option</li> <li>▪ <b>Totalizer</b> submenu – <b>Reset + hold</b> option</li> <li>▪ <b>Totalizer</b> submenu – <b>Reset + totalize</b> option</li> <li>▪ <b>Totalizer</b> submenu – <b>Hold</b> option</li> <li>▪ Flow override</li> <li>▪ Device search</li> </ul>

### Device description


In order to integrate field devices into a digital communication system, the IO-Link system needs a description of the device parameters, such as output data, input data, data format, data volume and supported transmission rate.

These data are available in the device description (IODD) which is provided to the IO-Link Master when the communication system is commissioned.

The IODD can be downloaded as follows:

- [www.endress.com](http://www.endress.com)
- <https://ioddfinder.io-link.com>

### Modbus RS485

<b>Physical interface</b>	RS485 in accordance with EIA/TIA-485 standard
<b>Terminating resistor</b>	Not integrated
<b>Protocol</b>	Modbus Applications Protocol Specification V1.1
<b>Response times</b>	<ul style="list-style-type: none"> <li>▪ Direct data access: typically 25 to 50 ms</li> <li>▪ Auto-scan buffer (data range): typically 3 to 5 ms</li> </ul>
<b>Device type</b>	Slave
<b>Slave address range</b>	1 to 247
<b>Broadcast address range</b>	0
<b>Function codes</b>	<ul style="list-style-type: none"> <li>▪ 03: Read holding register</li> <li>▪ 04: Read input register</li> <li>▪ 06: Write single registers</li> <li>▪ 08: Diagnostics</li> <li>▪ 16: Write multiple registers</li> <li>▪ 23: Read/write multiple registers</li> </ul>
<b>Broadcast messages</b>	<p>Supported by the following function codes:</p> <ul style="list-style-type: none"> <li>▪ 06: Write single registers</li> <li>▪ 16: Write multiple registers</li> <li>▪ 23: Read/write multiple registers</li> </ul>
<b>Supported baud rate</b>	<ul style="list-style-type: none"> <li>▪ 1 200 BAUD</li> <li>▪ 2 400 BAUD</li> <li>▪ 4 800 BAUD</li> <li>▪ 9 600 BAUD</li> <li>▪ 19 200 BAUD</li> <li>▪ 38 400 BAUD</li> <li>▪ 57 600 BAUD</li> <li>▪ 115 200 BAUD</li> </ul>
<b>Data transfer mode</b>	RTU
<b>Data access</b>	<p>Each parameter can be accessed via Modbus RS485.</p> <p> For Modbus register information</p>
<b>System integration</b>	<p>Information on system integration .</p> <ul style="list-style-type: none"> <li>▪ Modbus RS485 information</li> <li>▪ Function codes</li> <li>▪ Register information</li> <li>▪ Response time</li> <li>▪ Modbus data map</li> </ul>



## Power supply

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## Terminal assignment



The terminal assignment is documented on an adhesive label.

The following terminal assignment is available:

*Current output 4 to 20 mA HART (active) and pulse/frequency/switch output*

Supply voltage		Output 1				Output 2	
1 (+)	2 (-)	26 (+)	27 (-)	24 (+)	25 (-)	22 (+)	23 (-)
L/+	N/-	Current output 4 to 20 mA HART (active)		-		Pulse/frequency/switch output (passive)	

*Current output 4 to 20 mA HART (passive) and pulse/frequency/switch output*

Supply voltage		Output 1				Output 2	
1 (+)	2 (-)	26 (+)	27 (-)	24 (+)	25 (-)	22 (+)	23 (-)
L/+	N/-	-		Current output 4 to 20 mA HART (passive)		Pulse/frequency/switch output (passive)	

*Modbus RS485 and current output 4 to 20 mA (active)*

Supply voltage		Output 1				Output 2	
1 (+)	2 (-)	26 (+)	27 (-)	24 (+)	25 (-)	22 (B)	23 (A)
L/+	N/-	Current output 4 to 20 mA (active)		-		Modbus RS485	

*Modbus RS485 and current output 4 to 20 mA (passive)*

Supply voltage		Output 1				Output 2	
1 (+)	2 (-)	26 (+)	27 (-)	24 (+)	25 (-)	22 (B)	23 (A)
L/+	N/-	-		Current output 4 to 20 mA (passive)		Modbus RS485	

## Supply voltage

Order code for "Power supply"	Terminal voltage	Frequency range
Option A IO-Link port class A	DC 18 to 30 V <sup>1)</sup>	-
Option D	DC 24 V	-20 to +30 %
Option E	AC 100 to 240 V	-15 to +10 %
Option I	DC 24 V	-20 to +30 %
	AC 100 to 240 V	-15 to +10 %
Option M non-hazardous area	DC 24 V	-20 to +30 %
	AC 100 to 240 V	-15 to +10 %

1) These values are absolute minimum and maximum values. No tolerance applies. The DC power unit must be tested to ensure it meets technical safety requirements (e.g. PELV, SELV) with limited power sources (e.g. Class 2).

### Power consumption

- Transmitter:
  - HART, Modbus RS485: Max. 10 W (active power)
  - IO-Link: Max. 6 W (active power)
- Switch-on current:
  - HART, Modbus RS485: Max. 36 A (< 5 ms) as per NAMUR Recommendation NE 21
  - IO-Link: Max. 400 mA

### Current consumption



- Max. 400 mA (24 V)
- Max. 200 mA (110 V, 50/60 Hz; 230 V, 50/60 Hz)
- Max 200 mA. (18 to 30 V, IO-Link port class A)

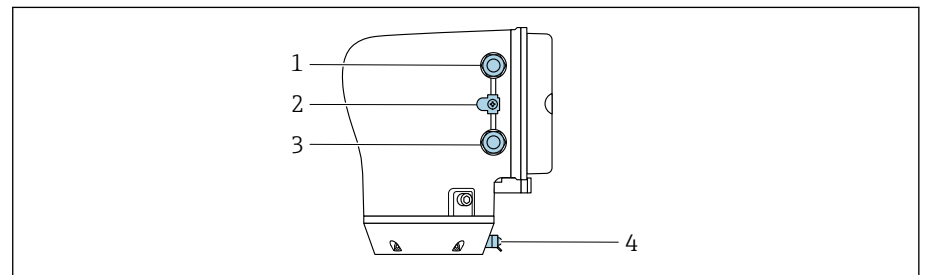
### Power supply failure

- Totalizers stop at the last value measured.
- Device configuration remains unchanged.
- Error messages (incl. total operated hours) are stored.

### Electrical connection

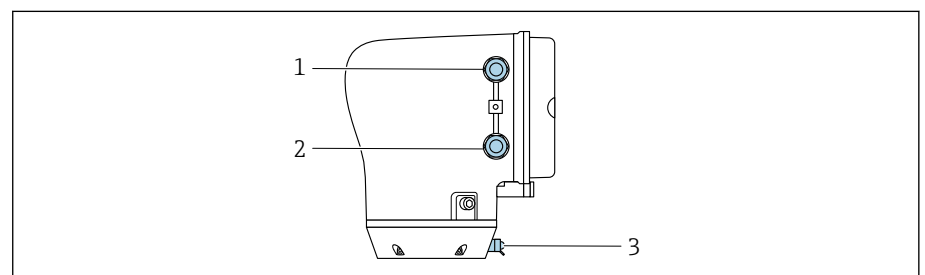
#### Transmitter terminal connections

 Terminal assignment → *Terminal assignment*,  22



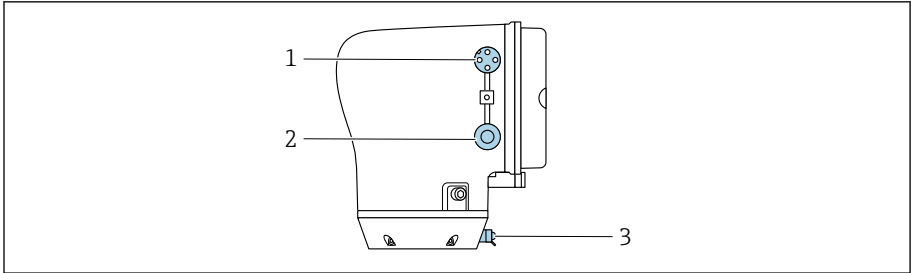
A0043283

- 1 Cable entry for power supply cable: supply voltage
- 2 Outer ground terminal: on transmitters made of polycarbonate with a metal pipe adapter
- 3 Cable entry for signal cable
- 4 Outer ground terminal



A0045438

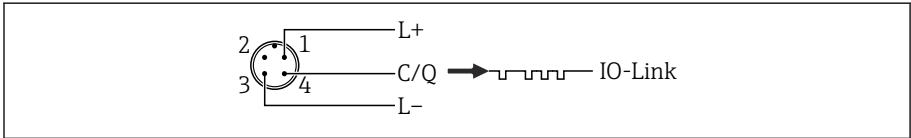
- 1 Cable entry for power supply cable: supply voltage
- 2 Cable entry for signal cable
- 3 Outer ground terminal



A0053767

- 1 M12 plug for power supply (supply voltage) and signals (IO-Link)
- 2 Dummy plug
- 3 Outer ground terminal

*Pin assignment of IO-Link device plug*

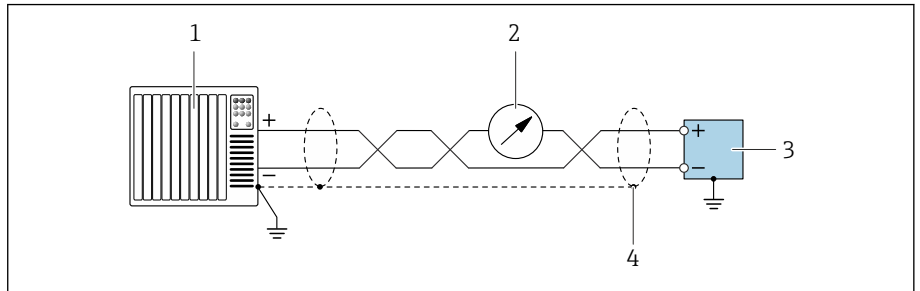


A0053891

- 1 M12 A-coded (IEC 61076-2-101)
- 1 PIN 1: power supply
- 2 PIN 2: not used
- 3 PIN 3: reference potential for power supply/output
- 4 PIN 4: output 1 (IO-link)

Examples of electric terminals

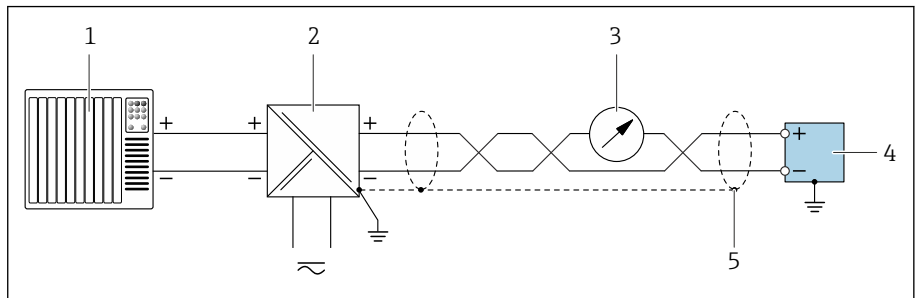
Current output 4 to 20 mA HART



A0055862

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

- 1 Automation system with 4 to 20 mA current input with HART (e.g. PLC)
- 2 Optional display unit: Note maximum load
- 3 Transmitter with 4 to 20 mA current output with HART (active)
- 4 Ground the cable shield on one side only. For installations in compliance with NAMUR NE98, grounding of the cable shield on both sides is required.



A0055861

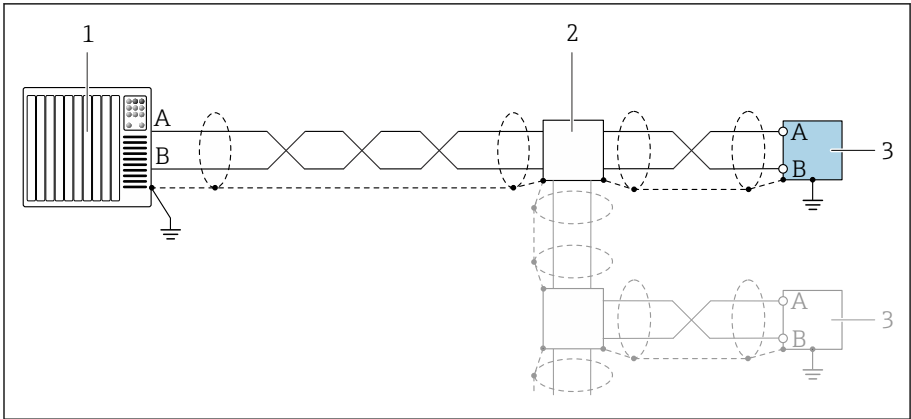
3 Connection example for 4 to 20 mA current output with HART (passive)

- 1 Automation system with 4 to 20 mA current input with HART (e.g. PLC)
- 2 Power supply
- 3 Optional display unit: Note maximum load
- 4 Transmitter with 4 to 20 mA current output with HART (passive)
- 5 Ground the cable shield on one side only. For installations in compliance with NAMUR NE98, grounding of the cable shield on both sides is required.

IO-Link

See <https://io-link.com>"IO-Link System Description"

Modbus RS485

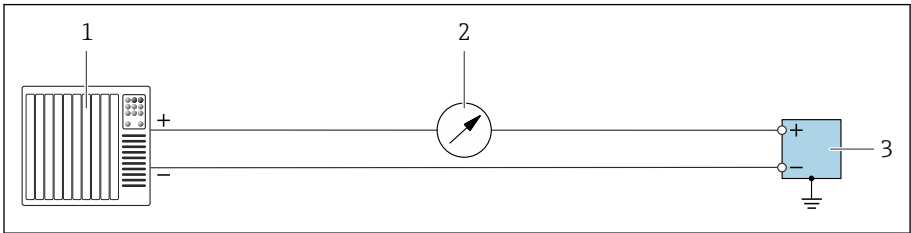


A0055863

4 Connection example for Modbus RS485

- 1 Automation system with Modbus master (e.g. PLC)
- 2 Optional distribution box
- 3 Transmitter with Modbus RS485

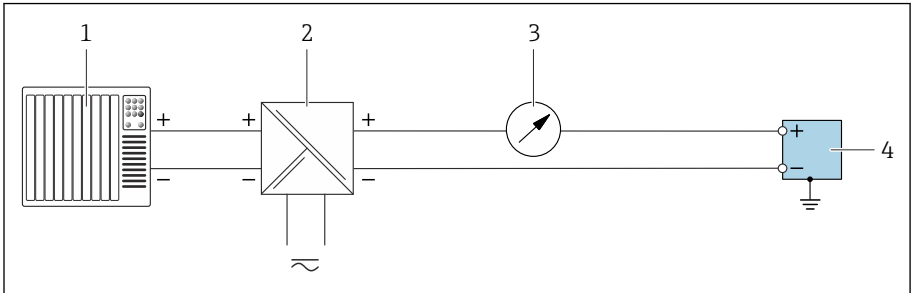
Current output 4 to 20 mA (without HART)



A0055851

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

- 1 Automation system with current input (e.g. PLC)
- 2 Optional additional display unit: Observe maximum load
- 3 Flowmeter with current output (active)

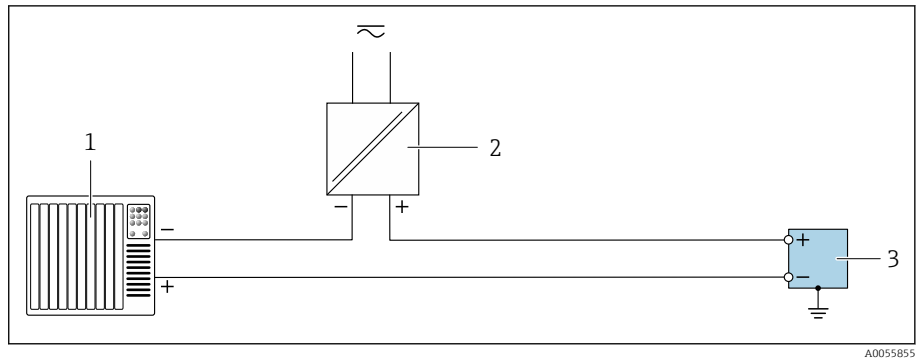


A0055852

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

- 1 Automation system with current input (e.g. PLC)
- 2 Power supply
- 3 Optional additional display unit: Observe maximum load
- 4 Transmitter with current output (passive)

Pulse output/frequency output/switch output



7 Connection example for pulse output/frequency output/switch output (passive)

- 1 Automation system with pulse input/frequency input/switch input (e.g. PLC)
- 2 Power supply
- 3 Transmitter with pulse output/frequency output/switch output (passive)

Potential equalization

Introduction

Correct potential equalization (equipotential bonding) is a prerequisite for stable and reliable flow measurement. Inadequate or incorrect potential equalization can result in device failure and present a safety hazard.

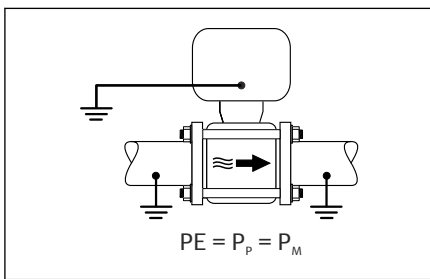
The following requirements must be observed to ensure correct, trouble-free measurement:

- The principle that the medium, the sensor and the transmitter must be at the same electric potential applies.
- Take in-company grounding guidelines, materials and the grounding conditions and potential conditions of the pipe into consideration.
- The necessary potential equalization connections must be established using a ground cable with a minimum cross-section of 6 mm<sup>2</sup> (0.0093 in<sup>2</sup>). Also use a cable lug.
- In the case of remote device versions, the ground terminal in the example always refers to the sensor and not to the transmitter.

Abbreviations used

- PE (Protective Earth): potential at the potential equalization terminals of the device
- P<sub>p</sub> (Potential Pipe): potential of the pipe, measured at the flanges
- P<sub>M</sub> (Potential Medium): potential of the medium

Connection examples for standard situations

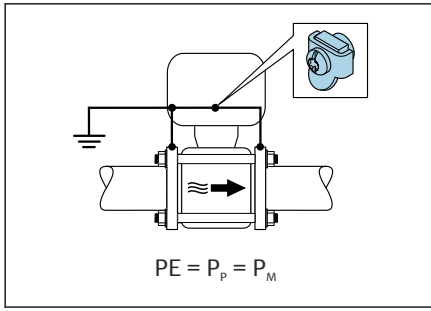


Unlined and grounded metal pipe

- Potential equalization is via the measuring tube.
- The medium is set to ground potential.

Starting conditions:

- Pipes are correctly grounded on both sides.
- Pipes are conductive and at the same electric potential as the medium
- ▶ Connect the connection housing of the transmitter or sensor to ground potential via the ground terminal provided for this purpose.



A0045824

### Plastic pipe or pipe with insulating liner

- Potential equalization is via the ground terminal and flanges
- The medium is set to ground potential.

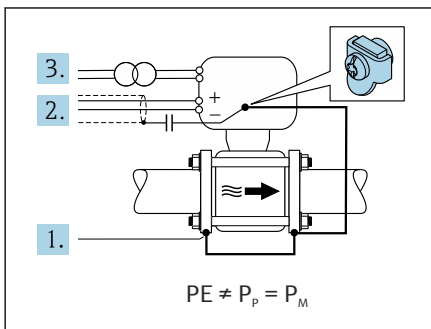
Starting conditions:

- The pipe has an insulating effect.
- Low-impedance medium grounding close to the sensor is not guaranteed.
- Equalizing currents through the medium cannot be ruled out.

1. Connect flanges to the ground terminal of the transmitter or sensor connection housing via the ground cable.
2. Connect the connection to ground potential.

### Connection example with the potential of medium not equal to potential equalization connection

In these cases, the medium potential can differ from the potential of the device.



A0045826

### Metal, ungrounded pipe

The sensor and transmitter are installed in a way that provides electrical insulation from PE, e.g. applications for electrolytic processes or systems with cathodic protection.

Starting conditions:

- Unlined metal pipe
- Pipes with an electrically conductive liner

1. Connect the pipe flanges and transmitter via the ground cable.
2. Route the shielding of the signal lines via a capacitor (recommended value  $1.5\mu\text{F}/50\text{V}$ ).
3. Device connected to power supply such that it is floating in relation to the potential equalization connection (isolation transformer). This measure is not required in the case of 24V DC supply voltage without PE (= SELV power unit).

### Terminals

Spring terminals

- Suitable for strands and strands with ferrules.
- Conductor cross-section 0.2 to 2.5 mm<sup>2</sup> (24 to 12 AWG).

### Cable entries

- Cable gland: M20 × 1.5 for cable  $\varnothing 6$  to 12 mm (0.24 to 0.47 in)
- Thread for cable entry:
  - NPT 1/2"
  - G 1/2", G 1/2" Ex d
  - M20
- M12 plug-in connector (IO-Link only)

### Overvoltage protection

<b>Mains voltage fluctuations</b>	→ Supply voltage, 22
<b>Overvoltage category</b>	Overvoltage category II
<b>Short-term, temporary overvoltage</b>	Between cable and neutral conductor up to 1200 V for max. 5s
<b>Long-term, temporary overvoltage</b>	Up to 500 V between cable and ground

## Cable specifications

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Requirements for connecting cable	30
Ground cable requirements	30
Connecting cable requirements	30

## Requirements for connecting cable

### Electrical safety

As per applicable national regulations.

### Permitted temperature range

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

### Power supply cable (incl. conductor for the inner ground terminal)

- A standard installation cable is sufficient.
- Provide grounding according to applicable national codes and regulations.

### Signal cable

- Current output 4 to 20 mA HART:  
A shielded cable is recommended, observe the grounding concept of the facility.
- Pulse/frequency/switch output:  
Standard installation cable
- IO-Link:  
Twisted three- or four-core cable M12 A-coded according to IEC 61076-2-101 recommended with
  - Conductor cross-section: 0.34 mm<sup>2</sup> (AWG22)
  - Max. cable length: 20 m
- Modbus RS485:  
Cable type A according to EIA/TIA-485 standard is recommended
- Current output 4 to 20 mA:  
Standard installation cable

### Ground cable requirements

Copper wire: at least 6 mm<sup>2</sup> (0.0093 in<sup>2</sup>)

### Connecting cable requirements



Connecting cable only necessary for remote version.

Electrode cable	Coil current cable
<p style="text-align: right; font-size: small;">A0054679</p> <p>1 GND (green): Ground-wire 0.38 mm<sup>2</sup> (AWG 21)</p> <p>2 E1 (brown): "Electrode E1" - core 0.38 mm<sup>2</sup> (AWG 21)</p> <p>3 E (yellow): grounding 0.38 mm<sup>2</sup> (AWG 21)</p> <p>4 E2 (white): "Electrode E2" - core 0.38 mm<sup>2</sup> (AWG 21)</p> <p>a Outer jacket</p> <p>b Cable shield</p> <p>c Core jacket</p> <p>d Core shield</p> <p>e Core insulation</p> <p>f Core</p>	<p style="text-align: right; font-size: small;">A0054680</p> <p>1 ER+ (black): coil current core 0.75 mm<sup>2</sup> (AWG 18)</p> <p>2 ER- (black): coil current core 0.75 mm<sup>2</sup> (AWG 18)</p> <p>3 NC (yellow-green): not connected 0.75 mm<sup>2</sup> (AWG 18)</p> <p>a Outer jacket</p> <p>b Cable shield</p> <p>c Core insulation</p> <p>d Core</p> <p>e Core reinforcement</p>

**i Armored connecting cable**

Armored connecting cables with additional, metal reinforcing braid can be ordered from Endress+Hauser. Armored connecting cables are used:

- 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

**Electrode cable**

<b>Design</b>	3×0.38 mm <sup>2</sup> (21 AWG) with common, braided copper shield (∅ ~ 9.5 mm (0.37 in)) and individual shielded cores
<b>Conductor resistance</b>	≤ 50 Ω/km (0.015 Ω/ft)
<b>Capacitance: core/shield</b>	≤ 420 pF/m (128 pF/ft)
<b>Cable length</b>	Depends on the medium conductivity: maximum 200 m (656 ft)
<b>Cable lengths (available for order)</b>	5 m (15 ft), 10 m (30 ft), 20 m (60 ft) or variable length: maximum 200 m (656 ft) Armored cables: variable length up to maximum 200 m (656 ft)
<b>Operating temperature</b>	-20 to +80 °C (-4 to +176 °F)

**Coil current cable**

<b>Design</b>	3×0.75 mm <sup>2</sup> (18 AWG) with common, braided copper shield (∅ ~ 9.5 mm (0.37 in)) and individual shielded cores
<b>Conductor resistance</b>	≤ 37 Ω/km (0.011 Ω/ft)
<b>Capacitance: core/shield</b>	≤ 120 pF/m (37 pF/ft)
<b>Cable length</b>	Depends on the medium conductivity, max. 200 m (656 ft)
<b>Cable lengths (available for order)</b>	5 m (15 ft), 10 m (30 ft), 20 m (60 ft) or variable length up to max. 200 m (656 ft) Armored cables: variable length up to max. 200 m (656 ft)
<b>Operating temperature</b>	-20 to +80 °C (-4 to +176 °F)
<b>Test voltage for cable insulation</b>	≤ AC 1433 V rms 50/60 Hz or ≥ DC 2026 V

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## Performance characteristics

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Reference operating conditions	34
Maximum measurement error	34
Repeatability	34
Influence of ambient temperature	34

### Reference operating conditions

- Error limits based on ISO 20456:2017
- Water, typically: +15 to +45 °C (+59 to +113 °F); 0.5 to 7 bar (7.3 to 101 psi)
- Data as indicated in the calibration protocol
- Accuracy based on accredited calibration rigs according to ISO 17025

**i** To obtain measured errors, use the *Applicator* sizing tool → *Service-specific accessory*, 90

### Maximum measurement error

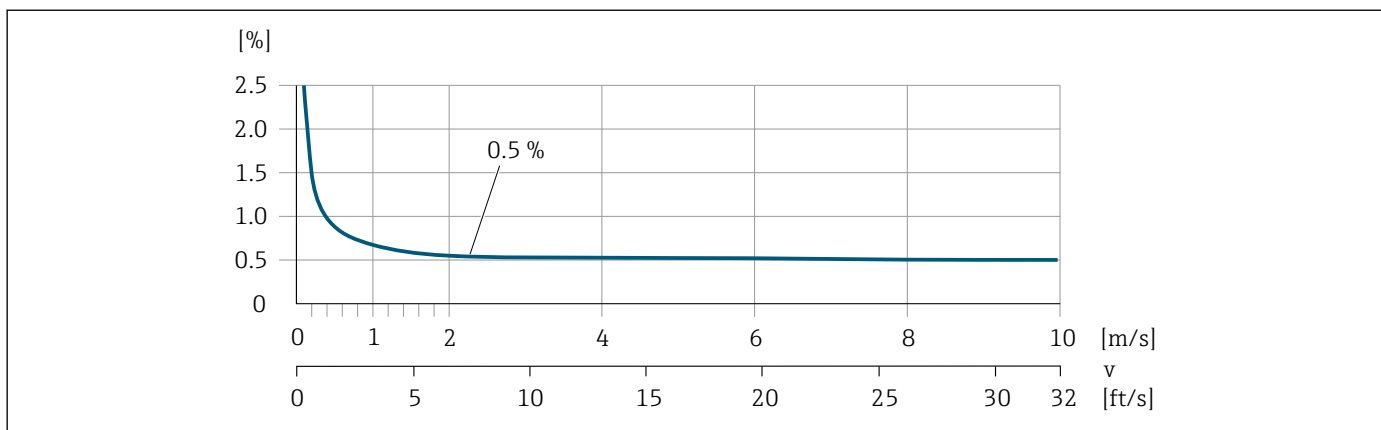
o. r. = of reading

### Maximum permissible error under reference operating conditions

#### Volume flow

±0.5 % o. r. ±1 mm/s (±0.04 in/s)

**i** Fluctuations in the supply voltage have no effect within the specified range.



**8** Maximum measurement error in % o.r.

### Accuracy of outputs

Current output	±5 µA
Pulse/frequency output	Max. ±100 ppm o. r. (across the entire ambient temperature range)

### Repeatability

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

### Influence of ambient temperature

Current output	Temperature coefficient max. 1 µA/°C
Pulse/frequency output	No additional effect. Is included in the accuracy.

# Installation

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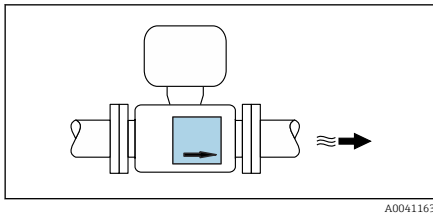
Installation conditions

## Installation conditions

### Flow direction

Install the device in the direction of flow.

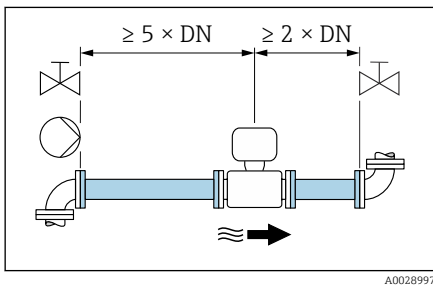
**i** Note the direction of arrow on the nameplate.



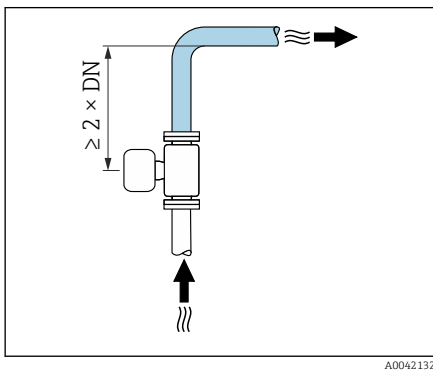
### Installation with inlet runs and outlet runs

Ensure straight, undisturbed inlet and outlet runs.

**i** To avoid negative pressure and to comply with accuracy specifications, install the sensor upstream from assemblies that produce turbulence (e.g. valves, T-sections) and downstream from pumps → *Installation near pumps*, 39.

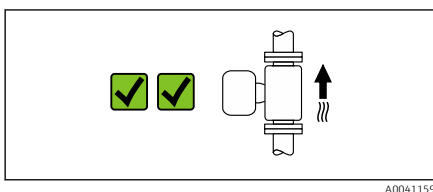


Keep a sufficient distance to the next pipe elbow.



### Orientations

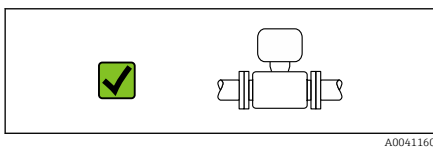
**Vertical orientation, upward direction of flow**  
For all applications.

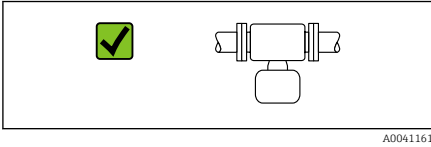


**Horizontal orientation, transmitter at top**

This orientation is suitable for the following applications:

For medium and low process temperatures, in order to maintain the minimum ambient temperature for the transmitter.



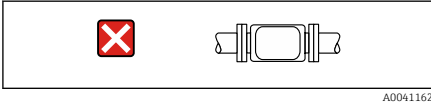


**Horizontal orientation, transmitter at bottom**

This orientation is suitable for the following applications:

- For medium and high process temperatures, in order to maintain the maximum ambient temperature for the transmitter.
- To prevent the electronics module from overheating in the case of a sharp rise in temperature (e.g. CIP or SIP processes), install the measuring instrument with the transmitter component pointing downwards.

This orientation is not suitable for the following applications:  
If empty pipe detection is to be used.

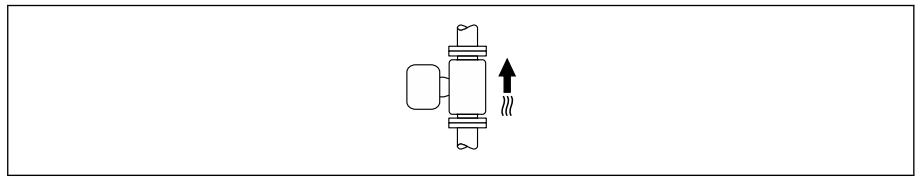


**Horizontal orientation, transmitter at side**

This orientation is not suitable

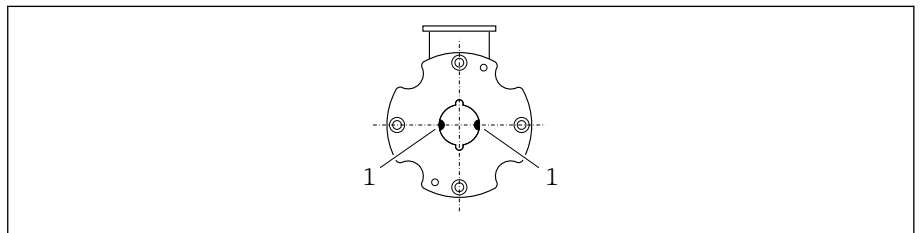
*Vertical*

Optimum for self-emptying pipe systems.



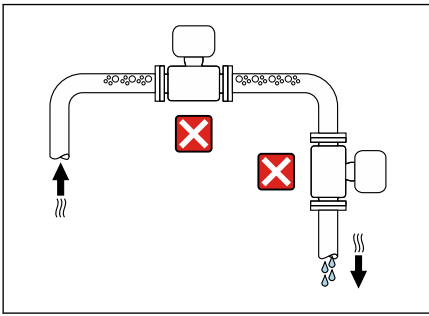
*Horizontal*

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



1 Measuring electrodes for signal detection

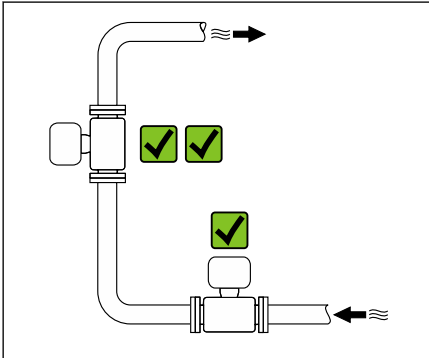
### Mounting locations



A0042131

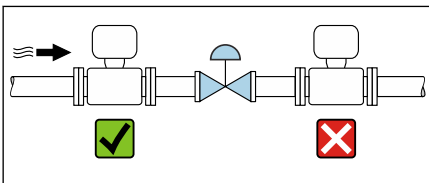
- Do not install the device at the highest point of the pipe.
- Do not install the device upstream from a free pipe outlet in a down pipe.

The device should ideally be installed in an ascending pipe.



A0042317

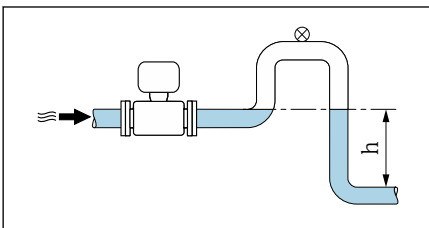
### Installation near control valves



A0041091

Install the device in the direction of flow upstream from the control valve.

### Installation upstream from a down pipe



A0041089

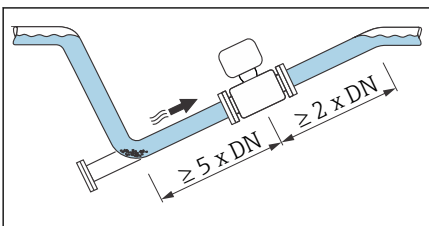
#### NOTICE

#### Negative pressure in the measuring pipe can damage the liner!

- ▶ If installing upstream from down pipes with a length  $h \geq 5$  m (16.4 ft): install a siphon with a vent valve downstream from the device.

**i** This arrangement prevents the flow of liquid stopping in the pipe and air entrainment.

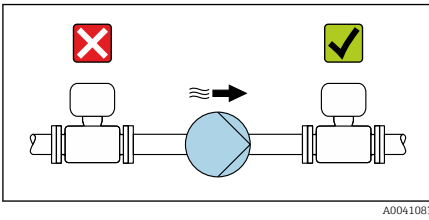
### Installation with partially filled pipes



A0041088

- Partially filled pipes with a gradient require a drain-type configuration.
- The installation of a cleaning valve is recommended.

### Installation near pumps



#### NOTICE

**A vacuum in the measuring tube can damage the liner!**

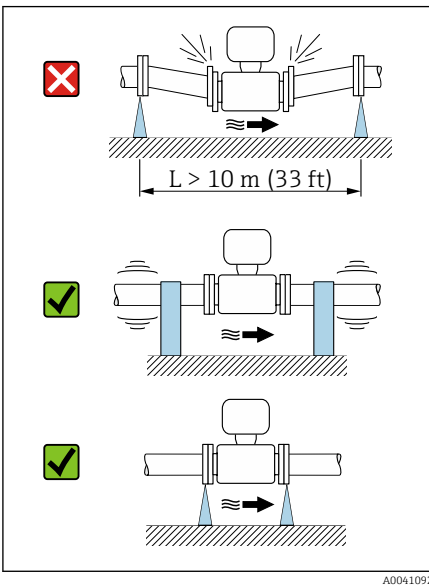
- ▶ Install the device in the direction of flow downstream from the pump.
- ▶ Install pulsation dampers if reciprocating, diaphragm or peristaltic pumps are used.



Information on the measuring system's resistance to vibration and shock  
 → *Vibration resistance and shock resistance*, 42

### Pipe vibrations

A remote version is recommended in the event of strong pipe vibrations.



#### NOTICE

**Pipe vibrations can damage the device!**

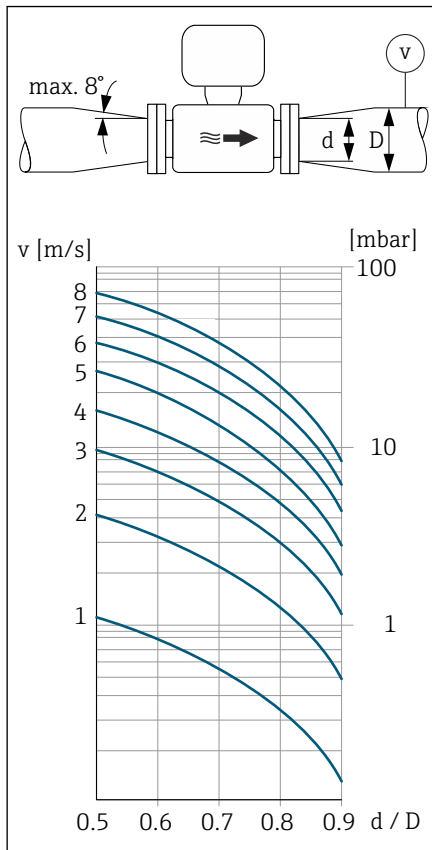
- ▶ Do not expose the device to strong vibrations.
- ▶ Support the pipe and fix it in place.
- ▶ Support the device and fix it in place.
- ▶ Mount the sensor and transmitter separately.

### Adapters

Suitable adapters (double-flange reducers) can be used to install the sensor in larger-diameter pipes. The resulting higher rate of flow improves measuring accuracy with very slow-moving media.

**i** The nomogram shown here can be used to calculate the pressure loss caused by reducers and expanders. It only applies to liquids with a viscosity similar to that of water.

1. Calculate the ratio of the diameters  $d/D$ .
2. Determine the flow velocity after the reduction.
3. From the chart, determine the pressure loss as a function of the flow velocity  $v$  and the  $d/D$  ratio.



A0041086

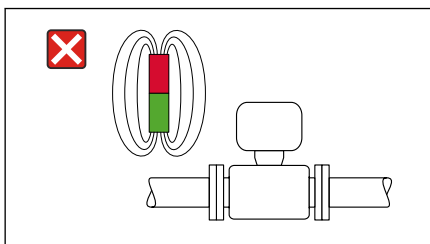
### Seals

Note the following when installing seals:

- Use seals with a hardness rating of 70° Shore.
- For DIN flanges: only install seals according to DIN EN 1514-1.

### Magnetism and static electricity

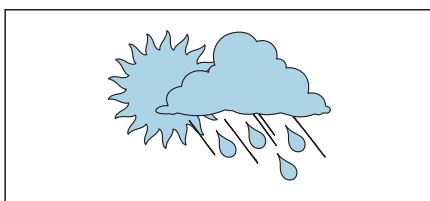
Do not install the device near magnetic fields, e.g. Engines, transformers.



A0042152

### Outdoor use

- Avoid exposure to direct sunlight.
- Install in a location protected from sunlight.
- Avoid direct exposure to weather conditions.
- Use a weather protection cover → *Transmitter*, 88.




A0023989

## Environment

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Ambient temperature range	42
Storage temperature	42
Relative humidity	42
Operating height	42
Degree of protection	42
Vibration resistance and shock resistance	42
Electromagnetic compatibility (EMC)	43

### Ambient temperature range

<b>Transmitter</b>	-40 to +60 °C (-40 to +140 °F)
<b>Local display</b>	-20 to +60 °C (-4 to +140 °F) The readability of the display may be impaired at temperatures outside the temperature range.
<b>Sensor</b>	-20 to +60 °C (-4 to +140 °F)
<b>Liner</b>	Do not exceed or fall below the permitted temperature range of the liner → <i>Medium temperature range</i> , 46.  Dependency of ambient temperature on medium temperature → <i>Medium temperature range</i> , 46

### Storage temperature

The storage temperature corresponds to the ambient temperature range of the transmitter and sensor.

### Relative humidity

The device is suitable for use in outdoor and indoor areas with a relative humidity of 5 to 95%.

### Operating height

According to EN 61010-1

- Without overvoltage protection: ≤ 2 000 m
- With overvoltage protection: > 2 000 m (e.g. Endress+Hauser HAW series)

### Degree of protection

<b>Transmitter</b>	<ul style="list-style-type: none"> <li>▪ IP66/67, Type 4X enclosure, suitable for pollution degree 4</li> <li>▪ Open housing: IP20, Type 1 enclosure, suitable for pollution degree 2</li> </ul>
<b>Sensor</b>	IP66/67, Type 4X enclosure, suitable for pollution degree 4

### Vibration resistance and shock resistance

#### Compact version

<b>Vibration, sinusoidal</b> Following IEC 60068-2-6	2 to 8.4 Hz	3.5 mm peak
	8.4 to 2 000 Hz	1 g peak
<b>Vibration, broad-band random</b> Following IEC 60068-2-64	10 to 200 Hz	0.003 g <sup>2</sup> /Hz
	200 to 2 000 Hz	0.001 g <sup>2</sup> /Hz (1.54 g rms)
<b>Shocks, half-sine</b> Following IEC 60068-2-27	6 ms 30 g	

#### Shock

Due to rough handling similar to IEC 60068-2-31.

#### Remote version (sensor)

<b>Vibration, sinusoidal</b> Following IEC 60068-2-6	2 to 8.4 Hz	7.5 mm peak
	8.4 to 2 000 Hz	1 g peak
<b>Vibration, broad-band random</b> Following IEC 60068-2-6	10 to 200 Hz	0.01 g <sup>2</sup> /Hz
	200 to 2 000 Hz	0.003 g <sup>2</sup> /Hz (2.7 g rms)

**Shocks, half-sine**  
Following IEC 60068-2-6

6 ms 50 g

**Shock**

Due to rough handling similar to IEC 60068-2-31.

**Electromagnetic compatibility (EMC)**

As per IEC/EN 61326 and

- HART, Modbus RS485: NAMUR Recommendation NE 21
- IO-Link: IO-Link Interface and System Specification



For more information: Declaration of Conformity

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## Process

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Medium temperature range	46
Conductivity	46
Flow limit	46
Pressure/temperature ratings	47
Pressure tightness	47
Pressure loss	47

## Medium temperature range

0 to +60 °C (+32 to +140 °F)

## Conductivity

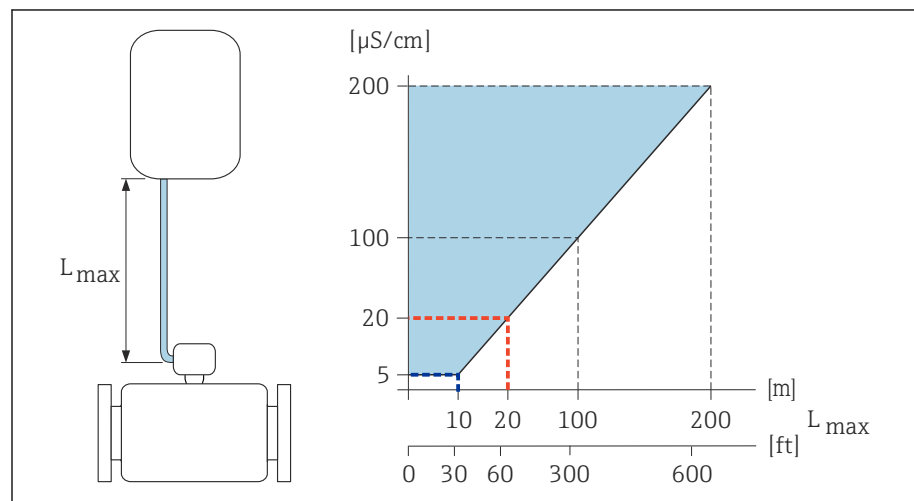
The minimum conductivity is:

- 5  $\mu\text{S}/\text{cm}$  for liquids in general
- 20  $\mu\text{S}/\text{cm}$  for demineralized water

The following basic conditions must be observed for  $< 20 \mu\text{S}/\text{cm}$ :

- Order code 013 for "Functionality", option D "Extended transmitter" and higher output signal damping is recommended for values under  $20 \mu\text{S}/\text{cm}$ .
- Observe the maximum permitted cable length  $L_{\text{max}}$ . This length is determined by the conductivity of the medium.
- With order code 013 "Functionality", option A "Standard transmitter" and empty pipe detection (EPD) switched on, the minimum conductivity is  $20 \mu\text{S}/\text{cm}$ .
- With order code 013 "Functionality", option A "Standard transmitter" - remote version, empty pipe detection may not be activated if  $L_{\text{max}} > 20 \text{ m}$ .

**i** Note that in the case of the remote version, the minimum conductivity depends on the cable length.



A0047485

### 9 Permitted length of connecting cable

Colored area = permitted range

$L_{\text{max}}$  = length of connecting cable in [m] ([ft])

[ $\mu\text{S}/\text{cm}$ ] = medium conductivity

Red line = order code 013 "Functionality", option A "Standard transmitter"

Blue line = order code 013 "Functionality", option D "Extended transmitter"

## Flow limit

Pipe diameter and flow rate determine the nominal diameter of the sensor.

**i** The flow velocity is increased by reducing the sensor nominal diameter.

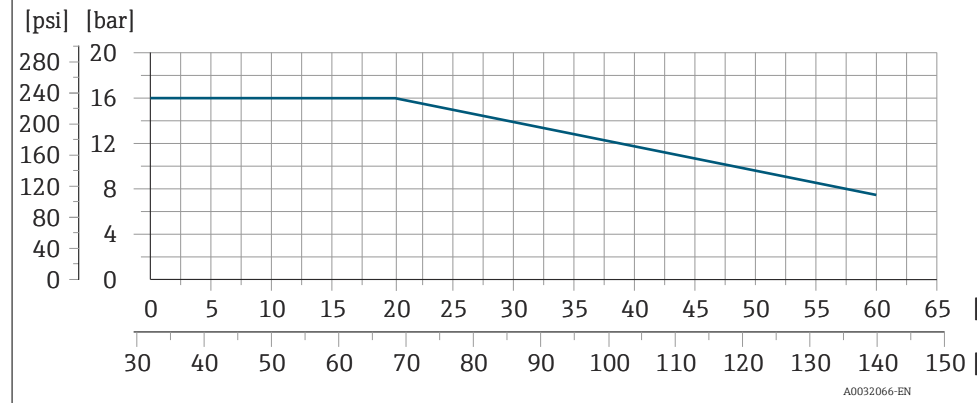
2 to 3 m/s (6.56 to 9.84 ft/s)	Optimum flow velocity
$v < 2 \text{ m/s}$ (6.56 ft/s)	For abrasive media, e.g. potter's clay, lime milk, ore slurry
$v > 2 \text{ m/s}$ (6.56 ft/s)	For media producing buildup, e.g. wastewater sludge

### Pressure/temperature ratings

Permitted process pressure

Fixed flange similar to EN 1092-1  
 Fixed flange similar to ASME B16.5  
 Fixed flange similar to JIS B2220

Stainless steel



### Pressure tightness

Measuring tube: 0 mbar abs. (0 psi abs.) at a medium temperature of  $\leq +60\text{ °C}$  ( $+140\text{ °F}$ )

### Pressure loss

- No pressure loss: transmitter installed in a pipe with the same nominal diameter.
- Pressure loss information when adapters are used → *Adapters*, 40



## Mechanical construction

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Measuring tube specification	51
Materials	52
Mounting bolts	53
Fitted electrodes	53
Process connections	54

## Weight

All values refer to devices with flanges with a standard pressure rating. Weight data are guideline values. The weight may be lower than indicated depending on the pressure rating and design.

### Transmitter remote version

- Polycarbonate: 1.4 kg (3.1 lbs)
- Aluminum: 2.4 kg (5.3 lbs)

### Sensor remote version

Aluminum sensor connection housing: see the information in the following table.

## Compact version

### Weight in SI units

DN		Weight
[mm]	[in]	[kg]
25	1	3.20
40	1½	3.80
50	2	4.60
65	–	5.40
80	3	6.40
100	4	9.10

### Weight in US units

DN		Weight
[mm]	[in]	[lbs]
25	1	7
40	1½	8
50	2	10
65	–	12
80	3	14
100	4	20

## Remote version

### Weight in SI units

DN		Weight
[mm]	[in]	[kg]
25	1	2.5
40	1½	3.1
50	2	3.9
65	–	4.7
80	3	5.7
100	4	8.4

*Weight in US units*

DN		Weight
[mm]	[in]	[kg]
25	1	6
40	1½	7
50	2	9
65	–	10
80	3	13
100	4	19

**Measuring tube specification**

**Wafer version**

*Pressure rating EN (DIN), PN16*

DN		Mounting bolts			Centering sleeves		Measuring tube	
[mm]	[in]		[mm]	[in]	Length		Internal diameter	
					[mm]	[in]	[mm]	[in]
25	1	4 × M12 ×	145	5.71	54	2.13	24	0.94
40	1½	4 × M16 ×	170	6.69	68	2.68	38	1.50
50	2	4 × M16 ×	185	7.28	82	3.23	50	1.97
65 <sup>1)</sup>	–	4 × M16 ×	200	7.87	92	3.62	60	2.36
65 <sup>2)</sup>	–	8 × M16 ×	200	7.87	– <sup>3)</sup>	–	60	2.36
80	3	8 × M16 ×	225	8.86	116	4.57	76	2.99
100	4	8 × M16 ×	260	10.24	147	5.79	97	3.82

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

*Pressure rating ASME, Class 150*

DN		Mounting bolts			Centering sleeves		Measuring tube	
[mm]	[in]		[mm]	[in]	Length		Internal diameter	
					[mm]	[in]	[mm]	[in]
25	1	4 × UNC ½" ×	145	5.70	– <sup>1)</sup>	–	24	0.94
40	1½	4 × UNC ½" ×	165	6.50	–	–	38	1.50
50	2	4 × UNC 5/8" ×	190.5	7.50	–	–	50	1.97
80	3	8 × UNC 5/8" ×	235	9.25	–	–	76	2.99
100	4	8 × UNC 5/8" ×	264	10.4	147	5.79	97	3.82

- 1) A centering sleeve is not required. The device is centered directly via the sensor housing.

*Pressure rating JIS, 10K*

DN		Mounting bolts			Centering sleeves		Measuring tube	
[mm]	[in]		[mm]	[in]	Length		Internal diameter	
					[mm]	[in]	[mm]	[in]
25	1	4 × M16 ×	170	6.69	54	2.13	24	0.94
40	1 ½	4 × M16 ×	170	6.69	68	2.68	38	1.50
50	2	4 × M16 ×	185	7.28	– <sup>1)</sup>	–	50	1.97
65	–	4 × M16 ×	200	7.87	–	–	60	2.36
80	3	8 × M16 ×	225	8.86	–	–	76	2.99
100	4	8 × M16 ×	260	10.24	–	–	97	3.82

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

**Threaded connection***Pressure rating EN (DIN), PN16*

DN		Threaded connection	Wrench size		Measuring tube	
[mm]	[in]		Length		Internal diameter	
			[mm]	[in]	[mm]	[in]
25	1	G 1"	28	1.1	24	0.94
40	1 ½	G 1 ½"	50	1.97	38	1.50
50	2	G 2"	60	2.36	50	1.97

*Pressure rating ASME, Class 150*

DN		Threaded connection	Wrench size		Measuring tube	
[mm]	[in]		Length		Internal diameter	
			[mm]	[in]	[mm]	[in]
25	1	NPT 1"	28	1.1	24	0.94
40	1 ½	NPT 1 ½"	50	1.97	38	1.50
50	2	NPT 2"	60	2.36	50	1.97

**Materials****Transmitter housing**

Order code for "Housing"

- Option A: Compact, coated aluminum
- Option N: Remote, polycarbonate
- Option P: Remote, aluminum, coated

Window material

- Order code for "Housing", option A: glass
- Order code for "Housing", option N: polycarbonate
- Order code for "Housing", option P: glass

Neck adapter

Order code for "Housing", option A, : Aluminum, coated

**Sensor connection housing**

Order code for "Sensor connection housing"

Option A: aluminum, AlSi10Mg, coated

Cable glands and entries	
Cable gland M20×1.5	Plastic
Adapter for cable entry with G ½" or NPT ½" female thread	Nickel-plated brass
Connecting cable for remote version	
	Electrode and coil current cable: PVC cable with copper shield
Sensor housing	
	Aluminum, AlSi10Mg, coated
Measuring tube	
	Polyamide
Liner	
	Polyamide
Electrodes	
	Stainless steel: 1.4435 (316L)
Seals	
	EPDM
Process connections	
EN 1092-1 (DIN 2501)	1.4301/304
ASME B16.5	1.4301/304
JIS B2220	1.4301/304
DIN ISO 228, G" external thread	1.4301/304
ASME B1.20, NPT" external thread	1.4301/304
Accessories	
Weather protection cover	Stainless steel, 1.4404 (316L)
Pipe mounting kit (welding jig)	Stainless steel 1.4301 (304)
Wall mounting kit	Stainless steel 1.4301 (304)

### Mounting bolts

#### Tensile strength

- Galvanized steel mounting bolts: strength category 5.6 or 5.8
- Stainless steel mounting bolts: strength category A2-70

### Fitted electrodes

Standard electrodes:  
Measuring electrodes

### Process connections

- EN 1092-1 (DIN 2501)
- ASME B16.5
- JIS B2220
- DIN ISO 228, G external thread
- ASME B1.20, NPT external thread

## Dimensions in SI units

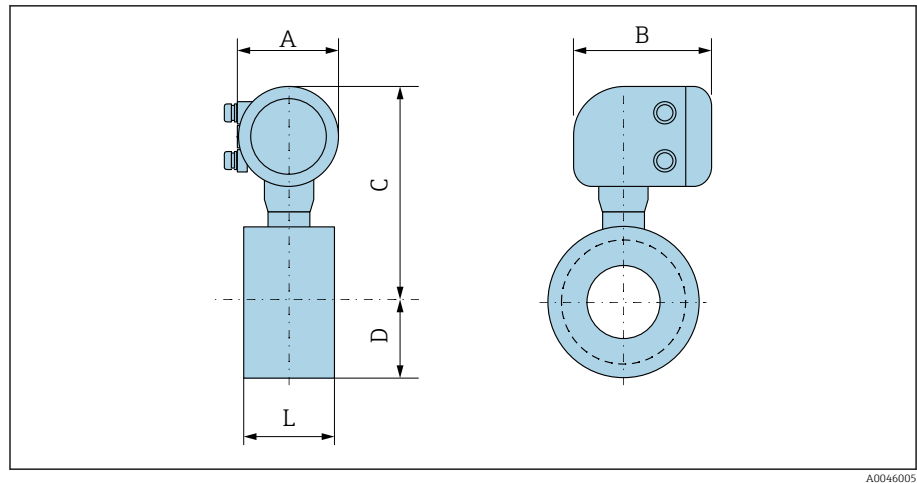
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<b>Compact version</b>	<b>56</b>
Wafer version	56
Threaded version	57
<b>Remote version</b>	<b>58</b>
Transmitter remote version	58
Sensor remote version	59
<b>Flange connections</b>	<b>61</b>
Flange similar to EN 1092-1: PN 16	61
Flange similar to ASME B16.5: Class 150	62
Flange JIS B2220: 10K	63
<b>Couplings</b>	<b>64</b>
External thread: ISO 228	64
External thread: ASME B1.20.1	64
<b>Accessories</b>	<b>65</b>
Weather protection cover	65

### Compact version

### Wafer version

Order code for "Housing", option A "Compact, aluminum, coated"



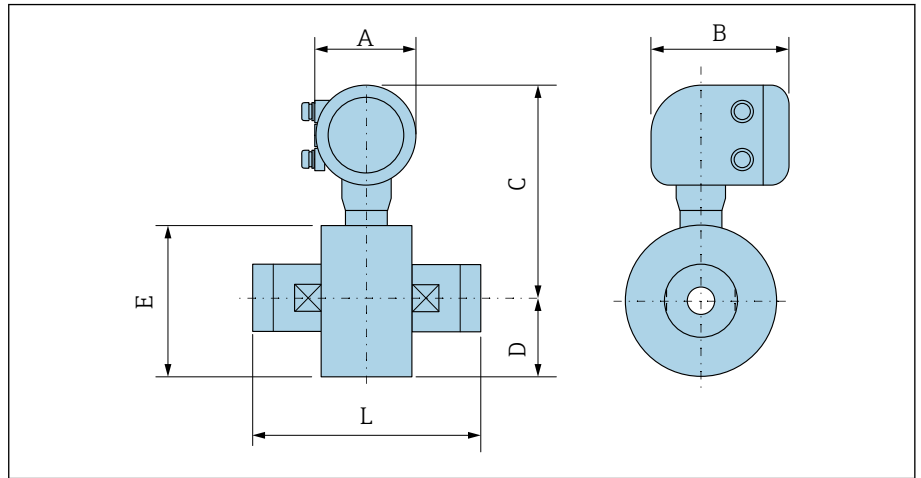
A0046005

DN		A <sup>1)</sup>	B	C	D	L
[mm]	[in]	[mm]	[mm]	[mm]	[mm]	[mm]
25	1	139	178	259	43	55
40	1 ½	139	178	270	52	69
50	2	139	178	281	62	83
65	-	139	178	291	70	93
80	-	139	178	295	76	117
-	3	139	178	295	76	117
100	4	139	178	309	89	148

1) Depending on the cable entry used: values up to +30 mm

**Threaded version**

*Order code for "Housing", option A "Compact, aluminum, coated"*



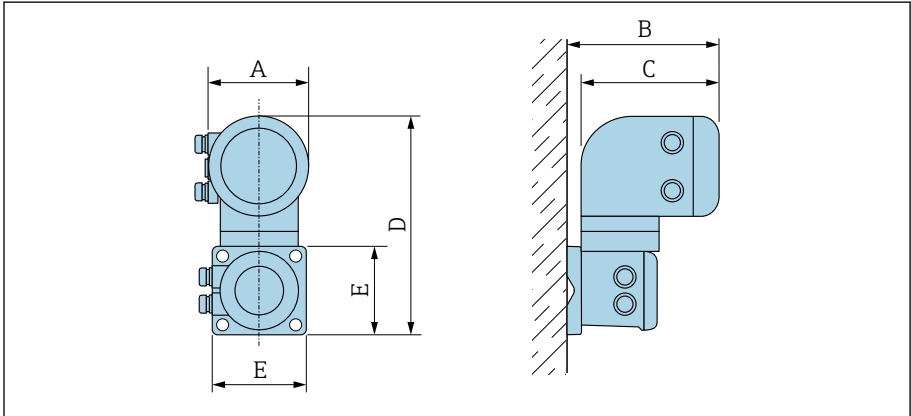
A0046007

DN		A <sup>1)</sup>	B	C	D	E	L
[mm]	[in]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
25	1	139	178	259	43	86	110
40	1 ½	139	178	270	52	104	140
50	2	139	178	281	62	124	200

1) Depending on the cable entry used: values up to +30 mm

Remote version

Transmitter remote version



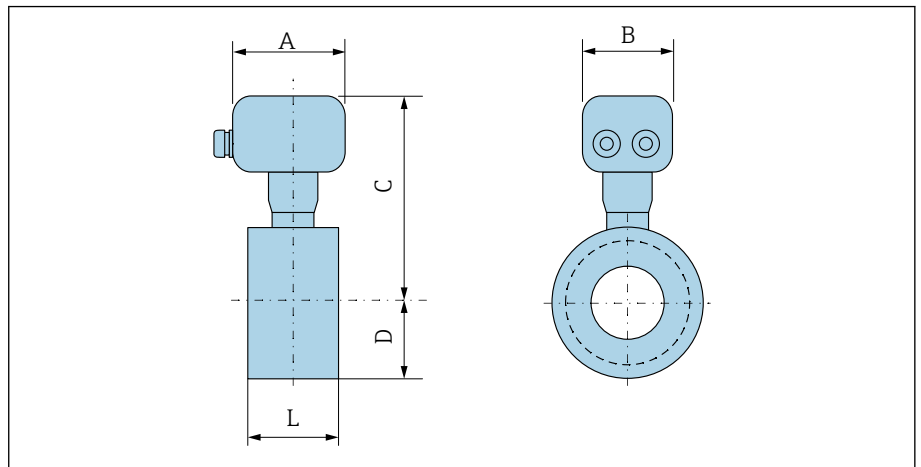
A0042715

Order code for "Housing"	A <sup>1)</sup> [mm]	B [mm]	C [mm]	D [mm]	E [mm]
Option N "Remote, polycarbonate"	132	187	172	307	130
Option P and T "Remote, coated aluminum"	139	185	178	309	130

1) Depending on the cable entry used: values up to + 30 mm

Sensor remote version

Wafer version

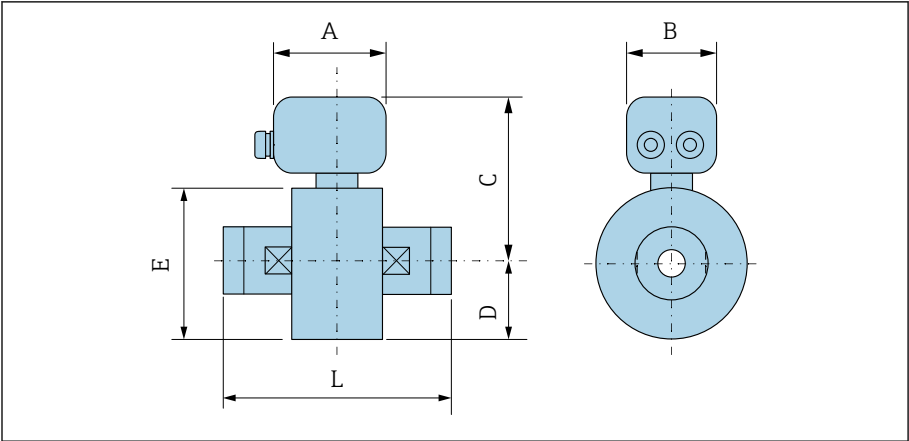


A0045564

DN		A <sup>1)</sup>	B	C	D	L
[mm]	[in]	[mm]	[mm]	[mm]	[mm]	[mm]
25	1	113	112	199	43	55
40	1 ½	113	112	210	52	69
50	2	113	112	221	62	83
65	-	113	112	231	70	93
80	-	113	112	235	76	117
-	3	113	112	235	76	117
100	4	113	112	249	89	148

1) Depending on the cable entry used: values up to +30 mm

Threaded connection



A0045807

DN		A <sup>1)</sup>	B	C	D	E	L
[mm]	[in]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
25	1	113	112	199	43	86	110
40	1 ½	113	112	210	52	104	140
50	2	113	112	221	62	124	200

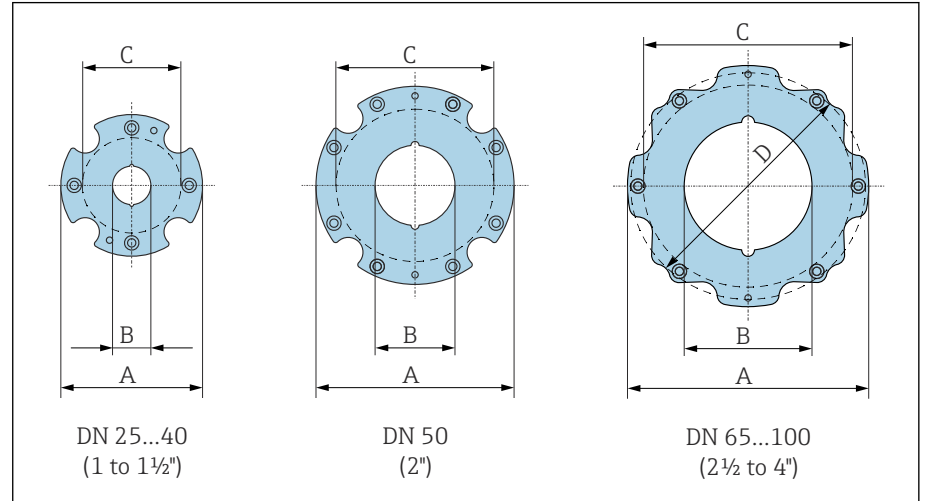
1) Depending on the cable entry used: values up to +30 mm

## Flange connections

### Flange similar to EN 1092-1: PN 16

Order code for "Process connection", option D3Z

Dimension B: Internal diameter depends on the liner → *Measuring tube specification*, 51

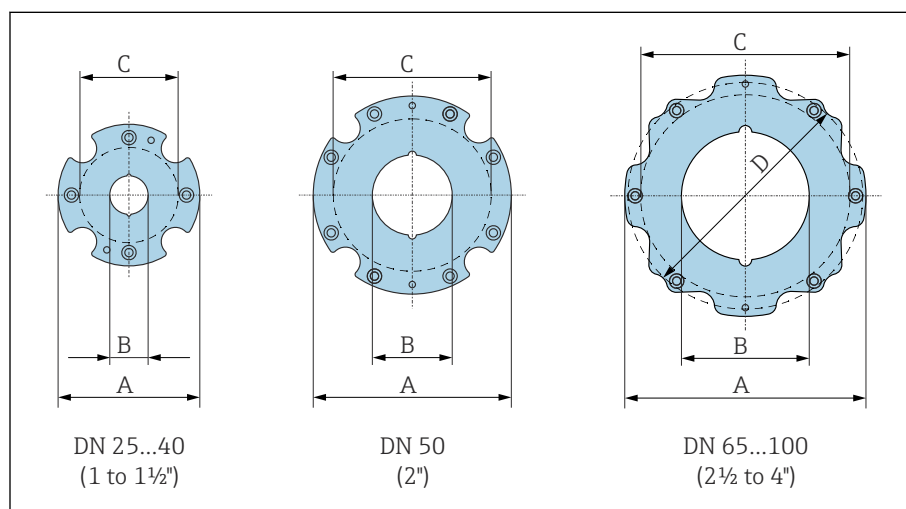


DN [mm]	A [mm]	B [mm]	C <sup>1)</sup> [mm]
25	86	24	68
40	105	38	87
50	124	50	106
65	139	60	125
80	151	76	135
100	179	97	160

1) Max. Ø seals

**Flange similar to ASME B16.5: Class 150**

Order code for "Process connection", option A1Z

Dimension B: internal diameter depends on the liner → *Measuring tube specification*, 51

A0046000

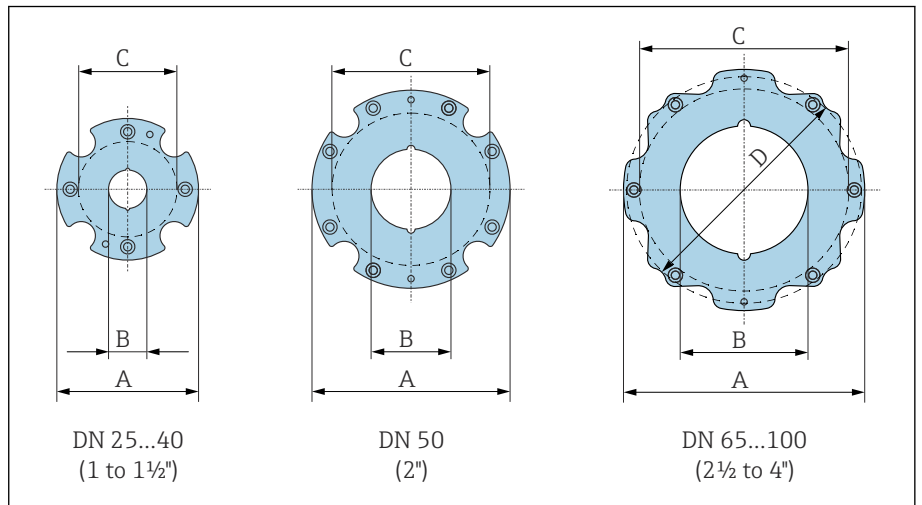
DN [in]	A [mm]	B [mm]	C <sup>1)</sup> [mm]	D [mm]
1	86	24	68	-
1 ½	105	38	87	-
2	124	50	106	-
3	151	76	135	138
4	179	97	160	-

1) Max. Ø seals

**Flange JIS B2220: 10K**

Order code for "Process connection", option N3Z

Mass B: internal diameter depends on the liner → *Measuring tube specification*, 51



A0046000

DN [mm]	A [mm]	B [mm]	C <sup>1)</sup> [mm]
25	86	24	68
40	105	38	87
50	124	50	106
65	139	60	125
80	151	76	135
100	179	97	160

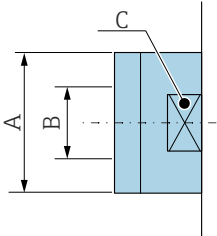
1) Max. Ø seals

**Couplings**

**External thread: ISO 228**

Order code for "Process connection", option I4S

Mass B: internal diameter depends on the liner → *Measuring tube specification*, 51



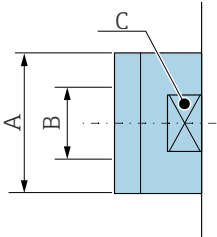
A0046008

DN [mm]	A [in]	B [mm]	C [mm]
25	G 1"	22	28
40	G 1 ½"	34.4	50
50	G 2"	43	60

**External thread: ASME B1.20.1**

Order code for "Process connection", option I5S

Mass B: internal diameter depends on the liner → *Measuring tube specification*, 51

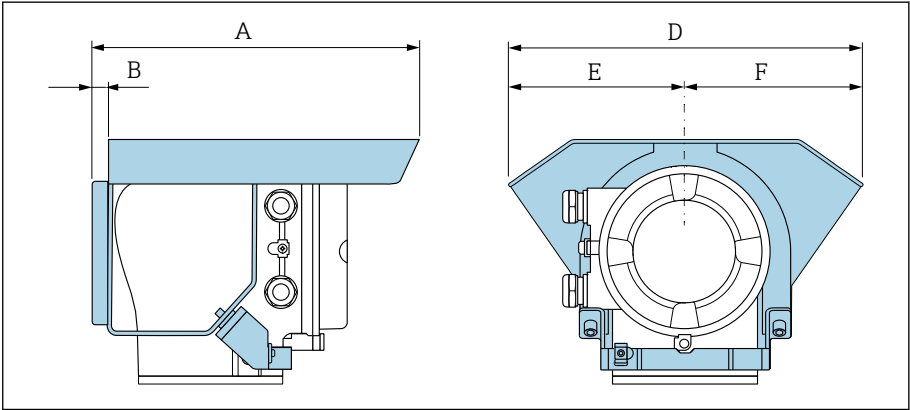


A0046008

DN [in]	A [in]	B [mm]	C [mm]
1	NPT 1"	22	28
1 ½	NPT 1 ½"	34.4	50
2	NPT 2"	43	60

Accessories

Weather protection cover



A0042332

A [mm]	B [mm]	D [mm]	E [mm]	F [mm]
257	12	280	140	140

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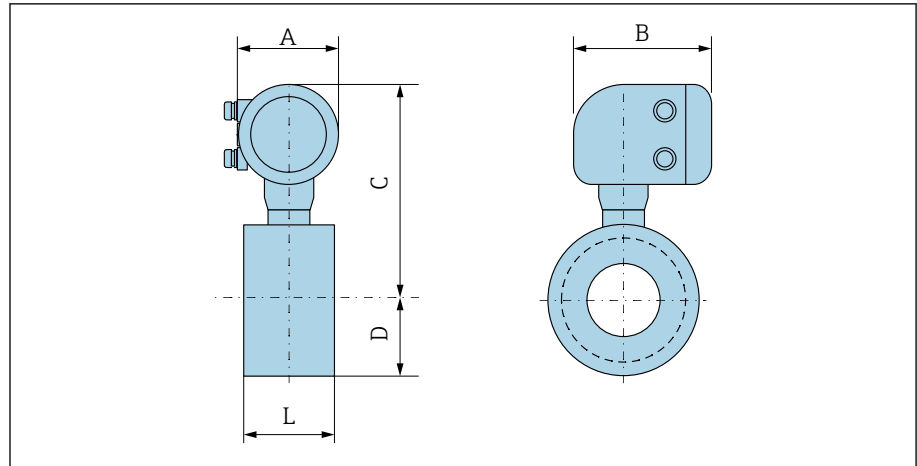
## Dimensions in US units

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<b>Compact version</b>	<b>68</b>
Wafer version	68
Threaded version	69
<b>Remote version</b>	<b>70</b>
Transmitter remote version	70
Sensor remote version	71
<b>Flange connections</b>	<b>73</b>
Flange similar to ASME B16.5: Class 150	73
<b>Couplings</b>	<b>74</b>
External thread: ASME B1.20.1	74
<b>Accessories</b>	<b>75</b>
Weather protection cover	75

**Compact version****Wafer version**

Order code for "Housing", option A "Compact, aluminum, coated"



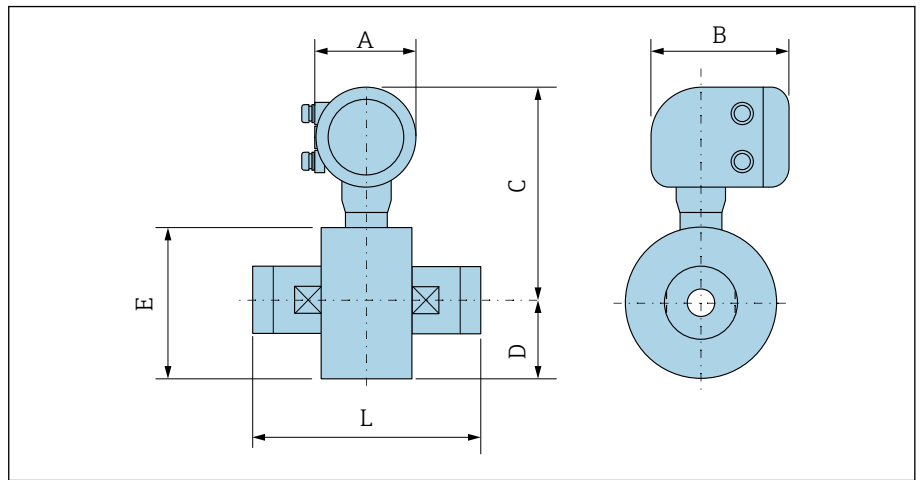
A0046005

DN [in]	A <sup>1)</sup> [in]	B [in]	C [in]	D [in]	L [in]
1	5.47	7.01	10.2	1.69	2.17
1 ½	5.47	7.01	10.63	2.05	2.72
2	5.47	7.01	11.06	2.44	3.27
3	5.47	7.01	11.61	2.99	4.61
4	5.47	7.01	12.17	3.5	5.83

1) Depending on the cable entry used: values up to +1.18 in

**Threaded version**

*Order code for "Housing", option A "Compact, aluminum, coated"*

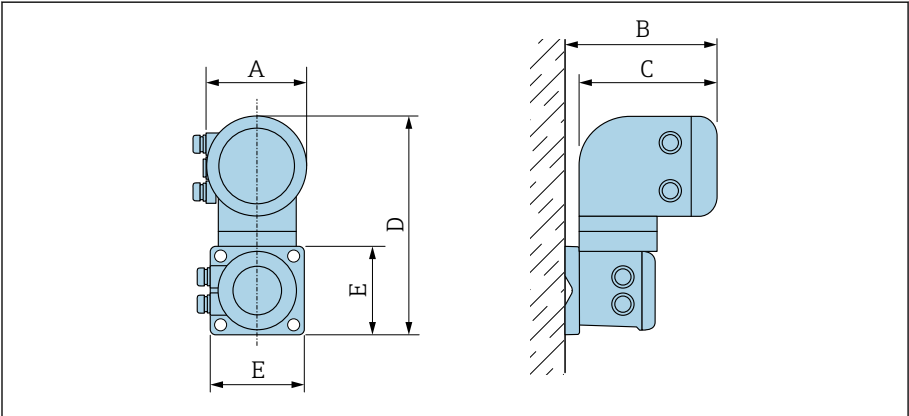


DN [in]	A <sup>1)</sup> [in]	B [in]	C [in]	D [in]	E [in]	L [in]
1	5.47	7.01	10.2	1.69	3.39	4.33
1 ½	5.47	7.01	10.63	2.05	4.09	5.51
2	5.47	7.01	11.06	2.44	4.88	7.87

1) Depending on the cable entry used: values up to +1.18 in

Remote version

Transmitter remote version



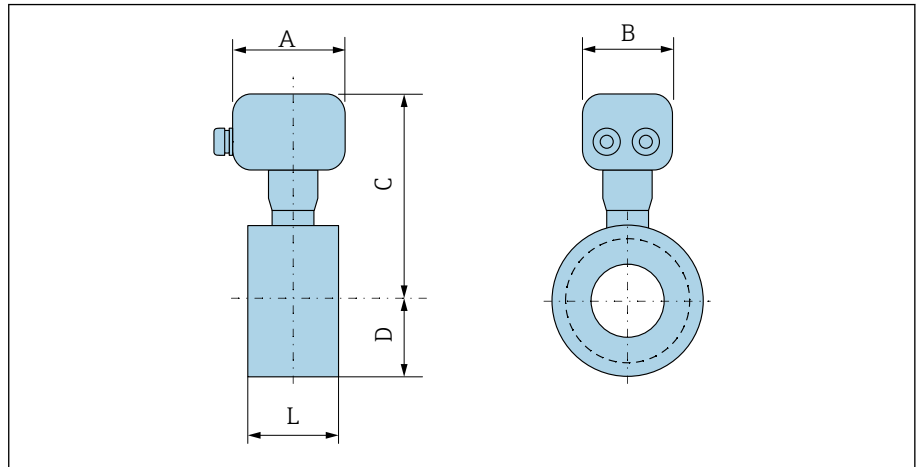
A0042715

Order code for "Housing"	A <sup>1)</sup> [in]	B [in]	C [in]	D [in]	E [in]
Option N "Remote, polycarbonate"	5.2	7.36	6.77	12.09	5.12
Option P and T "Remote, coated aluminum"	5.47	7.28	7.01	12.17	5.12

1) Depending on the cable entry used: values up to +1.18 in

Sensor remote version

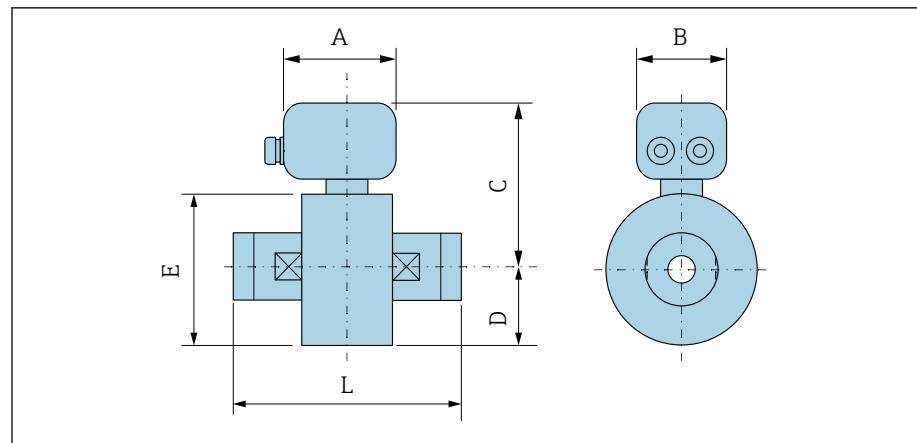
Wafer version



A0045564

DN [in]	A <sup>1)</sup> [in]	B [in]	C [in]	D [in]	L [in]
1	4.45	4.41	7.83	1.69	2.17
1 ½	4.45	4.41	8.27	2.05	2.72
2	4.45	4.41	8.7	2.44	3.27
3	4.45	4.41	9.25	2.99	4.61
4	4.45	4.41	9.8	3.5	5.83

1) Depending on the cable entry used: values up to +1.18 in

*Threaded connection*

A0045807

DN [in]	A <sup>1)</sup> [in]	B [in]	C [in]	D [in]	E [in]	L [in]
1	4.45	4.41	7.83	1.69	3.39	4.33
1 ½	4.45	4.41	8.27	2.05	4.09	5.51
2	4.45	4.41	8.7	2.44	4.88	7.87

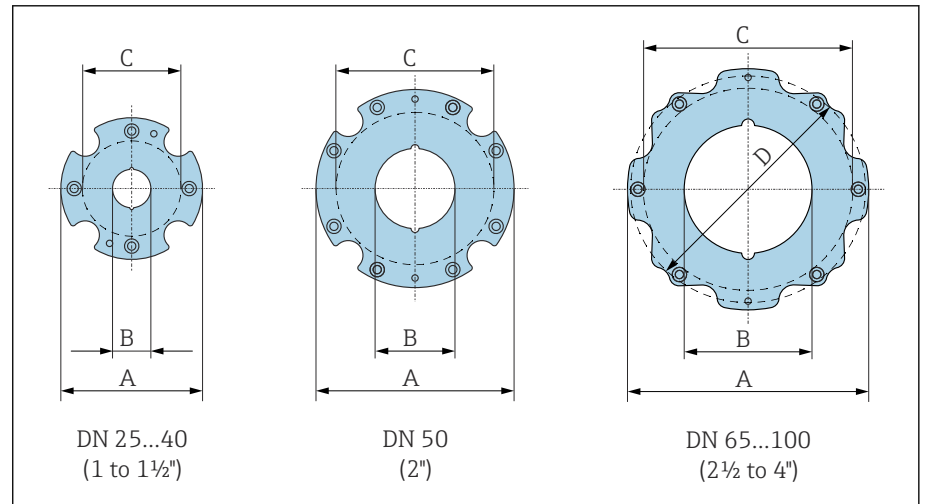
1) Depending on the cable entry used: values up to +1.18 in

## Flange connections

### Flange similar to ASME B16.5: Class 150

Order code for "Process connection", option A1Z

Dimension B: Internal diameter depends on liner → *Measuring tube specification*, 51



A0046000

DN [in]	A [in]	B [in]	C <sup>1)</sup> [in]	D [in]
1	3.39	0.94	2.68	-
1 ½	4.13	1.5	3.43	-
2	4.88	1.97	4.17	-
3	5.94	2.99	5.31	5.43
4	7.05	3.82	6.3	-

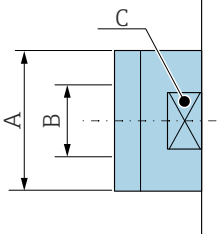
1) Max. Ø seals

### Couplings

**External thread: ASME B1.20.1**

Order code for "Process connection", option I5S

Mass B: internal diameter depends on the liner → *Measuring tube specification*, 51

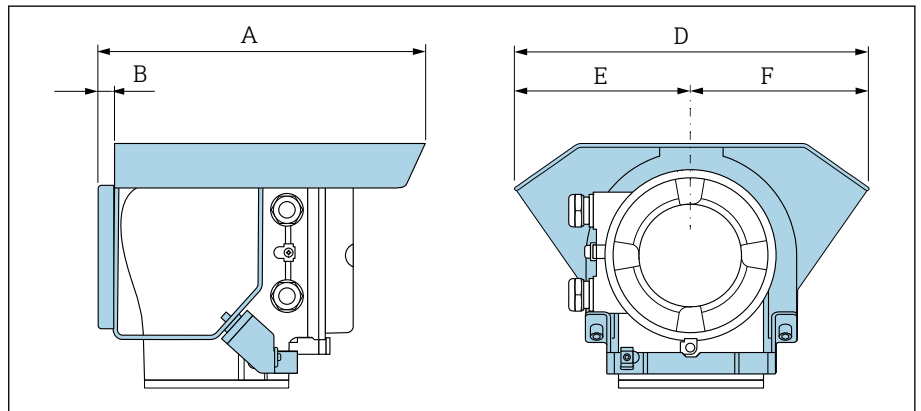


DN [in]	A [in]	B [mm]	C [mm]
1	NPT 1"	22	28
1 ½	NPT 1 ½"	34.4	50
2	NPT 2"	43	60

A0046008

Accessories

Weather protection cover



A0042332

A [in]	B [in]	D [in]	E [in]	F [in]
10.12	0.47	11.02	5.51	5.51

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## Local display

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## Operation concept

Operation method	Operation via local display with touchscreen <sup>1)</sup> Operation via: <ul style="list-style-type: none"> <li>▪ SmartBlue app <sup>2)</sup></li> <li>▪ Commubox FXA291</li> </ul>
Reliable operation	<ul style="list-style-type: none"> <li>▪ Operation in local language</li> <li>▪ Uniform operating philosophy in device and in the SmartBlue App</li> <li>▪ Write protection</li> <li>▪ When electronics modules are replaced: configurations are transferred using the T-DAT Backup device memory. The device memory contains process data, device data and the event logbook. No reconfiguration is necessary.</li> </ul>
Diagnostic behavior	Efficient diagnostic behavior increases measurement availability: <ul style="list-style-type: none"> <li>▪ Open remedial actions via local display and SmartBlue app</li> <li>▪ Diverse simulation options</li> <li>▪ Logbook of events that have occurred</li> </ul>

1) Only for HART and Modbus RS485 communication protocols

2) Optional via order code "Display; operation", options H, J or K

### IO-Link



The device-specific parameters are configured via IO-Link. There are specific configuration or operating programs from different manufacturers available to the user for this purpose. The device description file (IODD) is provided for the device.

#### IO-Link operating concept

Operator-oriented menu structure for user-specific tasks. Efficient diagnostic behavior increases measurement availability:

- Diagnostic messages
- Remedial action
- Simulation options

#### IODD download

Two options to download the IODD :

- [www.endress.com/download](http://www.endress.com/download)
- <https://ioddfinder.io-link.com/>

#### [www.endress.com/download](http://www.endress.com/download)

1. Select "Device Drivers".
2. Select the "IO Device Description (IODD)" entry under "Type".
3. Select "Product root".
4. Click "Search".

↳ A list of search results is displayed.

Select the appropriate version and download.

#### <https://ioddfinder.io-link.com/>

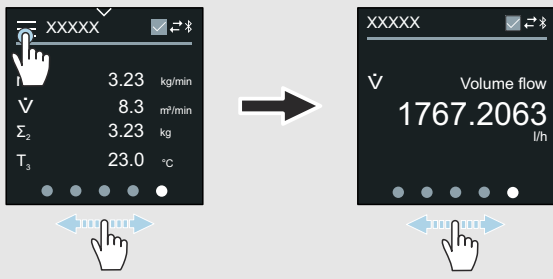
1. Enter "Endress" as the manufacturer and select.
  2. Select product name.
- ↳ A list of search results is displayed.

Select the appropriate version and download.



For detailed IO-Link information, see "IO-Link" Special Documentation for the device  
→ *Related documentation*, 4

## Operation options

<p>Local display</p>	 <p>10 Only for HART and Modbus RS485 communication protocols</p> <p>Display elements:</p> <ul style="list-style-type: none"> <li>▪ LCD touch screen <sup>1)</sup></li> <li>▪ Depends on the orientation, automatic alignment of the local display</li> <li>▪ Configuration of display format for measured variables and status variables</li> </ul> <p>Operating elements:</p> <ul style="list-style-type: none"> <li>▪ Touch screen <sup>1)</sup></li> <li>▪ Local display can also be accessed in the hazardous area</li> </ul>
<p>SmartBlue app</p>	<ul style="list-style-type: none"> <li>▪ The SmartBlue app allows the user to put devices into operation and operate them.</li> <li>▪ Based on Bluetooth</li> <li>▪ No separate driver required</li> <li>▪ Available for mobile handheld terminals, tablets and smartphones</li> <li>▪ Suitable for convenient and secure access to devices in hard-to-reach locations or in hazardous areas</li> <li>▪ Can be used within a 20 m (65.6 ft) radius of the device</li> <li>▪ Encrypted and secure data transmission</li> <li>▪ No data loss during commissioning and maintenance</li> <li>▪ Diagnostic information and process information in real time</li> </ul>

1) Only for HART and Modbus RS485 communication protocols

## Operating tools

Operating tools	Operating unit	Interface	Additional information
DeviceCare SFE100	<ul style="list-style-type: none"> <li>▪ Notebook</li> <li>▪ PC</li> <li>▪ Tablet with Microsoft Windows system</li> </ul>	<ul style="list-style-type: none"> <li>▪ CDI service interface</li> <li>▪ Fieldbus protocol</li> </ul>	Innovation brochure IN01047S
FieldCare SFE500	<ul style="list-style-type: none"> <li>▪ Notebook</li> <li>▪ PC</li> <li>▪ Tablet with Microsoft Windows system</li> </ul>	<ul style="list-style-type: none"> <li>▪ CDI service interface</li> <li>▪ Fieldbus protocol</li> </ul>	Operating Instructions BA00027S and BA00059S
SmartBlue app	<ul style="list-style-type: none"> <li>▪ Devices with iOS: iOS9.0 or higher</li> <li>▪ Devices with Android: Android 4.4 KitKat or higher</li> </ul>	Bluetooth	Endress+Hauser SmartBlue App: <ul style="list-style-type: none"> <li>▪ Google Playstore (Android)</li> <li>▪ iTunes Apple Shop (iOS devices)</li> </ul>
Device Xpert	Field Xpert SFX 100/350/370	HART fieldbus protocol	Operating Instructions BA01202S

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## Certificates and approvals

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### Non-Ex approval

- cSAus
- EAC
- UKCA

### Pressure Equipment Directive

- CRN
- PED Cat. II/III
- PESR Cat. II/III

### Drinking water approval

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

### HART certification

The device is certified and registered by the FieldComm Group. The measuring system meets all the requirements of the following specifications:

- Certified according to HART 7
- The device can also be operated with certified devices of other manufacturers (interoperability).

### Radio approval

The device has radio approvals.

### Additional certification

- IO-Link  
Self-certification with Manufacturer Declaration
- CRN approval  
Some device versions have a CRN approval. A CRN-approved process connection with a CSA approval must be ordered for a CRN-approved device.
- EN10204-3.1 material certificate, wetted parts and sensor housing (order code for "Test, certificate", option JA)
- Pressure test, internal process, test report (order code for "Test, certificate", option JB)
- Surface roughness test ISO4287/Ra, (wetted parts), test report (option JE)
- Compliance with requirements derived from cGMP, Declaration (option JG)

### External standards and guidelines

- IEC/EN 60529  
Degrees of protection provided by enclosure (IP code)
- IEC/EN 60068-2-6  
Environmental influences: Test procedure - Test Fc: vibration (sinusoidal)
- IEC/EN 60068-2-31  
Environmental influences: Test procedure - Test Ec: shocks due to rough handling, primarily for devices.
- IEC/EN 61010-1  
Safety requirements for electrical equipment for measurement, control and laboratory use - general requirements.
- GB 30439.5  
Safety requirements for industrial automation products - Part 5: Flowmeter safety requirements
- CAN/CSA-C22.2 No. 61010-1-12  
Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use - Part 1 General Requirements.
- IEC 61131-9  
Interface for communication with small sensors and actuators via a point-to-point connection

- IEC/EN 61326  
Emission in accordance with Class A requirements; Electromagnetic compatibility (EMC requirements)
- ANSI/ISA-61010-1 (82.02.01)  
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.
- ETSI EN 300 328  
Guidelines for 2.4 GHz radio components
- EN 301489  
Electromagnetic compatibility and radio spectrum matters (ERM).



## Application packages

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## Use

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 relevant order code is available from your local Endress+Hauser sales organization or on the product page of the Endress+Hauser website: [www.endress.com](http://www.endress.com).

## Heartbeat Verification + Monitoring

### Heartbeat Verification

Availability depends on the product structure.

Meets the requirement for traceable verification according to DIN ISO 9001:2015 Clause 7.6 a) "Control of monitoring and measuring equipment":

- Functional testing in the installed state without interrupting the process.
- Traceable verification results on request, including report.
- Simple testing process with local operation or other operating interfaces.
- Clear measuring point assessment (pass/fail) with high total test coverage within the framework of manufacturer specifications.
- Extension of calibration intervals according to operator's risk evaluation.

### Heartbeat Monitoring

Availability depends on the product structure.

Heartbeat Monitoring continuously provides data characteristic of the measuring principle to an external condition monitoring system, facilitating preventive maintenance or process analysis. This data enables the operator to:

- Draw conclusions - using this data and other information - about the measuring performance over time.
- Schedule servicing in time.
- Monitor the process quality or product quality .




## Accessories

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## Device-specific accessories









### Transmitter

Accessories	Description	Order number
Proline 10 transmitter	 Installation Instructions EA01350D	5XBBXX-*...*
Weather protection cover	Protects the device from weather exposure:  Installation Instructions EA01351D	71502730
Connecting cable	Can be ordered with the device. The following cable lengths are available: order code for "Cable, sensor connection" <ul style="list-style-type: none"> <li>▪ 5 m (16 ft)</li> <li>▪ 10 m (32 ft)</li> <li>▪ 20 m (65 ft)</li> <li>▪ User-configurable cable length m (ft)</li> </ul>  Max. cable length: 200 m (660 ft)	DK5013-*...*



### Sensor

Accessories	Description
Mounting kit for wafer version	Consists of: <ul style="list-style-type: none"> <li>▪ Mounting bolts</li> <li>▪ Nuts with washers</li> <li>▪ Flange seals</li> <li>▪ Centering sleeves (if required for the flange)</li> </ul>
Seal set	Consists of: 2 flange seals



## Communication-specific accessories

Accessory	Description
Commubox FXA195 USB/HART modem	Intrinsically safe HART communication with FieldCare and FieldXpert  Technical Information TI00404F
Commubox FXA291	Connects the Endress+Hauser devices with the CDI interface (= Endress+Hauser Common Data Interface) to the USB interface of a personal computer or laptop.  Technical Information TI405C/07
Commubox FXA291	Connects the Endress+Hauser devices with the CDI interface (= Endress+Hauser Common Data Interface) to the USB interface of a personal computer or laptop.  Technical Information TI405C/07
HART loop converter HMX50	Is used to evaluate and convert dynamic HART process variables to analog current signals or limit values.  <ul style="list-style-type: none"> <li>▪ Technical Information TI00429F</li> <li>▪ Operating Instructions BA00371F</li> </ul>
Fieldgate FXA42	Transmission of measured values from connected 4 to 20 mA analog and digital devices.  <ul style="list-style-type: none"> <li>▪ Technical Information TI01297S</li> <li>▪ Operating Instructions BA01778S</li> <li>▪ Product page: <a href="http://www.endress.com/fxa42">www.endress.com/fxa42</a></li> </ul>
Field Xpert SMT50	The Field Xpert SMT50 table PC for device configuration enables mobile plant asset management. It is suitable for commissioning and maintenance staff to manage field instruments with a digital communication interface and to record progress. This tablet PC is designed as an all-in-one solution with a preinstalled driver library and is an easy-to-use, touch-sensitive tool which can be used to manage field instruments throughout their entire life cycle.  <ul style="list-style-type: none"> <li>▪ Technical Information TI01555S</li> <li>▪ Operating Instructions BA02053S</li> <li>▪ Product page: <a href="http://www.endress.com/smt50">www.endress.com/smt50</a></li> </ul>
Field Xpert SMT70	Tablet PC for the configuration of the device. Enables mobile Plant Asset Management to manage the devices with a digital communication interface. Suitable for Zone 2.  <ul style="list-style-type: none"> <li>▪ Technical Information TI01342S</li> <li>▪ Operating Instructions BA01709S</li> <li>▪ Product page: <a href="http://www.endress.com/smt70">www.endress.com/smt70</a></li> </ul>
Field Xpert SMT77	Tablet PC for the configuration of the device. Enables mobile Plant Asset Management to manage the devices with a digital communication interface. Suitable for Zone 1.  <ul style="list-style-type: none"> <li>▪ Technical Information TI01418S</li> <li>▪ Operating Instructions BA01923S</li> <li>▪ Product page: <a href="http://www.endress.com/smt77">www.endress.com/smt77</a></li> </ul>
FieldPort SFP20	The FieldPort SFP20 is a USB interface for the configuration of Endress+Hauser IO-Link devices, and also of devices from other vendors. Combined with the IO-Link CommDTM (DeviceCare, FieldCare, Field Xpert) and the IODD Interpreter, the FieldPort complies with the FDT/DTM standards.
IO-Link master BL20	IO-Link master from Turck for DIN rails supports PROFINET, EtherNet/IP and Modbus TCP. With web server for easy configuration.

### Service-specific accessory

Accessory	Description	Order code
Applicator	Software for selecting and sizing Endress+Hauser devices.	<a href="https://portal.endress.com/webapp/applicator">https://portal.endress.com/webapp/applicator</a>
Netilion	<p>IIoT ecosystem: Unlock knowledge</p> <p>With the Netilion IIoT ecosystem, Endress+Hauser allows you to optimize your plant performance, digitize workflows, share knowledge, and enhance collaboration.</p> <p>Based on decades of experience in process automation, Endress+Hauser offers the process industry an IIoT ecosystem that enables you to gain useful insights from data. These insights can be used to optimize processes, leading to increased plant availability, efficiency, and reliability - ultimately resulting in a more profitable plant.</p>	<a href="http://www.netilion.endress.com">www.netilion.endress.com</a>
FieldCare	<p>FDT-based plant asset management software from Endress+Hauser. Management and configuration of Endress+Hauser devices.</p> <p> Operating Instructions BA00027S and BA00059S</p>	<ul style="list-style-type: none"> <li>▪ Device driver: <a href="http://www.endress.com">www.endress.com</a> → Download Area</li> <li>▪ CD-ROM (contact Endress+Hauser)</li> <li>▪ DVD (contact Endress+Hauser)</li> </ul>
DeviceCare	<p>Software for connecting and configuring Endress+Hauser devices.</p> <p> <ul style="list-style-type: none"> <li>▪ Technical Information: TI01134S</li> <li>▪ Innovation brochure: IN01047S</li> </ul> </p>	<ul style="list-style-type: none"> <li>▪ Device driver: <a href="http://www.endress.com">www.endress.com</a> → Download Area</li> <li>▪ CD-ROM (contact Endress+Hauser)</li> <li>▪ DVD (contact Endress+Hauser)</li> </ul>

### System components

Accessories	Description
Memograph M	<p>Graphic data manager:</p> <ul style="list-style-type: none"> <li>▪ Record measured values</li> <li>▪ Monitor limit values</li> <li>▪ Analyze measuring points</li> </ul> <p> <ul style="list-style-type: none"> <li>▪ Technical Information TI00133R</li> <li>▪ Operating Instructions BA00247R</li> </ul> </p>
iTEMP	<p>Temperature transmitter:</p> <ul style="list-style-type: none"> <li>▪ Measure the absolute pressure and gauge pressure of gases, vapors and liquids</li> <li>▪ Read the medium temperature</li> </ul> <p> "Fields of Activity" document FA00006T</p>

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[www.addresses.endress.com](http://www.addresses.endress.com)

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