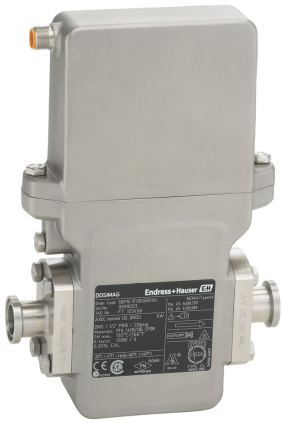
# Technical Information
# **Dosimag**

Electromagnetic flowmeter



## Flowmeter with maximum repeatability and ultra-compact sensor with hygienic design

### Application

- The measuring principle is practically independent of pressure, density, temperature and viscosity
- For demanding batching and dosing applications

*Device properties*

- Wetted materials suitable for CIP/SIP cleaning
- Nominal diameter: DN 4 to 25 (⅛ to 1")
- FDA-compliant measuring device
- Pulse/frequency/switch output, Modbus RS485
- ATEX, cCSAus
- Excellent and easy-to-clean transmitter

### Your benefits

- High process safety – high measuring accuracy and repeatability in shortest filling time
- Energy-saving flow measurement – no pressure loss due to cross-section constriction
- Maintenance-free – no moving parts
- Versatile and time-saving wiring – plug connector
- Industry-optimized – ultra-compact design
- For hygiene requirements – stainless steel housing

Endress+Hauser
People for Process Automation

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# Document information

## Symbols used

### Electrical symbols

| Symbol | Meaning |
|---|---|
|  | Direct current |
|  | Alternating current |
|  | Direct current and alternating current |
|  | **Ground connection**<br>A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system. |
|  | **Protective ground connection**<br>A terminal which must be connected to ground prior to establishing any other connections. |
|  | **Equipotential connection**<br>A connection that has to be connected to the plant grounding system: This may be a potential equalization line or a star grounding system depending on national or company codes of practice. |

### Symbols for certain types of information

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

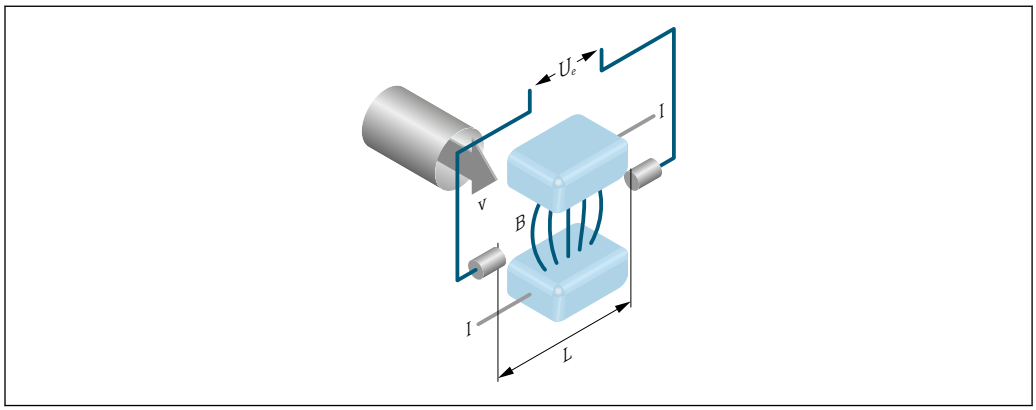
### Symbols in graphics

| 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.

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*Ue* *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**

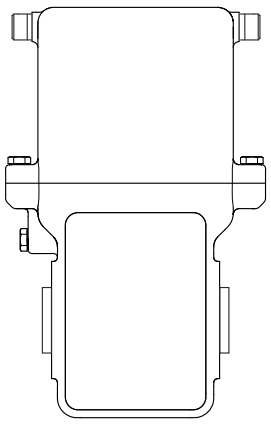
- Induced voltage $U_e = B \cdot L \cdot v$
- Volume flow $Q = A \cdot v$

## Measuring system

The device consists of a transmitter and a sensor.

The device is available as a compact version:
The transmitter and sensor form a mechanical unit.

**Dosimag**



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**Transmitter**

- Materials:
  - Transmitter housing: stainless steel 1.4308 (304)
  - Housing seal: EPDM
- Configuration:
  Via operating tools (e.g. FieldCare)

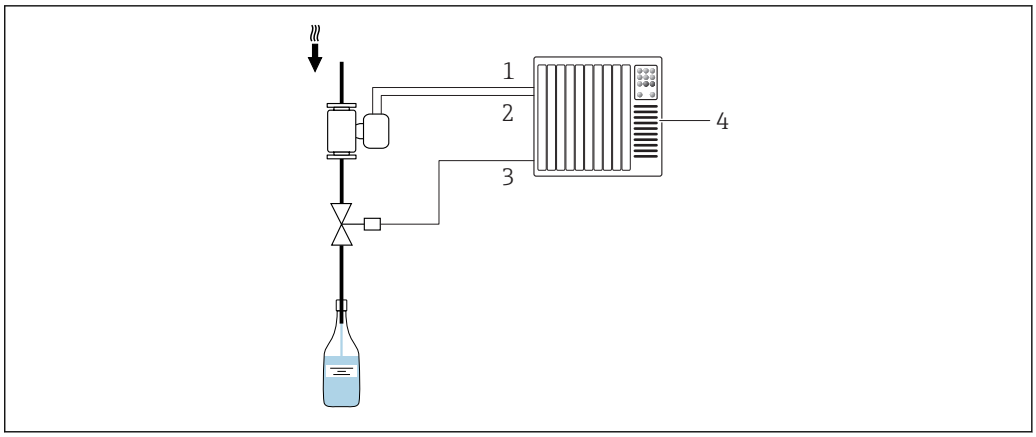
**Sensor**

- Range of nominal diameter: DN 4 (5/32"), DN 8 (3/8"), 15 (1/2"), 25 (1")
- Materials:
  - Sensor housing: stainless steel 1.4308 (304)
  - Measuring tube: stainless steel 1.4301 (304)
  - Liner: PFA
  - Process connection seals: EPDM, silicone, Viton
  - Electrodes: 1.4435 (316L); option Alloy C22, 2.4602 (UNS N06022), tantalum, platinum

## Equipment architecture

**Device version: Two pulse/frequency/switch outputs**

The device version has two pulse/frequency/switch outputs → 10.

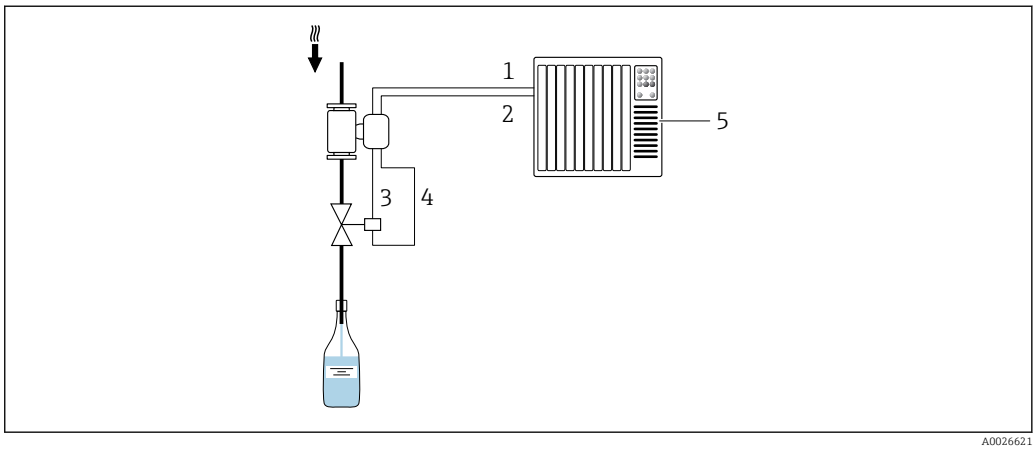



1 *Options for integration into a system for batching processes*

1 *Pulse/frequency/current output 1*
2 *Pulse/frequency/current output 2*
3 *Control of valve (by automation system)*
4 *Control system (e.g. PLC)*

**Device version: Modbus RS485, one or two switch outputs (Batch) and one status input**

Device versions with MODBUS RS485 have one or two switch outputs for valve control for the regulation of batching processes → 10.




2 *Options for integration into a system for batching processes*

1 *MODBUS RS485: Measured value (to the automation system)*
2 *Status input: Control of batching process (by the automation system)*
3 *Switch output 1 (batch): valve control, level 1*
4 *Switch output 2 (batch): valve control, level 2*
5 *Control system (e.g. PLC)*

*Integrated batching functions*

The following parameters can be used to configure and monitor batching processes.

*Configuration*

- Measured variable: volume flow
- Unit
- Batch quantity
- Fixed compensation quantity
- Select batch profile
- Drip correction mode: Off, low flow cut off or fixed time
- Measuring time drip quantity
- Filter depth drip median (3, 5 or 7)
- Average drip correction quantity
- Batch levels: One-level, two-level or one-level and blow out

- Start and stop level 2
- Blow out delay and duration
- Maximum batch time
- Maximum flow
- Disable time pressure shock suppression

*Display*

- Total amount measured from last batching process (incl. drip quantity)
- Duration of last batching process (incl. measurement of drip quantity)
- Switch-off time: From time of switch-off to when measurement of the drip quantity is complete
- Current drip correction quantity (drip correction quantity for next batching process)
- Sum of all batching processes measured
- Number of batching processes

The batching process (start batch, stop batch etc.) is controlled by the automation system via the status input or the Modbus RS485 .

**Safety**

**IT security**

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

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

# Input

**Measured variable**

**Direct measured variables**

Volume flow (proportional to induced voltage)

**Measuring range**

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

*Flow characteristic values in SI units*

| Nominal diameter | Recommended flow | Factory settings | |
|---|---|---|---|
| | Max. full scale value | Pulse value | Low flow cut off (v ~ 0.04 m/s) |
| [mm] | [l/s] | [ml] | [ml/s] |
| 4 | 0.14 | 0.005 | 0.5 |
| 8 | 0.5 | 0.02 | 2 |
| 15K [1)] | 1.2 | 0.1 | 7 |
| 15 | 1.66 | 0.1 | 7 |
| 25 | 5 | 0.2 | 16 |

1) Conical version (corresponds to DN 12)

*Flow characteristic values in US units*

| Nominal diameter | Recommended flow | Factory settings | |
|---|---|---|---|
| | Max. full scale value | Pulse value | Low flow cut off (v ~ 0.13 ft/s) |
| [in] | [gal/s] | [oz fl] | [oz fl/s] |
| 5/32 | 0.035 | 0.0002 | 0.02 |
| 5/16 | 0.13 | 0.001 | 0.08 |

| Nominal diameter [in] | Recommended flow<br>Max. full scale value [gal/s] | Factory settings<br>Pulse value [oz fl] | Low flow cut off (v ~ 0.13 ft/s) [oz fl/s] |
|---|---|---|---|
| ½K [1)] | 0.32 | 0.004 | 0.25 |
| ½ | 0.44 | 0.004 | 0.25 |
| 1 | 1.33 | 0.007 | 0.53 |

1) Conical version (corresponds to DN 12)

To calculate the measuring range, use the *Applicator* sizing tool → 42

### Recommended measuring range

"Flow limit" section → 26

**Operable flow range**

Over 1000 : 1

**Input signal**

Available only for device versions using the Modbus RS485 communication method → 10.

### Status input

The batching process is controlled by the automation system via the device's status input.

| | |
|---|---|
| **Maximum input values** | ▪ DC 30 V<br>▪ 6 mA |
| **Response time** | Adjustable: 10 to 200 ms |
| **Input signal level** | ▪ Low level: 0 to 1.5 V<br>▪ High level: 3 to 30 V |
| **Assignable functions** | ▪ Off<br>▪ Start batching process<br>▪ Start and stop batching process<br>▪ Reset totalizers 1-3 separately<br>▪ Reset all totalizers<br>▪ Flow override |

# Output

**Output signal**

### Pulse/frequency/switch output

| | |
|---|---|
| **Function** | Can be set to:<br>▪ Pulse<br>Quantity-proportional pulse with pulse width to be configured.<br>▪ Automatic pulse<br>Quantity-proportional pulse with on/off ratio of 1:1<br>▪ Frequency<br>Flow-proportional frequency output with on/off ratio of 1:1<br>▪ Switch<br>Contact for displaying a status |
| **Channel 2** | Redundant output of pulse output: 0°, 90° or 180° |
| **Version** | Passive, open emitter |
| **Maximum input values** | ▪ DC 30 V<br>▪ 25 mA |

| | |
|---|---|
| **Voltage drop** | At 25 mA: ≤ DC 2 V |
| **Pulse output** | |
| **Pulse width** | Adjustable: 0.05 to 3.75 ms |
| **Maximum pulse rate** | 10 000 Impulse/s |
| **Pulse value** | Adjustable |
| **Assignable measured variables** | Volume flow |
| **Frequency output** | |
| **Output frequency** | Adjustable: 0 to 10 000 Hz |
| **Damping** | Adjustable: 0 to 999.9 s |
| **Pulse/pause ratio** | 1:1 |
| **Assignable measured variables** | Volume flow |
| **Switch output** | |
| **Switching behavior** | Binary, conductive or non-conductive |
| **Number of switching cycles** | Unlimited |
| **Assignable functions** | ▪ Off<br>▪ On<br>▪ Diagnostic behavior<br>– Alarm<br>– Alarm and warning<br>– Warning<br>▪ Limit value:<br>– Off<br>– Volume flow<br>– Flow velocity<br>▪ Status<br>Low flow cut off |

### Modbus RS485

| | |
|---|---|
| **Physical interface** | In accordance with EIA/TIA-485-A standard |

### Switch output (batch: valve control)

▪ Only available for device version with Modbus RS485 → 📄 10.
▪ Depending on the device version, the device has one or two switch outputs.

| **Switch output** | |
|---|---|
| **Version** | Active, open emitter |
| **Maximum input values** | ▪ DC 30 V<br>▪ 500 mA |
| **Switching behavior** | Binary, conductive or non-conductive |
| **Number of switching cycles** | Unlimited |
| **Assignable functions** | ▪ Open<br>▪ Closed<br>▪ Batching |

**Signal on alarm**

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

**Pulse/frequency/switch output**

*Pulse output*

| | |
|---|---|
| **Failure mode** | Choose from:<br>▪ Actual value<br>▪ No pulses |

*Frequency output*

| | |
|---|---|
| **Failure mode** | Choose from:<br>▪ Actual value<br>▪ 0 Hz<br>▪ Defined value: 0 to 10 000 Hz |

*Switch output*

| | |
|---|---|
| **Failure mode** | Choose from:<br>▪ Current status<br>▪ Open<br>▪ Closed |

**Modbus RS485**

| | |
|---|---|
| **Failure mode** | Choose from:<br>▪ NaN value instead of current value<br>▪ Last valid value |

**Low flow cut off**

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

**Galvanic isolation**

- Device version: 2 pulse/frequency/switch outputs
  Order code for "Output, input", option 3:
  – Pulse/frequency/switch outputs galvanically isolated from supply potential.
  – Pulse/frequency/switch outputs not galvanically isolated from each other.
- Device version: Modbus RS485, 1 switch output (batch), 1 status input
  (Order code for "Output, input": option 4)
  Switch outputs (batch) and status input on supply potential
- Device version: Modbus RS485, 2 switch outputs (batch), 1 status input
  (Order code for "Output, input", option 5:)
  – Switch outputs (batch) on supply potential.
  – Status input, galvanically isolated.

**Protocol-specific data**

**Modbus RS485**

| | |
|---|---|
| Protocol | Modbus Applications Protocol Specification V1.1 |
| Device type | Slave |
| Slave address range | 1 to 247 |
| Broadcast address range | 0 |
| Function codes | ▪ 03: Read holding register<br>▪ 04: Read input register<br>▪ 06: Write single registers<br>▪ 08: Diagnostics<br>▪ 16: Write multiple registers<br>▪ 23: Read/write multiple registers<br>▪ 43: Read device identification |
| Broadcast messages | Supported by the following function codes:<br>▪ 06: Write single registers<br>▪ 16: Write multiple registers<br>▪ 23: Read/write multiple registers |

| | |
|---|---|
| Supported baud rate | ▪ 1200 BAUD<br>▪ 2400 BAUD<br>▪ 4800 BAUD<br>▪ 9600 BAUD<br>▪ 19200 BAUD<br>▪ 38400 BAUD<br>▪ 57600 BAUD<br>▪ 115200 BAUD |
| Data transfer mode | ▪ ASCII<br>▪ RTU |
| Data access | Each device parameter can be accessed via Modbus RS485.<br>For Modbus register information → 43 |

# Power supply

**Terminal assignment**

Connection is solely by means of device plug:

*There are different device versions available:*

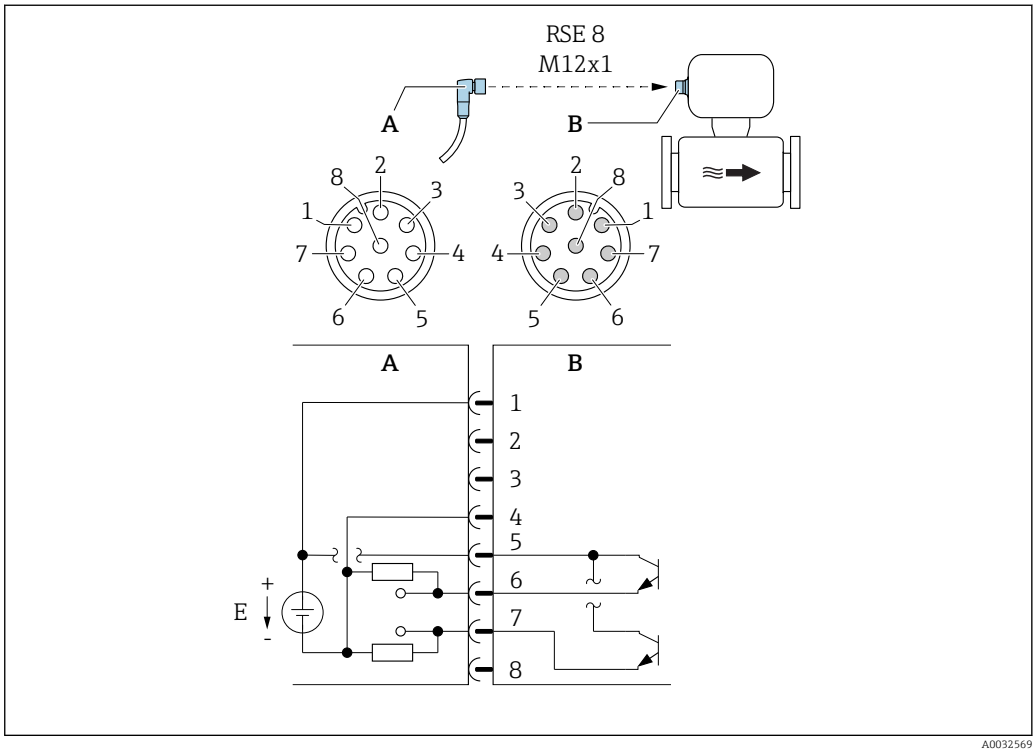
| Order code for "Output, input": | Device plug |
|---|---|
| Option **3**: 2 pulse/frequency/switch outputs [1] | → 11 |
| Option **4**: Modbus RS485, 1 switch output (batch), 1 status input | → 12 |
| Option **5**: Modbus RS485, 2 switch outputs (batch), 1 status input | → 13 |
| Option **6**: Modbus RS485 (custody transfer mode) | → 15 |

1) Can also be used for custody transfer mode.

**Pin assignment, device plug**

**Device version: 2 pulse/frequency/switch outputs**

Order code for "Output, input", option 3:
2 Pulse/frequency/switch output




3 *Connection to device*

*A Coupling: Supply voltage, pulse/freq./switch output*
*B Connector: Supply voltage, pulse/freq./switch output*
*E PELV or SELV power supply*
*1 to 8 Pin assignment*

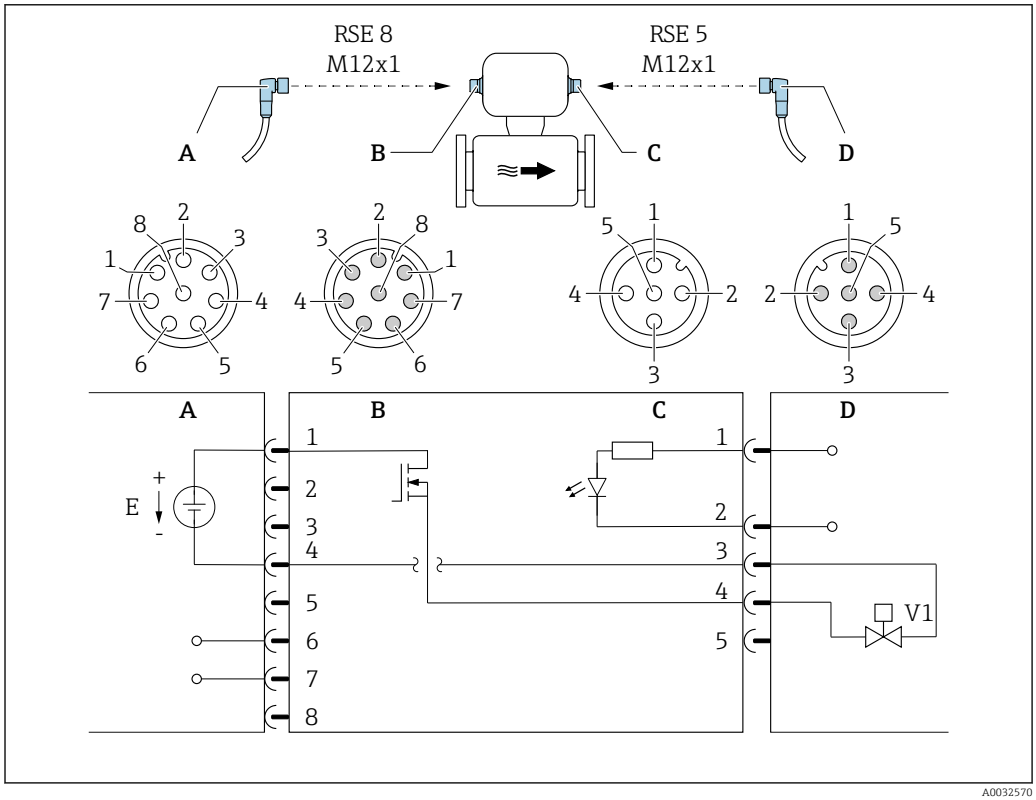
*Pin assignment*

| Connection: Coupling (A) – Connector (B) | | |
|---|---|---|
| **Pin** | **Assignment** | |
| 1 | L+ | Supply voltage |
| 2 | + | Service interface RX |
| 3 | + | Service interface TX |
| 4 | L- | Supply voltage |
| 5 | + | Pulse/frequency/switch output |
| 6 | – | Pulse/frequency/switch output 1 |
| 7 | – | Pulse/frequency/switch output 2 |
| 8 | – | Service interface GND |

Observe cable specifications → 17.

**Device version: Modbus RS485, status output and status input**

Order code for "Output, input", option 4:
- Modbus RS485
- 1 switch output (batch)
- 1 status input




4 *Connection to device*

*A Coupling: Supply voltage, Modbus RS485*
*B Connector: Supply voltage, Modbus RS485*
*C Coupling: Switch output (batch), status input*
*D Connector: Switch output (batch), status input*
*E PELV or SELV power supply*
*V1 Valve 1 (batch)*
*1 to 8 Pin assignment*

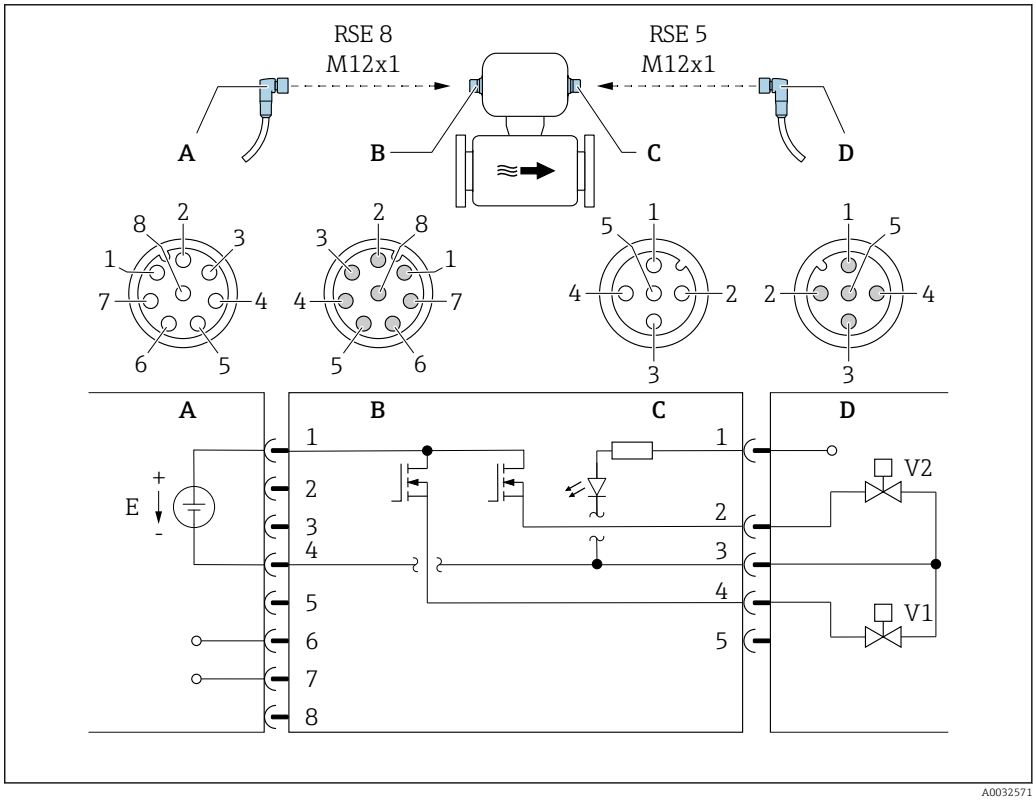
*Pin assignment*

| Connection: Coupling (A) – Connector (B) | | | Connection: Coupling (C) – Connector (D) | | |
|---|---|---|---|---|---|
| Pin | Assignment | | Pin | Assignment | |
| 1 | L+ | Supply voltage | 1 | + | Status input |
| 2 | + | Service interface RX | 2 | – | Status input |
| 3 | + | Service interface TX | 3 | – | Switch output (batch) |
| 4 | L- | Supply voltage | 4 | + | Switch output (batch) |
| 5 | | Not assigned | 5 | | Not assigned |
| 6 | A | Modbus RS485 | | | |
| 7 | B | Modbus RS485 | | | |
| 8 | – | Service interface GND | | | |

Observe cable specifications → 17.

**Device version: Modbus RS485 , 2 status outputs and status input**

Order code for "Output, input", option 5:
- Modbus RS485
- 2 switch outputs (batch)
- 1 status input




*5 Connection to device*

*A Coupling: Supply voltage, Modbus RS485*
*B Connector: Supply voltage, Modbus RS485*
*C Coupling: Switch outputs (batch), status input*
*D Connector: Switch outputs (batch), status input*
*E PELV or SELV power supply*
*V1 Valve (batch), level 1*
*V2 Valve (batch), level 2*
*1 to 8 Pin assignment*

*Pin assignment*

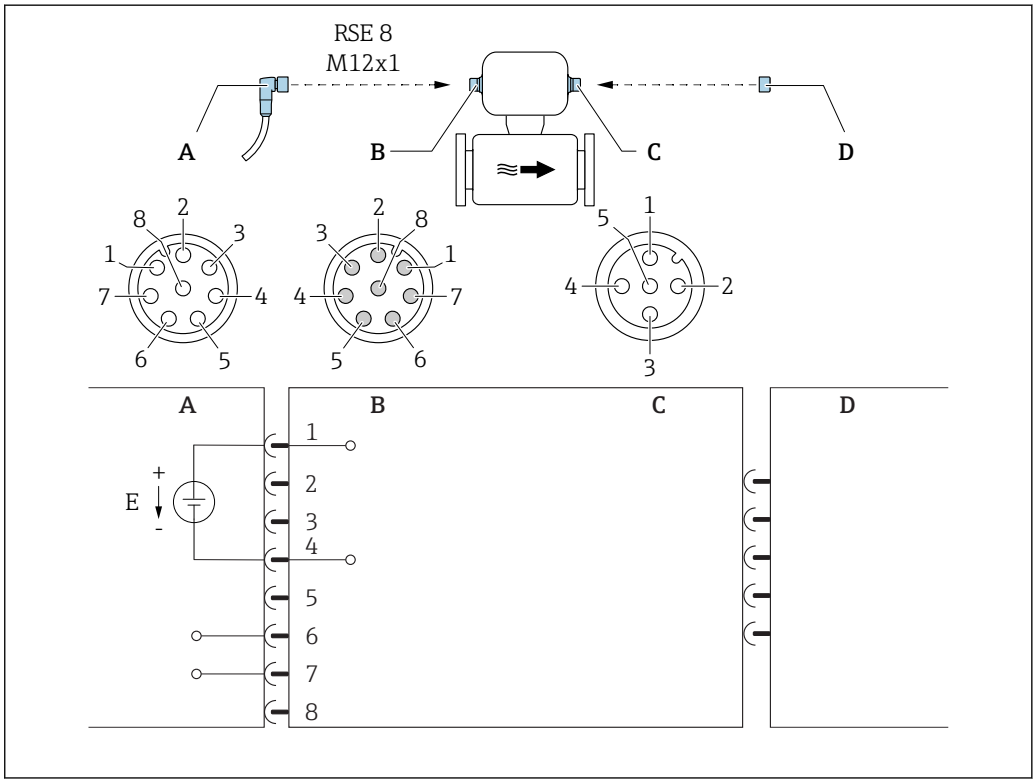
| Connection: Coupling (A) – Connector (B) | | | Connection: Coupling (C) – Connector (D) | | |
|---|---|---|---|---|---|
| Pin | Assignment | | Pin | Assignment | |
| 1 | L+ | Supply voltage | 1 | + | Status input |
| 2 | + | Service interface RX | 2 | + | Switch output (batch) 2 |
| 3 | + | Service interface TX | 3 | – | Switch outputs, status input |
| 4 | L- | Supply voltage | 4 | + | Switch output (batch) 1 |
| 5 | | Not assigned | 5 | | Not assigned |
| 6 | A | Modbus RS485 | | | |

| Connection: Coupling (A) – Connector (B) | | | Connection: Coupling (C) – Connector (D) | |
|---|---|---|---|---|
| Pin | Assignment | | Pin | Assignment |
| 7 | B | Modbus RS485 | | |
| 8 | – | Service interface GND | | |

Observe cable specifications → 17.

**Device version: Modbus RS485 (custody transfer mode)**

Order code for "Output, input", option 6 (device version for custody transfer mode):
Modbus RS485




6 *Connection to device*

*A Coupling: Supply voltage, Modbus RS485*
*B Connector: Supply voltage, Modbus RS485*
*C Coupling at device*
*D Connector: Dongle (hardware write protection for custody transfer mode)*
*E PELV or SELV power supply*

*Pin assignment*

| Connection: Coupling (A) – Connector (B) | | | Connection: Coupling (C) – Connector (D) | |
|---|---|---|---|---|
| **Pin** | **Assignment** | | **Pin** | **Assignment** |
| 1 | L+ | Supply voltage | 1 | NC |
| 2 | + | Service interface RX | 2 | NC |
| 3 | + | Service interface TX | 3 | NC |
| 4 | L- | Supply voltage | 4 | + |
| 5 | | Not assigned | 5 | - |
| 6 | A | Modbus RS485 | | |
| 7 | B | Modbus RS485 | | |
| 8 | – | Service interface GND | | |

Observe cable specifications → 17.

**Supply voltage**

DC 24 V (nominal voltage: DC 20 to 30 V)

- The power unit must be tested to ensure that it meets safety requirements (e.g. PELV, SELV).
- The supply voltage must not exceed a maximum short-circuit current of 50 A.

**Power consumption**

4.5 W

**Current consumption**

| Order code for "Output, input": | Maximum Power consumption |
|---|---|
| Option **3**: 2 pulse/frequency/switch outputs | 225 mA |
| Option **4**: Modbus RS485, 1 switch output (batch), 1 status input | 225 mA + 500 mA [1] |
| Option **5**: Modbus RS485, 2 switch outputs (batch), 1 status input | 225 mA + 1000 mA [1] |
| Option **6**: Modbus RS485 (custody transfer mode) | 225 mA |

1) Additional 500 mA per switch output (batch) used.

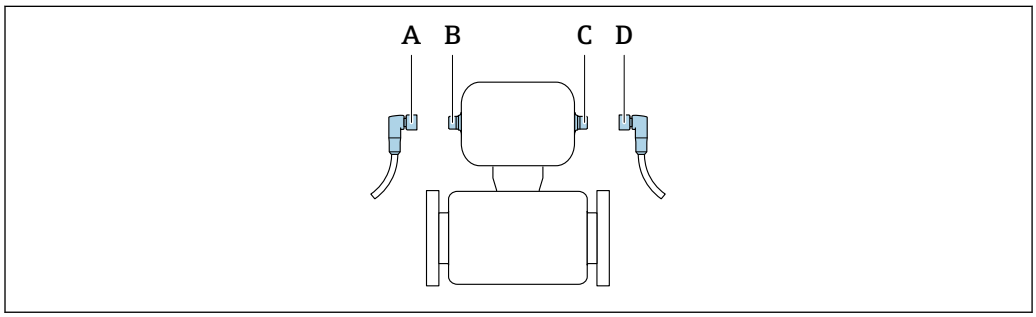
Switch-on current: max. 1 A (< 8 ms)

**Power supply failure**

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

**Electrical connection**

Connection is solely by means of device plug:

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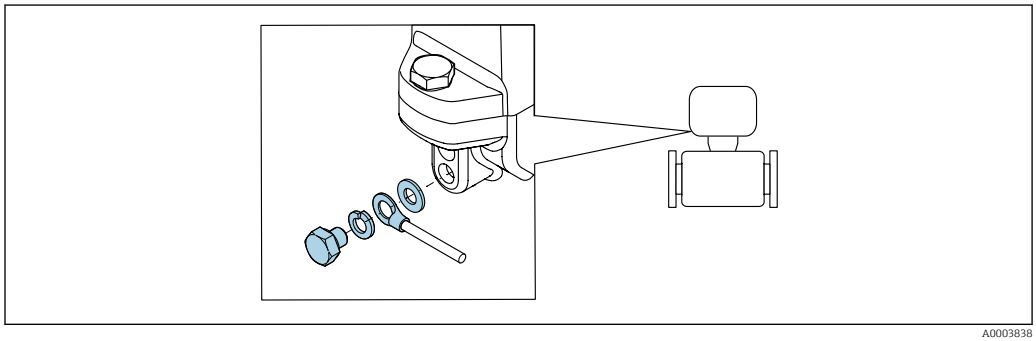
*A, C Coupling*
*B, D Plug*

*There are different device versions available:*

| Order code for "Output, input": | Device plug |
|---|---|
| Option **3**: 2 pulse/frequency/switch outputs | → 11 |
| Option **4**: Modbus RS485, 1 switch output (batch), 1 status input | → 12 |
| Option **5**: Modbus RS485, 2 switch outputs (batch), 1 status input | → 13 |
| Option **6**: Modbus RS485 (custody transfer mode) | → 15 |

### Grounding

Grounding is by means of a cable socket.



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## Potential equalization

### Requirements

No potential matching is needed for grounded steel lines.

For devices intended for use in hazardous locations, please observe the guidelines in the Ex documentation (XA).

## Cable specification

### Permitted temperature range

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

### Signal cable

Cables are not included in the scope of delivery; they can be ordered as an accessory → 41.

*Pulse/frequency/switch output*

Standard installation cable is sufficient.

*Status input and switch output (batch)*

Standard installation cable is sufficient.

### Modbus RS485

- The electrical connection of the shield to the device housing must be properly implemented (e.g. using a knurled nut).
- Please note the following with regard to cable loading:
  - Voltage drop due to the cable length and cable type.
  - Valve performance.

*Total length of cable in the Modbus network ≤ 50 m*

Use a shielded cable.

*Example:*
Terminated device connector with cable: Lumberg RKWTH 8-299/10

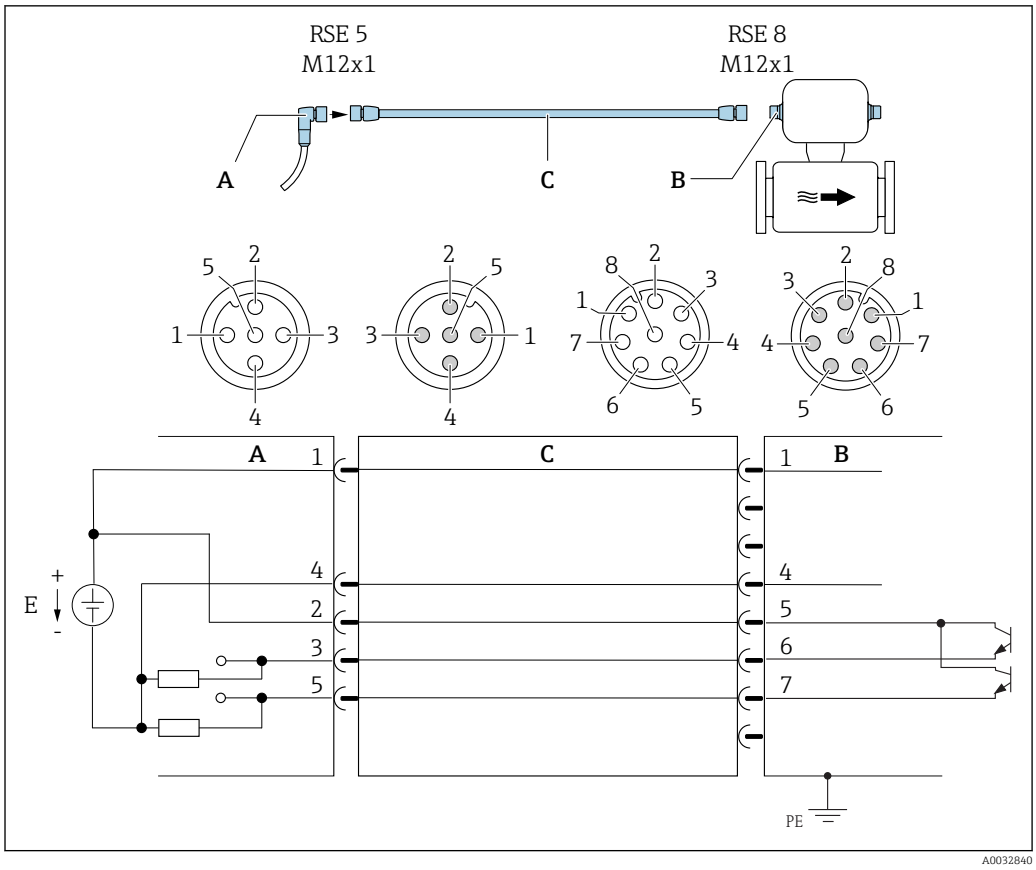
*Total length of cable in the Modbus network > 50 m*

Use shielded twisted pair cable for RS485 applications.

*Example:*
- Cable: Belden item no. 9842 (for 4-wire version, the same cable can be used for the power supply)
- Terminated device plug: Lumberg RKCS 8/9 (shieldable version)

### RSE8 to RSE5 adapter

This adapter is not included in the scope of delivery. It is essential for custody transfer mode.




7 *Connection to device*

*A Coupling*
*B Plug*
*C RSE8 to RSE5 adapter cable*
*E PELV or SELV power supply*

*Pin assignment*

| Pin | Assignment | |
|---|---|---|
| 1 | + | Supply voltage |
| 2 | + | Pulse/frequency/switch output |
| 3 | - | Pulse/frequency/switch output |
| 4 | – | Supply voltage |
| 5 | - | Pulse/frequency/switch output |

# Performance characteristics

**Reference operating conditions**

**In accordance with DIN EN 29104**
- Medium temperature: +28 ± 2 °C (+82 ± 4 °F)
- Ambient temperature: +22 ± 2 °C (+72 ± 4 °F)
- Warm-up period:30 min

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

To calculate the measuring range, use the *Applicator* sizing tool → 42

**Maximum measured error**

**Error limits under reference operating conditions**

o.r. = of reading

**Volume flow**

- ±0.25 % o.r. ± 1 to 4 m/s (3.3 to 13 ft/s) or
- ±0.5 % o.r. ± 1 mm/s (0.04 in/s) or
- ±5 % o.r.

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

**Accuracy of outputs**

In the case of analog outputs, the output accuracy must also be considered for the measured error, in contrast, this need not be considered in the case of fieldbus outputs (Modbus RS485).

The outputs have the following base accuracy specifications.

*Pulse/frequency output*

o.r. = of reading

| | |
|---|---|
| **Accuracy** | Max. ±50 ppm o.r. (across the entire ambient temperature range) |

**Repeatability**

o.r. = of reading

*DN 25 (500 ml/s), DN 15 (200 ml/s), DN 8 (50 ml/s), DN 4 (10 ml/s); 400 µS/cm*

| Batch time $t_a$ [s] | Relative standard deviation in relation to the batched volume [%] |
|---|---|
| 1.5 s < $t_a$ < 3 s | 0.4 |
| 3 s < $t_a$ < 5 s | 0.2 |
| 5 s < $t_a$ | 0.1 |

*DN 15K (200 ml/s); 400 µS/cm*

| Batch time $t_a$ [s] | Relative standard deviation in relation to the batched volume [%] |
|---|---|
| 1.5 s < $t_a$ < 3 s | 0.25 |
| 3 s < $t_a$ < 5 s | 0.12 |
| 5 s < $t_a$ | 0.08 |

**Influence of ambient temperature**

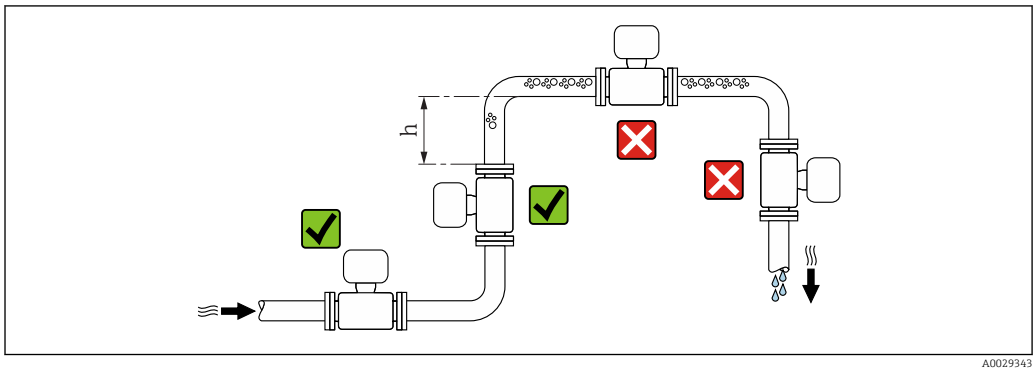
**Pulse/frequency output**

| | |
|---|---|
| **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.

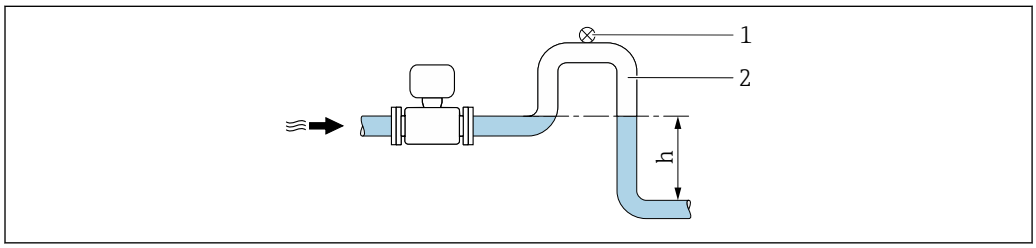
## Mounting location




Preferably install the sensor in an ascending pipe, and ensure a sufficient distance to the next pipe elbow: h ≥ 2 × DN

### Installation in down pipes

Install a siphon with a vent valve downstream of the sensor in down pipes whose length h ≥ 5 m (16.4 ft). This precaution is to avoid low pressure and the consequent risk of damage to the measuring tube. This measure also prevents the system losing prime.

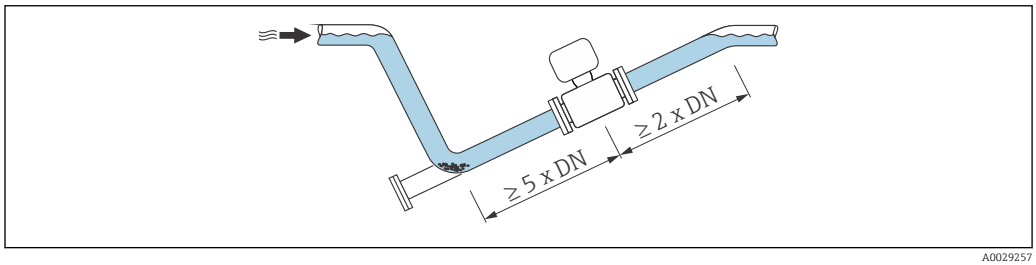



8 *Installation in a down pipe*

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

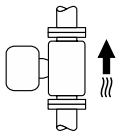
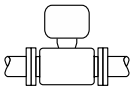
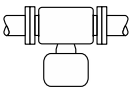
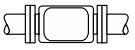
### Installation in partially filled pipes

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



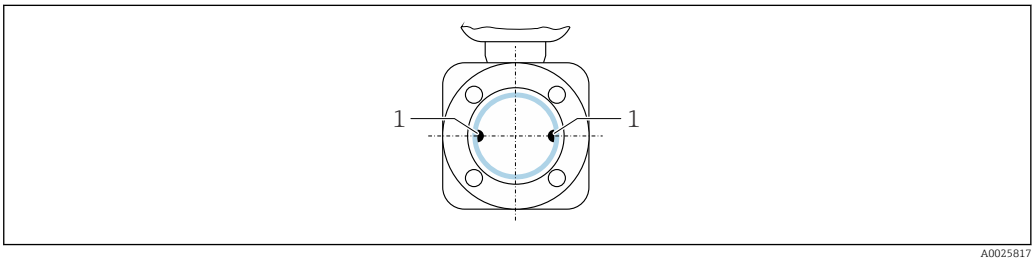

## Orientation

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



A0025817

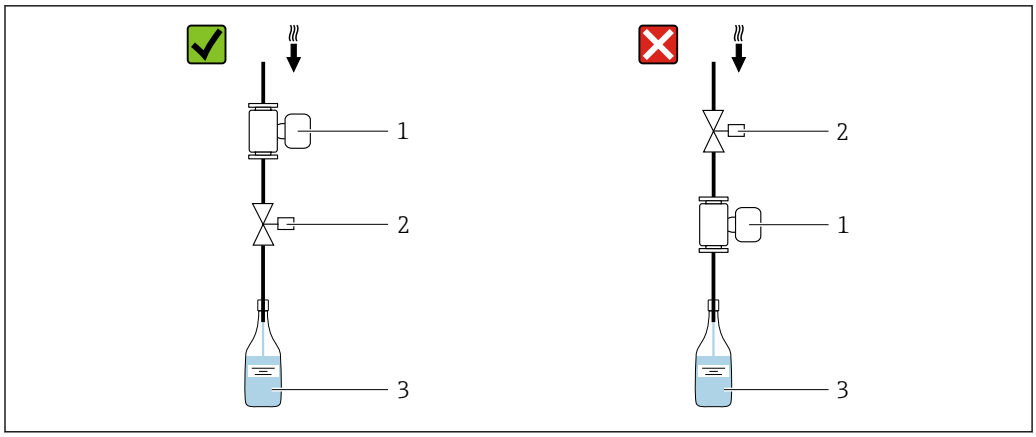
*1 Measuring electrodes for signal detection*

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

### Valves

Never install the sensor downstream from a filling valve. If the sensor is completely empty this corrupts the measured value.

Correct measurement is only possible if the pipe is completely full. Perform sample fillings before commencing filling in production.

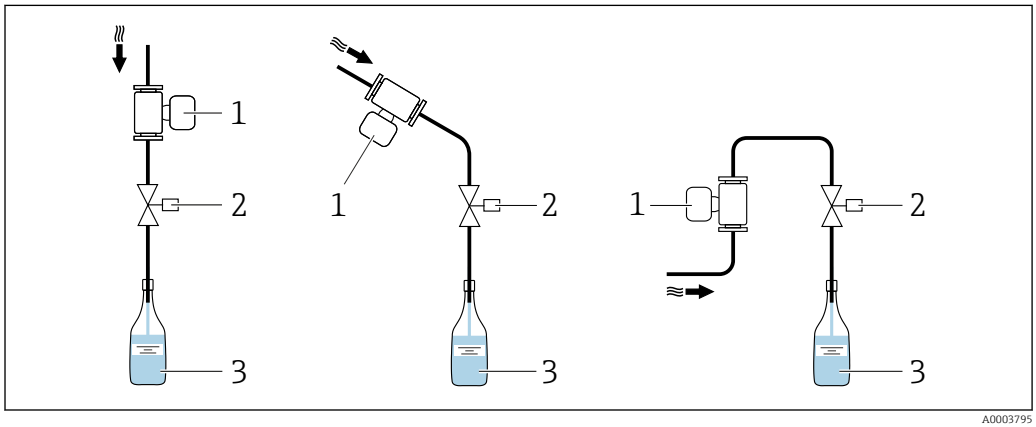



A0003768

*1 Measuring device*
*2 Filling valve*
*3 Container*

### Filling systems

The pipe system must be completely full to ensure optimum measurement.




A0003795

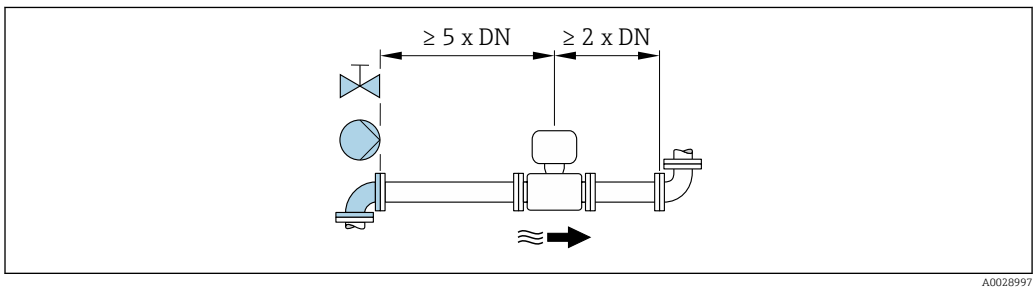
9 *Filling system*

*1 Measuring device*
*2 Filling valve*
*3 Container*

## 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

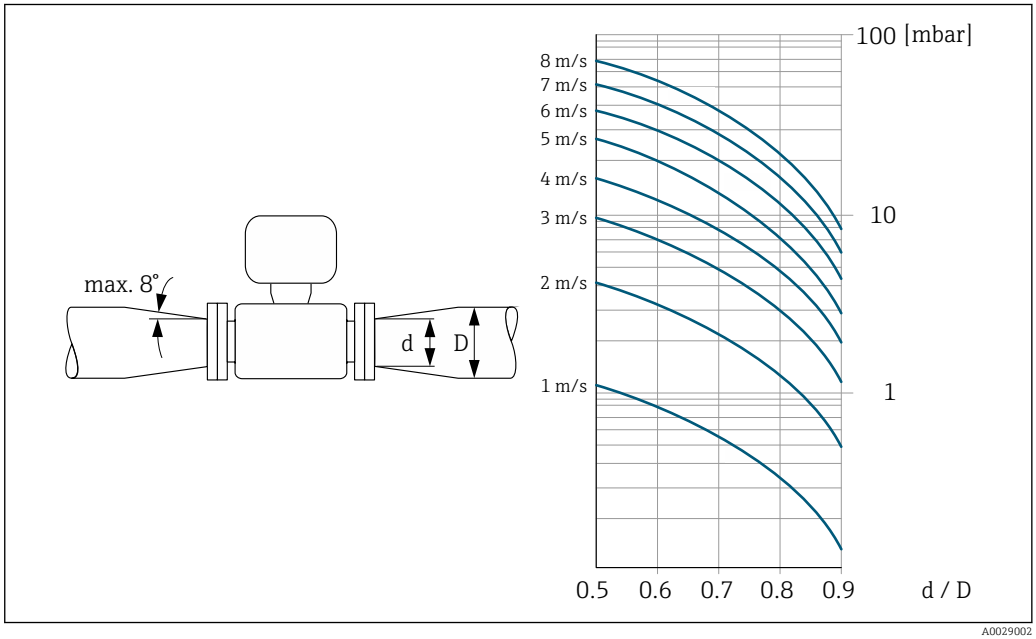
## Adapters

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.

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

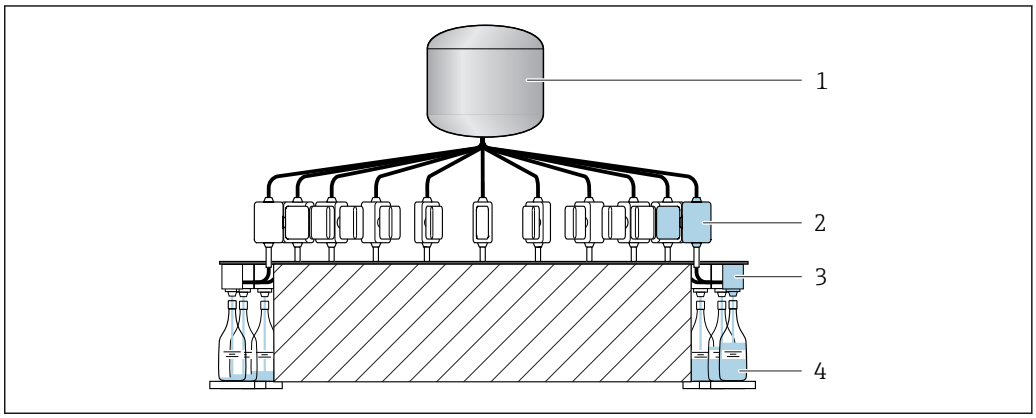



## Special mounting instructions

### Information for filling systems

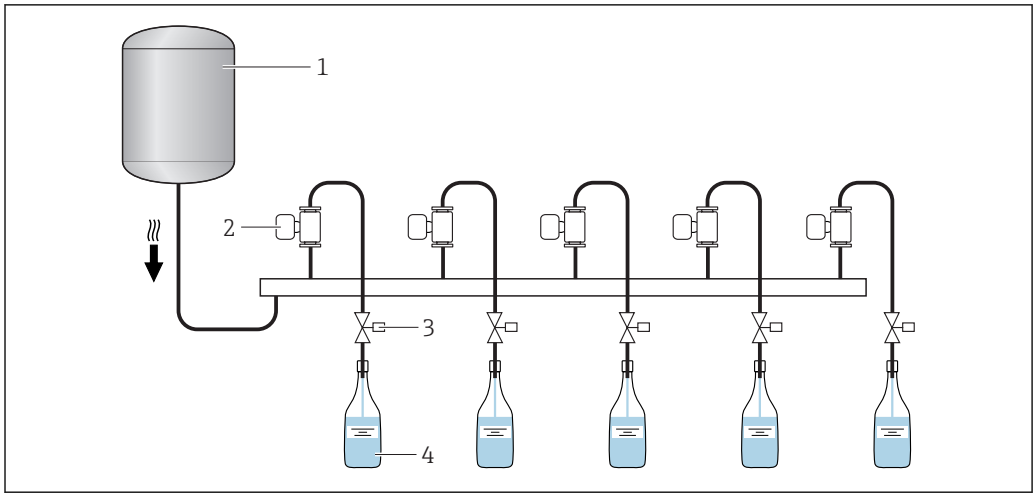
Correct measurement is possible only if the piping is completely filled. We therefore recommend that some test batches be carried out prior to production batching.

*Circular filling system*




1 *Tank*
2 *Measuring device*
3 *Batching valve*
4 *Vessel*

*Linear filling system*




*1 Tank*
*2 Measuring device*
*3 Batching valve*
*4 Vessel*

# Environment

**Ambient temperature range**

| | |
|---|---|
| Transmitter | –40 to +60 °C (–40 to +140 °F) |
| Sensor | –40 to +60 °C (–40 to +140 °F) |

### Temperature tables

The following interdependencies between the permitted ambient and fluid temperatures apply when operating the device in hazardous areas:

**Ex nA**

*SI units*

| | T5 [100 °C] | T4 [135 °C] | T3 [200 °C] | T2 [300 °C] | T1 [450 °C] |
|---|---|---|---|---|---|
| Ambient temperature $T_a$ | 60 | 50 | 45 | 45 | 45 |
| Maximum medium temperature $T_m$ | 70 | 105 | 130 | 130 | 130 |

*US units*

| | T5 [212 °F] | T4 [275 °F] | T3 [392 °F] | T2 [572 °F] | T1 [842 °F] |
|---|---|---|---|---|---|
| Ambient temperature $T_a$ | 140 | 122 | 113 | 113 | 113 |
| Maximum medium temperature $T_m$ | 158 | 221 | 266 | 266 | 266 |

The minimum temperature of the medium is –20 °C (–4 °F).

The minimum ambient temperature is –40 °C (–40 °F).

**Storage temperature**

The storage temperature corresponds to the ambient temperature range of the transmitter and sensor.→ 24

- 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.

**Degree of protection**

As standard: IP67, type 4X enclosure

**Shock resistance**

Acceleration up to 2 g based on IEC 60068-2-6

**Vibration resistance**

Acceleration up to 2 g based on IEC 60068-2-6

**Interior cleaning**

- Cleaning in place (CIP)
- Sterilization in place (SIP)

Observe the maximum medium temperatures → 25

**Electromagnetic compatibility (EMC)**

According to IEC/EN 61326

For details, refer to the Declaration of Conformity.

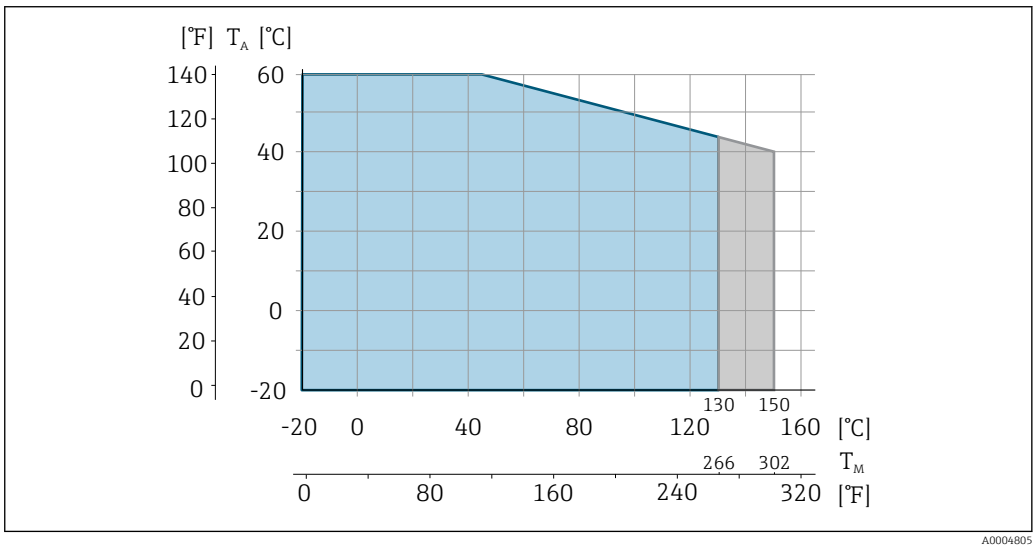
# Process

**Medium temperature range**

**Sensor**
−20 to +130 °C (−4 to +266 °F)

**Cleaning**
+150 °C (+302 °F) / 60 min for CIP and SIP processes

**Seals**
- EPDM: −20 to +130 °C (−4 to +266 °F) (max. +150 °C (302 °F) for cleaning
- Silicon:−20 to +130 °C (−4 to +266 °F)
- Viton:0 to +150 °C (+32 to +302 °F)




A0004805

$T_A$ Ambient temperature

$T_M$ Medium temperature

Light-gray area: standard fluid temperature range

Dark-gray area: fluid temperature range for cleaning

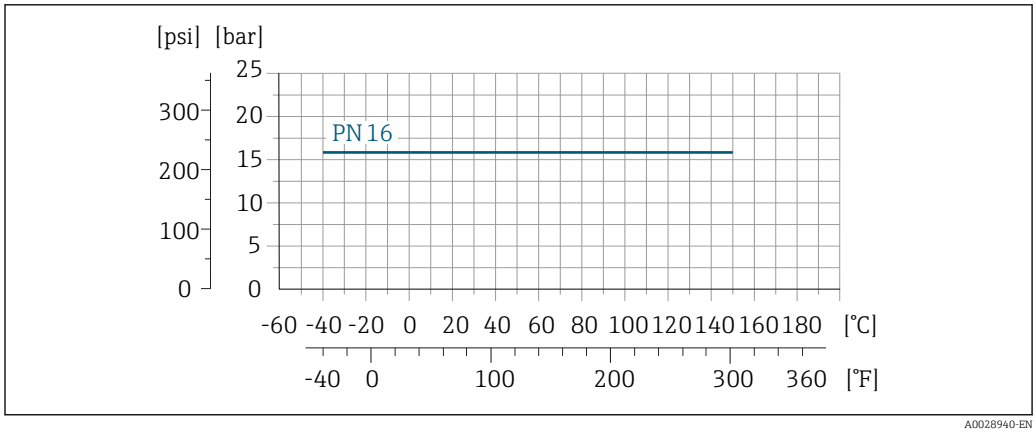
**Conductivity**

- ≥ 5 µS/cm for liquids in general
- ≥ 10 µS/cmfor demineralized water

**Pressure-temperature ratings**

Permitted process pressure: 16 bar (232 psi)

**Process connection: Welded connection as per EN 10357 (DIN 11850), ODT/SMS; clamp L14 AM7**




A0028940-EN

*10 Process connection material: 1.4404 (316L) (with molded seal)*

**Pressure tightness**

*Liner: PFA*

| Nominal diameter | | Limit values for absolute pressure in [mbar] ([psi]) for fluid temperatures: | |
|---|---|---|---|
| [mm] | [in] | +25 °C (+77 °F) | +150 °C (+302 °F) |
| 4 to 25 | 5/32 to 1 | > 1 mbar (0.402 in$H_2O$) (0) | > 1 mbar (0.402 in$H_2O$) (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 media (e.g. cleaning agents)
- v > 2 m/s (6.56 ft/s): For media that produce buildup (e.g. liquids containing oil and sugar)

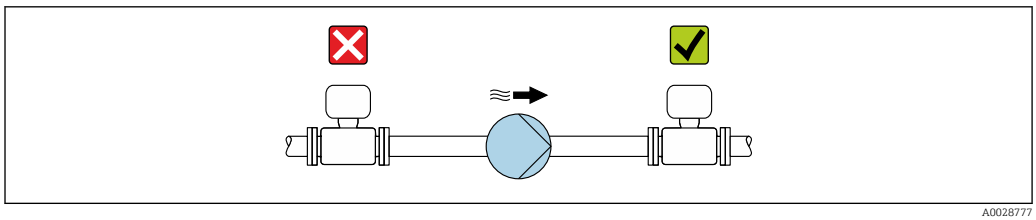
A necessary increase in the flow velocity can be achieved by reducing the sensor nominal diameter.

For an overview of the full scale values for the measuring range, see the "Measuring range" section → 🖹 6

**Pressure loss**

- For DN 8 (5/16"), DN 15 (½") and DN 25 (1") 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 → 🖹 22

**System pressure**



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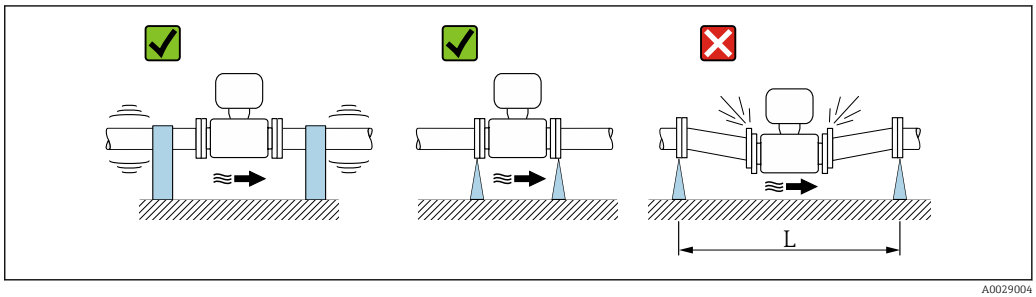
Never install the sensor on the pump suction side in order to avoid the risk of low pressure, and thus damage to the liner.

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

- For information on the liner's resistance to partial vacuum → 🖹 26
- For information on the shock resistance of the measuring system → 🖹 25
- For information on the vibration resistance of the measuring system → 🖹 25

### Vibrations




11 *Measures to avoid device vibrations (L > 10 m (33 ft))*

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

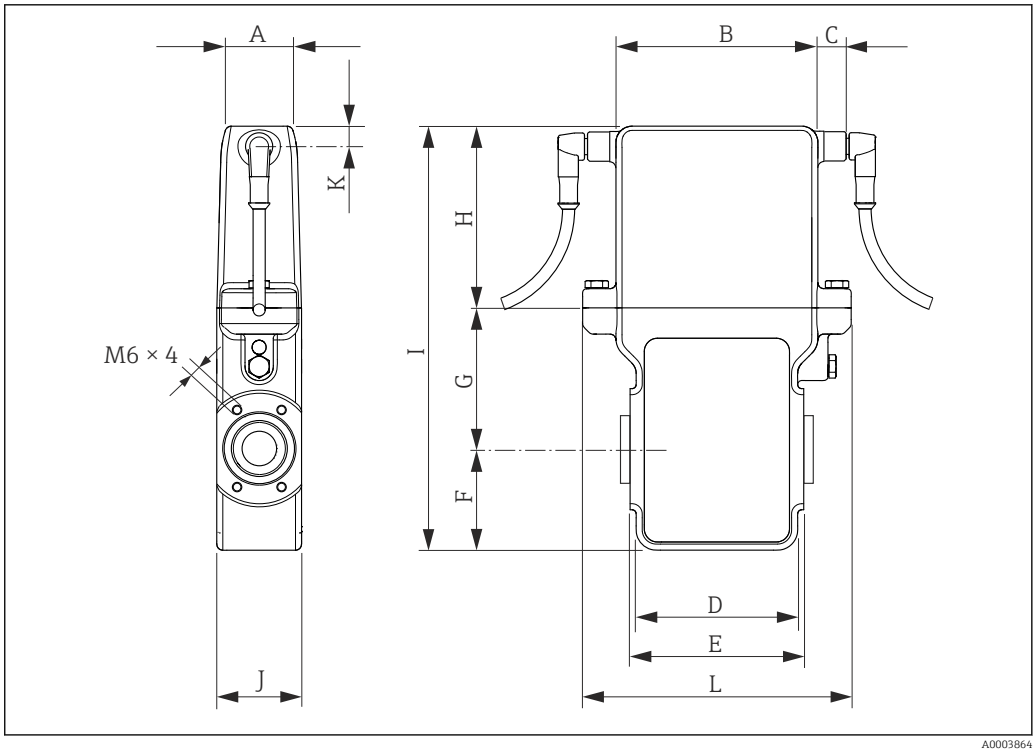
- For information on the shock resistance of the measuring system → 25
- For information on the vibration resistance of the measuring system → 25

# Mechanical construction

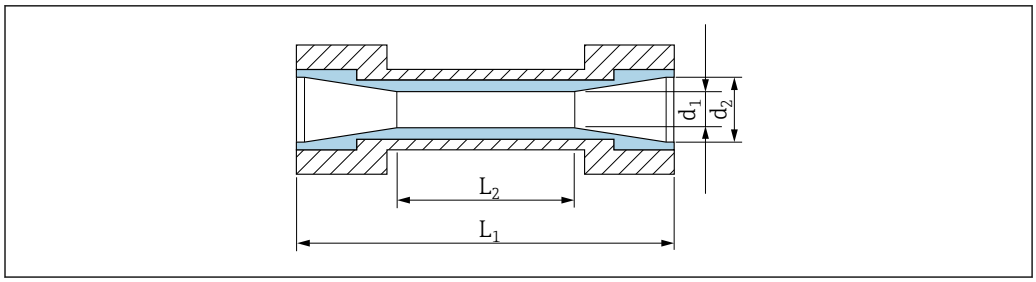
### Dimensions in SI units

#### Compact version

*Order code for "Housing", option B "Compact IP67 NEMA4X, stainless steel", DN 4 to 15 (5/32 to ½")*




| L [mm] | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] | F [mm] | G [mm] | H [mm] | I [mm] | J [mm] | K [mm] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 133 | 33.4 | 100 | 12 | 80 | 86 | 50 | 70 | 90 | 210 | 42 | 10 |

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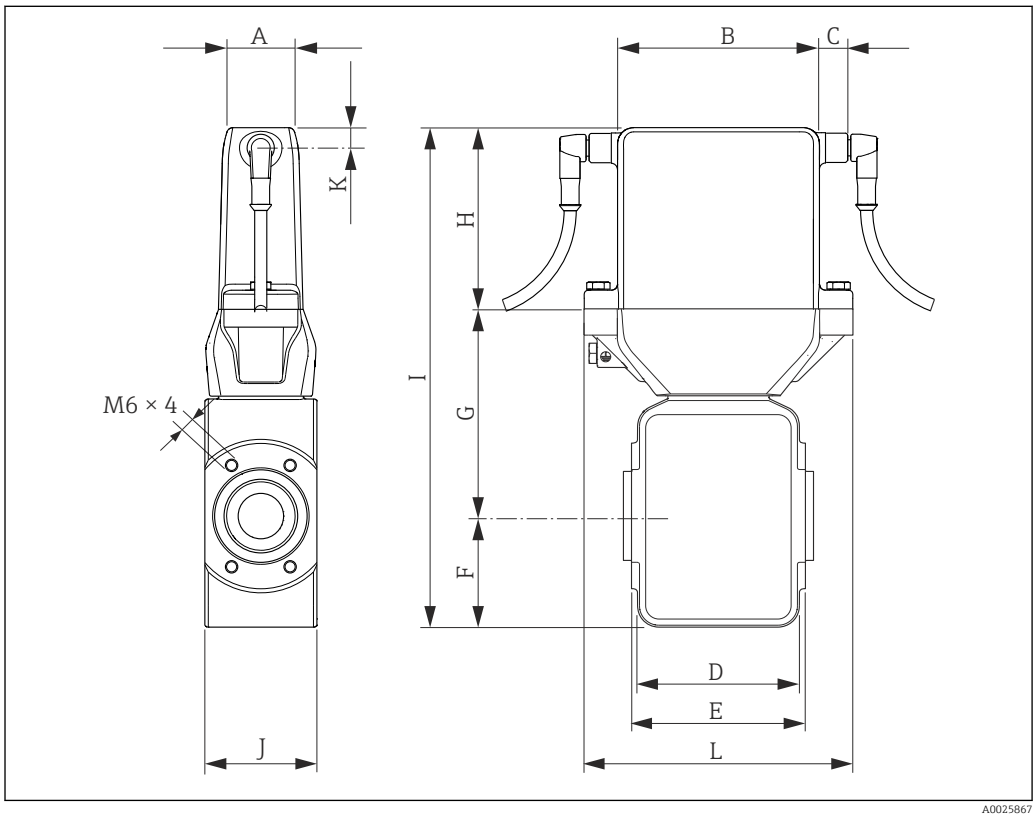
12 *Measuring tube dimensions*

| DN [mm] | $L_1$ [mm] 1) | L2 | $d_1$ [mm] | $d_2$ |
|---|---|---|---|---|
| 4 | 94 | 20 | 4.5 | 9 |
| 8 | 94 | – | 9 | 9 |
| 15K 2) | 94 | 20 | 12 | 16 |
| 15 | 94 | – | 16 | 16 |

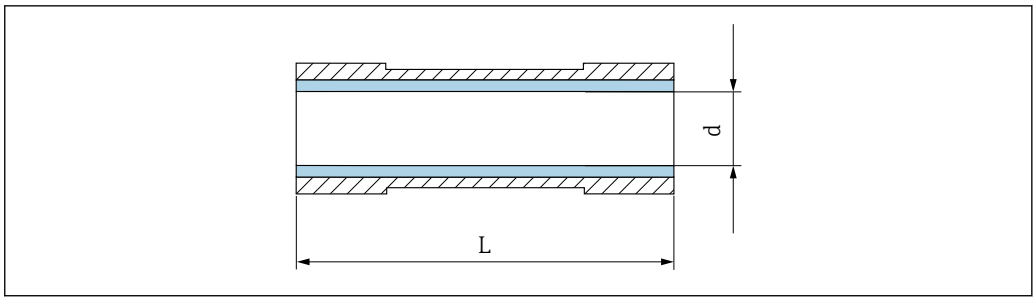
1) Total length depends on process connections
2) Conical version (corresponds to DN 12)

*Order code for "Housing", option B "Compact IP67 NEMA4X, stainless steel", DN 25 (1")*




A0025867

| L [mm] | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] | F [mm] | G [mm] | H [mm] | I [mm] | J [mm] | K [mm] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 133 | 33.4 | 100 | 12 | 80 | 86 | 55 | 102 | 90 | 247 | 55.5 | 10 |



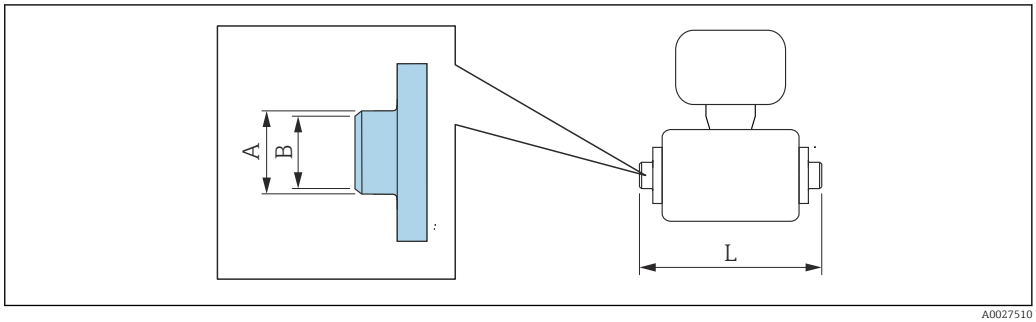

13 *Measuring tube dimensions*

| DN [mm] | L [1] [mm] | d [mm] |
|---|---|---|
| 25 | 94 | 22.6 (ASME) |
| 25 | 94 | 26 (DIN) |

1) Total length depends on process connections

### Welded connections

*With O-ring seal*




Length tolerance for dimension L in mm:
+1.5 / −2.0

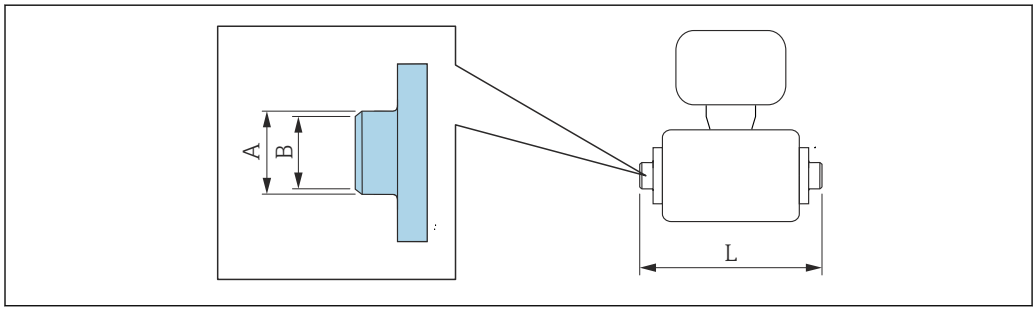
| Welded connection as per DIN EN ISO 1127<br>1.4404 (316L)<br>Order code for "Process connection", option B | | | | |
|---|---|---|---|---|
| DN [mm] | Suitable for pipe DIN EN ISO 1127 [mm] | A [mm] | B [mm] | L [mm] |
| 8 | 13.5 × 1.6 | 13.5 | 10.3 | 126.6 |
| 15K [1]<br>15 | 21.3 × 1.6 | 21.3 | 18.1 | 126.6 |

1) Conical version (corresponds to DN 12)

| Welded connection as per ODT/SMS<br>1.4404 (316L)<br>Order code for "Process connection", option C | | | | |
|---|---|---|---|---|
| DN<br>[mm] | Suitable for pipe ODT/SMS<br>[mm] | A<br>[mm] | B<br>[mm] | L<br>[mm] |
| 8 | 13.5 × 2.30 | 13.5 | 9 | 126.6 |
| 15K [1]<br>15 | 21.3 × 2.65 | 21.3 | 16 | 126.6 |

1) Conical version (corresponds to DN 12)

*With aseptic molded seal:*




A0027510

Length tolerance for dimension L in mm:
+1.5 / −2.0

| Welded connection EN 10357 (DIN 11850)<br>*1.4404 (316L): Order code for "Process connection", option U* | | | | |
|---|---|---|---|---|
| DN sensor<br>[mm] | Suitable for pipe EN 10357 (DIN 11850)<br>[mm] | A<br>[mm] | B<br>[mm] | L<br>[mm] |
| 4<br>8 | 13 × 1.5 | 13 | 10 | 132 |
| 15K [1]<br>15 | 19 × 1.5 | 19 | 16 | 132 |
| 25 | 30 × 2 | 30 | 26 | 132.3 |
| It is essential to take the internal diameters of the measuring tube and process connection (B) into account when cleaning with pigs! | | | | |

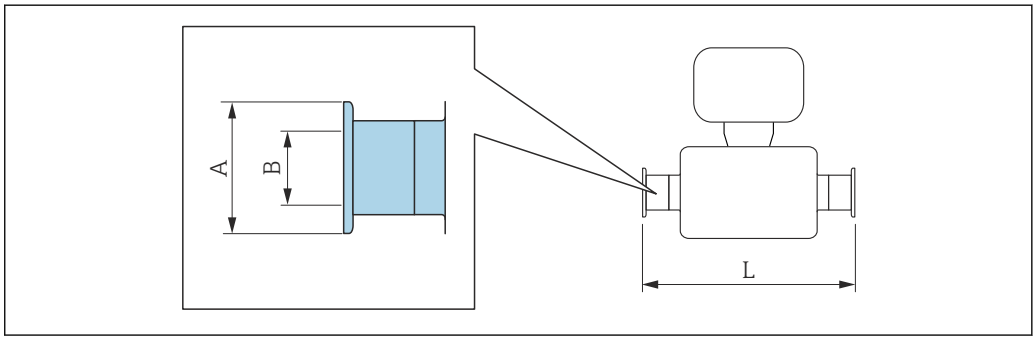
1) Conical version (corresponds to DN 12)

| Weld-in nipple ODT/SMS<br>*1.4404 (316L): Order code for "Process connection", option V* | | | | |
|---|---|---|---|---|
| DN sensor<br>[mm] | Suitable for pipe ODT/SMS<br>[mm] | A<br>[mm] | B<br>[mm] | L<br>[mm] |
| 4<br>8 | 12.7 × 1.65 | 12 | 10 | 118.2 |
| 15K [1]<br>15 | 19.05 × 1.65 | 18 | 16 | 118.2 |

| **Weld-in nipple ODT/SMS**<br>*1.4404 (316L): Order code for "Process connection", option V* | | | | |
|---|---|---|---|---|
| **DN sensor**<br>**[mm]** | **Suitable for pipe ODT/SMS**<br>**[mm]** | **A**<br>**[mm]** | **B**<br>**[mm]** | **L**<br>**[mm]** |
| 25 | 25.4 × 1.60 | 25 | 22.6 | 118.2 |
| It is essential to take the internal diameters of the measuring tube and process connection (B) into account when cleaning with pigs! | | | | |

1) Conical version (corresponds to DN 12)

### Clamp connections




A0015625

Length tolerance for dimension L in mm:
+1.5 / −2.0

| **Tri-Clamp L14 AM7**<br>*1.4404 (316L): Order code for "Process connection", option 1* | | | | |
|---|---|---|---|---|
| **DN sensor**<br>**[mm]** | **Suitable for pipe ODT**<br>**[mm]** | **A**<br>**[mm]** | **B**<br>**[mm]** | **L**<br>**[mm]** |
| 4<br>8 | 12.7 × 1.65 | 25.0 | 9.4 | 143 |
| 15K [1)]<br>15 | 19.1 × 1.65 | 25.0 | 15.8 | 143 |
| 25 | 25.4 × 1.65 | 50.4 | 22.1 | 143 |
| It is essential to take the internal diameters of the measuring tube and process connection (B) into account when cleaning with pigs! | | | | |

1) Conical version (corresponds to DN 12)

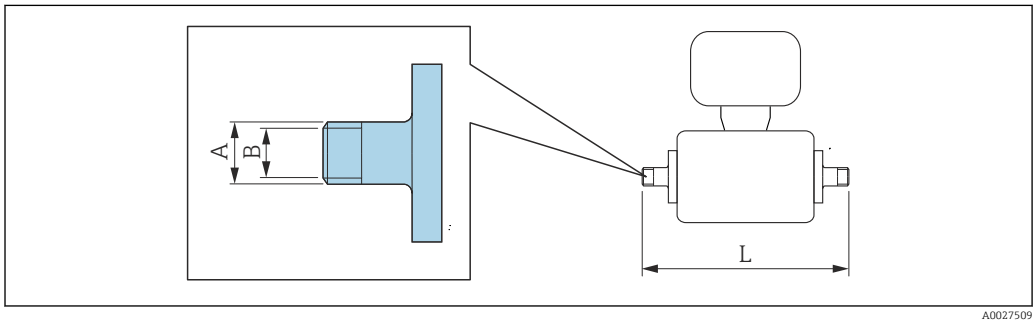
| **Tri-Clamp 1" L14 AM7**<br>*1.4404 (316L): Order code for "Process connection", option 8* | | | | |
|---|---|---|---|---|
| **DN sensor**<br>**[mm]** | **Suitable for pipe ODT**<br>**[mm]** | **A**<br>**[mm]** | **B**<br>**[mm]** | **L**<br>**[mm]** |
| 15K [1)]<br>15 | Pipe 25.4 × 1.65 | 50.4 | 22.1 | 143 |
| 25 | Pipe 25.4 × 1.65 | 50.4 | 22.1 | 143 |
| It is essential to take the internal diameters of the measuring tube and process connection (B) into account when cleaning with pigs! | | | | |

1) Conical version (corresponds to DN 12)

| **Tri-Clamp 3/4" (conical) L14 AM7**<br>*1.4404 (316L): Order code for "Process connection", option 2* | | | | |
|---|---|---|---|---|
| **DN sensor**<br>**[mm]** | **Suitable for pipe ODT**<br>**[mm]** | **A**<br>**[mm]** | **B**<br>**[mm]** | **L**<br>**[mm]** |
| 4<br>8 | Pipe 19.1 × 1.65 | 25.0 | 9 | 143 |
| It is essential to take the internal diameters of the measuring tube and process connection (B) into account when cleaning with pigs! | | | | |

### Cable glands

*With O-ring seal*




A0027509

Length tolerance for dimension L in mm:
+1.5 / −2.0

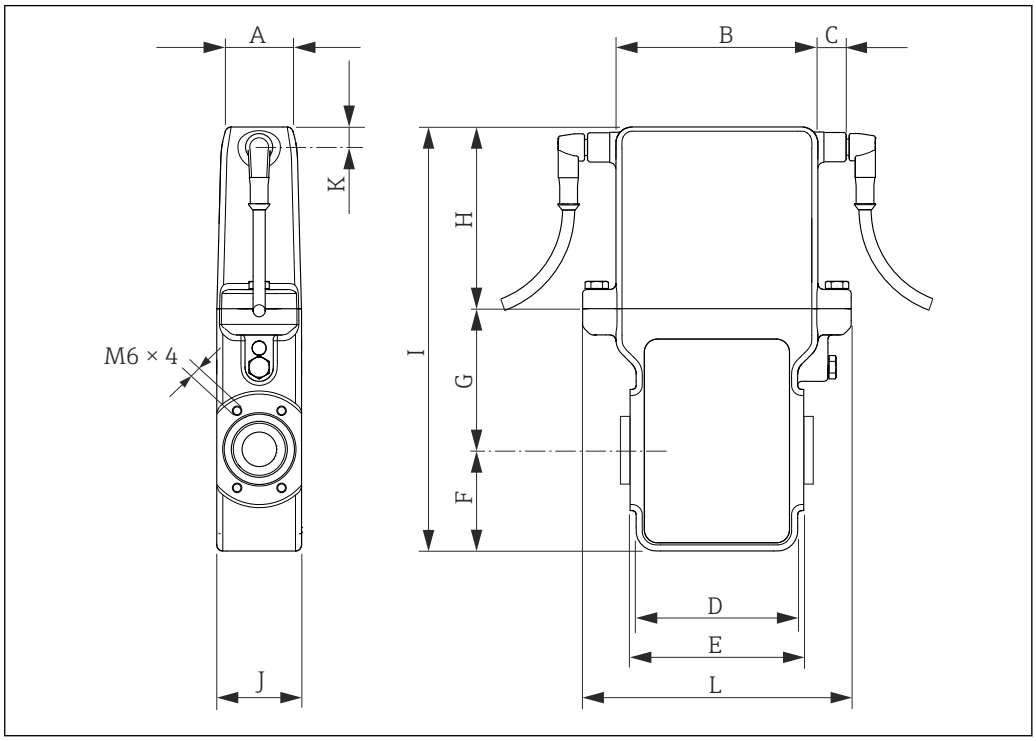
| **internal thread as per ISO 228/DIN 2999**<br>**1.4404 (316L)**<br>**Order code for "Process connection", option L** | | | | |
|---|---|---|---|---|
| **DN**<br>**[mm]** | **Suitable for external thread ISO 228 / DIN 2999**<br>**[in]** | **A**<br>**[mm]** | **B**<br>**[mm]** | **L**<br>**[mm]** |
| 8 | Rp 3/8 | 22 | 9 | 176 |
| 15K [1)]<br>15 | Rp ½ | 27 | 16 | 176 |

1) Conical version (corresponds to DN 12)

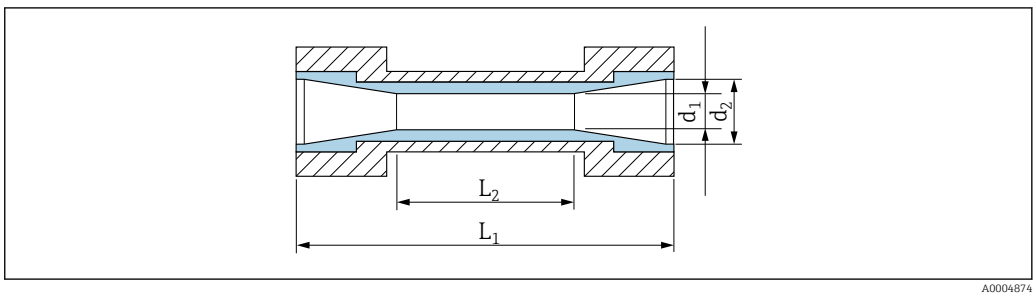
**Dimensions in US units**

**Compact version**

*Order code for "Housing", option B "Compact IP67 NEMA4X, stainless steel", DN 4 to 15 (5/32 to ½")*




| L [in] | A [in] | B [in] | C [in] | D [in] | E [in] | F [in] | G [in] | H [in] | I [in] | J [in] | K [in] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.24 | 1.31 | 3.94 | 0.47 | 3.15 | 3.39 | 1.97 | 2.76 | 3.54 | 8.27 | 1.65 | 0.39 |

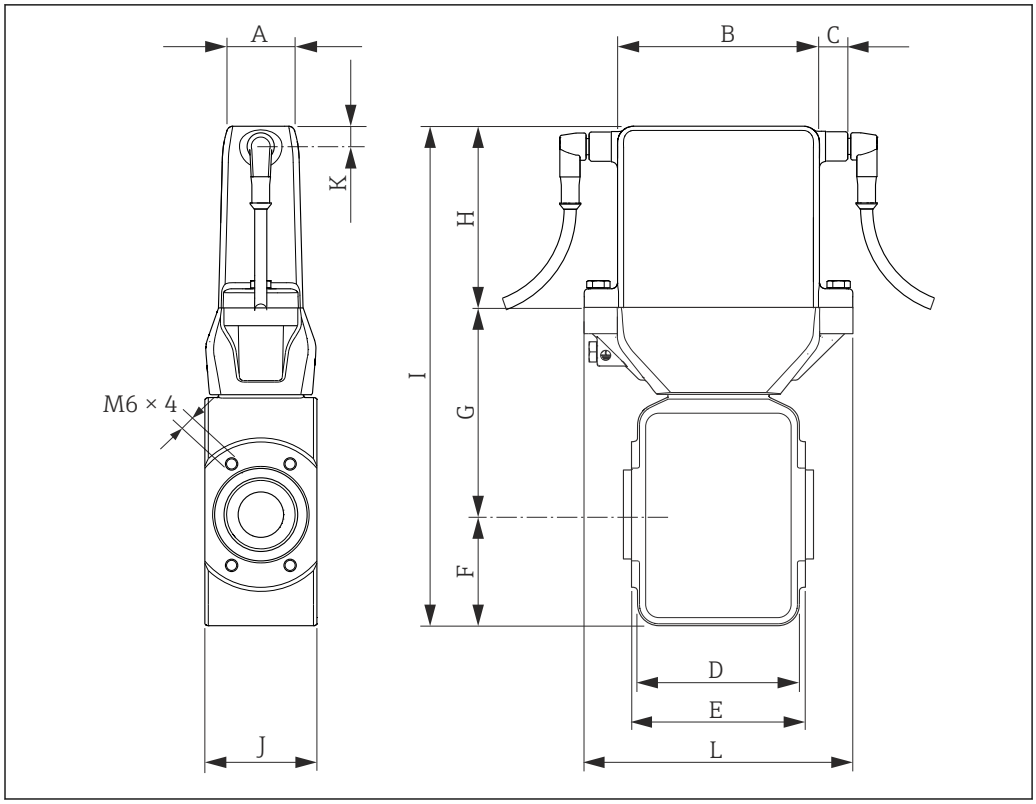



14 *Measuring tube dimensions*

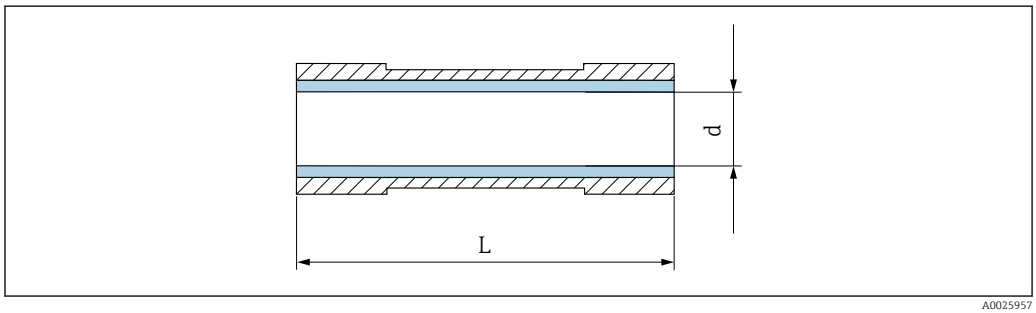
| DN [in] | L [1] [in] | L2 | $d_1$ [in] | $d_2$ |
|---|---|---|---|---|
| 5/32 | 3.70 | 0.79 | 0.17 | 0.35 |
| 5/16 | 3.70 | – | 0.35 | 0.35 |
| ½K [2] | 3.70 | 0.79 | 0.47 | 0.63 |
| ½ | 3.70 | – | 0.63 | 0.63 |

1) Total length depends on process connections
2) Conical version (corresponds to DN 12)

*Order code for "Housing", option B "Compact IP67 NEMA4X, stainless steel", DN 25 (1")*




| L [in] | A [in] | B [in] | C [in] | D [in] | E [in] | F [in] | G [in] | H [in] | I [in] | J [in] | K [in] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.24 | 1.31 | 3.94 | 0.47 | 3.15 | 3.39 | 2.17 | 4.02 | 3.54 | 9.72 | 2.19 | 0.39 |



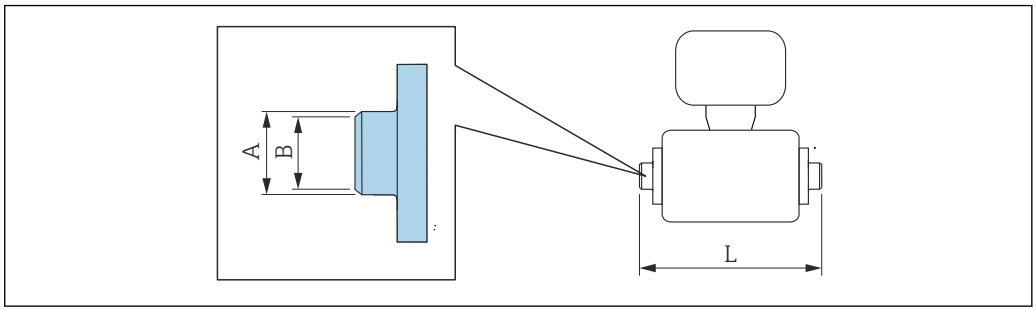

15 *Measuring tube dimensions*

| DN [in] | L [1)] [in] | d [in] |
|---|---|---|
| 1 | 3.70 | 0.89 (ASME) |
| 1 | 3.70 | 1.02 (DIN) |

1) Total length depends on process connections

### Welded connections

*With O-ring seal*



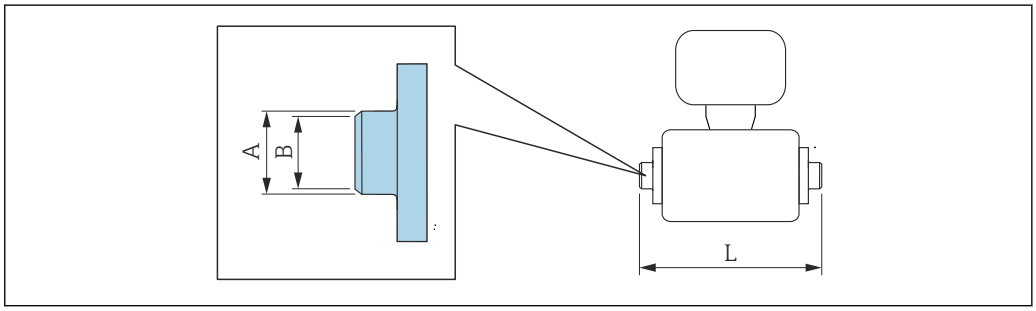

A0027510

Length tolerance for dimension L in inch:
+0.06 / −0.08

| Welded connection as per ODT/SMS<br>1.4404 (316L)<br>Order code for "Process connection", option C | | | | |
|---|---|---|---|---|
| DN<br>[in] | Suitable for pipe ODT/SMS<br>[in] | A<br>[in] | B<br>[in] | L<br>[in] |
| 5/16 | 0.53 × 0.09 | 0.53 | 0.35 | 4.98 |
| ½K 1)<br>½ | 0.84 × 0.10 | 0.84 | 0.63 | 4.98 |

1) Conical version (corresponds to DN 12)

*With aseptic molded seal:*




A0027510

Length tolerance for dimension L in inch:
+0.06 / −0.08

| Welded connection EN 10357 (DIN 11850)<br>*1.4404 (316L): Order code for "Process connection", option U* | | | | |
|---|---|---|---|---|
| DN sensor<br>[in] | Suitable for pipe EN 10357 (DIN 11850)<br>[in] | A<br>[in] | B<br>[in] | L<br>[in] |
| 5/32<br>5/16 | 0.51 × 0.06 | 0.51 | 0.39 | 5.20 |
| ½K 1)<br>½ | 0.75 × 0.06 | 0.75 | 0.63 | 5.20 |

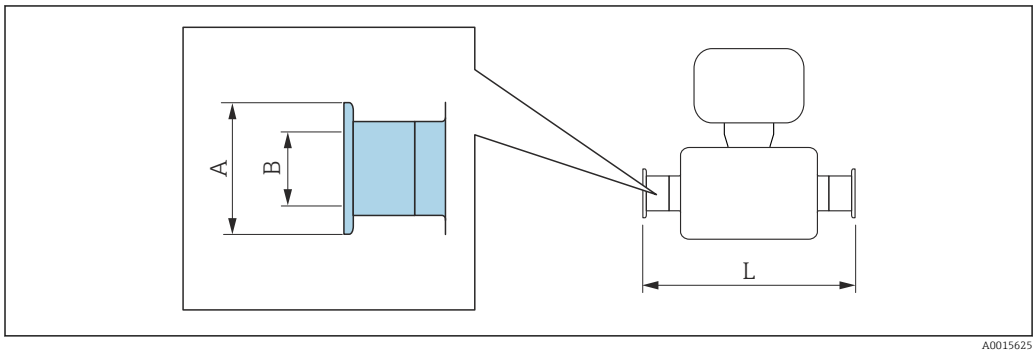
| **Welded connection EN 10357 (DIN 11850)**<br>*1.4404 (316L): Order code for "Process connection", option U* | | | | |
|---|---|---|---|---|
| **DN sensor**<br>**[in]** | **Suitable for pipe EN 10357 (DIN 11850)**<br>**[in]** | **A**<br>**[in]** | **B**<br>**[in]** | **L**<br>**[in]** |
| 1 | 1.18 × 0.08 | 1.18 | 1.02 | 5.21 |
| It is essential to take the internal diameters of the measuring tube and process connection (B) into account when cleaning with pigs! | | | | |

1) Conical version (corresponds to DN 12)

| **Weld-in nipple ODT/SMS**<br>*1.4404 (316L): Order code for "Process connection", option V* | | | | |
|---|---|---|---|---|
| **DN sensor**<br>**[in]** | **Suitable for pipe ODT/SMS**<br>**[in]** | **A**<br>**[in]** | **B**<br>**[in]** | **L**<br>**[in]** |
| 5/32<br>5/16 | 0.50 × 0.06 | 0.47 | 0.39 | 4.65 |
| ½K [1]<br>½ | 0.75 × 0.06 | 0.71 | 0.63 | 4.65 |
| 1 | 1 × 0.06 | 1 | 0.89 | 4.65 |
| It is essential to take the internal diameters of the measuring tube and process connection (B) into account when cleaning with pigs! | | | | |

1) Conical version (corresponds to DN 12)

### Clamp connections




A0015625

Length tolerance for dimension L in inch:
+0.06 / −0.08

| **Tri-Clamp L14 AM7**<br>*1.4404 (316L): Order code for "Process connection", option 1* | | | | |
|---|---|---|---|---|
| **DN sensor**<br>**[in]** | **Suitable for pipe ODT**<br>**[in]** | **A**<br>**[in]** | **B**<br>**[in]** | **L**<br>**[in]** |
| 5/32<br>5/16 | ODT ½ | 0.98 | 0.37 | 5.63 |
| ½K [1]<br>½ | ODT ¾ | 0.62 | 0.62 | 5.63 |

| **Tri-Clamp L14 AM7**<br>*1.4404 (316L): Order code for "Process connection", option 1* | | | | |
|---|---|---|---|---|
| **DN sensor**<br>**[in]** | **Suitable for pipe ODT**<br>**[in]** | **A**<br>**[in]** | **B**<br>**[in]** | **L**<br>**[in]** |
| 1 | ODT 1 | 1.98 | 0.87 | 5.63 |
| It is essential to take the internal diameters of the measuring tube and process connection (B) into account when cleaning with pigs! | | | | |

1) Conical version (corresponds to DN 12)

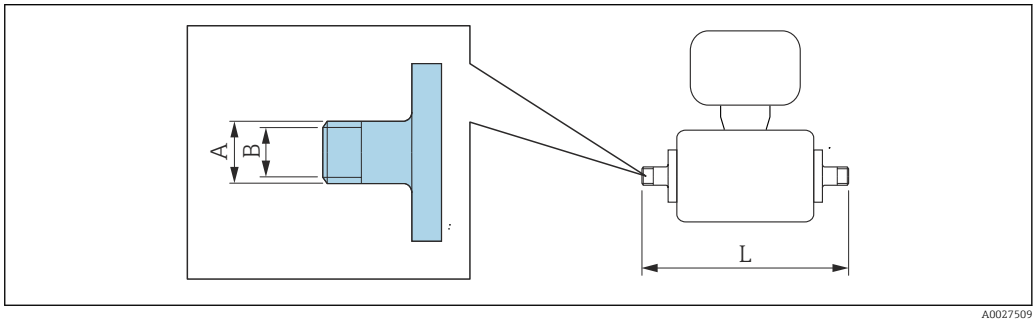
| **Tri-Clamp 1" L14 AM7**<br>*1.4404 (316L): Order code for "Process connection", option 8* | | | | |
|---|---|---|---|---|
| **DN sensor**<br>**[in]** | **Suitable for pipe ODT**<br>**[in]** | **A**<br>**[in]** | **B**<br>**[in]** | **L**<br>**[in]** |
| ½K [1)]<br>½ | 1 | 1.98 | 0.87 | 5.63 |
| 1 | 1 | 1.98 | 0.87 | 5.63 |
| It is essential to take the internal diameters of the measuring tube and process connection (B) into account when cleaning with pigs! | | | | |

1) Conical version (corresponds to DN 12)

| **Tri-Clamp 3/4" (conical) L14 AM7**<br>*1.4404 (316L): Order code for "Process connection", option 2* | | | | |
|---|---|---|---|---|
| **DN sensor**<br>**[in]** | **Suitable for pipe ODT**<br>**[in]** | **A**<br>**[in]** | **B**<br>**[in]** | **L**<br>**[in]** |
| 5/32<br>5/16 | ODT ¾ | 1.12 | 0.35 | 5.63 |
| It is essential to take the internal diameters of the measuring tube and process connection (B) into account when cleaning with pigs! | | | | |

### Cable glands

*With O-ring seal*




A0027509

Length tolerance for dimension L in inch:
+0.06 / −0.08

| internal thread as per ISO 228/DIN 2999<br>1.4404 (316L)<br>Order code for "Process connection", option L | | | | |
|---|---|---|---|---|
| DN<br><br>[in] | Suitable for external thread ISO 228 / DIN 2999<br><br>[in] | A<br><br>[in] | B<br><br>[in] | L<br><br>[in] |
| 5/16 | Rp 3/8 | 0.87 | 0.35 | 6.93 |
| ½K [1]<br>½ | Rp ½ | 1.06 | 0.63 | 6.93 |

1) Conical version (corresponds to DN 12)

## Weight

### Compact version

*Weight in SI units*

| DN [mm] | Weight [kg] |
|---|---|
| 4 | 2.8 |
| 8 | 2.8 |
| 15 | 2.8 |
| 25 | 4.3 |

*Weight in US units*

| DN [in] | Weight [lbs] |
|---|---|
| 5/32 | 6.17 |
| 5/16 | 6.17 |
| ½ | 6.17 |
| 1 | 9.48 |

## Materials

### Transmitter housing

- Acid and alkali-resistant outer surface
- Stainless steel 1.4308 (304)

### Device plugs

| Electrical connection | Material |
|---|---|
| Plug M12x1 | ▪ Socket: Stainless steel, 1.4404 (316L)<br>▪ Contact housing: Polyamide<br>▪ Contacts: Gold-plated brass |

### Sensor housing

- Acid and alkali-resistant outer surface
- Stainless steel 1.4301 (304)

### Measuring tube

Stainless steel 1.4301 (304)

*Liner*

PFA

**Electrodes**

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

**Process connections**

- Weld-in nipple: 1.4404 (316L)
- Weld-in nipple, aseptic: 1.4404 (316L)
- Tri-Clamp: 1.4404 (316L)
- Couplings: 1.4404 (316L)

List of all available process connections → 39

**Seals**

Molded seal (EPDM, silicone, Viton)

**Fitted electrodes**

- Standard: stainless steel 1.4435 (316L)
- Optional: Alloy C22, 2.4602 (UNS N06022), platinum, tantalum

**Process connections**

**With O-ring seal**

**Welded connections**
- DIN EN ISO 1127
- ODT/SMS

**Coupling**
ISO 228/DIN 2999

**With aseptic molded seal:**

**Welded connections**
- EN 10357, DIN 11850
- ODT/SMS

**Tri-Clamp**
L14 AM7

For information on the different materials used in the process connections → 39

**Surface roughness**

Stainless steel electrodes, 1.4435 (304L); Alloy C22, 2.4602 (UNS N06022), platinum, tantalum: 0.3 to 0.5 µm (11.8 to 19.7 µin)

Liner with PFA:
≤ 0.4 µm (15.7 µin)

Process connection:
≤ 0.8 µm (31 µin)
(All data relate to parts in contact with fluid)

# Operability

**Local operation**

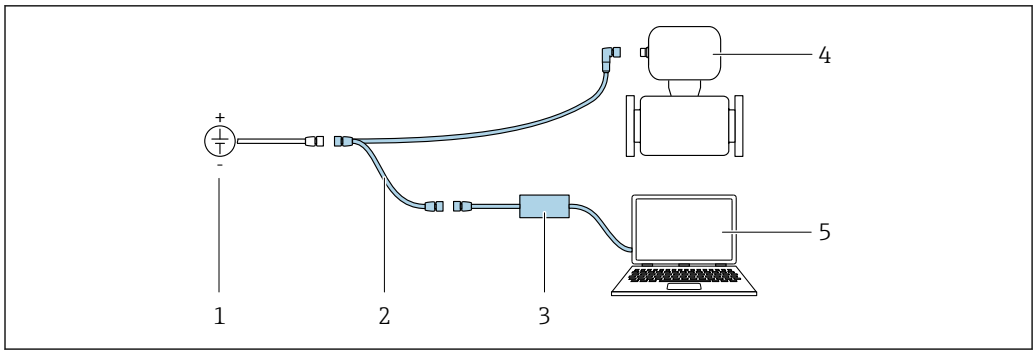
This device cannot be operated locally using a display or operating elements.

**Remote operation**

**Using service adapter and Commubox FXA291**

Operation and configuration can be performed using the Endress+Hauser FieldCare or DeviceCare service and configuration software.

The device is connected to the USB port of the computer via the service adapter and Commubox FXA291.




1 *Supply voltage 24 V DC*
2 *Service adapter*
3 *Commubox FXA291*
4 *Measuring device*
5 *Computer with "FieldCare" or "DeviceCare" operating tool*

The service adapter, cable and Commubox FXA291 are not included in the delivery. These components can be ordered as accessories → 41.

# Certificates and approvals

**CE mark**

The measuring system is in conformity with the statutory requirements of the applicable EC Directives. These are listed in the corresponding EC Declaration of Conformity along with the standards applied.

Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.

**C-Tick symbol**

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

**Ex approval**

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.

The separate Ex documentation (XA) containing all the relevant explosion protection data is available from your Endress+Hauser sales center.

**ATEX, IECEx**

Currently, the following versions for use in hazardous areas are available:

*Ex nA*

| Category | Type of protection |
|---|---|
| II3G | Ex nA IIC T5 to T1 Gc |

**cCSAus**

Currently, the following versions for use in hazardous areas are available:

Class I Division 2 Groups ABCD

**Sanitary compatibility**

- 3A approval and EHEDG-certified
- Seals → FDA-compliant

**Pressure Equipment Directive**

- With the PED/G1/x (x = category) marking on the sensor nameplate, Endress+Hauser confirms compliance with the "Essential Safety Requirements" specified in Annex I of the Pressure Equipment Directive 97/23/EC.
- Devices bearing this marking (PED) are suitable for the following types of medium:
  Media in Group 1 and 2 with a vapor pressure greater than, or smaller and equal to0.5 bar (7.3 psi)
- Devices not bearing this marking (PED) are designed and manufactured according to good engineering practice. They meet the requirements of Art.3 Section 3 of the Pressure Equipment Directive 97/23/EC. The range of application is indicated in tables 6 to 9 in Annex II of the Pressure Equipment Directive.

**Measuring instrument approval**

Dosimag is suitable as an (optional) component for recording volume in legally regulated measuring systems for AdBlue / DEF (Diesel Exhaust Fluid) in accordance with Appendix MI-005 of the European Measuring Instruments Directive 2014/32/EU. Dosimag is certified in accordance with OIML R117-1:2007 / OIML R117-2:2014 and has an MID evaluation certificate confirming conformity with the basic requirements of the Measuring Instruments Directive.

**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
- IEC/EN 61326
  Emission in accordance with Class A requirements. Electromagnetic compatibility (EMC requirements).
- CAN/CSA C22.2 No. 61010-1-12
  Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use, Part 1: General Requirements
- ANSI/ISA-61010-1 (82.02.01)
  Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 1: General Requirements

# 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

# 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 sensor

| Accessories | Description | Order code |
|---|---|---|
| Seal set | For regular replacement of the seals on the process connections. | DK5G**-*** |
| Housing seal | To seal the transmitter | 50102857 |
| Mounting set | Consists of:<br>▪ 2 process connections<br>▪ Screws<br>▪ Seals | DKH**-**** |

## Communication-specific accessories

| Accessories | Description |
|---|---|
| FieldCare | FDT-based plant asset management tool from Endress+Hauser.<br>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.<br>For details, see Operating Instructions BA00027S and BA00059S |
| DeviceCare | Tool for connecting and configuring Endress+Hauser field devices.<br>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.<br>For details, see the "Technical Information" document TI405C/07 |
| Adapter connection | Adapter connections for installation on other electrical connections:<br>▪ Adapter FXA291 (order number: 71035809)<br>▪ Adapter RSE8 (order number: 50107169)<br>RSE8 connection jack, 8-pin adapter (RSE8), 24 V DC, pulse, status<br>▪ Adapter RSE5 (order number: 50107168 )<br>RSE8 connection jack, 5-pin adapter (RSE5), 24 V DC, pulse, status<br>▪ Adapter RSE4 (order number: 50107167)<br>RSE8 connection jack, 4-pin adapter (RSE4), 24 V DC, pulse |
| Connecting cable RSE8 | Cable RKWTN8-56/5 P92, length: 5 m<br>(Order number: 50107895) |

## Service-specific accessories

| Accessories | Description |
|---|---|
| Applicator | Software for selecting and sizing Endress+Hauser measuring devices:<br>▪ Calculation of all data required to determine the optimum flowmeter: e.g. nominal diameter, pressure loss, accuracy or process connections.<br>▪ Graphic illustration of the calculation results<br>Administration, documentation and access to all project-related data and parameters throughout the entire life cycle of a project.<br>Applicator is available:<br>▪ Via the Internet: https://wapps.endress.com/applicator<br>▪ On CD-ROM for local PC installation. |
| W@M | Life cycle management for your plant<br>W@M supports you with a wide range of software applications over the entire process: from planning and procurement, to the installation, commissioning and operation of the measuring devices. All the relevant information is available for every measuring device over time entire life cycle, such as the Device status, spare parts, device-specific documentation.<br>The application already contains the data of your Endress+Hauser device. Endress +Hauser also takes care of maintaining and updating the data records.<br>W@M is available:<br>▪ Via the Internet: www.endress.com/lifecyclemanagement<br>▪ On CD-ROM for local PC installation. |

| | |
|---|---|
| FieldCare | FDT-based plant asset management tool from Endress+Hauser.<br>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.<br>For details, see Operating Instructions BA00027S and BA00059S |
| DeviceCare | Tool for connecting and configuring Endress+Hauser field devices.<br>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.<br>For details, see "Technical Information" TI00405C |

# 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

| Measuring device | Documentation code |
|---|---|
| Dosimag | KA01175D |

### Operating Instructions

| Measuring device | Documentation code | |
|---|---|---|
| | Pulse/frequency/status output Option 3 | Modbus RS485 Options 4, 5 and 6 |
| Dosimag | BA00098D | BA01321D |

### Description of device parameters

| Measuring device | Documentation code | |
|---|---|---|
| | Pulse/frequency/status output Option 3 | Modbus RS485 Options 4, 5 and 6 |
| Dosimag | GP01049D | GP01048D |

## Supplementary device-dependent documentation

### Safety Instructions

| Contents | Documentation code |
|---|---|
| ATEX/IECEx Ex nA | XA01332D |
| cCSAus | FES0231 |
| UL Class 1 Division 2 | XA01377D |

### Special Documentation

| Contents | Documentation code |
|---|---|
| Information on Custody Transfer Measurement | SD01514D |

# Registered trademarks

**Modbus®**
Registered trademark of SCHNEIDER AUTOMATION, INC.

**TRI-CLAMP®**
Registered trademark of Ladish & Co., Inc., Kenosha, USA

**Applicator®, FieldCare®, DeviceCare®**
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www.addresses.endress.com

Endress+Hauser
People for Process Automation