Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technical Information

Proline Promag H 200

Electromagnetic flow measuring system
The device with genuine two-wire technology and for minimal flow rates

Application

- Accurate bidirectional measurement of liquids with a minimum conductivity of ≥ 20 μS/cm for chemical applications.
- The electromagnetic measuring principle is unaffected by pressure and temperature. Additionally the flow profile has a minimal effect on the measurement results.

Device properties
- Medium temperature: max. +150 °C (+302 °F)
- Nominal diameter: DN 02 to 25 (1/12 to 1") with a very large selection of process connections
- Vacuum-resistant PFA liner and seals
- Two-wire aluminium transmitter
- Graphical local display with operation from the outside (Touch Control)
- Communication via 4-20 mA HART
- Ex approvals accepted worldwide: ATEX, IECEx cCSAus (intrinsic safety or flameproof enclosure)

Your benefits

Genuine loop-powered technology for seamless 2-wire integration and robustness in process applications

Sizing – correct product selection
Applicator - the reliable, easy-to-use tool for selecting and sizing measuring devices for every application

Installation – simple and efficient
- Compact design
- Suitable for installations in the hazardous area
- Reduced wiring effort due to two-wire technology

Commissioning – reliable and intuitive
Guided parameterization – "Make-it-run" wizards

Operation – increased measurement availability
- Measurement of volume flow
- No pressure loss, no moving parts, immune to vibrations
- Diagnostics; Automatic data restore by HistoROM

Cost-effective Life Cycle Management by W@M

TI01061D/06/EN/01.12
71185909

Endress+Hauser
People for Process Automation

Table of contents

Document information

Symbols used

Electrical symbols

Symbol	Meaning
A0011197	**Direct current** A terminal to which DC voltage is applied or through which direct current flows.
A0011198	**Alternating current** A terminal to which alternating voltage is applied or through which alternating current flows.
A0017381	**Direct current and alternating current** ▪ A terminal to which alternating voltage or DC voltage is applied. ▪ A terminal through which alternating current or direct current flows.
A0011200	**Ground connection** A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
A0011199	**Protective ground connection** A terminal which must be connected to ground prior to establishing any other connections.
A0011201	**Equipotential connection** A connection that has to be connected to the plant grounding system: This may be a potential equalization line or a star grounding system depending on national or company codes of practice.

Symbols for certain types of information

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

Symbols in graphics

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

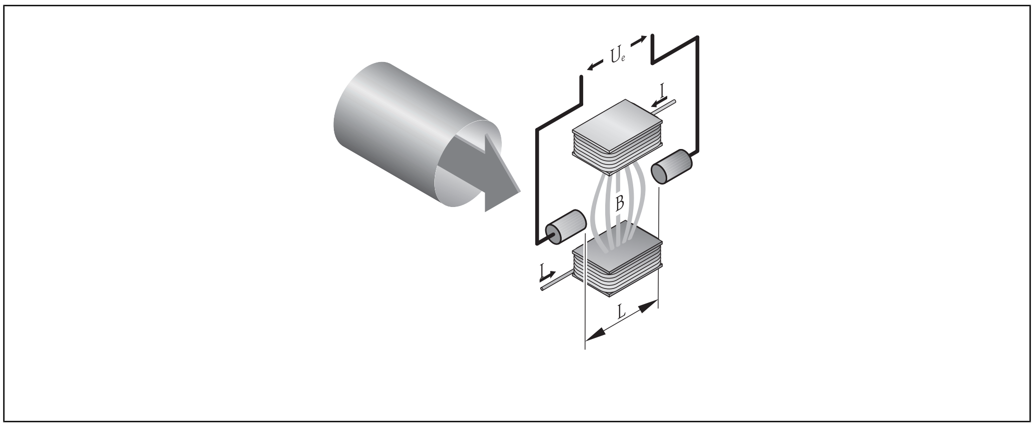
Symbol	Meaning
A0011187	**Hazardous area** Indicates a hazardous area.
A0011188	**Safe area (non-hazardous area)** Indicates a non-hazardous area.

Function and system design

Measuring principle

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

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



A0017035

1 $Ue = B \cdot L \cdot v$; $Q = A \cdot v$

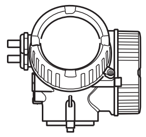
Ue *Induced voltage*
B *Magnetic induction (magnetic field)*
L *Electrode spacing*
v *Flow velocity*
Q *Volume flow*
A *Piping cross-section*
I *Current*

Measuring system

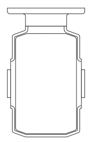
The device consists of a transmitter and a sensor.

One device version is available: compact version, transmitter and sensor form a mechanical unit.

Transmitter

Promag 200  A0013471	Materials: Aluminum coating AlSi10Mg Configuration: ▪ External operation via four-line, illuminated local display with touch control and guided menus ("Make-it-run" wizards) for applications ▪ Via operating tools (e.g. FieldCare)

Sensor

Promag H  A0017702	Nominal diameter range: DN 2 to 25 (1/12 to 1") Materials: ▪ Sensor housing: stainless steel 1.4301/304 ▪ Measuring tubes: stainless steel 1.4301/304 ▪ Liner: PFA (USP Class VI; FDA 21 CFR 177.1550; 3A) ▪ Process connections: stainless steel 1.4404/316L; PVDF; PVC adhesive sleeve ▪ Electrodes: 1.4435/316L, Alloy C-22, tantalum, platinum ▪ Seals: EPDM, FKM, Kalrez, silicone ▪ Ground rings: 1.4435/316L, Alloy C-22, tantalum

Input

Measured variable

Direct measured variables

Volume flow (proportional to induced voltage)

Calculated measured variables

Mass flow

Measuring range

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

Flow characteristic values in SI units

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.310 m/s/	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[mm]	[in]	[dm³/min]	[dm³/min]	[dm³]	[dm³/min]
2	1/12	0.06 to 1.8	0.5	0.005	0.01
4	1/8	0.25 to 7	2	0.025	0.05
8	3/8	1 to 30	8	0.1	0.1
15	½	4 to 100	25	0.2	0.5
25	1	9 to 300	75	0.5	1

Flow characteristic values in US units

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[in]	[mm]	[gal/min]	[gal/min]	[gal]	[gal/min]
1/12	2	0.015 to 0.5	0.1	0.001	0.002
1/8	4	0.07 to 2	0.5	0.005	0.008
3/8	8	0.25 to 8	2	0.02	0.025
½	15	1.0 to 27	6	0.05	0.10
1	25	2.5 to 80	18	0.2	0.25

To calculate the measuring range, use the *Applicator* sizing tool (→ 50)

Recommended measuring range

"Flow limit" section (→ 23)

Operable flow range

Over 1000 : 1

Output

Output signal

Current output

Current output	4-20 mA HART (passive)
Resolution	< 1 µA
Damping	Adjustable:0.0 to 999 s
Assignable measured variables	▪ Volume flow ▪ Mass flow

Pulse/frequency/switch output

Function	Can be set to pulse, frequency or switch output
Version	Passive, open collector
Maximum input values	▪ DC 35 V ▪ 50 mA For information on the Ex connection values (→ 8)
Voltage drop	▪ For ≤ 2 mA: 2 V ▪ For 10 mA: 8 V
Residual current	≤ 0.05 mA
Pulse output	
Pulse width	Adjustable:5 to 2000 ms
Maximum pulse rate	100 Impulse/s
Pulse value	Adjustable
Assignable measured variables	▪ Volume flow ▪ Mass flow

Frequency output	
Output frequency	Adjustable:0 to 1 000 Hz
Damping	Adjustable:0 to 999 s
Pulse/pause ratio	1:1
Assignable measured variables	▪ Volume flow ▪ Mass flow
Switch output	
Switching behavior	Binary, conductive or non-conductive
Switching delay	Adjustable:0 to 100 s
Number of switching cycles	Unlimited
Assignable functions	▪ Off ▪ On ▪ Diagnostic behavior ▪ Limit value – Volume flow – Mass flow ▪ Flow direction monitoring ▪ Status – Empty pipe detection – Low flow cut off

Signal on alarm

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

Current output

4-20 mA

Failure mode	Selectable (as per NAMUR recommendation NE 43): ▪ Minimum value: 3.6 mA ▪ Maximum value: 22 mA ▪ Defined value:3.59 to 22.5 mA ▪ Actual value ▪ Last valid value

HART

Device diagnostics	Device condition can be read out via HART Command 48

Pulse/frequency/switch output

Pulse output	
Failure mode	Choose from: ▪ Actual value ▪ No pulses
Frequency output	
Failure mode	Choose from: ▪ Actual value ▪ Defined value:0 to 1 250 Hz ▪ 0 Hz
Switch output	
Failure mode	Choose from: ▪ Current status ▪ Open ▪ Closed

Local display

Plain text display	With information on cause and remedial measures
Backlight	Additionally for device version with SD03 local display: red lighting indicates a device error.

Status signal as per NAMUR recommendation NE 107

Operating tool

- Via digital communication: HART protocol
- Via service interface

Plain text display	With information on cause and remedial measures

Additional information on remote operation (→ 46)

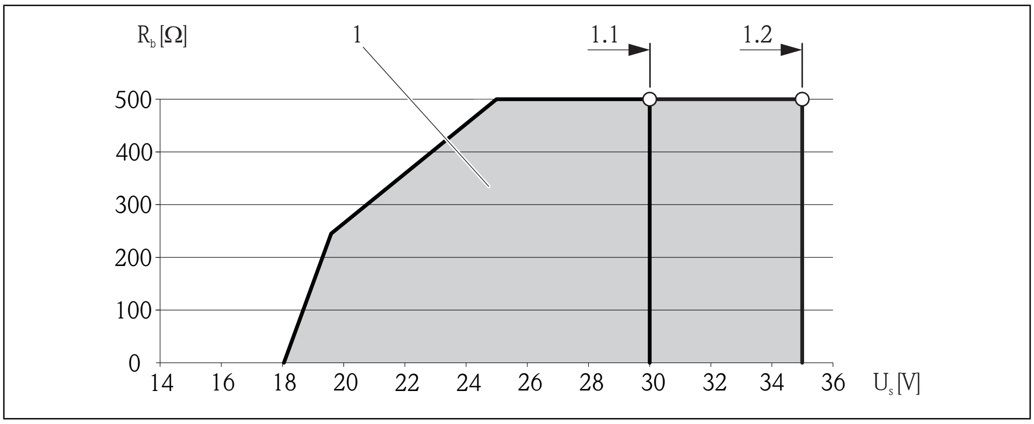
Load

Load for current output: 0 to 500 Ω, depending on the external supply voltage of the power supply unit

Calculation of the maximum load

Depending on the supply voltage of the power supply unit (U_S), the maximum load (R_B) including line resistance must be observed to ensure adequate terminal voltage at the device. In doing so, observe the minimum terminal voltage (→ 11)

- For U_S = 18 to 18.9 V: $R_B \leq (U_S - 18\ V) : 0.0036\ A$
- For U_S = 18.9 to 24.5 V: $R_B \leq (U_S - 13.5\ V) : 0.022\ A$
- For U_S = 24.5 to 30 V: $R_B \leq 500\ \Omega$



1 Operating range
1.1 For order code for "Output", option A "4-20 mA HART"/option B "4-20 mA HART, pulse/frequency/switch output" with Ex i
1.2 For order code for "Output", option A "4-20 mA HART"/option B "4-20 mA HART, pulse/frequency/switch output" with non-Ex and Ex d

Sample calculation
Supply voltage of the power supply unit: U_S =19 V
Maximum load: $R_B \leq (19\ V - 13.5\ V) : 0.022\ A = 250\ \Omega$

Ex connection data

Safety-related values

Ex d type of protection

Order code for "Output"	Output type	Safety-related values

Option **A**	4-20 mA HART	U_{nom} = DC 35 V U_{max} = 250 V
Option **B**	4-20 mA HART	U_{nom} = DC 35 V U_{max} = 250 V
	Pulse/frequency/switch output	U_{nom} = DC 35 V U_{max} = 250 V P_{max} = 1 W [1)]

1) Internal circuit limited by R_i = 760.5 Ω

Ex nA type of protection

Order code for "Output"	Output type	Safety-related values
Option **A**	4-20 mA HART	U_{nom} = DC 35 V U_{max} = 250 V
Option **B**	4-20 mA HART	U_{nom} = DC 35 V U_{max} = 250 V
	Pulse/frequency/switch output	U_{nom} = DC 35 V U_{max} = 250 V P_{max} = 1 W [1)]

1) Internal circuit limited by R_i = 760.5 Ω

Intrinsically safe values

Type of protection Ex ia

Order code for "Output"	Output type	Intrinsically safe values
Option **A**	4-20 mA HART	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 5 nF
Option **B**	4-20 mA HART	U_i = DC 30 V I_i = 300 mA P_i =1 W L_i = 0 µH C_i = 5 nF
	Pulse/frequency/switch output	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 6 nF

IS type of protection

Order code for "Output"	Output type	Intrinsically safe values
Option **A**	4-20 mA HART	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 5 nF

Option **B**	4-20 mA HART	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 5 nF
	Pulse/frequency/switch output	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 6 nF

Low flow cut off

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

Galvanic isolation

All outputs are galvanically isolated from one another.

Protocol-specific data

HART

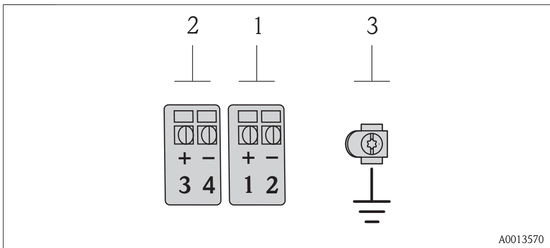
Manufacturer ID	0x11
Device type ID	0x48
HART protocol revision	6.0
Device description files (DTM, DD)	Information and files under: www.endress.com
HART load	▪ Min. 250 Ω ▪ Max.500 Ω
Dynamic variables	The measured variables can be freely assigned to the dynamic variables. **Measured variables for PV (primary dynamic variable)** ▪ Volume flow ▪ Mass flow **Measured variables for SV, TV, QV (secondary, tertiary and quaternary dynamic variable)** ▪ Volume flow ▪ Mass flow ▪ Totalizer 1 ▪ Totalizer 2 ▪ Totalizer 3

Power supply

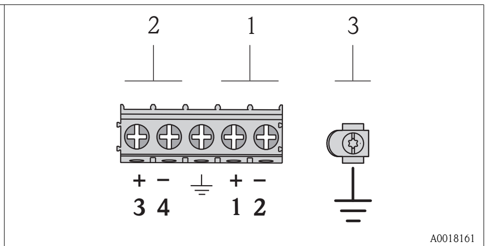
Terminal assignment

Transmitter

4-20 mA HART connection version with additional outputs



Maximum number of terminals, without integrated overvoltage protection



Maximum number of terminals, with integrated overvoltage protection

1 Output 1 (passive): supply voltage and signal transmission
2 Output 2 (passive): supply voltage and signal transmission
3 Ground terminal for cable shield

Order code for "Output"	Terminal numbers			
	Output 1		Output 2	
	1 (+)	2 (-)	3 (+)	4 (-)
Option **A**	4-20 mA HART (passive)		-	
Option **B**[1)]	4-20 mA HART (passive)		Pulse/frequency/switch output (passive)	

1) Output 1 must always be used; output 2 is optional.

Supply voltage

An external power supply is required for each output. The following supply voltage values apply for the 4-20 mA HART current output:

Order code for "Output"	Minimum terminal voltage[1) 2)]	Maximum terminal voltage
▪ Option **A**: 4-20 mA HART ▪ Option **B**: 4-20 mA HART, pulse/ frequency/switch output	For 4 mA: ≥ DC18 V For 20 mA: ≥ DC14 V	DC 35 V

1) External supply voltage of the power supply unit with load (→ 🗎 8)

2) For device versions with local display SD03: The terminal voltage must be increased by DC 2 V if backlighting is used.

For information on the Ex connection values (→ 🗎 8)

Various power supply units can be ordered from Endress+Hauser: see "Accessories" section (→ 🗎 51)

Power consumption

Transmitter

Order code for "Power supply"	Maximum power consumption
Option **A**: 4-20 mA HART	770 mW
Option **B**: 4-20 mA HART, pulse/frequency/switch output	▪ Operation with output 1:770 mW ▪ Operation with output 1 and 2:2 770 mW

For information on the Ex connection values (→ 🗎 8)

Current consumption

For 4-20 mA or 4-20 mA HART current output: 3.6 to 22.5 mA

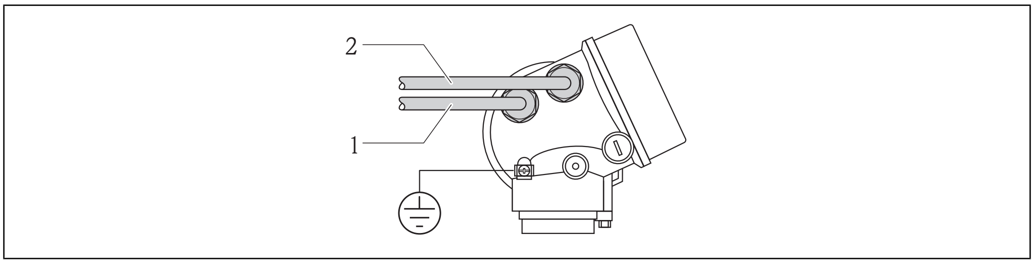
If the option **Defined value** is selected in the **Failure mode** parameter (→ 🗎 7): 3.59 to 22.5 mA

Power supply failure

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

Electrical connection

Connecting the transmitter



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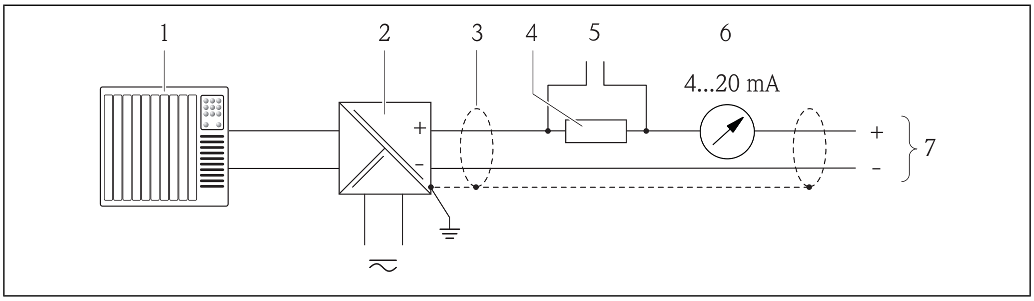
1 Cable entry for output 1
2 Cable entry for output 2

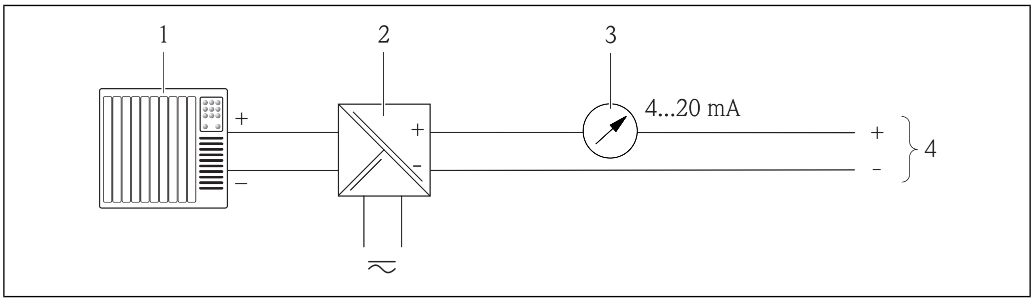
Connection examples



A0015511

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

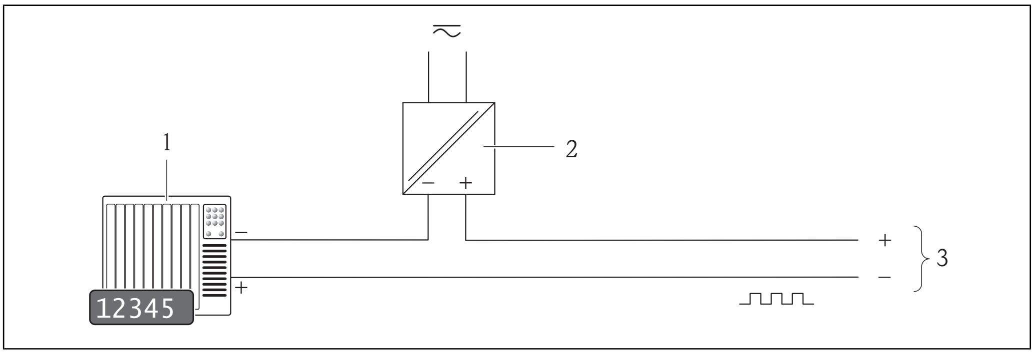
1 Automation system with current input (e.g. PLC)
2 Active barrier for power supply (e.g. RN221N) (→ 15)
3 Observe cable specification (→ 15)
4 Resistor for HART communication (≥ 250 Ω): observe maximum load (→ 8)
5 Connection for HART operating devices (→ 46)
6 Analog display unit: observe maximum load (→ 8)
7 Transmitter



A0015512

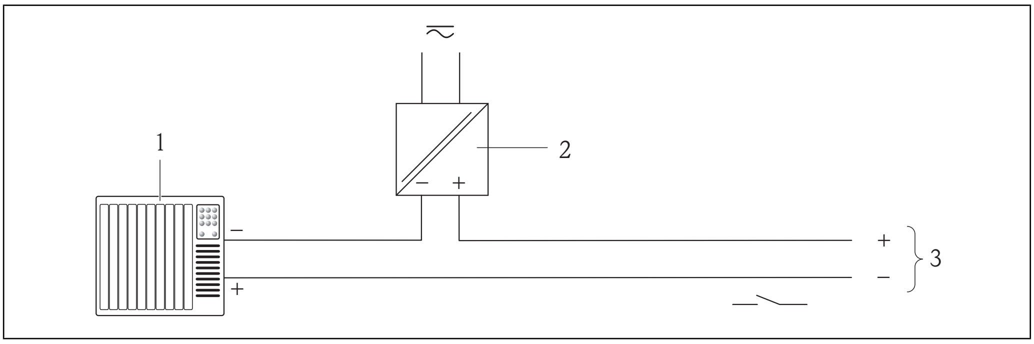
3 Connection example for 4-20 mA current output (passive)

1 Automation system with current input (e.g. PLC)
2 Active barrier for power supply (e.g. RN221N) (→ 11)
3 Analog display unit: observe maximum load (→ 8)
4 Transmitter



4 *Connection example for pulse/frequency output (passive)*

1 *Automation system with pulse/frequency input (e.g. PLC)*
2 *Power supply*
3 *Transmitter: Observe input values (→ 6)*



5 *Connection example for switch output (passive)*

1 *Control system with switch input (e.g. PLC)*
2 *Power supply*
3 *Transmitter: Observe input values (→ 6)*

Potential equalization

Requirements

Please consider the following to ensure correct measurement:
- Same electrical potential for the fluid and sensor
- Company-internal grounding concepts
- Pipe material and grounding

Connection examples for standard situations

Metal process connections

Potential matching usually takes place via the metallic process connections in contact with medium which are directly mounted on the measuring transmitter. This usually means that additional potential matching measures are unnecessary.

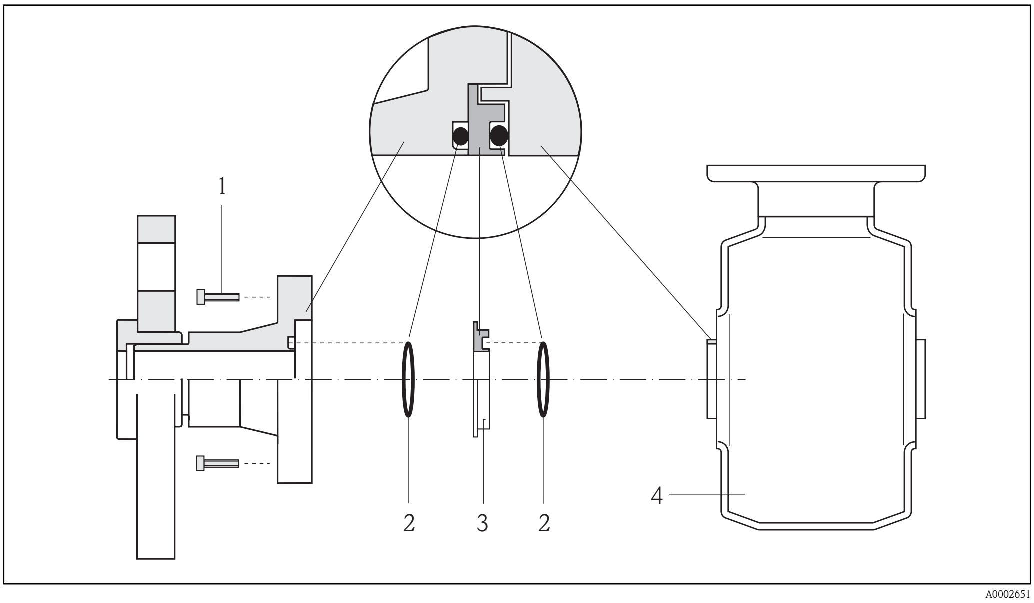
Connection example in special situations

Plastic process connections

If the process connections are made of a synthetic material, additional ground rings or process connections with an integrated ground electrode must be used to ensure the potential between the sensor and fluid is matched. No potential matching can affect the accuracy of the measurements or cause the destruction of the sensor through the electrochemical decomposition of the electrodes.

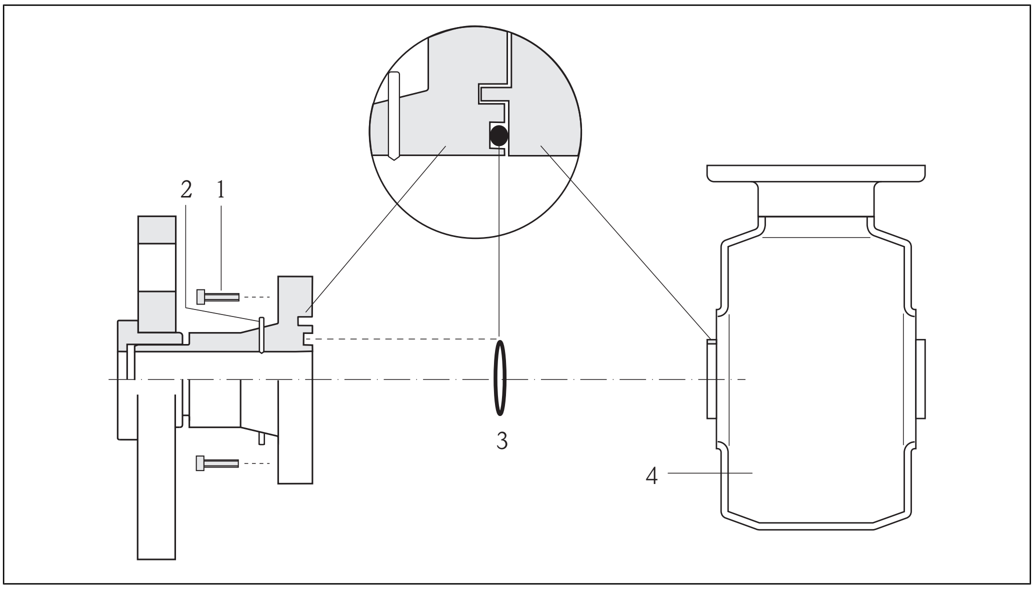
When using ground rings, note the following points:
- Depending on the option ordered, plastic disks may be installed at the process connections instead of ground rings. These plastic disks serve only as spacers and have no potential matching function. In addition, they provide a sealing function at the sensor/process connection interface. For this reason, with process connections without metal ground rings, these plastic disks/seals must not be removed, or must always be installed.
- Ground rings can be ordered separately from Endress+Hauser as accessories. When placing the order, make certain that the ground rings are compatible with the material used for the electrodes. Otherwise, there is a risk that the electrodes may be destroyed by electrochemical corrosion!
- Ground rings, including the seals, are mounted within the process connections. Therefore, the fitting length is not affected.

Potential equalization via additional ground ring



1 Allen screw (process connection)
2 O-ring seals
3 Plastic washer (spacer) or ground ring
4 Sensor

Potential equalization via ground electrodes on process connection



1 Allen screw (process connection)
2 Integrated ground electrodes
3 O-ring seal
4 Sensor

Terminals

- For device version without integrated overvoltage protection: plug-in spring terminals for wire cross-sections 0.5 to 2.5 mm² (20 to 14 AWG)
- For device version with integrated overvoltage protection: screw terminals for wire cross-sections 0.2 to 2.5 mm² (24 to 14 AWG)

Cable entries

- Cable gland (not for Ex d): M20 × 1.5 with cable ∅ 6 to 12 mm (0.24 to 0.47 in)
- Thread for cable entry:
  – For non-Ex and Ex: NPT ½"
  – For non-Ex and Ex (not for CSA Ex d/XP): G ½"
  – For Ex d: M20 × 1.5

Cable specification

Permitted temperature range

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

Signal cable

Current output

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

Pulse/frequency/switch output

Standard installation cable is sufficient.

Overvoltage protection

The device can be ordered with integrated overvoltage protection for several approvals:
Order code for "Accessory mounted", option **NA** "overvoltage protection"

Input voltage range	Values correspond to supply voltage specifications (→ 🗎 11) 1)
Resistance per channel	2 · 0.5 Ω max
DC sparkover voltage	400 to 700 V
Trip surge voltage	< 800 V

Capacitance at 1 MHz	< 1.5 pF
Nominal discharge current (8/20 µs)	10 kA
Temperature range	–40 to +85 °C (–40 to +185 °F)

1) The voltage is reduced by the amount of the internal resistance $I_{min} \cdot R_i$

Depending on the temperature class, restrictions apply to the ambient temperature for device versions with overvoltage protection .

Performance characteristics

Reference operating conditions

To DIN EN 29104
- Fluid temperature: +28 ± 2 °C (+82 ± 4 °F)
- Ambient temperature range: +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 (→ 50)

Maximum measured error

Accuracy of outputs

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

Current output

Accuracy	±10 µA

Pulse/frequency output

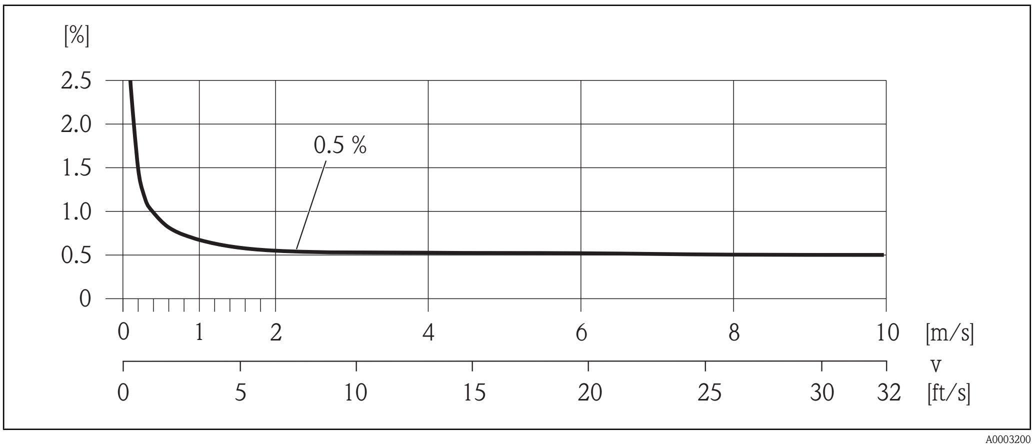
Accuracy	Max. ±100 ppm o.r.

Error limits under reference operating conditions

o.r. = of reading

Pulse output
±0.5 % o.r.±2 mm/s (0.08 in/s)

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



6 *Maximum measured error in % o.r.*

Repeatability

o.r. = of reading

max. ±0.2 % o.r. ±2 mm/s (0.08 in/s)

Influence of ambient temperature

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

Current output

Additional error, in relation to the span of 16 mA:

Temperature coefficient at zero point (4 mA)	0.02 %/10 K, max. 0.35 % over the entire temperature range –40 to +60 °C (–40 to +140 °F)
Temperature coefficient with span (20 mA)	0.05 %/10 K, max. 0.5 % over the entire temperature range –40 to +60 °C (–40 to +140 °F)

Pulse/frequency output

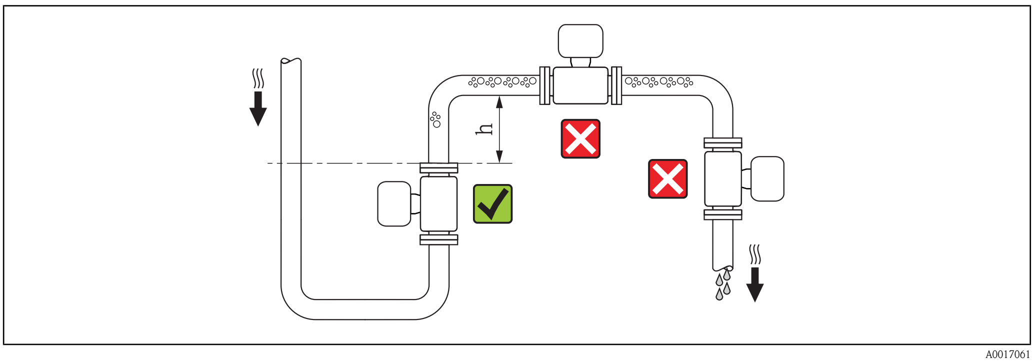
Temperature coefficient	Max. ±100 ppm o.r.

Installation

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

Mounting location

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

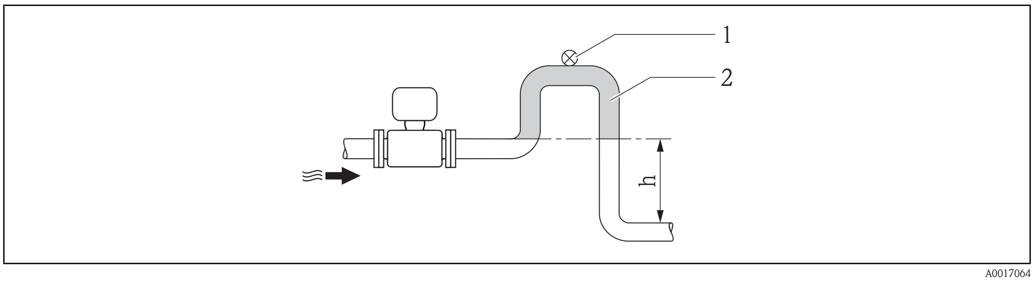


To prevent measuring errors arising from accumulation of gas bubbles in the measuring tube, avoid the following mounting locations in the pipe:
- Highest point of a pipeline.
- Directly upstream of a free pipe outlet in a down pipe.

Installation in down pipes

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

For information on the liner's resistance to partial vacuum (→ 23)



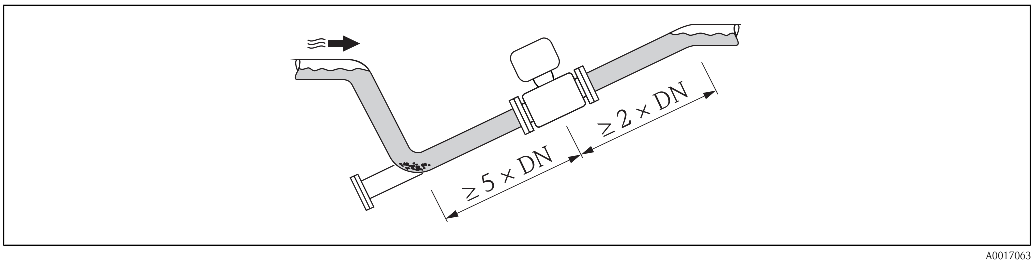
7 Installation in a down pipe

1 Vent valve
2 Pipe siphon
h Length of down pipe

Installation in partially filled pipes

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

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



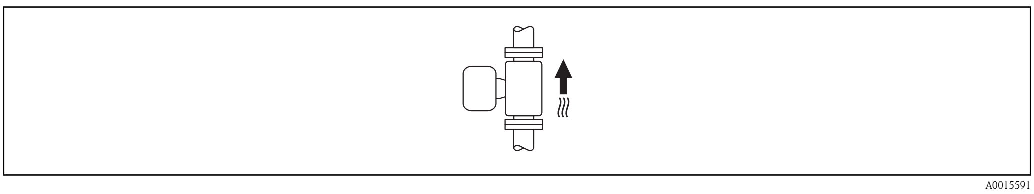
Orientation

The direction of the arrow on the sensor nameplate helps you to install the sensor according to the flow direction (direction of medium flow through the piping).
An optimum orientation position helps avoid gas and air accumulations and deposits in the measuring tube.

The measuring device also offers the empty pipe detection function to detect partially empty measuring pipes at outgassing fluids or applications with variable process pressures.

Vertical

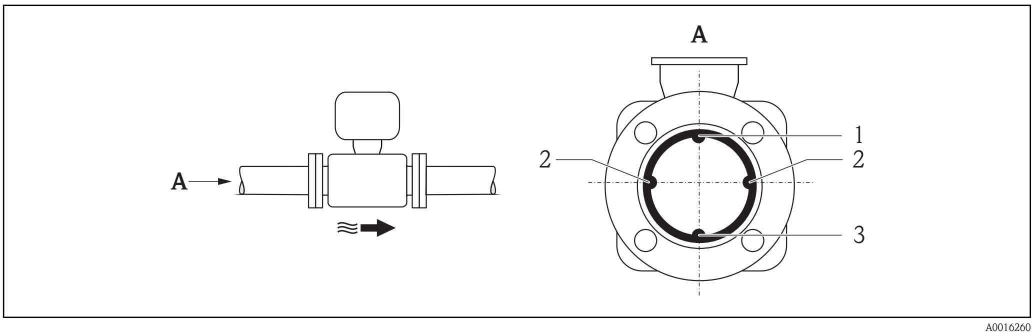
This is the optimum orientation for self-emptying piping systems and for use in conjunction with empty pipe detection.



Horizontal

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

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



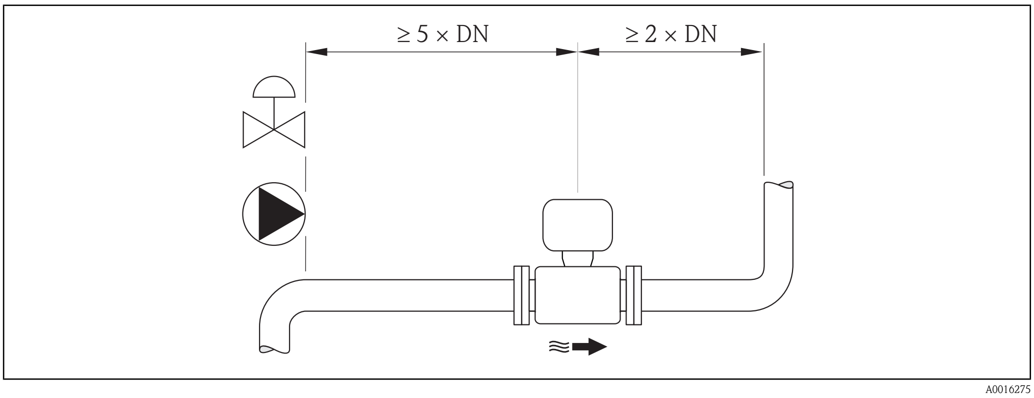
8 Horizontal orientation

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

Inlet and outlet runs

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

Observe the following inlet and outlet runs to comply with accuracy specifications:
- Inlet run ≥ 5 × DN
- Outlet run ≥ 2 × DN

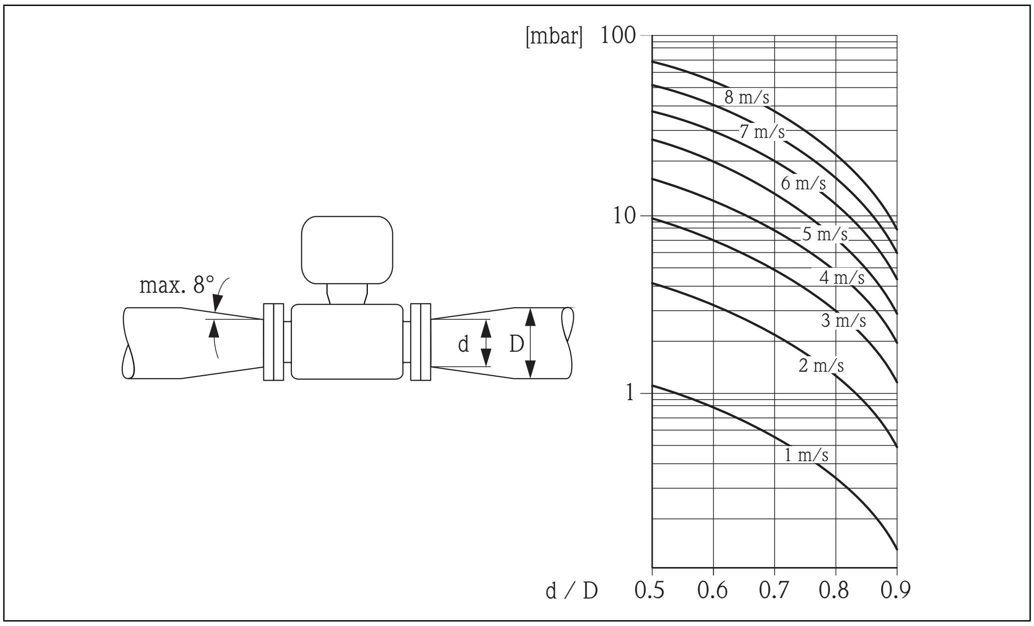


Adapters

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.



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Special mounting instructions

Weather protection cover

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

Environment

Ambient temperature range

Transmitter	–40 to +60 °C (–40 to +140 °F)
Local display	–20 to +60 °C (–4 to +140 °F), the readability of the display may be impaired at temperatures outside the temperature range.
Sensor	–40 to +60 °C (–40 to +140 °F)
Liner	Do not exceed or fall below the permitted temperature range of the liner (→ 🗎 21).

If operating outdoors:
- Install the measuring device in a shady location.
- Avoid direct sunlight, particularly in warm climatic regions.
- Avoid direct exposure to weather conditions.

Weather protection covers can be ordered from Endress+Hauser: see "Accessories" section (→ 🗎 49)

Storage temperature

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

- 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

Transmitter
- As standard: IP66/67, type 4X enclosure
- When housing is open: IP20, type 1 enclosure
- Display module: IP22, type 1 enclosure

	Sensor IP66/67, type 4X enclosure
Shock resistance	As per IEC/EN 60068-2-31
Vibration resistance	Acceleration up to 2 g following IEC 60068-2-6
Mechanical load	▪ Protect the transmitter housing against mechanical effects, such as shock or impact. ▪ Never use the transmitter housing as a ladder or climbing aid.
Electromagnetic compatibility (EMC)	As per IEC/EN 61326 and NAMUR Recommendation 21 (NE 21) Details are provided in the Declaration of Conformity.

Process

Medium temperature range

–20 to +150 °C (+4 to +302 °F)

Conductivity

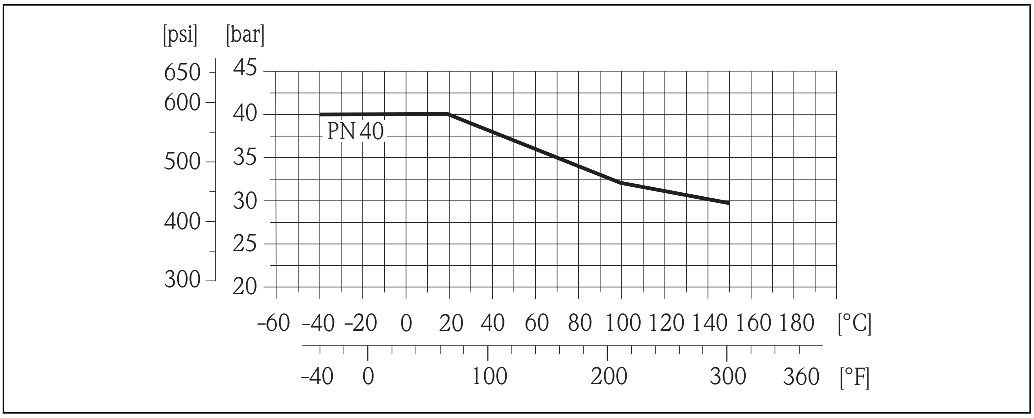
≥ 20 µS/cm

Pressure-temperature ratings

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

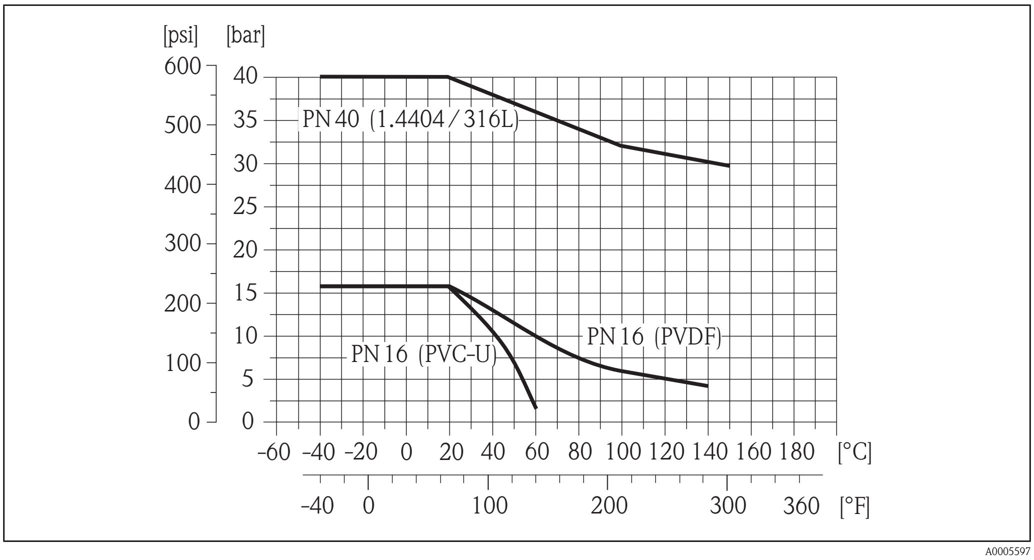
Process connections with O-ring seal

Welded connection as per DIN EN ISO 1127, ODT/SMS, ISO 2037; coupling as per ISO 228 / DIN 2999, NPT



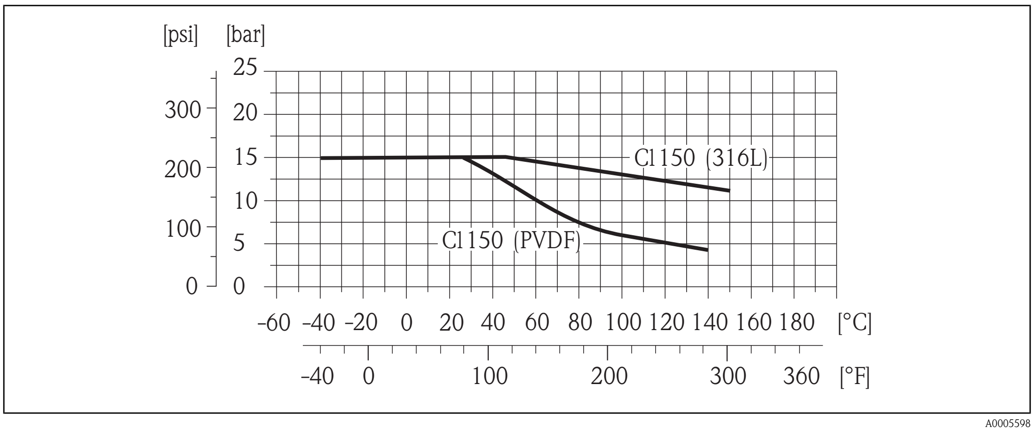
9 *Material 1.4404/316L*

Flange connection as per EN 1092-1 (DIN 2501), adhesive sleeve



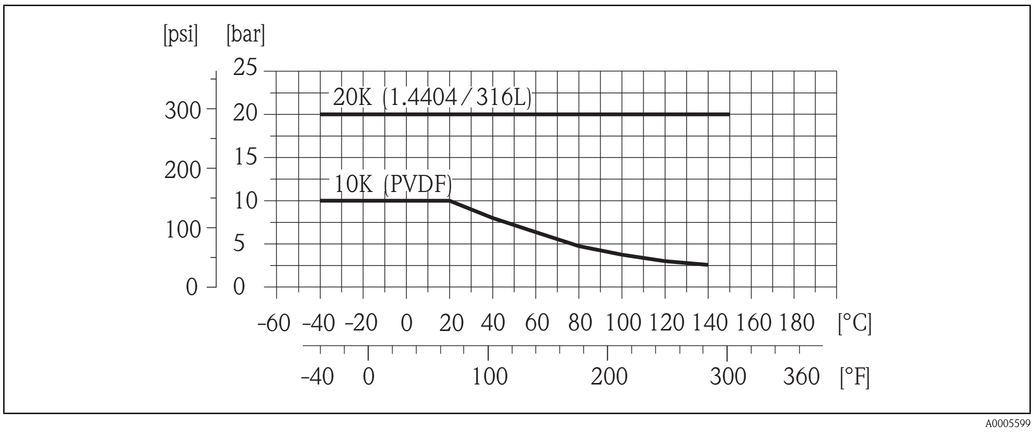
10 *Materials 1.4404/316L, PVDF, PVC-U*

Flange connection as per ASME B16.5



11 *Materials 1.4404/316L, PVDF*

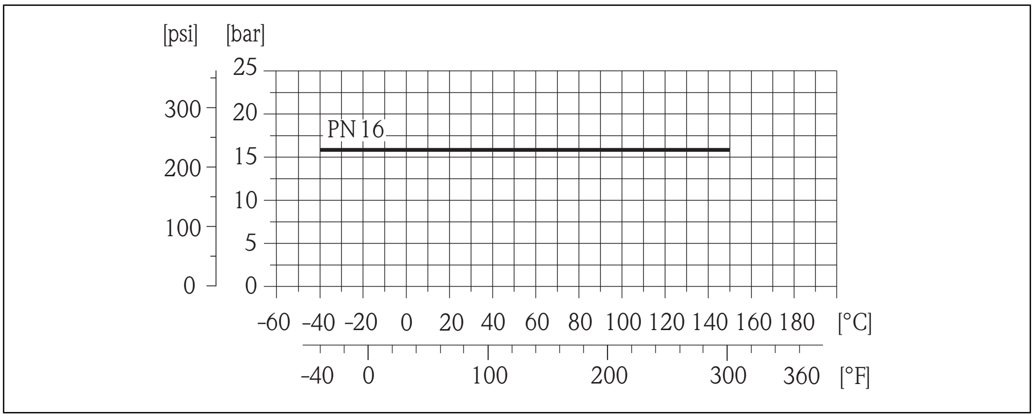
Flange connection as per JIS B2220



12 *Materials 1.4404/316L, PVDF*

Process connections with aseptic gasket seal

Welded connection as per DIN 11850, ODT/SMS, ISO 2037; clamp as per ISO 2852, DIN 32676, L14 AM7; coupling as per SC DIN 11851, DIN 11864-1, SMS 1145; flange as per DIN 11864-2



13 *Material 1.4404/316L*

Pressure tightness

Liner: PFA

Nominal diameter		Limit values for absolute pressure in [mbar] ([psi]) for fluid temperatures:				
[mm]	[in]	+25 °C (+77 °F)	+80 °C (+176 °F)	+100 °C (+212 °F)	+130 °C (+266 °F)	+150 °C (+302 °F)
2 to 25	1/12 to 1	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Flow limit

The diameter of the pipe and the flow rate determine the nominal diameter of the sensor. The optimum velocity of flow is between 2 to 3 m/s (6.56 to 9.84 ft/s). Also match the velocity of flow (v) to the physical properties of the fluid:
- v < 2 m/s (6.56 ft/s): for abrasive fluids
- v > 2 m/s (6.56 ft/s): for fluids producing buildup

For an overview of the measuring range full scale values, see the "Measuring range" section (→ 5)

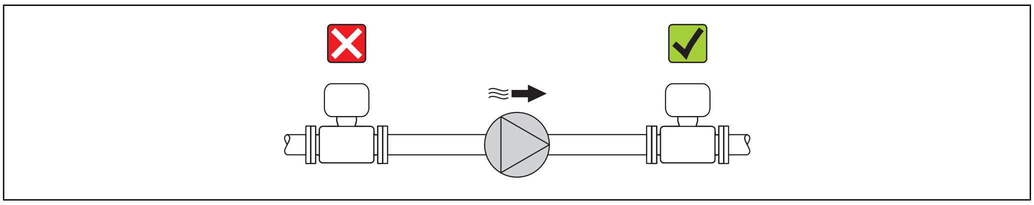
Pressure loss

- No pressure loss occurs as of nominal diameter DN 8 (3/8") if the sensor is installed in a pipe with the same nominal diameter.
- Pressure losses for configurations incorporating adapters according to DIN EN 545 (→ 19)

System pressure

- Never install the sensor on the pump suction side in order to avoid the risk of low pressure, and thus damage to the liner.
- Furthermore, install pulse dampers if reciprocating, diaphragm or peristaltic pumps are used.

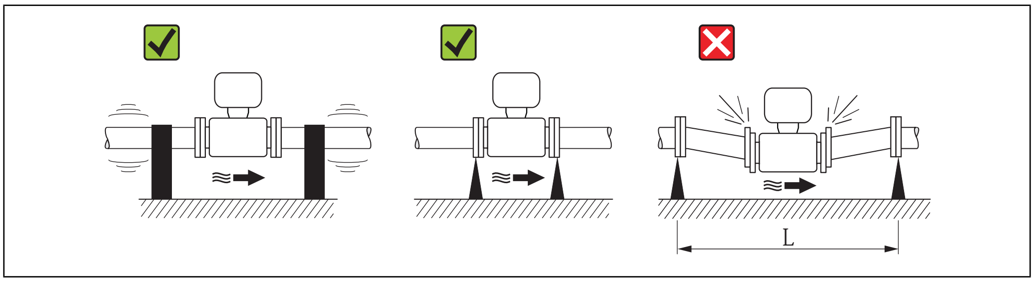
- For information on the liner's resistance to partial vacuum (→ 23)
- For information on the measuring system's resistance to vibration and shock (→ 21), (→ 21)



Vibrations

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

For information on the permitted resistance to vibration and shock (→ 21), (→ 21)



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14 Measures to prevent vibration of the device

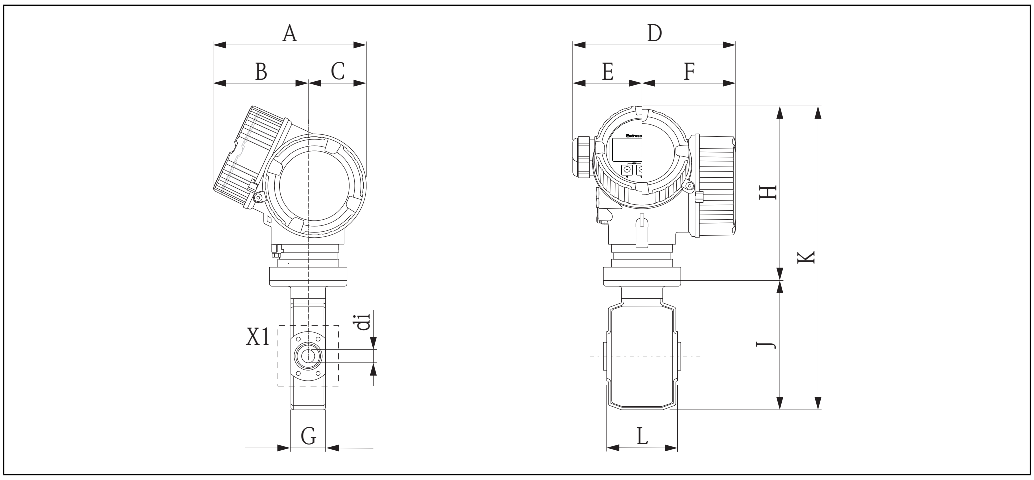
L > 10 m (33 ft)

Mechanical construction

Design, dimensions

Compact version

Order code for "Housing", option C "GT20 two-chamber, aluminium coating" with DN 2 to 25 (1/12 to 1")



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Dimensions in SI units

DN [mm]	L 1) [mm]	A [mm]	B 2) [mm]	C [mm]	D 3) [mm]	E [mm]	F 3) [mm]	G [mm]	H 4) [mm]	J [mm]	K 4) [mm]	X1 [mm]	di [mm]
2	86	162	102	60	165	75	90	43	271	55	326	4 × M6	2.25
4	86	162	102	60	165	75	90	43	271	55	326	4 × M6	4.5
8	86	162	102	60	165	75	90	43	271	55	326	4 × M6	9
15	86	162	102	60	165	75	90	43	271	55	326	4 × M6	16
25	86	162	102	60	165	75	90	56	271	55	326	4 × M6	26

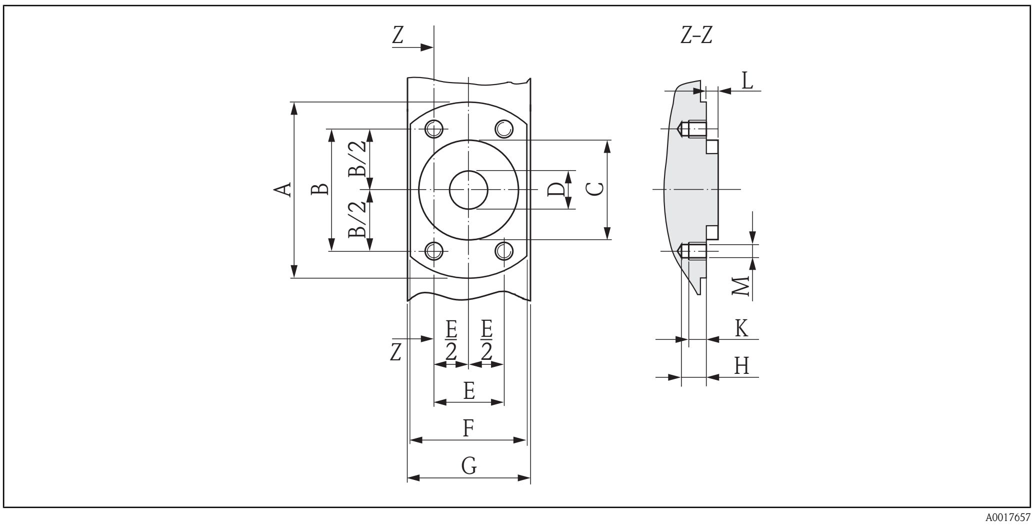
1) Total length (L) depends on the process connections.
2) For version without local display: values - 7 mm
3) For version with overvoltage protection (OVP): values + 8 mm
4) For version without local display: values - 10 mm

Dimensions in US units

DN [in]	L 1) [in]	A [in]	B 2) [in]	C [in]	D 3) [in]	E [in]	F 3) [in]	G [in]	H 4) [in]	J [in]	K 4) [in]	X1 [mm]	di [in]
1/12	3.39	6.38	4.02	2.36	6.50	2.95	3.54	1.69	10.7	2.17	12.8	4 × M6	0.09
1/8	3.39	6.38	4.02	2.36	6.50	2.95	3.54	1.69	10.7	2.17	12.8	4 × M6	0.18
3/8	3.39	6.38	4.02	2.36	6.50	2.95	3.54	1.69	10.7	2.17	12.8	4 × M6	0.35
½	3.39	6.38	4.02	2.36	6.50	2.95	3.54	1.69	10.7	2.17	12.8	4 × M6	0.63
1	3.39	6.38	4.02	2.36	6.50	2.95	3.54	2.20	10.7	2.17	12.8	4 × M6	1.02

1) Total length (L) depends on the process connections.
2) For version without local display: values - 0.28 in
3) For version with overvoltage protection (OVP): values + 0.31 in
4) For version without local display: values - 0.39 in

Detail X1, sensor flange connection DN 2 to 25 (1/12 to 1")



15 *Front view without process connections*

Dimensions in SI units

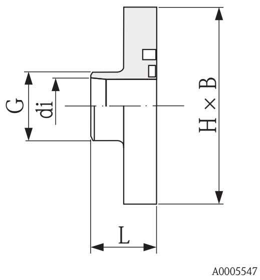
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	K [mm]	L [mm]	M [mm]
2	62	41.6	34	9	24	42	43	8.5	6	4	M6
4	62	41.6	34	9	24	42	43	8.5	6	4	M6
8	62	41.6	34	9	24	42	43	8.5	6	4	M6
15	62	41.6	34	16	24	42	43	8.5	6	4	M6
25	72	50.2	44	26	29	55	56	8.5	6	4	M6

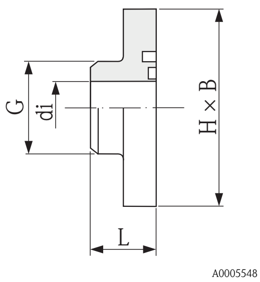
Dimensions in US units

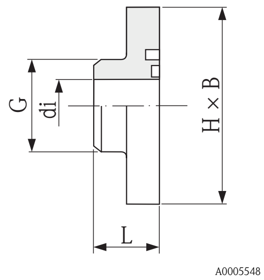
DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	K [in]	L [in]	M [mm]
1/12	2.44	1.64	1.34	0.35	0.94	1.65	1.69	0.33	0.24	0.16	M6
1/8	2.44	1.64	1.34	0.35	0.94	1.65	1.69	0.33	0.24	0.16	M6
3/8	2.44	1.64	1.34	0.35	0.94	1.65	1.69	0.33	0.24	0.16	M6
½	2.44	1.64	1.34	0.63	0.94	1.65	1.69	0.33	0.24	0.16	M6
1	2.83	1.98	1.73	0.89	1.14	2.17	2.20	0.33	0.24	0.16	M6

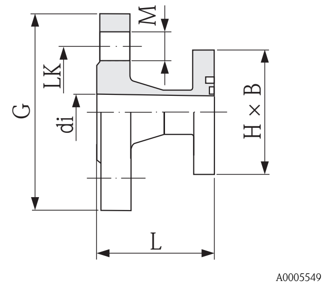
Process connections in SI units

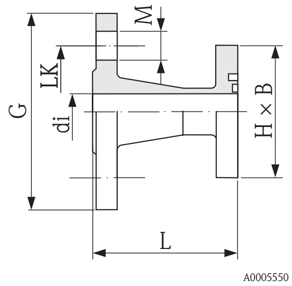
Process connections DN 2 to 25 with O-ring seal

Welded connection DIN EN ISO 1127, 1.4404/316L						
Order code for "Process connection", option D1S	**DN sensor** **[mm]**	**Suitable for pipe DIN EN ISO 1127** **[mm]**	**di** **[mm]**	**G** **[mm]**	**L** **[mm]**	**H × B** **[mm]**
	2 to 8	13.5 × 1.6	10.3	13.5	20.3	62 × 42
	15	21.3 × 1.6	18.1	21.3	20.3	62 × 42
	25 (DIN)	33.7 × 2.0	29.7	33.7	20.3	62 × 52
	Length = (2 × L) + 86 mm					

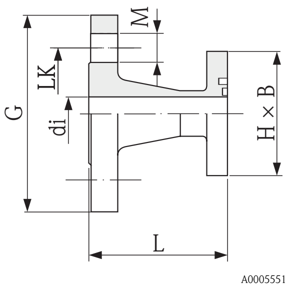
Welded connection ODT/SMS, 1.4404/316L						
Order code for "Process connection", option A2S	**DN sensor** **[mm]**	**Suitable for pipe ODT/ SMS** **[mm]**	**di** **[mm]**	**G** **[mm]**	**L** **[mm]**	**H × B** **[mm]**
	2 to 8	13.5 × 2.30	9	13.5	20.3	62 × 42
	15	21.3 × 2.65	16	21.3	20.3	62 × 42
	25 (DIN)	33.7 × 3.25	27.2	33.7	20.3	72 × 55
	Length = (2 × L) + 86 mm					

Welded connection ISO 2037, 1.4404/316L						
Order code for "Process connection", option I1S	**DN sensor** **[mm]**	**Suitable for pipe ISO 2037** **[mm]**	**di** **[mm]**	**G** **[mm]**	**L** **[mm]**	**H × B** **[mm]**
	2 to 8	13.5 × 2.3	9	13.5	20.3	62 × 42
	15	21.3 × 2.65	16	21.3	20.3	62 × 42
	25 (DIN)	33.7 × 3.25	27.2	33.7	20.3	72 × 55
	Length = (2 × L) + 86 mm					

Flange EN 1092-1 (DIN 2501), form B, 1.4404/316L, PN 40								
Order code for "Process connection", option D5S	**DN sensor** **[mm]**	**Suitable for flange EN 1092-1 (DIN 2501)** **[mm]**	**di** **[mm]**	**G** **[mm]**	**L** **[mm]**	**LK** **[mm]**	**M** **[mm]**	**H × B** **[mm]**
	2 to 8	DN 15	17.3	95	56.2	65	14	62 × 42
	15	DN 15	17.3	95	56.2	65	14	62 × 42
	25 (DIN)	DN 25	28.5	115	56.2	85	14	72 × 55
	Length = (2 × L) + 86 mm Length in accordance with DVGW (200 mm)							

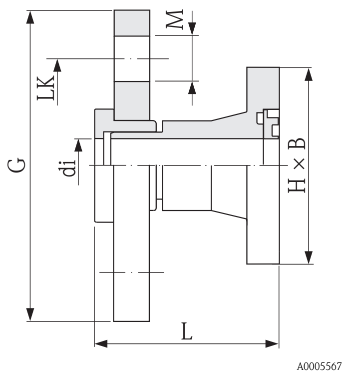
Flange ASME B16.5, 1.4404/316L, Class 150								
Order code for "Process connection", option A1S	**DN sensor** **[mm]**	**Suitable for flange ASME B16.5** **[in]**	**di** **[mm]**	**G** **[mm]**	**L** **[mm]**	**LK** **[mm]**	**M** **[mm]**	**H × B** **[mm]**
	2 to 8	½	15.7	89	66	60.5	15.7	62 × 42
	15	½	16	89	66	60.5	15.7	62 × 42
	25 (1" ASME)	1	26.7	108	71.8	79.2	15.7	72 × 55
	Length = (2 × L) + 86 mm							

Flange JIS B2220, 1.4404/316L, 20K								
Order code for "Process connection", option N4S	**DN sensor [mm]**	**Suitable for flange JIS B2220 [mm]**	**di [mm]**	**G [mm]**	**L [mm]**	**LK [mm]**	**M [mm]**	**H × B [mm]**
	2 to 8	DN 15	15	95	67	70	15	62 × 42
	15	DN 15	16	95	67	70	15	62 × 42
	25 (DIN)	DN 25	26	125	67	90	19	72 × 55



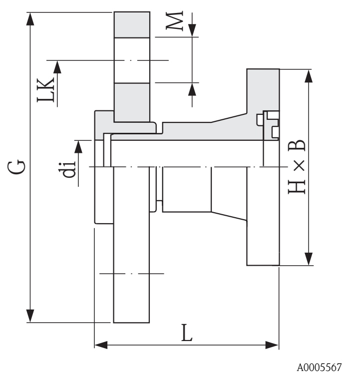
Length = (2 × L) + 86 mm

Flange EN 1092-1 (DIN 2501), PVDF, PN16								
Order code for "Process connection", option D3P	**DN sensor [mm]**	**Suitable for flange EN 1092-1 (DIN 2501) [mm]**	**di [mm]**	**G [mm]**	**L [mm]**	**LK [mm]**	**M [mm]**	**H × B [mm]**
	2 to 8	DN 15	16	95	57	65	14	62 × 42
	15	DN 15	16	95	57	65	14	62 × 42
	25 (DIN)	DN 25	27.2	115	57	85	14	72 × 55



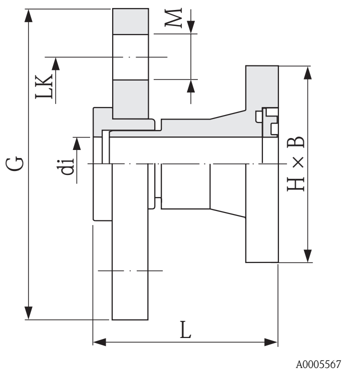
Length = (2 × L) + 86 mm
Length as per DVGW (200 mm) L)
The required grounding rings can be ordered as accessories (order code: DK5HR-****).

Flange ASME B16.5, PVDF, Class 150								
Order code for "Process connection", option A1P	**DN sensor [mm]**	**Suitable for flange ASME B16.5 [in]**	**di [mm]**	**G [mm]**	**L [mm]**	**LK [mm]**	**M [mm]**	**H × B [mm]**
	2 to 8	½	16	95	57	60	16	62 × 42
	15	½	16	95	57	60	16	62 × 42
	25 (DIN)	1	27.2	115	57	79	16	72 × 55

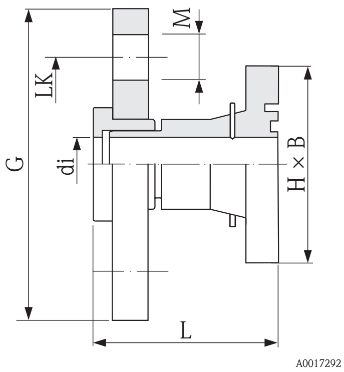


Length = (2 × L) + 86 mm
The required grounding rings can be ordered as accessories (order code: DK5HR-****).

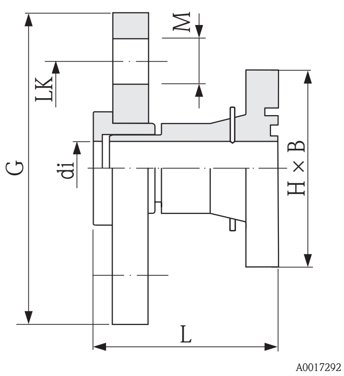
Flange JIS B2220, PVDF, 10K

Order code for "Process connection", option N3P	DN sensor [mm]	Suitable for flange JIS B2220 [mm]	di [mm]	G [mm]	L [mm]	LK [mm]	M [mm]	H × B [mm]
	2 to 8	DN 15	16	95	57	70	15	62 × 42
	15	DN 15	16	95	57	70	15	62 × 42
	25 (DIN)	DN 25	27.2	125	57	90	19	72 × 55
	Length = (2 × L) + 86 mm The required grounding rings can be ordered as accessories (order code: DK5HR-****).							

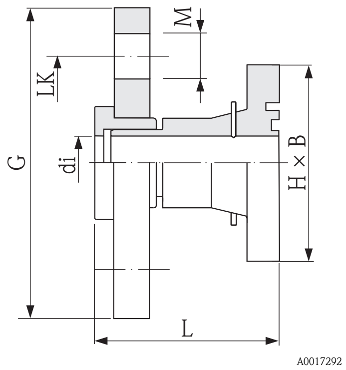
Flange with ground electrode EN 1092-1 (DIN 2501), PVDF, PN 16

Order code for "Process connection", option D4P	DN sensor [mm]	Suitable for flange EN 1092-1 (DIN 2501) [mm]	di [mm]	G [mm]	L [mm]	LK [mm]	M [mm]	H × B [mm]
	2 to 8	DN 15	16	95	57	65	14	62 × 42
	15	DN 15	16	95	57	65	14	62 × 42
	25 (DIN)	DN 25	27.2	115	57	85	14	72 × 55
	Length = (2 × L) + 86 mm Length in accordance with DVGW (200 mm) Grounding rings are not necessary.							

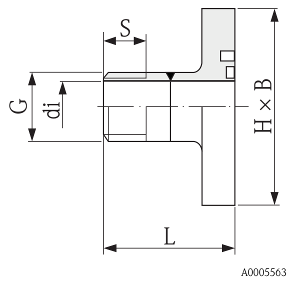
Flange with ground electrode ASME B16.5, PVDF, Class 150

Order code for "Process connection", option A4P	DN sensor [mm]	Suitable for flange ASME B16.5 [in]	di [mm]	G [mm]	L [mm]	LK [mm]	M [mm]	H × B [mm]
	2 to 8	½	16	95	57	60	16	62 × 42
	15	½	16	95	57	60	16	62 × 42
	25 (DIN)	1	27.2	115	57	79	16	72 × 55
	Length = (2 × L) + 86 mm Grounding rings are not necessary.							

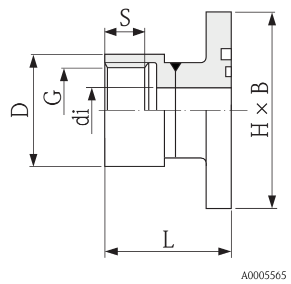
Flange with ground electrode, JIS B2220, PVDF, 10K

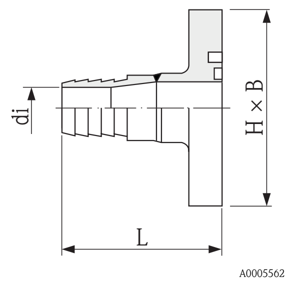
Order code for "Process connection", option N4P	DN sensor [mm]	Suitable for flange JIS B2220 [mm]	di [mm]	G [mm]	L [mm]	LK [mm]	M [mm]	H × B [mm]
	2 to 8	DN 15	16	95	57	70	15	62 × 42
	15	DN 15	16	95	57	70	15	62 × 42
	25 (DIN)	DN 25	27.2	125	57	90	19	72 × 55
	Length = (2 × L) + 86 mm Grounding rings are not necessary.							

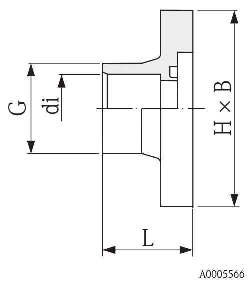
External screw, ISO 228/DIN 2999, 1.4404/316L

Order code for "Process connection", option I2S	DN sensor [mm]	Suitable for internal thread ISO 228/ DIN 2999 [in]	di [mm]	G [in]	L [mm]	S [mm]	H × B [mm]
	2 to 8	R 3/8	10	3/8	40	10.1	62 × 42
	15	R ½	16	½	40	13.2	62 × 42
	25 (1" ASME)	R 1	25	1	42	16.5	72 × 55
	Length = (2 × L) + 86 mm						

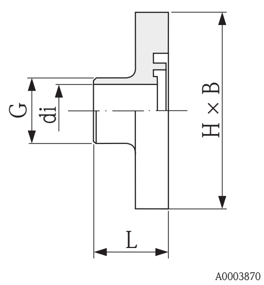
Internal thread, ISO 228/DIN 2999, 1.4404/316L

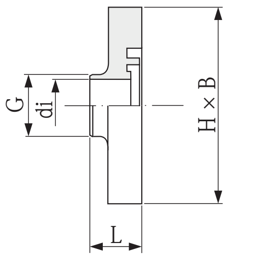
Order code for "Process connection", option I3S	DN sensor [mm]	Suitable for external thread ISO 228/DIN 2999 [in]	di [mm]	G [in]	D [mm]	L [mm]	S [mm]	H × B [mm]
	2 to 8	Rp 3/8	9	3/8	22	45	13	62 × 42
	15	Rp ½	16	½	27	45	14	62 × 42
	25 (1" ASME)	Rp 1	27.2	1	40	51	17	72 × 55
	Length = (2 × L) + 86 mm							

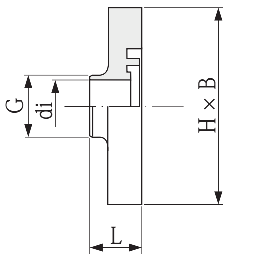
Hose connection 1.4404/316L					
Order code for "Process connection", options O1S, O2S, O3S	**DN sensor** **[mm]**	**Suitable for internal diameter** **[mm]**	**di** **[mm]**	**L** **[mm]**	**H × B** **[mm]**
	2 to 8	13	10	49	62 × 42
	15	16	12.6	49	62 × 42
	15	19	16	49	72 × 55
	Length = (2 × L) + 86 mm				

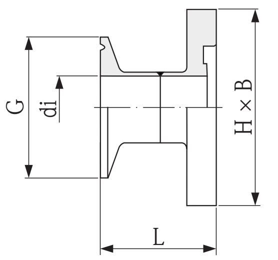
PVC adhesive sleeve						
Order code for "Process connection", options O1V, O2V	**DN sensor** **[mm]**	**Suitable for pipe** **[mm] / [in]**	**di** **[mm]**	**G** **[mm]**	**L** **[mm]**	**H × B** **[mm]**
	2 to 8	20 × 2 (DIN 8062)	20.2	27	38.5	62 × 42
	2 to 8	½	21.5	27.3	38.5	62 × 42
	15	20 × 2 (DIN 8062)	20.2	27	28	72 × 55
	Length = (2 × L) + 86 mm The required grounding rings can be ordered as accessories (order code: DK5HR-****).					

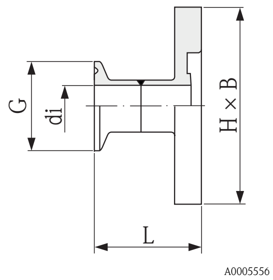
Process connections DN 2 to 25 with aseptic gasket seal

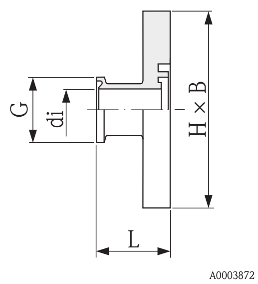
Welded connection DIN 11850, 1.4404/316L						
Order code for "Process connection", option DAS	**DN sensor** **[mm]**	**Suitable for pipe DIN 11850** **[mm]**	**di** **[mm]**	**G** **[mm]**	**L** **[mm]**	**H × B** **[mm]**
	2 to 8	14 × 2	10	14	23.3	62 × 42
	15	20 × 2	16	20	23.3	62 × 42
	25 (DIN)	30 × 2	26	30	23.3	72 × 55
	Length = (2 × L) + 86 mm Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.					

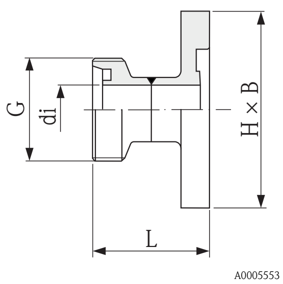
Welded connection ODT/SMS, 1.4404/316L						
Order code for "Process connection", option AAS	DN sensor [mm]	Suitable for pipe ODT/ SMS [mm]	di [mm]	G [mm]	L [mm]	H × B [mm]
	2 to 8	12.7 × 1.65	9	12.7	16.1	62 × 42
	15	19.1 × 1.65	16	19.1	16.1	62 × 42
	25 (1" ASME)	25.4 × 1.65	22.6	25.4	16.1	72 × 55
	Length = (2 × L) + 86 mm Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.					

Welded connection ISO 2037, 1.4404/316L						
Order code for "Process connection", option IAS	DN sensor [mm]	Suitable for pipe ISO 2037 [mm]	di [mm]	G [mm]	L [mm]	H × B [mm]
	2 to 8	12.7 × 1.65	9	12.7	16.1	62 × 42
	15	19.1 × 1.65	16	19.1	16.1	62 × 42
	25 (1" ASME)	25.4 × 1.65	22.6	25.4	16.1	72 × 55
	Length = (2 × L) + 86 mm Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.					

Clamp ISO 2852, Fig. 2, 1.4404/316L							
Order code for "Process connection", option IBS	DN sensor [mm]	Suitable for pipe ISO 2037/BS 4825-1 [mm]	DN Clamp ISO 2852 [mm]	di [mm]	G [mm]	L [mm]	H × B [mm]
	25 (1" ASME)	24.5 × 1.65	25	22.6	50.5	44.3	72 × 55
	Length = (2 × L) + 86 mm Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.						

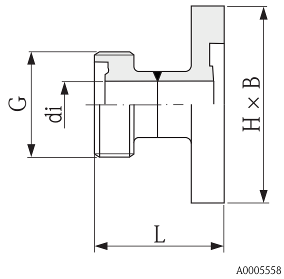
Clamp DIN 32676, 1.4404/316L						
Order code for "Process connection", option DBS	**DN sensor** **[mm]**	**Suitable for pipe DIN 11850** **[mm]**	**di** **[mm]**	**G** **[mm]**	**L** **[mm]**	**H × B** **[mm]**
	2 to 8	Pipe 14 × 2 (DN 10)	10	34	41	62 × 42
	15	Pipe 20 × 2 (DN 15)	16	34	41	62 × 42
	25 (DIN)	Pipe 30 × 2 (DN 25)	26	50.5	44.5	72 × 55
	Length = (2 × L) + 86 mm Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.					

Tri-clamp L14 AM7, 1.4404/316L						
Order code for "Process connection", option FAS	**DN sensor** **[mm]**	**Suitable for pipe ODT** **[mm] ([in])**	**di** **[mm]**	**G** **[mm]**	**L** **[mm]**	**H × B** **[mm]**
	2 to 8	Pipe 12.7 × 1.65 (ODT ½")	9.4	25	28.5	62 × 42
	15	Pipe 19.1 × 1.65 (ODT ¾")	15.8	25	28.5	62 × 42
	25 (1" ASME)	Pipe 25.4 × 1.65 (ODT 1")	22.1	50.4	28.5	72 × 55
	Length = (2 × L) + 86 mm Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.					

Coupling SC DIN 11851, threaded connection, 1.4404/316L						
Order code for "Process connection", option DCS	**DN sensor** **[mm]**	**Suitable for pipe DIN 11850** **[mm]**	**di** **[mm]**	**G** **[mm]**	**L** **[mm]**	**H × B** **[mm]**
	2 to 8	Pipe 12 × 1 (DN 10)	10	Rd 28 × 1/8	44	62 × 42
	15	Pipe 18 × 1.5 (ODT ¾")	16	Rd 34 × 1/8	44	62 × 42
	25 (DIN)	Pipe 28 × 1 or 28×1.5 (DN 25)	26	Rd 52 × 1/6	52	72 × 55
	Length = (2 × L) + 86 mm Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.					

Coupling DIN 11864-1, aseptic threaded connection, form A, 1.4404/316L

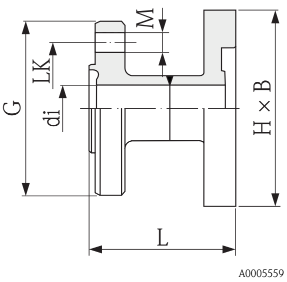
Order code for "Process connection", option DDS	DN sensor [mm]	Suitable for pipe DIN 11850 [mm]	di [mm]	G [mm]	L [mm]	H × B [mm]
	2 to 8	Pipe 13 × 1.5 (DN 10)	10	Rd 28 × 1/8	42	62 × 42
	15	Pipe 19 × 1.5 (DN 15)	16	Rd 34 × 1/8	42	62 × 42
	25 (DIN)	Pipe 29 × 1.5 (DN 25)	26	Rd 52 × 1/6	49	72 × 55



Length = (2 × L) + 86 mm
Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.

Flange DIN 11864-2, aseptic grooved flange, form A, 1.4404/316L

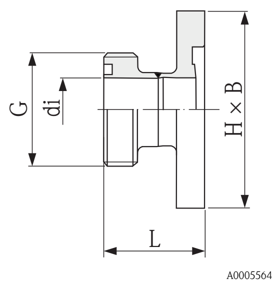
Order code for "Process connection", option DES	DN sensor [mm]	Suitable for pipe DIN 11850 [mm]	di [mm]	G [mm]	L [mm]	LK [mm]	M [mm]	H × B [mm]
	2 to 8	Pipe 13 × 1.5 (DN 10)	10	54	48.5	37	9	62 × 42
	15	Pipe 19 × 1.5 (DN 15)	16	59	48.5	42	9	62 × 42
	25 (DIN)	Pipe 29 × 1.5 (DN 25)	26	70	48.5	53	9	72 × 55



Length = (2 × L) + 86 mm
Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.

Coupling SMS 1145, threaded connection, 1.4404/316L

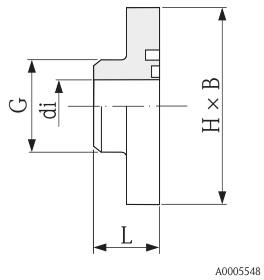
Order code for "Process connection", option SAS	DN sensor [mm]	Suitable for pipe OD [in]	DN SMS 1145 [mm]	di [mm]	G [mm]	L [mm]	H × B [mm]
	25 (1" ASME)	1	25	22.6	Rd 40 × 1/6	30.8	72 × 55

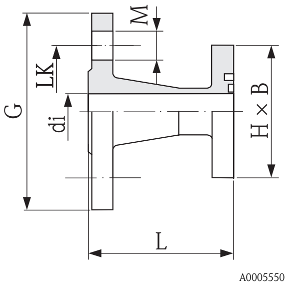


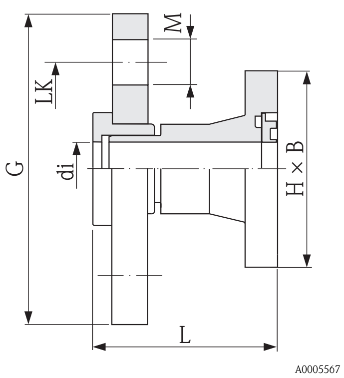
Length = (2 × L) + 86 mm
Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.

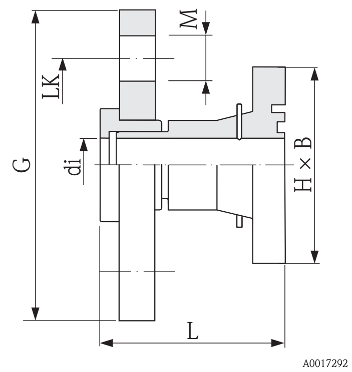
Process connections in US units

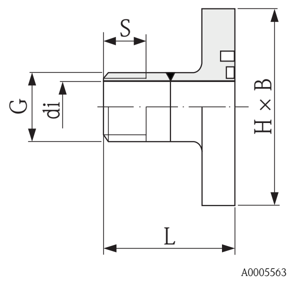
Process connections DN 1/12 to 1" with O-ring seal

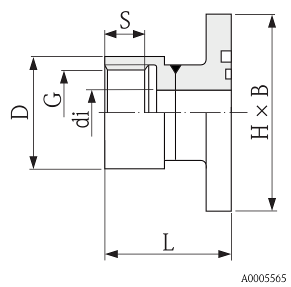
Welded connection ODT/SMS, 1.4404/316L						
Order code for "Process connection", option A2S	DN sensor [in]	Suitable for pipe ODT/ SMS [in]	di [in]	G [in]	L [in]	H × B [in]
	1/12 to 5/16	0.53 × 0.09	0.35	0.53	0.80	2.44 × 1.65
	½	0.84 × 0.10	0.63	0.84	0.80	2.44 × 1.65
	Length = (2 × L) + 3.39 in					

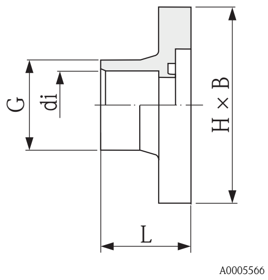
Flange ASME B16.5, 1.4404/316L, Class 150								
Order code for "Process connection", option A1S	DN sensor [in]	Suitable for flange ASME B16.5 [in]	di [in]	G [in]	L [in]	LK [in]	M [in]	H × B [in]
	1/12 to 5/16	½	0.62	3.50	2.60	2.38	0.62	2.44 × 1.65
	½	½	0.63	3.50	2.60	2.38	0.62	2.44 × 1.65
	1	1	1.05	4.25	2.83	3.12	0.62	2.83 × 2.17
	Length = (2 × L) + 3.39 in							

Flange ASME B16.5, PVDF, Class 150								
Order code for "Process connection", option A1P	DN sensor [in]	Suitable for flange ASME B16.5 [in]	di [in]	G [in]	L [in]	LK [in]	M [in]	H × B [in]
	1/12 to 5/16	½	0.63	3.74	2.24	2.36	0.63	2.44 × 1.65
	½	½	0.63	3.74	2.24	2.36	0.63	2.44 × 1.65
	Length = (2 × L) + 3.39 in The required grounding rings can be ordered as accessories (order code: DK5HR-****).							

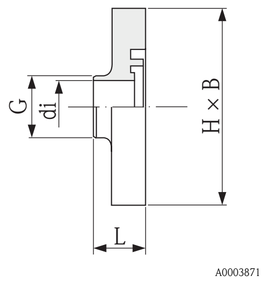
Flange with ground electrode ASME B16.5, PVDF, Class 150								
Order code for "Process connection", option A4P	**DN sensor** **[in]**	**Suitable for flange ASME B16.5** **[in]**	**di** **[in]**	**G** **[in]**	**L** **[in]**	**LK** **[in]**	**M** **[in]**	**H × B** **[in]**
	1/12 to 5/16	½	0.63	3.74	2.24	2.36	0.63	2.44 × 1.65
	½	½	0.63	3.74	2.24	2.36	0.63	2.44 × 1.65
	Length = (2 × L) + 3.39 in Grounding rings are not necessary.							

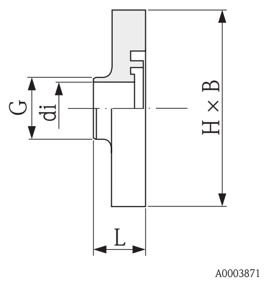
External thread, ISO 228/DIN 2999, 1.4404/316L							
Order code for "Process connection", option I2S	**DN sensor** **[in]**	**Suitable for internal thread ISO 228/ DIN 2999** **[in]**	**di** **[in]**	**G** **[in]**	**L** **[in]**	**S** **[in]**	**H × B** **[in]**
	1/12 to 5/16	R 3/8	0.39	3/8	1.57	0.40	2.44 × 1.65
	½	R ½	0.63	½	1.57	0.52	2.44 × 1.65
	1	R 1	0.98	1	1.65	0.655	2.83 × 2.17
	Length = (2 × L) + 3.39 in						

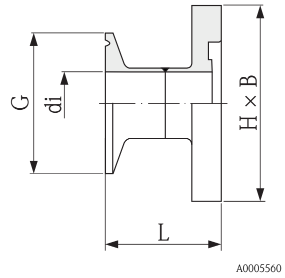
Internal thread, ISO 228/DIN 2999, 1.4404/316L								
Order code for "Process connection", option I3S	**DN sensor** **[in]**	**Suitable for external thread ISO 228/DIN 2999** **[in]**	**di** **[in]**	**G** **[in]**	**D** **[in]**	**L** **[in]**	**S** **[in]**	**H × B** **[in]**
	1/12 to 5/16	Rp 3/8	0.35	3/8	0.87	1.77	0.51	2.44 × 1.65
	½	Rp ½	0.63	½	1.06	1.77	0.55	2.44 × 1.65
	1	Rp 1	1.07	1	1.57	2.01	0.67	2.83 × 2.17
	Length = (2 × L) + 3.39 in							

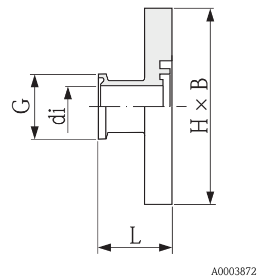
PVC adhesive sleeve						
Order code for "Process connection", options O1V, O2V	DN sensor [in]	Suitable for pipe [in]	di [in]	G [in]	L [in]	H × B [in]
	1/12 to 5/16	½	0.85	1.07	1.52	2.44 × 1.65
	Length = (2 × L) + 3.39 in The required grounding rings can be ordered as accessories (order code: DK5HR-****).					

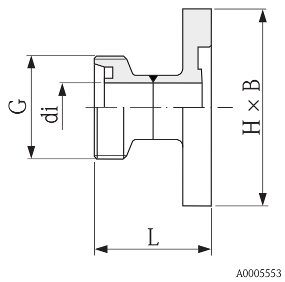
Process connections DN 1/12 to 1 with aseptic gasket seal

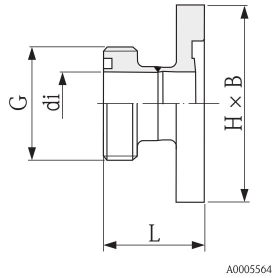
Welded connection ODT/SMS, 1.4404/316L						
Order code for "Process connection", option AAS	DN sensor [in]	Suitable for pipe ODT/ SMS [in]	di [in]	G [in]	L [in]	H × B [in]
	1/12 to 5/16	0.50 × 0.06	0.35	0.50	0.63	2.44 × 1.65
	½	0.75 × 0.06	0.63	0.75	0.63	2.44 × 1.65
	1	1.00 × 0.06	0.89	1.00	0.63	2.83 × 2.17
	Length = (2 × L) + 3.39 in Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.					

Welded connection ISO 2037, 1.4404/316L						
Order code for "Process connection", option IAS	DN sensor [in]	Suitable for pipe ISO 2037 [in]	di [in]	G [in]	L [in]	H × B [in]
	1/12 to 5/16	0.50 × 0.06	0.35	0.50	0.63	2.44 × 1.65
	½	0.75 × 0.06	0.63	0.75	0.63	2.44 × 1.65
	1	1.00 × 0.06	0.89	1.00	0.63	2.83 × 2.17
	Length = (2 × L) + 3.39 in Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.					

Clamp ISO 2852, Fig. 2, 1.4404/316L							
Order code for "Process connection", option IBS	**DN sensor [in]**	**Suitable for pipe ISO 2037/BS 4825-1 [in]**	**DN Clamp ISO 2852 [in]**	**di [in]**	**G [in]**	**L [in]**	**H × B [in]**
	1	0.96 × 0.06	1	0.89	2.00	1.74	2.83 × 2.17
	Length = (2 × L) + 3.39 in Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.						

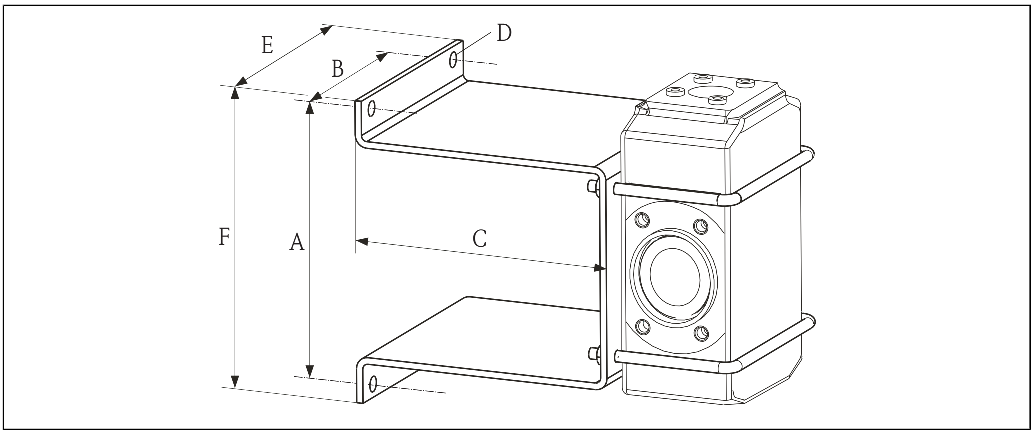
Tri-clamp L14 AM7, 1.4404/316L						
Order code for "Process connection", option FAS	**DN sensor [in]**	**Suitable for pipe OD [in]**	**di [in]**	**G [in]**	**L [in]**	**H × B [in]**
	1/12 to 5/16	½	0.37	1	1.12	2.44 × 1.65
	½	¾	0.62	25	1.12	2.44 × 1.65
	1	1	0.87	2	1.12	2.83 × 2.17
	Length = (2 × L) + 3.39 in Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.					

Coupling SC DIN 11851, threaded connection, 1.4404/316L						
Order code for "Process connection", option DCS	**DN sensor [in]**	**Suitable for pipe DIN 11850 [in]**	**di [in]**	**G [in]**	**L [in]**	**H × B [in]**
	½	Pipe ODT ¾	0.63	Rd 0.05 × 0.13	1.73	2.44 × 1.65
	Length = (2 × L) + 3.39 in Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.					

Coupling SMS 1145, threaded connection, 1.4404/316L							
Order code for "Process connection", option SAS	**DN sensor [in]**	**Suitable for pipe OD [in]**	**DN SMS 1145 [in]**	**di [in]**	**G [in]**	**L [in]**	**H × B [in]**
	1	1	1	0.89	Rd1.57 × 0.17	1.21	2.83 × 2.17
	Length = (2 × L) + 3.39 in Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.						

Accessories

Wall mounting kit



A0005537

Dimensions in SI units

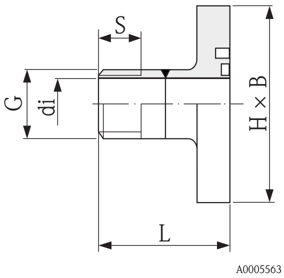
A [mm]	B [mm]	C [mm]	∅D [mm]	E [mm]	F [mm]
125	88	120	7	110	140

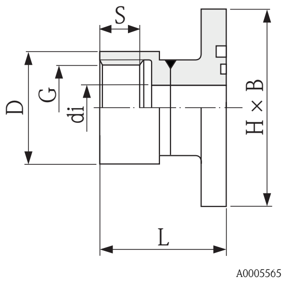
Dimensions in US units

A [in]	B [in]	C [in]	∅D [in]	E [in]	F [in]
4.92	3.46	4.72	0.28	4.33	5.51

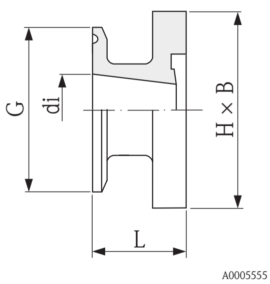
Process connections that can be ordered in SI units

Process connections DN 2 to 25 with O-ring seal

External thread, 1.4404/316L							
Order code DKH**-GD**	DN sensor [mm]	Suitable for internal thread NP [in]	di [mm]	G [in]	L [mm]	S [mm]	H × B [mm]
	2 to 8	NPT3/8	10	3/8	50	15.5	62 × 42
	15	NPT ½	16	½	50	20	62 × 42
	25 (1" ASME)	NPT1	25	1	55	25	72 × 55
	Length = (2 × L) + 86 mm						

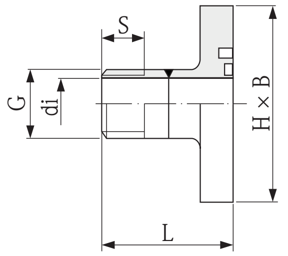
Internal thread, 1.4404/316L								
Order option DKH**-GC**	DN sensor [mm]	Suitable for external thread NP [in]	di [mm]	G [in]	D [mm]	L [mm]	S [mm]	H × B [mm]
	2 to 8	NPT3/8	8.9	3/8	22	45	13	62 × 42
	15	NPT ½	16	½	27	45	14	62 × 42
	25 (1" ASME)	NPT1	27.2	1	40	51	17	72 × 55
	Length = (2 × L) + 86 mm							

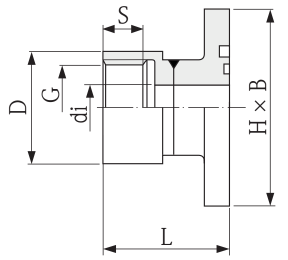
Process connections DN 2 to 25 with aseptic gasket seal

Tri-clamp L14 AM17, 1.4404/316L						
Order code DKH**-HF**	DN sensor [mm]	Suitable for pipe OD [mm] ([in])	di [mm]	G [mm]	L [mm]	H × B [mm]
	15	Pipe ODT 1	22.1	50.4	28.5	62 × 42
	Length = (2 × L) + 86 mm Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.					

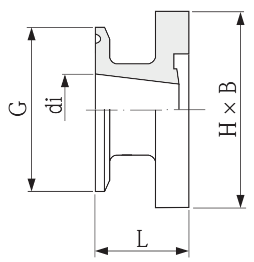
Process connections that can be ordered in US units

Process connections DN 1/12 to 1" with O-ring seal

External thread, 1.4404/316L							
Order code DKH-GD****	**DN sensor** [in]	**Suitable for internal thread NP** [in]	**di** [in]	**G** [in]	**L** [in]	**S** [in]	**H × B** [in]
 A0005563	1/12 to 5/16	NPT3/8	0.39	3/8	2	0.61	2.44 × 1.65
	½	NPT ½	0.63	½	2	0.79	2.44 × 1.65
	1	NPT1	1	1	2.17	1	2.83 × 2.17
	Length = (2 × L) + 3.39 in						

Internal thread, 1.4404/316L								
Order option DKH-GC****	**DN sensor** [in]	**Suitable for external thread NP** [in]	**di** [in]	**G** [in]	**D** [in]	**L** [in]	**S** [in]	**H × B** [in]
 A0005565	1/12 to 5/16	NPT3/8	0.35	3/8	0.87	1.77	0.51	2.44 × 1.65
	½	NPT ½	0.63	½	1.06	1.77	0.55	2.44 × 1.65
	1	NPT1	1.07	1	1.57	2.01	0.67	2.83 × 2.17
	Length = (2 × L) + 3.39 in							

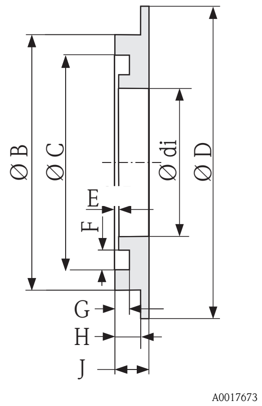
Process connections DN 1/12 to 1" with aseptic gasket seal

Tri-clamp L14 AM17, 1.4404/316L						
Order code DKH-HF****	**DN sensor** [in]	**Suitable for pipe OD** [in]	**di** [in]	**G** [in]	**L** [in]	**H × B** [in]
 A0005555	½	Pipe ODT 1	0.87	2	1.12	2.44 × 1.65
	Length = (2 × L) + 3.39 in Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.					

Grounding rings in SI units

For PVDF flanges, PVC adhesive sleeve

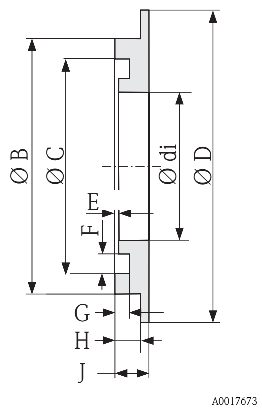
Grounding rings 1.4435/316L, Alloy C-22, tantalum										
Order code DK5HR-****	DN sensor [mm]	di [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	J [mm]
	2 to 8	9	22	17.6	33.9	0.5	3.5	1.9	3.4	4.5
	15	16	29	24.6	33.9	0.5	3.5	1.9	3.4	4.5
	25 (DIN)	26	39	34.6	43.9	0.5	3.5	1.9	3.4	4.5



Grounding rings in US units

For PVDF flanges, PVC adhesive sleeve

Grounding rings 1.4435/316L, Alloy C-22, tantalum										
Order code DK5HR-****	DN sensor [in]	di [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	J [in]
	1/12 to 5/16	0.35	0.87	0.69	1.33	0.02	0.14	0.07	0.13	0.18
	½	0.63	1.14	0.97	1.33	0.02	0.14	0.07	0.13	0.18
	1	0.89	1.44	1.23	1.73	0.02	0.14	0.07	0.13	0.18



Weight

Compact version

- Including the transmitter (1.9 kg (4.2 lbs))
- Weight specifications apply to standard pressure ratings and without packaging material.

Nominal diameter		Weight	
[mm]	[in]	[kg]	[lbs]
2	1/12	3.7	8.2
4	1/8	3.7	8.2
8	3/8	3.8	8.4
15	1/2	3.9	8.6
25	1	4.0	8.8

Measuring tube specification

Nominal diameter		Pressure rating EN (DIN)	Process connection internal diameter PFA	
[mm]	[in]	[bar]	[mm]	[in]
2	1/12	PN 16/40	2.25	0.09
4	1/8	PN 16/40	4.5	0.18
8	3/8	PN 16/40	9.0	0.35
15	½	PN 16/40	16.0	0.63
–	1	PN 16/40	22.6	0.89
25	–	PN 16/40	26.0	1.02

Materials

Transmitter housing

- Order code for "Housing", option **C**: aluminum coating AlSi10Mg
- Window material: glass

Transmitter cable entries

Order code for "Housing", option C "GT20 two-chamber, aluminum coating"

Electrical connection	Type of protection	Material
Cable gland M20 × 1.5	▪ Non-Ex ▪ Ex ia ▪ Ex ic	Plastic
	▪ Ex nA ▪ Ex tb	Nickel-plated brass
Thread G ½" via adapter	For non-Ex and Ex (except for CSA Ex d/XP)	Nickel-plated brass
Thread NPT ½" via adapter	For non-Ex and Ex	

Sensor housing

Aluminum coating AlSi10Mg

Measuring tubes

Stainless steel 1.4301/304

Liner

PFA (USP Class VI, FDA 21 CFR 177.1550, 3A)

Process connections

- Stainless steel 1.4404/316L
- PVDF
- PVC adhesive sleeve

List of all available process connections (→ 📄 44)

Electrodes

- Standard: 1.4435/316L
- Optional: Alloy C-22, tantalum, platinum

Seals

- O-ring seal: EPDM, FKM, Kalrez
- Aseptic gasket seal: EPDM [1)], FKM, silicone [1)]

Accessories

Weather protection cover

Stainless steel 1.4301

Ground rings

- Standard: 1.4435/316L
- Optional: Alloy C-22, tantalum

Wall mounting kit

Stainless steel 1.4301/304

Fitted electrodes

Measuring electrodes and empty pipe detection electrodes (only DN 25 (1")):
1.4435/316L, Alloy C-22, platinum, tantalum

Process connections

With O-ring seal
- Welded connection (DIN EN ISO 1127, ODT/SMS, ISO 2037)
- Flange (EN (DIN), ASME, JIS)
- Flange from PVDF (EN (DIN), ASME, JIS)
- External thread
- Internal thread
- Hose connection
- PVC adhesive sleeve

With aseptic gasket seal
- Welded connection (DIN 11850, ODT/SMS, ISO 2037)
- Clamp (ISO 2852, DIN 32676, L14 AM7)
- Coupling (DIN 11851, DIN 11864-1, ISO 2853, SMS 1145)
- Flange DIN 11864-2

For information on the materials of the process connections (→ 🗎 43)

Surface roughness

Electrodes with 1.4435/316L, Alloy C-22, platinum, tantalum:
≤ 0.3 to 0.5 µm (11.8 to 19.7 µin)
(All data relate to parts in contact with fluid)

Liner with PFA:
≤ 0.4 µm (15.7 µin)
(All data relate to parts in contact with fluid)

Process connections made from stainless steel:
≤ 0.8 µm (31 µin)
(All data relate to parts in contact with fluid)

Operability

Operating concept

Operator-oriented menu structure for user-specific tasks
- Commissioning
- Operation
- Diagnostics
- Expert level

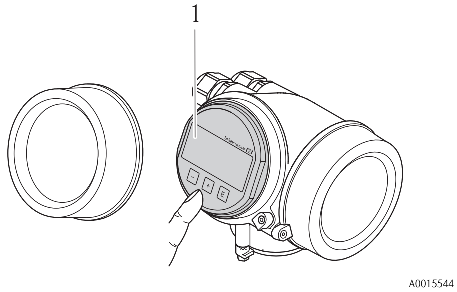
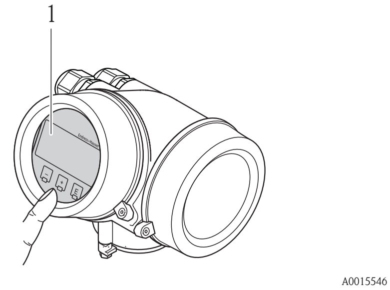
Quick and safe commissioning
- Guided menus ("Make-it-run" wizards) for applications
- Menu guidance with brief explanations of the individual parameter functions

1) USP Class VI, FDA 21 CFR 177.2600, 3A

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

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

Local operation

Order code for "Display; Operation", option **C** "SD02"	Order code for "Display; Operation", option **E** "SD03"
	
1 Operation with pushbuttons	*1 Operation with touch control*

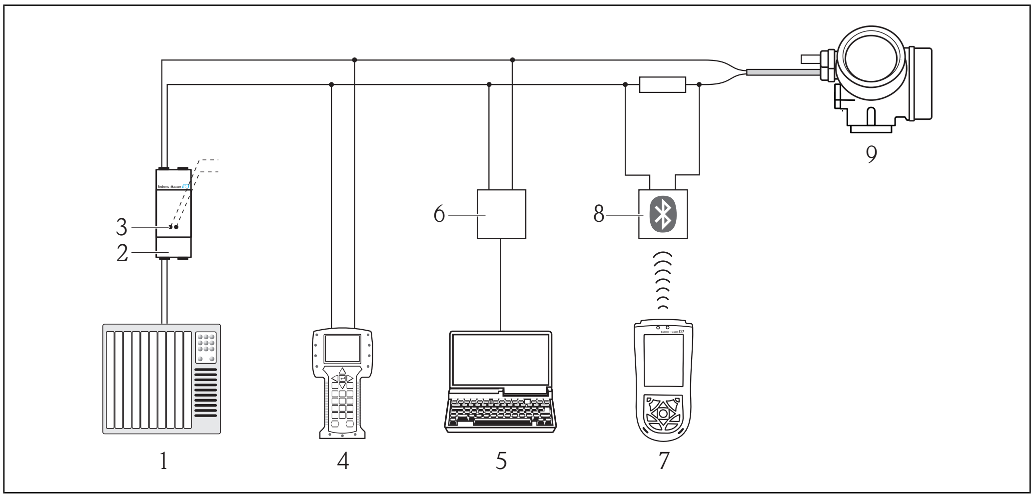
Display elements
- 4-line display
- In the case of order code for "Display; Operation", option **E**: white background lighting; switches to red in event of device errors
- Format for displaying measured variables and status variables can be individually configured
- Permitted ambient temperature for the display: –20 to +60 °C (–4 to +140 °F)
  The readability of the display may be impaired at temperatures outside the temperature range.

Operating elements
- In the case of order code "Display; Operation", Option **C**: local operation with 3 push buttons (⊕, ⊖, Ⓔ)
- In the case of order code for "Display; Operation", option **E**: external operation via touch control; 3 optical keys: ⊕, ⊖, Ⓔ
- Operating elements also accessible in various hazardous areas

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

Remote operation

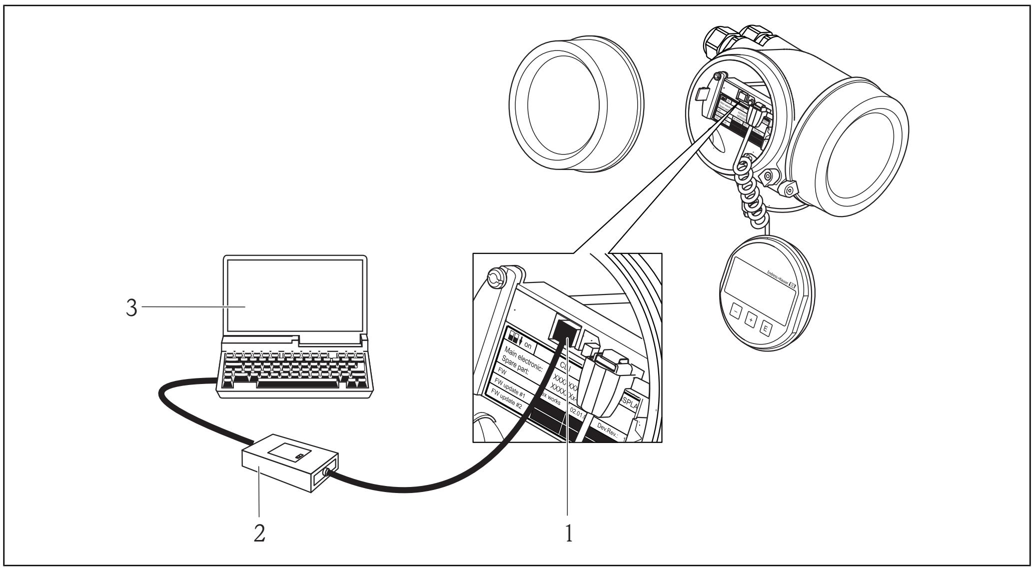
Via HART protocol



16 Options for remote operation via HART protocol

1 *Control system (e.g. PLC)*
2 *Transmitter power supply unit, e.g. RN221N (with communication resistor)*
3 *Connection for Commubox FXA195 and Field Communicator 475*
4 *Field Communicator 475*
5 *Computer with operating tool (e.g. FieldCare, AMS Device Manager, SIMATIC PDM)*
6 *Commubox FXA195 (USB)*
7 *Field Xpert SFX100*
8 *VIATOR Bluetooth modem with connecting cable*
9 *Transmitter*

Via service interface (CDI)



1 *Service interface (CDI = Endress+Hauser Common Data Interface) of the measuring device*
2 *Commubox FXA291*
3 *Computer with "FieldCare" operating tool with COM DTM "CDI Communication FXA291"*

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 d

Category (ATEX)	Type of protection
II2G	Ex d[ia] IIC T6-T1 Gb
II2D	Ex tb IIIC T** Db

Ex ia

Category (ATEX)	Type of protection
II2G	Ex ia IIC T6-T1 Gb
III2D	Ex tb IIIC T** Db

Ex nA

Category (ATEX)	Type of protection
II3G	Ex nA IIC T6-T1 Gc

Ex ic

Category (ATEX)	Type of protection
II3G	Ex ic IIC T6-T1 Gc

cCSAus

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

XP (Ex d)
Class I/II/III Division 1 Groups ABCDEFG

IS (Ex i)
Class I/II/III Division 1 Groups ABCDEFG

NI (Ex nA, Ex nL)
Class I Division 2 Groups ABCD; NIFW*

*= NIFW parameter as per Control Drawings

Sanitary compatibility

- 3A approval and EHEDG-certified
- Seals → conform to FDA (apart from Kalrez seals)

Other standards and guidelines

- EN 60529
  Degrees of protection provided by enclosures (IP code)
- EN 61010-1
  Protection Measures for Electrical Equipment for Measurement, Control, Regulation and Laboratory Procedures
- IEC/EN 61326
  Emission in accordance with Class A requirements. Electromagnetic compatibility (EMC requirements)
- ANSI/ISA-61010-1 (82.02.01): 2004
  Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use - Part 1 General Requirements
- CAN/CSA-C22.2 No. 61010-1-04
  Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use - Part 1 General Requirements
- NAMUR NE 21
  Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment
- NAMUR NE 32
  Data retention in the event of a power failure in field and control instruments with microprocessors
- NAMUR NE 43
  Standardization of the signal level for the breakdown information of digital transmitters with analog output signal.
- NAMUR NE 53
  Software of field devices and signal-processing devices with digital electronics
- NAMUR NE 105
  Specifications for integrating fieldbus devices in engineering tools for field devices
- NAMUR NE 107
  Self-monitoring and diagnosis of field devices
- NAMUR NE 131
  Requirements for field devices for standard applications

Ordering information

Detailed ordering information is available from the following sources:
- In the Product Configurator on the Endress+Hauser website: www.endress.com → Select country → Instruments → Select device → Product page function: Configure this product
- From your Endress+Hauser Sales Center: www.endress.com/worldwide

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

Application packages

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

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

Diagnostics functions

Package	Description

HistoROM extended function	Comprises extended functions concerning the event log and the activation of the measured value memory (data logger). Event log: Memory volume is extended from 20 message entries (basic version) to up to 100 entries. Data logging (line recorder): ▪ Memory capacity for up to 1000 measured values is activated. ▪ 250 measured values can be output via each of the 4 memory channels. The recording interval can be defined and configured by the user. ▪ Data logging is visualized via the local display or FieldCare.

Accessories

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

Device-specific accessories

For the transmitter

Accessories	Description
	Transmitter for replacement or storage. Use the order code to define the following specifications: ▪ Approvals ▪ Output ▪ Display / operation ▪ Housing ▪ Software For details, see Installation Instructions EA00104D
Weather protection cover	Is used to protect the measuring device from the effects of the weather: e.g. rainwater, excess heating from direct sunlight or extreme cold in winter. For details, see Installation Instructions SD00333F
Ground cable	Set, consisting of two ground cables for potential equalization.

For the sensor

Accessories	Description
Seal set	For the regular replacement of seals for the sensor.
Welding jig	Welded connection as process connection: welding jig for installation in pipe.
Ground rings	Are used to ground the fluid in lined measuring tubes to ensure proper measurement. For details, see Installation Instructions EA00070D
Mounting kit	Consists of: ▪ 2 process connections ▪ Threaded fasteners ▪ Seals

Communication-specific accessories

Accessories	Description
Commubox FXA191 HART	For intrinsically safe HART communication with FieldCare via the RS232C interface. For details, see "Technical Information" TI00237F

Commubox FXA195 HART	For intrinsically safe HART communication with FieldCare via the USB interface. For details, see "Technical Information" TI00404F
Commubox FXA291	Connects Endress+Hauser field devices with a CDI interface (= Endress+Hauser Common Data Interface) and the USB port of a computer or laptop. For details, see "Technical Information" TI00405C
HART Loop Converter HMX50	Is used to evaluate and convert dynamic HART process variables to analog current signals or limit values. For details, see "Technical Information" TI00429F and Operating Instructions BA00371F
WirelessHART adapter	Is used for the wireless connection of field devices. The WirelessHART adapter can be easily integrated into field devices and existing infrastructures, offers data protection and transmission safety and can be operated in parallel with other wireless networks with minimum cabling complexity. For details, see Operating Instructions BA00061S
Fieldgate FXA320	Gateway for the remote monitoring of connected 4-20 mA measuring devices via a Web browser. For details, see "Technical Information" TI00025S and Operating Instructions BA00053S
Fieldgate FXA520	Gateway for the remote diagnostics and remote configuration of connected HART measuring devices via a Web browser. For details, see "Technical Information" TI00025S and Operating Instructions BA00051S
Field Xpert SFX100	Compact, flexible and robust industry handheld terminal for remote configuration and for obtaining measured values via the HART current output (4-20 mA). For details, see Operating Instructions BA00060S

Service-specific accessories

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

FieldCare	FDT-based plant asset management tool from Endress+Hauser. It can configure all smart field units in your system and helps you manage them. By using the status information, it is also a simple but effective way of checking their status and condition. For details, see Operating Instructions BA00027S and BA00059S

System components

Accessories	Description
Memograph M graphic display recorder	The Memograph M graphic data manager provides information on all the relevant measured variables. Measured values are recorded correctly, limit values are monitored and measuring points analyzed. The data are stored in the 256 MB internal memory and also on a SD card or USB stick. For details, see "Technical Information" TI00133R and Operating Instructions BA00247R
RN221N	Active barrier with power supply for safe separation of 4-20 mA standard signal circuits. Offers bidirectional HART transmission. For details, see "Technical Information" TI00073R and Operating Instructions BA00202R
RNS221	Supply unit for powering two 2-wire measuring devices solely in the non-Ex area. Bidirectional communication is possible via the HART communication jacks. For details, see "Technical Information" TI00081R and Brief Operating Instructions KA00110R

Documentation

The following document types are available:
- On the CD-ROM supplied with the device
- In the Download Area of the Endress+Hauser Internet site: www.endress.com → Download

Standard documentation

Communication	Document type	Documentation code
HART	Operating Instructions	BA01110D
- - - -	Brief Operating Instructions	KA01120D

Supplementary device-dependent documentation

Document type	Approval	Documentation code
Safety Instructions	ATEX/IECEx Ex d[ia], Ex tb	XA01015D
	ATEX/IECEx Ex ia, Ex tb	XA01016D
	ATEX/IECEx Ex nA, Ex ic	XA01017D
	cCSAus XP (Ex d)	XA01018D
	cCSAus IS (Ex i)	XA01019D
Information on the Pressure Equipment Directive		SD01056D
Installation Instructions		Specified for each individual accessory (→ 49)

Registered trademarks

HART®
Registered trademark of the HART Communication Foundation, Austin, USA

Applicator®, FieldCare®, Field Xpert™, HistoROM®
Registered or registration-pending trademarks of the Endress+Hauser Group

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People for Process Automation

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EH-COSIMA ProMoDo