

# Technical Information

## Proline Promag 50H, 53H

### Electromagnetic flowmeter



The flowmeter for smallest flow rates with a modular electronic concept and/or with flexible system integration

#### Application

- The measuring principle is virtually independent of pressure, density, temperature and viscosity
- For the smallest flow quantities and demanding hygienic applications

#### Device properties

- Liner made of PFA
- Sensor housing made of stainless steel (3-A, EHEDG)
- Wetted materials CIP, SIP cleanable
- Device in compact or remote version

#### Promag 53

- 4-line backlit display with touch control
- HART, PROFIBUS PA/DP, Modbus RS485, FF, EtherNet/IP

#### Your benefits

- Flexible installation concept – numerous hygienic process connections
- Energy-saving flow measurement – no pressure loss due to cross-section constriction
- Maintenance-free – no moving parts

#### Promag 53

- Quality – software for filling & dosing, density, electrode cleaning and also advanced diagnostics
- Easy calculation – bidirectional totalizers
- Automatic recovery of data for servicing

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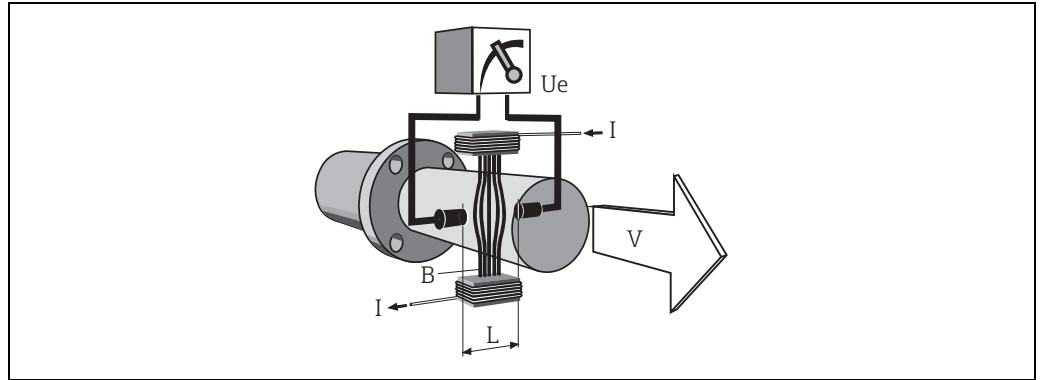
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## Function and system design

### 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 by means of the pipe cross-sectional area. The DC magnetic field is created through a switched direct current of alternating polarity.



$$U_e = B \cdot L \cdot v$$

$$Q = A \cdot v$$

$U_e$	Induced voltage
$B$	Magnetic induction (magnetic field)
$L$	Electrode spacing
$v$	Flow velocity
$Q$	Volume flow
$A$	Pipe cross-section
$I$	Current strength

### Measuring system

The measuring system consists of a transmitter and a sensor.

Two versions are available:

- Compact version: Transmitter and sensor form a mechanical unit.
- Remote version: Sensor is mounted separate from the transmitter.

Transmitter:

- Promag 50 (user interface with push buttons for operation, two-line display, illuminated)
- Promag 53 ("Touch Control" without opening the housing, four-line display, unilluminated)

Sensor:

- Promag H (DN 2 to 150 / 1/2 to 6")

## Input

**Measured variable** Flow velocity (proportional to induced voltage)

**Measuring ranges** Measuring ranges for liquids  
Typically  $v = 0.01$  to  $10$  m/s ( $0.03$  to  $33$  ft/s) with the specified accuracy

Flow characteristic values (SI units)					
Nominal diameter		Recommended flow rate Min./max. full scale value ( $v \sim 0.3$ or $10$ m/s)	Factory settings		
[mm]	[inch]		Full scale value, current output ( $v \sim 2.5$ m/s)	Pulse value ( $\sim 2$ pulses/s)	Low flow cut off ( $v \sim 0.04$ m/s)
2	1/12"	0.06 to 1.8 dm <sup>3</sup> /min	0.5 dm <sup>3</sup> /min	0.005 dm <sup>3</sup>	0.01 dm <sup>3</sup> /min
4	1/8"	0.25 to 7 dm <sup>3</sup> /min	2 dm <sup>3</sup> /min	0.025 dm <sup>3</sup>	0.05 dm <sup>3</sup> /min
8	3/8"	1 to 30 dm <sup>3</sup> /min	8 dm <sup>3</sup> /min	0.1 dm <sup>3</sup>	0.1 dm <sup>3</sup> /min
15	1/2"	4 to 100 dm <sup>3</sup> /min	25 dm <sup>3</sup> /min	0.2 dm <sup>3</sup>	0.5 dm <sup>3</sup> /min
25	1"	9 to 300 dm <sup>3</sup> /min	75 dm <sup>3</sup> /min	0.5 dm <sup>3</sup>	1 dm <sup>3</sup> /min
40	1 1/2"	25 to 700 dm <sup>3</sup> /min	200 dm <sup>3</sup> /min	1.5 dm <sup>3</sup>	3 dm <sup>3</sup> /min
50	2"	35 to 1100 dm <sup>3</sup> /min	300 dm <sup>3</sup> /min	2.5 dm <sup>3</sup>	5 dm <sup>3</sup> /min
65	–	60 to 2000 dm <sup>3</sup> /min	500 dm <sup>3</sup> /min	5 dm <sup>3</sup>	8 dm <sup>3</sup> /min
80	3"	90 to 3000 dm <sup>3</sup> /min	750 dm <sup>3</sup> /min	5 dm <sup>3</sup>	12 dm <sup>3</sup> /min
100	4"	145 to 4700 dm <sup>3</sup> /min	1200 dm <sup>3</sup> /min	10 dm <sup>3</sup>	20 dm <sup>3</sup> /min
125	–	220 to 7500 dm <sup>3</sup> /min	1850 dm <sup>3</sup> /min	15 dm <sup>3</sup>	30 dm <sup>3</sup> /min
150	6"	20 to 600 m <sup>3</sup> /h	150 m <sup>3</sup> /h	0.03 m <sup>3</sup>	2.5 m <sup>3</sup> /h

Flow characteristic values (US units)					
Nominal diameter		Recommended flow rate Min./max. full scale value ( $v \sim 0.3$ or $10$ m/s)	Factory settings		
[inch]	[mm]		Full scale value, current output ( $v \sim 2.5$ m/s)	Pulse value ( $\sim 2$ pulses/s)	Low flow cut off ( $v \sim 0.04$ m/s)
1/12"	2	0.015 to 0.5 gal/min	0.1 gal/min	0.001 gal	0.002 gal/min
1/8"	4	0.07 to 2 gal/min	0.5 gal/min	0.005 gal	0.008 gal/min
3/8"	8	0.25 to 8 gal/min	2 gal/min	0.02 gal	0.025 gal/min
1/2"	15	1.0 to 27 gal/min	6 gal/min	0.05 gal	0.10 gal/min
1"	25	2.5 to 80 gal/min	18 gal/min	0.2 gal	0.25 gal/min
1 1/2"	40	7 to 190 gal/min	50 gal/min	0.5 gal	0.75 gal/min
2"	50	10 to 300 gal/min	75 gal/min	0.5 gal	1.25 gal/min
3"	80	24 to 800 gal/min	200 gal/min	2 gal	2.5 gal/min
4"	100	40 to 1250 gal/min	300 gal/min	2 gal	4 gal/min
–	125	60 to 1950 gal/min	450 gal/min	5 gal	7 gal/min
6"	150	90 to 2650 gal/min	600 gal/min	5 gal	12 gal/min

**Operable flow range** Over 1000 : 1

**Input signal****Status input (auxiliary input)**

- U = 3 to 30 V DC,  $R_i = 5 \text{ k}\Omega$ , galvanically isolated
- Configurable for: totalizer(s) reset, positive zero return, error-message reset

**Status input (auxiliary input) with PROFIBUS DP and Modbus RS485**

- U = 3 to 30 V DC,  $R_i = 3 \text{ k}\Omega$ , galvanically isolated
- Switching level: 3 to 30 V DC, independent of polarity
- Configurable for: totalizer(s) reset (Modbus RS485 only), positive zero return, error-message reset, batching start/stop (optional), batch totalizer reset (optional)

**Current input (only Promag 53)**

- active/passive selectable, galvanically isolated, full scale value selectable, resolution: 3  $\mu\text{A}$ , temperature coefficient: typ. 0.005% o.r./ $^{\circ}\text{C}$  (o.r. = of reading)
- active: 4 to 20 mA,  $R_i \leq 150 \text{ W}$ , max. 24 V DC, short-circuit proof
- passive: 0/4 to 20 mA,  $R_i < 150 \text{ W}$ , max. 30 V DC

## Output

**Output signal****Promag 50****Current output**

active/passive selectable, galvanically isolated, time constant selectable (0.01 to 100 s), full scale value selectable, temperature coefficient: typ. 0.005% o.r./ $^{\circ}\text{C}$  (o.r. = of reading), resolution: 0.5 mA

- active: 0/4 to 20 mA,  $R_L < 700 \Omega$  (for HART:  $R_L \geq 250 \Omega$ )
- passive: 4 to 20 mA; supply voltage  $V_S$ : 18 to 30 V DC;  $R_i \geq 150 \Omega$

**Pulse/frequency output**

passive, open collector, 30 V DC, 250 mA, galvanically isolated

- Frequency output: full scale frequency 2 to 1000 Hz ( $f_{\text{max}} = 1250 \text{ Hz}$ ), on/off ratio 1:1, pulse width max. 10 s
- Pulse output: pulse value and pulse polarity selectable, max. pulse width configurable (0.5 to 2000 ms)

**PROFIBUS DP interface**

- Transmission technology (Physical Layer): RS485 in accordance with ANSI/TIA/EIA-485-A: 1998, galvanically isolated
- Profile version 3.0
- Data transmission rate: 9.6 kBaud to 12 MBaud
- Automatic data transmission rate recognition
- Function blocks: 1  $\times$  analog Input, 1  $\times$  totalizer
- Output data: volume flow, totalizer
- Input data: positive zero return (ON/OFF), totalizer control, value for local display
- Cyclic data transmission compatible with previous model Promag 33
- Bus address adjustable via miniature switches or local display (optional) at the measuring device

**PROFIBUS PA interface**

- Transmission technology (Physical Layer): IEC 61158-2 (MBP), galvanically isolated
- Profile version 3.0
- Current consumption: 11 mA
- Permissible supply voltage: 9 to 32 V
- Bus connection with integrated reverse polarity protection
- Error current FDE (Fault Disconnection Electronic): 0 mA
- Function blocks: 1  $\times$  analog input, 2  $\times$  totalizer
- Output data: volume flow, totalizer
- Input data: positive zero return (ON/OFF), totalizer control, value for local display
- Cyclic data transmission compatible with previous model Promag 33
- Bus address adjustable via miniature switches or local display (optional) at the measuring device

**Promag 53****Current output**

active/passive selectable, galvanically isolated, time constant selectable (0.01 to 100 s), full scale value selectable, temperature coefficient: typ. 0.005% o.r./°C (o.r. = of reading), resolution: 0.5 mA

- active: 0/4 to 20 mA,  $R_L < 700 \Omega$  (for HART:  $R_L \geq 250 \Omega$ )
- passive: 4 to 20 mA; supply voltage  $V_S$ : 18 to 30 V DC;  $R_i \geq 150 \Omega$

**Pulse/frequency output**

active/passive selectable, galvanically isolated (Ex i version: only passive)

- active: 24 V DC, 25 mA (max. 250 mA during 20 ms),  $R_L \geq 100 \Omega$
- passive: open collector, 30 V DC, 250 mA
- Frequency output: full scale frequency 2 to 10000 Hz ( $f_{max} = 12500$  Hz), for EEx-ia 2 to 5000 Hz; on/off ratio 1:1, pulse width max. 10 s
- Pulse output: pulse value and pulse polarity selectable, max. pulse width configurable (0.05 to 2000 ms)

**PROFIBUS DP interface**

- Transmission technology (Physical Layer): RS485 in accordance with ANSI/TIA/EIA-485-A: 1998, galvanically isolated
- Profile version 3.0
- Data transmission rate: 9.6 kBaud to 12 MBaud
- Automatic data transmission rate recognition
- Function blocks: 2 × analog input, 3 × totalizer
- Output data: volume flow, calculated mass flow, totalizer 1 to 3
- Input data: positive zero return (ON/OFF), totalizer control, value for local display
- Cyclic data transmission compatible with previous model Promag 33
- Bus address adjustable via miniature switches or local display (optional) at the measuring device
- Available output combination → 8

**PROFIBUS PA interface**

- Transmission technology (Physical Layer): IEC 61158-2 (MBP), galvanically isolated
- Profile version 3.0
- Current consumption: 11 mA
- Permissible supply voltage: 9 to 32 V
- Bus connection with integrated reverse polarity protection
- Error current FDE (Fault Disconnection Electronic): 0 mA
- Function blocks: 2 × analog input, 3 × totalizer
- Output data: volume flow, calculated mass flow, totalizer 1 to 3
- Input data: positive zero return (ON/OFF), totalizer control, value for local display
- Cyclic data transmission compatible with previous model Promag 33
- Bus address adjustable via miniature switches or local display (optional) at the measuring device

**Modbus RS485 interface**

- Transmission technology (Physical Layer): RS485 in accordance with ASME/TIA/EIA-485-A: 1998, galvanically isolated
- Modbus device type: slave
- Address range: 1 to 247
- Bus address adjustable via miniature switches or local display (optional) at the measuring device
- Supported Modbus function codes: 03, 04, 06, 08, 16, 23
- Broadcast: supported with the function codes 06, 16, 23
- Transmission mode: RTU or ASCII
- Supported baudrate: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud
- Response time:
  - Direct data access = typically 25 to 50 ms
  - Auto-scan buffer (data range) = typically 3 to 5 ms
- Available output combination → 8

**FOUNDATION Fieldbus interface**

- FOUNDATION Fieldbus H1
- Transmission technology (Physical Layer): IEC 61158-2 (MBP), galvanically isolated
- ITK version 5.01
- Current consumption: 12 mA
- Error current FDE (Fault Disconnection Electronic): 0 mA
- Bus connection with integrated reverse polarity protection
- Function blocks:
  - 5 × Analog Input (execution time: 18 ms each)
  - 1 × PID (25 ms)
  - 1 × Digital Output (18 ms)
  - 1 × Signal Characterizer (20 ms)
  - 1 × Input Selector (20 ms)
  - 1 × Arithmetic (20 ms)
  - 1 × Integrator (18 ms)
- Output data: volume flow, calculated mass flow, totalizer 1 to 3
- Input data: positive zero return (ON/OFF), reset totalizer
- Link Master (LM) functionality is supported

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<b>Signal on alarm</b>	<ul style="list-style-type: none"> <li>■ Current output → failure response selectable (e.g. in accordance with NAMUR recommendation NE 43)</li> <li>■ Pulse/frequency output → failure response selectable</li> <li>■ Status output (Promag 50) → "non-conductive" by fault or power supply failure</li> <li>■ Relay output (Promag 53) → "de-energized" by fault or power supply failure</li> </ul>
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<b>Load</b>	See "Output signal"
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<b>Low flow cutoff</b>	Switch points for low flow cutoff are selectable.
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<b>Galvanic isolation</b>	All circuits for inputs, outputs and power supply are galvanically isolated from each other.
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<b>Switching output</b>	<p><b>Status output (Promag 50, Promag 53)</b>                  Open collector, max. 30 V DC / 250 mA, galvanically isolated.                  Configurable for: error messages, Empty Pipe Detection (EPD), flow direction, limit values</p> <p><b>Relay outputs (Promag 53)</b>                  Normally closed (NC or break) or normally open (NO or make) contacts available                  (factory setting: relay 1 = NO, relay 2 = NC),                  max. 30 V / 0.5 A AC; 60 V / 0.1 A DC, galvanically isolated.                  Configurable for: error messages, Empty Pipe Detection (EPD), flow direction, limit values, batching contacts</p>
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## Power supply

### Terminal assignment

#### Terminal assignment, Promag 50

Order code for "Input/Output"	Terminal No. (inputs/outputs)			
	20 (+) / 21 (-)	22 (+) / 23 (-)	24 (+) / 25 (-)	26 (+) / 27 (-)
W	-	-	-	Current output HART
A	-	-	Frequency output	Current output HART
D	Status input	Status output	Frequency output	Current output HART
H	-	-	-	PROFIBUS PA
J	-	-	+5 V (external termination)	PROFIBUS DP
S	-	-	Frequency output, Ex i, passive	Current output, Ex i, active, HART
T	-	-	Frequency output, Ex i, passive	Current output, Ex i, passive, HART

Ground terminal → 10

#### Terminal assignment, Promag 53

The inputs and outputs on the communication board can be either permanently assigned or variable, depending on the version ordered (see table). Replacements for modules which are defective or which have to be replaced can be ordered as accessories.

Order code for "Input/Output"	Terminal No. (inputs/outputs)			
	20 (+) / 21 (-)	22 (+) / 23 (-)	24 (+) / 25 (-)	26 (+) / 27 (-)
Fixed communication boards (fixed assignment)				
A	-	-	Frequency output	Current output HART
B	Relay output 2	Relay output 1	Frequency output	Current output HART
F	-	-	-	PROFIBUS PA, Ex i
G	-	-	-	FOUNDATION Fieldbus, Ex i
H	-	-	-	PROFIBUS PA
J	-	-	-	PROFIBUS DP
K	-	-	-	FOUNDATION Fieldbus
Q	-	-	Status input	Modbus RS485
S	-	-	Frequency output, Ex i	Current output, Ex i, active, HART
T	-	-	Frequency output, Ex i	Current output, Ex i, passive, HART
Flexible communication boards				
C	Relay output 2	Relay output 1	Frequency output	Current output HART
D	Status input	Relay output	Frequency output	Current output HART
L	Status input	Relay output 2	Relay output 1	Current output HART
M	Status input	Frequency output	Frequency output	Current output HART
N	Current output	Frequency output	Status input	Modbus RS485
P	Current output	Frequency output	Status input	PROFIBUS DP
V	Relay output 2	Relay output 1	Status input	PROFIBUS DP
2	Relay output	Current output	Frequency output	Current output HART
4	Current input	Relay output	Frequency output	Current output HART
7	Relay output 2	Relay output 1	Status input	Modbus RS485

Ground terminal → 10



**Supply voltage**

- 85 to 260 V AC, 45 to 65 Hz
- 20 to 55 V AC, 45 to 65 Hz
- 16 to 62 V DC

PROFIBUS PA and FOUNDATION Fieldbus

- Non-Ex: 9 to 32 V DC
  - Ex i: 9 to 24 V DC
  - Ex d: 9 to 32 V DC
- 

**Power consumption**

- AC: < 15 VA (incl. sensor)
- DC: < 15 W (incl. sensor)

Switch-on current:

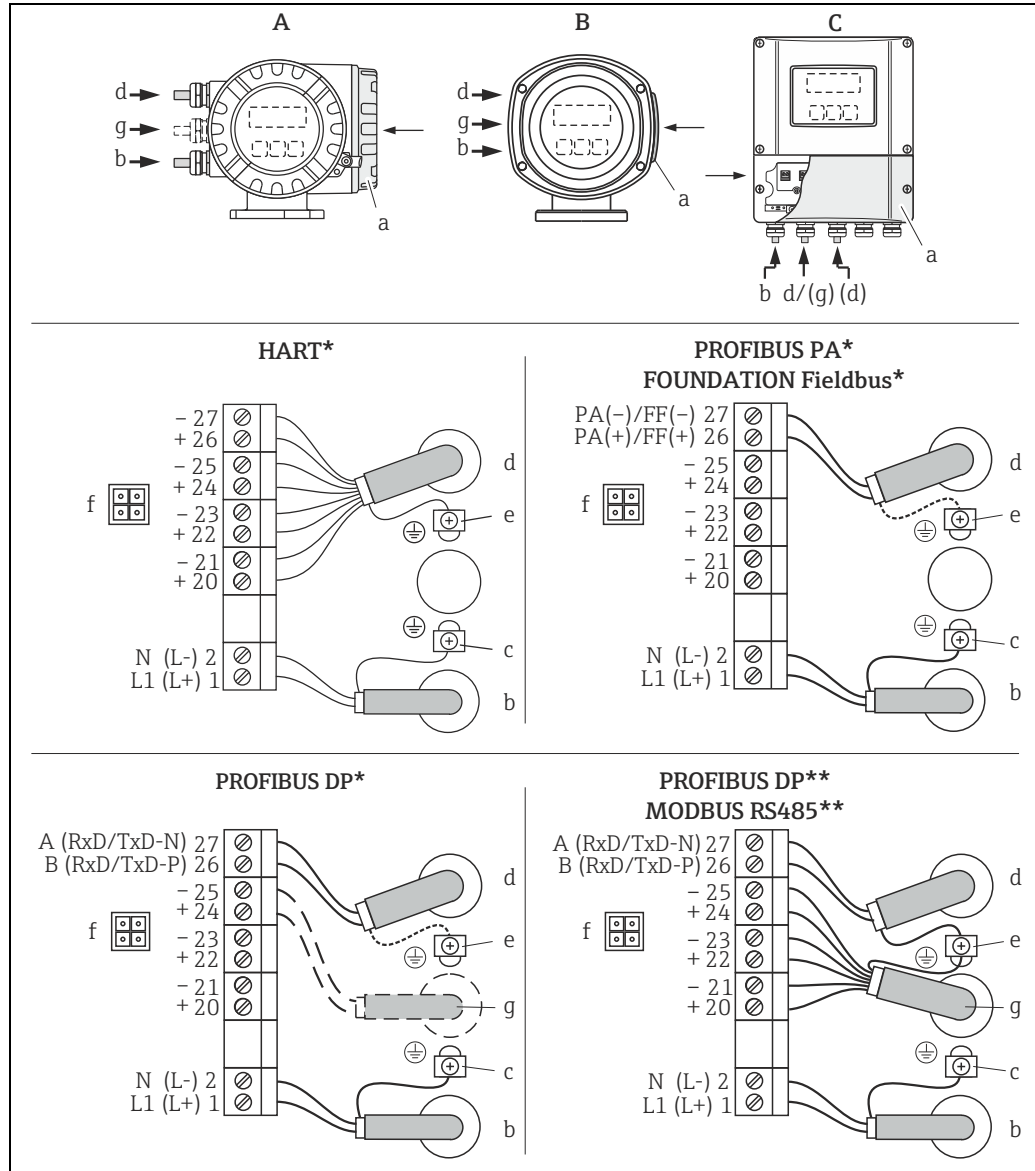
- Max. 3.0 A (< 5 ms) for 260 V AC
  - Max. 8.5 A (< 5 ms) for 24 V DC
- 

**Power supply failure**

Lasting at least one half cycle frequency: EEPROM saves measuring system data

- EEPROM or T-DAT (Promag 53 only) retain the measuring system data in the event of a power supply failure
- S-DAT: exchangeable data storage chip which stores the data of the sensor (nominal diameter, serial number, calibration factor, zero point etc.)

## Electrical connection



A0002441

Connecting the transmitter, cable cross-section max. 2.5 mm<sup>2</sup> (14 AWG)

- A View A (field housing)  
 B View B (stainless steel field housing)  
 C View C (wall-mount housing)

\*) Fixed communication board

\*\*) Flexible communication board

a Connection compartment cover

b Cable for power supply: 85 to 260 V AC / 20 to 55 V AC / 16 to 62 V DC

- Terminal No. 1: L1 for AC, L+ for DC

- Terminal No. 2: N for AC, L- for DC

c Ground terminal for protective conductor

d Electrode cable: see "Electrical connection, terminal assignment" → 8

Fieldbus cable:

- Terminal No. 26: DP (B) / PA + / FF + / Modbus RS485 (B) / (PA, FF: with reverse polarity protection)

- Terminal No. 27: DP (A) / PA - / FF - / Modbus RS485 (A) / (PA, FF: with reverse polarity protection)

e Ground terminal for electrode cable shield / Fieldbus cable / RS485 line

f Service adapter for connecting service interface FXA193 (Fieldcheck, FieldCare)

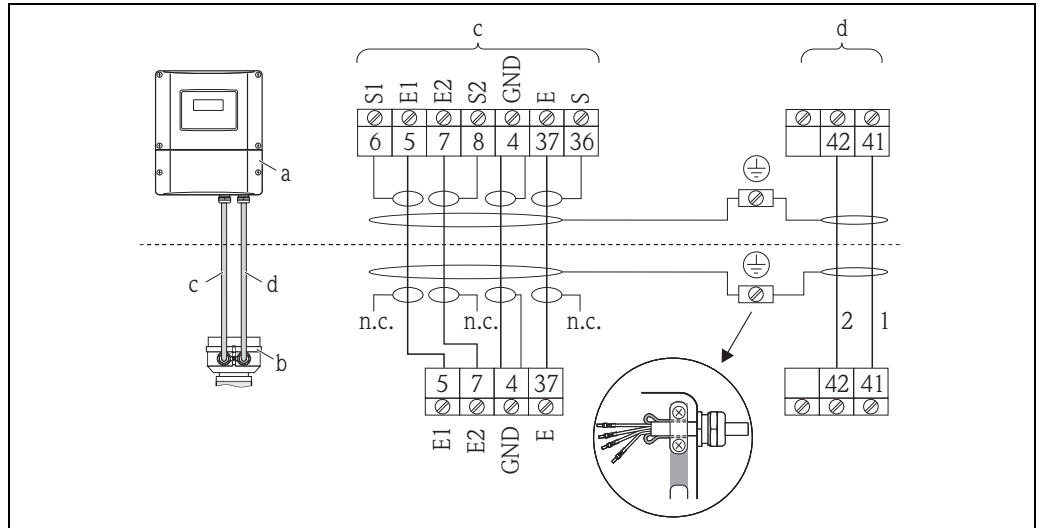
g Electrode cable: see "Electrical connection, terminal assignment" → 8

Cable for external termination (only for PROFIBUS DP with fixed assignment communication board):

- Terminal No. 24: +5 V

- Terminal No. 25: DGND

**Electrical connection, remote version**



Connecting the remote version

- a Wall-mount housing connection compartment
- b Sensor connection housing cover
- c Electrode cable
- d Coil current cable

n.c. Not connected, insulated cable shields

Terminal no. and cable colors: 6/5 = brown; 7/8 = white; 4 = green; 36/37 = yellow, 41 = 1, 42 = 2

**Potential equalization**

Perfect measurement is only ensured when the medium and the sensor have the same electrical potential.

**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.

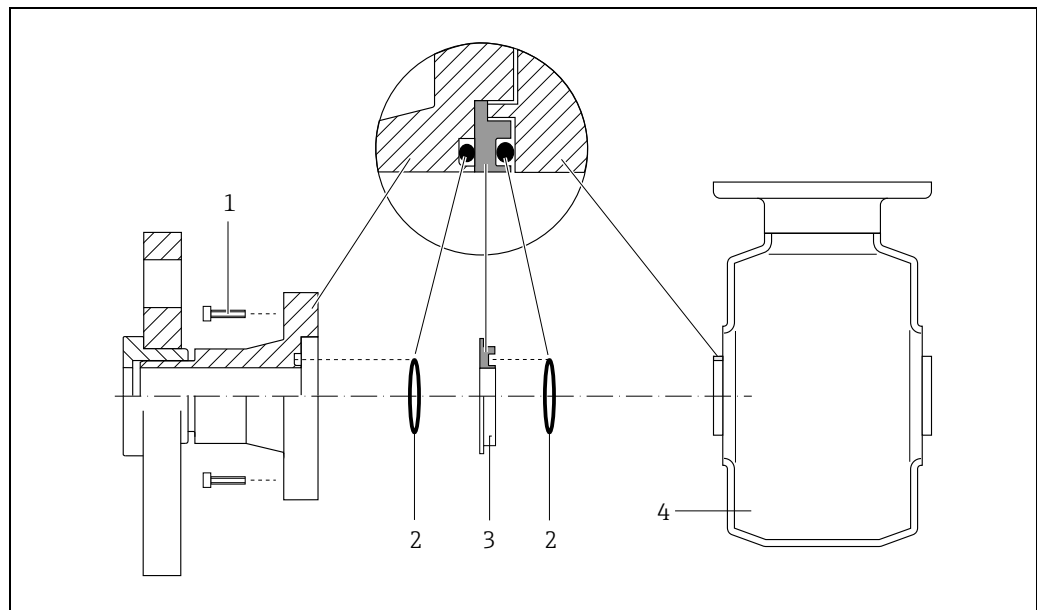
**Plastic process connections (DN 2 to 25)**

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! You can find material data on → 59.
- Ground rings, including the seals, are mounted within the process connections. Therefore, the fitting length is not affected. You can find the dimensions of ground rings on → 46.

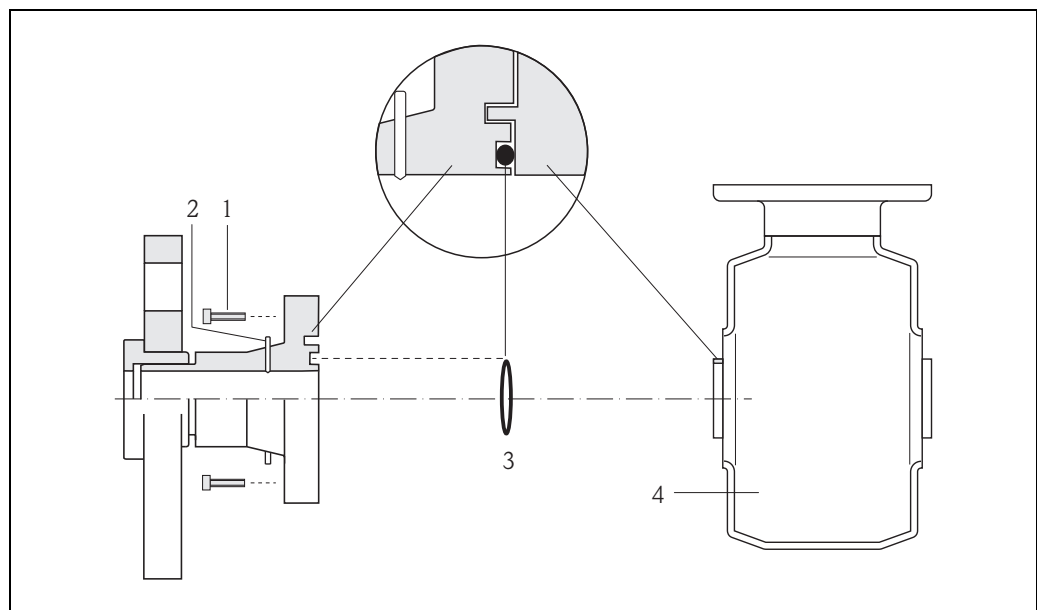
Potential equalization via additional ground ring



A0002651

- 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



A0017293

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

**Cable entries**

**Power supply and electrode cables (inputs/outputs)**

- Cable entry M20 × 1.5 (8 to 12 mm / 0.31 to 0.47")
- Sensor cable entry for armoured cables M20 × 1.5 (9.5 to 16 mm / 0.37 to 0.63")
- Thread for cable entries, ½" NPT, G ½"

**Connecting cable for remote version**

- Cable entry M20 × 1.5 (8 to 12 mm / 0.31 to 0.47")
- Sensor cable entry for armoured cables M20 × 1.5 (9.5 to 16 mm / 0.37 to 0.63")
- Thread for cable entries, ½" NPT, G ½"

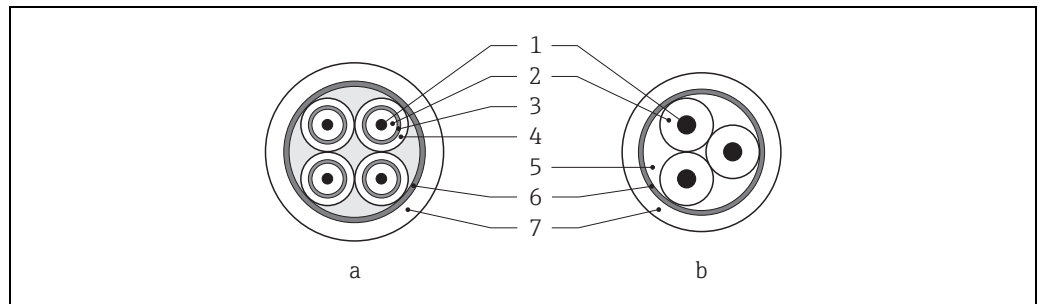
**Remote version cable specifications**

**Coil current cable**

- 3 × 0.75 mm<sup>2</sup> (18 AWG) PVC cable with common, braided copper shield (∅ ~ 9 mm / 0.35")
- Conductor resistance: ≤ 37 Ω/km (≤ 0.011 Ω/ft)
- Capacitance core/core, shield grounded: ≤ 120 pF/m (≤ 37 pF/ft)
- Operating temperature: -20 to +80 °C (-68 to +176 °F)
- Cable cross-section: max. 2.5 mm<sup>2</sup> (14 AWG)
- Test voltage for cable insulation: ≤ 1433 AC r.m.s 50/60 Hz or ≥ 2026 V DC

**Electrode cable**

- 3 × 0.38 mm<sup>2</sup> (20 AWG) PVC cable with common, braided copper shield (∅ ~ 9.5 mm / 0.37") and individual shielded cores
- With empty pipe detection (EPD): 4 × 0.38 mm<sup>2</sup> (20 AWG) PVC cable with common, braided copper shield (∅ ~ 9.5 mm / 0.37") and individual shielded cores
- Conductor resistance: ≤ 50 Ω/km (≤ 0.015 Ω/ft)
- Capacitance core/shield: ≤ 420 pF/m (≤ 128 pF/ft)
- Operating temperature: -20 to +80 °C (-68 to +176 °F)
- Cable cross-section: max. 2.5 mm<sup>2</sup> (14 AWG)



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

**Operation in zones of severe electrical interference**

The measuring device complies with the general safety requirements in accordance with EN 61010 and the EMC requirements of IEC/EN 61326 and NAMUR recommendation NE 21.



**Caution!**

Grounding is by means of the ground terminals provided for the purpose inside the connection housing. Ensure that the stripped and twisted lengths of cable shield to the ground terminal are as short as possible.

## Performance characteristics

### Reference operating conditions

- Error limits following DIN EN 29104, future ISO 20456
- Water, typically +15 to +45°C (+59 to +113 °F); 0,5 to 7 bar (73 to 101 psi)
- Specification as per calibration protocol
- Data on the measured error based on accredited calibration rigs traced back to ISO 17025

### Maximum measured error

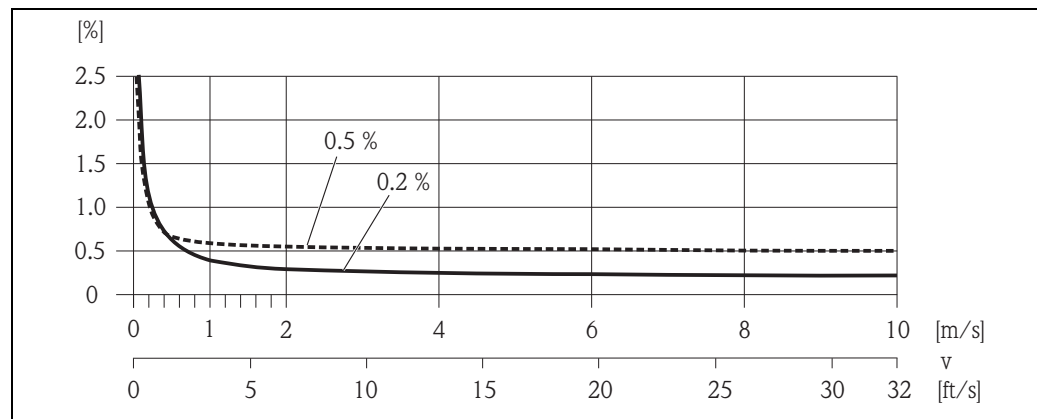
#### Promag 50

- Pulse output:  $\pm 0.5\%$  o.r.  $\pm 1$  mm/s  
optional:  $\pm 0.2\%$  o.r.  $\pm 2$  mm/s  
(o.r. = of reading)
- Current output: also typically  $\pm 5$   $\mu$ A

#### Promag 53

- Pulse output:  $\pm 0.2\%$  o.r.  $\pm 2$  mm/s (o.r. = of reading)
- Current output: also typically  $\pm 5$   $\mu$ A

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



Max. measured error in % of reading

A0005531

### Repeatability

Max.  $\pm 0.1\%$  o.r.  $\pm 0.5$  mm/s (o.r. = of reading)

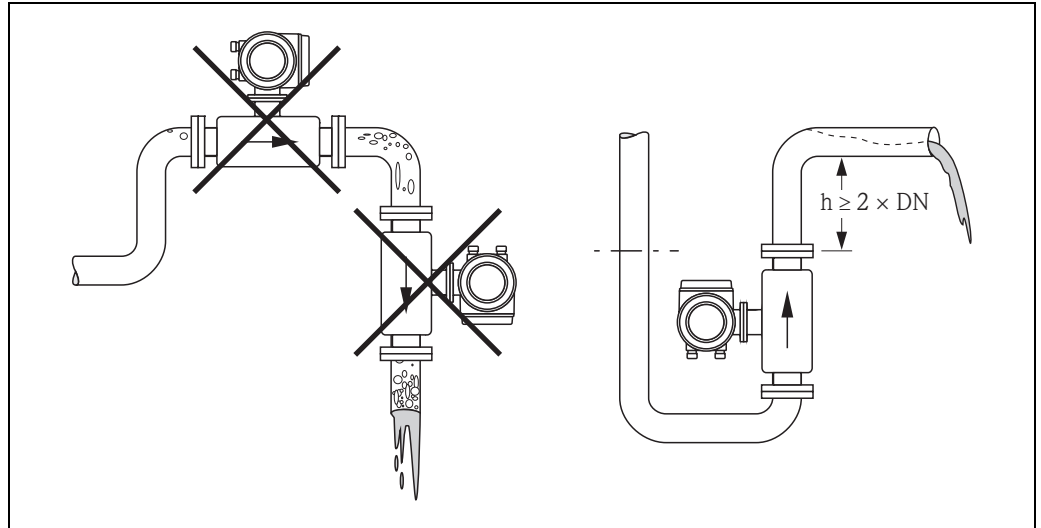
## Installation

### Mounting location

Entrained air or gas bubble formation in the measuring tube can result in an increase in measuring errors.

**Avoid** the following installation locations in the pipe:

- Highest point of a pipeline. Risk of air entrainment.
- Directly upstream from a free pipe outlet in a vertical pipeline.



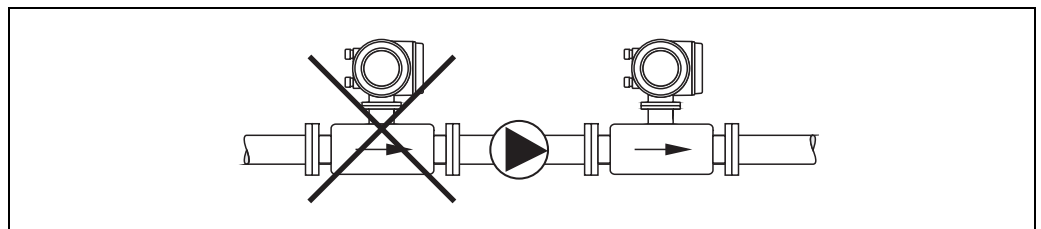
A0011899

Mounting location

### Installation of pumps

Sensors may not be installed on the pump suction side. This precaution is to avoid low pressure and the consequent risk of damage to the lining of the measuring tube. Information on the pressure tightness of the measuring tube lining → 28, "Pressure tightness" section.

It might be necessary to install pulse dampers in systems incorporating reciprocating, diaphragm or peristaltic pumps. Information on the shock and vibration resistance of the measuring system → 20, "Shock and vibration resistance" section.



A0011900

Installation of pumps

**Partially filled pipes**

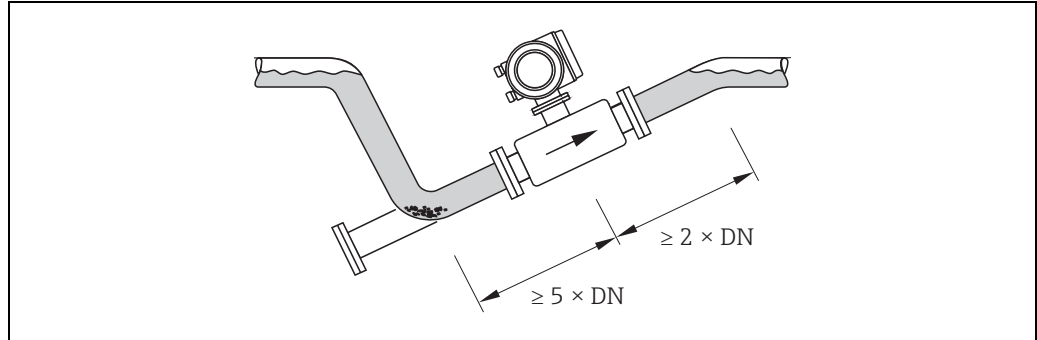
Partially filled pipes with gradients necessitate a drain-type configuration.

The empty pipe detection function (EPD) provides additional security in detecting empty or partially filled pipes.



Note!

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



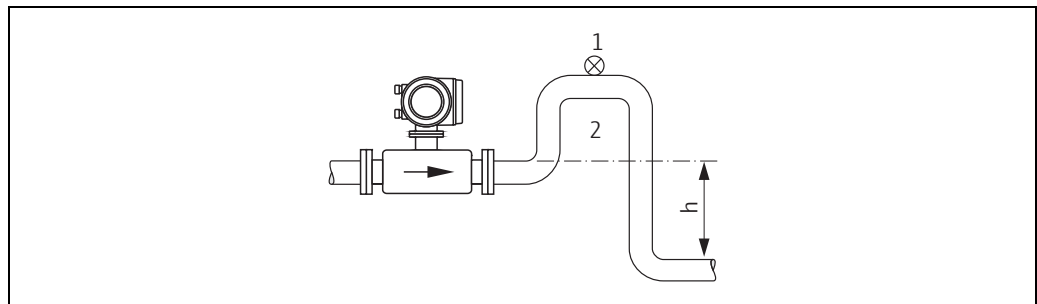
A0011901

Installation with partially filled pipes

**Down pipes**

Install a siphon or a vent valve downstream of the sensor in down pipes  $h \geq 5 \text{ m}$  (16.4 ft). This precaution is to avoid low pressure and the consequent risk of damage to the lining of the measuring tube. This measure also prevents the liquid current stopping in the pipe which could cause air locks.

Information on the pressure tightness of the measuring tube lining → 28, "Pressure tightness" section.



A0011902

Installation measures for vertical pipes

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

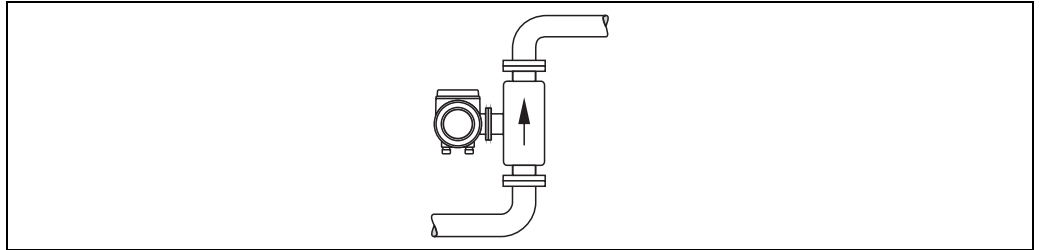


**Orientation**

An optimum orientation position helps avoid gas and air accumulations and deposits in the measuring tube. The measuring device also offers the additional empty pipe detection function (EPD) for the detection of partially filled measuring tubes, e.g. in the case of degassing fluids or varying process pressures.

**Vertical orientation**

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



A0011903

Vertical orientation

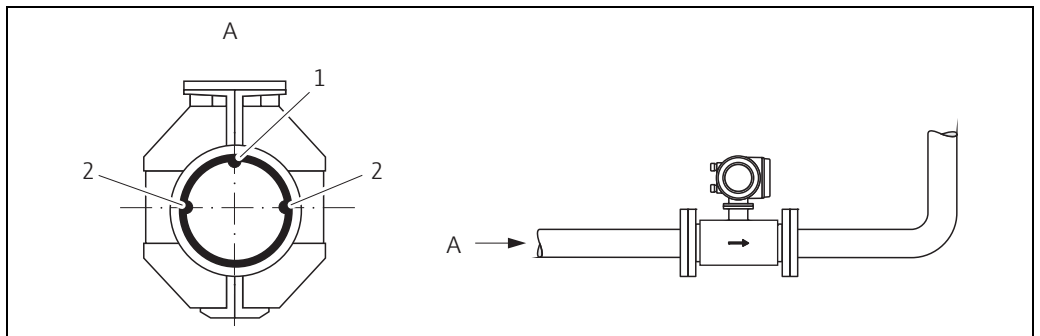
**Horizontal orientation**

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



Note!

Empty pipe detection only works correctly with horizontal orientation if the transmitter housing is facing upwards. Otherwise there is no guarantee that empty pipe detection will respond if the measuring tube is only partially filled or empty.



A0012953

Horizontal orientation

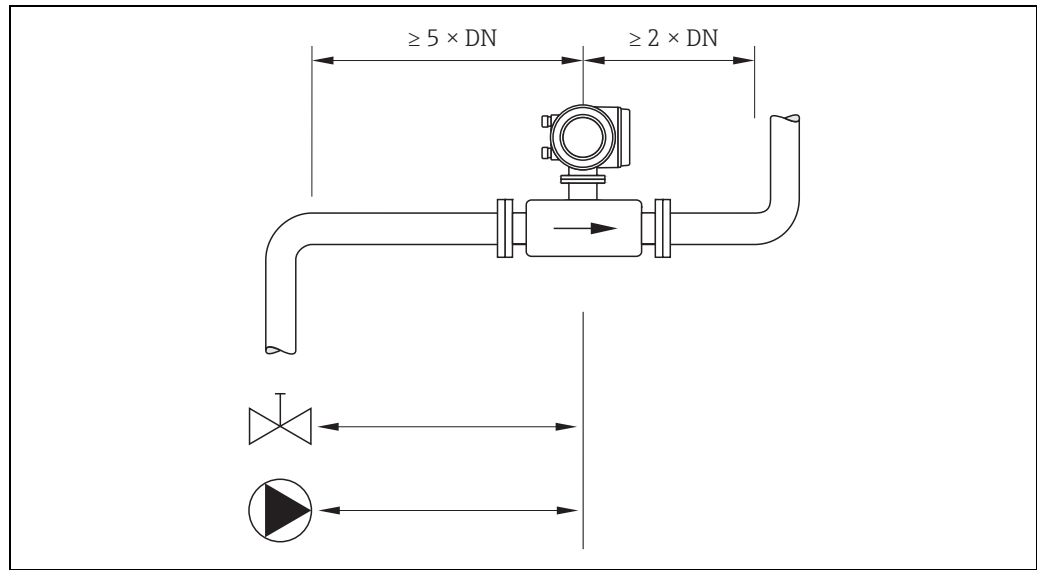
- 1 EPD electrode for empty pipe detection (not for DN 2 to 8 / 1/2 to 5/16")
- 2 Measuring electrodes for signal detection

**Inlet and outlet run**

If possible, install the sensor well clear of assemblies such as valves, T-pieces, elbows etc.

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

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



*Inlet and outlet run*

A0011905

**Adapters**

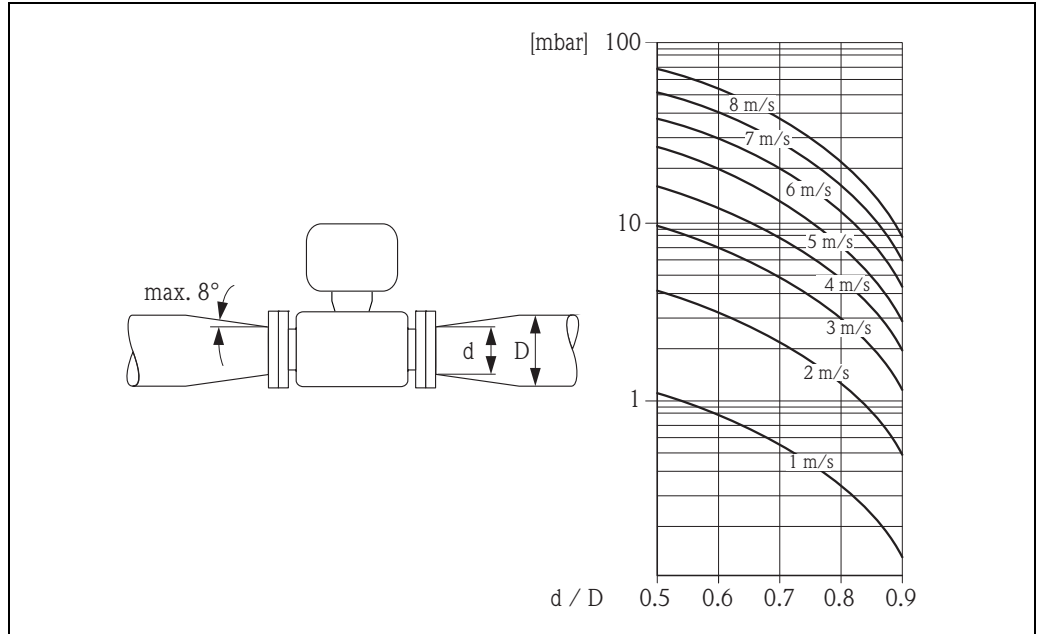
Suitable adapters to DIN EN 545 (double-flange reducers) can be used to install the sensor in larger-diameter pipes. The resultant increase in the rate of flow improves measuring accuracy with very slow-moving fluids. The nomogram shown here can be used to calculate the pressure loss caused by cross-section reduction.



Note!

- The nomogram only applies to liquids of viscosity similar to that of water.
- For high viscosities of the fluid the selection of a pipe with larger diameter may be considered to reduce the pressure loss.

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



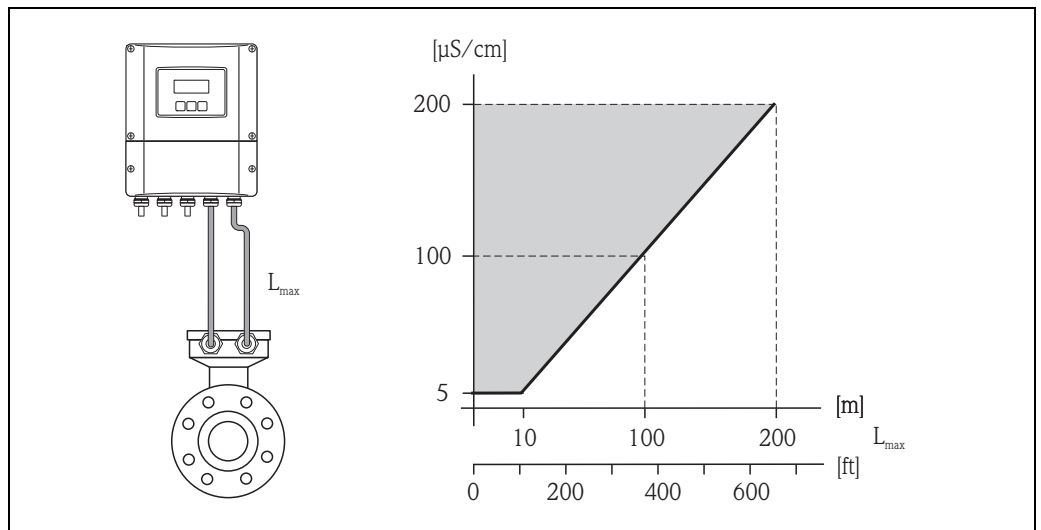
Pressure loss due to adapters

A0016359

**Length of connecting cable**

When mounting the remote version, please note the following to achieve correct measuring results:

- Fix the cable run or route it in an armored conduit. Cable movements can falsify the measuring signal especially in the case of low fluid conductivities.
- Route the cable well clear of electrical machines and switching elements.
- If necessary, ensure potential equalization between sensor and transmitter.
- The permissible cable length  $L_{max}$  depends on the fluid conductivity. A minimum conductivity of 20  $\mu\text{S}/\text{cm}$  is required for measuring demineralized water.
- When the empty pipe detection function is switched on (EPD), the maximum connecting cable length is 10 m (33 ft).



Permitted length of connecting cable for remote version

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

A0010734

## Environment

### Ambient temperature range

#### Transmitter

- Standard: -20 to +60 °C (-4 to +140 °F)
- Optional: -40 to +60 °C (-40 to +140 °F)



#### Note!

At ambient temperatures below -20 °C (-4 °F) the readability of the display may be impaired.

#### Sensor

- -40 to +60 °C (-40 to +140 °F)



#### Note!

The permitted temperature range of the measuring tube lining may not be undershot or overshoot (→ 20, Section "Medium temperature range").

Please note the following points:

- Install the device at a shady location. Avoid direct sunlight, particularly in warm climatic regions.
- The transmitter must be mounted separate from the sensor if both the ambient and fluid temperatures are high.

### Storage temperature

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



#### Note!

- The measuring device must be protected against direct sunlight during storage in order to avoid unacceptably high surface temperatures.
- A storage location must be selected where moisture does not collect in the measuring device. This will help prevent fungus and bacteria infestation which can damage the liner.
- If protecting caps or protective covers are mounted, these must not be removed before mounting the device.

### Degree of protection

- Standard: IP 67 (NEMA 4X) for transmitter and sensor.

### Shock and vibration resistance

Acceleration up to 2 g following IEC 68-2-6

### Interior cleaning

- CIP cleaning
- SIP cleaning

### Electromagnetic compatibility (EMC)

- As per IEC/EN 61326 and NAMUR recommendation NE 21
- Emission: to limit value for industry EN 55011

## Process

### Medium temperature range

The permissible medium temperature depends on the sensor and the sealing material:

#### Sensor:

- DN 2 to 150 (1/12 to 6"): -20 to +150 °C (-4 to +302 °F)

#### Seals:

- EPDM: -20 to +150 °C (-4 to 302 °F)
- Viton (FKM): -20 to +150 °C (-4 to 302 °F)
- Silicone (VMQ): -20 to +150 °C (-4 to 302 °F)
- Kalrez: -20 to +150 °C (-4 to 302 °F)

**Conductivity**

- The minimum conductivity is:
- $\geq 5 \mu\text{S/cm}$  for fluids generally
  - $\geq 20 \mu\text{S/cm}$  for demineralized water



Note!

In the remote version, the necessary minimum conductivity also depends on the cable length  
 (-> 19, Section "Length of connecting cable").

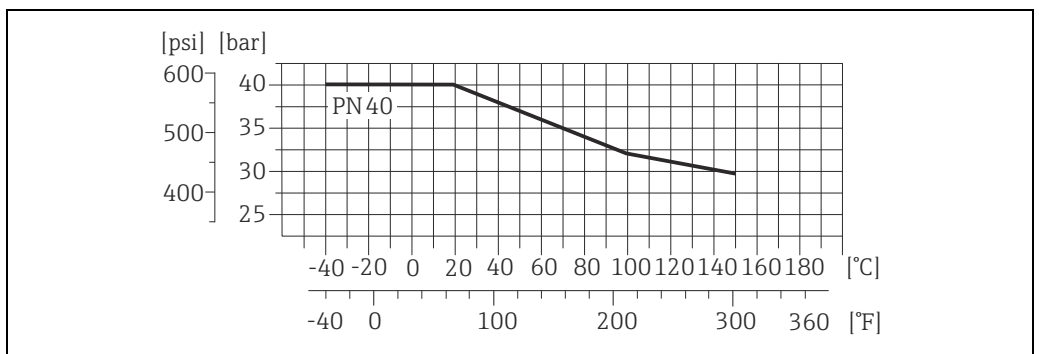
**Pressure-temperature ratings**

The following diagrams contain pressure-temperature ratings (reference curves) for flange materials with regard to the medium temperature.

**Process connections with O-ring seal, DN 2 to 25 (1/2 to 1")**

Process connection: welding nipple according to DIN EN ISO 1127, ODT/SMS, ISO 2037;  
 coupling according to ISO 228 (DIN 2999), NPT

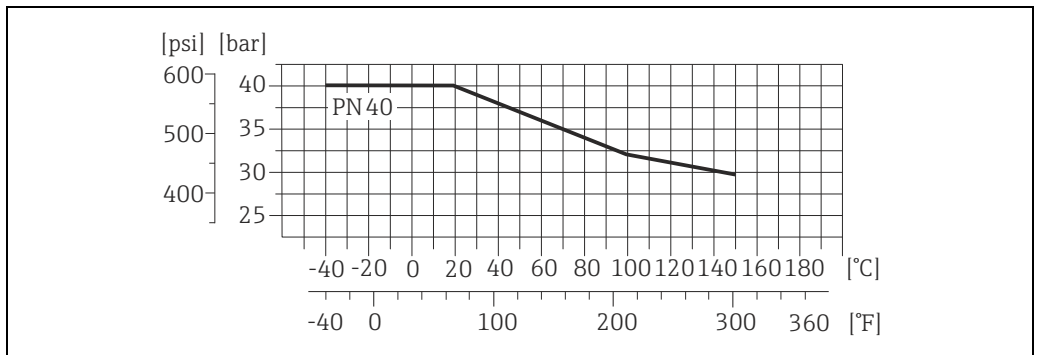
Process connection material: stainless steel, 1.4404 (316L)



A0021191-EN

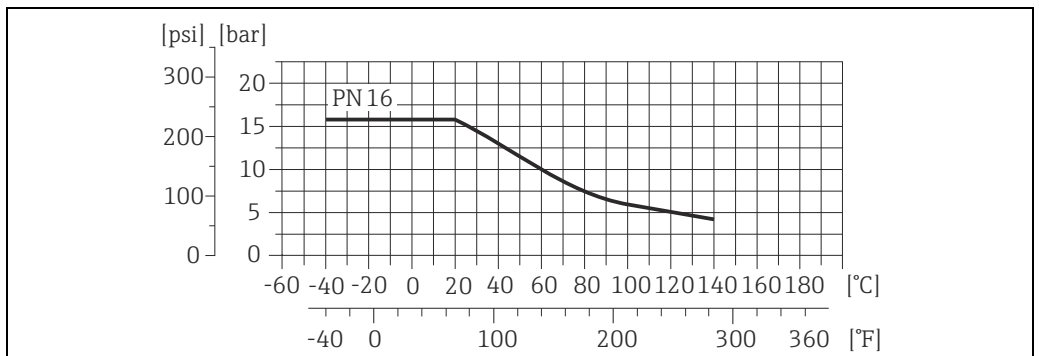
Process connection: flange according to EN 1092-1 (DIN 2501), adhesive sleeve

Process connection material: stainless steel, 1.4404 (316L)



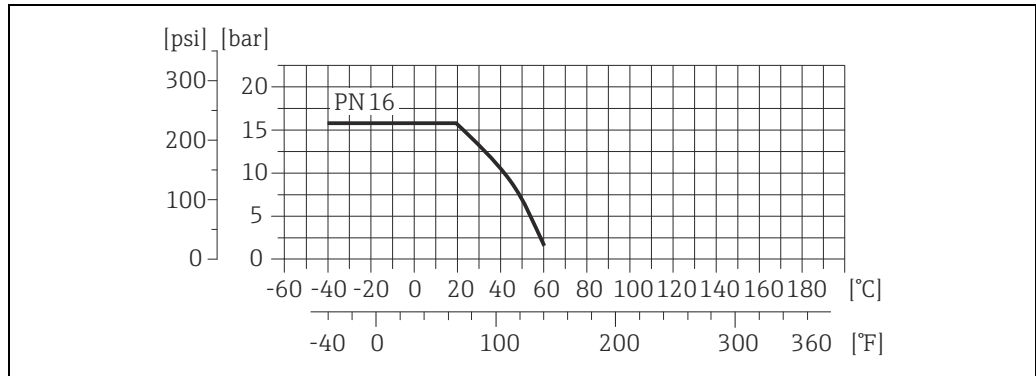
A0021191-EN

Process connection material: PVDF



A0021230-EN

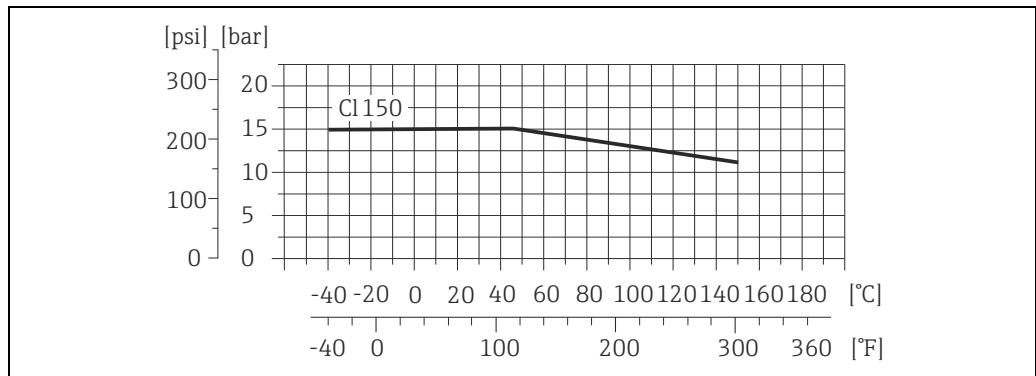
Process connection material: PVC-U



A0021231-EN

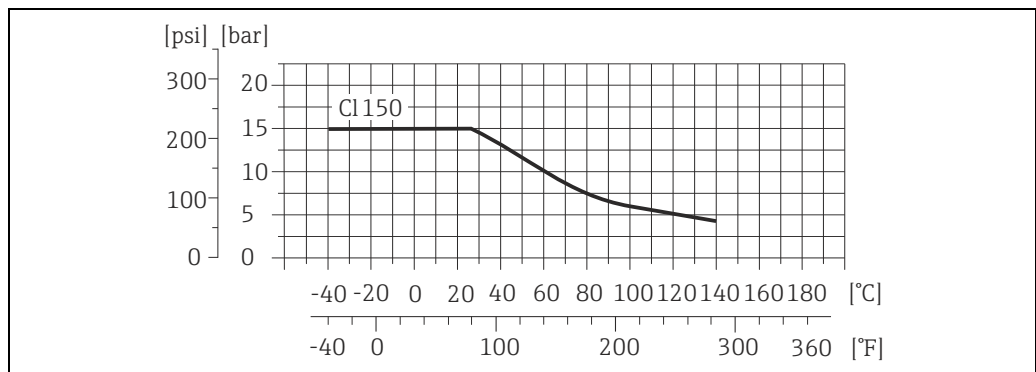
Process connection: flange according to ASME B16.5

Process connection material: stainless steel, 1.4404 (316L)



A0021192-EN

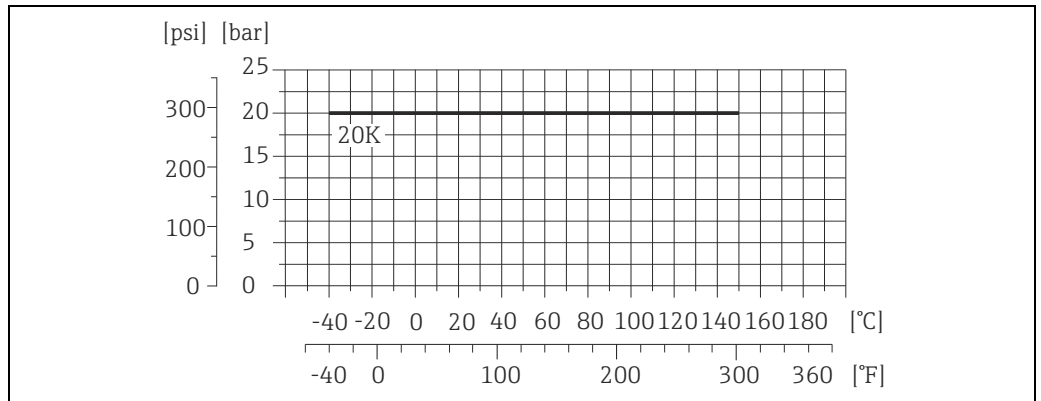
Process connection material: PVDF



A0021232-EN

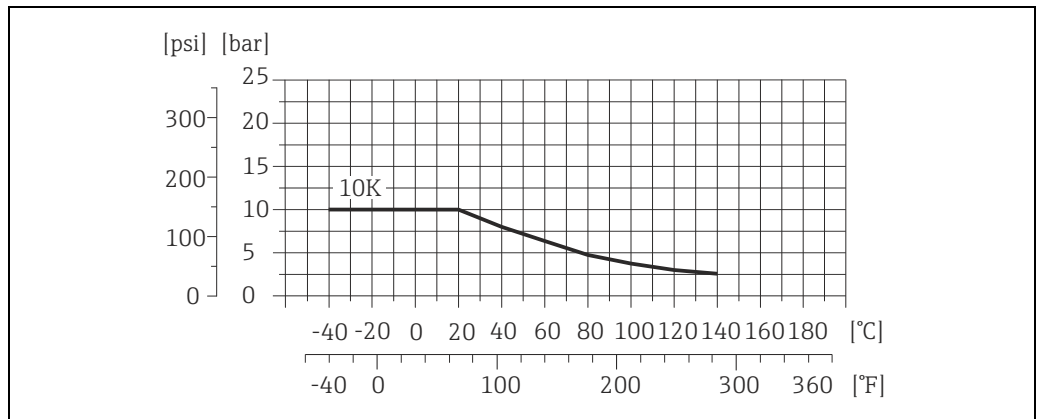
Process connection: flange according to JIS B2220

Process connection material: stainless steel, 1.4404 (316L)



A0021193-EN

Process connection material: PVDF



A0021233-EN

**Process connections with aseptic molded seal, DN 2 to 25 (1/16 to 1")**

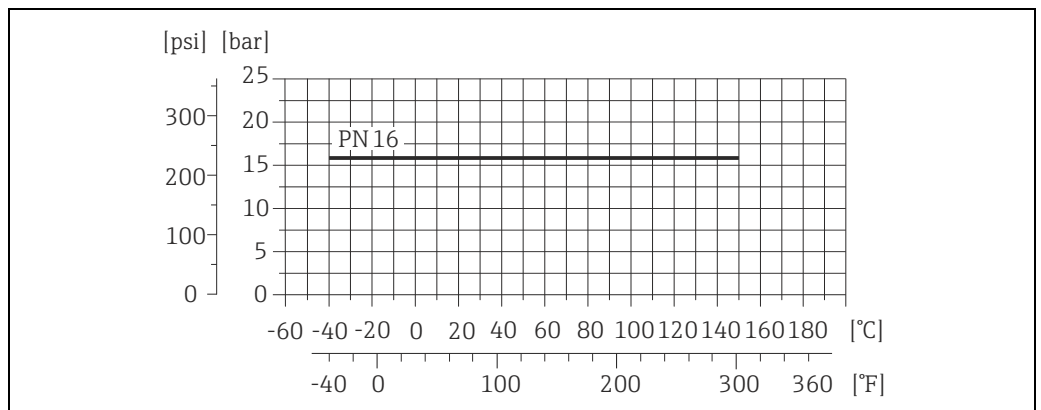
Process connection: welding nipple according to EN 10357 (DIN 11850);

Clamp according to ISO 2852, DIN 32676, L14 AM7; coupling according to SC DIN 11851;

DIN 11864-1, SMS 1145;

flange according to DIN 11864-2

Process connection material: stainless steel, 1.4404 (316L)

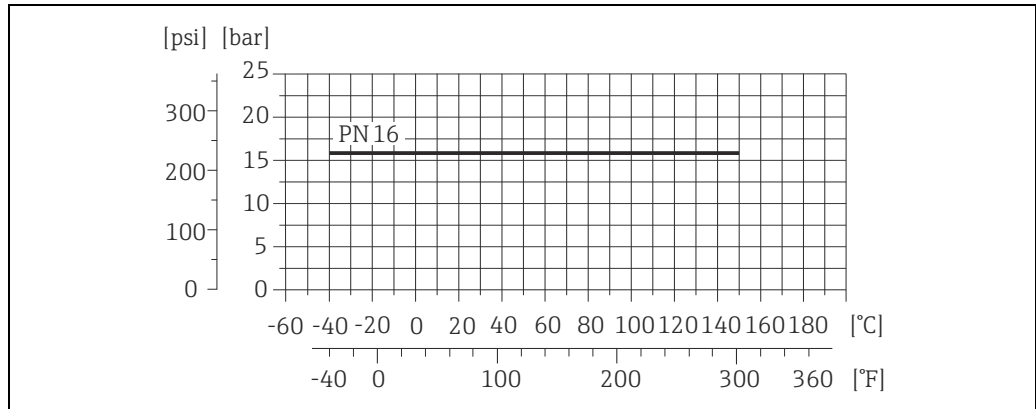


A0021190-EN

**Process connections with aseptic molded seal, DN 40 to 150 (1½ to 6")**

Process connection: welding nipple according to ODT/SMS;  
coupling according to SMS 1145

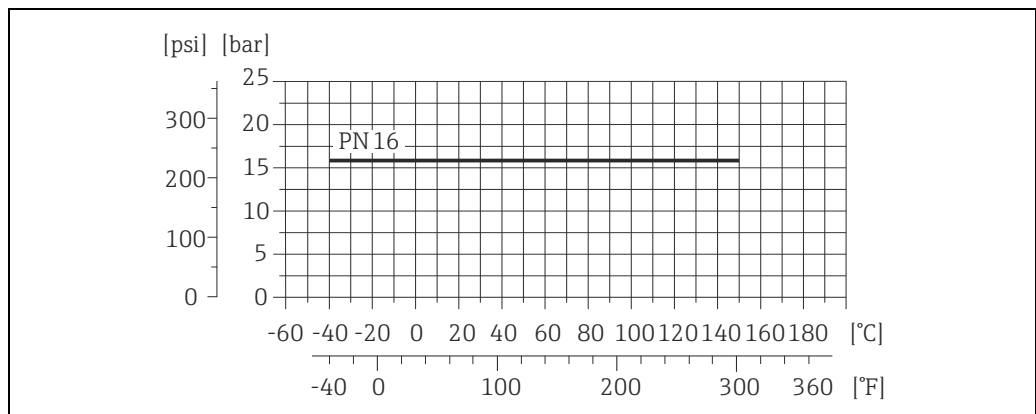
Process connection material: stainless steel, 1.4404 (F316L)



A0021190-EN

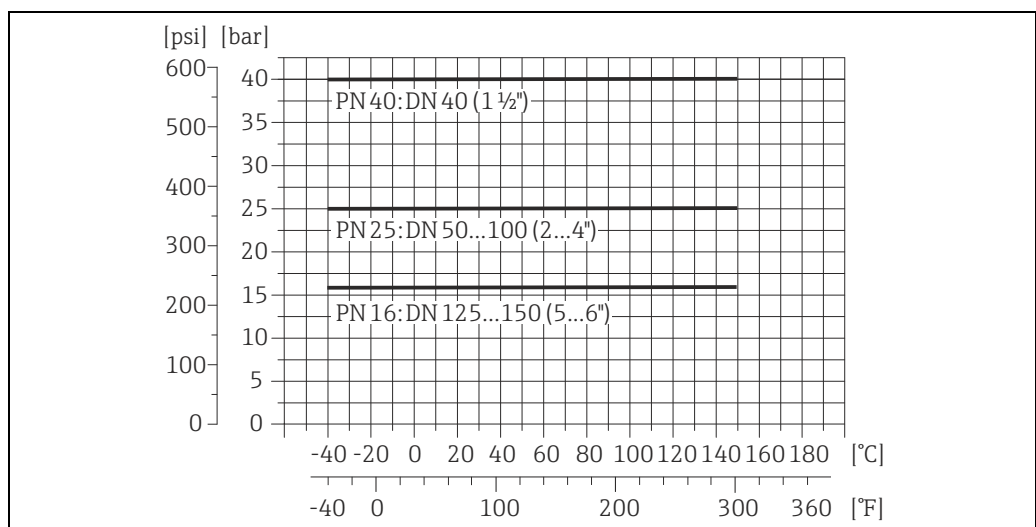
Process connection: welding nipple according to EN 10357 (DIN 11850);  
coupling according to SC DIN 11851

Process connection material: stainless steel, 1.4404 (F316L)



A0021190-EN

For order codes with suffixes +CA/+CB:

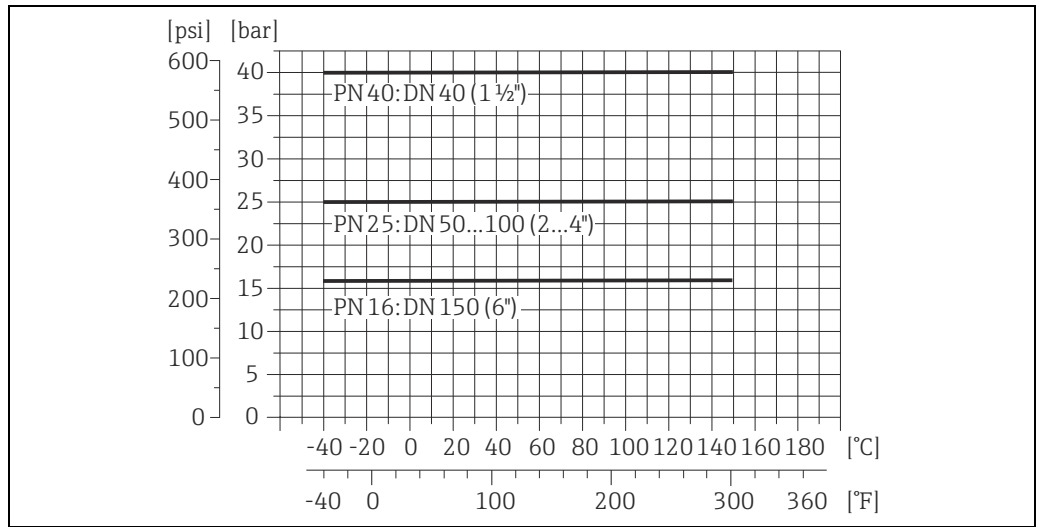


A0021195-EN



Process connection: welding nipple according to ASME BPE

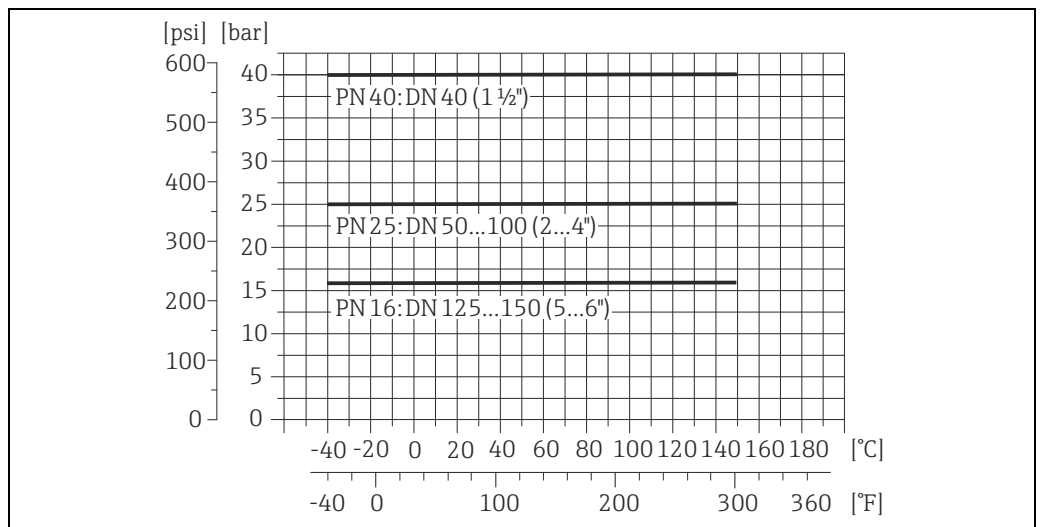
Process connection material: stainless steel, 1.4404 (F316L)



A0021196-EN

Process connection: welding nipple according to ISO 2037

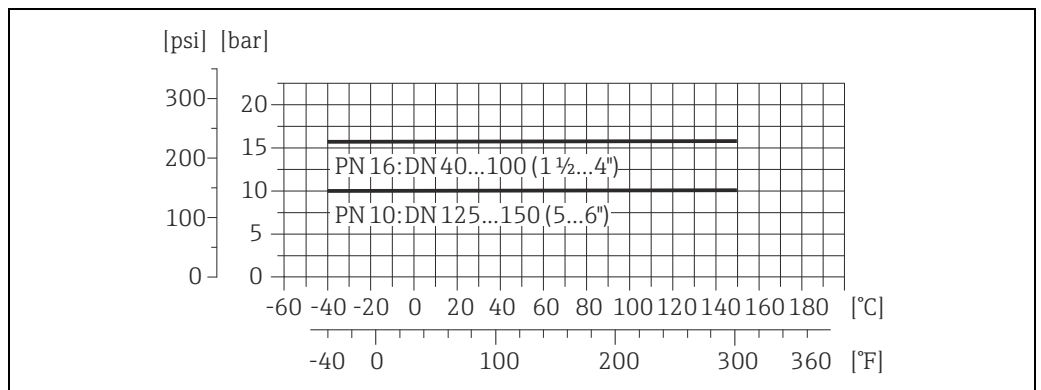
Process connection material: stainless steel, 1.4404 (F316L)



A0021195-EN

Process connection: Clamp according to ISO 2852, DIN 32676, L14 AM7

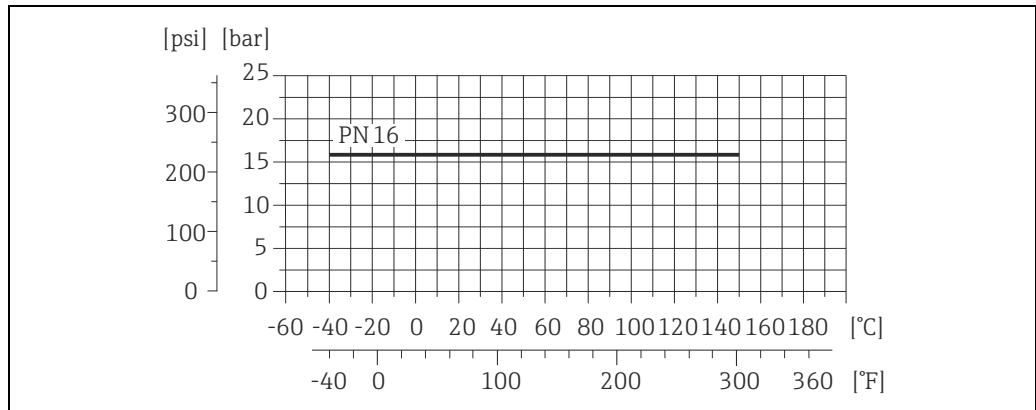
Process connection material: stainless steel, 1.4404 (F316L)



A0021197-EN

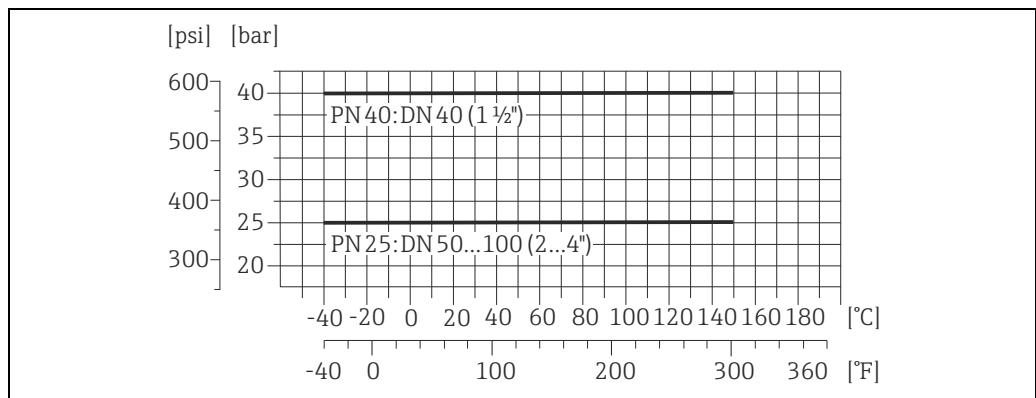
Process connection: coupling according to DIN 11864-1, ISO 2853

Process connection material: stainless steel, 1.4404 (F316L)



A0021190-EN

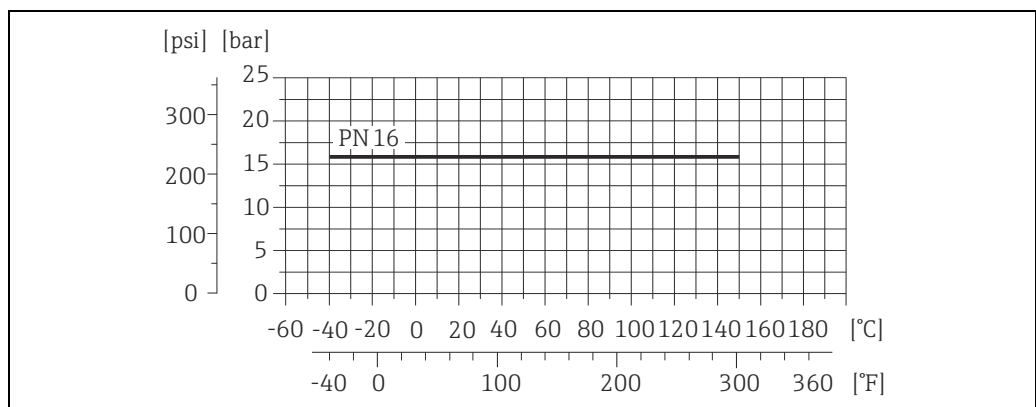
For order codes with suffixes +CA/+CB:



A0021194-EN

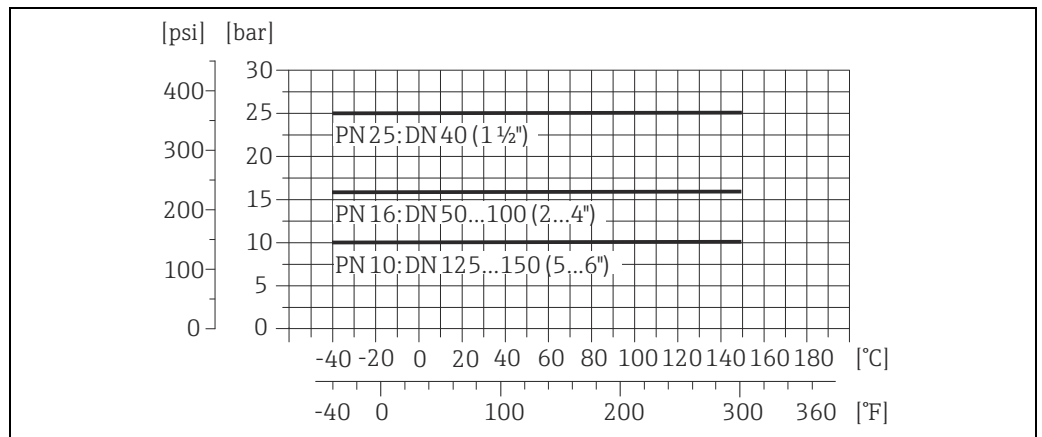
Process connection: flange according to DIN 11864-2

Process connection material: stainless steel, 1.4404 (F316L)



A0021190-EN

For order codes with suffixes +CA/+CB:



A0021198-EN

**Medium pressure range  
(nominal pressure)**

The permitted nominal pressure depends on the process connection, the seal and the nominal diameter:

**Process connections DN 2 to 25 (1/12 to 1") with O-ring seal**

Nominal diameter	[mm]	2	4	8	15	25
	[inch]	1/12"	1/8"	3/8"	1/2"	1"
Weld sockets: DIN EN ISO 1127, ODT/SMS		1.4404 (316L): PN 40 (580 psi)				
Couplings: ISO 228/DIN 2999, NPT						
Flange: EN 1092-1 (DIN 2501)		1.4404 (316L): PN 40 (580 psi), PVDF: PN 16 (232 psi)				
Flange: ASME B16.5		1.4404 (316L), PVDF: Class 150				
Flange: JIS B2220		1.4404 (316L): 20 K, PVDF: 10 K				
Hose connection		1.4404 (316L): PN 16 (232 psi)				
PVC adhesive fitting		PVC: PN 16 (232 psi)				

**Process connections DN 2 to 25 (1/12 to 1") with aseptic gasket seal**

Nominal diameter	[mm]	2	4	8	15	25
	[inch]	1/12"	1/8"	3/8"	1/2"	1"
Weld sockets: EN 10357 (DIN 11850), ODT/SMS		1.4404 (316L): PN 16 (232 psi)				
Couplings: SC DIN 11851, DIN 11864-1, SMS 1145						
Clamp: ISO 2852/Fig. 2, DIN 32676, L14 AM7						
Flange: DIN 11864-2						

## Process connections DN 40 to 150 (1½ to 6") with aseptic gasket seal 1.4404 (F316L)

Nominal diameter	[mm]	40	50	65	80	100	125	150
	[inch]	1½"	2"	-	3"	4"	-	6"
Weld socket: ODT/SMS	PN 16 (232 psi)							
Weld socket: EN 10357 (DIN 11850)	PN 16 (232 psi)							
- For order codes with suffixes +CA/+CB	PN 40 (580 psi)	PN 25 (362.5 psi)				PN 16 (232 psi)		
Weld socket: ISO 2037	PN 40 (580 psi)	PN 25 (362.5 psi)				PN16 (232 psi)		
Weld socket: ASME BPE	PN 40 (580 psi)	PN 25 (362.5 psi)				-	PN 16 (232 psi)	
Clamp: ISO 2852, DIN 32676, L14 AM7	PN 16 (232 psi)						PN 10 (145 psi)	
Coupling: SC DIN 11851	PN 16 (232 psi)							
- For order codes with suffixes +CA/+CB	PN 40 (580 psi)	PN 25 (362.5 psi)				PN 16 (232 psi)		
Coupling: SMS 1145	PN 16 (232 psi)							
Coupling: DIN 11864-1, ISO 2853	PN 16 (232 psi)							
- For order codes with suffixes +CA/+CB	PN 40 (580 psi)	PN 25 (362.5 psi)				-		
Flange: DIN 11864-2	PN 16 (232 psi)							
- For order codes with suffixes +CA/+CB	PN 25 (362.5 psi)	PN 16 (232 psi)				PN 10 (145 psi)		

## Pressure tightness

Measuring tube lining: PFA

Nominal diameter		Limit values for abs. pressure [mbar] ([psi]) at fluid temperatures:				
[mm]	[inch]	25 °C (77 °F)	80 °C (176 °F)	100 °C (212 °F)	130 °C (266 °F)	150 °C (302 °F)
2 to 150	½ to 6"	0	0	0	0	0

## Limiting flow

The diameter of the pipe and the flow rate determine the nominal diameter of the sensor. The optimum flow velocity is between 2 and 3 m/s (6.5 to 9.8 ft/s). Also match the velocity of flow (v) to the physical properties of the fluid:

- $v < 2$  m/s (6.5 ft/s): For low conductivity values
- $v > 2$  m/s (6.5 ft/s): For media that produce buildup (e.g. milk with high fat content)



Note!

- A necessary increase in the flow velocity can be achieved by reducing the sensor nominal diameter (→ 18, Section "Adapters").
- For fluids with high levels of solids, the selection of a pipe with nominal diameter  $> DN 8$  (¾") may be considered, to improve the stability of the signal and cleanability due to larger electrodes.

## Pressure loss

- With nominal diameters from DN 8 (¾") no pressure loss if the sensor is installed in a pipe with the same nominal diameter.
- Pressure losses for configurations incorporating adapters according to DIN EN 545 (→ 18, Section "Adapters").

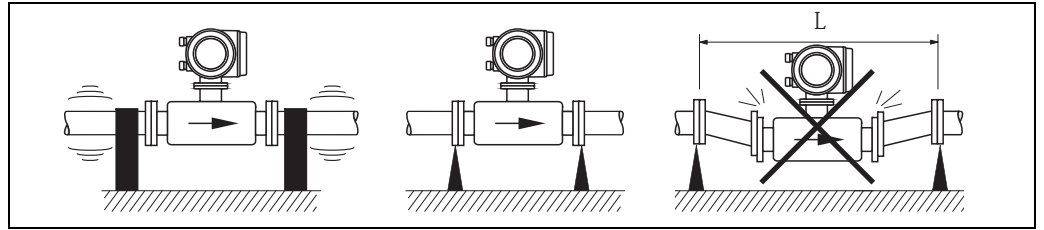
## Vibrations



Secure the piping and the sensor if vibration is severe.

Note!

If vibrations are too severe, we recommend the sensor and transmitter be mounted separately. Information on the permitted shock and vibration resistance → 20, "Shock and vibration resistance" section.



A0011906

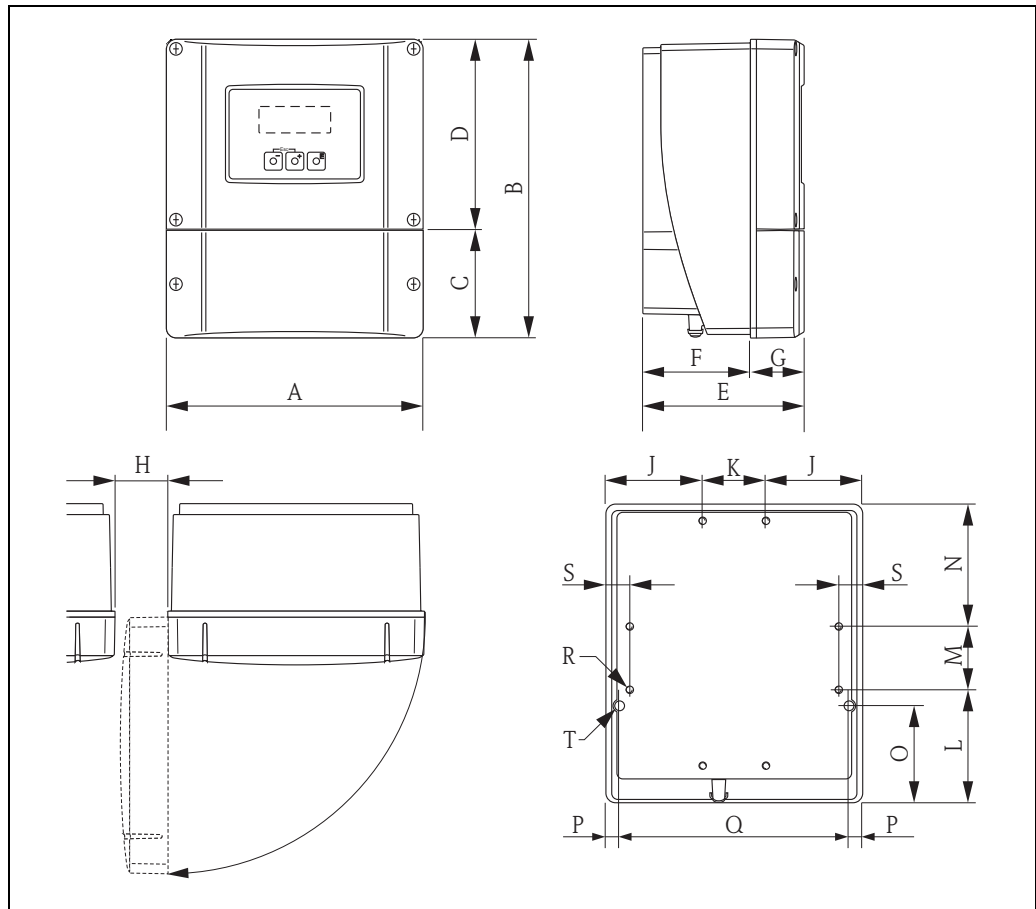
Measures to prevent vibration of the measuring device

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

## Mechanical construction

### Design, dimensions

### Transmitter remote version, wall-mount housing (non Ex-zone and II3G/Zone 2)



A0001150

#### Dimensions (SI units)

A	B	C	D	E	F	G	H	J	K
215	250	90.5	159.5	135	90	45	> 50	81	53
L	M	N	O	P	Q	R	S	T <sup>1)</sup>	
95	53	102	81.5	11.5	192	8 × M5	20	2 × Ø 6.5	

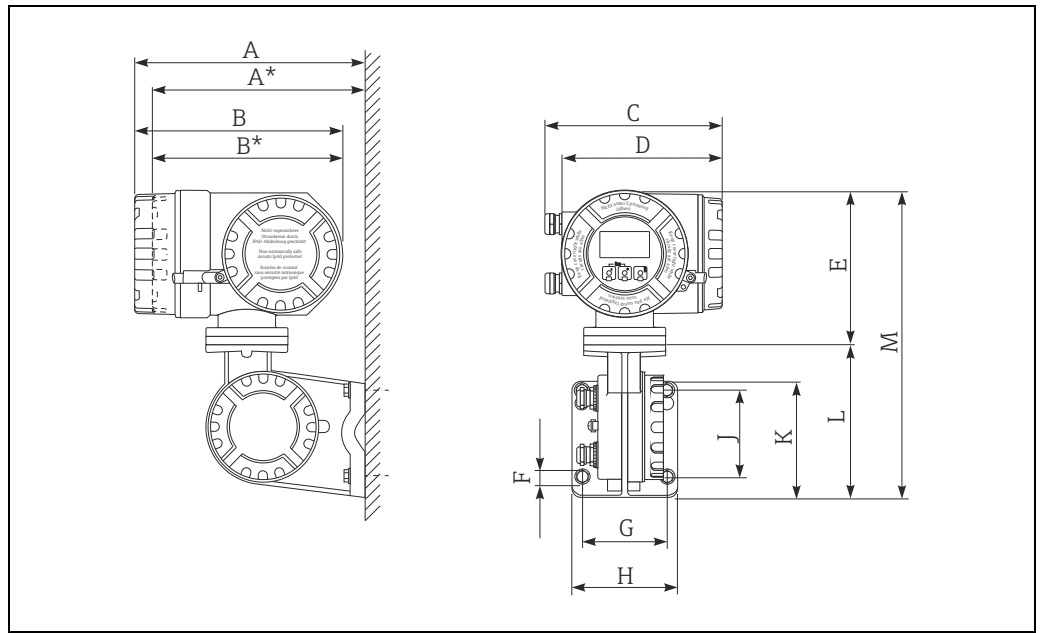
<sup>1)</sup> Securing screw for wall mount: M6 (screw head max. 10.5 mm)  
All dimensions in [mm]

#### Dimensions (US units)

A	B	C	D	E	F	G	H	J	K
8.46	9.84	3.56	6.27	5.31	3.54	1.77	> 1.97	3.18	2.08
L	M	N	O	P	Q	R	S	T <sup>1)</sup>	
3.74	2.08	4.01	3.20	0.45	7.55	8 × M5	0.79	2 × Ø 0.26	

<sup>1)</sup> Securing screw for wall mount: M6 (screw head max. 0.41")  
All dimensions in [inch]

Transmitter remote version, connection housing (II2GD/Zone 1)



A0002128

Dimensions (SI units)

A	A*	B	B*	C	D	E	Ø F	G	H	J	K	L	M
265	242	240	217	206	186	178	8.6 (M8)	100	130	100	144	170	355

All dimensions in [mm]

Dimensions (US units)

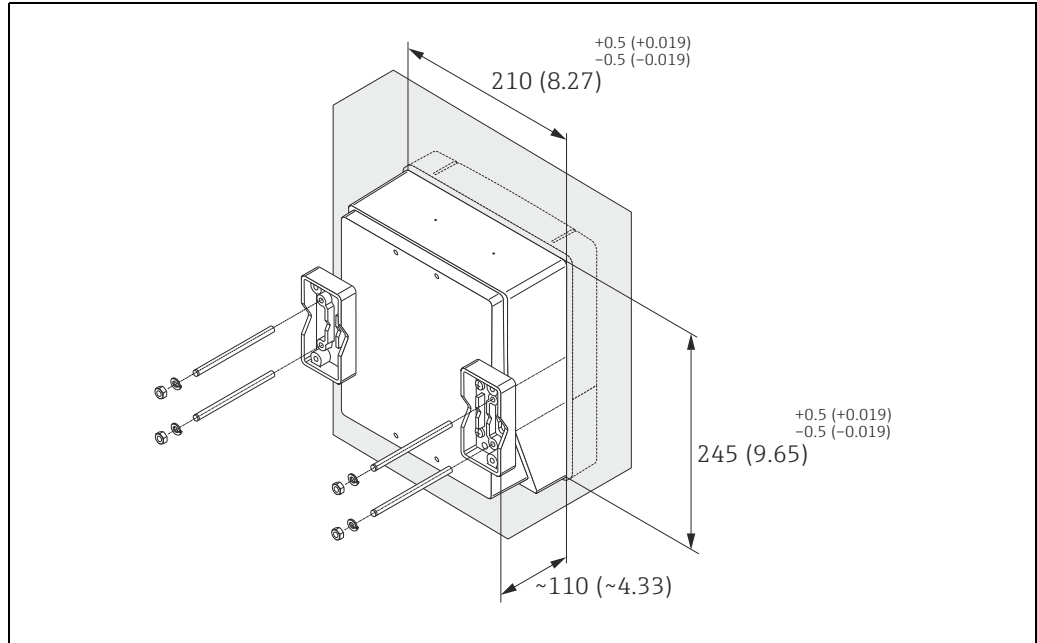
A	A*	B	B*	C	D	E	Ø F	G	H	J	K	L	M
10.4	9.53	9.45	8.54	8.11	7.32	7.01	0.34 (M8)	3.94	5.12	3.94	5.67	6.69	14.0

All dimensions in [inch]

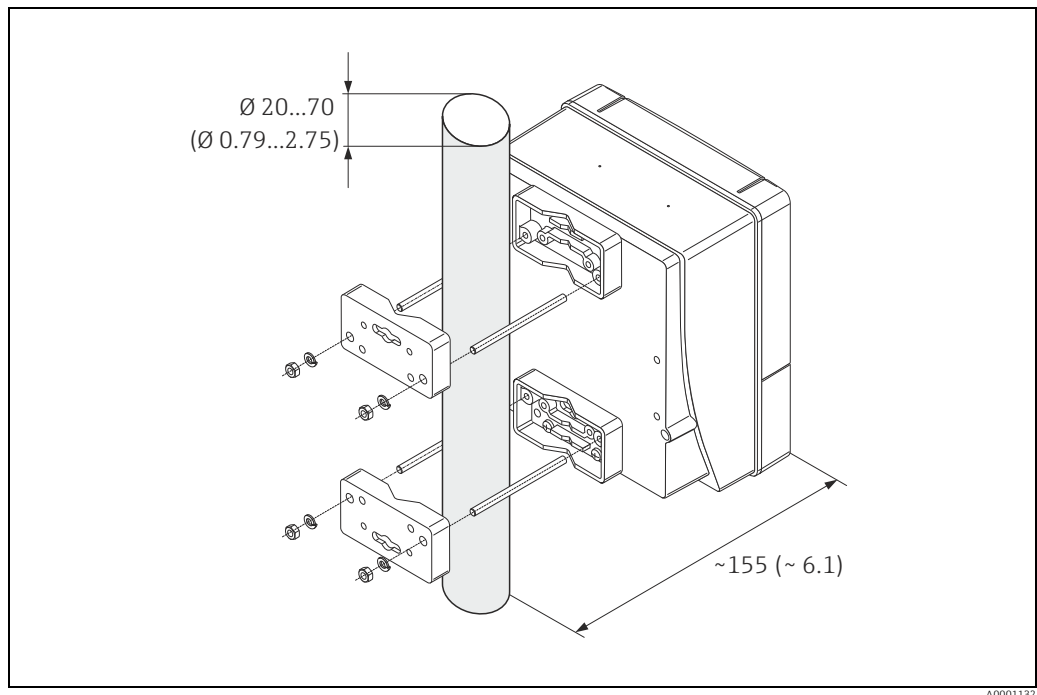
There is a separate mounting kit for the wall-mounted housing. It can be ordered from Endress+Hauser as an accessory. The following installation variants are possible:

- Panel mounting
- Pipe mounting

#### Panel mounting

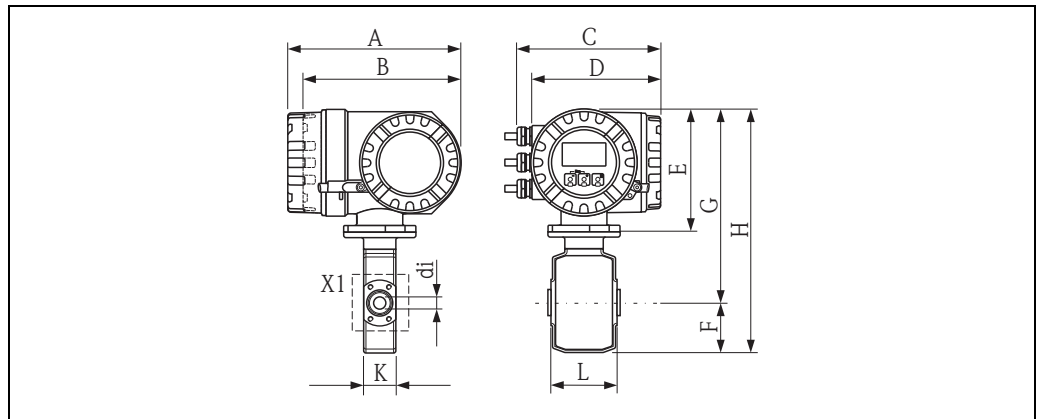


#### Pipe mounting





Compact version, aluminum field housing DN 2 to 25 (1/12 to 1")



A0005426

Dimensions in SI units

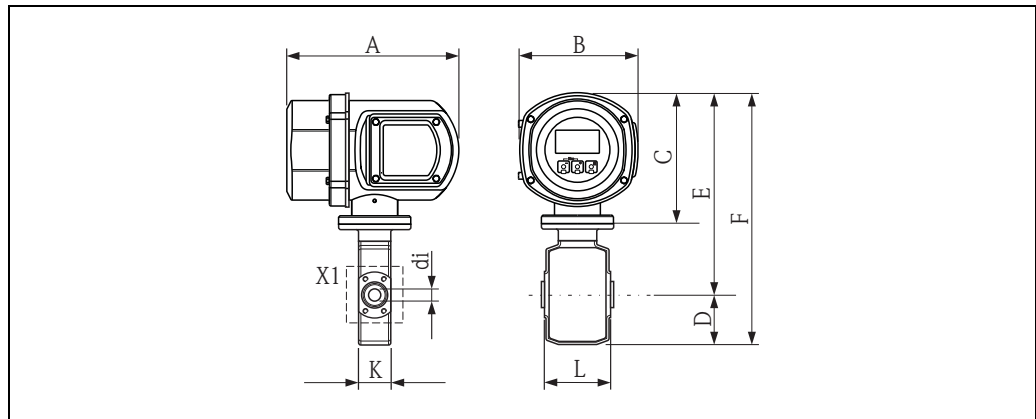
DN	L	A	B	C	D	E	F	G	H	K	X1	di
2	86	227	207	187	168	160	48	245	293	43	M6 × 4	2.25
4										43		4.5
8										43		9
15										43		16
25										52		249

Total length depends on the process connections.  
All dimensions in [mm]

Dimensions in US units

DN	L	A	B	C	D	E	F	G	H	K	X1	di
1/12"	3.39	8.94	8.15	7.36	6.61	6.30	1.88	9.62	11.5	1.69	M6 × 4	0.09
1/8"										1.69		0.18
3/8"										1.69		0.35
1/2"										1.69		0.63
1"										2.04		9.76

Total length depends on the process connections.  
All dimensions in [inch]

Compact version, stainless steel field housing DN 2 to 25 ( $\frac{1}{12}$  to 1")

A0005427

## Dimensions in SI units

DN	L	A	B	C	D	E	F	K	X1	di
2	86	225	153	168	48	254	302	43	M6 × 4	2.25
4								43		4.5
8								43		9
15					43	16				
25					52	258	310	53		26

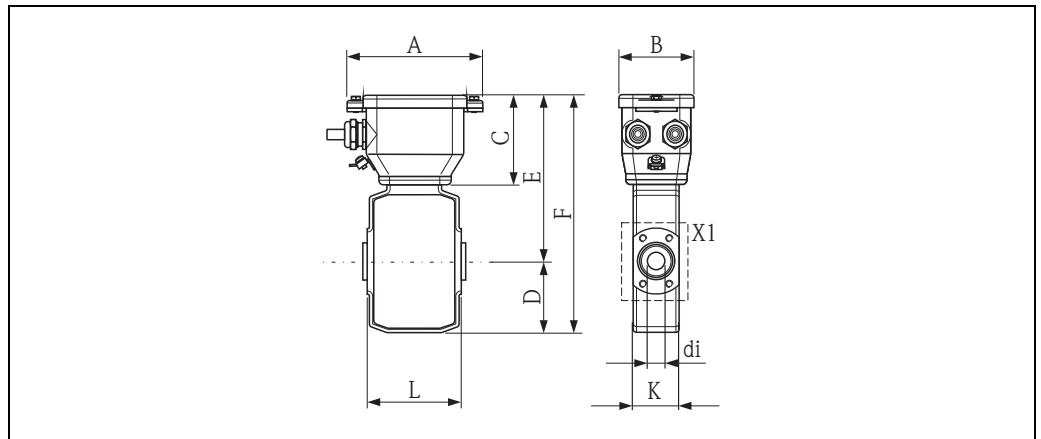
Total length depends on the process connections.  
All dimensions in [mm]

## Dimensions in US units

DN	L	A	B	C	D	E	F	K	X1	di
$\frac{1}{12}$ "	3.39	8.86	6.02	6.61	1.88	9.96	11.84	1.69	M6 × 4	0.09
$\frac{1}{8}$ "								1.69		0.18
$\frac{3}{8}$ "								1.69		0.35
$\frac{1}{2}$ "					1.69	0.63				
1"					2.04	10.11	12.15	2.07		0.89

Total length depends on the process connections.  
All dimensions in [inch]

Sensor, remote version DN 2 to 25 ( $\frac{1}{12}$  to 1")



A0005536

Dimensions in SI units

DN	L	A	B	C	D	E	F	K	X1	di
2	86	127	70	75	48	129	177	43	M6 × 4	2.25
4								43		4.5
8								43		9.0
15								43		16.0
25					52	133	185	53		26.0

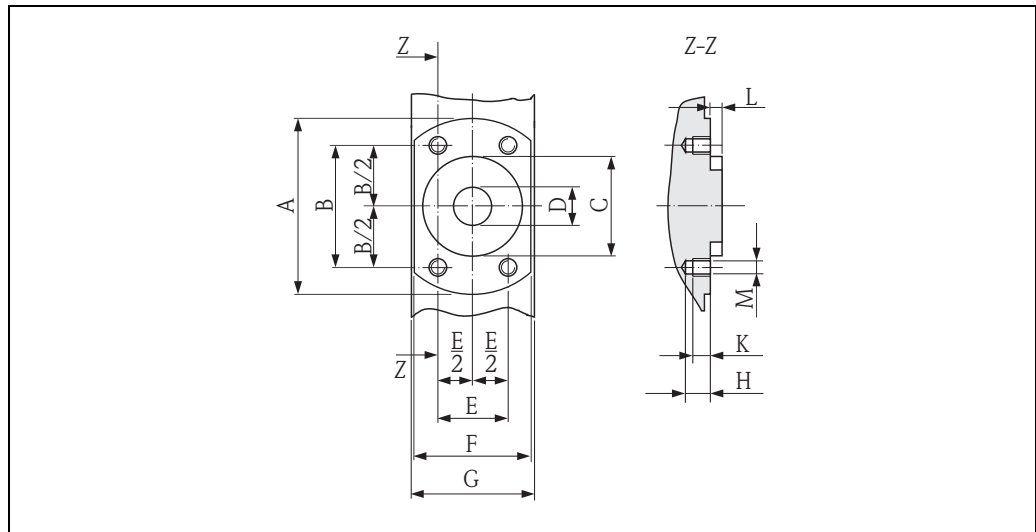
Total length depends on the process connections.  
All dimensions in [mm]

Dimensions in US units

DN	L	A	B	C	D	E	F	K	X1	di
$\frac{1}{12}$ "	3.39	5.00	2.76	2.95	1.88	5.06	6.94	1.69	M6 × 4	0.09
$\frac{1}{8}$ "								1.69		0.18
$\frac{3}{8}$ "								1.69		0.35
$\frac{1}{2}$ "								1.69		0.63
1"					2.04	5.21	7.25	2.07		0.89

Total length depends on the process connections.  
All dimensions in [inch]

Sensor, front view (without process connections) DN 2 to 25 ( $\frac{1}{12}$  to 1")



A0008190

Dimensions in SI units

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

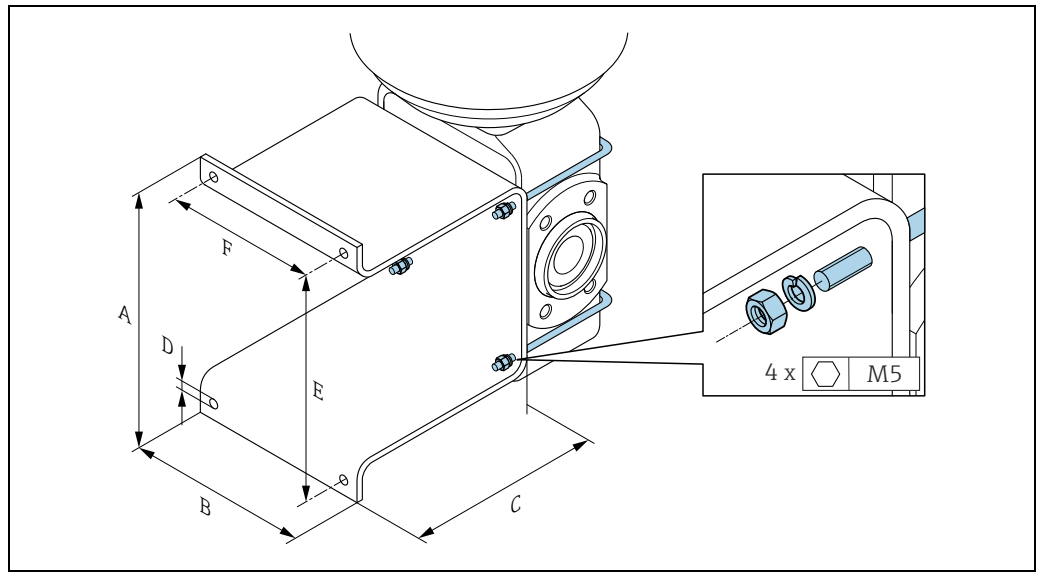
All dimensions in [mm]

Dimensions in US units

DN	A	B	C	D	E	F	G	H	K	L	M
$\frac{1}{12}$ "	2.44	1.64	1.34	0.35	0.94	1.65	1.69	0.33	0.24	0.16	M6
$\frac{1}{8}$ "				0.35							
$\frac{3}{8}$ "				0.35							
$\frac{1}{2}$ "				0.63							
1"	2.83	1.98	1.73	0.89	1.14	2.17	2.20				

All dimensions in [inch]

Sensor, wall mounting kit DN 2 to 25 (1/12 to 1")

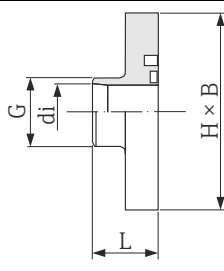


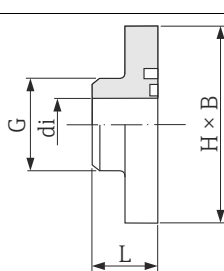
A0005537

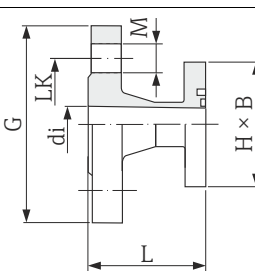
Dimensions in mm (inch)

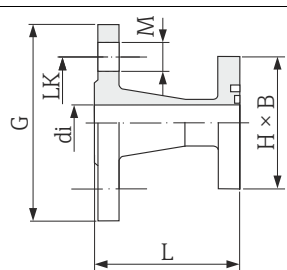
A	B	C	Ø D	E	F
140 (5.51")	110 (4.33")	120 (4.72")	7 (0.28")	125 (4.92")	88 (3.46")

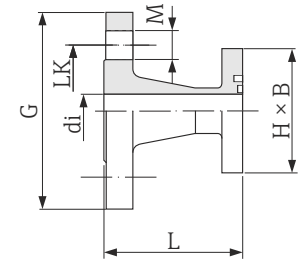
Process connections with O-ring seal, DN 2 to 25 (1/12 to 1")

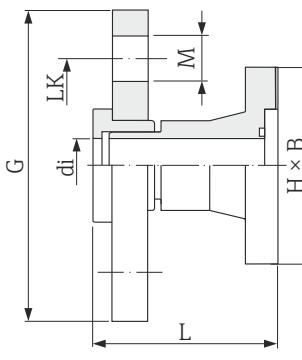
Welding nipple according to DIN EN ISO 1127 1.4404 (316L)	Sensor DN	Fits to piping	di	G	L	H × B
5*H**-B*****	[mm]	DIN EN ISO 1127	[mm]	[mm]	[mm]	[mm]
	2 to 8	13.5 × 1.6	10.3	13.5	20.3	62 × 42
	15	21.3 × 1.6	18.1	21.3	20.3	62 × 42
	25 (DIN)	33.7 × 2.0	29.7	33.7	20.3	62 × 52
<ul style="list-style-type: none"> <li>Fitting length = (2 × L) + 86 mm</li> <li>Surface roughness: <math>R_a \leq 1.6 \mu\text{m}</math></li> </ul>						

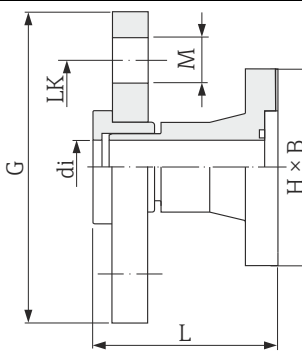
Welding nipple according to ODT/SMS 1.4404 (316L)	Sensor DN	Fits to piping	di	G	L	H × B
5*H**-C*****	[mm]	ODT/SMS 1127	[mm]	[mm]	[mm]	[mm]
	2 to 8	13.5 × 2.3	9.0	13.5	20.3	62 × 42
	15	21.3 × 2.65	16.0	21.3	20.3	62 × 42
	25 (1" ANSI)	33.7 × 3.25	27.2	33.7	20.3	72 × 55
<ul style="list-style-type: none"> <li>Fitting length = (2 × L) + 86 mm</li> <li>Surface roughness: <math>R_a \leq 1.6 \mu\text{m}</math></li> </ul>						

Flange according to EN 1092-1 (DIN 2501), Form B: PN 40 1.4404 (316L)	Sensor DN	Fits to flange <sup>1)</sup>	di	G	L	LK	M	H × B
5*H**-D*****	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[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
<sup>1)</sup> EN 1092-1 (DIN 2501) <ul style="list-style-type: none"> <li>Fitting length = (2 × L) + 86 mm</li> <li>Fitting length to DVGW (200 mm)</li> <li>Surface roughness: <math>R_a \leq 1.6 \mu\text{m}</math></li> </ul>								

Flange according to ASME B16.5: Class 150 1.4404 (316L)	Sensor DN	Fits to flange <sup>1)</sup>	di	G	L	LK	M	H × B
5*H**-E*****	[mm]	[inch]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
	2 to 8	1/2"	15.7	89	66.0	60.5	15.7	62 × 42
	15	1/2"	16.0	89	66.0	60.5	15.7	62 × 42
	25 (1" ANSI)	1"	26.7	108	71.8	79.2	15.7	72 × 55
<sup>1)</sup> ASME B16.5 <ul style="list-style-type: none"> <li>Fitting length = (2 × L) + 86 mm</li> <li>Surface roughness: <math>R_a \leq 1.6 \mu\text{m}</math></li> </ul>								

Flange according to JIS B2220: 20K 1.4404 (316L)	Sensor DN	Fits to flange	di	G	L	LK	M	H × B
5*H**-F*****	[mm]	B2220	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
	2 to 8	ND 15	15	95	67	70	15	62 × 42
	15	ND 15	16	95	67	70	15	62 × 42
	25 (DIN)	ND 25	26	125	67	90	19	72 × 55
<ul style="list-style-type: none"> <li>Fitting length = <math>(2 \times L) + 86</math> mm</li> <li>Surface roughness: <math>R_a \leq 1.6</math> μm</li> </ul>								

Lap joint flange according to EN 1092-1 (DIN 2501): PN 16 PVDF	Sensor DN	Fits to flange	di	G	L	LK	M	H × B
5*H**-G*****	[mm]	EN 1092-1 (DIN 2501)	[mm]	[mm]	[mm]	[mm]	[mm]	[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
<ul style="list-style-type: none"> <li>Fitting length = <math>(2 \times L) + 86</math> mm</li> <li>Fitting length to DVGW (200 mm)</li> <li>Surface roughness: <math>R_a \leq 1.6</math> μm</li> <li>The requisite ground rings can be ordered as accessories (Order No. DK5HR-****).</li> </ul>								

Lap joint flange according to ASME B16.5: Class 150 PVDF	Sensor DN	Fits to flange	di	G	L	LK	M	H × B
5*H**-H*****	[mm]	ASME B16.5	[mm]	[mm]	[mm]	[mm]	[mm]	[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
<ul style="list-style-type: none"> <li>Fitting length = <math>(2 \times L) + 86</math> mm</li> <li>Surface roughness: <math>R_a \leq 1.6</math> μm</li> <li>The requisite ground rings can be ordered as accessories (Order No. DK5HR-****).</li> </ul>								

Lap joint flange according to JIS B2220: 10K PVDF	Sensor DN	Fits to flange	di	G	L	LK	M	H × B
5*H**J*****	[mm]	B2220	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
	2 to 8	ND 15	16	95	57	70	15	62 × 42
	15	ND 15	16	95	57	70	15	62 × 42
	25 (DIN)	ND 25	27.2	125	57	90	19	72 × 55
<ul style="list-style-type: none"> <li>Fitting length = <math>(2 \times L) + 86</math> mm</li> <li>Surface roughness: <math>R_a \leq 1.6</math> <math>\mu</math>m</li> <li>The requisite ground rings can be ordered as accessories (Order No. DK5HR-****).</li> </ul>								

External thread according to ISO 228/DIN 2999 1.4404 (316L)	Sensor DN	Fits to internal thread	di	G	L	S	H × B
5*H**K*****	[mm]	[inch]	[mm]	[inch]	[mm]	[mm]	[mm]
	2 to 8	R 3/8"	10	3/8"	40	10.1	62 × 42
	15	R 1/2"	16	1/2"	40	13.2	62 × 42
	25 (1" ANSI)	R 1"	25	1"	42	16.5	72 × 55
<ul style="list-style-type: none"> <li>Fitting length = <math>(2 \times L) + 86</math> mm</li> <li>Surface roughness: <math>R_a \leq 1.6</math> <math>\mu</math>m</li> </ul>							

Internal thread according to ISO 228/DIN 2999 1.4404 (316L)	Sensor DN	Fits to external thread	di	G	D	L	S	H × B
5*H**L*****	[mm]	[inch]	[mm]	[inch]	[mm]	[mm]	[mm]	[mm]
	2 to 8	Rp 3/8"	9	3/8"	22	45	13	62 × 42
	15	Rp 1/2"	16	1/2"	27	45	14	62 × 42
	25 (1" ANSI)	Rp 1"	27.2	1"	40	51	17	72 × 55
<ul style="list-style-type: none"> <li>Fitting length = <math>(2 \times L) + 86</math> mm</li> <li>Surface roughness: <math>R_a \leq 1.6</math> <math>\mu</math>m</li> </ul>								

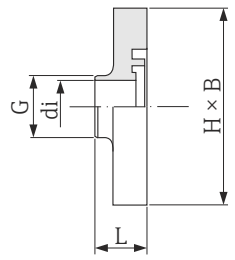


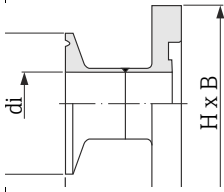
Hose adapter 1.4404 (316L)	Sensor DN	Fits to inside diameter	di	L	H × B
5*H**-M/N/P*****	[mm]	[mm]	[mm]	[mm]	[mm]
	2 to 8	13	10.0	49	62 × 42
	15	16	12.6	49	62 × 42
	15	19	16.0	49	62 × 42
<ul style="list-style-type: none"> <li>Fitting length = (2 × L) + 86 mm</li> <li>Surface roughness: <math>R_a \leq 1.6 \mu\text{m}</math></li> </ul>					

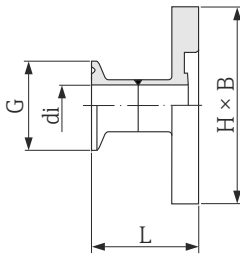
Adhesive sleeve PVC	Sensor DN	Fits to pipe	di	G	L	H × B
5*H**-R/S*****	[mm]	[mm] / [inch]	[mm]	[mm]	[mm]	[mm]
	2 to 8	½" [inch]	21.5	27.3	38.5	62 × 42
	2 to 8	20 × 2 [mm] (DIN 8062)	20.2	27.0	38.5	62 × 42
	15	20 × 2 [mm] (DIN 8062)	20.2	27.0	28.0	62 × 42
<ul style="list-style-type: none"> <li>Fitting length = (2 × L) + 86 mm</li> <li>Surface roughness: <math>R_a \leq 1.6 \mu\text{m}</math></li> <li>The requisite ground rings can be ordered as accessories (Order No. DK5HR-*****).</li> </ul>						

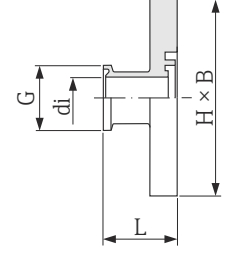
Process connections with aseptic gasket seal, DN 2 to 25 (½ to 1")

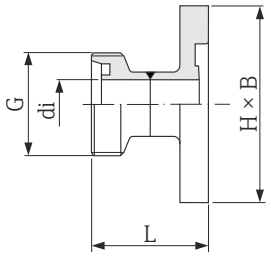
Welding nipple according to EN 10375 (DIN 1180) 1.4404 (316L)	Sensor DN	Fits to piping	di	G	L	H × B
5*H**-U*****	[mm]	EN 10357 (DIN 11850)	[mm]	[mm]	[mm]	[mm]
	2 to 8	14 × 2	10	14	23.3	62 × 42
	15	20 × 2	16	20	23.3	62 × 42
	25 (DIN)	30 × 2	26	30	23.3	72 × 55
<ul style="list-style-type: none"> <li>Fitting length = (2 × L) + 86 mm</li> <li>Surface roughness: <math>R_a \leq 0.8 \mu\text{m}</math></li> <li>If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!</li> </ul>						

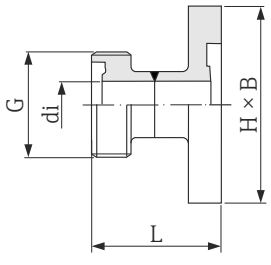
Welding nipple according to ODT/SMS 1.4404 (316L)	Sensor DN	Fits to piping	di	G	L	H × B
5*H**-V*****	[mm]	ODT/SMS	[mm]	[mm]	[mm]	[mm]
 <p style="text-align: right; font-size: small;">A0003871</p>	2 to 8	12.7 × 1.65	9.0	12.7	16.1	62 × 42
	15	19.1 × 1.65	16.0	19.1	16.1	62 × 42
	25 (1" ANSI)	25.4 × 1.65	22.6	25.4	16.1	72 × 55
<ul style="list-style-type: none"> <li>■ Fitting length = (2 × L) + 86 mm</li> <li>■ Surface roughness: <math>R_a \leq 0.8 \mu\text{m}</math></li> <li>■ If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!</li> </ul>						

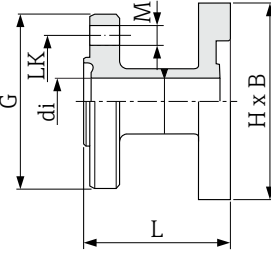
Clamp according to ISO 2852, Fig. 2 1.4404 (316L)	Sensor DN	Fits to piping	Clamp ISO 2852, DN	di	G	L	H × B
5*H**-W*****	[mm]	ISO 2037 / BS 4825-1	[mm]	[mm]	[mm]	[mm]	[mm]
 <p style="text-align: right; font-size: small;">A0005560</p>	25 (1" ANSI)	Tube 24.5 × 1.65	25	22.6	50.5	44.3	72 × 55
	<ul style="list-style-type: none"> <li>■ Fitting length = (2 × L) + 86 mm</li> <li>■ Surface roughness: <math>R_a \leq 0.8 \mu\text{m}</math></li> <li>■ If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!</li> </ul>						

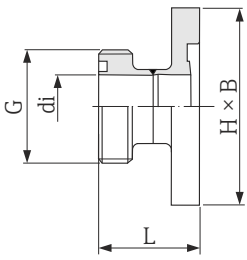
Clamp according to DIN 32676 1.4404 (316L)	Sensor DN	Fits to piping	di	G	L	H × B
5*H**-0*****	[mm]	EN 10357 (DIN 11850)	[mm]	[mm]	[mm]	[mm]
 <p style="text-align: right; font-size: small;">A0005556</p>	2 to 8	Tube 14 × 2 (DN 10)	10	34.0	41.0	62 × 42
	15	Tube 20 × 2 (DN 15)	16	34.0	41.0	62 × 42
	25 (DIN)	Tube 30 × 2 (DN 25)	26	50.5	44.5	72 × 55
<ul style="list-style-type: none"> <li>■ Fitting length = (2 × L) + 86 mm</li> <li>■ Surface roughness: <math>R_a \leq 0.8 \mu\text{m}</math></li> <li>■ If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!</li> </ul>						

Tri-Clamp for L14 AM7 1.4404 (316L)	Sensor DN	Fits to piping	di	G	L	H × B
5*H**-1*****	[mm]	OD	[mm]	[mm]	[mm]	[mm]
 <p style="text-align: right; font-size: small;">A0003872</p>	2 to 8	Tube 12.7 × 1.65 (OD ½")	9.4	25.0	28.5	62 × 42
	15	Tube 19.1 × 1.65 (ODT ¾")	15.8	25.0	28.5	62 × 42
	25 (1" ANSI)	Tube 25.4 × 1.65 (ODT 1")	22.1	50.4	28.5	72 × 55
<ul style="list-style-type: none"> <li>■ Fitting length = (2 × L) + 86 mm</li> <li>■ Surface roughness: <math>R_a \leq 0.8 \mu\text{m}</math></li> <li>■ If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!</li> </ul>						

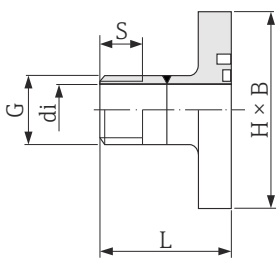
Coupling SC DIN 11851, threaded adapter 1.4404 (316L)	Sensor DN	Fits to piping	di	G	L	H × B
5*H**-2*****	[mm]	EN 10357 (DIN 11850)	[mm]	[mm]	[mm]	[mm]
	2 to 8	Tube 12 × 1 (DN 10)	10	Rd 28 × 1/8"	44	62 × 42
	15	Tube 18 × 1.5 (DN 15)	16	Rd 34 × 1/8"	44	62 × 42
	25 (DIN)	Tube 28 × 1 or 28 × 1.5 (DN 25)	26	Rd 52 × 1/6"	52	72 × 55
<ul style="list-style-type: none"> <li>▪ Fitting length = (2 × L) + 86 mm</li> <li>▪ Surface roughness: <math>R_a \leq 0.8 \mu\text{m}</math></li> <li>▪ If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!</li> </ul>						

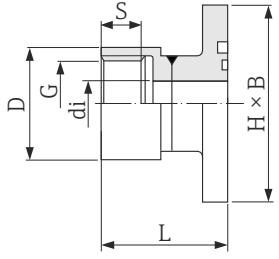
Coupling DIN 11864-1, aseptic threaded hygienic connection, form A 1.4404 (316L)	Sensor DN	Fits to piping	di	G	L	H × B
5*H**-3*****	[mm]	EN 10357 (DIN 11850)	[mm]	[mm]	[mm]	[mm]
	2 to 8	Tube 13 × 1.5 (DN 10)	10	Rd 28 × 1/8"	42	62 × 42
	15	Tube 19 × 1.5 (DN 15)	16	Rd 34 × 1/8"	42	62 × 42
	25 (DIN)	Tube 29 × 1.5 (DN 25)	26	Rd 52 × 1/6"	49	72 × 55
<ul style="list-style-type: none"> <li>▪ Fitting length = (2 × L) + 86 mm</li> <li>▪ Surface roughness: <math>R_a \leq 0.8 \mu\text{m}</math></li> <li>▪ If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!</li> </ul>						

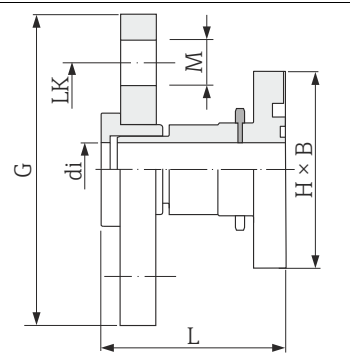
Flange according to DIN 11864-2, aseptic grooved flange, form A 1.4404 (316L)	Sensor DN	Fits to piping	di	G	L	LK	M	H × B
5*H**-4*****	[mm]	EN 10357 (DIN 11850)	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
	2 to 8	Tube 13 × 1.5 (DN 10)	10	54	48.5	37	9	62 × 42
	15	Tube 19 × 1.5 (DN 15)	16	59	48.5	42	9	62 × 42
	25 (DIN)	Tube 29 × 1.5 (DN 25)	26	70	48.5	53	9	72 × 55
<ul style="list-style-type: none"> <li>▪ Fitting length = (2 × L) + 86 mm</li> <li>▪ Surface roughness: <math>R_a \leq 0.8 \mu\text{m}</math></li> <li>▪ If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!</li> </ul>								

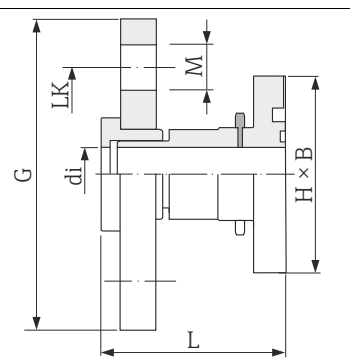
Coupling SMS 1145, threaded adapter 1.4404 (316L)	Sensor DN	Fits to piping	SMS 1145 DN	di	G	L	H × B
5*H**-5*****	[mm]	OD	[mm]	[mm]	[mm]	[mm]	[mm]
 <p style="text-align: right; font-size: small;">A0005564</p>	25 (1" ANSI)	1"	25	22.6	Rd 40 × 1/6"	30.8	72 × 55
	<ul style="list-style-type: none"> <li>■ Fitting length = (2 × L) + 86 mm</li> <li>■ Surface roughness: <math>R_a \leq 0.8 \mu\text{m}</math></li> <li>■ If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!</li> </ul>						

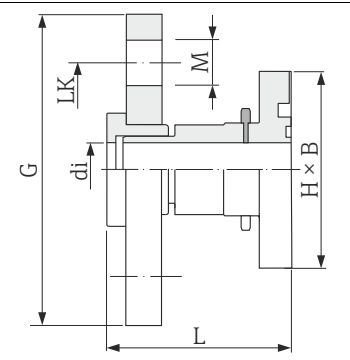
Process connections orderable only as accessories with O-ring seal, DN 2 to 25 / 1/12 to 1"

External thread 1.4404 (316L)	Sensor DN	Fits to internal thread	di	G	L	S	H × B
DKH**-GD**	[mm]	NP	[mm]	[inch]	[mm]	[mm]	[mm]
 <p style="text-align: right; font-size: small;">A0005563</p>	2 to 8	NPT 3/8"	10	3/8"	50	15.5	62 × 42
	15	NPT 1/2"	16	1/2"	50	20.0	62 × 42
	25 (1" ANSI)	NPT 1"	25	1"	55	25.0	72 × 55
	<ul style="list-style-type: none"> <li>■ Fitting length = (2 × L) + 86 mm</li> <li>■ Surface roughness: <math>R_a \leq 1.6 \mu\text{m}</math></li> </ul>						

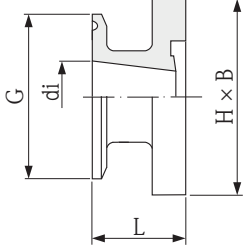
Internal thread 1.4404 (316L)	Sensor DN	Fits to external thread	di	G	D	L	S	H × B
DKH**-GC**	[mm]	NP	[mm]	[inch]	[mm]	[mm]	[mm]	[mm]
 <p style="text-align: right; font-size: small;">A0005565</p>	2 to 8	NPT 3/8"	8.9	3/8"	22	45	13	62 × 42
	15	NPT 1/2"	16.0	1/2"	27	45	14	62 × 42
	25 (1" ANSI)	NPT 1"	27.2	1"	40	51	17	72 × 55
	<ul style="list-style-type: none"> <li>■ Fitting length = (2 × L) + 86 mm</li> <li>■ Surface roughness: <math>R_a \leq 1.6 \mu\text{m}</math></li> </ul>							

Lap joint flange with grounding electrode according to EN 1092-1 (DIN 2501): PN 16 PVDF	Sensor DN	Fits to flange	di	G	L	LK	M	H × B
DKH** -FG**	[mm]	EN 1092-1 (DIN 2501)	[mm]	[mm]	[mm]	[mm]	[mm]	[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
	<ul style="list-style-type: none"> <li>■ Fitting length = <math>(2 \times L) + 86</math> mm</li> <li>■ Fitting length to DVGW (200 mm)</li> <li>■ Surface roughness: <math>R_a \leq 1.6 \mu\text{m}</math></li> <li>■ Grounds rings are not required</li> </ul>							

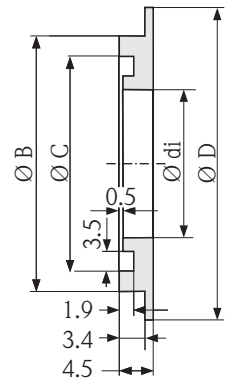
Lap joint flange with grounding electrode according to ASME B16.5: Class 150 PVDF	Sensor DN	Fits to flange	di	G	L	LK	M	H × B
DKH** -FH**	[mm]	ASME B16.5	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
	2 to 8	½"	16	95	57	60	16	62 × 42
	15	½"	16	95	57	60	16	62 × 42
	25 (DIN)	1"	27.2	115	57	79	16	72 × 55
	<ul style="list-style-type: none"> <li>■ Fitting length = <math>(2 \times L) + 86</math> mm</li> <li>■ Surface roughness: <math>R_a \leq 1.6 \mu\text{m}</math></li> <li>■ Grounds rings are not required</li> </ul>							

Lap joint flange with grounding electrode according to JIS B2220: 10K PVDF	Sensor DN	Fits to flange	di	G	L	LK	M	H × B
DKH** -FJ**	[mm]	B2220	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
	2 to 8	ND 15	16	95	57	70	15	62 × 42
	15	ND 15	16	95	57	70	15	62 × 42
	25 (DIN)	ND 25	27.2	125	57	90	19	72 × 55
	<ul style="list-style-type: none"> <li>■ Fitting length = <math>(2 \times L) + 86</math> mm</li> <li>■ Surface roughness: <math>R_a \leq 1.6 \mu\text{m}</math></li> <li>■ Grounds rings are not required</li> </ul>							

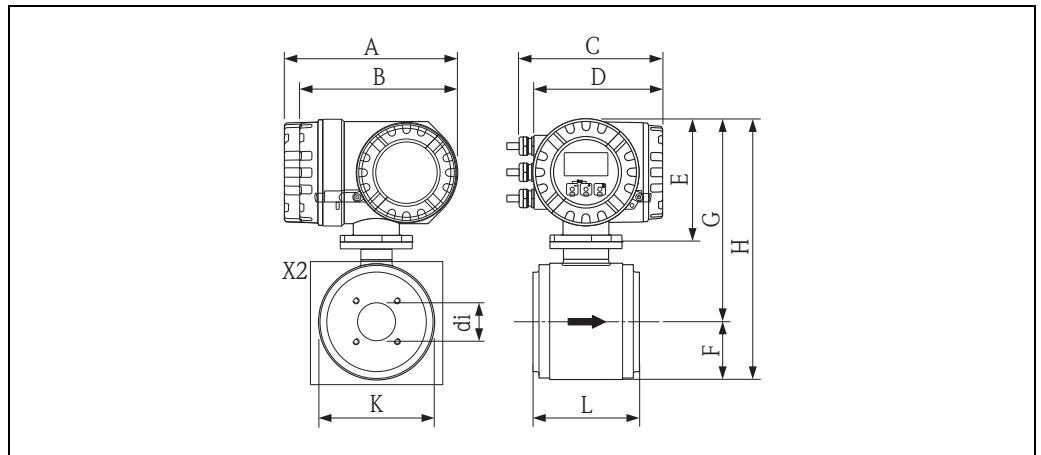
Process connections orderable only as accessories with aseptic gasket seal, DN 15

Tri-Clamp for L14 AM7 1.4404 (316L)	Sensor DN	Fits to piping	di	G	L	H × B
DKH** - HF**	[mm]	OD	[mm]	[mm]	[mm]	[mm]
 <p style="text-align: right; font-size: small;">A000555</p>	15	Tube 25.4 × 1.65 (ODT 1")	22.1	50.4	28.5	62 × 42
	<ul style="list-style-type: none"> <li>■ Fitting length = (2 × L) + 86 mm</li> <li>■ Surface roughness: <math>R_a \leq 0.8 \mu\text{m}</math></li> <li>■ If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!</li> </ul>					

Ground rings (accessories for PVDF flanges / PVC adhesive fitting), DN 2 to 25 / 1/12 to 1"

For lap joint flange made of PVDF and PVC adhesive sleeve 1.4435 (316L) Alloy C22 tantalum	Sensor DN	di	B	C	D
DK5HR - ****	[mm]	[mm]	[mm]	[mm]	[mm]
 <p style="text-align: right; font-size: small;">A0005568</p>	2 to 8	9.0	22.0	17.6	33.9
	15	16.0	29.0	24.6	33.9
	25 (1" ANSI)	22.6	36.5	31.2	43.9
	25 (DIN)	26.0	39.0	34.6	43.9

**Compact version, aluminum field housing DN 40 to 150 (1½ to 6")**



A0005425

*Dimensions in SI units*

DN	L	A	B	C	D	E	F	G	H	K	X2	di
40	140	227	207	187	168	160	53.5	252	305.5	107	M8 × 4	34.8
50	140						60	258.5	318.5	120	M8 × 4	47.5
65	140						67.5	266	333.5	135	M8 × 6	60.2
80	140						74	272.5	346.5	148	M8 × 6	72.9
100	140						87	285.5	372.5	174	M8 × 6	97.4
125	200						103	301.5	404.5	206	M10 × 6	120.0
150	200						117	315.5	432.5	234	M10 × 6	146.9

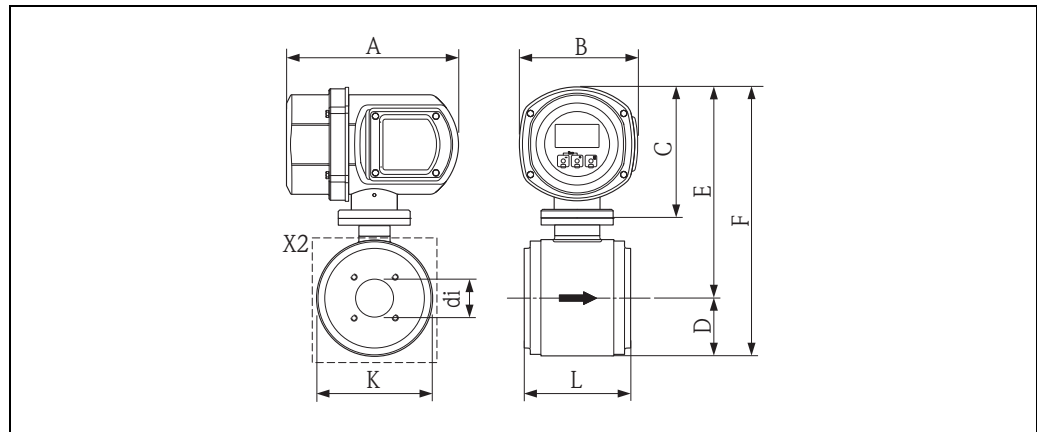
Total length depends on the process connections.  
All dimensions in [mm]

*Dimensions in US units*

DN	L	A	B	C	D	E	F	G	H	K	X2	di
1½"	5.51	8.94	8.15	7.36	6.61	6.30	2.11	9.92	12.36	4.21	M8 × 4	1.37
2"	5.51						2.36	10.18	12.76	4.72	M8 × 4	1.87
3"	5.51						2.91	10.73	13.64	5.83	M8 × 6	2.87
4"	5.51						3.43	11.24	14.67	6.85	M8 × 6	3.83
6"	7.87						4.61	12.42	17.03	9.21	M10 × 6	5.78

Total length depends on the process connections.  
All dimensions in [inch]

## Compact version, stainless steel field housing DN 40 to 150 (1½ to 6")



A0005428

## Dimensions in SI units

DN	L	A	B	C	D	E	F	K	X2	di
40	140	220	153	171	53.5	261.5	315	107	M8 × 4	34.8
50	140				60	268	328	120	M8 × 4	47.5
65	140				67.5	275.5	343	135	M8 × 6	60.2
80	140				74	282	356	148	M8 × 6	72.9
100	140				87	295	382	174	M8 × 6	97.4
125	200				103	311	414	206	M10 × 6	120.0
150	200				117	325	442	234	M10 × 6	146.9

Total length depends on the process connections.  
All dimensions in [mm]

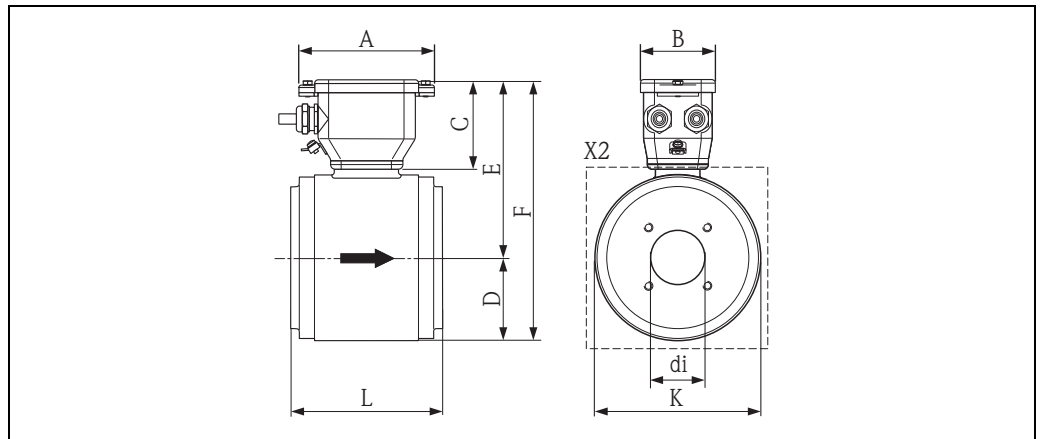
## Dimensions in US units

DN	L	A	B	C	D	E	F	K	X2	di
1½"	5.51	8.66	6.02	6.73	2.11	10.30	12.40	4.21	M8 × 4	1.37
2"	5.51				2.36	10.55	12.91	4.72	M8 × 4	1.87
3"	5.51				2.91	11.10	14.02	5.83	M8 × 6	2.87
4"	5.51				3.43	11.61	15.04	6.85	M8 × 6	3.83
6"	7.87				4.61	12.80	17.40	9.21	M10 × 6	5.78

Total length depends on the process connections.  
All dimensions in [inch]



Sensor, remote version DN 40 to 150 (1½ to 6")



A0005535

Dimensions in SI units

DN	L	A	B	C	D	E	F	K	X2	di
40	140	125	70	75	53.5	138.5	192	107	M8 × 4	34.8
50	140				60	145	205	120	M8 × 4	47.5
65	140				67.5	152.5	220	135	M8 × 6	60.2
80	140				74	159	233	148	M8 × 6	72.9
100	140				87	172	259	174	M8 × 6	97.4
125	200				103	188	291	206	M10 × 6	120.0
150	200				117	202	319	234	M10 × 6	146.9

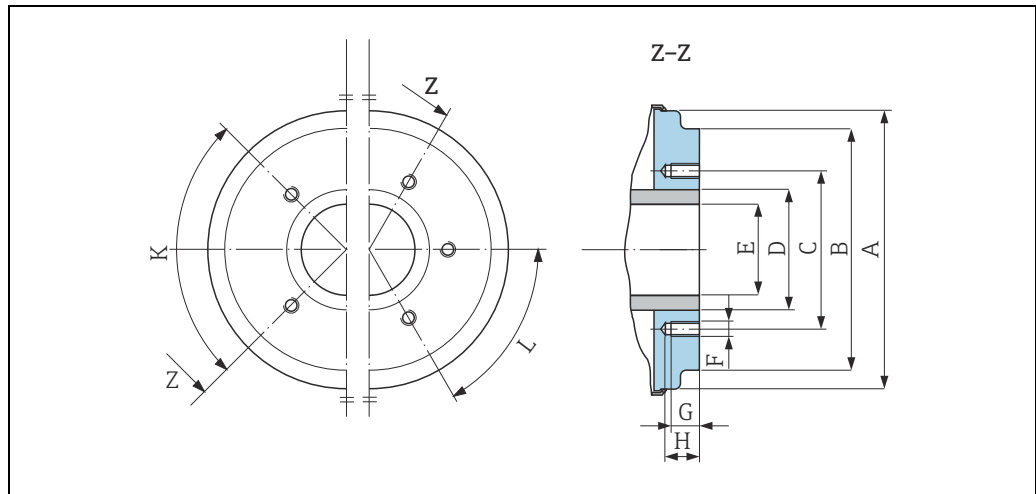
Total length depends on the process connections.  
All dimensions in [mm]

Dimensions in US units

DN	L	A	B	C	D	E	F	K	X2	di
1½"	5.51	4.92	2.76	2.95	2.11	5.45	7.56	4.21	M8 × 4	1.37
2"	5.51				2.36	5.71	8.07	4.72	M8 × 4	1.87
3"	5.51				2.91	6.26	9.17	5.83	M8 × 6	2.87
4"	5.51				3.43	6.77	10.20	6.85	M8 × 6	3.83
6"	7.87				4.61	7.95	12.56	9.21	M10 × 6	5.78

Total length depends on the process connections.  
All dimensions in [inch]

Sensor, front view (without process connections) DN 40 to 150 (1½ to 6")



A000528

Dimensions in SI units

DN	A	B	C	D	E	F	G	H	Threaded holes	
									K 90° ±0.5°	L 60° ±0.5°
40	99.7	85.8	71.0	48.3	34.8	M 8	12	17	4	–
50	112.7	98.8	83.5	60.3	47.5	M 8	12	17	4	–
65	127.7	114.8	100.0	76.1	60.2	M 8	12	17	–	6
80	140.7	133.5	114.0	88.9	72.9	M 8	12	17	–	6
100	166.7	159.5	141.0	114.3	97.4	M 8	12	17	–	6
125	198.7	191.5	171.0	139.7	120.0	M 10	15	20	–	6
150	226.7	219.5	200.0	168.3	146.9	M 10	15	20	–	6

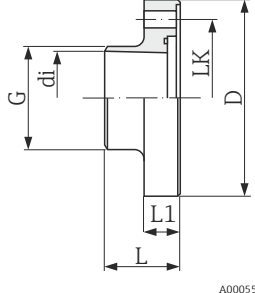
All dimensions in [mm]

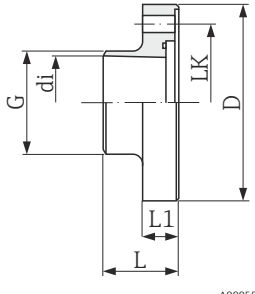
Dimensions in US units

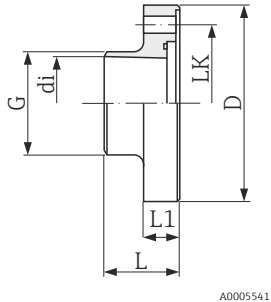
DN	A	B	C	D	E	F	G	H	Threaded holes	
									K 90° ±0.5°	L 60° ±0.5°
1½"	3.93	3.38	2.80	1.90	1.37	M 8	0.47	0.67	4	–
2"	4.44	3.89	3.29	2.37	1.87	M 8	0.47	0.67	4	–
3"	5.54	5.26	4.49	3.50	2.87	M 8	0.47	0.67	–	6
4"	6.56	6.28	5.55	4.50	3.83	M 8	0.47	0.67	–	6
6"	8.93	8.64	7.87	6.63	5.78	M 10	0.59	0.79	–	6

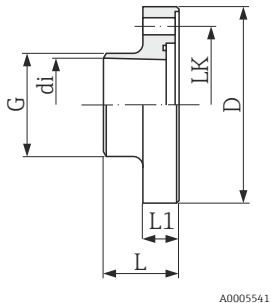
All dimensions in [inch]

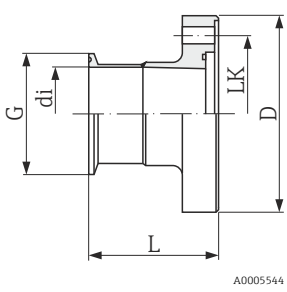
Process connections with aseptic gasket seal, DN 40 to 150 (1½ to 6")

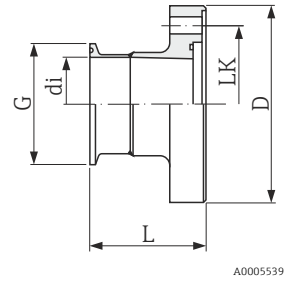
Welding nipple according to EN 10357 (DIN 11850), 1.4404 (F316L)	Sensor DN	Fits to piping	di	G	D	L	L1	LK	L <sub>tot</sub> <sup>1)</sup>	
 <p>A0005541</p>	[mm]	EN 10357 (DIN 11850)	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
	Order codes: 5*H**-U***** , DKH**-HR** Surface roughness: R <sub>a</sub> ≤ 0.8 μm									
	40	41 × 1.5	38	43	92.0	42	19	71.0	220	
	50	53 × 1.5	50	55	105.0	42	19	83.5	220	
	65	70 × 2	66	72	121.0	42	21	100.0	220	
	80	85 × 2	81	87	140.7	73	18	114.0	280	
	100	104 × 2	100	106	166.7	73	18	141.0	280	
	125	129 × 2	125	129	198.7	53	25	171.0	300	
	150	154 × 2	150	154	226.7	53	25	200.0	300	
	Order codes: 5*H**-U*****+CA/+CB, DKH**-HR**+CA/+CB Surface roughness +CA: R <sub>a</sub> ≤ 0.8 μm Surface roughness +CB: R <sub>a</sub> ≤ 0.38 μm									
	40	41 × 1.5	38.0	41	99.7	43	18	71.0	220	
	50	53 × 1.5	50.0	53	112.7	43	18	83.5	220	
	65	70 × 2	66.0	70	127.7	43	18	100.0	220	
	80	85 × 2	81.0	85	140.7	43	18	114.0	220	
	100	104 × 2	100.0	104	166.7	43	18	141.0	220	
1) L <sub>tot</sub> = fitting length If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!										

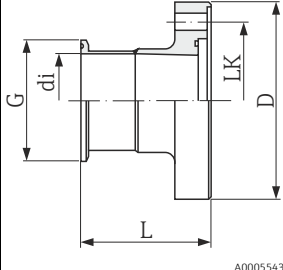
Welding nipple according to ODT/SMS 1.4404 (F316L)	Sensor DN	Fits to Piping	di	G	D	L	L1	LK	L <sub>tot</sub> <sup>1)</sup>	
 <p>A0005541</p>	[mm]	OD/SMS	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
	Order codes: 5*H**-V***** , DKH**-HB**									
	40	38.1 × 1.65	35.3	40	92	42	19	71.0	220	
	50	50.8 × 1.65	48.1	55	105	42	19	83.5	220	
	65	63.5 × 1.65	59.9	66	121	42	21	100.0	220	
	80	76.2 × 1.65	72.6	79	140.7	73	18	114.0	280	
	100	101.6 × 1.65	97.5	104	166.7	73	18	141.0	280	
	1) L <sub>tot</sub> = fitting length Surface roughness: R <sub>a</sub> ≤ 0.8 μm If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!									

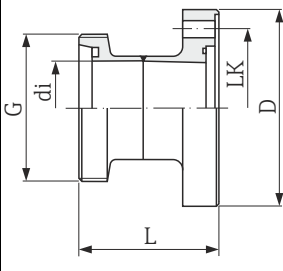
Welding nipple according to ASME BPE 1.4404 (F316L)	Sensor DN		Fits to Piping	di	G	D	L	L1	LK	L <sub>tot</sub> <sup>1)</sup>
	[mm]	[inch]	ASME BPE	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
 <p>A0005541</p>	Order codes: 5*H**-Q*****-DKH**-HN**									
	40	1½"	38.1 × 1.65	34.8	38.1	99.7	43	18	71.0	220
	50	2"	50.8 × 1.65	47.5	50.8	112.7	43	18	83.5	220
	65	-	63.5 × 1.65	60.2	63.5	127.7	43	18	100.0	220
	80	3"	76.2 × 1.65	72.9	76.2	140.7	43	18	114.0	220
	100	4"	101.6 × 2.11	97.4	101.6	166.7	43	18	141.0	220
	150	6"	152.4 × 2.77	149.9	152.4	226.7	53	25	200.0	300
	1) L <sub>tot</sub> = fitting length Surface roughness: R <sub>a</sub> ≤ 0.8 μm If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!									

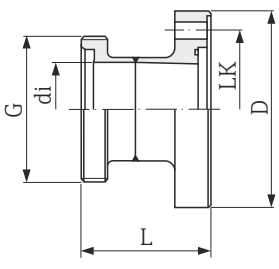
Welding nipple according to ISO 2037 1.4404 (F316L)	Sensor DN	Fits to Piping	di	G	D	L	L1	LK	L <sub>tot</sub> <sup>1)</sup>	
	[mm]	ISO 2037	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
 <p>A0005541</p>	Order codes: 5*H**-T*****-DKH**-HP**									
	40	38 × 1.2	35.6	38	99.7	43	18	71.0	220	
	50	51 × 1.2	48.6	51	112.7	43	18	83.5	220	
	65	63.5 × 1.6	60.3	63.5	127.7	43	18	100.0	220	
	80	76.1 × 1.6	72.9	76.1	140.7	43	18	114.0	220	
	100	101.6 × 2	97.6	101.6	166.7	43	18	141.0	220	
	125	139.7 × 2	135.7	139.7	198.7	93	25	171.0	380	
	150	168.3 × 2.6	163.1	168.3	226.7	93	25	200.0	380	
1) L <sub>tot</sub> = fitting length Surface roughness: R <sub>a</sub> ≤ 0.8 μm If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!										

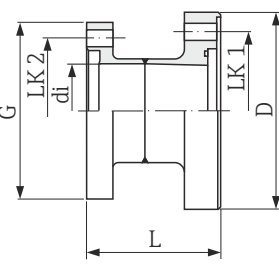
Clamp according to ISO 2852, Fig. 2 1.4404 (F316L)	Sensor DN	Fits to piping	Clamp ISO 2852 nominal diameter	di	G	D	L	LK	L <sub>tot</sub> <sup>1)</sup>	
	[mm]	ISO 2037/BS 4825-1	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
	Order codes: 5*H**-W*****-DKH**-HC** Surface roughness: R <sub>a</sub> ≤ 0.8 μm									
	40	38.0 × 1.6	38.0	35.6	50.5	92.0	68.5	71.0	273	
	50	51.0 × 1.6	51.0	48.6	64.0	105.0	68.5	83.5	273	
	65	63.5 × 1.6	63.5	60.3	77.5	121.0	68.5	100.0	273	
	80	76.1 × 1.6	76.1	72.9	91.0	140.7	99.5	114.0	333	
	100	101.6 × 2.0	101.6	97.6	119.0	166.7	99.5	141.0	333	
	125	139.7 × 2.0	139.7	135.7	155.0	198.7	53.0	171.0	300	
	150	168.3 × 2.6	168.3	163.1	183.0	226.7	53.0	200.0	300	
	Order codes: 5*H**-W*****+CA/+CB; DKH**-HC**+CA/+CB Surface roughness +CA: R <sub>a</sub> ≤ 0.8 μm Surface roughness +CB: R <sub>a</sub> ≤ 0.38 μm									
	40	38.0 × 1.6	38.0	35.6	50.5	99.7	43	71.0	220	
	50	51.0 × 1.6	51.0	48.6	64.0	112.7	43	83.5	220	
	65	63.5 × 1.6	63.5	60.3	77.5	127.7	43	100.0	220	
	80	76.1 × 1.6	76.1	72.9	91.0	140.7	43	114.0	220	
	100	101.6 × 2.0	101.6	97.6	119.0	166.7	43	141.0	220	
1) L <sub>tot</sub> = fitting length If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!										

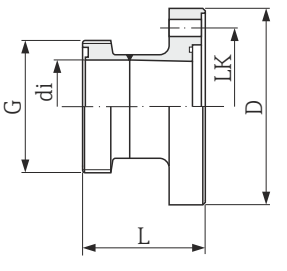
Clamp according to DIN 32676 1.4404 (F316L)	Sensor DN	Fits to piping	di	G	D	L	LK	L <sub>tot</sub> <sup>1)</sup>	
	[mm]	EN 10357 (DIN 11850)	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
	Order codes: 5*H**-0*****-DKH**-HD** Surface roughness: R <sub>a</sub> ≤ 0.8 μm								
	40	41 × 1.5	38	38	50.5	92.0	61.5	71.0	259
	50	53 × 1.5	50	50	64.0	105.0	61.5	83.5	259
	65	70 × 2	66	66	91.0	121.0	68.0	100.0	272
	80	85 × 2	81	81	106.0	140.7	99.0	114.0	332
	100	104 × 2	100	100	119.0	166.7	99.0	141.0	332
	125	129 × 2	125	125	155.0	198.7	53.0	171.0	300
	150	154 × 2	150	150	183.0	226.7	53.0	200.0	300
	Order codes: 5*H**-0*****+CA/+CB; DKH**-HD**+CA/+CB Surface roughness +CA: R <sub>a</sub> ≤ 0.8 μm Surface roughness +CB: R <sub>a</sub> ≤ 0.38 μm								
	40	41 × 1.5	38	38	50.5	99.7	43	71.0	220
	50	53 × 1.5	50	50	64.0	112.7	43	83.5	220
	65	70 × 2	66	66	91.0	127.7	43	100.0	220
	80	85 × 2	81	81	106.0	140.7	43	114.0	220
	100	104 × 2	100	100	119.0	166.7	43	141.0	220
1) L <sub>tot</sub> = fitting length If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!									

Tri-Clamp for L14 AM7 1.4404 (F316L)	Sensor DN		Fits to piping	di	G	D	L	LK	L <sub>tot</sub> <sup>1)</sup>
	[mm]	[inch]	ASME BPE	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
	Order codes: 5*H**-1*****, DKH**-HE**								
	Surface roughness: R <sub>a</sub> ≤ 0.8 μm								
	40	1½"	38.1 × 1.65	34.8	50.4	92.0	68.6	71.0	273.2
	50	2"	50.8 × 1.65	47.5	63.9	105.0	68.6	83.5	273.2
	65	-	63.5 × 1.65	60.2	77.4	121.0	68.6	100.0	273.2
	80	3"	76.2 × 1.65	72.9	90.9	140.7	99.6	114.0	333.2
	100	4"	101.6 × 2.11	97.4	118.9	166.7	99.6	141.0	333.2
	150	6"	152.4 × 2.77	146.9	166.9	226.7	53	200.0	300
	Order codes: 5*H**-1*****+CA/+CB, DKH**-HE**+CA/+CB								
	Surface roughness +CA: R <sub>a</sub> ≤ 0.8 μm								
	Surface roughness +CB: R <sub>a</sub> ≤ 0.38 μm								
	40	1½"	38.1 × 1.65	34.8	50.4	99.7	43	71.0	220
	50	2"	50.8 × 1.65	47.5	63.9	112.7	43	83.5	220
	65	-	63.5 × 1.65	60.2	77.4	127.7	43	100.0	220
	80	3"	76.2 × 1.65	72.9	90.9	140.7	43	114.0	220
100	4"	101.6 × 1.65	97.4	118.9	166.7	43	141.0	220	
1) L <sub>tot</sub> = fitting length If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!									

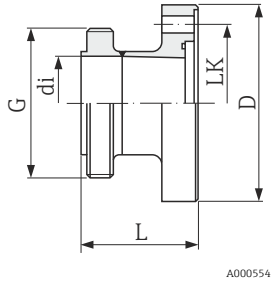
Coupling SC DIN 11851, threaded adapter 1.4404 (F316L)	Sensor DN	Fits to piping	di	G	D	L	LK	L <sub>tot</sub> <sup>1)</sup>
	[mm]	DN 11850	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
	Order codes: 5*H**-2*****, DKH**-HG**							
	Surface roughness: R <sub>a</sub> ≤ 0.8 μm							
	40	42 × 1.5	38	Rd 65 × 1/6"	92.0	72	71.0	280
	50	54 × 1.5	50	Rd 78 × 1/6"	105.0	74	83.5	284
	65	70 × 2	66	Rd 95 × 1/6"	121.0	78	100.0	292
	80	85 × 2	81	Rd 110 × ¼"	140.7	114	114.0	362
	100	104 × 2	100	Rd 130 × ¼"	166.7	123	141.0	380
	125	129 × 2	125	Rd 160 × ¼"	198.7	93	171.0	380
	150	154 × 2	150	Rd 160 × ¼"	226.7	98	200.0	390
	Order codes: 5*H**-2*****+CA/+CB, DKH**-HG**+CA/+CB							
	Surface roughness +CA: R <sub>a</sub> ≤ 0.8 μm							
	Surface roughness +CB: R <sub>a</sub> ≤ 0.38 μm							
	40	42 × 1.5	38	Rd 65 × 1/6"	99.7	63	71.0	260
	50	54 × 1.5	50	Rd 78 × 1/6"	112.7	63	83.5	260
	65	70 × 2	66	Rd 95 × 1/6"	127.7	68	100.0	270
80	85 × 2	81	Rd 110 × ¼"	140.7	73	114.0	280	
100	104 × 2	100	Rd 130 × ¼"	166.7	78	141.0	290	
1) L <sub>tot</sub> = fitting length If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!								

Coupling DIN 11864-1, aseptic threaded hygienic connection, Form A 1.4404 (F316L)	Sensor DN	Fits to piping	di	G	D	L	LK	L <sub>tot</sub> <sup>1)</sup>	
 <p style="text-align: right; font-size: small;">A0005545</p>	[mm]	DN 11850	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
	Order codes: 5*H**-3*****+, DKH**-HH** Surface roughness: R <sub>a</sub> ≤ 0.8 μm								
	40	42 × 1.5	38	Rd 65 × 1/6"	92.0	71	71.0	278	
	50	54 × 1.5	50	Rd 78 × 1/6"	105.0	71	83.5	278	
	65	70 × 2	66	Rd 95 × 1/6"	121.0	76	100.0	288	
	80	85 × 2	81	Rd 110 × 1/4"	140.7	113	114.0	360	
	100	104 × 2	100	Rd 130 × 1/4"	166.7	121	141.0	376	
	Order codes: 5*H**-3*****+CA/+CB, DKH**-HH**+CA/+CB Surface roughness +CA: R <sub>a</sub> ≤ 0.8 μm Surface roughness +CB: R <sub>a</sub> ≤ 0.38 μm								
	40	42 × 1.5	38	Rd 65 × 1/6"	99.7	61	71.0	256	
	50	54 × 1.5	50	Rd 78 × 1/6"	112.7	61	83.5	256	
	65	70 × 2	66	Rd 95 × 1/6"	127.7	66	100.0	266	
	80	85 × 2	81	Rd 110 × 1/4"	140.7	71	114.0	276	
	100	104 × 2	100	Rd 130 × 1/4"	166.7	76	141.0	286	
	1) L <sub>tot</sub> = fitting length If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!								

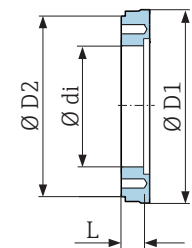
Grooved flange DIN 11864-2, aseptic grooved flange, form A 1.4404 (F316L)	Sensor DN	Fits to piping	di	G	D	L	LK 1	LK 2	L <sub>tot</sub> <sup>1)</sup>
 <p style="text-align: right; font-size: small;">A0005546</p>	[mm]	DN 11850	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
	Order codes: 5*H**-4*****+, DKH**-HJ** Surface roughness: R <sub>a</sub> ≤ 0.8 μm								
	40	42 × 1.5	38	82	92.0	64	71.0	65	264
	50	54 × 1.5	50	94	105.0	64	83.5	77	264
	65	70 × 2	66	113	121.0	64	100.0	95	264
	80	85 × 2	81	133	140.7	129	114.0	112	392
	100	104 × 2	100	159	166.7	129	141.0	137	392
	125	129 × 2	125	190	198.7	84	171.0	161	362
	150	154 × 2	150	220	226.7	84	200.0	188	362
	Order codes: 5*H**-4*****+CA/+CB, DKH**-HJ**+CA/+CB Surface roughness +CA: R <sub>a</sub> ≤ 0.8 μm Surface roughness +CB: R <sub>a</sub> ≤ 0.38 μm								
	40	42 × 1.5	38	82	99.7	56	71.0	65	246
	50	54 × 1.5	50	94	112.7	56	83.5	77	246
	65	70 × 2	66	113	127.7	56	100.0	95	246
	80	85 × 2	81	133	140.7	68	114.0	112	270
	100	104 × 2	100	159	166.7	72	141.0	137	278
1) L <sub>tot</sub> = fitting length If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!									

Coupling SMS 1145, threaded adapter 1.4404 (F316L)	Sensor DN	Fits to piping	SMS 1145 DN	di	G	D	L	LK	L <sub>tot</sub> <sup>1)</sup>	
 <p>A0005538</p>	[mm]	OD	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
	Order codes: 5*H**-5*****+DKH**-HK**									
	Surface roughness: R <sub>a</sub> ≤ 0.8 μm									
	40	38.1 × 1.65	38.0	35.5	Rd 60 × 1/6"	92.0	63	71.0	262	
	50	50.8 × 1.65	51.0	48.5	Rd 70 × 1/6"	105.0	65	83.5	266	
	65	63.5 × 1.65	63.5	60.5	Rd 85 × 1/6"	121.0	70	100.0	276	
	80	76.2 × 1.65	76.0	72.6	Rd 98 × 1/6"	140.7	106	114.0	346	
	100	101.6 × 1.65	101.6	97.5	Rd 132 × 1/6"	166.7	101	141.0	336	
	Order codes: 5*H**-5*****+CA/+CB, DKH**-HK**+CA/+CB									
	Surface roughness +CA: R <sub>a</sub> ≤ 0.8 μm									
	Surface roughness +CB: R <sub>a</sub> ≤ 0.38 μm									
	40	38.1 × 1.65	38.0	34.8	Rd 60 × 1/6"	99.7	61	71.0	256	
	50	50.8 × 1.65	51.0	47.5	Rd 70 × 1/6"	112.7	61	83.5	256	
	65	63.5 × 1.65	63.5	60.2	Rd 85 × 1/6"	127.7	66	100.0	266	
	80	76.2 × 1.65	76.0	72.6	Rd 98 × 1/6"	140.7	71	114.0	276	
100	101.6 × 1.65	101.6	97.4	Rd 132 × 1/6"	166.7	76	141.0	286		
1) L <sub>tot</sub> = fitting length If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!										



Coupling ISO 2853, threaded adapter 1.4404 (F316L)	Sens or DN	Fits to piping	ISO 2853 DN	di	G	D	L	LK	L <sub>tot</sub> <sup>1)</sup>	
	[mm]	ISO 2037 / BS 4825-1	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
	Surface roughness: R <sub>a</sub> ≤ 0.8 μm									
	40	38.0 × 1.6	38.0	35.6	Tr 50.5×3.175	92.0	61.5	71.0	259	
	50	51.0 × 1.6	51.0	48.6	Tr 64×3.175	105.0	61.5	83.5	259	
	65	63.5 × 1.6	63.5	60.3	Tr 77.5×3.175	121.0	61.5	100.0	259	
	80	76.1 × 1.6	76.1	72.9	Tr 91×3.175	140.7	92.5	114.0	319	
	100	101.6 × 2.0	101.6	97.6	Tr 118×3.175	166.7	92.5	141.0	319	
	Order codes: 5*H**-6*****+CA/+CB, DKH**-HL**+CA/+CB									
	Surface roughness +CA: R <sub>a</sub> ≤ 0.8 μm									
	Surface roughness +CB: R <sub>a</sub> ≤ 0.38 μm									
40	38.0 × 1.6	38.0	35.6	Tr 50.5×3.175	99.7	61	71.0	256		
50	51.0 × 1.6	51.0	48.6	Tr 64×3.175	112.7	61	83.5	256		
65	63.5 × 1.6	63.5	60.3	Tr 77.5×3.175	127.7	66	100.0	266		
80	76.1 × 1.6	76.0	72.9	Tr 91×3.175	140.7	71	114.0	276		
100	101.6 × 2.0	101.6	97.6	Tr 118×3.175	166.7	76	141.0	286		
1) L <sub>tot</sub> = fitting length										
If pigs are used for cleaning, it is essential to take the inside diameters of measuring tube and process connection (di) into account!										

Distance disk (accessory for DN 80 to 100/3 to 4")

Distance disk 1.4435 (316L)	Sensor DN		di	D1	D2	L
	[mm]	[inch]	[mm]	[mm]	[mm]	[mm]
	80	3"	72.9	140.7	141	33
	100	4"	97.4	166.7	162	33

## Weight

## Weight in SI units

Nominal diameter DN [mm]	Compact version (DIN)		Remote version (without cable; DIN)	
	Aluminum field housing	Stainless steel field housing	Sensor	Transmitter (wall-mount housing)
	[kg]	[kg]	[kg]	[kg]
2	5.2	5.7	2.0	6
4	5.2	5.7	2.0	6
8	5.3	5.8	2.0	6
15	5.4	5.9	1.9	6
25	5.5	6.0	2.8	6
40	7.1	7.6	4.1	6
50	7.6	8.1	4.6	6
65	8.4	8.9	5.4	6
80	9	9.5	6.0	6
100	10.3	10.8	7.3	6
125	15.7	16.2	12.7	6
150	18.1	18.6	15.1	6

- Transmitter (compact version): 3.4 kg
- Weight data valid for standard pressure ratings and without packaging material.

## Weight in US units

Nominal diameter DN [in]	Compact version (DIN)		Remote version (without cable; DIN)	
	Aluminum field housing	Stainless steel field housing	Sensor	Transmitter (wall-mount housing)
	[lbs]	[lbs]	[lbs]	[lbs]
1/12"	11.5	12.6	4	13
1/8"	11.5	12.6	4	13
3/8"	11.7	12.8	4	13
1/2"	11.9	13.0	4	13
1"	12.1	13.2	6	13
1 1/2"	15.7	16.8	4.1	13
2"	16.8	17.9	4.6	13
3"	19.8	20.9	6.0	13
4"	22.7	23.8	7.3	13
6"	39.9	41.0	15.1	13

- Transmitter (compact version): 7.5 lbs
- Weight data valid for standard pressure ratings and without packaging material.

## Measuring tube specifications

Nominal diameter		Pressure rating <sup>1)</sup>	Internal diameter <sup>2)</sup>	
[mm]	[inch]	EN (DIN) [bar]	PFA [mm]	[inch]
2	1/12"	PN 16 / PN 40	2.25	0.09
4	1/8"	PN 16 / PN 40	4.5	0.18
8	3/8"	PN 16 / PN 40	9.0	0.35
15	1/2"	PN 16 / PN 40	16.0	0.63
–	1"	PN 16 / PN 40	22.6	0.89
25	–	PN 16 / PN 40	26.0	1.02
40	1 1/2"	PN 16 / PN 25 / PN 40	35.3	1.39
50	2"	PN 16 / PN 25 / PN 40	48.1	1.89
65	–	PN 16 / PN 25 / PN 40	59.9	2.36
80	3"	PN 16 / PN 25 / PN 40	72.6	2.86
100	4"	PN 16 / PN 25 / PN 40	97.5	3.84
125	–	PN 10 / PN 16	120.0	4.72
150	6"	PN 10 / PN 16	146.5	5.77

<sup>1)</sup> Pressure rating depends on the process connection and the seals used.

<sup>2)</sup> Internal diameter of process connections.

## Material

- Transmitter housing:
  - Compact housing: powder coated die-cast aluminum or stainless-steel field housing (1.4301 (304))
  - Wall-mounted housing: powder coated die-cast aluminum
- Window material: glass or polycarbonate
- Sensor housing: stainless steel 1.4301 (304)
- Wall mounting kit (holder panel): 1.4301 (304)
- Measuring tube: stainless steel 1.4301 (304)
- Lining material: PFA (USP Class VI; FDA 21 CFR 177.1550; 3A)
- Flanges:
  - All connections 1.4404 (316L)
  - Flanges (EN (DIN), ANSI, JIS) made of PVDF
  - Adhesive fitting made of PVC
- Ground rings: 1.4435 (316L)(optional: Alloy C-22, Tantalum)
- Electrodes:
  - Standard: 1.4435 (316L)
  - Optional: Alloy C-22, Tantalum, Platinum (up to DN 25 / 1" only)
- Seals:
  - DN 2 to 25 (1/12 to 1"): O-Ring (EPDM, Viton, Kalrez), gasket seal (EPDM\*, Viton, Silicone\*)
  - DN 40 to 150 (1 1/2 to 6"): gasket seal (EPDM\*, Silicone\*)

\* = USP Class VI; FDA 21 CFR 177.2600; 3A

<b>Fitted electrodes</b>	<p>Measuring electrodes and empty pipe detection electrodes</p> <ul style="list-style-type: none"> <li>■ Standard with: 1.4435 (316L), Alloy C-22, Tantalum, Platinum</li> <li>■ DN 2 to 8 (<math>\frac{1}{2}</math> to <math>\frac{5}{16}</math>): without empty pipe detection electrode</li> </ul>
<b>Process connections</b>	<p>With O-ring:</p> <ul style="list-style-type: none"> <li>■ Weld sockets (DIN EN ISO 1127, ODT/SMS)</li> <li>■ Flange (EN (DIN), ANSI, JIS)</li> <li>■ PVDF flange (EN (DIN), ANSI, JIS)</li> <li>■ External pipe thread</li> <li>■ Internal pipe thread</li> <li>■ Hose connection</li> <li>■ PVC adhesive fittings</li> </ul> <p>With gasket seals:</p> <ul style="list-style-type: none"> <li>■ Weld sockets (EN 10357 (DIN 11850), ODT/SMS, ASME BPE, ISO 2037)</li> <li>■ Clamps (ISO 2852, DIN 32676, L14 AM7)</li> <li>■ Coupling (DIN 11851, DIN 11864-1, ISO 2853, SMS 1145)</li> <li>■ Flange (DIN 11864-2)</li> </ul>
<b>Surface roughness</b>	<p>Stainless steel electrodes, 1.4435 (316L); Alloy C22, 2.4602 (UNS N06022); platinum; tantalum:  <math>\leq 0.3</math> to <math>0.5 \mu\text{m}</math> (<math>11.8</math> to <math>19.7 \mu\text{in}</math>)          (All data relate to parts in contact with fluid)</p> <p>Liner with PFA:  <math>\leq 0,4 \mu\text{m}</math> (<math>15.7 \mu\text{in}</math>)          (All data relate to parts in contact with fluid)</p> <p>Stainless steel process connections:</p> <ul style="list-style-type: none"> <li>■ With O-ring seal: <math>\leq 1.6 \mu\text{m}</math> (<math>63 \mu\text{in}</math>)</li> <li>■ With aseptic seal: <math>\leq 0.8 \mu\text{m}</math> (<math>31.5 \mu\text{in}</math>)</li> </ul> <p>Optional: <math>\leq 0.38 \mu\text{m}</math> (<math>15 \mu\text{in}</math>)          (All data relate to parts in contact with fluid)</p>

## Operability

<b>Local operation</b>	<p><b>Display elements</b></p> <ul style="list-style-type: none"> <li>■ Liquid crystal display: backlit, two lines (Promag 50) or four lines (Promag 53) with 16 characters per line</li> <li>■ Custom configurations for presenting different measured-value and status variables</li> <li>■ Totalizer             <ul style="list-style-type: none"> <li>– Promag 50: 2 totalizers</li> <li>– Promag 53: 3 totalizers</li> </ul> </li> </ul> <p><b>Operating elements</b></p> <p>Unified operation concept for both types of transmitter:</p> <p>Promag 50:</p> <ul style="list-style-type: none"> <li>■ Local operation via three keys (□, ⊕, ⊞)</li> <li>■ Quick Setup menus for straightforward commissioning</li> </ul> <p>Promag 53:</p> <ul style="list-style-type: none"> <li>■ Local operation via three keys (□, ⊕, ⊞)</li> <li>■ Application-specific Quick Setup menus for straightforward commissioning</li> </ul>
<b>Language packages</b>	<p>Language packages available for operation in different countries:</p> <p>Promag 50, Promag 53:</p> <ul style="list-style-type: none"> <li>■ Western Europe and America (WEA):              English, German, Spanish, Italian, French, Dutch, Portuguese</li> <li>■ Eastern Europe and Scandinavia (EES):              English, Russian, Polish, Norwegian, Finnish, Swedish, Czech</li> <li>■ South and east Asia (SEA):              English, Japanese, Indonesian</li> </ul>

- Promag 53:
- China (CN):  
English, Chinese

You can change the language package via the operating program "FieldCare".

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- Remote operation**
- Promag 50: Remote control via HART, PROFIBUS DP/PA
  - Promag 53: Remote control via HART, PROFIBUS DP/PA, Modbus RS485, FOUNDATION Fieldbus
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## Certificates and approvals

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- CE mark**
- The measuring system is in conformity with the statutory requirements of the EC Directives. Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.
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- C-tick symbol**
- The measuring system meets the EMC requirements of the "Australian Communications and Media Authority (ACMA)".
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- Ex approval**
- Information about currently available Ex versions (ATEX, FM, CSA) can be supplied by your Endress+Hauser Sales Center on request. All explosion protection data are given in a separate documentation which is available upon request.
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- Sanitary compatibility**
- 3A approval and EHEDG-certified
  - Seals → conform to FDA (apart from Kalrez seals)
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- Certification FOUNDATION Fieldbus**
- The flow device has successfully passed all the test procedures carried out and is certified and registered by the Fieldbus Foundation. The device thus meets all the requirements of the following specifications:
- Certified to FOUNDATION Fieldbus Specification
  - The device meets all the specifications of the FOUNDATION Fieldbus H1.
  - Interoperability Test Kit (ITK), revision status 5.01 (device certification number: on request)
  - The device can also be operated with certified devices of other manufacturers
  - Physical Layer Conformance Test of the Fieldbus Foundation
- 

- Certification Modbus RS485**
- The measuring device meets all the requirements of the Modbus/TCP conformity test and has the "Modbus/TCP Conformance Test Policy, Version 2.0". The measuring device has successfully passed all the test procedures carried out and is certified by the "Modbus/TCP Conformance Test Laboratory" of the University of Michigan.
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- Certification PROFIBUS DP/PA**
- The flowmeter has successfully passed all the test procedures carried out and is certified and registered by the PNO (PROFIBUS User Organization). The device thus meets all the requirements of the following specifications:
- Certified to PROFIBUS PA, profile version 3.0 (device certification number: on request)
  - The device can also be operated with certified devices of other manufacturers (interoperability)
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- Pressure equipment directive**
- The measuring devices can be ordered with or without PED (Pressure Equipment Directive). If a device with PED is required, this must be ordered explicitly. This is not possible or required for devices with nominal diameters of DN 25 (1") or smaller.
- With the identification PED/G1/III on the sensor nameplate, Endress+Hauser confirms conformity with the "Basic safety requirements" of Appendix I of the Pressure Equipment Directive 97/23/EC.
  - Devices with this identification (with PED) are suitable for the following types of fluid:
    - Fluids of Group 1 and 2 with a steam pressure of greater than, or smaller and equal to 0.5 bar (7.3 psi)
    - Unstable gases
  - Devices without this identification (without PED) are designed and manufactured according to good engineering practice. They correspond to the requirements of Art. 3, Section 3 of the Pressure Equipment Directive 97/23/EC. Their application is illustrated in Diagrams 6 to 9 in Appendix II of the Pressure Equipment Directive 97/23/EC.
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## Other standards and guidelines

- EN 60529  
Degrees of protection by housing (IP code)
- EN 61010  
Safety requirements for electrical equipment for measurement, control and laboratory use.
- IEC/EN 61326  
"Emission in accordance with requirements for Class A".  
Electromagnetic compatibility (EMC requirements)
- NAMUR NE 21:  
Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment.
- 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.
- ANSI/ISA-S82.01  
Safety Standard for Electrical and Electronic Test, Measuring, Controlling and related Equipment - General Requirements. Pollution degree 2, Installation Category II.
- CAN/CSA-C22.2 No. 1010.1-92  
Safety requirements for Electrical Equipment for Measurement and Control and Laboratory Use. Pollution degree 2, Installation Category II

## Ordering information

Detailed ordering information is available from the following sources:

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

## Accessories

Various accessories, which can be ordered separately from Endress+Hauser, are available for the transmitter and the sensor. The Endress+Hauser service organization can provide detailed information on the order codes of your choice.

### Device-specific accessories

#### For the transmitter

Accessory	Description
Promag 53 and Promag 50 transmitter	Transmitter for replacement or for stock. Use the order code to define the following specifications: <ul style="list-style-type: none"> <li>- Approvals</li> <li>- Degree of protection / version</li> <li>- Cable type for the remote version</li> <li>- Cable entries</li> <li>- Display / power supply / operation</li> <li>- Software</li> <li>- Outputs / inputs</li> </ul>
Software packages for Promag 53	Software add-ons on F-CHIP, can be ordered individually: <ul style="list-style-type: none"> <li>- ECC electrode cleaning</li> <li>- Batching</li> </ul>
Input/output conversion kit for Promag 53	Conversion kit with appropriate slot modules for converting the present input/output configuration to a new version.
Mounting kit for Promag 53 transmitter	Mounting kit for wall-mounted housing (remote version). Suitable for: <ul style="list-style-type: none"> <li>■ Wall mounting</li> <li>■ Pipe mounting</li> <li>■ Panel mounting</li> </ul> Mounting set for aluminum housings. Suitable for pipe mounting.
Cable for remote version	Coil and electrode cables, various lengths. Reinforced cable on request.
Wall mounting kit	Wall mounting kit for Promag H transmitter.

#### For the sensor

Accessory	Description
Mounting kit	Mounting kit for Promag H, comprising: <ul style="list-style-type: none"> <li>■ 2 Process connections</li> <li>■ Screws</li> <li>■ Seals</li> </ul>
Adapter connection for Promag 53	Adapter connections for installing Promag 53 H instead of Promag 30/33 A or Promag 30/33 H, DN 25.
Ground rings:	If the process connections are made of PVC or PVDF, ground rings are necessary to ensure that potential is matched. A set comprises 2 ground rings.
Set of seals	For regular replacement of the seals of the Promag H sensor.
Welding jig	Weld nipples as process connection: Welding jig for installation in pipes.
Spacer	A spacer is required if a sensor of DN 80 to 100 is replaced in an existing installation and the new sensor is shorter.

**Communication-specific accessories**

Accessory	Description
HART handheld terminal Field Xpert SFX 100	Handheld terminal for remote configuration and for obtaining measured values via the HART current output (4 to 20 mA). Contact your Endress+Hauser representative for more information.
FOUNDATION FIELDBUS handheld terminal 375	Handheld terminal for remote configuration and for obtaining measured values via FOUNDATION Fieldbus-H1.  Contact your Endress+Hauser representative for more information.
Fieldgate FXA320	Gateway for remote interrogation of HART sensors and actuators via web browser: <ul style="list-style-type: none"> <li>▪ 2-channel analog input (4 to 20 mA)</li> <li>▪ 4 binary inputs with event counter function and frequency measurement</li> <li>▪ Communication via modem, Ethernet or GSM</li> <li>▪ Visualization via Internet/Intranet in the web browser and/or WAP cellular phone</li> <li>▪ Limit value monitoring with alarm signaling by e-mail or SMS</li> <li>▪ Synchronized time stamping of all measured values.</li> </ul>
Fieldgate FXA520	Gateway for remote interrogation of HART sensors and actuators via web browser: <ul style="list-style-type: none"> <li>▪ Web server for remote monitoring of up to 30 measuring points</li> <li>▪ Intrinsically safe version [EEx ia]IIC for applications in hazardous areas</li> <li>▪ Communication via modem, Ethernet or GSM</li> <li>▪ Visualization via Internet/Intranet in the web browser and/or WAP cellular phone</li> <li>▪ Limit value monitoring with alarm signaling by e-mail or SMS</li> <li>▪ Synchronized time stamping of all measured values</li> <li>▪ Remote diagnostics and remote configuration of connected HART devices</li> </ul>
FXA195	The Commubox FXA195 connects intrinsically safe smart transmitters using the HART protocol to the USB port of a personal computer. This enables remote operation of the transmitter with operating software (e.g. FieldCare). Power is supplied to the Commubox via the USB port.

**Service-specific accessories**

Accessory	Description
Applicator	Software for selecting and configuring flowmeters. Applicator can be downloaded from the Internet or ordered on CD-ROM for installation on a local PC. Contact your Endress+Hauser representative for more information.
Fieldcheck	Tester/simulator for testing flowmeters in the field. When used in conjunction with the "FieldCare" software package, test results can be imported into a database, printed and used for official certification. Contact your Endress+Hauser representative for more information.
FieldCare	FieldCare is Endress+Hauser's FDT-based plant asset management tool. 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.
FXA193	The FXA193 service interface connects the device to the PC for operation via FieldCare.
Memograph M graphic display recorder	The Memograph M graphic display recorder provides information on all the relevant process 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. The ReadWin® 2000 PC software is part of the standard package and is used for configuring, visualizing and archiving the data captured.



## Documentation

- Flow Measurement (FA00005D/06)
- Operating Instructions Promag 50 (BA00046D/06 and BA00049D/06)
- Operating Instructions Promag Promag 50 PROFIBUS PA (BA00055D/06 and BA00056D/06)
- Operating Instructions Promag Promag 53 (BA00047D/06 and BA00048D/06)
- Operating Instructions Promag Promag 53 FOUNDATION Fieldbus (BA00051D/06 and BA00052D/06)
- Operating Instructions Promag 53 Modbus RS485 (BA00117D/06 and BA00118D/06)
- Operating Instructions Promag Promag 53 PROFIBUS DP/PA (BA00053D/06 and BA00054D/06)
- Supplementary documentation on Ex-ratings: ATEX, IECEx, FM, CSA, NEPSI
- Special documentation Promag 53: Data transmission via EtherNet/IP (SD00146D)

## Registered trademarks

HART®

Registered trademark of the HART Communication Foundation, Austin, USA

PROFIBUS®

Registered trademark of the PROFIBUS Nutzerorganisation e.V., Karlsruhe, D

FOUNDATION™ Fieldbus

Registered trademark of the Fieldbus Foundation, Austin, USA

Modbus®

Registered trademark of SCHNEIDER AUTOMATION, INC.

HistoROM™, S-DAT®, T-DAT™, F-CHIP®, FieldCare®, Fieldcheck®, FieldXpert™, Applicator®

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