Technical Information
Proline Promag H 100

Electromagnetic flowmeter

The flowmeter for smallest flow rates with an ultra-compact transmitter

Application

- The electromagnetic measuring principle is unaffected by pressure, temperature and flow profile
- For the smallest flow rates and demanding hygienic applications

Device properties

- Integrated temperature measurement
- Sensor housing made of stainless steel (3A, EHEDG)
- Wetted materials CIP, SIP cleanable
- Robust, ultra-compact transmitter housing
- High ingress protection: IP69K
- Pre-configured plug connector

Your benefits

- Multivariable measurement for flow, temperature and conductivity
- Flexible installation concept – numerous hygienic process connections
- Energy-saving flow measurement – no pressure loss due to cross-section constriction
- Maintenance-free – no moving parts
- Space-saving transmitter – full functionality on smallest footprint
- Time-saving local operation without additional software and hardware – integrated web server
- Integrated verification – Heartbeat Technology™

Endress+Hauser
People for Process Automation

Table of contents

Document information 3
Symbols used 3

Function and system design 4
Measuring principle 4
Measuring system 5
Device architecture 6
Safety 6

Input 6
Measured variable 6
Measuring range 6
Operable flow range 8
Input signal 8

Output 8
Output signal 8
Signal on alarm 9
Low flow cut off 11
Galvanic isolation 11
Protocol-specific data 11

Power supply 16
Terminal assignment 16
Pin assignment, device plug 20
Supply voltage 22
Power consumption 22
Current consumption 22
Power supply failure 22
Electrical connection 23
Potential equalization 27
Terminals 28
Cable entries 29
Cable specification 29

Performance characteristics 30
Reference operating conditions 30
Maximum measured error 30
Repeatability 31
Temperature measurement response time 31
Influence of ambient temperature 31

Installation 31
Mounting location 31
Orientation 32
Inlet and outlet runs 33
Adapters 33

Environment 34
Ambient temperature range 34
Storage temperature 35
Degree of protection 35
Shock resistance 35
Vibration resistance 35
Mechanical load 35
Interior cleaning 35
Electromagnetic compatibility (EMC) 35

Process 35
Medium temperature range 35
Conductivity 36
Pressure-temperature ratings 36
Pressure tightness 42
Flow limit 42
Pressure loss 42
System pressure 42
Vibrations 42

Mechanical construction 43
Design, dimensions 43
Weight 74
Measuring tube specification 74
Materials 75
Fitted electrodes 77
Process connections 77
Surface roughness 77

Operability 77
Operating concept 77
Remote operation 78

Certificates and approvals 81
CE mark 81
C-Tick symbol 81
Ex approval 81
Sanitary compatibility 81
Certification PROFIBUS 82
Modbus RS485 certification 82
EtherNet/IP certification 82
Pressure Equipment Directive 82
Other standards and guidelines 82

Ordering information 83

Application packages 83
Heartbeat Technology 83

Accessories 83
Device-specific accessories 83
Communication-specific accessories 84
Service-specific accessories 85
System components 85

Documentation 85
Standard documentation 86
Supplementary device-dependent documentation 86

Registered trademarks 86

Document information

Symbols used

Electrical symbols

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

Symbols for certain types of information

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

Symbols in graphics

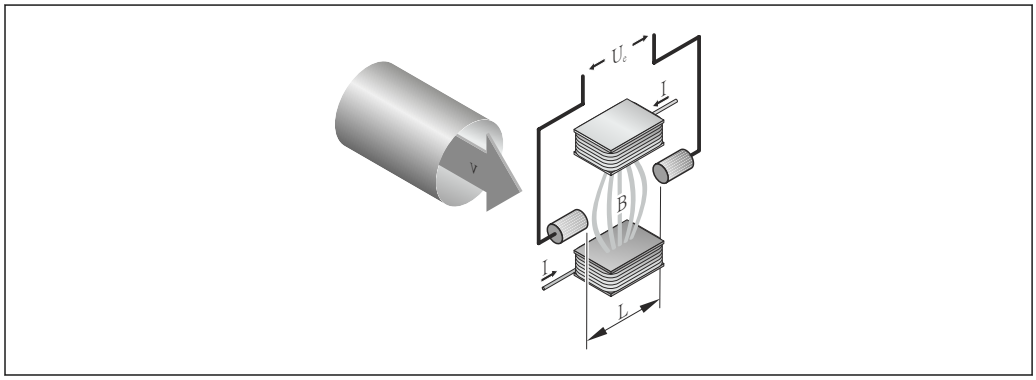
Symbol	Meaning
1, 2, 3,...	Item numbers
1. , 2. , 3. ...	Series of steps
A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections
A0013441	Flow direction

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

Function and system design

Measuring principle

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



A0017035

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

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

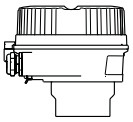
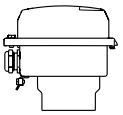
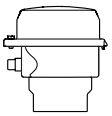
Formulae for calculation

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

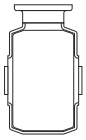
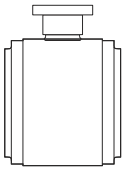
Measuring system

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

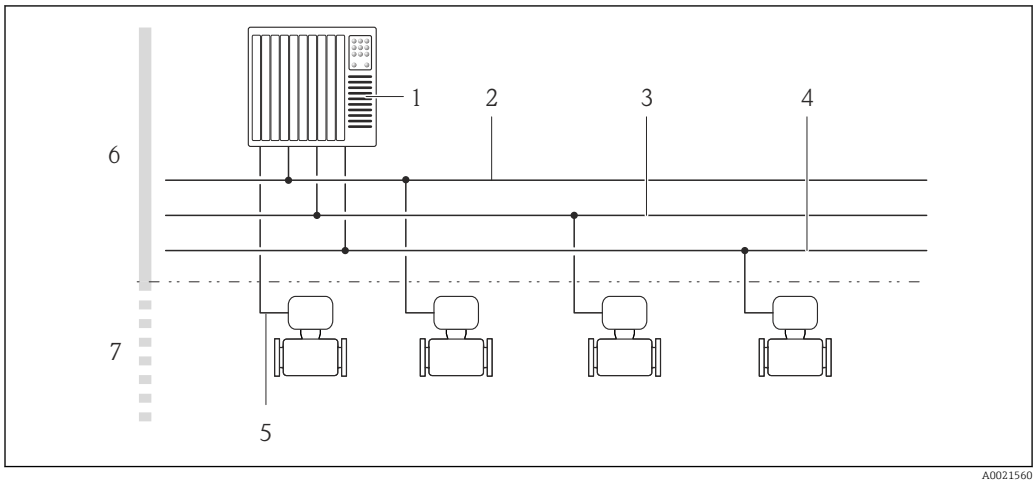
Transmitter

Promag 100  A0016693  A0016694  A0016695	Device versions and materials: ▪ Compact, aluminum coated: Coated aluminum AlSi10Mg ▪ Compact, hygienic, stainless: Hygienic version, stainless steel 1.4301 (304) ▪ Ultra compact, hygienic, stainless: Hygienic version, stainless steel 1.4301 (304) Configuration: ▪ Via operating tools (e.g. FieldCare) ▪ Also for device version with 4-20 mA HART, pulse/frequency/switch output: Via Web browser (e.g. Microsoft Internet Explorer) ▪ Also for device version with EtherNet/IP output: – Via Web browser (e.g. Microsoft Internet Explorer) – Via Add-on Profile Level 3 for automation system from Rockwell Automation – Via Electronic Data Sheet (EDS)

Sensor

Promag H  A0019897  A0019898	Nominal diameter range: DN 2 to 150 (1/12 to 6") Materials: ▪ Sensor housing: stainless steel 1.4301 (304) ▪ Measuring tubes: stainless steel 1.4301 (304) ▪ Liner: PFA ▪ Process connections: stainless steel 1.4404 (316L); PVDF; PVC adhesive sleeve ▪ Electrodes: 1.4435 (316L), Alloy C22, tantalum, platinum (only up to DN 25 (1")) ▪ Seals: – DN 2 to 25 (1/12 to 1"): O-ring seal (EPDM, FKM, Kalrez), aseptic molded seal (EPDM, FKM, silicone) – DN 40 to 150 (1 ½ to 6"): aseptic molded seal (EPDM, FKM, silicone) ▪ Grounding rings: 1.4435 (316L), Alloy C22, tantalum

Device architecture



1 Possibilities for integrating measuring devices into a system

1 Control system (e.g. PLC)
2 EtherNet/IP
3 PROFIBUS DP
4 Modbus RS485
5 4-20 mA HART, pulse/frequency/switch output
6 Non-hazardous area
7 Non-hazardous area and Zone 2/Div. 2

Safety

IT security

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

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

Endress+Hauser can be contacted to provide support in performing this task.

Input

Measured variable

Direct measured variables

- Volume flow (proportional to induced voltage)
- Temperature (DN 15 to 150 (½ to 6"))
- Electrical conductivity

Calculated measured variables

- Mass flow
- Corrected volume flow
- Corrected electrical conductivity

Measuring range

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

Electrical conductivity: 5 to 10 000 µS/cm/cm

Flow characteristic values in SI units

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Current output full scale value [1] (v ~ 2.5 m/s)	Pulse value [1] (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[mm]	[in]	[dm³/min]	[dm³/min]	[dm³]	[dm³/min]
2	1/12	0.06 to 1.8	0.5	0.005	0.01
4	1/8	0.25 to 7	2	0.025	0.05
8	3/8	1 to 30	8	0.1	0.1
15	½	4 to 100	25	0.2	0.5
25	1	9 to 300	75	0.5	1
40	1 ½	25 to 700	200	1.5	3
50	2	35 to 1 100	300	2.5	5
65	–	60 to 2 000	500	5	8
80	3	90 to 3 000	750	5	12
100	4	145 to 4 700	1200	10	20
125	5	220 to 7 500	1850	15	30
150	6	20 to 600 m³/h	150 m³/h	0.03 m³	2.5 m³/h

1) HART only

Flow characteristic values in US units

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Current output full scale value [1] (v ~ 2.5 m/s)	Pulse value [1] (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[in]	[mm]	[gal/min]	[gal/min]	[gal]	[gal/min]
1/12	2	0.015 to 0.5	0.1	0.001	0.002
1/8	4	0.07 to 2	0.5	0.005	0.008
3/8	8	0.25 to 8	2	0.02	0.025
½	15	1 to 27	6	0.05	0.1
1	25	2.5 to 80	18	0.2	0.25
1 ½	40	7 to 190	50	0.5	0.75
2	50	10 to 300	75	0.5	1.25
3	80	24 to 800	200	2	2.5
4	100	40 to 1 250	300	2	4
5	125	60 to 1 950	450	5	7
6	150	90 to 2 650	600	5	12

1) HART only

To calculate the measuring range, use the *Applicator* sizing tool (→ 🖹 85)

Recommended measuring range

"Flow limit" section (→ 42)

Operable flow range

Over 1000 : 1

Input signal

Fieldbuses

To increase the accuracy of certain measured variables or to calculate the corrected volume flow, the automation system can continuously write different measured values to the measuring device via Modbus RS485, EtherNet/IP or HART input:

- Process pressure or fluid temperature to increase accuracy (e.g. external values from Cerabar M, Cerabar S or iTEMP)
- Reference density for calculating the corrected volume flow

Various pressure transmitters and temperature measuring devices can be ordered from Endress +Hauser: see "Accessories" section (→ 85)

Output

Output signal

Current output

Current output	4-20 mA HART (active)
Maximum output values	▪ DC 24 V (when idle) ▪ 22.5 mA
Load	0 to 700 Ω
Resolution	0.38 µA
Damping	Adjustable: 0.07 to 999 s
Assignable measured variables	▪ Volume flow ▪ Mass flow ▪ Corrected volume flow ▪ Flow velocity ▪ Conductivity ▪ Corrected conductivity ▪ Temperature ▪ Electronics temperature

Pulse/frequency/switch output

Function	Can be set to pulse, frequency or switch output
Version	Passive, open collector
Maximum input values	▪ DC30 V ▪ 25 mA
Voltage drop	For 25 mA: ≤ DC2 V
Pulse output	
Pulse width	Adjustable: 0.05 to 2 000 ms
Maximum pulse rate	10 000 Impulse/s
Pulse value	Adjustable
Assignable measured variables	▪ Volume flow ▪ Mass flow ▪ Corrected volume flow
Frequency output	
Output frequency	Adjustable: 0 to 10 000 Hz
Damping	Adjustable: 0 to 999 s

Pulse/pause ratio	1:1
Assignable measured variables	▪ Volume flow ▪ Mass flow ▪ Corrected volume flow ▪ Flow velocity ▪ Conductivity ▪ Corrected conductivity ▪ Temperature ▪ Electronics temperature
Switch output	
Switching behavior	Binary, conductive or non-conductive
Switching delay	Adjustable: 0 to 100 s
Number of switching cycles	Unlimited
Assignable functions	▪ Off ▪ On ▪ Diagnostic behavior ▪ Limit value: – Off – Volume flow – Mass flow – Corrected volume flow – Flow velocity – Conductivity – Corrected conductivity – Totalizer 1-3 – Temperature – Electronics temperature ▪ Flow direction monitoring ▪ Status – Empty pipe detection – Low flow cut off

PROFIBUS DP

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

Modbus RS485

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

EtherNet/IP

Standards	In accordance with IEEE 802.3

Signal on alarm

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

Current output

4-20 mA

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

HART

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

Pulse/frequency/switch output

Pulse output	
Failure mode	Choose from: ▪ Actual value ▪ No pulses
Frequency output	
Failure mode	Choose from: ▪ Actual value ▪ Defined value: 0 to 12 500 Hz ▪ 0 Hz
Switch output	
Failure mode	Choose from: ▪ Current status ▪ Open ▪ Closed

PROFIBUS DP

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

Modbus RS485

Failure mode	Choose from: ▪ NaN value instead of current value ▪ Last valid value

EtherNet/IP

Device diagnostics	Device condition can be read out in Input Assembly

Operating tool

- Via digital communication:
  - HART protocol
  - PROFIBUS DP
- Via service interface

Plain text display	With information on cause and remedial measures

Additional information on remote operation (→ 78)

Web browser

Plain text display	With information on cause and remedial measures

Light emitting diodes (LED)

Status information	Status indicated by various light emitting diodes The following information is displayed depending on the device version: ▪ Supply voltage active ▪ Data transmission active ▪ Device alarm/error has occurred ▪ EtherNet/IP network available ▪ EtherNet/IP connection established

Low flow cut off

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

Galvanic isolation

The following connections are galvanically isolated from each other:
- Outputs
- Power supply

Protocol-specific data

HART

Manufacturer ID	0x11
Device type ID	0x3A
HART protocol revision	6.0
Device description files (DTM, DD)	Information and files under: www.endress.com
HART load	Min. 250 Ω
Dynamic variables	The measured variables can be freely assigned to the dynamic variables. **Measured variables for PV (primary dynamic variable)** ▪ Off ▪ Volume flow ▪ Mass flow ▪ Corrected volume flow ▪ Flow velocity ▪ Corrected conductivity ▪ Temperature ▪ Electronics temperature **Measured variables for SV, TV, QV (secondary, tertiary and quaternary dynamic variable)** ▪ Volume flow ▪ Mass flow ▪ Corrected volume flow ▪ Flow velocity ▪ Corrected conductivity ▪ Temperature ▪ Electronics temperature ▪ Totalizer 1 ▪ Totalizer 2 ▪ Totalizer 3

PROFIBUS DP

Manufacturer ID	0x11
Ident number	0x1561
Profile version	3.02
Device description files (GSD, DTM, DD)	Information and files under: ▪ www.endress.com ▪ www.profibus.org

Output values (from measuring device to automation system)	**Analog input 1 to 8** ▪ Mass flow ▪ Volume flow ▪ Corrected volume flow ▪ Target mass flow ▪ Carrier mass flow ▪ Density ▪ Reference density ▪ Concentration ▪ Dynamic viscosity ▪ Kinematic viscosity ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Carrier pipe temperature ▪ Electronics temperature ▪ Oscillation frequency ▪ Oscillation amplitude ▪ Frequency fluctuation ▪ Oscillation damping ▪ Tube damping fluctuation ▪ Signal asymmetry ▪ Exciter current **Digital input 1 to 2** ▪ Partially filled pipe detection ▪ Low flow cut off **Totalizer 1 to 3** ▪ Mass flow ▪ Volume flow ▪ Corrected volume flow
Input values (from automation system to measuring device)	**Analog output 1 to 3 (fixed assignment)** ▪ Pressure ▪ Temperature ▪ Reference density **Digital output 1 to 3 (fixed assignment)** ▪ Digital output 1: switch positive zero return on/off ▪ Digital output 2: perform zero point adjustment ▪ Digital output 3: switch switch output on/off **Totalizer 1 to 3** ▪ Totalize ▪ Reset and hold ▪ Preset and hold ▪ Stop ▪ Operating mode configuration: – Net flow total – Forward flow total – Reverse flow total
Supported functions	▪ Identification & Maintenance Simplest device identification on the part of the control system and nameplate ▪ PROFIBUS upload/download Reading and writing parameters is up to ten times faster with PROFIBUS upload/download ▪ Condensed status Simplest and self-explanatory diagnostic information by categorizing diagnostic messages that occur
Configuration of the device address	▪ DIP switches on the I/O electronics module ▪ Via operating tools (e.g. FieldCare)

Modbus RS485

Protocol	Modbus Applications Protocol Specification V1.1
Device type	Slave
Slave address range	1 to 247

Broadcast address range	0
Function codes	▪ 03: Read holding register ▪ 04: Read input register ▪ 06: Write single registers ▪ 08: Diagnostics ▪ 16: Write multiple registers ▪ 23: Read/write multiple registers
Broadcast messages	Supported by the following function codes: ▪ 06: Write single registers ▪ 16: Write multiple registers ▪ 23: Read/write multiple registers
Supported baud rate	▪ 1 200 BAUD ▪ 2 400 BAUD ▪ 4 800 BAUD ▪ 9 600 BAUD ▪ 19 200 BAUD ▪ 38 400 BAUD ▪ 57 600 BAUD ▪ 115 200 BAUD
Data transfer mode	▪ ASCII ▪ RTU
Data access	Each device parameter can be accessed via Modbus RS485. For Modbus register information

EtherNet/IP

Protocol	▪ The CIP Networks Library Volume 1: Common Industrial Protocol ▪ The CIP Networks Library Volume 2: EtherNet/IP Adaptation of CIP
Communication type	▪ 10Base-T ▪ 100Base-TX
Device profile	Generic device (product type: 0x2B)
Manufacturer ID	0x49E
Device type ID	0x103A
Baud rates	Automatic $^{10}/_{100}$ Mbit with half-duplex and full-duplex detection
Polarity	Auto-polarity for automatic correction of crossed TxD and RxD pairs
Supported CIP connections	Max. 3 connections
Explicit connections	Max. 6 connections
I/O connections	Max. 6 connections (scanner)
Configuration options for measuring device	▪ DIP switches on the electronics module for IP addressing ▪ Manufacturer-specific software (FieldCare) ▪ Add-on Profile Level 3 for Rockwell Automation control systems ▪ Web browser ▪ Electronic Data Sheet (EDS) integrated in the measuring device
Configuration of the EtherNet interface	▪ Speed: 10 MBit, 100 MBit, auto (factory setting) ▪ Duplex: half-duplex, full-duplex, auto (factory setting)
Configuration of the device address	▪ DIP switches on the electronics module for IP addressing (last octet) ▪ DHCP ▪ Manufacturer-specific software (FieldCare) ▪ Add-on Profile Level 3 for Rockwell Automation control systems ▪ Web browser ▪ EtherNet/IP tools, e.g. RSLinx (Rockwell Automation)
Device Level Ring (DLR)	No

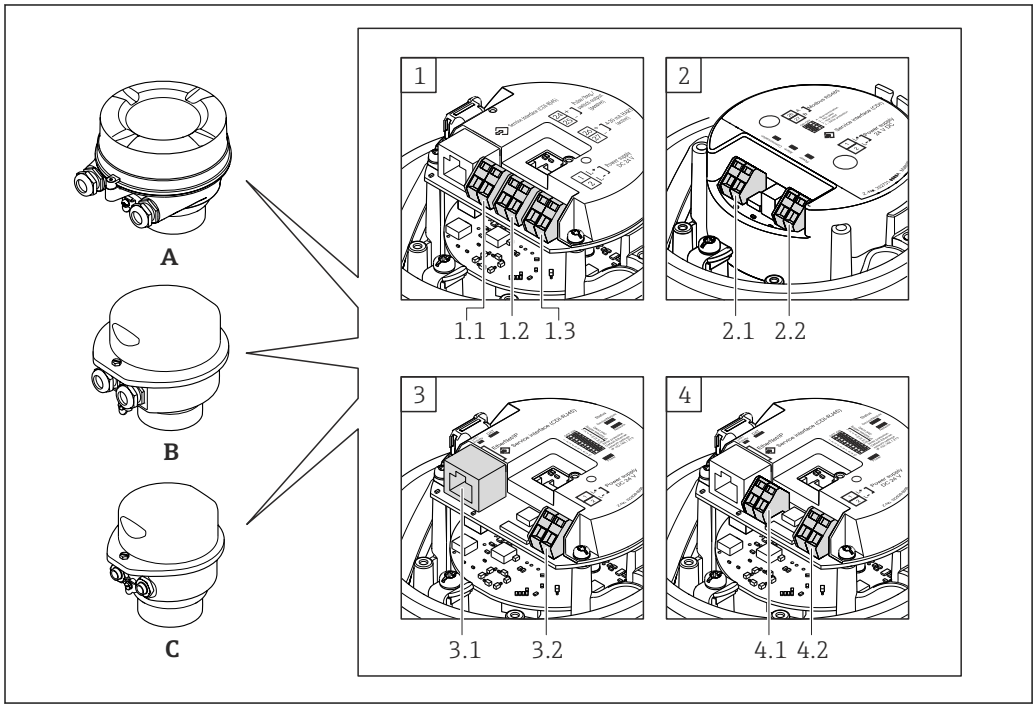
Fix Input			
RPI	5 ms to 10 s (factory setting: 20 ms)		
Exclusive Owner Multicast		Instance	Size [byte]
	Instance configuration:	0x68	398
	O → T configuration:	0x66	56
	T → O configuration:	0x64	32
Exclusive Owner Multicast		Instance	Size [byte]
	Instance configuration:	0x69	-
	O → T configuration:	0x66	56
	T → O configuration:	0x64	32
Input only Multicast		Instance	Size [byte]
	Instance configuration:	0x68	398
	O → T configuration:	0xC7	-
	T → O configuration:	0x64	32
Input only Multicast		Instance	Size [byte]
	Instance configuration:	0x69	-
	O → T configuration:	0xC7	-
	T → O configuration:	0x65	32
Input Assembly	▪ Current device diagnostics ▪ Volume flow ▪ Mass flow ▪ Corrected volume flow ▪ Temperature ▪ Totalizer 1 ▪ Totalizer 2 ▪ Totalizer 3		
Configurable Input			
RPI	5 ms to 10 s (factory setting: 20 ms)		
Exclusive Owner Multicast		Instance	Size [byte]
	Instance configuration:	0x68	398
	O → T configuration:	0x66	56
	T → O configuration:	0x65	88
Exclusive Owner Multicast		Instance	Size [byte]
	Instance configuration:	0x69	-
	O → T configuration:	0x66	56
	T → O configuration:	0x64	88
Input only Multicast		Instance	Size [byte]
	Instance configuration:	0x68	398
	O → T configuration:	0xC7	-
	T → O configuration:	0x64	88
Input only Multicast		Instance	Size [byte]
	Instance configuration:	0x69	-
	O → T configuration:	0xC7	-
	T → O configuration:	0x65	88

Configurable Input Assembly	▪ Volume flow ▪ Temperature ▪ Corrected volume flow ▪ Mass flow ▪ Totalizer 1 to 3 ▪ Flow velocity ▪ Volume flow unit ▪ Temperature unit ▪ Corrected volume flow unit ▪ Mass flow unit ▪ Unit totalizer 1-3 ▪ Flow velocity unit
Fix Output	
Output Assembly	▪ Activation of reset totalizers 1-3 ▪ Activation of reference density compensation ▪ Activation of temperature compensation ▪ Reset totalizers 1-3 ▪ External density ▪ Density unit ▪ External temperature ▪ Temperature unit
Configuration	
Configuration Assembly	Only the most common configurations are listed below. ▪ Software write protection ▪ Mass flow unit ▪ Mass unit ▪ Volume flow unit ▪ Volume unit ▪ Corrected volume flow unit ▪ Corrected volume unit ▪ Density unit ▪ Reference density unit ▪ Temperature unit ▪ Pressure unit ▪ Length ▪ Totalizer 1-3: – Assignment – Unit – Operating mode – Failure mode ▪ Alarm delay

Power supply

Terminal assignment

Overview: housing version - terminals/device plugs



A Housing version: compact, aluminum coated
B Housing version: compact, hygienic, stainless
C Housing version: ultra compact, hygienic, stainless, M12 device plug
1 Connection version: 4-20 mA HART, pulse/frequency/switch output
1.1 Signal transmission: pulse/frequency/switch output
1.2 Signal transmission: 4-20 mA HART
1.3 Supply voltage
2 Connection version: Modbus RS485
2.1 Signal transmission
2.2 Supply voltage
3 Connection version: EtherNet/IP
3.1 Signal transmission
3.2 Supply voltage
4.1 PROFIBUS DP
4.2 Supply voltage

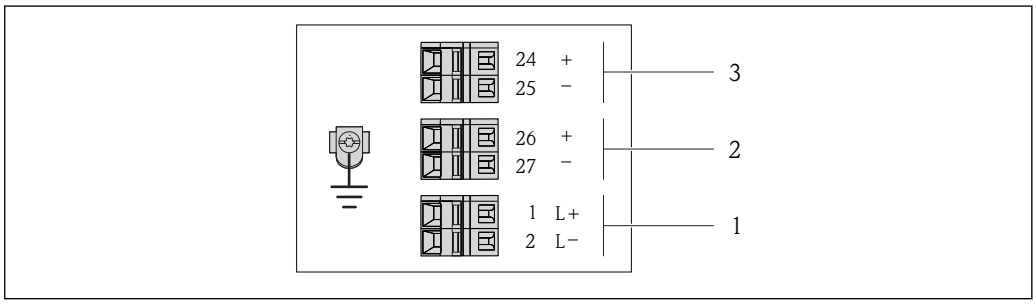
Transmitter

Connection version 4-20 mA HART with pulse/frequency/switch output

Order code for "Output", option **B**

Depending on the housing version, the transmitters can be ordered with terminals or device plugs.

Order code for "Housing"	Connection methods available		Possible options for order code "Electrical connection"
	Outputs	Power supply	
Options **A**, **B**	Terminals	Terminals	▪ Option **A**: coupling M20x1 ▪ Option **B**: thread M20x1 ▪ Option **C**: thread G ½" ▪ Option **D**: thread NPT ½"
Options **A**, **B**	Device plug (→ 🖹 20)	Terminals	▪ Option **L**: plug M12x1 + thread NPT ½" ▪ Option **N**: plug M12x1 + coupling M20 ▪ Option **P**: plug M12x1 + thread G ½" ▪ Option **U**: plug M12x1 + thread M20
Options **A**, **B**, **C**	Device plug (→ 🖹 20)	Device plug (→ 🖹 20)	Option **Q**: 2 x plug M12x1
Order code for "Housing": ▪ Option **A**: compact, coated aluminum ▪ Option **B**: compact hygienic, stainless ▪ Option **C**: ultra compact hygienic, stainless, M12 device plug			



2 Terminal assignment 4-20 mA HART with pulse/frequency/switch output

1 Power supply: DC 24 V
2 Output 1: 4-20 mA HART (active)
3 Output 2: pulse/frequency/switch output (passive)

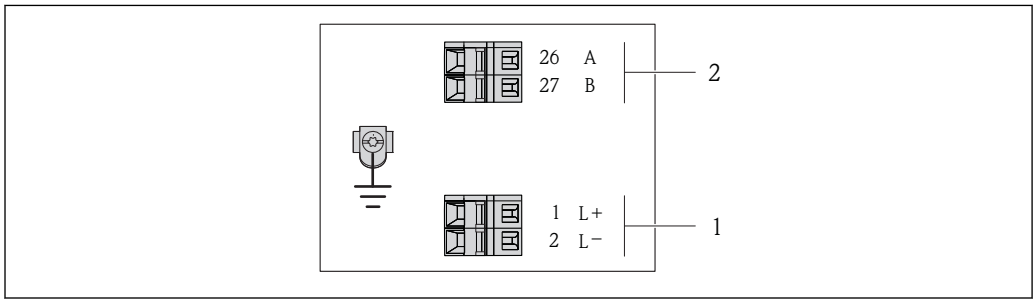
Order code for "Output"	Terminal number					
	Power supply		Output 1		Output 2	
	2 (L-)	1 (L+)	27 (–)	26 (+)	25 (–)	24 (+)
Option **B**	DC 24 V		4-20 mA HART (active)		Pulse/frequency/switch output (passive)	
Order code for "Output": Option **B**: 4-20 mA HART with pulse/frequency/switch output						

PROFIBUS DP connection version for use in non-hazardous areas and Zone 2/Div. 2

Order code for "Output", option **L**

Depending on the housing version, the transmitters can be ordered with terminals or device plugs.

Order code for "Housing"	Connection methods available		Possible options for order code "Electrical connection"
	Output	Power supply	
Options **A**, **B**	Terminals	Terminals	▪ Option **A**: coupling M20x1 ▪ Option **B**: thread M20x1 ▪ Option **C**: thread G ½" ▪ Option **D**: thread NPT ½"
Options **A**, **B**	Device plug (→ 🖹 21)	Terminals	▪ Option **L**: plug M12x1 + thread NPT ½" ▪ Option **N**: plug M12x1 + coupling M20 ▪ Option **P**: plug M12x1 + thread G ½" ▪ Option **U**: plug M12x1 + thread M20
Options **A**, **B**, **C**	Device plug (→ 🖹 21)	Device plug (→ 🖹 21)	Option **Q**: 2 x plug M12x1
Order code for "Housing": ▪ Option **A**: compact, coated aluminum ▪ Option **B**: compact hygienic, stainless ▪ Option **C**: ultra compact hygienic, stainless, M12 device plug			



3 PROFIBUS DP terminal assignment

1 Power supply: DC 24 V
2 PROFIBUS DP

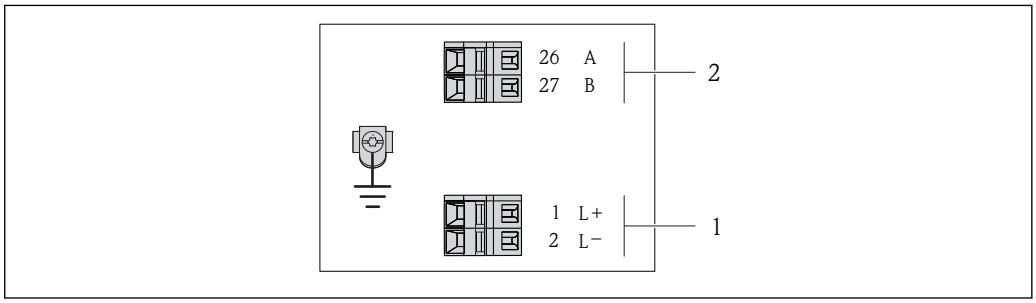
Order code for "Output"	Terminal number			
	Power supply		Output	
	2 (L-)	1 (L+)	27 (B)	26 (A)
Option **L**	DC 24 V		PROFIBUS DP	
Order code for "Output": Option **L**: PROFIBUS DP, for use in non-hazardous areas and Zone 2/div. 2				

Connection version Modbus RS485, for use in non-hazardous areas and Zone 2/Div. 2

Order code for "Output", option **M**

Depending on the housing version, the transmitters can be ordered with terminals or device plugs.

Order code for "Housing"	Connection methods available		Possible options for order code "Electrical connection"
	Output	Power supply	
Options **A**, **B**	Terminals	Terminals	▪ Option **A**: coupling M20x1 ▪ Option **B**: thread M20x1 ▪ Option **C**: thread G ½" ▪ Option **D**: thread NPT ½"
Options **A**, **B**	Device plug (→ 🖹 21)	Terminals	▪ Option **L**: plug M12x1 + thread NPT ½" ▪ Option **N**: plug M12x1 + coupling M20 ▪ Option **P**: plug M12x1 + thread G ½" ▪ Option **U**: plug M12x1 + thread M20
Options **A**, **B**, **C**	Device plug (→ 🖹 21)	Device plug (→ 🖹 21)	Option **Q**: 2 x plug M12x1
Order code for "Housing": ▪ Option **A**: compact, coated aluminum ▪ Option **B**: compact hygienic, stainless ▪ Option **C**: ultra compact hygienic, stainless, M12 device plug			



4 Modbus RS485 terminal assignment

1 Power supply: DC 24 V
2 Modbus RS485

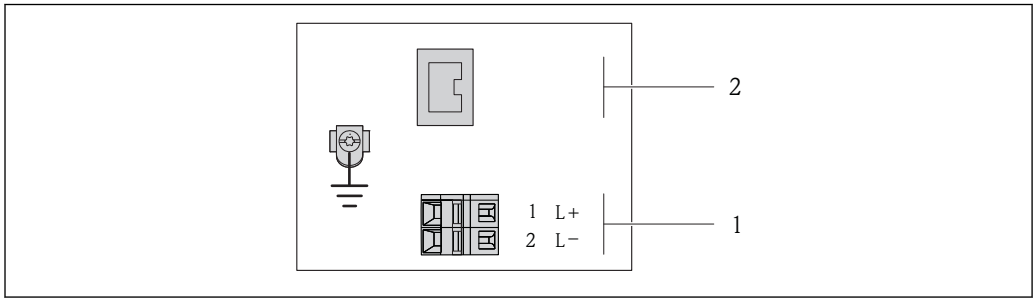
Order code for "Output"	Terminal number			
	Power supply		Output	
	2 (L-)	1 (L+)	27 (B)	26 (A)
Option **M**	DC 24 V		Modbus RS485	
Order code for "Output": Option **M**: Modbus RS485, for use in non-hazardous areas and Zone 2/Div. 2				

EtherNet/IP connection version

Order code for "Output", option **N**

Depending on the housing version, the transmitters can be ordered with terminals or device plugs.

Order code for "Housing"	Connection methods available		Possible options for order code "Electrical connection"
	Output	Power supply	
Options **A**, **B**	Device plug (→ 🖹 22)	Terminals	▪ Option **L**: plug M12x1 + thread NPT ½" ▪ Option **N**: plug M12x1 + coupling M20 ▪ Option **P**: plug M12x1 + thread G ½" ▪ Option **U**: plug M12x1 + thread M20
Options **A**, **B**, **C**	Device plug (→ 🖹 22)	Device plug (→ 🖹 22)	Option **Q**: 2 x plug M12x1
Order code for "Housing": ▪ Option **A**: compact, coated aluminum ▪ Option **C**: ultra compact hygienic, stainless, M12 device plug			



5 EtherNet/IP terminal assignment

1 Power supply: DC 24 V
2 EtherNet/IP

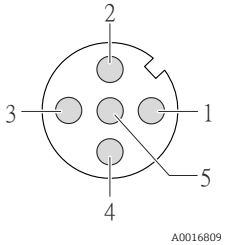
Order code for "Output"	Terminal number		
	Power supply		Output
	2 (L-)	1 (L+)	Device plug M12x1
Option **N**	DC 24 V		EtherNet/IP
Order code for "Output": Option **N**: EtherNet/IP			

Pin assignment, device plug

Order codes for the M12x1 plug, see the "Order code for **electrical connection**" column:
- 4-20 mA HART, pulse/frequency/switch output (→ 🖹 17)
- Modbus RS485 (→ 🖹 19)
- EtherNet/IP (→ 🖹 20)

Supply voltage

Supply voltage for all communication types (on the device side)

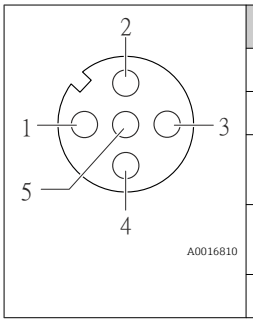


Pin	Assignment		Coding	Plug/socket
1	L+	DC24 V	A	Plug
2				
3				
4	L-	DC24 V		
5		Grounding/shielding		

The following is recommended as a socket:
- Binder, series 763, part no. 79 3440 35 05
- Alternatively: Phoenix part no. 1669767 SAC-5P-M12MS
  - With the order code for "Output", option **B**: 4-20 mA HART, pulse/frequency/switch output
  - With the order code for "Output", option **N**: EtherNet/IP
- When using the device in a hazardous location: Use a suitably certified socket.

4-20 mA HART with pulse/frequency/switch output

4-20 mA HART with pulse/frequency/switch output (on the device side)

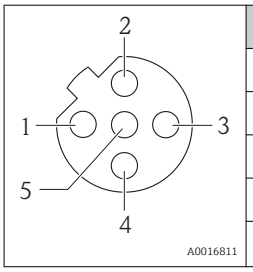


Pin		Assignment	Coding	Plug/socket
1	+	4-20 mA HART (active)	A	Socket
2	-	4-20 mA HART (active)		
3	+	Pulse/frequency/switch output (passive)		
4	-	Pulse/frequency/switch output (passive)		
5		Grounding/shielding		

- Recommended plug: Binder, series 763, part no. 79 3439 12 05
- When using the device in a hazardous location: Use a suitably certified plug.

PROFIBUS DP

PROFIBUS DP, non-hazardous area and Zone 2/Div. 2 (on the device side)

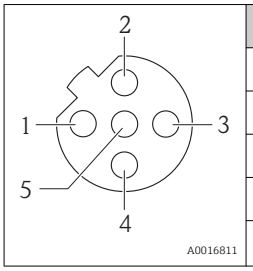


Pin		Assignment	Coding	Plug/socket
1			B	Socket
2	A	PROFIBUS DP		
3				
4	B	PROFIBUS DP		
5		Grounding/shielding		

- Recommended plug: Binder, series 763, part no. 79 4449 20 05
- When using the device in a hazardous location: Use a suitably certified plug.

Modbus RS485

Modbus RS485, non-hazardous area and Zone 2/Div. 2 (on the device side)

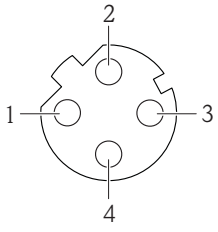


Pin		Assignment	Coding	Plug/socket
1			B	Socket
2	A	Modbus RS485		
3				
4	B	Modbus RS485		
5		Grounding/shielding		

- Recommended plug: Binder, series 763, part no. 79 4449 20 05
- When using the device in a hazardous location: Use a suitably certified plug.

EtherNet/IP

EtherNet/IP (on the device side)



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

Recommended plug:
- Binder, series 763, part no. 99 3729 810 04
- Phoenix, part no. 1543223 SACC-M12MSD-4Q
- When using the device in a hazardous location: Use a suitably certified plug.

Supply voltage

Transmitter

For device version with all communication types: DC 20 to 30 V

The power unit must be tested to ensure it meets safety requirements (e.g. PELV, SELV).

Power consumption

Transmitter

Order code for "Output"	Maximum Power consumption
Option **B**: 4-20mA HART, pulse/frequency/switch output	3.5 W
Option **L**: PROFIBUS DP	3.5 W
Option **M**: Modbus RS485	3.5 W
Option **N**: EtherNet/IP	3.5 W

Current consumption

Transmitter

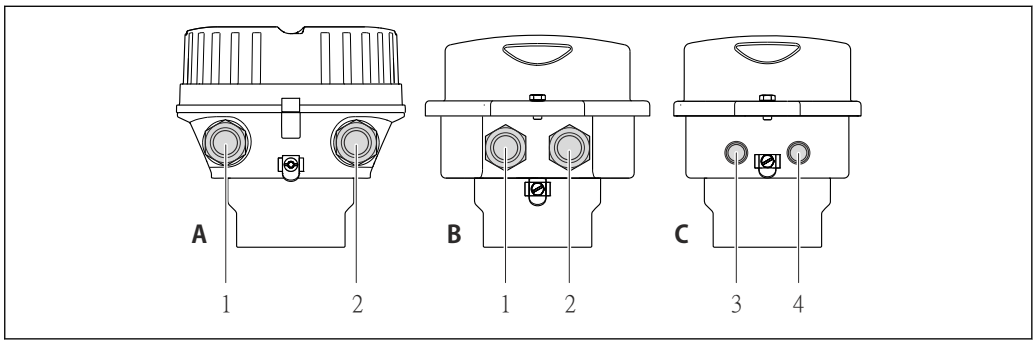
Order code for "Output"	Maximum Current consumption	Maximum switch-on current
Option **B**: 4-20mA HART, pul./ freq./switch output	145 mA	18 A (<0.125 ms)
Option **L**: PROFIBUS DP	145 mA	18 A (<0.125 ms)
Option **M**: Modbus RS485	90 mA	10 A (<0.8 ms)
Option **N**: EtherNet/IP	145 mA	18 A (<0.125 ms)

Power supply failure

- Totalizers stop at the last value measured.
- Depending on the device version, the configuration is retained in the device memory or in the plug-in memory (HistoROM DAT).
- Error messages (incl. total operated hours) are stored.

Electrical connection

Connecting the transmitter



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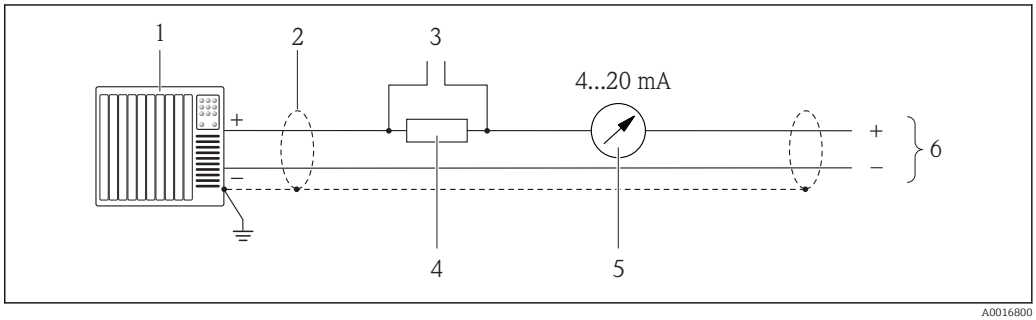
A Housing version: compact, aluminum coated
B Housing version: compact hygienic, stainless
1 Cable entry or device plug for signal transmission
2 Cable entry or device plug for supply voltage
C Housing version: ultra-compact hygienic, stainless, M12 device plug
3 Device plug for signal transmission
4 Device plug for supply voltage

- Terminal assignment (→ 17)
- Pin assignment, device plug (→ 20)

In the case of device versions with a connector, the transmitter housing does not need to be opened to connect the signal cable or power supply cable.

Connection examples

Current output 4-20 mA HART



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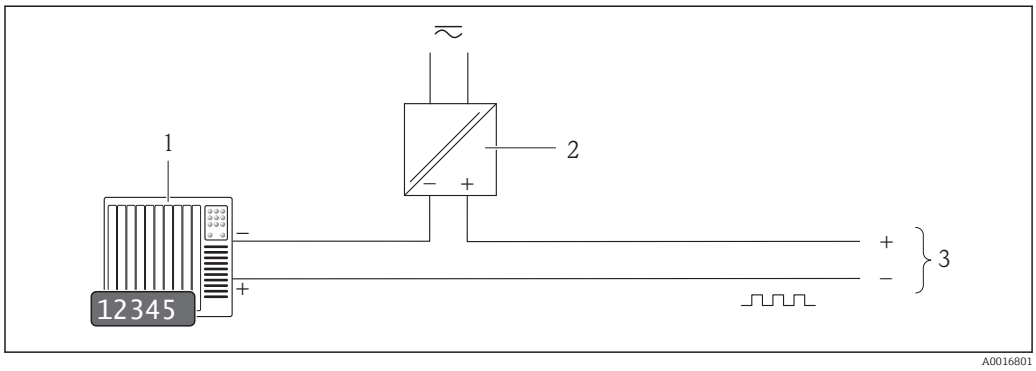
6 Connection example for 4-20 mA HART current output (active)

1 Automation system with current input (e.g. PLC)
2 Cable shield, observe cable specifications (→ 29)
3 Connection for HART operating devices (→ 78)
4 Resistor for HART communication (≥ 250 Ω): observe maximum load (→ 8)
5 Analog display unit: observe maximum load (→ 8)
6 Transmitter

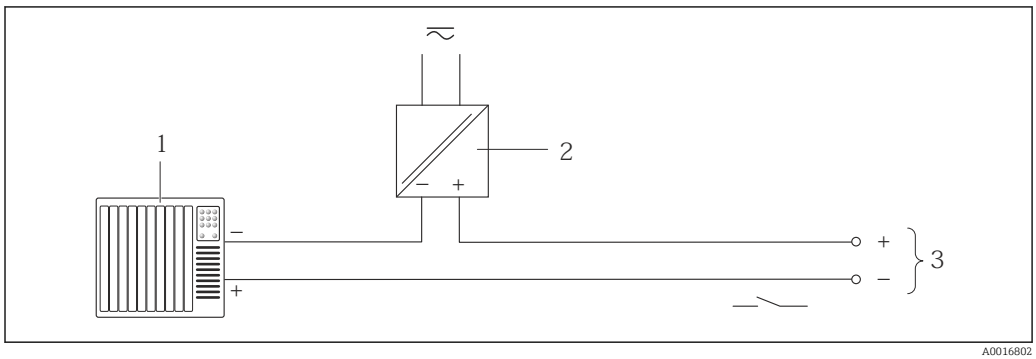
Pulse/frequency output



7 Connection example for pulse/frequency output (passive)

1 Automation system with pulse/frequency input (e.g. PLC)
2 Power supply
3 Transmitter: observe input values (→ 8)

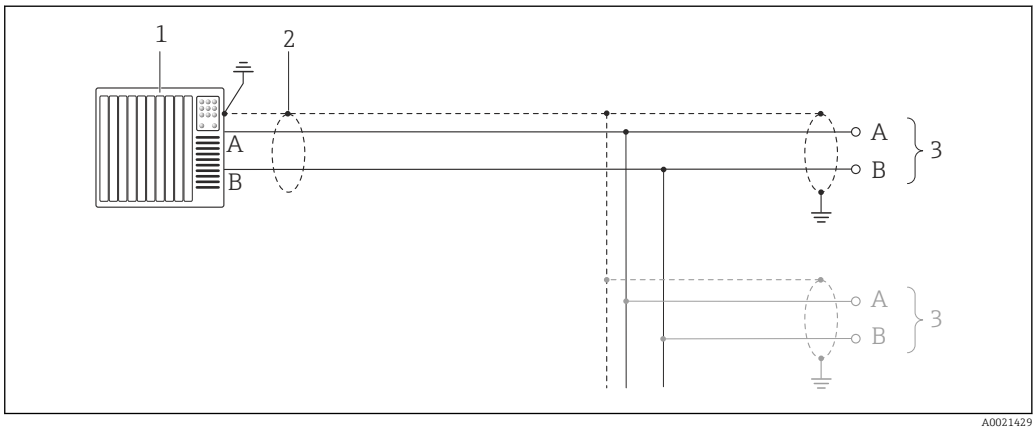
Switch output



8 Connection example for switch output (passive)

1 Automation system with switch input (e.g. PLC)
2 Power supply
3 Transmitter: observe input values (→ 8)

PROFIBUS DP

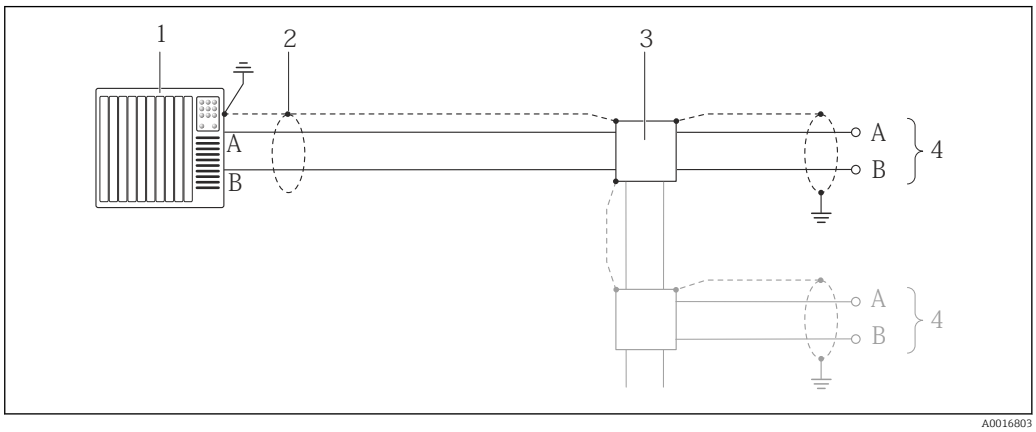


9 Connection example for PROFIBUS DP, non-hazardous area and Zone 2/Div. 2

1 Control system (e.g. PLC)
2 Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications (→ 29)
3 Distribution box
4 Transmitter

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

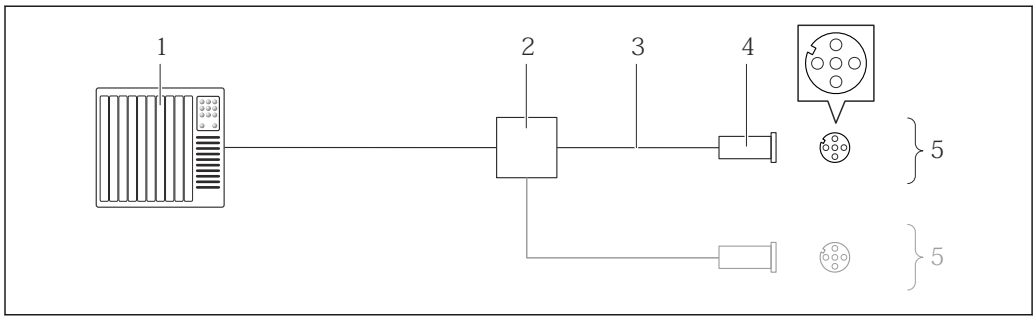
Modbus RS485



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

1 Control system (e.g. PLC)
2 Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications (→ 29)
3 Distribution box
4 Transmitter

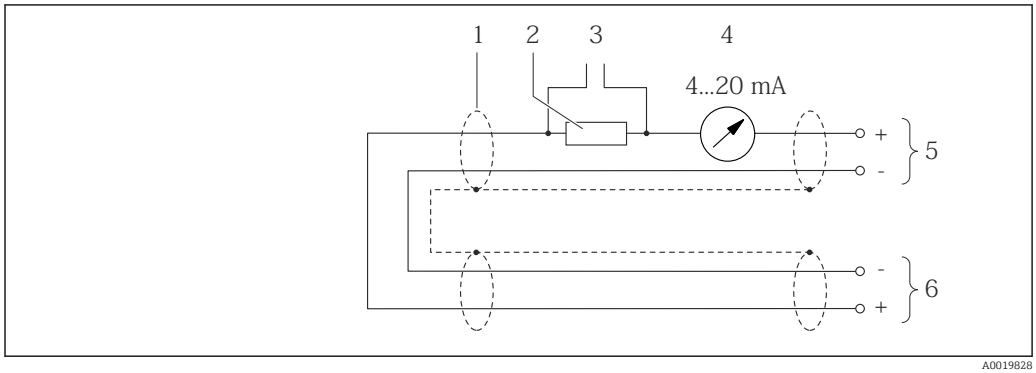
EtherNet/IP



11 Connection example for EtherNet/IP

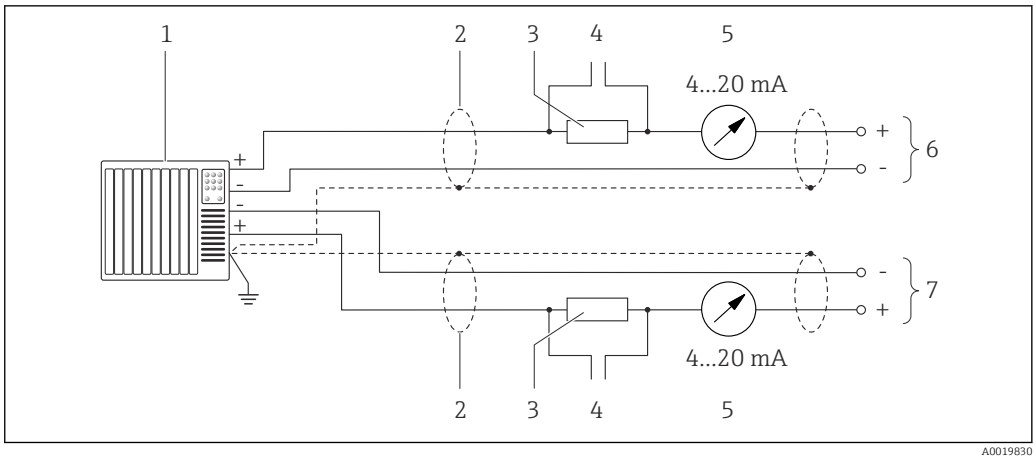
1 *Control system (e.g. PLC)*
2 *Ethernet switch*
3 *Observe cable specifications (→ 29)*
4 *Device plug*
5 *Transmitter*

HART input



12 Connection example for HART input (burst mode) via current output (active)

1 *Cable shield, observe cable specifications (→ 29)*
2 *Resistor for HART communication (≥ 250 Ω): observe maximum load (→ 8)*
3 *Connection for HART operating devices (→ 78)*
4 *Analog display unit*
5 *Transmitter*
6 *Sensor for external measured variable*



13 Connection example for HART input (master mode) via current output (active)

1 *Automation system with current input (e.g. PLC).*
Prerequisite: automation system with HART version 6, HART commands 113 and 114 can be processed.
2 *Cable shield, observe cable specifications (→ 29)*
3 *Resistor for HART communication (≥ 250 Ω): observe maximum load (→ 8)*
4 *Connection for HART operating devices (→ 78)*
5 *Analog display unit*
6 *Transmitter*
7 *Sensor for external measured variable*

Potential equalization

Requirements

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

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

Connection examples for standard situations

Metal process connections

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

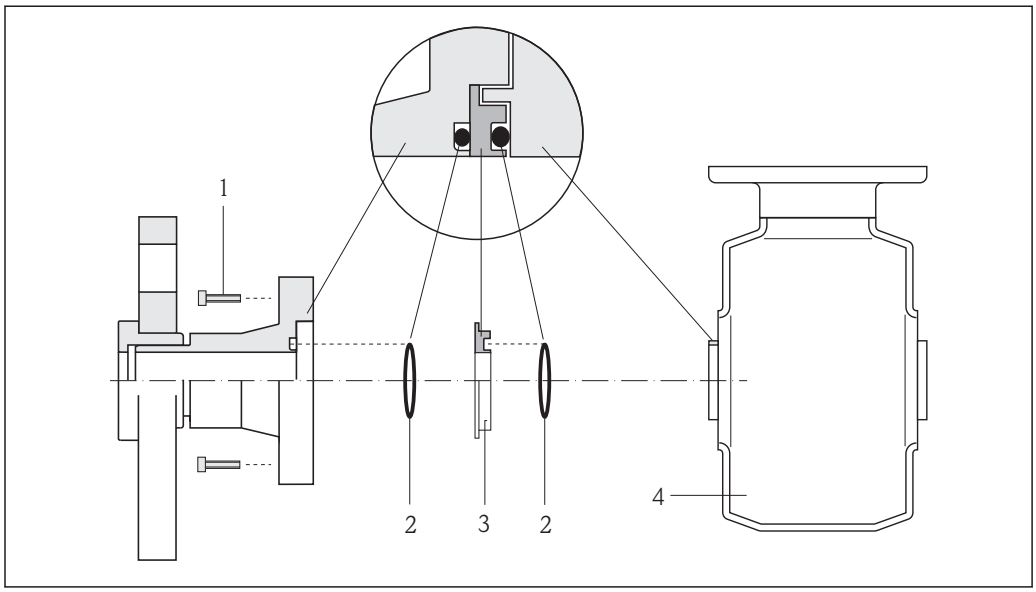
Connection example in special situations

Plastic process connections

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

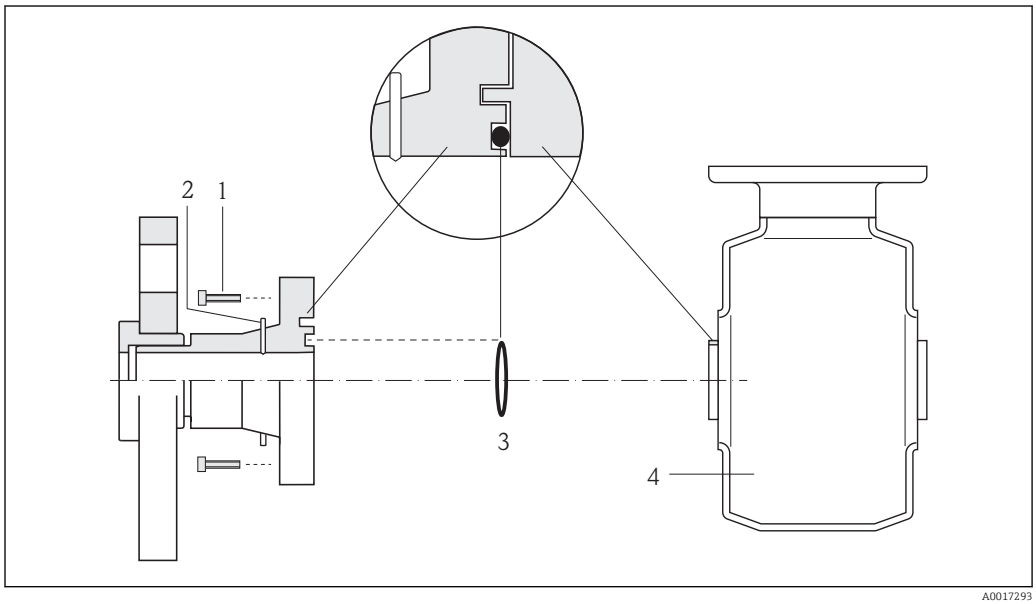
When using ground rings, note the following points:
- Depending on the option ordered, plastic disks may be installed at the process connections instead of ground rings. These plastic disks serve only as spacers and have no potential matching function. In addition, they provide a sealing function at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

Potential equalization via additional ground ring



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

Potential equalization via ground electrodes on process connection



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

Terminals

Transmitter
Spring terminals for wire cross-sections0.5 to 2.5 mm^2 (20 to 14 AWG)

Cable entries

- Cable gland: M20 × 1.5 with cable Φ6 to 12 mm (0.24 to 0.47 in)
- Thread for cable entry:
  - NPT ½"
  - G ½"
  - M20

Cable specification

Permitted temperature range

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

Power supply cable

Standard installation cable is sufficient.

Signal cable

Current output

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

Pulse/frequency/switch output

Standard installation cable is sufficient.

PROFIBUS DP

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

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

Modbus RS485

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

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

EtherNet/IP

The standard ANSI/TIA/EIA-568-B.2 Annex specifies CAT 5 as the minimum category for a cable used for EtherNet/IP. CAT 5e and CAT 6 are recommended.

For more information on planning and installing EtherNet/IP networks, please refer to the "Media Planning and Installation Manual. EtherNet/IP" of the ODVA Organization.

Performance characteristics

Reference operating conditions

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

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

To calculate the measuring range, use the *Applicator* sizing tool (→ 🖹 85)

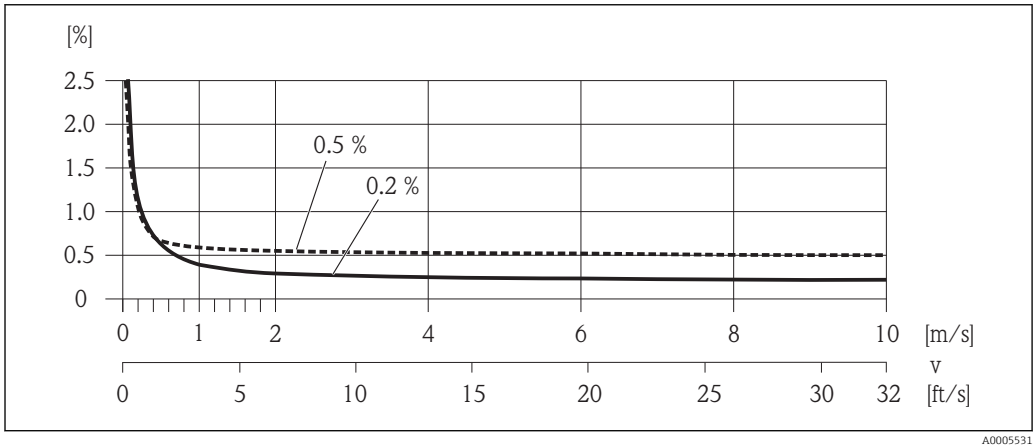
Maximum measured error

Error limits under reference operating conditions

o.r. = of reading

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

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



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

Temperature
±3 °C (±5.4 °F)

Electrical conductivity
Max. measured error not specified.

Accuracy of outputs

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

The output accuracy must be factored into the measured error if analog outputs are used, but can be ignored for fieldbus outputs (e.g. Modbus RS485, EtherNet/IP).

Current output

Accuracy	Max. ±0.05 % o.f.s. or ±5 µA

Pulse/frequency output

Accuracy	Max. ±50 ppm o.r.

Repeatability

o.r. = of reading

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

Temperature
±0.5 °C (±0.9 °F)

Electrical conductivity
Max. ±5 % o.r.

Temperature measurement response time

T_{90} < 15 s

Influence of ambient temperature

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

Current output

Temperature coefficient	Max. ±50 ppm/°C o.f.s. or ±1 µA/°C

Pulse/frequency output

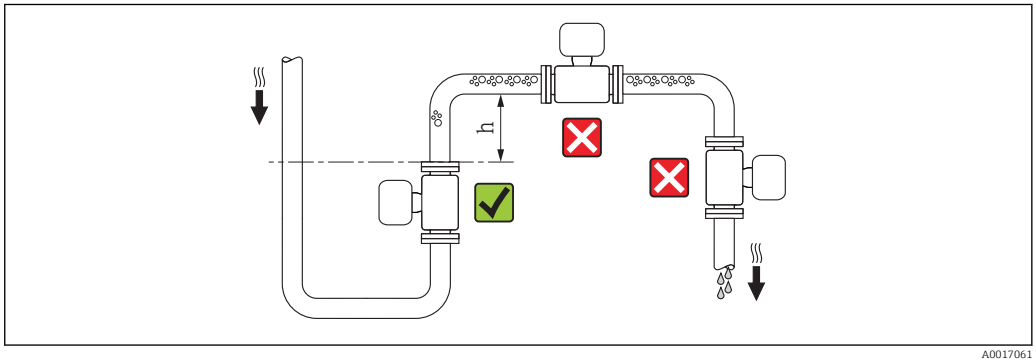
Temperature coefficient	Max. ±50 ppm o.r./100 °C

Installation

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

Mounting location

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



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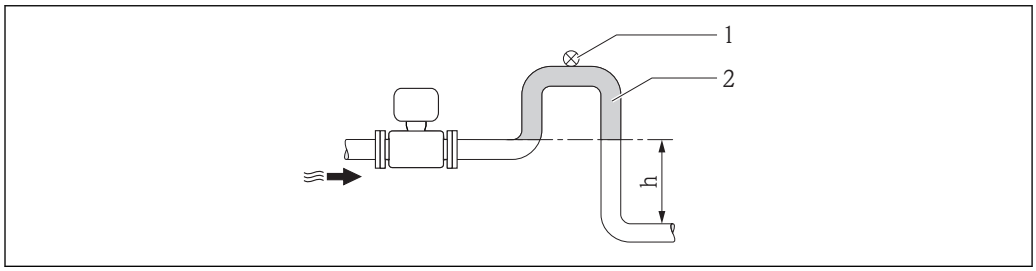
To prevent measuring errors arising from accumulation of gas bubbles in the measuring tube, avoid the following mounting locations in the pipe:
- Highest point of a pipeline.
- Directly upstream of a free pipe outlet in a down pipe.

Installation in down pipes

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

For information on the liner's resistance to partial vacuum (→ 42)



A0017064

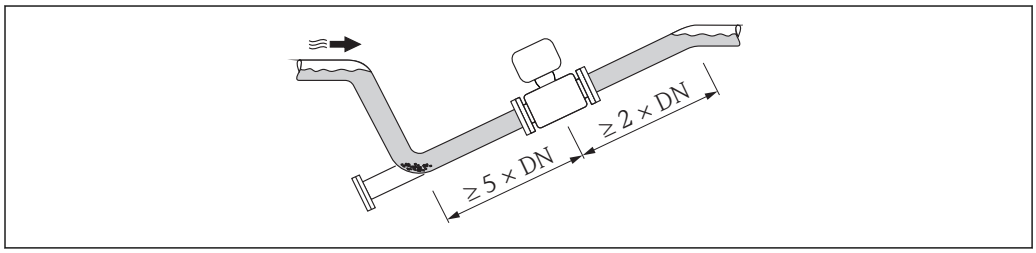
15 *Installation in a down pipe*

1 Vent valve
2 Pipe siphon
h Length of down pipe

Installation in partially filled pipes

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

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



A0017063

Orientation

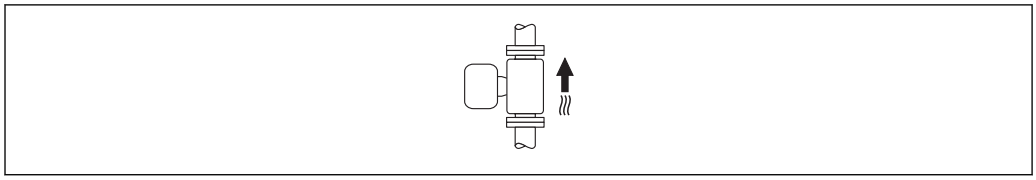
The direction of the arrow on the sensor nameplate helps you to install the sensor according to the flow direction (direction of medium flow through the piping).

An optimum orientation position helps avoid gas and air accumulations and deposits in the measuring tube.

The measuring device also offers the empty pipe detection function to detect partially filled measuring pipes in the event of outgassing fluids or variable process pressures.

Vertical

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

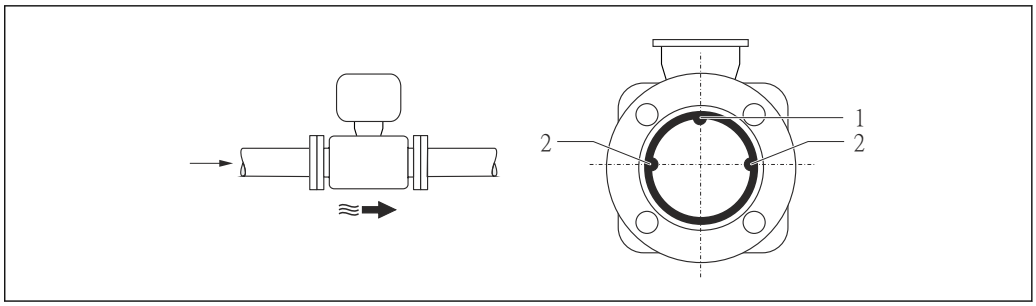


A0015591

Horizontal

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

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



A0019602

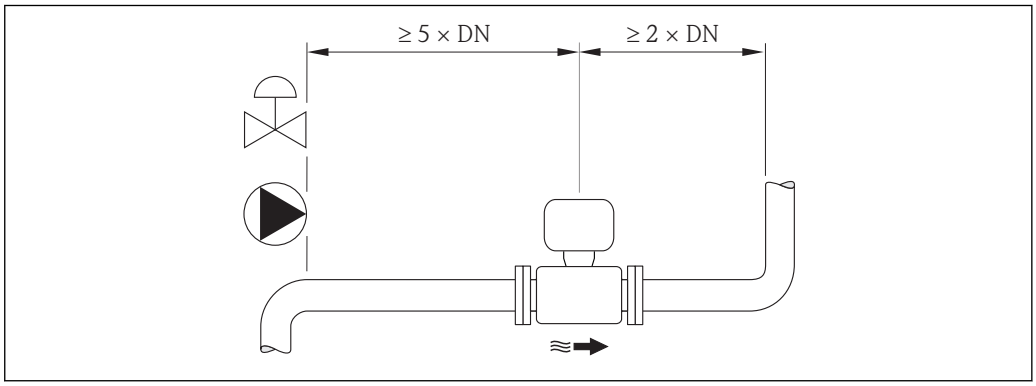
16 *Horizontal orientation*

1 EPD electrode for empty pipe detection
2 Measuring electrodes for signal detection

Inlet and outlet runs

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

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



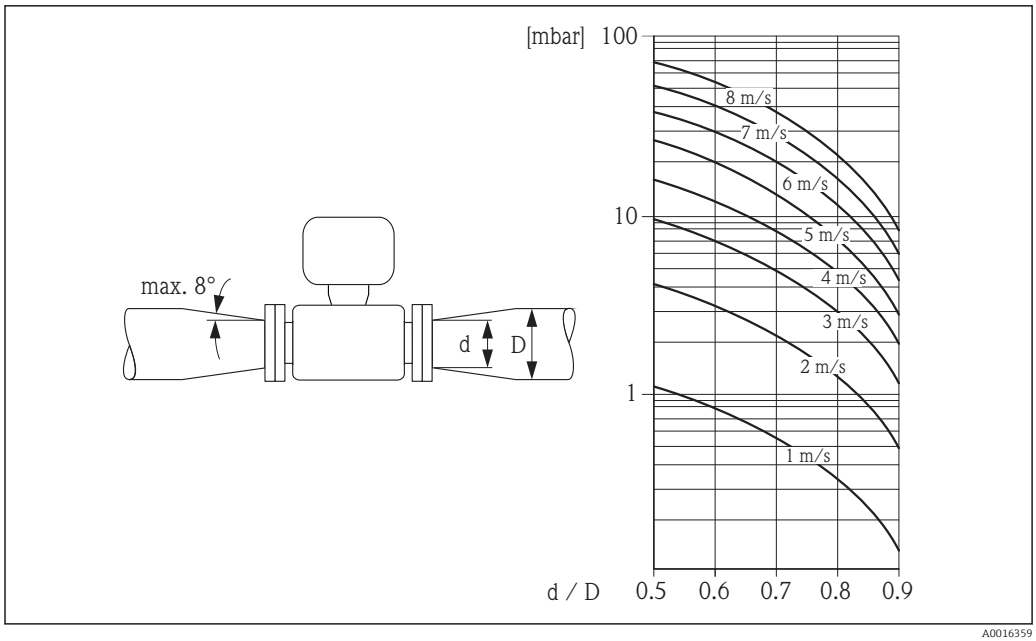
A0016275

Adapters

Suitable adapters to DIN EN 545 (double-flange reducers) can be used to install the sensor in larger-diameter pipes. The resultant increase in the rate of flow improves measuring accuracy with very slow-moving fluids.

The nomogram shown here can be used to calculate the pressure loss caused by reducers and expanders:
- Calculate the ratio of the diameters d/D.
- From the nomogram read off the pressure loss as a function of flow velocity (downstream from the reduction) and the d/D ratio.

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



Environment

Ambient temperature range

Transmitter	–40 to +60 °C (–40 to +140 °F)
Sensor	–40 to +60 °C (–40 to +140 °F)
Liner	Do not exceed or fall below the permitted temperature range of the liner (→ 🖹 35).

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

Temperature tables

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

Ex nA, $_{C}CSA_{US}$ NI

SI units

T_a [°C]	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
30	50	95	130	150	150	150
50	–	95	130	150	150	150
60	–	95	110	110	110	110

US units

T_a [°F]	T6 [185 °F]	T5 [212 °F]	T4 [275 °F]	T3 [392 °F]	T2 [572 °F]	T1 [842 °F]
86	122	203	266	302	302	302
122	–	203	266	302	302	302
140	–	203	230	230	230	230

Storage temperature

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

- Protect the measuring device against direct sunlight during storage in order to avoid unacceptably high surface temperatures.
- Select a storage location where moisture cannot collect in the measuring device as fungus or bacteria infestation can damage the liner.
- If protection caps or protective covers are mounted these should never be removed before installing the measuring device.

Degree of protection

Transmitter and sensor
- As standard: IP66/67, type 4X enclosure
- With the order code for "Sensor options", option **CM**: IP69K can also be ordered
- When housing is open: IP20, type 1 enclosure

Shock resistance

As per IEC/EN 60068-2-31

Vibration resistance

Acceleration up to 2 g following IEC 60068-2-6

Mechanical load

- Protect the transmitter housing against mechanical effects, such as shock or impact.
- Never use the transmitter housing as a ladder or climbing aid.

Interior cleaning

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

Electromagnetic compatibility (EMC)

- As per IEC/EN 61326 and NAMUR Recommendation 21 (NE 21)
- Complies with emission limits for industry as per EN 55011 (Class A)
- Device version with PROFIBUS DP: Complies with emission limits for industry as per EN 50170 Volume 2, IEC 61784

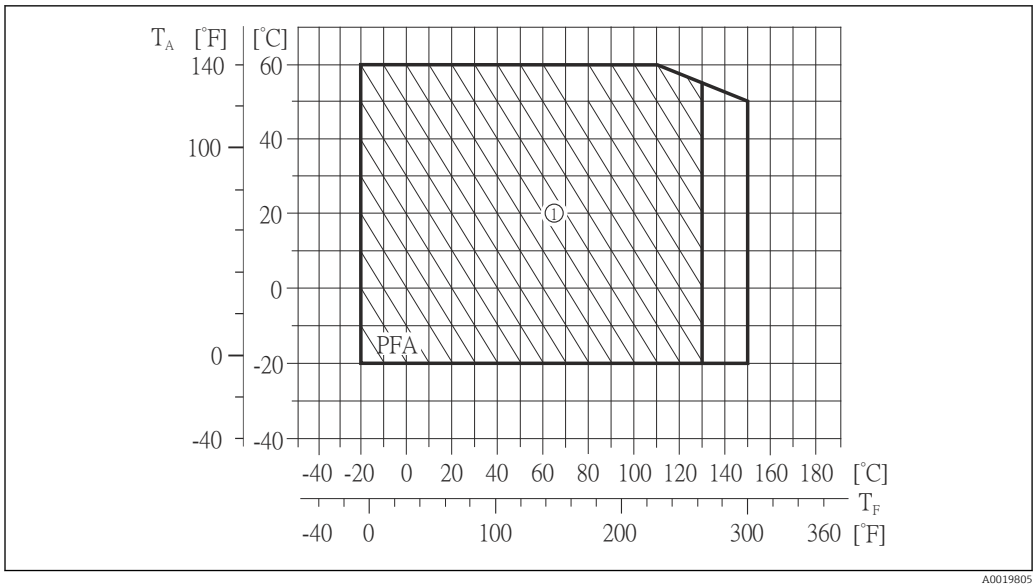
The following applies for PROFIBUS DP: If baud rates > 1.5 MBaud an EMC cable entry must be used and the cable shield must continue as far as the terminal wherever possible.

Details are provided in the Declaration of Conformity.

Process

Medium temperature range

−20 to +150 °C (−4 to +302 °F)



A0019805

T_A Ambient temperature

T_F Medium temperature

1 Harsh environment and IP68 only to +130 °C (+266 °F)

Conductivity

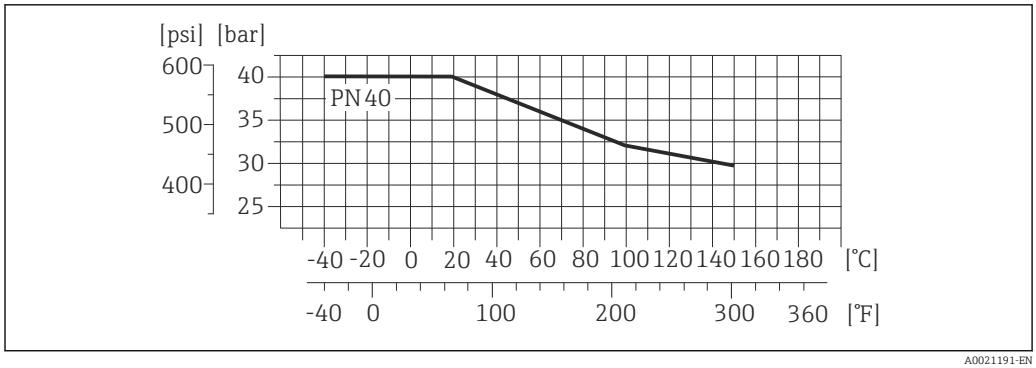
≥ 5 µS/cm for liquids in general

Pressure-temperature ratings

The following graphics contain material load diagrams (reference curves) for different process connections in relation to the medium temperature.

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

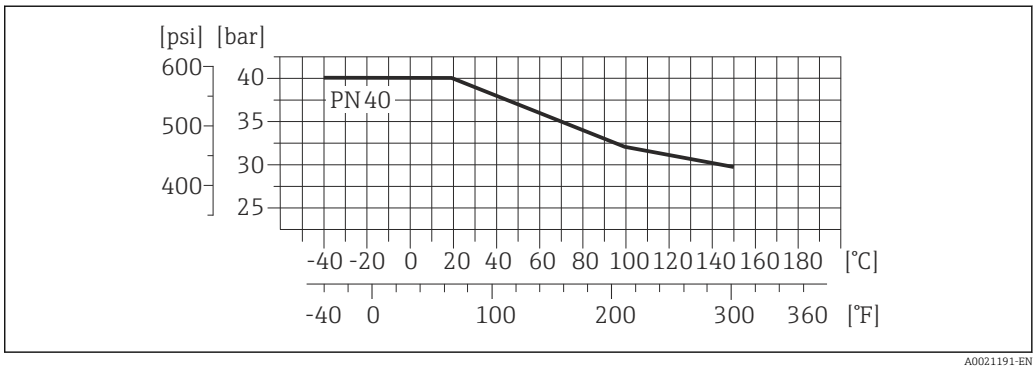
Welded connection as per DIN EN ISO 1127, ODT/SMS, ISO 2037; coupling as per ISO 228 / DIN 2999, NPT



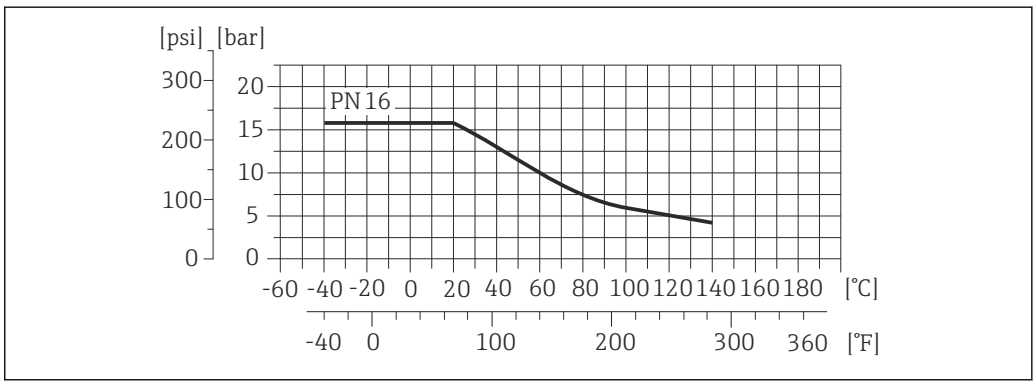
A0021191-EN

17 Material 1.4404 (316L)

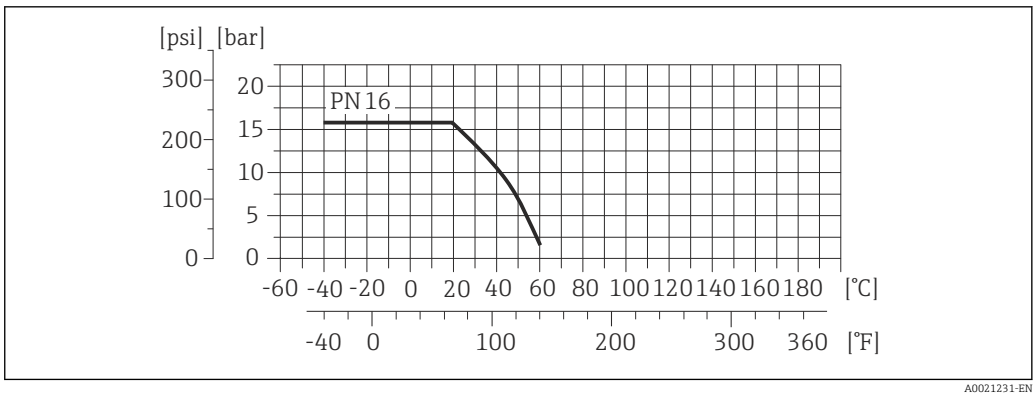
Flange connection as per EN 1092-1 (DIN 2501), adhesive sleeve



18 Materials 1.4404 (316L)

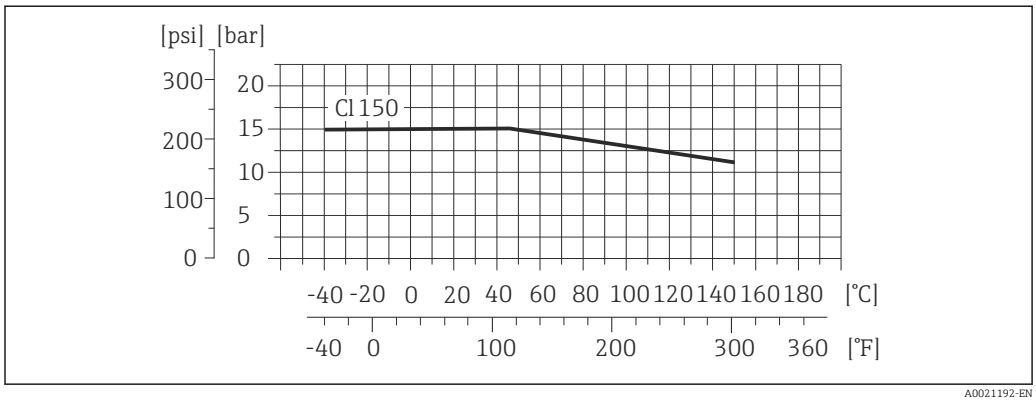


19 Materials PVDF

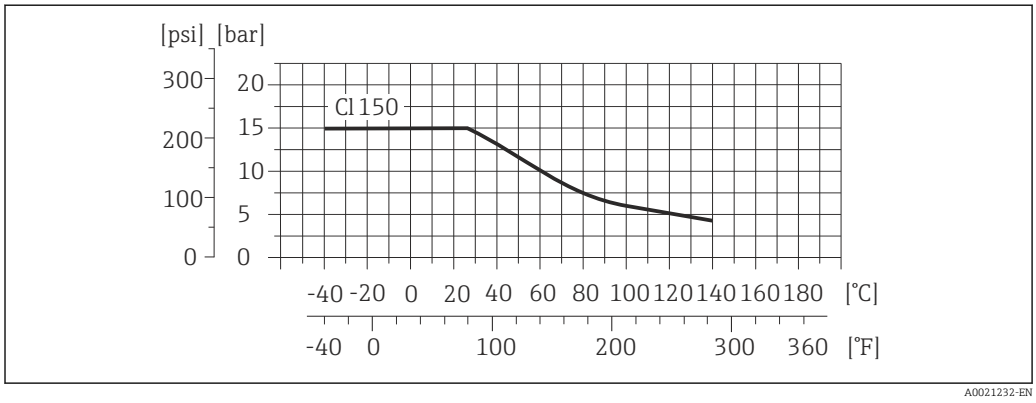


20 Materials PVC-U

Flange connection as per ASME B16.5

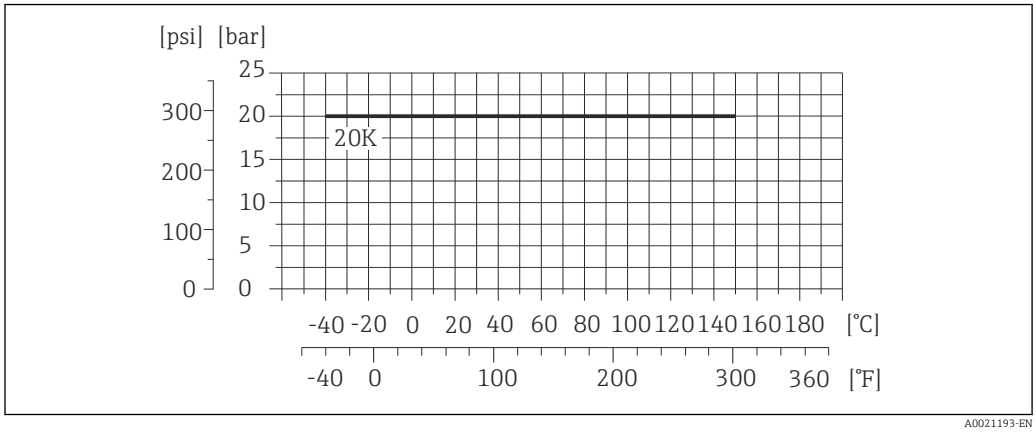


21 Materials 1.4404 (316L)

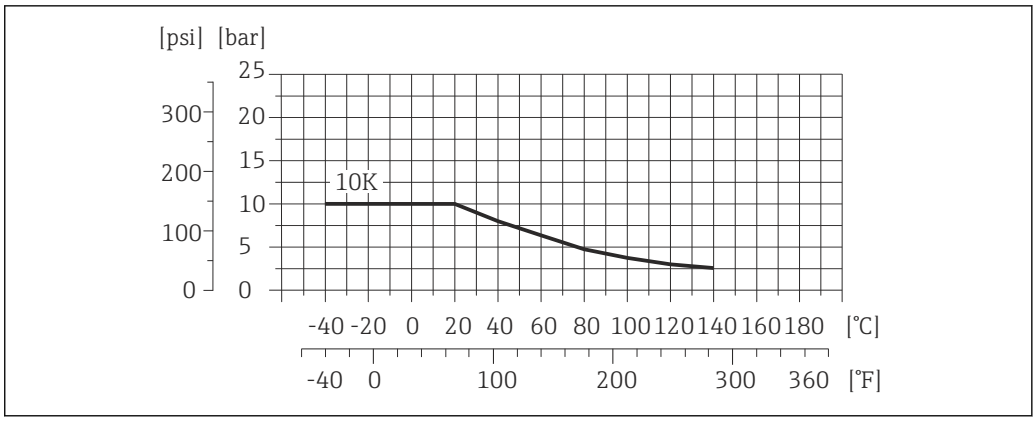


22 Materials PVDF

Flange connection as per JIS B2220



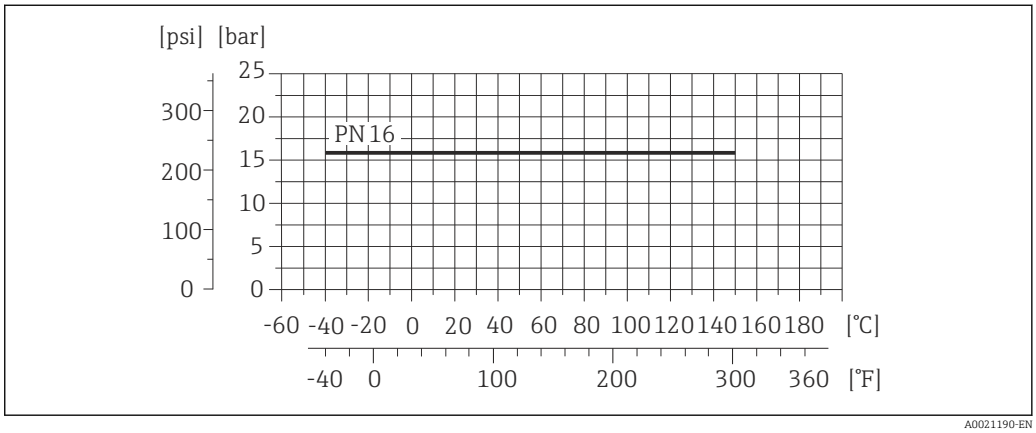
23 Materials 1.4404 (316L)



24 Materials PVDF

Process connections with aseptic molded seal, DN 2 to 25 (1/12 to 1")

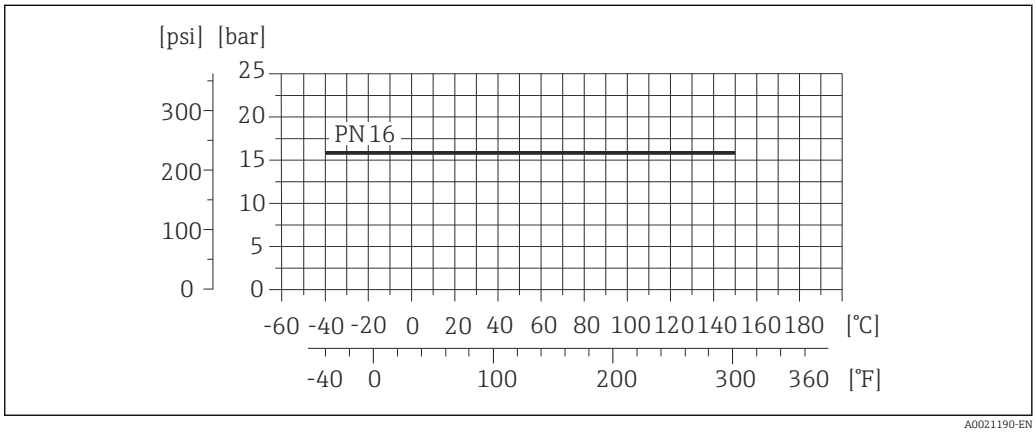
Welded connection as per DIN 11850, ASME BPE, ISO 2037; clamp as per ISO 2852, DIN 32676, L14 AM7; coupling as per SC DIN 11851, DIN 11864-1, SMS 1145; flange as per DIN 11864-2



25 Material 1.4404 (316L)

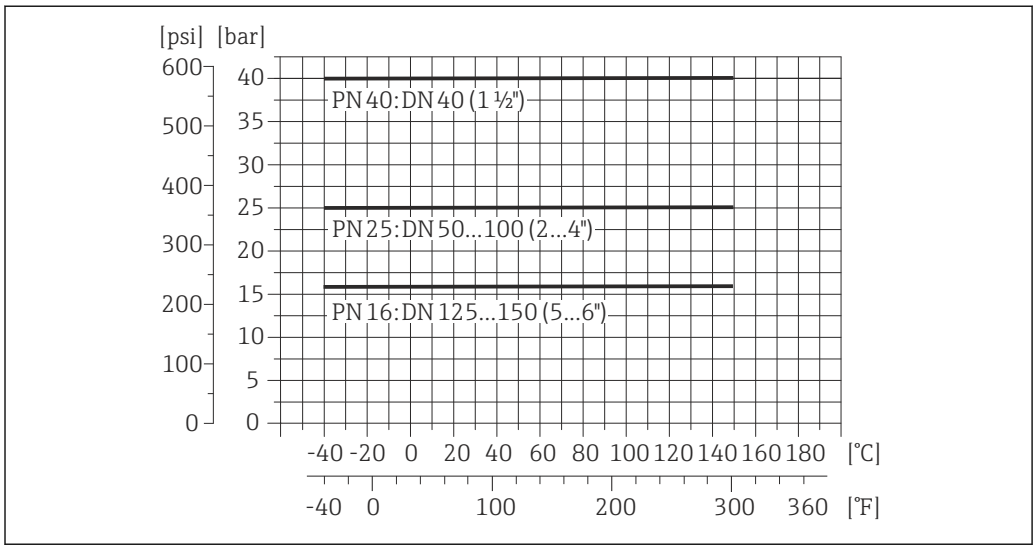
Process connections with aseptic molded seal, DN 40 to 150 (1 ½ to 6")

Coupling as per SMS 1145



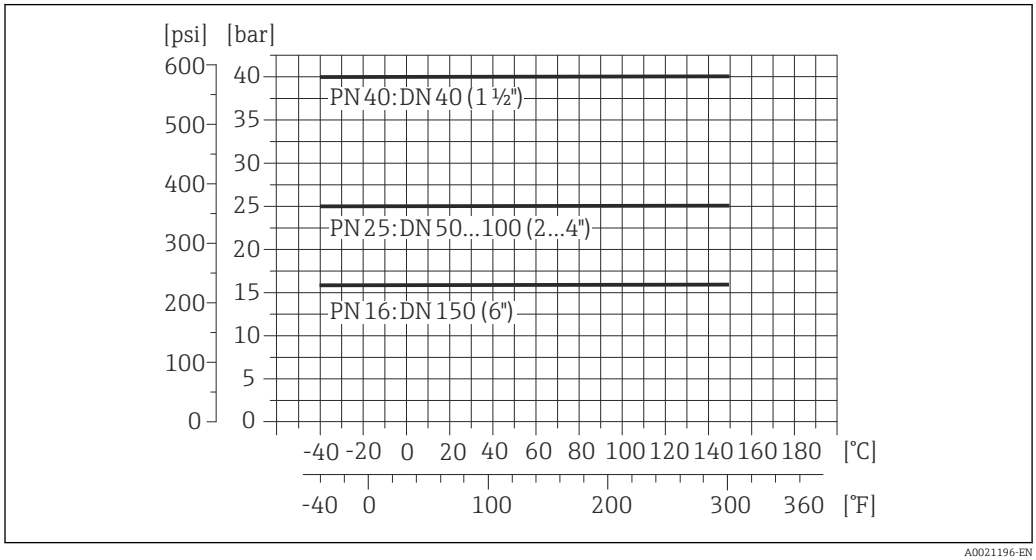
26 Material 1.4404 (316L)

Welded connection as per DIN 11850; coupling as per SC DIN 11851

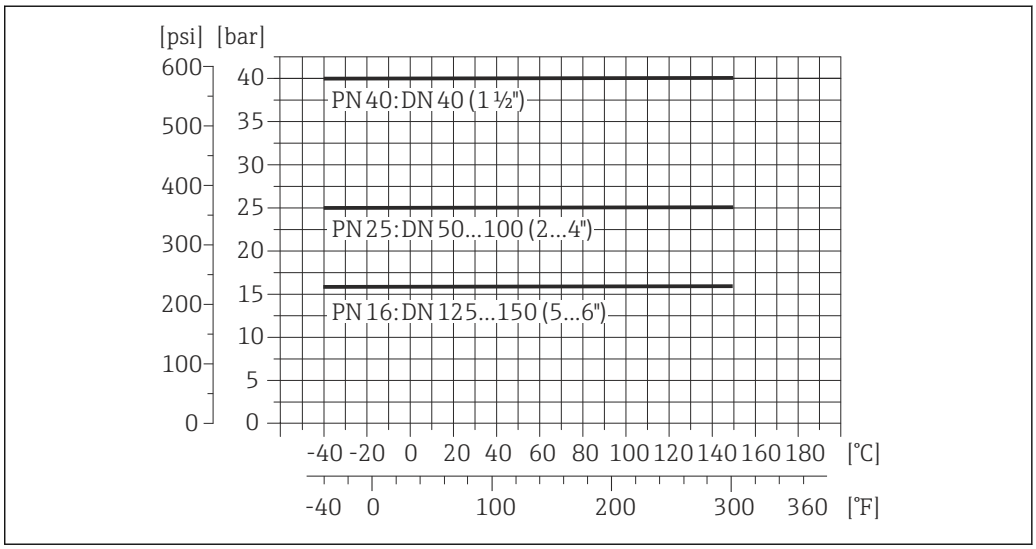


27 *Material 1.4404 (316L)*

Welded connection as per ASME BPE

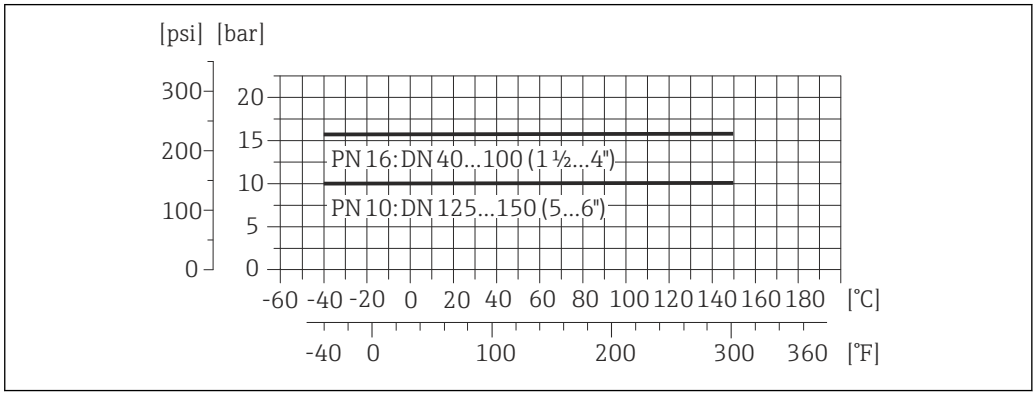


Welded connection as per ISO 2037



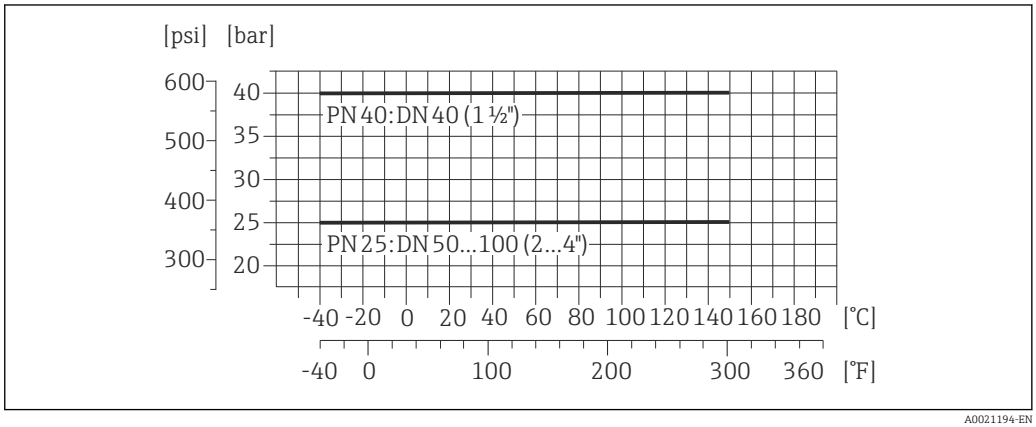
28 *Material 1.4404 (316L)*

Clamp as per ISO 2852, DIN 32676, L14 AM7



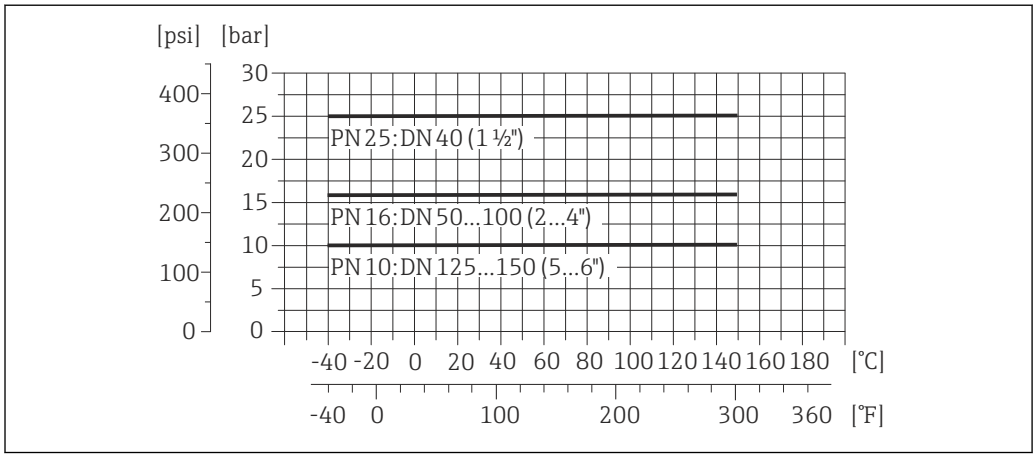
29 *Material 1.4404 (316L)*

Coupling as per DIN 11864-1, ISO 2853



30 *Material 1.4404 (316L)*

Flange connection as per DIN 11864-2



31 Material 1.4404 (316L)

Pressure tightness

Liner: PFA

Nominal diameter		Limit values for absolute pressure in [mbar] ([psi]) for fluid temperatures:				
[mm]	[in]	+25 °C (+77 °F)	+80 °C (+176 °F)	+100 °C (+212 °F)	+130 °C (+266 °F)	+150 °C (+302 °F)
2 to 150	1/12 to 6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Flow limit

The diameter of the pipe and the flow rate determine the nominal diameter of the sensor. The optimum flow velocity is between 2 to 3 m/s (6.56 to 9.84 ft/s). Also match the velocity of flow (v) to the physical properties of the fluid:
- v < 2 m/s (6.56 ft/s): for low conductivity values
- v > 2 m/s (6.56 ft/s): for fluids producing buildup (e.g. milk with a high fat content)

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

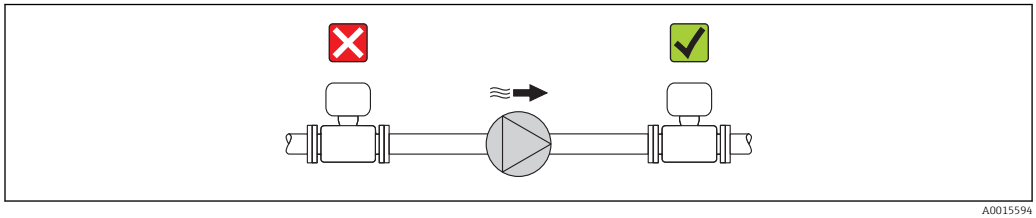
Pressure loss

- No pressure loss occurs as of nominal diameter DN 8 (3/8") if the sensor is installed in a pipe with the same nominal diameter.
- Pressure losses for configurations incorporating adapters according to DIN EN 545 (→ 33)

System pressure

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

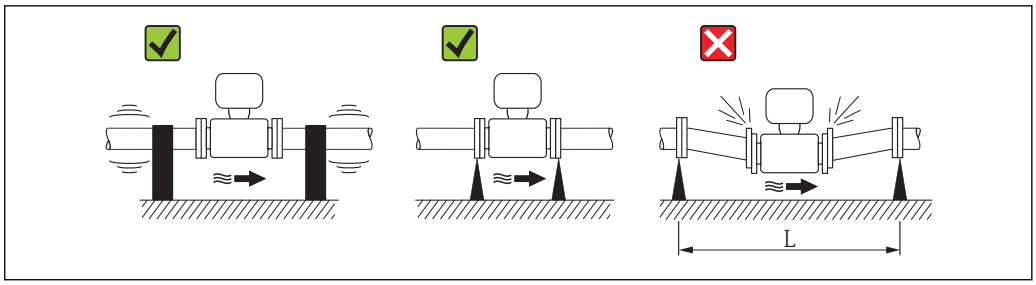
- For information on the liner's resistance to partial vacuum (→ 42)
- For information on the measuring system's resistance to vibration and shock (→ 35), (→ 35)



Vibrations

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

For information on the permitted resistance to vibration and shock (→ 35), (→ 35)



32 *Measures to prevent vibration of the device*

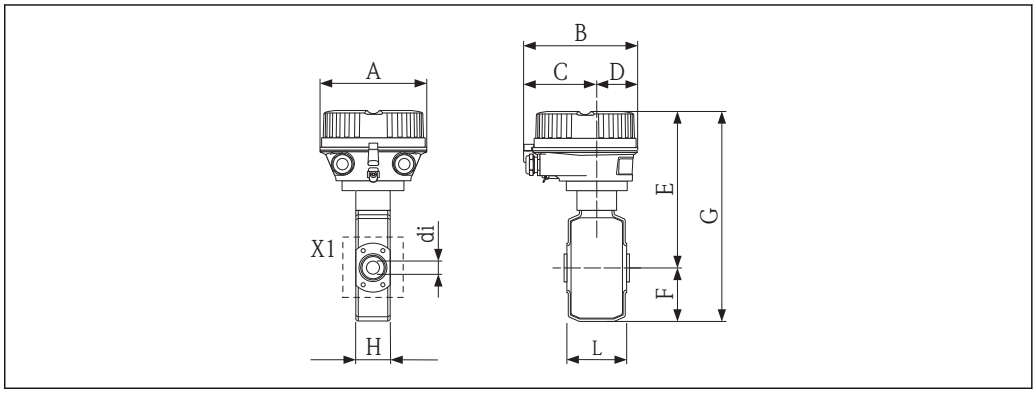
L *> 10 m (33 ft)*

Mechanical construction

Design, dimensions

Compact version

Order code for "Housing", option A "Compact, coated aluminum" with DN 2 to 25 (1/12 to 1")



Dimensions in SI units

DN [mm]	L [1)] [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	X1 [mm]	di [mm]
2	86	136	147.5	93.5	54	179	55	234	43	4 × M6	2.25
4	86	136	147.5	93.5	54	179	55	234	43	4 × M6	4.5
8	86	136	147.5	93.5	54	179	55	234	43	4 × M6	9
15	86	136	147.5	93.5	54	179	55	234	43	4 × M6	16
25	86	136	147.5	93.5	54	179	55	234	56	4 × M6	26

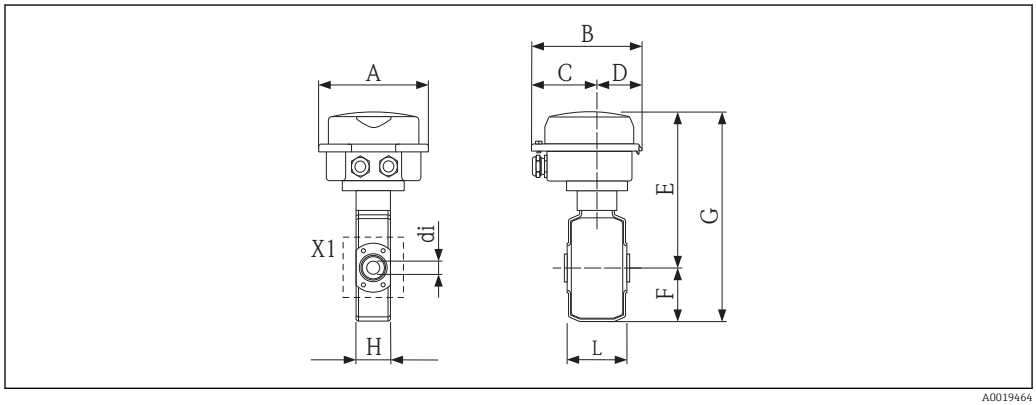
1) Total length (L) depends on the process connections.

Dimensions in US units

DN [in]	L [1)] [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	X1 [mm]	di [in]
1/12	3.39	5.35	5.81	3.68	2.13	7.05	2.17	9.21	1.69	4 × M6	0.09
1/8	3.39	5.35	5.81	3.68	2.13	7.05	2.17	9.21	1.69	4 × M6	0.18
3/8	3.39	5.35	5.81	3.68	2.13	7.05	2.17	9.21	1.69	4 × M6	0.35
½	3.39	5.35	5.81	3.68	2.13	7.05	2.17	9.21	1.69	4 × M6	0.63
1	3.39	5.35	5.81	3.68	2.13	7.05	2.17	9.21	2.20	4 × M6	1.02

1) Total length (L) depends on the process connections.

Order code for "Housing", option B "Compact hygienic, stainless" with DN 2 to 25 (1/12 to 1")



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Dimensions in SI units

DN [mm]	L [1)] [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	X1 [mm]	di [mm]
2	86	133.5	136.8	78	58.8	173	55	228	43	4 × M6	2.25
4	86	133.5	136.8	78	58.8	173	55	228	43	4 × M6	4.5
8	86	133.5	136.8	78	58.8	173	55	228	43	4 × M6	9
15	86	133.5	136.8	78	58.8	173	55	228	43	4 × M6	16
25	86	133.5	136.8	78	58.8	173	55	228	56	4 × M6	26

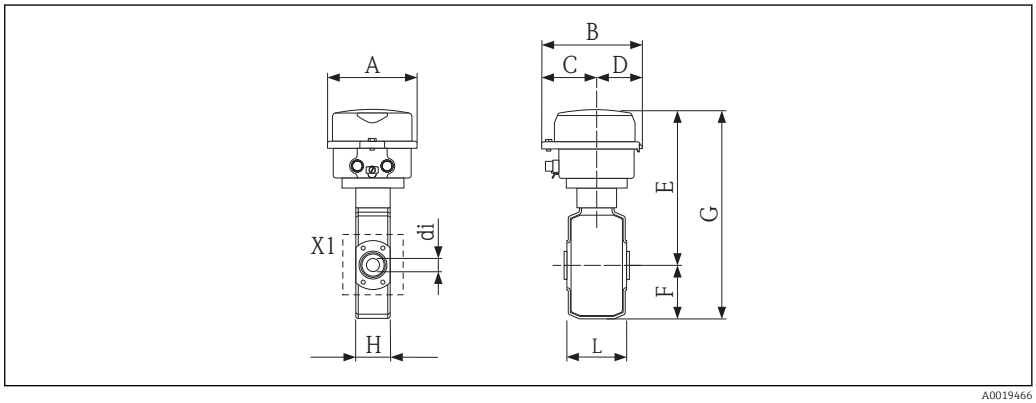
1) Total length (L) depends on the process connections.

Dimensions in US units

DN [in]	L [1)] [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	X1 [mm]	di [in]
1/12	3.39	5.26	5.39	3.07	2.31	6.81	2.17	8.98	1.69	4 × M6	0.09
1/8	3.39	5.26	5.39	3.07	2.31	6.81	2.17	8.98	1.69	4 × M6	0.18
3/8	3.39	5.26	5.39	3.07	2.31	6.81	2.17	8.98	1.69	4 × M6	0.35
½	3.39	5.26	5.39	3.07	2.31	6.81	2.17	8.98	1.69	4 × M6	0.63
1	3.39	5.26	5.39	3.07	2.31	6.81	2.17	8.98	2.20	4 × M6	1.02

1) Total length (L) depends on the process connections.

Order code for "Housing", option C "Ultra compact hygienic, stainless" with DN 2 to 25 (1/12 to 1")



A0019466

Dimensions in SI units

DN [mm]	L [1)] [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	X1 [mm]	di [mm]
2	86	111.4	123.6	67.7	55.9	173	55	228	43	4 × M6	2.25
4	86	111.4	123.6	67.7	55.9	173	55	228	43	4 × M6	4.5
8	86	111.4	123.6	67.7	55.9	173	55	228	43	4 × M6	9
15	86	111.4	123.6	67.7	55.9	173	55	228	43	4 × M6	16
25	86	111.4	123.6	67.7	55.9	173	55	228	56	4 × M6	26

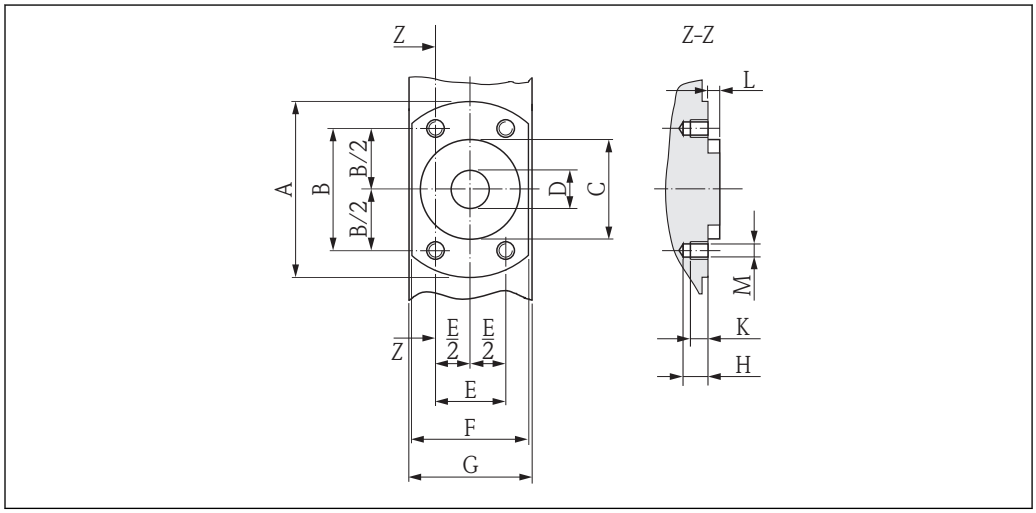
1) Total length (L) depends on the process connections.

Dimensions in US units

DN [in]	L [1)] [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	X1 [mm]	di [in]
1/12	3.39	4.39	4.87	2.67	2.20	6.81	2.17	8.98	1.69	4 × M6	0.09
1/8	3.39	4.39	4.87	2.67	2.20	6.81	2.17	8.98	1.69	4 × M6	0.18
3/8	3.39	4.39	4.87	2.67	2.20	6.81	2.17	8.98	1.69	4 × M6	0.35
½	3.39	4.39	4.87	2.67	2.20	6.81	2.17	8.98	1.69	4 × M6	0.63
1	3.39	4.39	4.87	2.67	2.20	6.81	2.17	8.98	2.20	4 × M6	1.02

1) Total length (L) depends on the process connections.

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



33 *Front view without process connections*

Dimensions in SI units

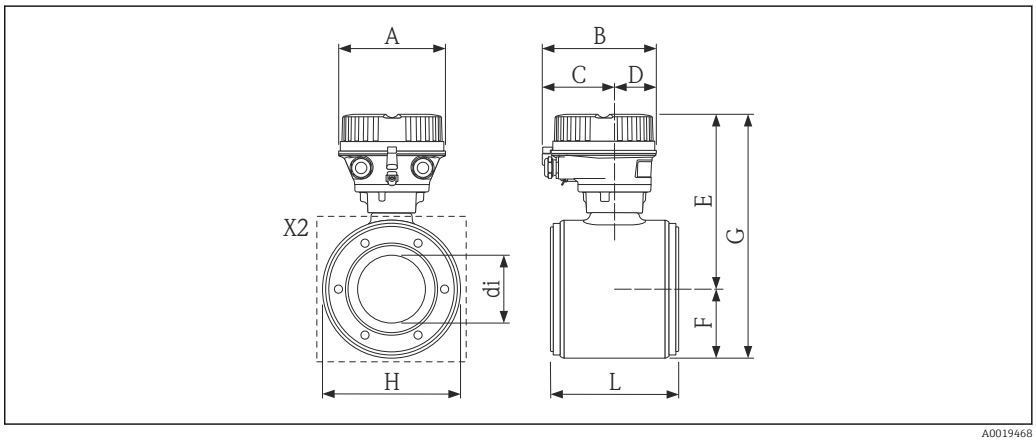
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	K [mm]	L [mm]	M [mm]
2	62	41.6	34	9	24	42	43	8.5	6	4	M6
4	62	41.6	34	9	24	42	43	8.5	6	4	M6
8	62	41.6	34	9	24	42	43	8.5	6	4	M6
15	62	41.6	34	16	24	42	43	8.5	6	4	M6
25	72	50.2	44	26	29	55	56	8.5	6	4	M6

Dimensions in US units

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	K [in]	L [in]	M [mm]
1/12	2.44	1.64	1.34	0.35	0.94	1.65	1.69	0.33	0.24	0.16	M6
1/8	2.44	1.64	1.34	0.35	0.94	1.65	1.69	0.33	0.24	0.16	M6

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

Order code for "Housing", option A "Compact, coated aluminum" with DN 40 to 150 (1 ½ to 6")



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Dimensions in SI units

DN [mm]	L [1)] [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	X1 [mm]	di [mm]
40	140	136	147.5	93.5	54	179.3	53.3	232.6	107	4 × M8	34.8
50	140	136	147.5	93.5	54	185.8	59.8	245.6	120	4 × M8	47.5
65	140	136	147.5	93.5	54	195.6	69.6	265.2	135	6 × M8	60.2
80	140	136	147.5	93.5	54	199.8	73.8	273.6	148	6 × M8	72.9
100	140	136	147.5	93.5	54	212.8	86.8	299.6	174	6 × M8	97.4
125	200	136	147.5	93.5	54	228.8	102.8	331.6	206	6 × M10	120.0
150	200	136	147.5	93.5	54	242.8	116.8	359.6	234	6 × M10	146.9

1) Total length (L) depends on the process connections.

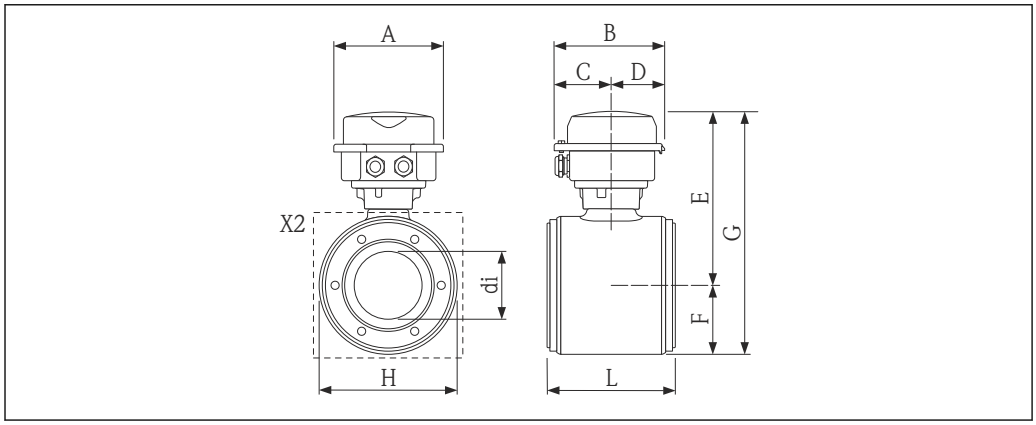
Dimensions in US units

DN [in]	L [1)] [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	X1 [mm]	di [in]
1 ½	5.51	5.35	5.81	3.68	2.13	7.06	2.10	9.16	4.21	4 × M8	1.37
2	5.51	5.35	5.81	3.68	2.13	7.31	2.35	9.67	4.72	4 × M8	1.87
3	5.51	5.35	5.81	3.68	2.13	7.87	2.91	10.8	5.83	6 × M8	2.87

DN [in]	L [1] [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	X1 [mm]	di [in]
4	5.51	5.35	5.81	3.68	2.13	8.38	3.42	11.8	6.85	6 × M8	3.83
5	7.87	5.35	5.81	3.68	2.13	9.01	4.05	13.1	8.11	6 × M10	4.72
6	7.87	5.35	5.81	3.68	2.13	9.56	4.60	14.2	9.21	6 × M10	5.78

1) Total length (L) depends on the process connections.

Order code for "Housing", option B "Compact hygienic, stainless" with DN 40 to 150 (1 ½ to 6")



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Dimensions in SI units

DN [mm]	L [1] [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	X1 [mm]	di [mm]
40	140	133.5	136.8	78	58.8	173.3	53.3	226.6	107	4 × M8	34.8
50	140	133.5	136.8	78	58.8	179.8	59.8	239.6	120	4 × M8	47.5
65	140	133.5	136.8	78	58.8	189.6	69.6	259.2	135	6 × M8	60.2
80	140	133.5	136.8	78	58.8	193.8	73.8	267.6	148	6 × M8	72.9
100	140	133.5	136.8	78	58.8	206.8	86.8	293.6	174	6 × M8	97.4
125	200	133.5	136.8	78	58.8	222.8	102.8	325.6	206	6 × M10	120.0
150	200	133.5	136.8	78	58.8	236.8	116.8	353.6	234	6 × M10	146.9

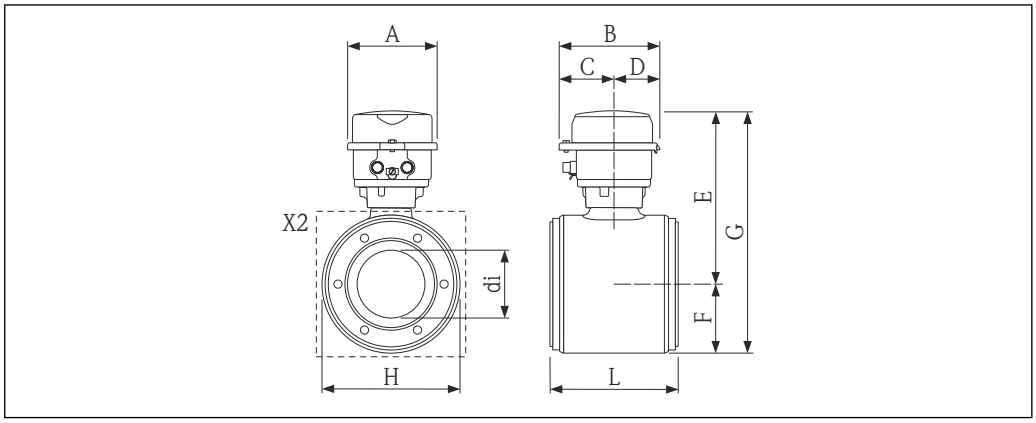
1) Total length (L) depends on the process connections.

Dimensions in US units

DN [in]	L [1)] [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	X1 [mm]	di [in]
1 ½	5.51	5.26	5.39	3.07	2.31	6.82	2.10	8.92	4.21	4 × M8	1.37
2	5.51	5.26	5.39	3.07	2.31	7.08	2.35	9.43	4.72	4 × M8	1.87
3	5.51	5.26	5.39	3.07	2.31	7.63	2.91	10.5	5.83	6 × M8	2.87
4	5.51	5.26	5.39	3.07	2.31	8.14	3.42	11.6	6.85	6 × M8	3.83
5	7.87	5.26	5.39	3.07	2.31	8.77	4.05	12.8	8.11	6 × M10	4.72
6	7.87	5.26	5.39	3.07	2.31	9.32	4.60	13.9	9.21	6 × M10	5.78

1) Total length (L) depends on the process connections.

Order code for "Housing", option C "Ultra compact hygienic, stainless" with DN 40 to 150 (1 ½ to 6")



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Dimensions in SI units

DN [mm]	L [1)] [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	X1 [mm]	di [mm]
40	140	111.4	123.6	67.7	55.9	173.3	53.3	226.6	107	4 × M8	34.8
50	140	111.4	123.6	67.7	55.9	179.8	59.8	239.6	120	4 × M8	47.5
65	140	111.4	123.6	67.7	55.9	189.6	69.6	259.2	135	6 × M8	60.2
80	140	111.4	123.6	67.7	55.9	193.8	73.8	267.6	148	6 × M8	72.9
100	140	111.4	123.6	67.7	55.9	206.8	86.8	293.6	174	6 × M8	97.4
125	200	111.4	123.6	67.7	55.9	222.8	102.8	325.6	206	6 × M10	120.0
150	200	111.4	123.6	67.7	55.9	236.8	116.8	353.6	234	6 × M10	146.9

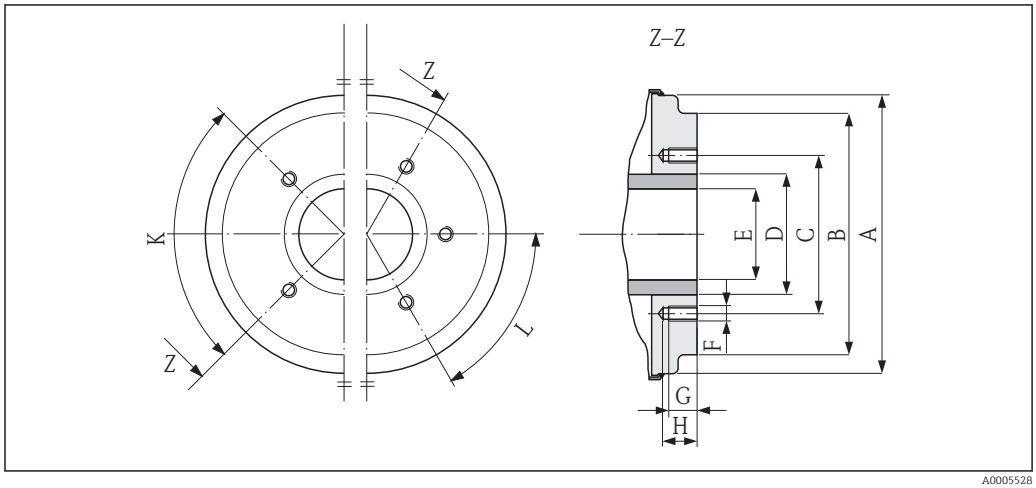
1) Total length (L) depends on the process connections.

Dimensions in US units

DN [in]	L [1)] [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	X1 [mm]	di [in]
1 ½	5.51	4.39	4.87	2.67	2.20	6.82	2.10	8.92	4.21	4 × M8	1.37
2	5.51	4.39	4.87	2.67	2.20	7.08	2.35	9.43	4.72	4 × M8	1.87
3	5.51	4.39	4.87	2.67	2.20	7.63	2.91	10.5	5.83	6 × M8	2.87
4	5.51	4.39	4.87	2.67	2.20	8.14	3.42	11.6	6.85	6 × M8	3.83
5	7.87	4.39	4.87	2.67	2.20	8.77	4.05	12.8	8.11	6 × M10	4.72
6	7.87	4.39	4.87	2.67	2.20	9.32	4.60	13.9	9.21	6 × M10	5.78

1) Total length (L) depends on the process connections.

Detail X2, sensor flange connection DN 40 to 150 (1 ½ to 6")



34 *Front view without process connections*

Dimensions in SI units

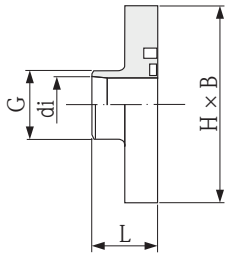
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	K 90° ±0.5° Tapped holes	L 60° ±0.5° Tapped holes
40	99.7	85.8	71.0	48.3	34.8	M8	12	17	4	–
50	112.7	98.8	83.5	60.3	47.5	M8	12	17	4	–
65	127.7	114.8	100.0	76.1	60.2	M8	12	17	–	6
80	140.7	133.5	114.0	88.9	72.9	M8	12	17	–	6
100	166.7	159.5	141.0	114.3	97.4	M8	12	17	–	6
125	198.7	191.5	171.0	139.7	120.0	M10	15	20	–	6
150	226.7	219.5	200.0	168.3	146.9	M10	15	20	–	6

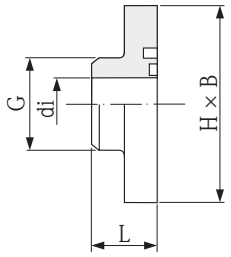
Dimensions in US units

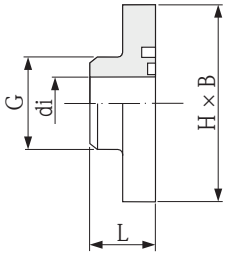
DN	A	B	C	D	E	F	G	H	K	L
									90° ±0.5°	60° ±0.5°
[in]	[in]	[in]	[in]	[in]	[in]	[mm]	[in]	[in]	Tapped holes	
1 ½	3.93	3.38	2.80	1.90	1.37	M8	0.47	0.67	4	–
2	4.44	3.89	3.29	2.37	1.87	M8	0.47	0.67	4	–
3	5.54	5.26	4.49	3.50	2.87	M8	0.47	0.67	–	6
4	6.56	6.28	5.55	4.50	3.83	M8	0.47	0.67	–	6
5	7.82	7.54	6.73	5.50	4.72	M10	0.59	0.79	–	6
6	8.93	8.64	7.87	6.63	5.78	M10	0.59	0.79	–	6

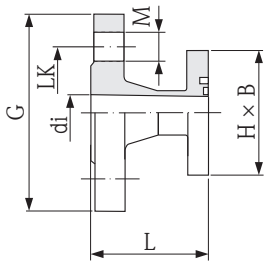
Process connections in SI units

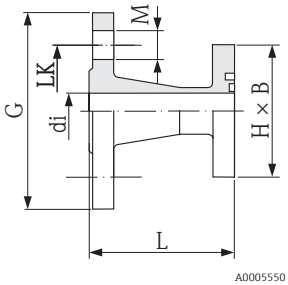
Process connections DN 2 to 25 with O-ring seal

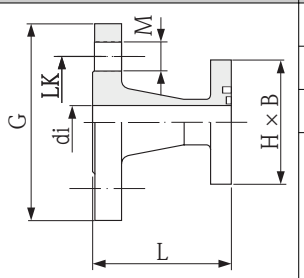
Welded connection DIN EN ISO 1127, 1.4404 (316L)						
Order code for "Process connection", option D1S	DN [mm]	Suitable for pipe DIN EN ISO 1127 [mm]	di [mm]	G [mm]	L [mm]	H × B [mm]
 A0005547	2 to 8	13.5 × 1.6	10.3	13.5	20.3	62 × 42
	15	21.3 × 1.6	18.1	21.3	20.3	62 × 42
	25 (DIN)	33.7 × 2.0	29.7	33.7	20.3	62 × 52
	Length = (2 × L) + 86 mm					

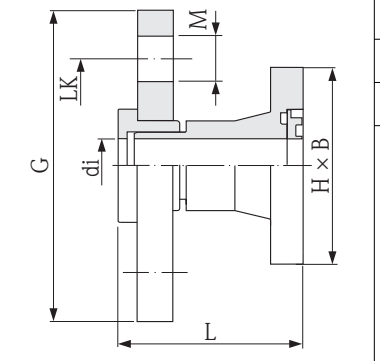
Welded connection ODT/SMS, 1.4404 (316L)						
Order code for "Process connection", option A2S	DN [mm]	Suitable for pipe ODT/SMS [mm]	di [mm]	G [mm]	L [mm]	H × B [mm]
 A0005548	2 to 8	13.5 × 2.30	9	13.5	20.3	62 × 42
	15	21.3 × 2.65	16	21.3	20.3	62 × 42
	25 (DIN)	33.7 × 3.25	27.2	33.7	20.3	72 × 55
	Length = (2 × L) + 86 mm					

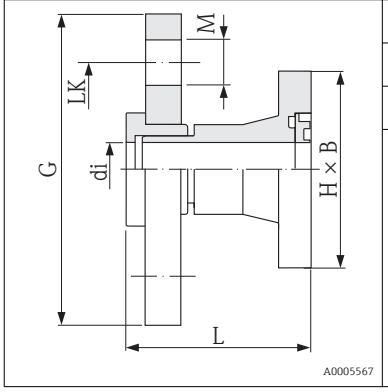
Welded connection ISO 2037, 1.4404 (316L)						
Order code for "Process connection", option I1S	DN [mm]	Suitable for pipe ISO 2037 [mm]	di [mm]	G [mm]	L [mm]	H × B [mm]
	2 to 8	13.5 × 2.3	9	13.5	20.3	62 × 42
	15	21.3 × 2.65	16	21.3	20.3	62 × 42
	25 (DIN)	33.7 × 3.25	27.2	33.7	20.3	72 × 55
	Length = (2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

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

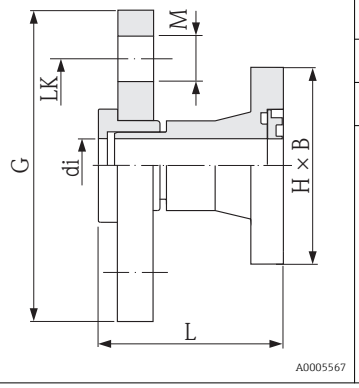
Flange ASME B16.5, 1.4404 (316L), Class 150								
Order code for "Process connection", option A1S	DN [mm]	Suitable for flange ASME B16.5 [in]	di [mm]	G [mm]	L [mm]	LK [mm]	M [mm]	H × B [mm]
	2 to 8	½	15.7	89	66	60.5	15.7	62 × 42
	15	½	16	89	66	60.5	15.7	62 × 42
	25 (1" ASME)	1	26.7	108	71.8	79.2	15.7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

Flange JIS B2220, 1.4404 (316L), 20K								
Order code for "Process connection", option N4S	DN [mm]	Suitable for flange JIS B2220 [mm]	di [mm]	G [mm]	L [mm]	LK [mm]	M [mm]	H × B [mm]
	2 to 8	DN 15	15	95	67	70	15	62 × 42
	15	DN 15	16	95	67	70	15	62 × 42
	25 (DIN)	DN 25	26	125	67	90	19	72 × 55
	Length = (2 × L) + 86 mm							

Flange EN 1092-1 (DIN 2501), PVDF, PN16								
Order code for "Process connection", option D3P	DN [mm]	Suitable for flange EN 1092-1 (DIN 2501) [mm]	di [mm]	G [mm]	L [mm]	LK [mm]	M [mm]	H × B [mm]
	2 to 8	DN 15	16	95	57	65	14	62 × 42
	15	DN 15	16	95	57	65	14	62 × 42
	25 (DIN)	DN 25	27.2	115	57	85	14	72 × 55
	Length = (2 × L) + 86 mm Length in accordance with DVGW (200 mm) The required grounding rings can be ordered as accessories (order code: DK5HR-****).							

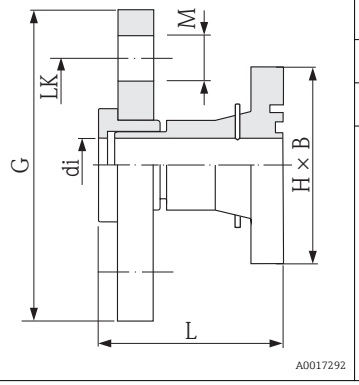
Flange ASME B16.5, PVDF, Class 150								
Order code for "Process connection", option A1P	DN [mm]	Suitable for flange ASME B16.5 [in]	di [mm]	G [mm]	L [mm]	LK [mm]	M [mm]	H × B [mm]
	2 to 8	½	16	95	57	60	16	62 × 42
	15	½	16	95	57	60	16	62 × 42
	25 (DIN)	1	27.2	115	57	79	16	72 × 55
	Length = (2 × L) + 86 mm The required grounding rings can be ordered as accessories (order code: DK5HR-****).							

Flange JIS B2220, PVDF, 10K

Order code for "Process connection", option N3P	DN [mm]	Suitable for flange JIS B2220 [mm]	di [mm]	G [mm]	L [mm]	LK [mm]	M [mm]	H × B [mm]
	2 to 8	DN 15	16	95	57	70	15	62 × 42
	15	DN 15	16	95	57	70	15	62 × 42
	25 (DIN)	DN 25	27.2	125	57	90	19	72 × 55

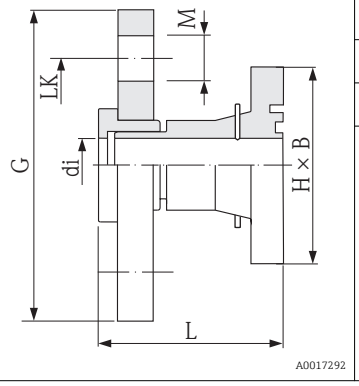
Length = (2 × L) + 86 mm
The required grounding rings can be ordered as accessories (order code: DK5HR-****).

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

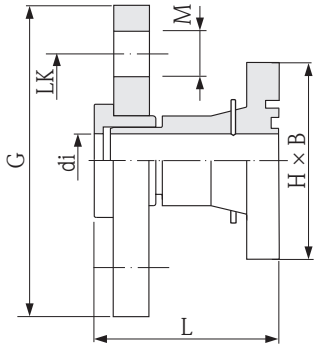
Order code for "Process connection", option D4P	DN [mm]	Suitable for flange EN 1092-1 (DIN 2501) [mm]	di [mm]	G [mm]	L [mm]	LK [mm]	M [mm]	H × B [mm]
	2 to 8	DN 15	16	95	57	65	14	62 × 42
	15	DN 15	16	95	57	65	14	62 × 42
	25 (DIN)	DN 25	27.2	115	57	85	14	72 × 55

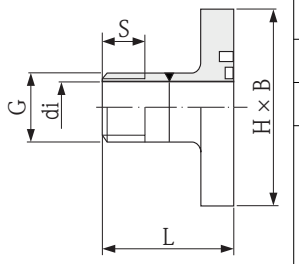
Length = (2 × L) + 86 mm
Length in accordance with DVGW (200 mm)
Grounding rings are not necessary.

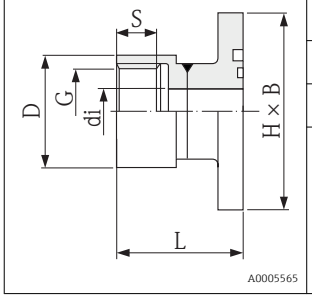
Flange with ground electrode ASME B16.5, PVDF, Class 150

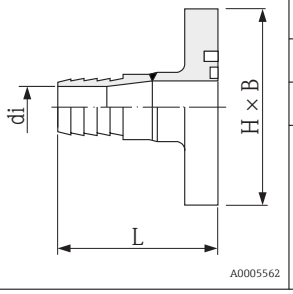
Order code for "Process connection", option A4P	DN [mm]	Suitable for flange ASME B16.5 [in]	di [mm]	G [mm]	L [mm]	LK [mm]	M [mm]	H × B [mm]
	2 to 8	½	16	95	57	60	16	62 × 42
	15	½	16	95	57	60	16	62 × 42
	25 (DIN)	1	27.2	115	57	79	16	72 × 55

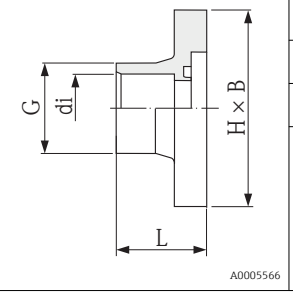
Length = (2 × L) + 86 mm
Grounding rings are not necessary.

Flange with ground electrode, JIS B2220, PVDF, 10K								
Order code for "Process connection", option N4P	DN [mm]	Suitable for flange JIS B2220 [mm]	di [mm]	G [mm]	L [mm]	LK [mm]	M [mm]	H × B [mm]
	2 to 8	DN 15	16	95	57	70	15	62 × 42
	15	DN 15	16	95	57	70	15	62 × 42
	25 (DIN)	DN 25	27.2	125	57	90	19	72 × 55
	Length = (2 × L) + 86 mm Grounding rings are not necessary.							

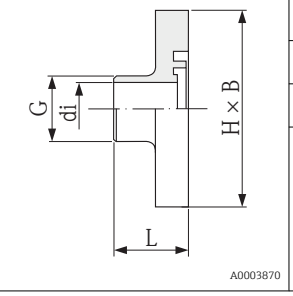
External thread, ISO 228 / DIN 2999, 1.4404 (316L)							
Order code for "Process connection", option I2S	DN [mm]	Suitable for internal thread ISO 228 / DIN 2999 [in]	di [mm]	G [in]	L [mm]	S [mm]	H × B [mm]
	2 to 8	R 3/8	10	3/8	40	10.1	62 × 42
	15	R ½	16	½	40	13.2	62 × 42
	25 (1" ASME)	R 1	25	1	42	16.5	72 × 55
	Length = (2 × L) + 86 mm						

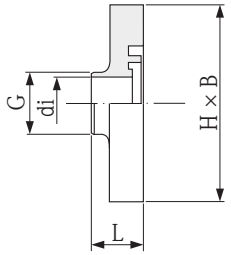
Internal thread, ISO 228 / DIN 2999, 1.4404 (316L)								
Order code for "Process connection", option I3S	DN [mm]	Suitable for external thread ISO 228 / DIN 2999 [in]	di [mm]	G [in]	D [mm]	L [mm]	S [mm]	H × B [mm]
	2 to 8	Rp 3/8	9	3/8	22	45	13	62 × 42
	15	Rp ½	16	½	27	45	14	62 × 42
	25 (1" ASME)	Rp 1	27.2	1	40	51	17	72 × 55
	Length = (2 × L) + 86 mm							

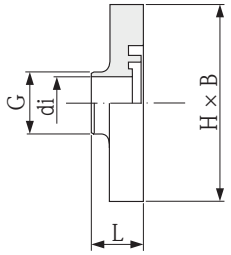
Hose connection 1.4404 (316L)					
Order code for "Process connection", options O1S, O2S, O3S	**DN** [mm]	**Suitable for internal diameter** [mm]	**di** [mm]	**L** [mm]	**H × B** [mm]
	2 to 8	13	10	49	62 × 42
	15	16	12.6	49	62 × 42
	15	19	16	49	72 × 55
	Length = (2 × L) + 86 mm				

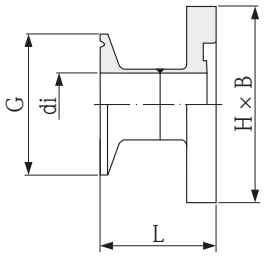
PVC adhesive sleeve						
Order code for "Process connection", options O1V, O2V	**DN** [mm]	**Suitable for pipe** [mm] / [in]	**di** [mm]	**G** [mm]	**L** [mm]	**H × B** [mm]
	2 to 8	20 × 2 (DIN 8062)	20.2	27	38.5	62 × 42
	2 to 8	½	21.5	27.3	38.5	62 × 42
	15	20 × 2 (DIN 8062)	20.2	27	28	72 × 55
	Length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

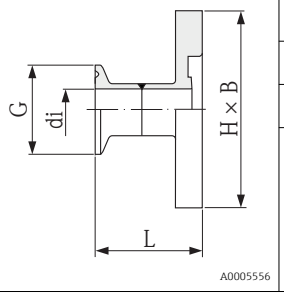
Process connections DN 2 to 25 with aseptic molded seal

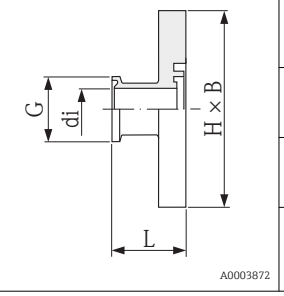
Welded connection DIN 11850, 1.4404 (316L)						
Order code for "Process connection", option DAS	**DN** [mm]	**Suitable for pipe DIN 11850** [mm]	**di** [mm]	**G** [mm]	**L** [mm]	**H × B** [mm]
	2 to 8	14 × 2	10	14	23.3	62 × 42
	15	20 × 2	16	20	23.3	62 × 42
	25 (DIN)	30 × 2	26	30	23.3	72 × 55
	Length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

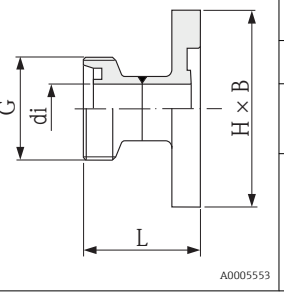
Welded connection ASME BPE, 1.4404 (316L)						
Order code for "Process connection", option AAS	DN [mm]	Suitable for pipe ASME BPE [mm]	di [mm]	G [mm]	L [mm]	H × B [mm]
	2 to 8	12.7 × 1.65	9	12.7	16.1	62 × 42
	15	19.1 × 1.65	16	19.1	16.1	62 × 42
	25 (1" ASME)	25.4 × 1.65	22.6	25.4	16.1	72 × 55
	Length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

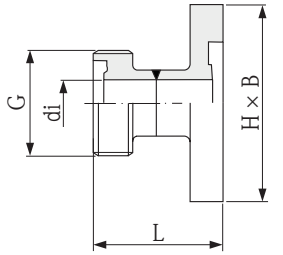
Welded connection ISO 2037, 1.4404 (316L)						
Order code for "Process connection", option IAS	DN [mm]	Suitable for pipe ISO 2037 [mm]	di [mm]	G [mm]	L [mm]	H × B [mm]
	2 to 8	12.7 × 1.65	9	12.7	16.1	62 × 42
	15	19.1 × 1.65	16	19.1	16.1	62 × 42
	25 (1" ASME)	25.4 × 1.65	22.6	25.4	16.1	72 × 55
	Length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

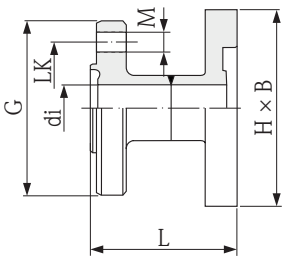
Clamp ISO 2852, Fig. 2, 1.4404 (316L)							
Order code for "Process connection", option IBS	DN [mm]	Suitable for pipe ISO 2037/BS 4825-1 [mm]	DN Clamp ISO 2852 [mm]	di [mm]	G [mm]	L [mm]	H × B [mm]
	25 (1" ASME)	24.5 × 1.65	25	22.6	50.5	44.3	72 × 55
	Length = (2 × L) + 86 mm Please note the internal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

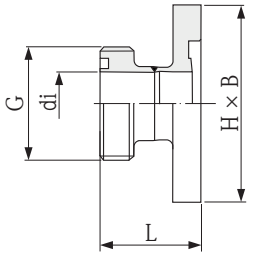
Clamp DIN 32676, 1.4404 (316L)						
Order code for "Process connection", option DBS	**DN** [mm]	**Suitable for pipe DIN 11850** [mm]	**di** [mm]	**G** [mm]	**L** [mm]	**H × B** [mm]
	2 to 8	Pipe 14 × 2 (DN 10)	10	34	41	62 × 42
	15	Pipe 20 × 2 (DN 15)	16	34	41	62 × 42
	25 (DIN)	Pipe 30 × 2 (DN 25)	26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

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

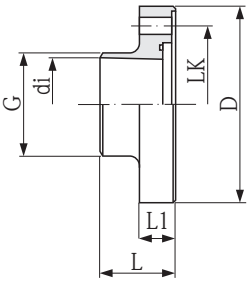
Coupling SC DIN 11851, threaded connection, 1.4404 (316L)						
Order code for "Process connection", option DCS	**DN** [mm]	**Suitable for pipe DIN 11850** [mm]	**di** [mm]	**G** [mm]	**L** [mm]	**H × B** [mm]
	2 to 8	Pipe 12 × 1 (DN 10)	10	Rd28 × ⅛	44	62 × 42
	15	Pipe 18 × 1.5 (ODT ¾")	16	Rd34 × ⅛	44	62 × 42
	25 (DIN)	Pipe 28 × 1 or 28×1.5 (DN 25)	26	Rd52 × ⅙	52	72 × 55
	Length = (2 × L) + 86 mm Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.					

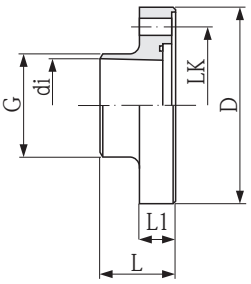
Coupling DIN 11864-1, aseptic threaded connection, form A, 1.4404 (316L)						
Order code for "Process connection", option DDS	DN [mm]	Suitable for pipe DIN 11850 [mm]	di [mm]	G [mm]	L [mm]	H × B [mm]
	2 to 8	Pipe 13 × 1.5 (DN 10)	10	Rd28 × ⅛	42	62 × 42
	15	Pipe 19 × 1.5 (DN 15)	16	Rd34 × ⅛	42	62 × 42
	25 (DIN)	Pipe 29 × 1.5 (DN 25)	26	Rd52 × ⅙	49	72 × 55
	Length = (2 × L) + 86 mm Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.					

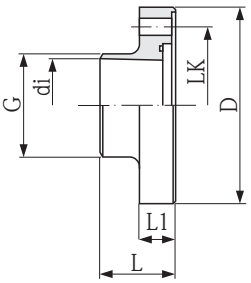
Flange DIN 11864-2, aseptic grooved flange, form A, 1.4404 (316L)								
Order code for "Process connection", option DES	DN [mm]	Suitable for pipe DIN 11850 [mm]	di [mm]	G [mm]	L [mm]	LK [mm]	M [mm]	H × B [mm]
	2 to 8	Pipe 13 × 1.5 (DN 10)	10	54	48.5	37	9	62 × 42
	15	Pipe 19 × 1.5 (DN 15)	16	59	48.5	42	9	62 × 42
	25 (DIN)	Pipe 29 × 1.5 (DN 25)	26	70	48.5	53	9	72 × 55
	Length = (2 × L) + 86 mm Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.							

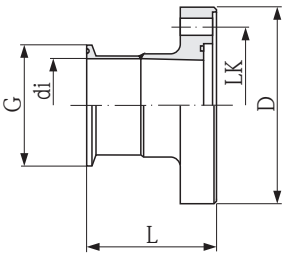
Coupling SMS 1145, threaded connection, 1.4404 (316L)							
Order code for "Process connection", option SAS	DN [mm]	Suitable for pipe OD [in]	DN SMS 1145 [mm]	di [mm]	G [mm]	L [mm]	H × B [mm]
	25 (1" ASME)	1	25	22.6	Rd40 × ⅙	30.8	72 × 55
	Length = (2 × L) + 86 mm Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.						

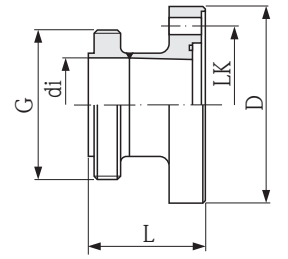
Process connections DN 40 to 150 with aseptic molded seal

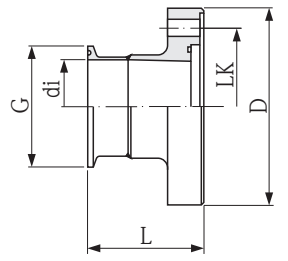
Welded connection DIN 11850, 1.4404 (316L)									
Order code for "Process connection", option DAS	**DN** [mm]	**Suitable for pipe DIN 11850** [mm]	**di** [mm]	**G** [mm]	**D** [mm]	**L** [mm]	**L1** [mm]	**LK** [mm]	**L_{tot} 1)** [mm]
 A0005541	40	41 × 1.5	38	41	99.7	43	18	71	220
	50	53 × 1.5	50	53	112.7	43	18	83.5	220
	65	70 × 2	66	70	127.7	43	18	100	220
	80	85 × 2	81	85	140.7	43	18	114	280
	100	104 × 2	100	104	166.7	43	18	141	280
	125	129 × 2	125	129	198.7	53	25	171	300
	150	154 × 2	150	154	226.7	53	25	200	300
	1) L_{tot} = length Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.								

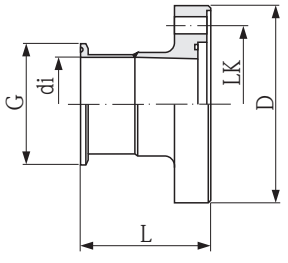
Welded connection ASME BPE, 1.4404 (316L)									
Order code for "Process connection", option AAS	**DN** [mm]	**Suitable for pipe ASME BPE** [mm]	**di** [mm]	**G** [mm]	**D** [mm]	**L** [mm]	**L1** [mm]	**LK** [mm]	**L_{tot} 1)** [mm]
 A0005541	40	38.1 × 1.65	34.8	38.1	99.7	43	18	71	220
	50	50.8 × 1.65	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	220
	80	76.2 × 1.65	72.9	76.2	140.7	43	18	114	220
	100	101.6 × 1.65	97.4	101.6	166.7	43	18	141	220
	150	152.4 × 2.77	149.9	149.9	226.7	53	25	141	300
	1) L_{tot} = length Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.								

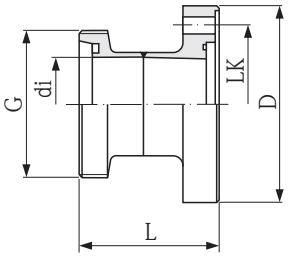
Welded connection ISO 2037, 1.4404 (316L)									
Order code for "Process connection", option IAS	**DN** [mm]	**Suitable for pipe ISO 2037** [mm]	**di** [mm]	**G** [mm]	**D** [mm]	**L** [mm]	**L1** [mm]	**LK** [mm]	**L_{tot} 1)** [mm]
 A0005541	40	38 × 1.2	35.6	38	99.7	43	18	71	220
	50	51 × 1.2	48.6	51	112.7	43	18	83.5	220
	65	63.5 × 1.6	60.3	63.5	127.7	43	18	100	220
	80	76.1 × 1.6	72.9	76.1	140.7	43	18	114	220
	100	101.6 × 2	97.6	101.6	166.7	43	18	141	220
	125	139.7 × 2	135.7	139.7	198.7	93	25	171	380
	150	168.3 × 2.6	163.1	168.3	226.7	93	25	200	380
	1) L_{tot} = length Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.								

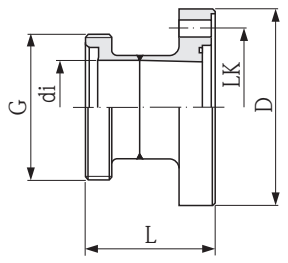
Clamp ISO 2852, Fig. 2, 1.4404 (316L)									
Order code for "Process connection", option IBS	DN [mm]	Suitable for pipe ISO 2037/BS 4825-1 [mm]	DN Clamp ISO 2852 [mm]	di [mm]	G [mm]	D [mm]	L [mm]	LK [mm]	L_{tot} [1] [mm]
 A0005544	40	38 × 1.6	38	35.6	50.5	99.7	43	71	220
	50	51 × 1.6	51	48.6	64	112.7	43	83.5	220
	65	63.5 × 1.6	63.5	60.3	77.5	127.7	43	100	220
	80	76.1 × 1.6	76.1	72.9	91	140.7	43	114	220
	100	101.6 × 2	101.6	97.6	119	166.7	43	141	220
	125	139.7 × 2	139.7	135.7	155	198.7	53	171	300
	150	168.3 × 2.6	168.3	163.1	183	226.7	53	200	300
	[1] L_{tot} = length Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.								

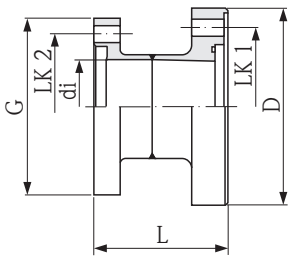
Coupling ISO 2853, threaded connection, 1.4404 (316L)									
Order code for "Process connection", option ICS	DN [mm]	Suitable for pipe ISO 2037/BS 4825-1 [mm]	DN Clamp ISO 2853 [mm]	di [mm]	G [mm]	D [mm]	L [mm]	LK [mm]	L_{tot} [1] [mm]
 A0005542	40	38 × 1.6	38	35.6	Tr 50.5 × 3.175	99.7	61	71	256
	50	51 × 1.6	51	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	266
	80	76.1 × 1.6	76.1	72.9	Tr 91 × 3.175	140.7	71	114	276
	100	101.6 × 2	101.6	97.6	Tr 118 × 3.175	166.7	76	141	286
	[1] L_{tot} = length Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.								

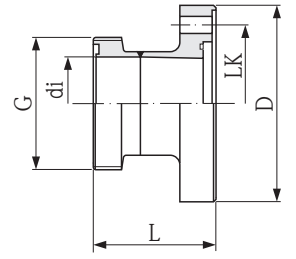
Clamp DIN 32676, 1.4404 (316L)								
Order code for "Process connection", option DBS	DN [mm]	Suitable for pipe DIN 11850 [mm]	di [mm]	G [mm]	D [mm]	L [mm]	LK [mm]	L_{tot} [1] [mm]
 A0005539	40	41 × 1.5	38	50.5	99.7	43	71	220
	50	53 × 1.5	50	64	112.7	43	83.5	220
	65	70 × 2	66	91	127.7	43	100	220
	80	85 × 2	81	106	140.7	43	114	220
	100	104 × 2	100	119	166.7	43	141	220
	125	129 × 2	125	155	198.7	53	171	300
	150	154 × 2	150	183	226.7	53	200	300
	[1] L_{tot} = length Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.							

Tri-Clamp for L14 AM7, 1.4404 (316L)								
Order code for "Process connection", option FAS	DN [mm]	Suitable for pipe ODT/SMS [mm]	di [mm]	G [mm]	D [mm]	L [mm]	LK [mm]	L_{tot} [1] [mm]
	40	38.1 × 1.65	34.8	50.4	99.7	43	71	220
	50	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	220
	80	76.2 × 1.65	72.9	90.9	140.7	43	114	220
	100	101.6 × 2.11	97.4	118.9	166.7	43	141	220
	150	152.4 × 2.77	146.9	166.9	226.7	53	200	300
	[1] L_{tot} = length Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.							

Coupling SC DIN 11851, threaded connection, 1.4404 (316L)								
Order code for "Process connection", option DCS	DN [mm]	Suitable for pipe DIN 11850 [mm]	di [mm]	G [mm]	D [mm]	L [mm]	LK [mm]	L_{tot} [1] [mm]
	40	42 × 1.5	38	Rd 65 × 1/6"	99.7	63	71	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	270
	80	85 × 2	81	Rd 110 × 1/4"	140.7	73	114	280
	100	104 × 2	100	Rd 130 × 1/4"	166.7	78	141	290
	125	129 × 2	125	Rd 160 × 1/4"	198.7	93	171	380
	150	154 × 2	150	Rd 160 × 1/4"	226.7	98	200	390
	[1] L_{tot} = length Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.							

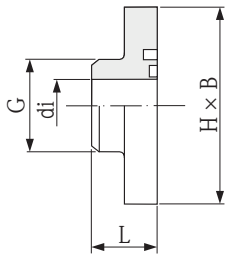
Coupling DIN 11864-1, aseptic threaded connection, form A, 1.4404 (316L)								
Order code for "Process connection", option DDS	DN [mm]	Suitable for pipe DIN 11850 [mm]	di [mm]	G [mm]	D [mm]	L [mm]	LK [mm]	L_{tot} [1] [mm]
	40	42 × 1.5	38	Rd 65 × 1/6"	99.7	61	71	256
	50	54 × 1.5	50	Rd 78 × 1/6"	112.7	61	83.5	256
	65	70 × 2	66	Rd 95 × 1/6"	127.7	66	100	266
	80	85 × 2	81	Rd 110 × 1/4"	140.7	71	114	276
	100	104 × 2	100	Rd 130 × 1/4"	166.7	76	141	286
	[1] L_{tot} = length Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.							

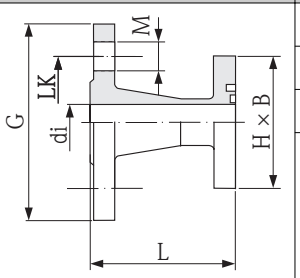
Flange DIN 11864-2, aseptic grooved flange, form A, 1.4404 (316L)									
Order code for "Process connection", option DES	DN [mm]	Suitable for pipe DIN 11850 [mm]	di [mm]	G [mm]	D [mm]	L [mm]	LK 1 [mm]	LK 2 [mm]	L_{tot} [1] [mm]
 A0005546	40	42 × 1.5	38	82	99.7	56	71	65	246
	50	54 × 1.5	50	94	112.7	56	83.5	77	246
	65	70 × 2	66	113	127.7	56	100	95	246
	80	85 × 2	81	133	140.7	68	114	112	270
	100	104 × 2	100	159	166.7	72	141	137	278
	125	129 × 2	125	190	198.7	84	171	161	362
	150	154 × 2	150	220	226.7	84	200	188	362
	[1] L_{tot} = length Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.								

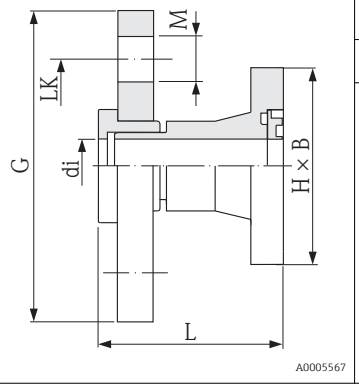
Coupling SMS 1145, threaded connection, 1.4404 (316L)									
Order code for "Process connection", option SAS	DN [mm]	Suitable for pipe ODT [mm]	DN SMS 1145 [mm]	di [mm]	G [mm]	D [mm]	L [mm]	LK [mm]	L_{tot} [1] [mm]
 A0005538	40	38.1 × 1.65	38	34.8	Rd 60 × 1/6"	99.7	61	71	256
	50	50.8 × 1.65	51	47.5	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	266
	80	76.2 × 1.65	76	72.6	Rd 98 × 1/6"	140.7	71	114	276
	100	101.6 × 1.65	101.6	97.4	Rd 132 × 1/6"	166.7	76	141	286
	[1] L_{tot} = length Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.								

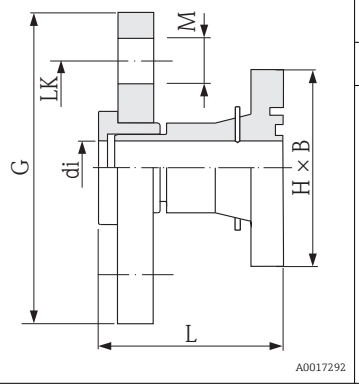
Process connections in US units

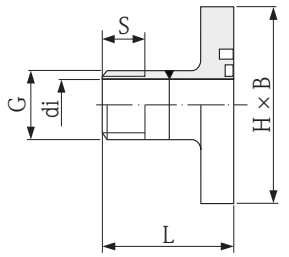
Process connections DN 1/12 to 1" with O-ring seal

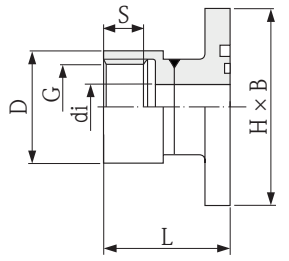
Welded connection ODT/SMS, 1.4404 (316L)						
Order code for "Process connection", option A2S	DN [in]	Suitable for pipe ODT/SMS [in]	di [in]	G [in]	L [in]	H × B [in]
 A0005548	1/12 to 5/16	0.53 × 0.09	0.35	0.53	0.80	2.44 × 1.65
	½	0.84 × 0.10	0.63	0.84	0.80	2.44 × 1.65
	Length = (2 × L) + 3.39 in					

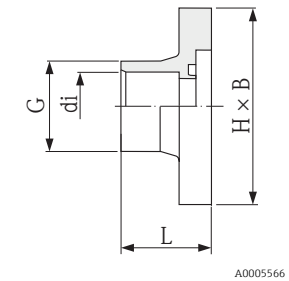
Flange ASME B16.5, 1.4404 (316L), Class 150								
Order code for "Process connection", option A1S	DN [in]	Suitable for flange ASME B16.5 [in]	di [in]	G [in]	L [in]	LK [in]	M [in]	H × B [in]
	1/12 to 5/16	½	0.62	3.50	2.60	2.38	0.62	2.44 × 1.65
	½	½	0.63	3.50	2.60	2.38	0.62	2.44 × 1.65
	1	1	1.05	4.25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

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

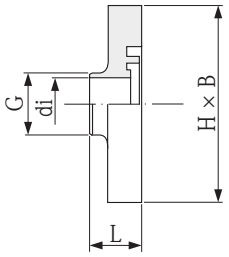
Flange with ground electrode ASME B16.5, PVDF, Class 150								
Order code for "Process connection", option A4P	DN [in]	Suitable for flange ASME B16.5 [in]	di [in]	G [in]	L [in]	LK [in]	M [in]	H × B [in]
	1/12 to 5/16	½	0.63	3.74	2.24	2.36	0.63	2.44 × 1.65
	½	½	0.63	3.74	2.24	2.36	0.63	2.44 × 1.65
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

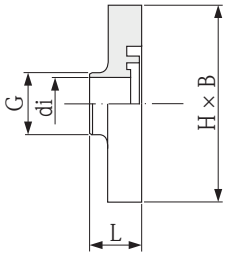
External thread, ISO 228/DIN 2999, 1.4404 (316L)							
Order code for "Process connection", option I2S	DN [in]	Suitable for internal thread ISO 228 / DIN 2999 [in]	di [in]	G [in]	L [in]	S [in]	H × B [in]
	1/12 to 5/16	R 3/8	0.39	3/8	1.57	0.40	2.44 × 1.65
	½	R ½	0.63	½	1.57	0.52	2.44 × 1.65
	1	R 1	0.98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

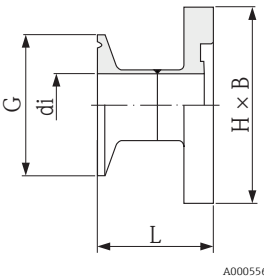
Internal thread, ISO 228/DIN 2999, 1.4404 (316L)							
Order code for "Process connection", option I3S	DN [in]	Suitable for external thread ISO 228 / DIN 2999 [in]	di [in]	G [in]	D [in]	L [in]	S [in]	H × B [in]
	1/12 to 5/16	Rp 3/8	0.35	3/8	0.87	1.77	0.51	2.44 × 1.65
	½	Rp ½	0.63	½	1.06	1.77	0.55	2.44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

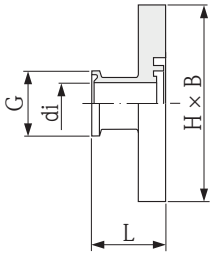
PVC adhesive sleeve						
Order code for "Process connection", options O1V, O2V	DN [in]	Suitable for pipe [in]	di [in]	G [in]	L [in]	H × B [in]
	1/12 to 5/16	½	0.85	1.07	1.52	2.44 × 1.65
	Length = (2 × L) + 3.39 in The required grounding rings can be ordered as accessories (order code: DK5HR-****).					

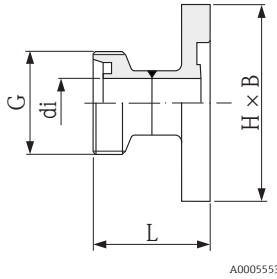
Process connections DN 1/12 to 1" with aseptic molded seal

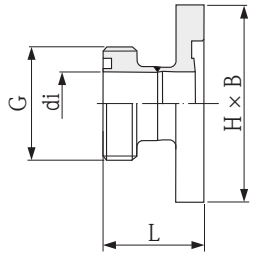
Welded connection ASME BPE, 1.4404 (316L)						
Order code for "Process connection", option AAS	**DN** [in]	**Suitable for pipe ASME BPE** [in]	**di** [in]	**G** [in]	**L** [in]	**H × B** [in]
	1/12 to 5/16	0.50 × 0.06	0.35	0.50	0.63	2.44 × 1.65
	½	0.75 × 0.06	0.63	0.75	0.63	2.44 × 1.65
	1	1.00 × 0.06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

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

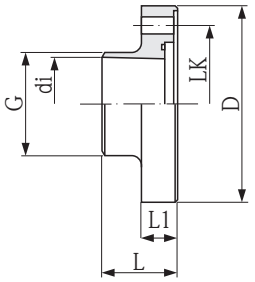
Clamp ISO 2852, Fig. 2, 1.4404 (316L)							
Order code for "Process connection", option IBS	**DN** [in]	**Suitable for pipe ISO 2037/BS 4825-1** [in]	**DN Clamp ISO 2852** [in]	**di** [in]	**G** [in]	**L** [in]	**H × B** [in]
	1	0.96 × 0.06	1	0.89	2.00	1.74	2.83 × 2.17
	Length = (2 × L) + 3.39 in Please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

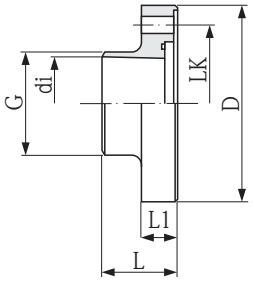
Tri-Clamp L14 AM7, 1.4404 (316L)						
Order code for "Process connection", option FAS	**DN** [in]	**Suitable for pipe OD** [in]	**di** [in]	**G** [in]	**L** [in]	**H × B** [in]
	1/12 to 5/16	½	0.37	1	1.12	2.44 × 1.65
	½	¾	0.62	25	1.12	2.44 × 1.65
	1	1	0.87	2	1.12	2.83 × 2.17
	Length = (2 × L) + 3.39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

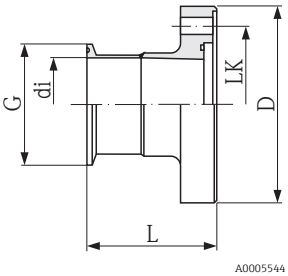
Coupling SC DIN 11851, threaded connection, 1.4404 (316L)						
Order code for "Process connection", option DCS	**DN** [in]	**Suitable for pipe DIN 11850** [in]	**di** [in]	**G** [in]	**L** [in]	**H × B** [in]
	½	Pipe ODT ¾	0.63	Rd0.05 × 0.13	1.73	2.44 × 1.65
	Length = (2 × L) + 3.39 in Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.					

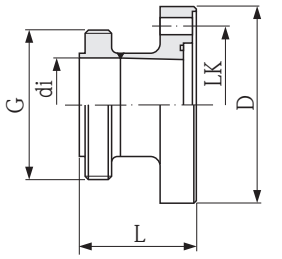
Coupling SMS 1145, threaded connection, 1.4404 (316L)							
Order code for "Process connection", option SAS	**DN** [in]	**Suitable for pipe OD** [in]	**DN SMS 1145** [in]	**di** [in]	**G** [in]	**L** [in]	**H × B** [in]
	1	1	1	0.89	Rd1.57 × 0.17	1.21	2.83 × 2.17
	Length = (2 × L) + 3.39 in Please note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

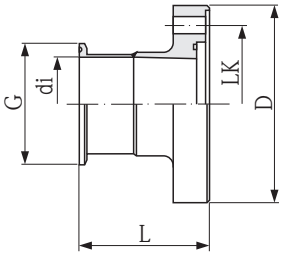
Process connections DN 1 ½ to 6" with aseptic molded seal

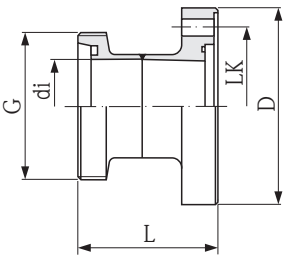
Welded connection ASME BPE, 1.4404 (316L)									
Order code for "Process connection", option AAS	**DN** [in]	**Suitable for pipe ASME BPE** [in]	**di** [in]	**G** [in]	**D** [in]	**L** [in]	**L1** [in]	**LK** [in]	**L_{tot} 1)** [in]
	1 ½	1.50 × 0.06	1.37	1.50	3.93	1.69	0.71	2.80	8.66
	2	2.00 × 0.06	1.87	2.00	4.44	1.69	0.71	3.29	8.66
	3	3.00 × 0.06	2.87	3.00	5.54	1.69	0.71	4.49	8.66
	4	4.00 × 0.08	3.83	4.00	6.56	1.69	0.71	5.55	8.66
	6	6.00 × 0.11	5.90	6.00	8.93	2.09	0.98	7.87	11.8
	1) L_{tot} = length Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.								

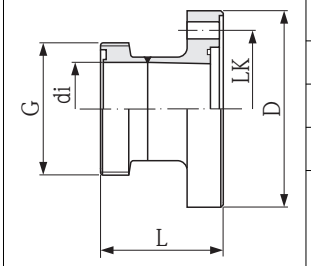
Welded connection ISO 2037, 1.4404 (316L)									
Order code for "Process connection", option IAS	**DN** [in]	**Suitable for pipe ISO 2037** [in]	**di** [in]	**G** [in]	**D** [in]	**L** [in]	**L1** [in]	**LK** [in]	**L_{tot} 1)** [in]
	1 ½	1.50 × 0.05	1.40	1.50	3.93	1.69	0.71	2.80	8.66
	2	2.00 × 0.05	1.91	2.01	4.44	1.69	0.71	3.29	8.66
	3	3.00 × 0.06	2.87	3.00	5.54	1.69	0.71	4.49	8.66
	4	2.50 × 0.08	3.84	4.00	6.56	1.69	0.71	5.55	8.66
	5	4.00 × 0.08	5.34	5.50	7.82	3.66	0.98	6.73	15.0
	6	6.63 × 0.10	6.42	6.63	8.93	3.66	0.98	7.87	15.0
	1) L_{tot} = length Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.								

Clamp ISO 2852, Fig. 2, 1.4404 (316L)									
Order code for "Process connection", option IBS	**DN** [in]	**Suitable for pipe ISO 2037/BS 4825-1** [in]	**DN Clamp ISO 2852** [in]	**di** [in]	**G** [in]	**D** [in]	**L** [in]	**LK** [in]	**L_{tot} 1)** [in]
	1 ½	1.50 × 0.06	1.50	1.40	1.99	3.93	1.69	2.80	8.66
	2	2.00 × 0.06	2.01	1.91	2.52	4.44	1.69	3.29	8.66
	3	3.00 × 0.06	3.00	2.87	3.58	5.54	1.69	4.49	8.66
	4	2.50 × 0.08	4.00	3.84	4.69	6.56	1.69	5.55	8.66
	5	4.00 × 0.08	5.50	5.34	6.10	7.82	2.09	6.73	11.8
	6	6.63 × 0.10	6.63	6.42	7.20	8.93	2.09	7.87	11.8
	1) L_{tot} = length Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.								

Coupling ISO 2853, threaded connection, 1.4404 (316L)									
Order code for "Process connection", option ICS	**DN** [in]	**Suitable for pipe ISO 2037/BS 4825-1** [in]	**DN Clamp ISO 2853** [in]	**di** [in]	**G** [in]	**D** [in]	**L** [in]	**LK** [in]	**L_{tot}[1)]** [in]
 A0005542	1 ½	1.50 × 0.06	1.50	1.40	Tr 2.00 × 0.13	3.93	2.40	2.80	10.8
	2	2.00 × 0.06	2.01	1.91	Tr 2.52 × 0.13	4.44	2.40	3.29	10.8
	3	3.00 × 0.06	3.00	2.87	Tr 3.58 × 0.13	5.54	2.80	4.49	10.9
	4	2.50 × 0.08	4.00	3.84	Tr 4.65 × 0.13	6.56	2.99	5.55	11.3
	[1)] L_{tot} = length Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.								

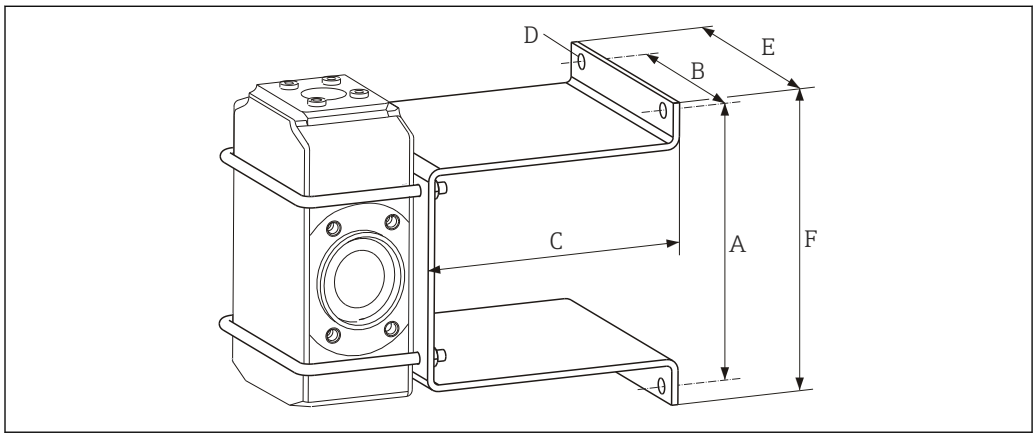
Tri-Clamp for L14 AM7, 1.4404 (316L)								
Order code for "Process connection", option FAS	**DN** [in]	**Suitable for pipe ODT/SMS** [in]	**di** [in]	**G** [in]	**D** [in]	**L** [in]	**LK** [in]	**L_{tot}[1)]** [in]
 A0005543	1 ½	1.50 × 0.06	1.37	1.98	3.93	1.69	2.80	8.66
	2	2.00 × 0.06	1.87	2.52	4.44	1.69	3.29	8.66
	3	3.00 × 0.06	2.87	3.58	5.54	1.69	4.49	8.66
	4	4.00 × 0.08	3.83	4.68	6.56	1.69	5.55	8.66
	6	6.00 × 0.11	5.90	6.57	8.93	2.09	7.87	11.8
	[1)] L_{tot} = length Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.							

Coupling SC DIN 11851, threaded connection, 1.4404 (316L)								
Order code for "Process connection", option DCS	**DN** [in]	**Suitable for pipe DIN 11850** [in]	**di** [in]	**G** [in]	**D** [in]	**L** [in]	**LK** [in]	**L_{tot}[1)]** [in]
 A0005540	1 ½	1.65 × 0.06	1.5	Rd 2.56 × 1/6	3.93	2.48	2.80	10.2
	2	2.13 × 0.06	1.97	Rd 3.07 × 1/6	4.44	2.48	3.29	10.2
	3	3.35 × 0.08	3.19	Rd 4.33 × 1/4	5.54	2.87	4.49	11.0
	4	4.09 × 0.08	3.94	Rd 5.12 × 1/4	6.56	3.07	5.55	11.4
	5	5.08 × 0.08	4.92	Rd 6.30 × 1/4	7.82	3.66	6.73	15.0
	6	6.06 × 0.08	5.91	Rd 6.30 × 1/4	8.93	3.86	7.87	15.4
	[1)] L_{tot} = length Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.							

Coupling SMS 1145, threaded connection, 1.4404 (316L)									
Order code for "Process connection", option SAS	DN [in]	Suitable for pipe ODT [in]	DN SMS 1145 [in]	di [in]	G [in]	D [in]	L [in]	LK [in]	L_{tot} [1)] [in]
	1 ½	1.50 × 0.06	1.50	1.37	Rd 2.36 × 1/6	3.93	2.40	2.80	10.1
	2	2.00 × 0.06	2.00	1.87	Rd 2.76 × 1/6	4.44	2.40	3.29	10.1
	3	3.00 × 0.06	3.00	2.86	Rd 3.86 × 1/6	5.54	2.80	4.49	10.9
	4	4.00 × 0.08	4.00	3.83	Rd 5.20 × 1/6	6.56	2.99	5.55	11.3
	[1)] L_{tot} = length Please note the internal diameters of the measuring tube and process connection (di) when cleaning with pigs.								

Accessories

Wall mounting kit DN 2 to 25 (1/12 to 1")



Dimensions in SI units

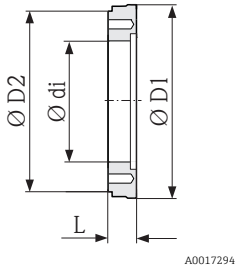
A [mm]	B [mm]	C [mm]	Ø D [mm]	E [mm]	F [mm]
125	88	120	7	110	140

Dimensions in US units

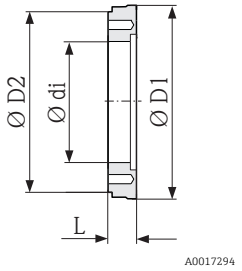
A [in]	B [in]	C [in]	Ø D [in]	E [in]	F [in]
4.92	3.46	4.72	0.28	4.33	5.51

Spacer DN 80 to 100 (3 to 4")

Dimensions in SI units

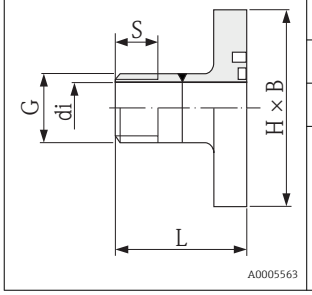
Order code DK5HB-****	DN [mm]	di [mm]	D1 [mm]	D2 [mm]	L [mm]
	80	72.9	140.7	141	33
	100	97.4	166.7	162	33

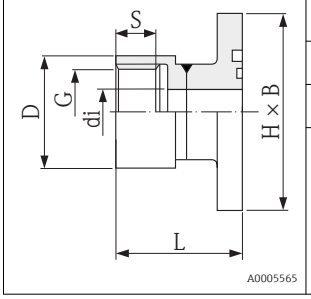
Dimensions in US units

Order code DK5HB-****	DN [in]	di [in]	D1 [in]	D2 [in]	L [in]
	3	2.87	5.54	5.55	1.30
	4	3.83	6.56	6.38	1.30

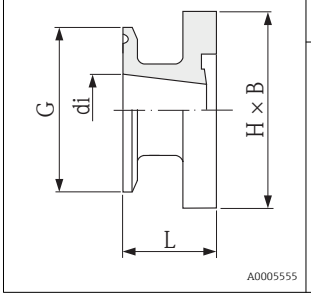
Process connections that can be ordered in SI units

Process connections DN 2 to 25 with O-ring seal

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

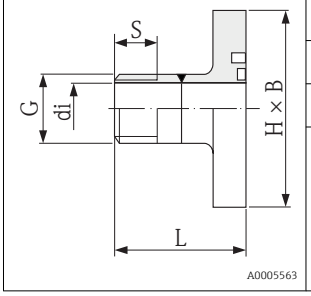
Internal thread, 1.4404 (316L)								
Order code DKH**-GC**	DN [mm]	Suitable for external thread NP [in]	di [mm]	G [in]	D [mm]	L [mm]	S [mm]	H × B [mm]
	2 to 8	NPT3/8	8.9	3/8	22	45	13	62 × 42
	15	NPT ½	16	½	27	45	14	62 × 42
	25 (1" ASME)	NPT1	27.2	1	40	51	17	72 × 55
	Length = (2 × L) + 86 mm							

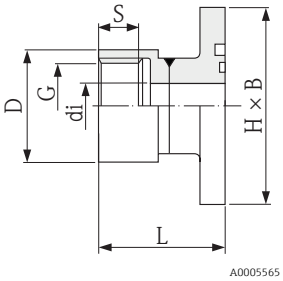
Process connections DN 2 to 25 with aseptic molded seal

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

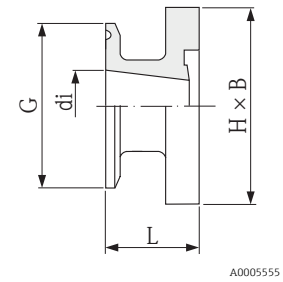
Process connections that can be ordered in US units

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

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

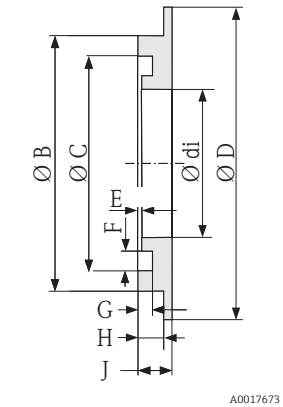
Internal thread, 1.4404 (316L)								
Order code DKH-GC****	**DN** [in]	**Suitable for external thread NP** [in]	**di** [in]	**G** [in]	**D** [in]	**L** [in]	**S** [in]	**H × B** [in]
	1/12 to 5/16	NPT3/8	0.35	3/8	0.87	1.77	0.51	2.44 × 1.65
	½	NPT ½	0.63	½	1.06	1.77	0.55	2.44 × 1.65
	1	NPT1	1.07	1	1.57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

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

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

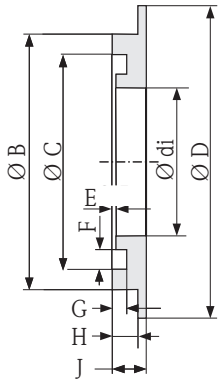
Grounding rings in SI units

For PVDF flanges, PVC adhesive sleeve

Grounding rings 1.4435 (316L), Alloy C22, tantalum										
Order code DK5HR-****	**DN** [mm]	**di** [mm]	**B** [mm]	**C** [mm]	**D** [mm]	**E** [mm]	**F** [mm]	**G** [mm]	**H** [mm]	**J** [mm]
	2 to 8	9	22	17.6	33.9	0.5	3.5	1.9	3.4	4.5
	15	16	29	24.6	33.9	0.5	3.5	1.9	3.4	4.5
	25 (DIN)	26	39	34.6	43.9	0.5	3.5	1.9	3.4	4.5

Grounding rings in US units

For PVDF flanges, PVC adhesive sleeve

Grounding rings 1.4435 (316L), Alloy C22, tantalum										
Order code DK5HR-****	DN [in]	di [in]	B [in]	C [in]	D [in]	E [in]	F [in]	G [in]	H [in]	J [in]
	1/12 to 5/16	0.35	0.87	0.69	1.33	0.02	0.14	0.07	0.13	0.18
	½	0.63	1.14	0.97	1.33	0.02	0.14	0.07	0.13	0.18
	1	0.89	1.44	1.23	1.73	0.02	0.14	0.07	0.13	0.18

Weight

Compact version

- Including the transmitter
- Weight specifications apply to standard pressure ratings and without packaging material.

Nominal diameter		Weight	
[mm]	[in]	[kg]	[lbs]
2	1/12	2.00	4.41
4	1/8	2.00	4.41
8	3/8	2.00	4.41
15	½	1.90	4.19
25	1	2.80	6.17
40	1 ½	4.10	9.04
50	2	4.60	10.1
65	–	5.40	11.9
80	3	6.00	13.2
100	4	7.30	16.1
125	5	12.7	28.0
150	6	15.1	33.3

Measuring tube specification

Nominal diameter		Pressure rating [1]	Process connection internal diameter	
		EN (DIN)	PFA	
[mm]	[in]	[bar]	[mm]	[in]
2	1/12	PN 16/40	2.25	0.09
4	1/8	PN 16/40	4.5	0.18
8	3/8	PN 16/40	9.0	0.35
15	½	PN 16/40	16.0	0.63
–	1	PN 16/40	22.6	0.89
25	–	PN 16/40	26.0	1.02
40	1 ½	PN 16/25/40	35.3	1.39

Nominal diameter		Pressure rating [1]	Process connection internal diameter
		EN (DIN)	PFA
[mm]	[in]	[bar]	[mm]	[in]
50	2	PN 16/25	48.1	1.89
65	–	PN 16/25	59.9	2.36
80	3	PN 16/25	72.6	2.86
100	4	PN 16/25	97.5	3.84
125	5	PN 10/16	120.0	4.72
150	6	PN 10/16	146.5	5.77

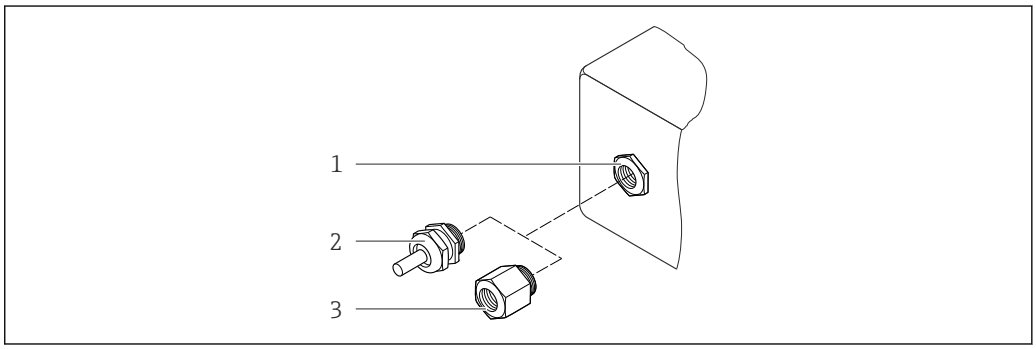
1) Depending on process connection and seals used

Materials

Transmitter housing

- Order code for "Housing", option **A** "Compact, aluminum coated":
  Coated aluminum AlSi10Mg
- Order code for "Housing", option **B** "Compact, hygienic, stainless":
  Hygienic version, stainless steel 1.4301 (304)
- Order code for "Housing", option **C** "Ultra compact hygienic, stainless":
  Hygienic version, stainless steel 1.4301 (304)

Cable entries/cable glands



35 *Possible cable entries/cable glands*

1 Cable entry in transmitter housing, wall-mount housing or connection housing with internal thread M20 x 1.5
2 Cable gland M20 x 1.5
3 Adapter for cable entry with internal thread G ½" or NPT ½"

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

The various cable entries are suitable for hazardous and non-hazardous areas.

Cable entry/cable gland	Material
Cable gland M20 × 1.5	Nickel-plated brass
Adapter for cable entry with internal thread G ½"	
Adapter for cable entry with internal thread NPT ½"	

Order code for "Housing", option B "Compact, hygienic, stainless"

The various cable entries are suitable for hazardous and non-hazardous areas.

Cable entry/cable gland	Material
Cable gland M20 × 1.5	Stainless steel 1.4404 (316L)
Adapter for cable entry with internal thread G ½"	
Adapter for cable entry with internal thread NPT ½"	

Device plug

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

Sensor housing

Stainless steel 1.4301 (304)

Measuring tubes

Stainless steel 1.4301 (304)

Liner

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

Process connections

- Stainless steel 1.4404 (316L)
- PVDF
- PVC adhesive sleeve

List of all available process connections (→ 77)

Electrodes

- Standard: 1.4435 (316L)
- Optional: Alloy C22, tantalum, platinum (only up to DN 25 (1"))

Seals

- O-ring seal (DN 2 to 25 (1/12 to 1")): EPDM, FKM, Kalrez
- Aseptic molded seal (DN 2 to 150 (1/12 to 6")): EPDM [1], FKM, silicone [1]

Accessories

Grounding rings

- Standard: 1.4435 (316L)
- Optional: Alloy C22, tantalum

Wall mounting kit

Stainless steel 1.4301 (304)

Spacer

1.4435 (316L)

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

Fitted electrodes

- 2 measuring electrodes for signal detection
- 1 empty pipe detection electrode for empty pipe detection/temperature measurement (only DN 15 to 150 (½ to 6"))

Process connections

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

With aseptic molded seal:
- Welded connection (DIN 11850, ASME BPE, ISO 2037)
- Clamp (ISO 2852, ISO 2853, DIN 32676, L14 AM7)
- Coupling (DIN 11851, DIN 11864-1, ISO 2853, SMS 1145)
- Flange DIN 11864-2

For information on the materials of the process connections (→ 76)

Surface roughness

Electrodes with 1.4435 (316L), Alloy C22, platinum, tantalum:
≤ 0.3 to 0.5 µm (11.8 to 19.7 in)
(All data relate to parts in contact with fluid)

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

Stainless steel process connections:
≤ 0.8 µm (31 µin)
Optional: ≤ 0.38 µm (15 µin)
(All data relate to parts in contact with fluid)

Operability

Operating concept

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

Rapid and safe commissioning
- Individual menus for applications
- Menu guidance with brief explanations of the individual parameter functions

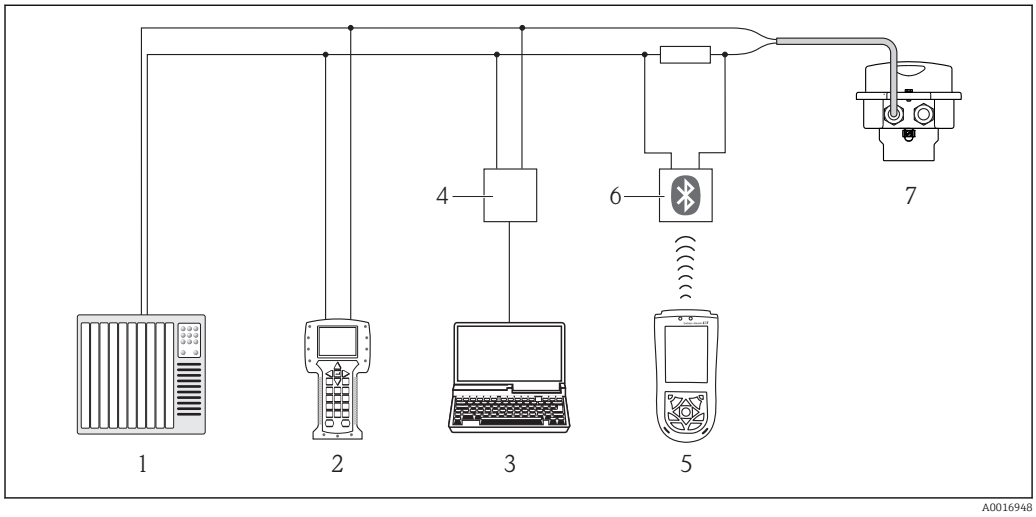
Reliable operation
- Operation in the following languages:
  - Via "FieldCare" operating tool:
    English, German, French, Spanish, Italian, Dutch, Chinese, Japanese
  - Via Web browser:
    English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Bahasa (Indonesian), Vietnamese, Czech
- Uniform operating philosophy applied to operating tools and Web browser
- If replacing the electronic module, transfer the device configuration via the plug-in memory (HistoROM DAT) which contains the process and measuring device data and the event logbook. No need to reconfigure.
  For devices with Modbus RS485, the data recovery function is implemented without the plug-in memory (HistoROM DAT).

Efficient diagnostics increase measurement availability
- Troubleshooting measures can be called up via the operating tools and Web browser
- Diverse simulation options
- Status indicated by several light emitting diodes (LEDs) on the electronic module in the housing compartment

Remote operation

Via HART protocol

This communication interface is present in the following device version:
Order code for "Output", option **B**: 4-20 mA HART, pulse/frequency/switch output

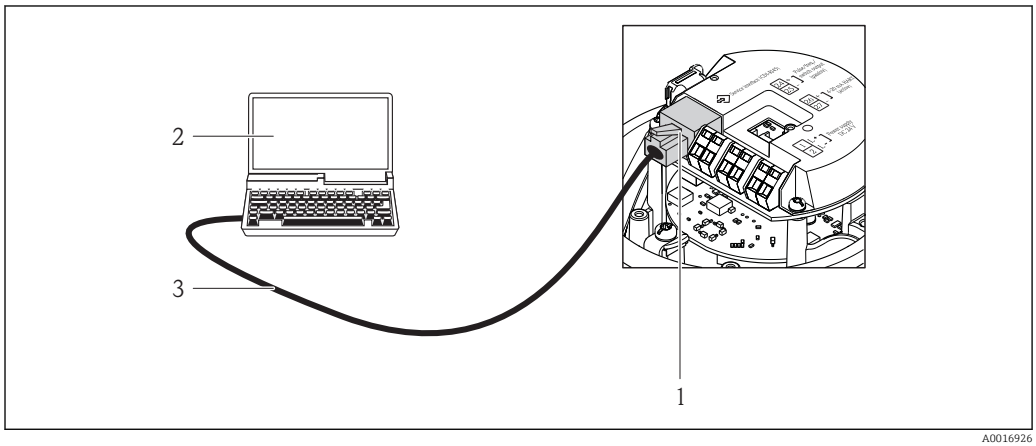


36 Options for remote operation via HART protocol

1 *Control system (e.g. PLC)*
2 *Field Communicator 475*
3 *Computer with operating tool (e.g. FieldCare, AMS Device Manager, SIMATIC PDM)*
4 *Commubox FXA195 (USB)*
5 *Field Xpert SFX100*
6 *VIATOR Bluetooth modem with connecting cable*
7 *Transmitter*

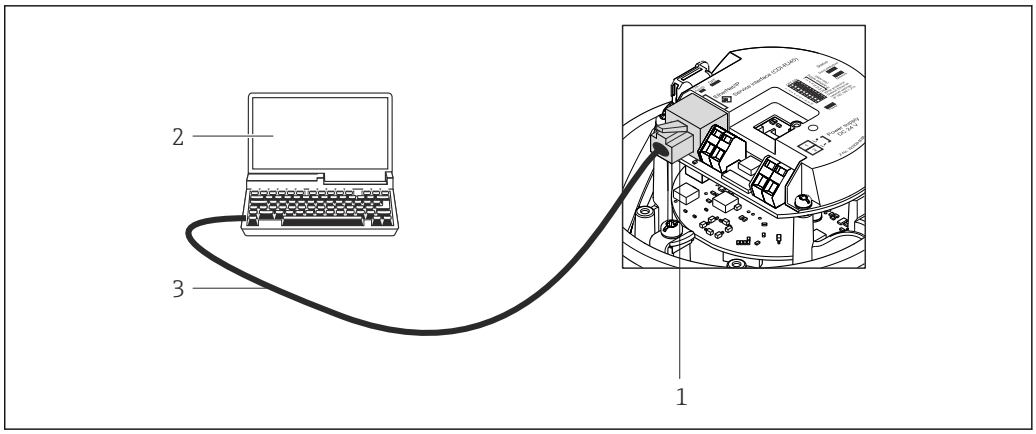
Via service interface (CDI-RJ45)

This communication interface is present in the following device version:
- Order code for "Output", option **B**: 4-20 mA HART, pulse/frequency/switch output
- Order code for "Output", option **L**: PROFIBUS DP
- Order code for "Output", option **N**: EtherNet/IP



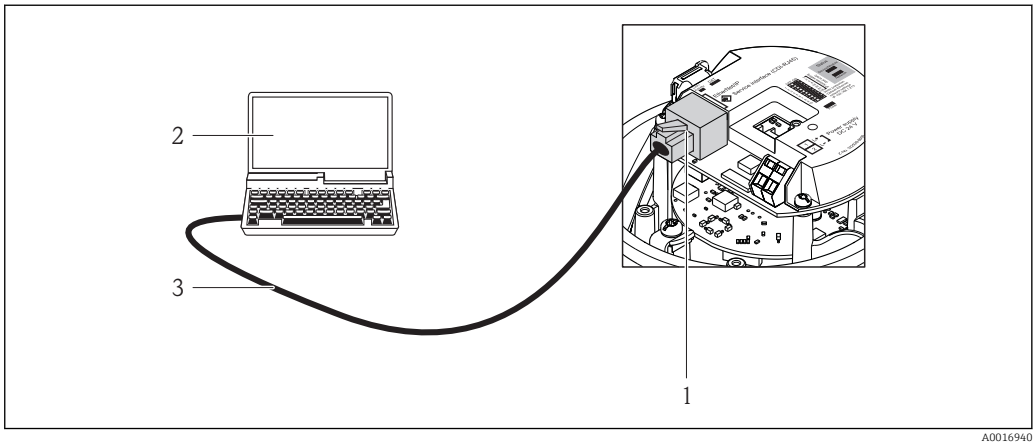
37 Connection for the order code for "Output", option B: 4-20 mA HART, pulse/frequency/switch output

1 *Service interface (CDI -RJ45) of the measuring device with access to the integrated Web server*
2 *Computer with Web browser (e.g. Internet Explorer) for accessing the integrated device Web server or with "FieldCare" operating tool with COM DTM "CDI Communication TCP/IP"*
3 *Standard Ethernet connecting cable with RJ45 plug*



38 *Connection for order code for "Output", option L: PROFIBUS DP*

1 *Service interface (CDI -RJ45) of the measuring device with access to the integrated Web server*
2 *Computer with Web browser (e.g. Internet Explorer) for accessing the integrated device Web server or with "FieldCare" operating tool with COM DTM "CDI Communication TCP/IP"*
3 *Standard Ethernet connecting cable with RJ45 plug*

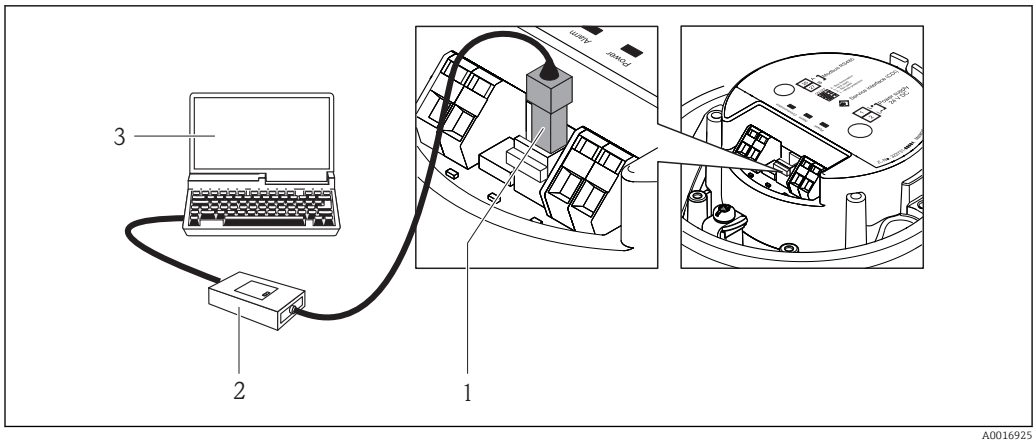


39 *Connection for order code for "Output", option N: EtherNet/IP*

1 *Service interface (CDI -RJ45) and EtherNet/IP interface of the measuring device with access to the integrated Web server*
2 *Computer with Web browser (e.g. Internet Explorer) for accessing the integrated device Web server or with "FieldCare" operating tool with COM DTM "CDI Communication TCP/IP"*
3 *Standard Ethernet connecting cable with RJ45 plug*

Via service interface (CDI)

This communication interface is present in the following device version:
Order code for "Output", option **M**: Modbus RS485

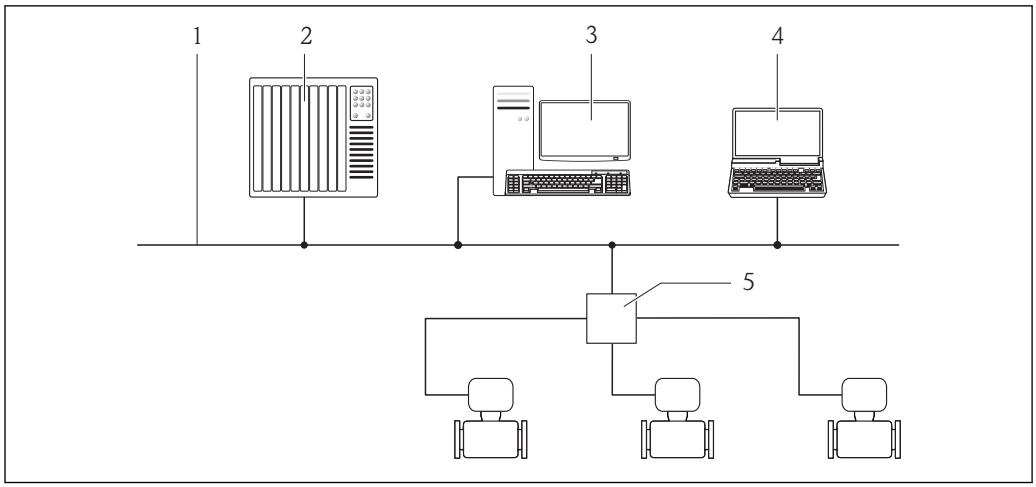


A0016925

1 Service interface (CDI) of the measuring device
2 Commubox FXA291
3 Computer with "FieldCare" operating tool with COM DTM "CDI Communication FXA291"

Via Ethernet network

This communication interface is present in the following device version:
Order code for "Output", option **N**: EtherNet/IP

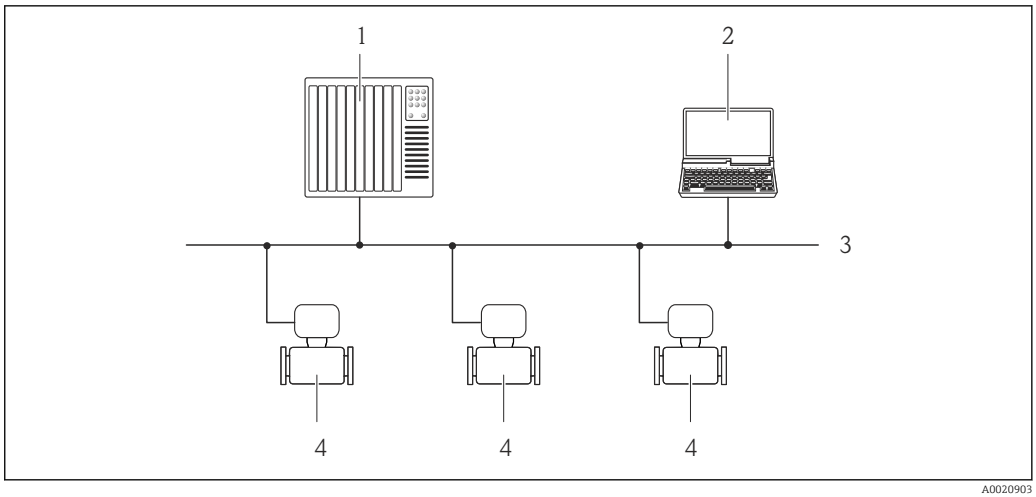


A0016961

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

Via PROFIBUS DP network

This communication interface is present in the following device version:
Order code for "Output", option **L**: PROFIBUS DP



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

Certificates and approvals

CE mark

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

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

C-Tick symbol

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

Ex approval

The measuring device is certified for use in hazardous areas and the relevant safety instructions are provided in the separate "Safety Instructions" (XA) document. Reference is made to this document on the nameplate.

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

ATEX, IECEx

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

Ex nA

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

cCSAus

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

NI

Category	Type of protection
Class I Division 2 Groups ABCD	NI (Non-incendive version), NIFW parameter [1]

1) Entity and NIFW parameter in accordance with Control Drawings

Sanitary compatibility

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

Certification PROFIBUS	**PROFIBUS interface** The measuring device is certified and registered by the PROFIBUS User Organization (PNO). The measuring system meets all the requirements of the following specifications: ▪ Certified in accordance with PROFIBUS PA Profile 3.02 ▪ The device can also be operated with certified devices of other manufacturers (interoperability)
Modbus RS485 certification	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.
EtherNet/IP certification	The measuring device is certified and registered by the ODVA (Open Device Vendor Association). The measuring system meets all the requirements of the following specifications: ▪ Certified in accordance with the ODVA Conformance Test ▪ EtherNet/IP Performance Test ▪ EtherNet/IP PlugFest compliance ▪ The device can also be operated with certified devices of other manufacturers (interoperability)
Pressure Equipment Directive	The devices can be ordered with or without a PED approval. If a device with a PED approval is required, this must be explicitly stated in the order. For devices with nominal diameters less than or equal to DN 25 (1"), this is neither possible nor necessary. ▪ With the PED/G1/x (x = category) marking on the sensor nameplate, Endress+Hauser confirms compliance with the "Essential Safety Requirements" specified in Annex I of the Pressure Equipment Directive 97/23/EC. ▪ Devices bearing this marking (PED) are suitable for the following types of medium: Media in Group 1 and 2 with a vapor pressure greater than, or smaller and equal to0.5 bar (7.3 psi) ▪ Devices not bearing this marking (PED) are designed and manufactured according to good engineering practice. They meet the requirements of Art.3 Section 3 of the Pressure Equipment Directive 97/23/EC. The range of application is indicated in tables 6 to 9 in Annex II of the Pressure Equipment Directive.
Other standards and guidelines	▪ EN 60529 Degrees of protection by housing (IP code) ▪ EN 61010-1 Protection Measures for Electrical Equipment for Measurement, Control, Regulation and Laboratory Procedures. ▪ IEC/EN 61326 Emission in accordance with Class A requirements. Electromagnetic compatibility (EMC requirements) ▪ NAMUR NE 21 Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment. ▪ NAMUR NE 32 Data Retention in the Event of a Power Failure in Field and Control Instruments with Microprocessors ▪ NAMUR NE 43 Standardization of the signal level for the breakdown information of digital transmitters with analog output signal. ▪ NAMUR NE 53 Software of field devices and signal-processing devices with digital electronics ▪ NAMUR NE 105 Specifications for Integrating Fieldbus Devices in Engineering Tools for Field Devices ▪ NAMUR NE 107 Self-monitoring and diagnosis of field devices ▪ NAMUR NE 131 Requirements for field devices for standard applications

Ordering information

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

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

Application packages

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

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

Heartbeat Technology

Package	Description
Heartbeat Verification +Monitoring	**Heartbeat Monitoring:** Continuously supplies monitoring data, which are characteristic of the measuring principle, for an external condition monitoring system. This makes it possible to: ▪ Draw conclusions - using these data and other information - about the impact the measuring application has on the measuring performance over time. ▪ Schedule servicing in time. ▪ Monitor the product quality, e.g. gas pockets. **Heartbeat Verification:** Makes it possible to check the device functionality on demand when the device is installed, without having to interrupt the process. ▪ Access via onsite operation or other interfaces (requires no on-site presence). ▪ Ideal solution for recurring device checks (SIL). ▪ End-to-end, traceable documentation of the verification results and verification report. ▪ Extension of calibration intervals.

Accessories

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

Device-specific accessories

For the transmitter

Accessories	Description
Adapter set	Adapter connections for installing Promag H instead of a Promag 30/33 A or Promag 30/33 H (DN 25) device. Consists of: ▪ 2 process connections ▪ Threaded fasteners ▪ Seals
Seal set	For the regular replacement of seals for the sensor.

Spacer	If replacing a DN 80/100 sensor in an existing installation, a spacer is needed if the new sensor is shorter.
Welding jig	Welded connection as process connection: welding jig for installation in pipe.
Grounding rings	Are used to ground the fluid in lined measuring tubes to ensure proper measurement. For details, see Installation Instructions EA00070D
Mounting kit	Consists of: ▪ 2 process connections ▪ Threaded fasteners ▪ Seals
Wall mounting kit	Wall mounting kit for measuring device (only DN 2 to 25 (1/12 to 1"))

For the sensor

Accessories	Description
Adapter set	Adapter connections for installing Promag H instead of a Promag 30/33 A or Promag 30/33 H (DN 25) device. Consists of: ▪ 2 process connections ▪ Threaded fasteners ▪ Seals
Seal set	For the regular replacement of seals for the sensor.
Spacer	If replacing a DN 80/100 sensor in an existing installation, a spacer is needed if the new sensor is shorter.
Welding jig	Welded connection as process connection: welding jig for installation in pipe.
Grounding rings	Are used to ground the fluid in lined measuring tubes to ensure proper measurement. For details, see Installation Instructions EA00070D
Mounting kit	Consists of: ▪ 2 process connections ▪ Threaded fasteners ▪ Seals
Wall mounting kit	Wall mounting kit for measuring device (only DN 2 to 25 (1/12 to 1"))

Communication-specific accessories

Accessories	Description
Commubox FXA195 HART	For intrinsically safe HART communication with FieldCare via the USB interface. For details, see "Technical Information" TI00404F
Commubox FXA291	Connects Endress+Hauser field devices with a CDI interface (= Endress+Hauser Common Data Interface) and the USB port of a computer or laptop. For details, see "Technical Information" TI00405C
HART Loop Converter HMX50	Is used to evaluate and convert dynamic HART process variables to analog current signals or limit values. For details, see "Technical Information" TI00429F and Operating Instructions BA00371F
Wireless HART adapter SWA70	Is used for the wireless connection of field devices. The WirelessHART adapter can be easily integrated into field devices and existing infrastructures, offers data protection and transmission safety and can be operated in parallel with other wireless networks with minimum cabling complexity. For details, see Operating Instructions BA00061S

Fieldgate FXA320	Gateway for the remote monitoring of connected 4-20 mA measuring devices via a Web browser. For details, see "Technical Information" TI00025S and Operating Instructions BA00053S
Fieldgate FXA520	Gateway for the remote diagnostics and remote configuration of connected HART measuring devices via a Web browser. For details, see "Technical Information" TI00025S and Operating Instructions BA00051S
Field Xpert SFX100	Compact, flexible and robust industry handheld terminal for remote configuration and for obtaining measured values via the HART current output (4-20 mA). For details, see Operating Instructions BA00060S

Service-specific accessories

Accessories	Description
Applicator	Software for selecting and sizing Endress+Hauser measuring devices: ▪ Calculation of all the necessary data for identifying the optimum flowmeter: e.g. nominal diameter, pressure loss, accuracy or process connections. ▪ Graphic illustration of the calculation results Administration, documentation and access to all project-related data and parameters over the entire life cycle of a project. Applicator is available: ▪ Via the Internet: https://wapps.endress.com/applicator ▪ On CD-ROM for local PC installation.
W@M	Life cycle management for your plant W@M supports you with a wide range of software applications over the entire process: from planning and procurement, to the installation, commissioning and operation of the measuring devices. All the relevant device information, such as the device status, spare parts and device-specific documentation, is available for every device over the entire life cycle. The application already contains the data of your Endress+Hauser device. Endress +Hauser also takes care of maintaining and updating the data records. W@M is available: ▪ Via the Internet: www.endress.com/lifecyclemanagement ▪ On CD-ROM for local PC installation.
FieldCare	FDT-based plant asset management tool from Endress+Hauser. It can configure all smart field units in your system and helps you manage them. By using the status information, it is also a simple but effective way of checking their status and condition. For details, see Operating Instructions BA00027S and BA00059S

System components

Accessories	Description
Memograph M graphic display recorder	The Memograph M graphic data manager provides information on all the relevant measured variables. Measured values are recorded correctly, limit values are monitored and measuring points analyzed. The data are stored in the 256 MB internal memory and also on a SD card or USB stick. For details, see "Technical Information" TI00133R and Operating Instructions BA00247R

Documentation

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

Standard documentation

Communication	Document type	Documentation code
HART	Operating Instructions	BA01171D
EtherNet IP	Operating Instructions	BA01173D
Modbus	Operating Instructions	BA01175D
PROFIBUS DP	Operating Instructions	BA01237D
- - - -	Brief Operating Instructions	KA01142D

Supplementary device-dependent documentation

Document type	Approval	Documentation code
Safety Instructions	ATEX/IECEx Ex nA	XA01090D
Special Documentation	Modbus RS485 Register Information	SD01148D
Special Documentation	Heartbeat Technology	SD01149D
Installation Instructions		Specified for each individual accessory (→ 🖹 83)

Registered trademarks

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

PROFIBUS®
Registered trademark of the PROFIBUS User Organization, Karlsruhe, Germany

Modbus®
Registered trademark of SCHNEIDER AUTOMATION, INC.

EtherNet/IP™
Trademark of ODVA, Inc.

Microsoft®
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Endress+Hauser

People for Process Automation