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Technical Information
Proline Promag H 300

Electromagnetic flowmeter

Specialist for hygienic applications with a compact, easily accessible transmitter

Applications

- The bidirectional measuring principle is virtually independent of pressure, density, temperature and viscosity
- For applications with hygienic requirements

Device properties
- Liner made of PFA
- Hygienic version as per 3-A, EHEDG
- Wetted materials CIP/SIP cleanable
- Compact dual-compartment hygienic housing with IP69 and with up to 3 I/Os
- Backlit display with touch control and WLAN access
- Remote display available

Your benefits

- Flexible installation – hygienic measurement with 0 x DN inlet run and numerous process connections
- Energy-saving flow measurement – no pressure loss due to cross section constriction
- Maintenance-free – no moving parts
- Full access to process and diagnostic information – numerous, freely combinable I/Os and Ethernet
- Reduced complexity and variety – user-configurable I/O functionality
- Built-in verification – Heartbeat Technology

Endress+Hauser
People for Process Automation

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About this document

Electrical symbols

Symbol	Meaning
	Direct current
	Alternating current
	Direct current and alternating current
	**Ground connection** A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
	**Protective earth (PE)** Ground terminals that must be connected to ground prior to establishing any other connections. The ground terminals are located on the interior and exterior of the device: ▪ Interior ground terminal: protective earth is connected to the mains supply. ▪ Exterior ground terminal: device is connected to the plant grounding system.

Communication-specific symbols

Symbol	Meaning
	**Wireless Local Area Network (WLAN)** Communication via a wireless, local area network
	**LED** LED is off.
	**LED** LED is on.
	**LED** LED flashing.

Symbols for certain types of information

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

Symbols in graphics

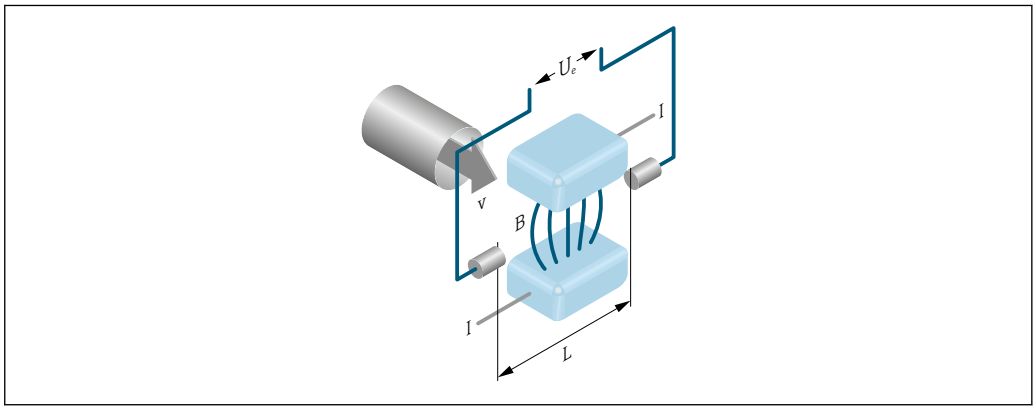
Symbol	Meaning
1, 2, 3, ...	Item numbers
1., 2., 3., ...	Series of steps
A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections

Symbol	Meaning
	Hazardous area
	Safe area (non-hazardous area)
	Flow direction

Function and system design

Measuring principle

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



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

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

Formulae for calculation

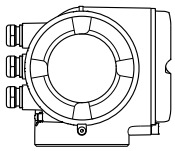
- Induced voltage $U_e = B \cdot L \cdot v$
- Volume flow $Q = A \cdot v$

Measuring system

The device consists of a transmitter and a sensor.

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

Transmitter

Proline 300
 
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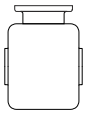
	Device versions and materials:
	▪ Transmitter housing
	  ▪ Aluminum, coated: aluminum, AlSi10Mg, coated
	  ▪ Stainless, hygienic: stainless steel, 1.4404
	▪ Material of window in transmitter housing:
	  ▪ Aluminum, coated: glass
	  ▪ Stainless, hygienic: polycarbonate
	
	Configuration:
	▪ External operation via 4-line, illuminated graphic local display (LCD) with touch control and guided menus ("Make-it-run" wizards) for application-specific commissioning.
	▪ Via service interface or WLAN interface:
	  ▪ Operating tools (e.g. FieldCare, DeviceCare)
	  ▪ Web server (access via web browser)

Sensor

Promag H
 
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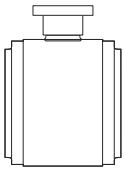
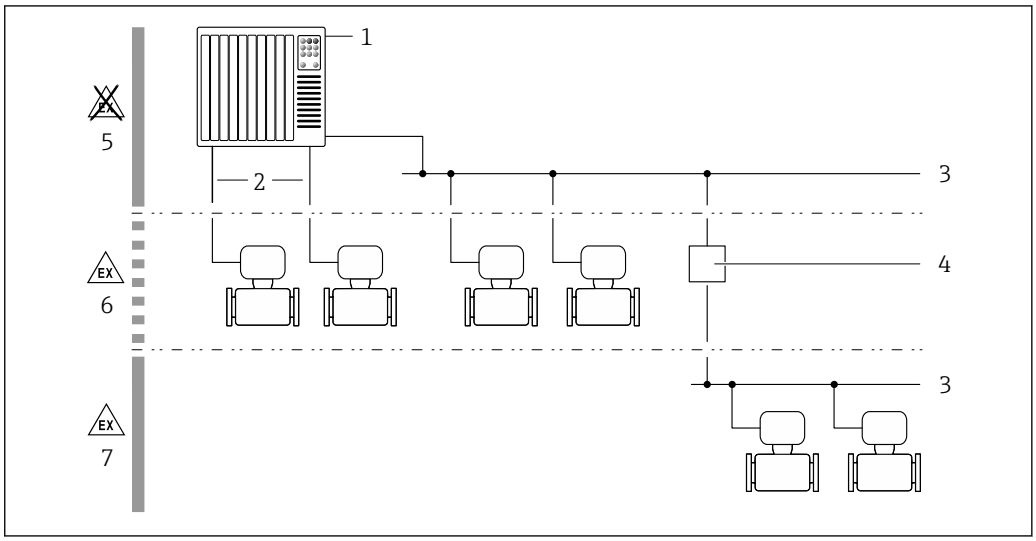
 
A0019898
	Nominal diameter range: DN 2 to 150 (1/12 to 6")
	
	Materials:
	▪ Sensor housing: stainless steel, 1.4301 (304)
	▪ Measuring tubes: stainless steel, 1.4301 (304)
	▪ Liner: PFA
	▪ Electrodes: stainless steel, 1.4435 (316L); Alloy C22, 2.4602 (UNS N06022); tantalum (Ta 2.5 W); platinum (Pl/lr 20%) (only up to DN 25 (1"))
	▪ Process connections: stainless steel, 1.4404 (F316L); PVDF; PVC adhesive sleeve
	▪ Seals:
	  ▪ DN 2 to 25 (1/12 to 1"): O-ring seal (EPDM, FKM, Kalrez), aseptic gasket seal (EPDM, FKM, silicone)
	  ▪ DN 40 to 150 (1 ½ to 6"): aseptic gasket seal (EPDM, FKM, silicone)
	▪ Grounding rings: stainless steel, 1.4435 (316L); Alloy C22, 2.4602 (UNS N06022); tantalum

Equipment architecture



1 *Possibilities for integrating measuring instruments into a system*

1 *Automation system (e.g. PLC)*
2 *Connection cable (0/4 to 20 mA HART etc.)*
3 *Fieldbus*
4 *Coupler*
5 *Non-hazardous area*
6 *Hazardous area: Zone 2; Class I, Division 2*
7 *Hazardous area: Zone 1; Class I, Division 1*

Dependability

IT security

The manufacturer warranty is valid only if the product is installed and used as described in the Operating Instructions. The product is equipped with security mechanisms to protect it against any inadvertent changes to the settings.

IT security measures, which provide additional protection for the product and associated data transfer, must be implemented by the operators themselves in line with their security standards.

Device-specific IT security

The device offers a range of specific functions to support protective measures on the operator's side. These functions can be configured by the user and guarantee greater in-operation safety if used correctly. The following list provides an overview of the most important functions:

Function/interface	Factory setting	Recommendation
Write protection via hardware write protection switch → 🖹 8	Not enabled	On an individual basis following risk assessment
Access code (also applies to web server login or FieldCare connection) → 🖹 8	Not enabled (0000)	Assign a customized access code during commissioning
WLAN (order option in display module)	Enabled	On an individual basis following risk assessment
WLAN security mode	Enabled (WPA2-PSK)	Do not change
WLAN passphrase (Password) → 🖹 8	Serial number	Assign an individual WLAN passphrase during commissioning
WLAN mode	Access point	On an individual basis following risk assessment
Web server → 🖹 8	Enabled	On an individual basis following risk assessment
Service interface CDI-RJ45 → 🖹 9	Enabled	-

Protecting access via hardware write protection

Write access to the parameters of the device via the local display, web browser or operating tool (e.g. FieldCare, DeviceCare) can be disabled via a write protection switch (DIP switch on the main electronics module). When hardware write protection is enabled, only read access to the parameters is possible.

Hardware write protection is disabled when the device is delivered.

Protecting access via a password

Different passwords are available to protect write access to the device parameters or access to the device via the WLAN interface.

- User-specific access code
  Protect write access to the device parameters via the local display, web browser or operating tool (e.g. FieldCare, DeviceCare). Access authorization is clearly regulated through the use of a user-specific access code.
- WLAN passphrase
  The network key protects a connection between an operating unit (e.g. notebook or tablet) and the device via the WLAN interface which can be ordered as an option.
- Infrastructure mode
  When the device is operated in infrastructure mode, the WLAN passphrase corresponds to the WLAN passphrase configured on the operator side.

User-specific access code

Local display, web browser and operating tool (e.g. FieldCare, DeviceCare)
- Write access to the device parameters via the local display, web browser or operating tool (e.g. FieldCare, DeviceCare) can be protected by the modifiable, user-specific access code.
- When delivered, the device does not have an access code; the default value is *0000* (open).

WLAN passphrase: Operation as WLAN access point

A connection between an operating unit (e.g. notebook or tablet) and the device via the WLAN interface, which can be ordered as an optional extra, is protected by the network key. The WLAN authentication of the network key complies with the IEEE 802.11 standard.

When the device is delivered, the network key is pre-defined depending on the device. It can be changed via the **WLAN settings** submenu in the **WLAN passphrase** parameter.

Infrastructure mode

A connection between the device and WLAN access point is protected by means of an SSID and passphrase on the system side. Please contact the relevant system administrator for access.

General notes on the use of passwords

- The access code and network key supplied with the device should be changed during commissioning for security reasons.
- Follow the general rules for generating a secure password when defining and managing the access code or network key.
- The user is responsible for the management and careful handling of the access code and network key.

Access via web server

The integrated web server can be used to operate and configure the device via a web browser. The connection is established via the service interface (CDI-RJ45) or WLAN interface . For device versions with the Ethernet/IP and PROFINET communication protocols, the connection can also be established via the terminal connection for signal transmission with Ethernet/IP, PROFINET (RJ45 plug), PROFINET over Ethernet-APL (two-wire) or Modbus TCP over Ethernet-APL.

The web server is enabled when the device is delivered. The web server can be disabled if necessary via the **Web server functionality** parameter (e.g., after commissioning).

The device and status information can be hidden on the login page. This prevents unauthorized access to the information.

For detailed information on device parameters, see: Description of Device Parameters.

Access via OPC UA

The "OPC UA Server" application package is available in the device version with the HART communication protocol → 123.

The device can communicate with OPC UA clients using the "OPC UA Server" application package.

The OPC UA server integrated in the device can be accessed via the WLAN access point using the WLAN interface - which can be ordered as an optional extra - or the service interface (CDI-RJ45) via Ethernet network. Access rights and authorization as per separate configuration.

The following Security Modes are supported as per the OPC UA Specification (IEC 62541):
- Without
- Basic128Rsa15 – signed
- Basic128Rsa15 – signed and encrypted

Access via service interface (port 2): CDI-RJ45

The device can be connected to a network via the service interface. Device-specific functions guarantee the secure operation of the device in a network.

The use of relevant industrial standards and guidelines that have been defined by national and international safety committees, such as IEC/ISA62443 or the IEEE, is recommended. This includes organizational security measures such as the assignment of access authorization as well as technical measures such as network segmentation.

PROFINET, Ethernet/IP:

The device can be integrated into a ring topology. The device is integrated via the terminal connection for signal transmission, output 1 (port 1) and the terminal connection to the service interface (port 2)→ 113.

For detailed information on connecting transmitters with an Ex de approval, see separate document "Safety instructions" (XA) for the device.

Advanced safety requirements

If the specified requirements for measures cannot be met, alternative measures may need to be put in place. This may involve, for example, mechanical protection of the product against tampering, the cabling, or organizational measures. The Proline measuring instruments can be used in the open field for example. Measures to combat physical tampering of the Proline measuring instruments must be arranged by the customer.

Additional analysis is required if Proline measuring instruments are integrated into a different system. Please note the following:
- The fieldbus network (OT) and company network (IT) must be strictly separated.
- Endress+Hauser recommends the segmentation of the fieldbus networks according to DIN IEC 62443-3-3.

Network

Pay particular attention to the network components used, the router and switches for example. The operator must guarantee the integrity of the components. Access to the network must be restricted by the operator, if necessary.

FDI Packages

Signed FDI Packages can be obtained via www.endress.com for the configuration of the field device.

User training

Depending on the application scenario, users who are not specialized in this area may come in contact with the instrument. We recommend that these users be trained in the safe use of the relevant terminals, components and/or interfaces and be made aware of security issues.

Input

Measured variable

Direct measured variables

- Volume flow (proportional to induced voltage)
- Temperature [1]
- Electrical conductivity

Calculated measured variables

- Mass flow
- Corrected volume flow
- Corrected electrical conductivity [1]

Measuring range

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

Flow characteristic values in SI units: DN 2 to 125 (1/12 to 5")

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[mm]	[in]	[dm³/min]	[dm³/min]	[dm³]	[dm³/min]
2	1/12	0.06 to 1.8	0.5	0.005	0.01
4	5/32	0.25 to 7	2	0.025	0.05
8	5/16	1 to 30	8	0.1	0.1
15	½	4 to 100	25	0.2	0.5
25 [1]	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

1) The values apply for the product version: 5HxB26

Flow characteristic values in SI units: DN 150 (6")

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[mm]	[in]	[m³/h]	[m³/h]	[m³]	[m³/h]
150	6	20 to 600	150	0.03	2.5

1) Available only for nominal diameters DN 15 to 150 (½ to 6") and with the order code for "Sensor option", option CI "Medium temperature measurement".

Flow characteristic values in US units: 1/12 - 6" (DN 2 - 150)

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[in]	[mm]	[gal/min]	[gal/min]	[gal]	[gal/min]
1/12	2	0.015 to 0.5	0.1	0.001	0.002
1/32	4	0.07 to 2	0.5	0.005	0.008
5/16	8	0.25 to 8	2	0.02	0.025
½	15	1 to 27	6	0.05	0.1
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) The values apply for the product version: 5HxB26

Recommended measuring range

Flow limit → 67

Operable flow range

Over 1000 : 1

Input signal

Output and input variants

→ 13

External measured values

To increase the measurement accuracy of certain measured variables or to calculate the mass flow, the automation system can continuously write different measured values to the measuring instrument:
- Medium temperature enables temperature-compensated conductivity measurement (e.g. iTEMP)
- Reference density for calculating the mass flow

Various pressure and temperature measuring devices can be ordered from Endress+Hauser: see "Accessories" section → 126

It is recommended to read in external measured values to calculate the corrected volume flow.

HART protocol

The measured values are written from the automation system to the measuring device via the HART protocol. The pressure transmitter must support the following protocol-specific functions:
- HART protocol
- Burst mode

Current input

The measured values are written from the automation system to the measuring device via the current input → 12.

Digital communication

The measured values can be written by the automation system via:
- FOUNDATION Fieldbus
- PROFIBUS DP
- PROFIBUS PA
- Modbus RS485
- Modbus TCP over Ethernet-APL
- EtherNet/IP
- PROFINET
- PROFINET over Ethernet-APL

Current input 0/4 to 20 mA

Current input	0/4 to 20 mA (active/passive)
Current span	▪ 4 to 20 mA (active) ▪ 0/4 to 20 mA (passive)
Resolution	1 µA
Voltage drop	Typically: 0.6 to 2 V for 3.6 to 22 mA (passive)
Maximum input voltage	≤ 30 V (passive)
Open-circuit voltage	≤ 28.8 V (active)
Possible input variables	▪ Temperature ▪ Density

Status input

Maximum input values	▪ DC −3 to 30 V ▪ If status input is active (ON): R_i >3 kΩ
Response time	Configurable: 5 to 200 ms
Input signal level	▪ Low signal: DC −3 to +5 V ▪ High signal: DC 12 to 30 V
Assignable functions	▪ Off ▪ Reset the individual totalizers separately ▪ Reset all totalizers ▪ Flow override

Output

Output and input variants

Depending on the option selected for output/input 1, different options are available for the other outputs and inputs. Only one option can be selected for each output/input 1 to 3. The following tables must be read vertically (↓).

Example: If the option BA "4–20 mA HART" was selected for output/input 1, one of the options A, B, D, E, F, H, I or J is available for output 2 and one of the options A, B, D, E, F, H, I or J is available for output 3.

Output/input 1 and options for output/input 2

Options for output/input 3 → 14

Order code for "Output; input 1" (020) →	Possible options														
Current output 4 to 20 mA HART	**BA**														
Current output 4 to 20 mA HART Ex i passive	↓	**CA**													
Current output 4 to 20 mA HART Ex i active		↓	**CC**												
FOUNDATION fieldbus			↓	**SA**											
FOUNDATION fieldbus Ex i				↓	**TA**										
PROFIBUS DP					↓	**LA**									
PROFIBUS PA						↓	**GA**								
PROFIBUS PA Ex i							↓	**HA**							
Modbus RS485								↓	**MA**						
EtherNet/IP 2-port switch integrated									↓	**NA**					
PROFINET 2-port switch integrated										↓	**RA**				
PROFINET over Ethernet-APL											↓	**RB**			
PROFINET over Ethernet-APL Ex i												↓	**RC**		
Modbus TCP over Ethernet-APL 10 Mbit/s, SPE 10 Mbit/s, Ethernet 100 Mbit/s													↓	**MB**	
Modbus TCP over Ethernet-APL, Ex i, 10 Mbit/s, Ethernet 100 Mbit/s														↓	**MC**
Order code for "Output; input 2" (021) →	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Not used	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
Current output 4 to 20 mA	**B**			**B**		**B**	**B**		**B**	**B**	**B**	**B**		**B**	
Current output 4 to 20 mA Ex i passive		**C**	**C**		**C**			**C**					**C**		**C**
User-configurable input/output [1]	**D**			**D**		**D**	**D**		**D**	**D**	**D**	**D**		**D**	
Pulse/frequency/switch output	**E**			**E**		**E**	**E**		**E**	**E**	**E**	**E**		**E**	
Double pulse output [2]	**F**								**F**						
Pulse/frequency/switch output Ex i passive		**G**	**G**		**G**			**G**					**G**		**G**
Relay output	**H**			**H**		**H**	**H**		**H**	**H**	**H**	**H**		**H**	
Current input 0/4 to 20 mA	**I**			**I**		**I**	**I**		**I**	**I**	**I**	**I**		**I**	
Status input	**J**			**J**		**J**	**J**		**J**	**J**	**J**	**J**		**J**	

1) A specific input or output can be assigned to a user-configurable input/output → 21.
2) If double pulse output (F) is selected for output/input 2 (021), only the double pulse output (F) option is available for selection for output/input 3 (022).

Output/input 1 and options for output/input 3

Options for output/input 2 → 13

Order code for "Output; input 1" (020) →	Possible options														
Current output 4 to 20 mA HART	**BA**														
Current output 4 to 20 mA HART Ex i passive	↓	**CA**													
Current output 4 to 20 mA HART Ex i active		↓	**CC**												
FOUNDATION fieldbus			↓	**SA**											
FOUNDATION fieldbus Ex i				↓	**TA**										
PROFIBUS DP					↓	**LA**									
PROFIBUS PA						↓	**GA**								
PROFIBUS PA Ex i							↓	**HA**							
Modbus RS485								↓	**MA**						
Ethernet/IP 2-port switch integrated									↓	**NA**					
PROFINET 2-port switch integrated										↓	**RA**				
PROFINET over Ethernet-APL 10 Mbit/s, 2-wire											↓	**RB**			
PROFINET over Ethernet-APL Ex i, 10 Mbit/s, 2-wire												↓	**RC**		
Modbus TCP over Ethernet-APL 10 Mbit/s, SPE 10 Mbit/s, Ethernet 100 Mbit/s													↓	**MB**	
Modbus TCP over Ethernet-APL, Ex i, 10 Mbit/s, Ethernet 100 Mbit/s														↓	**MC**
Order code for "Output; input 3" (022) →	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Not used	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
Current output 4 to 20 mA	**B**					**B**			**B**	**B**	**B**	**B**		**B**	
Current output 4 to 20 mA Ex i passive		**C**	**C**												
User-configurable input/output	**D**					**D**			**D**	**D**	**D**	**D**		**D**	
Pulse/frequency/switch output	**E**					**E**			**E**	**E**	**E**	**E**		**E**	
Double pulse output (slave) [1]	**F**								**F**						
Pulse/frequency/switch output Ex i passive		**G**	**G**												
Relay output	**H**					**H**			**H**	**H**	**H**	**H**		**H**	
Current input 0/4 to 20 mA	**I**					**I**			**I**	**I**	**I**	**I**		**I**	
Status input	**J**					**J**			**J**	**J**	**J**	**J**		**J**	

1) If double pulse output (F) is selected for output/input 2 (021), only the double pulse output (F) option is available for output/input 3 (022).

Output signal

Current output 4 to 20 mA HART

Order code	"Output; input 1" (20): Option BA: current output 4 to 20 mA HART
Signal mode	Can be set to: ▪ Active ▪ Passive
Current range	Can be set to: ▪ 4 to 20 mA NAMUR ▪ 4 to 20 mA US ▪ 4 to 20 mA ▪ 0 to 20 mA (only if the signal mode is active) ▪ Fixed current
Open-circuit voltage	DC 28.8 V (active)
Maximum input voltage	DC 30 V (passive)
Load	250 to 700 Ω
Resolution	0.38 µA
Damping	Configurable: 0 to 999.9 s
Assignable measured variables	▪ Volume flow ▪ Mass flow ▪ Corrected volume flow ▪ Flow velocity ▪ Conductivity ▪ Corrected conductivity ▪ Temperature ▪ Electronics temperature

Current output 4 to 20 mA HART Ex i

Order code	"Output; input 1" (20) choose from: ▪ Option CA: current output 4 to 20 mA HART Ex i passive ▪ Option CC: current output 4 to 20 mA HART Ex i active
Signal mode	Depends on the selected order version.
Current range	Can be set to: ▪ 4 to 20 mA NAMUR ▪ 4 to 20 mA US ▪ 4 to 20 mA ▪ 0 to 20 mA (only if the signal mode is active) ▪ Fixed current
Open-circuit voltage	DC 21.8 V (active)
Maximum input voltage	DC 30 V (passive)
Load	▪ 250 to 400 Ω (active) ▪ 250 to 700 Ω (passive)
Resolution	0.38 µA
Damping	Configurable: 0 to 999.9 s
Assignable measured variables	▪ Volume flow ▪ Mass flow ▪ Corrected volume flow ▪ Flow velocity ▪ Conductivity ▪ Corrected conductivity ▪ Temperature ▪ Electronics temperature

FOUNDATION Fieldbus

FOUNDATION Fieldbus	H1, IEC 61158-2, galvanically isolated
Data transfer	31.25 kbit/s
Current consumption	10 mA
Permitted supply voltage	9 to 32 V
Bus connection	With integrated reverse polarity protection

PROFIBUS DP

Signal encoding	NRZ code
Data transfer	9.6 kBaud...12 MBaud
Terminating resistor	Integrated, can be activated via DIP switches

PROFIBUS PA

PROFIBUS PA	In accordance with EN 50170 Volume 2, IEC 61158-2 (MBP), galvanically isolated
Data transmission	31.25 kbit/s
Current consumption	10 mA
Permitted supply voltage	9 to 32 V
Bus connection	With integrated reverse polarity protection

Modbus RS485

Physical interface	RS485 in accordance with EIA/TIA-485 standard
Terminating resistor	Integrated, can be activated via DIP switches

Modbus TCP over Ethernet-APL

Port 1: Modbus TCP over Ethernet-APL 10 Mbit/s	

Device usage	**Device connection to an APL field switch (terminal 26/27)**
	The device may only be operated according to the following APL port classifications:
	▪ If used in hazardous areas: SLAA or SLAC [1)]
	▪ If used in non-hazardous areas: SLAX
	Connection values of APL field switch (corresponds to APL port classification SPCC or SPAA, for instance):
	▪ Maximum input voltage: 15 V_{DC}
	▪ Minimum output values: 0.54 W
	Device connection to an SPE switch
	▪ In non-hazardous areas, the device can be used with an appropriate SPE switch:
	  ▪ Maximum output voltage: 30 V_{DC}
	  ▪ Minimum output power: 1.85 W
	▪ The SPE switch must support the 10BASE-T1L standard and PoDL power classes 10, 11 or 12 and have a function to disable power class detection.

Standards	According to IEEE 802.3cg, APL port profile specification v1.0, galvanically isolated
Data transfer	Full-duplex (APL/SPE)
Current consumption	Terminal 26/27 max. approx. 45 mA

Permitted supply voltage	9 to 30 V
Bus connection	Terminal 26/27 with integrated reverse polarity protection

1) For more information on using the device in the hazardous area, see the Ex-specific Safety Instructions

Port 2: Modbus TCP over Ethernet 100 Mbit/s	
Device usage	**Device connection to a Fast Ethernet (RJ45) switch** In non-hazardous areas, the Ethernet switch must support the standard 100BASE-TX.
Standards	In accordance with IEEE 802.3u
Data transfer	Half-duplex, full-duplex
Current consumption	-
Permitted supply voltage	-
Bus connection	Service interface (RJ45)

EtherNet/IP

Standards	In accordance with IEEE 802.3

PROFINET

Standards	In accordance with IEEE 802.3

PROFINET over Ethernet-APL

Device use	**Device connection to an APL field switch** The device may only be operated according to the following APL port classifications: ▪ If used in hazardous areas: SLAA or SLAC [1)] ▪ If used in non-hazardous areas: SLAX Connection values of APL field switch (corresponds to APL port classification SPCC or SPAA, for instance): ▪ Maximum input voltage: 15 V_{DC} ▪ Minimum output values: 0.54 W **Device connection to an SPE switch** ▪ In non-hazardous areas, the device can be used with an appropriate SPE switch: The device can be connected to an SPE switch with a maximum voltage of 30 V_{DC} and a minimum output power of 1.85 W connected. ▪ The SPE switch must support the 10BASE-T1L standard and PoDL power classes 10, 11 or 12 and have a function to disable power class detection.
PROFINET	According to IEC 61158 and IEC 61784
Ethernet-APL	According to IEEE 802.3cg, APL port profile specification v1.0, galvanically isolated
Data transfer	10 Mbit/s
Current consumption	**Transmitter** ▪ Max. 400 mA(24 V) ▪ Max. 200 mA (110 V, 50/60 Hz; 230 V, 50/60 Hz)
Permitted supply voltage	9 to 30 V
Network connection	With integrated reverse polarity protection

1) For more information on using the device in the hazardous area, see the Ex-specific Safety Instructions

Current output 4 to 20 mA

Order code	"Output; input 2" (21), "Output; input 3" (022): Option B: current output 4 to 20 mA
Signal mode	Can be set to: ▪ Active ▪ Passive
Current range	Can be set to: ▪ 4 to 20 mA NAMUR ▪ 4 to 20 mA US ▪ 4 to 20 mA ▪ 0 to 20 mA (only if the signal mode is active) ▪ Fixed current
Maximum output values	22.5 mA
Open-circuit voltage	DC 28.8 V (active)
Maximum input voltage	DC 30 V (passive)
Load	0 to 700 Ω
Resolution	0.38 µA
Damping	Configurable: 0 to 999.9 s
Assignable measured variables	▪ Volume flow ▪ Mass flow ▪ Corrected volume flow ▪ Flow velocity ▪ Conductivity ▪ Corrected conductivity ▪ Temperature ▪ Electronics temperature

Current output 4 to 20 mA Ex i passive

Order code	"Output; input 2" (21), "Output; input 3" (022): Option C: current output 4 to 20 mA Ex i passive
Signal mode	Passive
Current range	Can be set to: ▪ 4 to 20 mA NAMUR ▪ 4 to 20 mA US ▪ 4 to 20 mA ▪ Fixed current
Maximum output values	22.5 mA
Maximum input voltage	DC 30 V
Load	0 to 700 Ω
Resolution	0.38 µA
Damping	Configurable: 0 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 configured as pulse, frequency or switch output
Version	Open collector Can be set to: ▪ Active ▪ Passive ▪ Passive NAMUR Ex-i, passive
Maximum input values	DC 30 V, 250 mA (passive)
Open-circuit voltage	DC 28.8 V (active)
Voltage drop	For 22.5 mA: ≤ DC 2 V
Pulse output	
Maximum input values	DC 30 V, 250 mA (passive)
Maximum output current	22.5 mA (active)
Open-circuit voltage	DC 28.8 V (active)
Pulse width	Configurable: 0.05 to 2 000 ms
Maximum pulse rate	10 000 Impulse/s
Pulse value	Configurable
Assignable measured variables	▪ Volume flow ▪ Mass flow ▪ Corrected volume flow
Frequency output	
Maximum input values	DC 30 V, 250 mA (passive)
Maximum output current	22.5 mA (active)
Open-circuit voltage	DC 28.8 V (active)
Output frequency	Configurable: end value frequency 2 to 10 000 Hz(f_{max} = 12 500 Hz)
Damping	Configurable: 0 to 999.9 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	
Maximum input values	DC 30 V, 250 mA (passive)
Open-circuit voltage	DC 28.8 V (active)
Switching behavior	Binary, conductive or non-conductive
Switching delay	Configurable: 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
	  ▪ Buildup index
	  ▪ HBSI limit value exceeded
	  ▪ Low flow cut off

Double pulse output

Function	Double pulse
Version	Open collector Can be set to: ▪ Active ▪ Passive ▪ Passive NAMUR
Maximum input values	DC 30 V, 250 mA (passive)
Open-circuit voltage	DC 28.8 V (active)
Voltage drop	For 22.5 mA: ≤ DC 2 V
Output frequency	Configurable: 0 to 1 000 Hz
Damping	Configurable: 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

Relay output

Function	Switching output
Version	Relay output, galvanically isolated
Switching behavior	Can be set to: ▪ NO (normally open), factory setting ▪ NC (normally closed)

Maximum switching capacity (passive)	▪ DC 30 V, 0.1 A ▪ AC 30 V, 0.5 A

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
	  ▪ Buildup index
	  ▪ HBSI limit value exceeded
	  ▪ Low flow cut off

User-configurable input/output

One specific input or output is assigned to a user-configurable input/output (configurable I/O) during device commissioning.

The following inputs and outputs are available for assignment:
- Choice of current output: 4 to 20 mA (active), 0/4 to 20 mA (passive)
- Pulse/frequency/switch output
- Choice of current input: 4 to 20 mA (active), 0/4 to 20 mA (passive)
- Status input

The technical values correspond to those of the inputs and outputs described in this section.

Failure signal

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

HART current output

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

PROFIBUS PA

Status and alarm messages	Diagnostics in accordance with PROFIBUS PA Profile 3.02
Failure current FDE (Fault Disconnection Electronic)	0 mA

PROFIBUS DP

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

EtherNet/IP

Device diagnostics	Device condition can be read out in Input Assembly

PROFINET

Device diagnostics	According to "Application Layer protocol for decentralized periphery", Version 2.3

PROFINET over Ethernet-APL

Device diagnostics	Diagnostics according to PROFINET PA Profile 4.02

FOUNDATION Fieldbus

Status and alarm messages	Diagnostics in accordance with FF-891
Failure current FDE (Fault Disconnection Electronic)	0 mA

Modbus RS485

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

Modbus TCP over Ethernet-APL/SPE/Fast Ethernet

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

Current output

Current output 4-20 mA	
Failure mode	Configurable: ▪ 4 to 20 mA in accordance with NAMUR recommendation NE 43 ▪ 4 to 20 mA in accordance with US ▪ Min. value: 3.59 mA ▪ Max. value: 22.5 mA ▪ Definable value between: 3.59 to 22.5 mA ▪ Actual value ▪ Last valid value
Current output 4-20 mA	
Failure mode	Configurable: ▪ Maximum alarm: 22 mA ▪ Definable value between: 0 to 20.5 mA

Pulse/frequency/switch output

Pulse output	
Failure mode	Configurable: ▪ Actual value ▪ No pulses
Frequency output	
Failure mode	Configurable: ▪ Actual value ▪ 0 Hz ▪ Definable value between: 2 to 12 500 Hz

Switch output	
Failure mode	Configurable: ▪ Current status ▪ Open ▪ Closed

Relay output

Failure mode	Choose from: ▪ Current status ▪ Open ▪ Closed

Local display

Plain text display	With information on cause and remedial measures
Backlight	Red lighting indicates a device error.

Status signal as per NAMUR recommendation NE 107

Interface/protocol

- Via digital communication:
  - HART protocol
  - FOUNDATION Fieldbus
  - PROFIBUS PA
  - PROFIBUS DP
  - Modbus RS485
  - Modbus TCP over Ethernet-APL
  - EtherNet/IP
  - PROFINET
  - PROFINET over Ethernet-APL
- Via service interface
  - Service interface CDI-RJ45
  - Via service interface/port 2: (RJ45)
  - WLAN interface
- Plain text display
  - With information on cause and remedial actions
  - Modbus TCP

Additional information on remote operation → 106

Web browser

Plain text display	With information on cause and remedial measures

LEDs

Status information	Status indicated by various LEDs The following information is displayed depending on the device version: ▪ Supply voltage active ▪ Data transmission active ▪ Device alarm/error has occurred ▪ Network available [1] ▪ Connection established [1] ▪ Diagnostic status [2] ▪ PROFINET blinking feature [3]

1) Only available for PROFINET, PROFINET over Ethernet-APL, Modbus over Ethernet-APL, Ethernet/IP
2) Only available for Modbus over Ethernet-APL
3) Only available for PROFINET, PROFINET over Ethernet-APL,

Load

Output signal → 15

Ex connection data

Safety-related values

Order code for "Output; input 1"	Output type	Safety-related values	
		Output; input 1 (Port 1)	Service interface (Port 2)
Option **BA**	Current output 4-20 mA HART	U_N = 30 V_{DC} U_M = 250 V_{AC}	U_N = 3.3 V_{AC} U_M = 250 V_{AC}
Option **GA**	PROFIBUS PA	U_N = 32 V_{DC} U_M = 250 V_{AC}	U_N = 3.3 V_{AC} U_M = 250 V_{AC}
Option **LA**	PROFIBUS DP	U_N = 5 V U_M = 250 V_{AC}	U_N = 3.3 V_{AC} U_M = 250 V_{AC}
Option **MA**	Modbus RS485	U_N = 5 V U_M = 250 V_{AC}	U_N = 3.3 V_{AC} U_M = 250 V_{AC}
Option **MB**	Modbus TCP over Ethernet-APL 10 Mbit/s, SPE 10 Mbit/s, Ethernet 100 Mbit/s	APL port profile SLAX SPE PoDL classes 10, 11, 12 U_N = 30 V_{DC} U_M = 250 V_{AC}	U_N = 3.3 V_{AC} U_M = 250 V_{AC}
Option **NA**	EtherNet/IP	U_N = 3.3 V_{AC} U_M = 250 V_{AC}	U_N = 3.3 V_{AC} U_M = 250 V_{AC}
Option **RA**	PROFINET	U_N = 3.3 V_{AC} U_M = 250 V_{AC}	U_N = 3.3 V_{AC} U_M = 250 V_{AC}
Option **RB**	PROFINET over Ethernet-APL/SPE, 10Mbit/s	APL port profile SLAX SPE PoDL classes 10, 11, 12 U_N = 30 V_{DC} U_M = 250 V_{AC}	U_N = 3.3 V_{AC} U_M = 250 V_{AC}
Option **SA**	FOUNDATION Fieldbus	U_N = 32 V_{DC} U_M = 250 V_{AC}	U_N = 3.3 V_{AC} U_M = 250 V_{AC}
The specifications for U_M only apply to devices with Ex i circuits. Zone 1; Class I, Division 1 devices; Zone 2; Class I Division 2 devices with Ex i sensor.			

Order code for "Output; input 2" "Output; input 3"	Output type	Safety-related values	
		Output; input 2	Output; input 3
Option **B**	Current output 4-20 mA	U_N = 30 V_{DC} U_M = 250 V_{AC}	
Option **D**	Configurable I/O initial setting off	U_N = 30 V_{DC} U_M = 250 V_{AC}	
Option **E**	Pulse/frequency/switch output	U_N = 30 V_{DC} U_M = 250 V_{AC}	

Order code for "Output; input 2" "Output; input 3"	Output type	Safety-related values	
		Output; input 2	Output; input 3
Option **F**	Double pulse output	U_N = 30 V_{DC} U_M = 250 V_{AC}	
Option **H**	Relay output	U_N = 30 V_{DC} I_N =100 mA_{DC}/500 mA_{AC} U_M = 250 V_{AC}	
Option **I**	Current input 4-20 mA	U_N = 30 V_{DC} U_M = 250 V_{AC}	
Option **J**	Status input	U_N = 30 V_{DC} U_M = 250 V_{AC}	

Intrinsically safe values

Zone 1, Zone 21			
Order code for "Output; input 1"	**Output type**	**Intrinsically safe values**	
		Output; input 1 (Port 1)	**Service interface (Port 2)**
Option CA	Current output 4-20mA HART Ex-i passive	**Ex ia** U_i = 30 V I_i = 100 mA P_i = 1.25 W L_i = 0 µH C_i = 6 nF	**Ex ia** U_i = 10 V I_i = n. a. P_i = n. a. L_i = 0 µH C_i = 200 nF
Option CC	Current output 4-20mA HART Ex-i active	**Ex ia** U_0 = 21.8 V I_0 = 90 mA P_0 = 491 mW L_0 = 4.1 mH(IIC)/15 mH(IIB) C_0 = 160 nF(IIC)/1 160 nF(IIB) U_i = 30 V I_i = 10 mA P_i = 0.3 W L_i = 5 µH L_i = 4.1 µH C_i = 6 nF	**Ex ia** U_i = 10 V I_i = n. a. P_i = n. a. L_i = 0 µH C_i = 200 nF
Option HA	PROFIBUS PA Ex i (STANDARD + FISCO)	**Ex ia** U_i = 30 V I_i = 570 mA P_i = 8.5 W L_i = 10 µH C_i = 5 nF	**Ex ia** U_i = 10 V I_i = n. a. P_i = n. a. L_i = 0 µH C_i = 200 nF

Zone 1, Zone 21			
Order code for "Output; input 1"	**Output type**	**Intrinsically safe values**	
		Output; input 1 (Port 1)	**Service interface (Port 2)**
Option MC	Modbus TCP over Ethernet-APL, Ex-i, 10Mbit/s	**2-WISE power load, APL port profile SLAA** [1] **Ex ia** U_i = 17.5 V I_i = 380 mA P_i = 5.32 W L_i = 10 µH C_i = 5 nF **Cable specifications according to 2-WISE:** R_c = 15 to 150 Ω/km L_c = 0.4 to 1 mH/km C_c = 45 to 200 nF/km C_c = C_c line/line + 0,5 C_c line/screen, if both lines are floating, or C_c = C_c line/line + C_c line/screen, if the screen is connected to one line Length of cable (not including cable stubs): ≤ 200 m (656.2 ft) Length of cable stubs: ≤1 m (3.3 ft)	**Ex ia** U_i = 10 V I_i = n. a. P_i = n. a. L_i = 0 µH C_i = 200 nF
Option RC	PROFINET over Ethernet-APL, Ex-i, 10Mbit/s	**2-WISE power load, APL port profile SLAA** [1] **Ex ia** U_i = 17.5 V I_i = 380 mA P_i = 5.32 W L_i = 10 µH C_i = 5 nF **Cable specifications according to 2-WISE:** R_c = 15 to 150 Ω/km L_c = 0.4 to 1 mH/km C_c = 45 to 200 nF/km C_c = C_c line/line + 0,5 C_c line/screen, if both lines are floating, or C_c = C_c line/line + C_c line/screen, if the screen is connected to one line Length of cable (not including cable stubs): ≤ 200 m (656.2 ft) Length of cable stubs: ≤1 m (3.3 ft)	**Ex ia** U_i = 10 V I_i = n. a. P_i = n. a. L_i = 0 µH C_i = 200 nF
Option TA	FOUNDATION Fieldbus Ex i (STANDARD + FISCO)	**Ex ia** U_i = 30 V I_i = 570 mA P_i = 8.5 W L_i = 10 µH C_i = 5 nF	**Ex ia** U_i = 10 V I_i = n. a. P_i = n. a. L_i = 0 µH C_i = 200 nF

1) For further options see Ethernet-APL Installation Drawing HE_01622.

Zone 2		
Order code for "Output; input 1"	**Output type**	**Intrinsically safe values or NIFW values Output; input 1 (Port 1)**
Option HA	PROFIBUS PA Ex i (STANDARD + FISCO)	**Ex ic** **AEx ic, Ex ic, NIFW** U_i = 32 V I_i = 570 mA P_i = 8.5 W L_i = 10 µH C_i = 5 nF
Option MC	Modbus TCP over Ethernet-APL, Ex-i, 10Mbit/s	**2-WISE power load, APL port profile SLAC** [1] **Ex ic** **AEx ic, Ex ic, NIFW** U_i = 17.5 V I_i = 380 mA P_i = 5.32 W L_i = 10 µH C_i = 5 nF **Cable specifications according to 2-WISE:** R_c = 15 to 150 Ω/km L_c = 0.4 to 1 mH/km C_c = 45 to 200 nF/km C_c = C_c line/line + 0,5 C_c line/screen, if both lines are floating, or C_c = C_c line/line + C_c line/screen, if the screen is connected to one line Length of cable (not including cable stubs): ≤ 200 m (656.2 ft) Length of cable stubs: ≤1 m (3.3 ft)
Option RC	PROFINET over Ethernet-APL, Ex-i, 10Mbit/s	
Option TA	FOUNDATION Fieldbus Ex i (STANDARD + FISCO)	**Ex ic** **AEx ic, Ex ic, NIFW** U_i = 32 V I_i = 570 mA P_i = 8.5 W L_i = 10 µH C_i = 5 nF

1) For further options see Ethernet-APL Installation Drawing HE_01622.

Order code for "Output; input 2" "Output; input 3"	**Output type**	**Intrinsically safe values or NIFW values**	
		Output; input 2	**Output; input 3**
Option C	Current output 4-20mA Ex-i passive	**Ex ia** **Ex ic** **AEx ic, Ex ic, NIFW** U_i = 30 V I_i = 100 mA P_i = 1.25 W L_i = 0 C_i = 0	
Option G	Pulse/frequency/switch output Ex-i passive	**Ex ia** **Ex ic** **AEx ic, Ex ic, NIFW** U_i = 30 V I_i = 100 mA P_i = 1.25 W L_i = 0 C_i = 0	

Low flow cut off

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

Galvanic isolation

The outputs are galvanically isolated:
- from the power supply
- from one another
- from the protective ground connection (PE)

Protocol-specific data

HART

Manufacturer ID	0x11
Device type ID	0x3C
HART protocol revision	7
Device description files (DTM, DD)	Information and files under: www.endress.com
HART load	Min. 250 Ω
System integration	Information on system integration: Operating Instructions → 126. ▪ Measured variables via HART protocol ▪ Burst Mode functionality

FOUNDATION Fieldbus

Manufacturer ID	0x452B48 (hex)
Ident number	0x103C (hex)
Device revision	1
DD revision	Information and files under: ▪ www.endress.com ▪ www.fieldcommgroup.org
CFF revision	
Interoperability Test Kit (ITK)	Version 6.2.0
ITK Test Campaign Number	Information: ▪ www.endress.com ▪ www.fieldcommgroup.org
Link Master capability (LAS)	Yes
Choice of "Link Master" and "Basic Device"	Yes Factory setting: Basic Device
Node address	Factory setting: 247 (0xF7)
Supported functions	The following methods are supported: ▪ Restart ▪ ENP Restart ▪ Diagnostic ▪ Set to OOS ▪ Set to AUTO ▪ Read trend data ▪ Read event logbook
Virtual Communication Relationships (VCRs)	
Number of VCRs	44
Number of link objects in VFD	50
Permanent entries	1
Client VCRs	0
Server VCRs	10
Source VCRs	43
Sink VCRs	0
Subscriber VCRs	43
Publisher VCRs	43
Device Link Capabilities	
Slot time	4
Min. delay between PDU	8

Max. response delay	16
System integration	Information regarding system integration: Operating Instructions → 126. ▪ Cyclic data transmission ▪ Description of the modules ▪ Execution times ▪ Methods

PROFIBUS DP

Manufacturer ID	0x11
Ident number	0x1570
Profile version	3.02
Device description files (GSD, DTM, DD)	Information and files under: ▪ https://www.endress.com/download On the device product page: PRODUCTS → Product Finder → Links ▪ https://www.profibus.com
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)
Compatibility with earlier model	If the device is replaced, the measuring device Promag 300 supports the compatibility of the cyclic data with previous models. It is not necessary to adjust the engineering parameters of the PROFIBUS network with the Promag 300 GSD file. Earlier models: ▪ Promag 50 PROFIBUS DP ▪ ID No.: 1546 (hex) ▪ Extended GSD file: EH3x1546.gsd ▪ Standard GSD file: EH3_1546.gsd ▪ Promag 53 PROFIBUS DP ▪ ID No.: 1526 (hex) ▪ Extended GSD file: EH3x1526.gsd ▪ Standard GSD file: EH3_1526.gsd Description of the function scope of compatibility: Operating Instructions → 126.
System integration	Information regarding system integration: Operating Instructions → 126. ▪ Cyclic data transmission ▪ Block model ▪ Description of the modules

PROFIBUS PA

Manufacturer ID	0x11
Ident number	0x156C
Profile version	3.02
Device description files (GSD, DTM, DD)	Information and files under: ▪ https://www.endress.com/download On the device product page: PRODUCTS → Product Finder → Links ▪ https://www.profibus.com

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 ▪ Local display ▪ Via operating tools (e.g. FieldCare)
Compatibility with earlier model	If the device is replaced, the measuring device Promag 300 supports the compatibility of the cyclic data with previous models. It is not necessary to adjust the engineering parameters of the PROFIBUS network with the Promag 300 GSD file. Earlier models: ▪ Promag 50 PROFIBUS PA ▪ ID No.: 1525 (hex) ▪ Extended GSD file: EH3x1525.gsd ▪ Standard GSD file: EH3_1525.gsd ▪ Promag 53 PROFIBUS PA ▪ ID No.: 1527 (hex) ▪ Extended GSD file: EH3x1527.gsd ▪ Standard GSD file: EH3_1527.gsd Description of the function scope of compatibility: Operating Instructions → 126.
System integration	Information regarding system integration: Operating Instructions → 126. ▪ Cyclic data transmission ▪ Block model ▪ Description of the modules

Modbus RS485

Protocol	Modbus Applications Protocol Specification V1.1
Response times	▪ Direct data access: typically 25 to 50 ms ▪ Auto-scan buffer (data range): typically 3 to 5 ms
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	▪ 1200 BAUD ▪ 2400 BAUD ▪ 4800 BAUD ▪ 9600 BAUD ▪ 19200 BAUD ▪ 38400 BAUD ▪ 57600 BAUD ▪ 115200 BAUD
Data transmission mode	▪ ASCII ▪ RTU

Data access	Each device parameter can be accessed via Modbus RS485. For Modbus register information
Compatibility with earlier model	If the device is replaced, the measuring instrument Promag 300 supports the compatibility of the Modbus registers for the process variables and the diagnostic information with the previous model Promag 53. It is not necessary to change the engineering parameters in the automation system. Description of the function scope of compatibility: Operating Instructions → 126.
System integration	Information regarding system integration: Operating Instructions → 126. ▪ Modbus RS485 information ▪ Function codes ▪ Register information ▪ Response time ▪ Modbus data map

Modbus TCP over Ethernet-APL

Port 1: Modbus TCP over Ethernet-APL 10 Mbit/s, SPE 10 Mbit/s	
Protocol	▪ Modbus application protocol V1.1 ▪ TCP
Response times	On Modbus client request: Typically 3 to 5 ms
TCP port	502
Modbus TCP connections	Maximum 4
Communication type	Ethernet Advanced Physical Layer 10BASE-T1L
Data transfer	Full-duplex
Polarity	Automatic correction of crossed "APL signal + " and "APL signal -" signal lines
Device type	Address
Device type ID	0xC43C
Function codes	▪ 03: Read holding register ▪ 04: Read input register ▪ 06: Write single registers ▪ 16: Write multiple registers ▪ 23: Read/write multiple registers ▪ 43: Read device identification
Broadcast support for function codes	▪ 06: Write single registers ▪ 16: Write multiple registers ▪ 23: Read/write multiple registers ▪ 43: Read device identification
Supported transfer speed	10 Mbit/s (Ethernet-APL)
Supported features	Address can be configured using DHCP, web server or software
Device description files (FDI)	Information and files available at: www.endress.com → Downloads area
Configuration options for measuring instrument	▪ Asset management software (FieldCare, DeviceCare, Field Expert) ▪ Integrated web server via web browser and IP address ▪ Onsite operation

Supported functions	▪ Device identification using: Nameplate ▪ Measured value status The process variables are communicated with a measured value status ▪ Blinking feature via the local display for simple device identification and assignment ▪ Device operation via asset management software (e.g. FieldCare, DeviceCare)
System integration	Information regarding system integration: Operating Instructions → 126. ▪ Overview and description of the supported function codes ▪ Status coding ▪ Factory setting

Port 2: Modbus TCP over Ethernet 100 Mbit/s	
Protocol	▪ Modbus application protocol V1.1 ▪ TCP
Response times	On Modbus client request: Typically 3 to 5 ms
TCP port	502
Modbus TCP connections	Maximum 4
Communication type	▪ 10BASE-T ▪ 100BASE-TX
Data transfer	Half-duplex, full-duplex
Polarity	Auto-MDIX
Device type	Address
Device type ID	0xC43C
Function codes	▪ 03: Read holding register ▪ 04: Read input register ▪ 06: Write single registers ▪ 16: Write multiple registers ▪ 23: Read/write multiple registers ▪ 43: Read device identification
Broadcast support for function codes	▪ 06: Write single registers ▪ 16: Write multiple registers ▪ 23: Read/write multiple registers ▪ 43: Read device identification
Supported transfer speed	▪ 10 Mbit/s ▪ 100 Mbit/s (Fast-Ethernet)
Supported features	Address can be configured using DHCP, web server or software
Device description files (FDI)	Information and files available at: www.endress.com → Downloads area
Configuration options for measuring instrument	▪ Asset management software (FieldCare, DeviceCare, Field Expert) ▪ Integrated web server via web browser and IP address ▪ Onsite operation
Supported functions	▪ Device identification using: Nameplate ▪ Measured value status The process variables are communicated with a measured value status ▪ Device operation via asset management software (e.g. FieldCare, DeviceCare)
System integration	Information regarding system integration: Operating Instructions → 126. ▪ Overview and description of the supported function codes ▪ Status coding ▪ Factory setting

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	0x000049E
Device type ID	0x103C
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)	Yes
System integration	Information regarding system integration: Operating Instructions → 126. ▪ Cyclic data transmission ▪ Block model ▪ Input and output groups

PROFINET

Protocol	Application layer protocol for decentral device periphery and distributed automation, Version 2.3
Communication type	100 Mbit/s
Conformity class	Conformance class B
Netload Class	Netload Class 2 100 Mbit/s
Baud rates	Automatic 100 Mbit/s with full-duplex detection
Periods	From 8 ms
Polarity	Auto-polarity for automatic correction of crossed TxD and RxD pairs
Media Redundancy Protocol (MRP)	Yes
System redundancy support	System redundancy S2 (2 AR with 1 NAP)
Device profile	Application interface identifier 0xF600 Generic device
Manufacturer ID	0x11
Device type ID	0x843C

Device description files (GSD, DTM, DD)	Information and files available at: ▪ www.endress.com On the product page for the device: Documents/Software → Device drivers ▪ www.profibus.com
Supported connections	▪ 2 x AR (IO Controller AR) ▪ 1 x AR (IO-Supervisor Device AR connection allowed) ▪ 1 x Input CR (Communication Relation) ▪ 1 x Output CR (Communication Relation) ▪ 1 x Alarm CR (Communication Relation)
Configuration options for measuring instrument	▪ DIP switches on the electronics module, for device name assignment (last part) ▪ Asset management software (FieldCare, DeviceCare, Field Xpert) ▪ Integrated web server via web browser and IP address ▪ Device master file (GSD), can be read out via the integrated web server of the measuring instrument. ▪ Onsite operation
Configuration of the device name	▪ DIP switches on the electronics module, for device name assignment (last part) ▪ DCP protocol ▪ Asset management software (FieldCare, DeviceCare, Field Xpert) ▪ Integrated web server

Supported functions	▪ Identification & Maintenance, simple device identifier via:
	  ▪ Control system
	  ▪ Nameplate
	▪ Measured value status
	The process variables are communicated with a measured value status
	▪ Blinking feature via the local display for simple device identification and assignment
	▪ Device operation via asset management software (e.g. FieldCare, DeviceCare, SIMATIC PDM)

System integration	Information regarding system integration: Operating Instructions → 126. ▪ Cyclic data transmission ▪ Overview and description of the modules ▪ Status coding ▪ Startup configuration ▪ Factory setting

PROFINET over Ethernet-APL

Protocol	Application layer protocol for decentral device periphery and distributed automation, Version 2.43
Communication type	Ethernet Advanced Physical Layer 10BASE-T1L
Conformance Class	Conformance Class B (PA)
Netload Class	PROFINET Netload Robustness Class 2 10 Mbit/s
Data transfer	10 Mbit/s Full-duplex
Cycle times	64 ms
Polarity	Automatic correction of crossed "APL signal +" and "APL signal -" signal lines
Media Redundancy Protocol (MRP)	Not possible (point-to-point connection to APL field switch)
System redundancy support	System redundancy S2 (2 AR with 1 NAP)
Device profile	PROFINET PA profile 4.02 (Application interface identifier API: 0x9700)
Manufacturer ID	17
Device type ID	0xA43C
Device description files (GSD, DTM, FDI)	Information and files available at: ▪ www.endress.com → Downloads area ▪ www.profibus.com

Supported connections	▪ 2x AR (IO Controller AR) ▪ 2x AR (IO Supervisor Device AR connection allowed)
Configuration options for measuring instrument	▪ DIP switches on the electronics module, for device name assignment (last part) ▪ Asset management software (FieldCare, DeviceCare, Field Xpert) ▪ Integrated Web server via Web browser and IP address ▪ Device master file (GSD), can be read out via the integrated Web server of the measuring instrument. ▪ Onsite operation
Configuration of the device name	▪ DIP switches on the electronics module, for device name assignment (last part) ▪ DCP protocol ▪ Asset management software (FieldCare, DeviceCare, Field Xpert) ▪ Integrated web server

Supported functions	▪ Identification & Maintenance, simple device identifier via:
	  ▪ Control system
	  ▪ Nameplate
	▪ Measured value status
	The process variables are communicated with a measured value status
	▪ Blinking feature via the local display for simple device identification and assignment
	▪ Device operation via asset management software (e.g. FieldCare, DeviceCare, SIMATIC PDM with FDI package)

System integration	Information regarding system integration: Operating Instructions → 126. ▪ Cyclic data transmission ▪ Overview and description of the modules ▪ Status coding ▪ Factory setting

Power supply

Terminal assignment **Transmitter: supply voltage, input/outputs**

HART

Supply voltage		Input/output 1 (Port 1)		Input/output 2		Input/output 3		Service interface (Port 2)
1 (+)	2 (–)	26 (+)	27 (-)	24 (+)	25 (–)	22 (+)	23 (–)	CDI-RJ45
				The terminal assignment depends on the specific device version ordered → 13.				

FOUNDATION fieldbus

Supply voltage		Input/output 1 (Port 1)		Input/output 2		Input/output 3		Service interface (Port 2)
1 (+)	2 (–)	26 (A)	27 (B)	24 (+)	25 (–)	22 (+)	23 (–)	CDI-RJ45
				The terminal assignment depends on the specific device version ordered → 13.				

PROFIBUS DP

Supply voltage		Input/output 1 (Port 1)		Input/output 2		Input/output 3		Service interface (Port 2)
1 (+)	2 (–)	26 (B)	27 (A)	24 (+)	25 (–)	22 (+)	23 (–)	CDI-RJ45
				The terminal assignment depends on the specific device version ordered → 13.				

PROFIBUS PA

Supply voltage		Input/output 1 (Port 1)		Input/output 2		Input/output 3		Service interface (Port 2)
1 (+)	2 (–)	26 (B)	27 (A)	24 (+)	25 (–)	22 (+)	23 (–)	CDI-RJ45
				The terminal assignment depends on the specific device version ordered → 13.				

Modbus RS485

Supply voltage		Input/output 1 (Port 1)		Input/output 2		Input/output 3		Service interface (Port 2)
1 (+)	2 (–)	26 (B)	27 (A)	24 (+)	25 (–)	22 (+)	23 (–)	CDI-RJ45
				The terminal assignment depends on the specific device version ordered → 13.				

Modbus TCP

Supply voltage		Input/output 1 1 (Port [1)])		Input/output 2		Input/output 3		Service interface (Port 2) [1)]
1 (+)	2 (–)	26 (+)	27 (-)	24 (+)	25 (–)	22 (+)	23 (–)	CDI-RJ45
				The terminal assignment depends on the specific device version ordered → 13.				

1) For Modbus TCP communication, either port 1 OR port 2 can be used.

PROFINET

Supply voltage		Input/output 1 (Port 1) [1]	Input/output 2		Input/output 3		Service interface (Port 2) [1]
1 (+)	2 (–)	RJ45	24 (+)	25 (–)	22 (+)	23 (–)	CDI-RJ45
			The terminal assignment depends on the specific device version ordered → 13.				

1) Port can be used for communication or as a service interface (CDI-RJ45).

PROFINET over Ethernet-APL

Supply voltage		Input/output 1 (Port 1)		Input/output 2		Input/output 3		Service interface (Port 2 [1])
1 (+)	2 (–)	26 (+)	27 (-)	24 (+)	25 (–)	22 (+)	23 (–)	CDI-RJ45
				The terminal assignment depends on the specific device version ordered → 13.				

1) No PROFINET communication available on port 2

Ethernet/IP

Supply voltage		Input/output 1 (Port 1) [1]	Input/output 2		Input/output 3		Service interface (Port 2) [1]
1 (+)	2 (–)	RJ45	24 (+)	25 (–)	22 (+)	23 (–)	CDI-RJ45
			The terminal assignment depends on the specific device version ordered → 13.				

1) Port can be used for communication or as a service interface (CDI-RJ45).

Terminal assignment of the remote display and operating module → 40.

For information on the pin assignment of the device plugs, see the Operating Instructions for the device.

Available device plugs

Device plugs may not be used in hazardous areas!

Device plugs for Proline 300:
Order code for "Input; output 1"
- Option **SA** "FOUNDATION Fieldbus" → 37
- Option **GA** "PROFIBUS PA" → 38
- Option **NA** "EtherNet/IP" → 38
- Option **RA** "PROFINET" → 38
- Option **RB** "PROFINET over Ethernet-APL" → 38
- Option **MB** "Modbus TCP" → 38

Device plug for connecting to the service interface:
Order code for "Accessory mounted"
Option **NB**, RJ45 M12 adapter (service interface) → 49

Order code for "Input; output 1", option SA "FOUNDATION fieldbus"

Order code for "Electrical connection"	Cable entry/connection → 40	
	2	3
M, 3, 4, 5	7/8" plug	–

Order code for "Input; output 1", option GA "PROFIBUS PA"

Order code for "Electrical connection"	Cable entry/connection → 🖹 40	
	2	3
L, N, P, U	Connector M12×1	–

Order code for "Input; output 1", option NA "EtherNet/IP"

Order code for "Electrical connection"	Cable entry/connection → 🖹 40	
	2	3
L, N, P, U	Connector M12×1	–
R [1) 2)], S [1) 2)], T [1) 2)], V [1) 2)]	Connector M12×1	Connector M12×1

1) Not compatible with an external WLAN antenna (order code for "Accessory enclosed", option P8), an RJ45 M12 adapter for the service interface (order code for "Accessory mounted", option NB)
2) Suitable for integrating the device into a ring topology.

Order code for "Input; output 1", option RA "PROFINET"

Order code for "Electrical connection"	Cable entry/connection → 🖹 40	
	2	3
L, N, P, U	Connector M12×1	–
R [1) 2)], S [1) 2)], T [1) 2)], V [1) 2)]	Connector M12×1	Connector M12×1

1) Not compatible with an external WLAN antenna (order code for "Accessory enclosed", option P8), an RJ45 M12 adapter for the service interface (order code for "Accessory mounted", option NB)
2) Suitable for integrating the device into a ring topology.

Order code for "Input; output 1", option RB "PROFINET over Ethernet-APL"

Order code for "Electrical connection"	Cable entry/connection → 🖹 40	
	2	3
L, N, P, U	Connector M12×1	–

Order code for "Input; output 1", option MB "Modbus TCP over Ethernet-APL"

Order code for "Electrical connection"	Accessories	Cable entry/connection → 🖹 39	
		2	3
L, N, P, U	-	Connector M12×1 A-coded	–
L, N, P, U	NB [1)]	Connector M12×1 A-coded	Connector M12×1 [1)] D-coded
1 [2)], 2 [2)], 7 [2)], 8 [2)]	–	–	Connector M12×1 D-coded

1) Cannot be used as a Modbus TCP port.
2) Not compatible with an external WLAN antenna (order code for "Accessory enclosed", option P8, an RJ45 M12 adapter for the service interface (order code for "Accessory mounted", option NB) or a remote operating and display module DKX001.

Order code for "Accessory mounted", option NB: "Adapter RJ45 M12 (service interface)"

Order code for "Accessory mounted"	Cable entry/connection → 🖹 39	
	Cable entry 2	Cable entry 3
NB [1]	–	Connector M12×1

1) Not compatible with electrical connection option 1, 2, 7, 8

Supply voltage

Order code "Power supply"	Terminal voltage		Frequency range
Option **D**	DC 24 V	±20%	–
Option **E**	AC 100 to 240 V	−15…+10%	50/60 Hz, ±4 Hz
Option **I**	DC 24 V	±20%	–
	AC 100 to 240 V	−15…+10%	50/60 Hz, ±4 Hz

Power consumption

Transmitter

Max. 10 W (active power)

switch-on current	Max. 36 A (<5 ms) as per NAMUR Recommendation NE 21

Current consumption

Transmitter

- Max. 400 mA (24 V)
- Max. 200 mA (110 V, 50/60 Hz; 230 V, 50/60 Hz)

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.

Overcurrent protection element

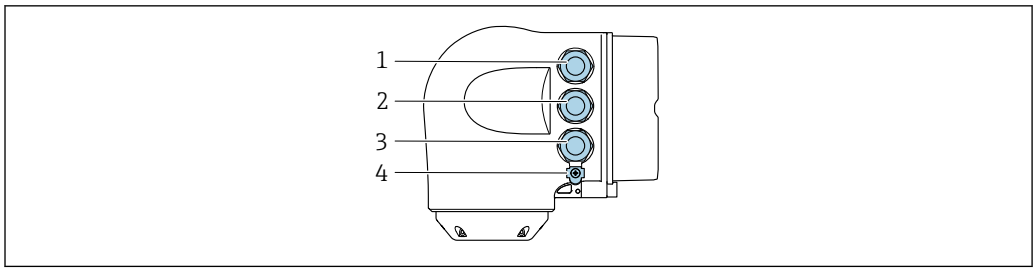
The device must be operated with a dedicated circuit breaker, as it does not have an ON/OFF switch of its own.

- The circuit breaker must be easy to reach and labeled accordingly.
- Permitted nominal current of the circuit breaker: 2 A up to maximum 10 A.

Electrical connection

Transmitter connection

- Terminal assignment→ 🖹 36
- Device plugs available→ 🖹 37



A0026781

1 *Terminal connection for supply voltage*
2 *Terminal connection for signal transmission, input/output*
3 *Terminal connection for signal transmission, input/output or terminal for network connection via service interface (CDI-RJ45); Optional: terminal connection for external WLAN antenna or connection for remote display and operating module DKX001*
4 *Protective ground connection (PE)*

An adapter for the RJ45 to the M12 connector is optionally available:
Order code for "Accessories", option **NB**: "Adapter RJ45 M12 (service interface)"

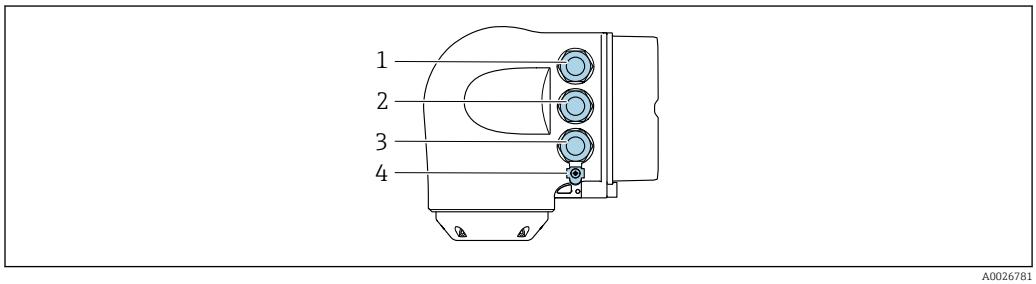
The adapter connects the service interface (CDI-RJ45) to an M12 connector mounted in the cable entry. The connection to the service interface can be established via an M12 connector without opening the device.

Network connection via service interface (CDI-RJ45) → 📄 113

Connecting in a ring topology

Device versions with EtherNet/IP and PROFINET communication protocols can be integrated into a ring topology. The device is integrated via the terminal connection for signal transmission (output 1) and the connection to the service interface (CDI-RJ45).

Integrating the transmitter into a ring topology:
- EtherNet/IP
- PROFINET



A0026781

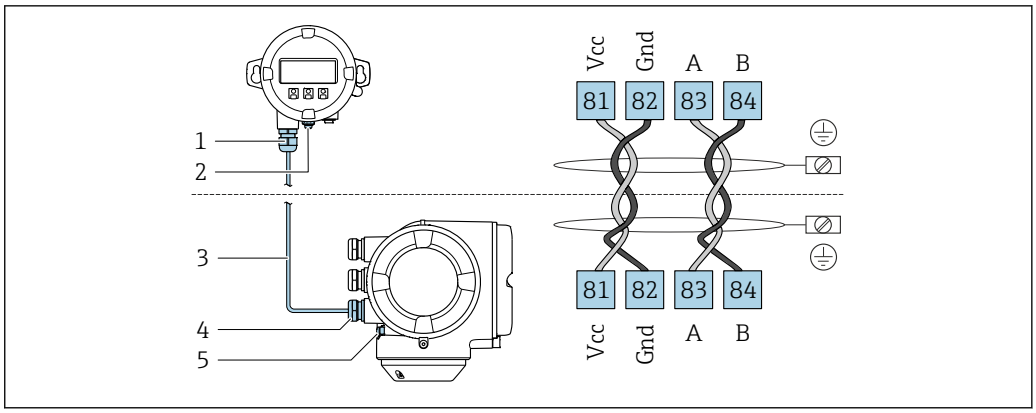
1 *Terminal connection for supply voltage*
2 *Terminal connection for signal transmission: PROFINET or EtherNet/IP (RJ45 plug)*
3 *Connection to service interface (CDI-RJ45)*
4 *Protective ground connection (PE)*

If the device has additional inputs/outputs, these are routed in parallel via the cable entry for connection to the service interface (CDI-RJ45).

Connecting the remote display and operating module DKX001

The remote display and operating module DKX001 is available as an optional extra → 📄 123..

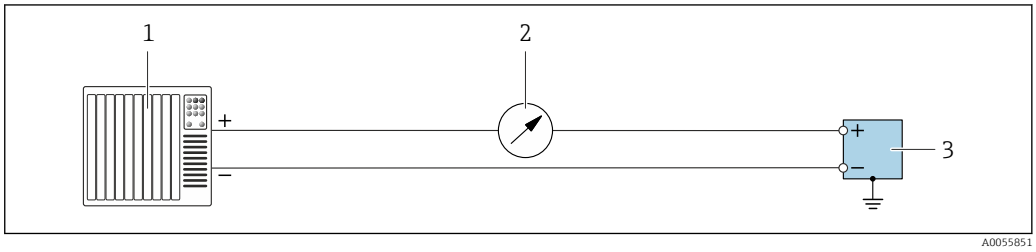
- The remote display and operating module DKX001 is only available for the following housing version: order code for "Housing": option A "Aluminum, coated"
- The measuring instrument is always supplied with a dummy cover when the remote display and operating module DKX001 is ordered directly with the measuring instrument. Display or operation at the transmitter is not possible in this case.
- If ordered subsequently, the remote display and operating module DKX001 may not be connected at the same time as the existing measuring instrument display module. Only one display or operation unit may be connected to the transmitter at any one time.



1 Remote display and operating module DKX001
2 Protective ground connection (PE)
3 Connecting cable
4 Measuring instrument
5 Protective ground connection (PE)

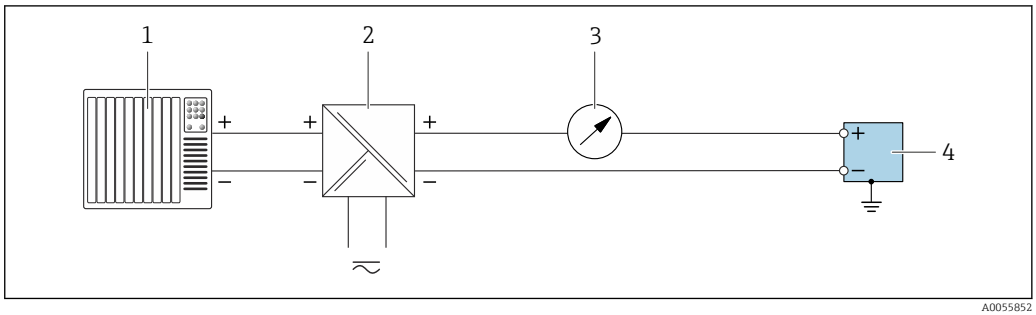
Connection examples

Current output 4 to 20 mA (without HART)



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

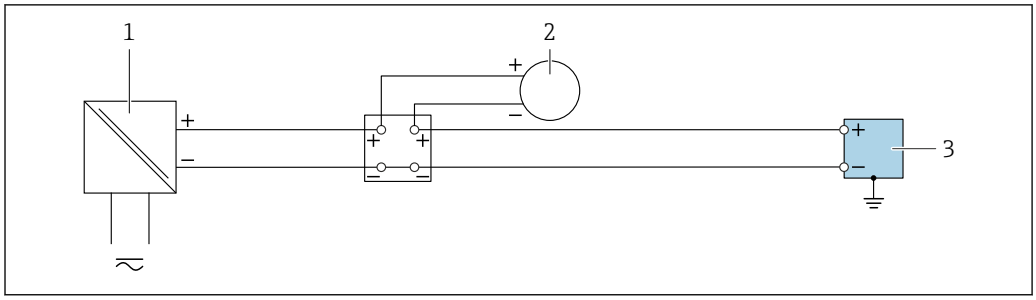
1 Automation system with current input (e.g. PLC)
2 Optional additional display unit: Observe maximum load
3 Flowmeter with current output (active)



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

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

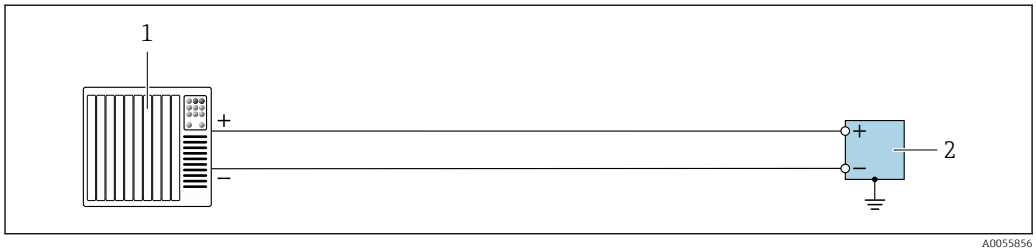
Current input 4 to 20 mA



4 *Connection example for 4 to 20 mA current input*

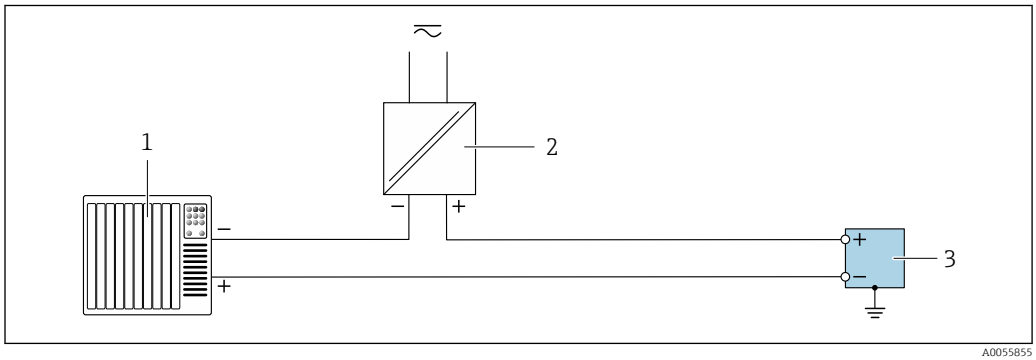
1 *Power supply*
2 *External measuring instrument with 4 to 20 mA passive current output. e.g. pressure or temperature)*
3 *Transmitter with 4 to 20 mA current input*

Pulse output/frequency output/switch output



5 *Connection example for pulse output/frequency output/switch output (active)*

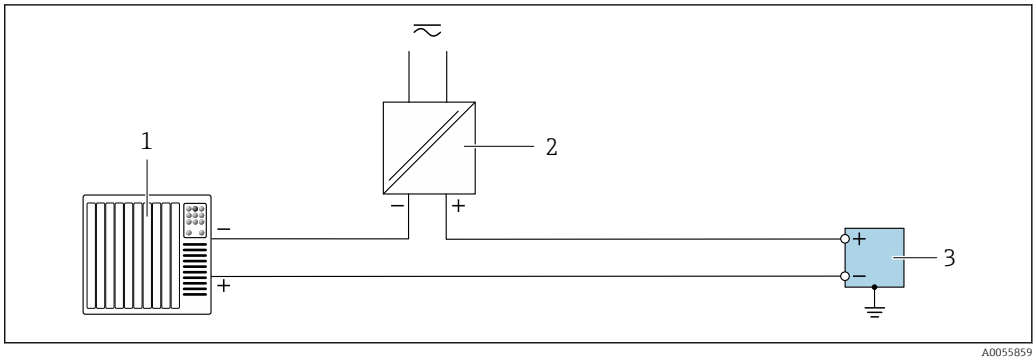
1 *Automation system with pulse input/frequency input/switch input (e.g. PLC)*
2 *Transmitter with pulse output/frequency output/switch output (active)*



6 *Connection example for pulse output/frequency output/switch output (passive)*

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

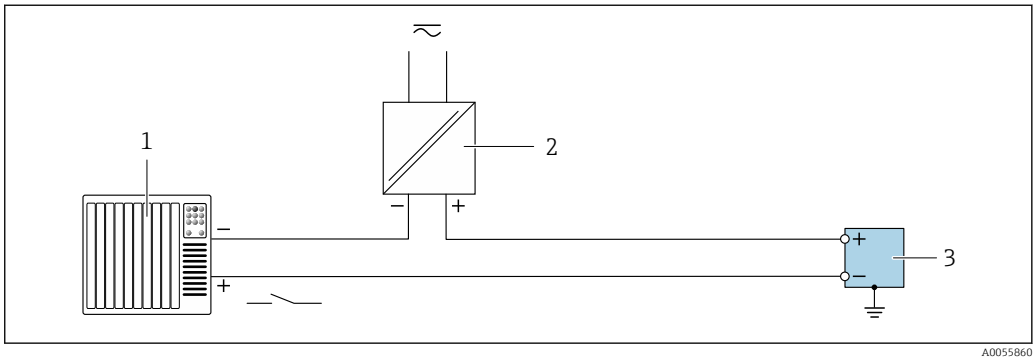
Relay output



7 Connection example for relay output

1 Automation system with switch input (e.g. PLC)
2 Power supply
3 Transmitter with relay output

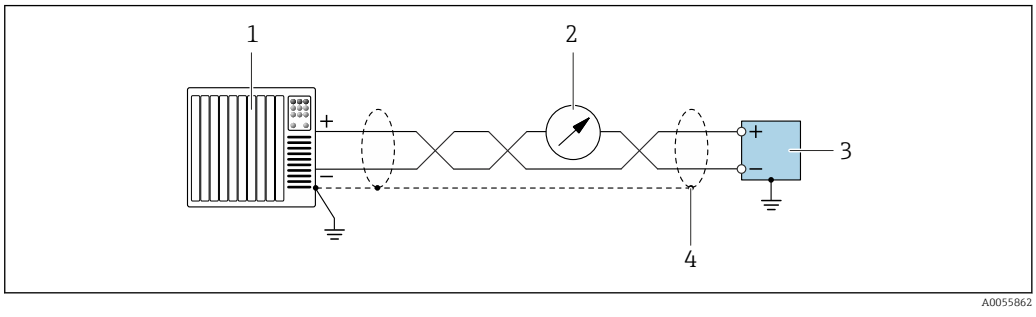
Status input



8 Connection example for status input

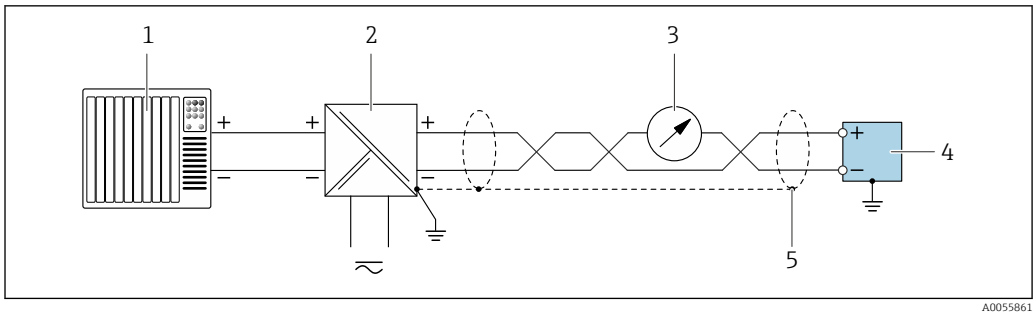
1 Automation system with switch output passive e.g. PLC)
2 Power supply
3 Transmitter with status input

Current output 4 to 20 mA HART



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

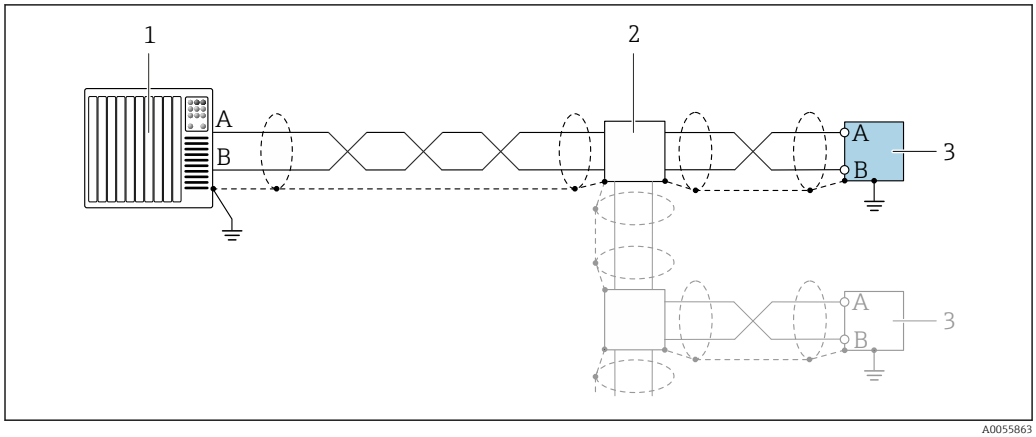
1 Automation system with 4 to 20 mA current input with HART (e.g. PLC)
2 Optional display unit: Note maximum load
3 Transmitter with 4 to 20 mA current output with HART (active)
4 Ground the cable shield on one side only. For installations in compliance with NAMUR NE98, grounding of the cable shield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



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

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

Modbus RS485



11 *Connection example for Modbus RS485*

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

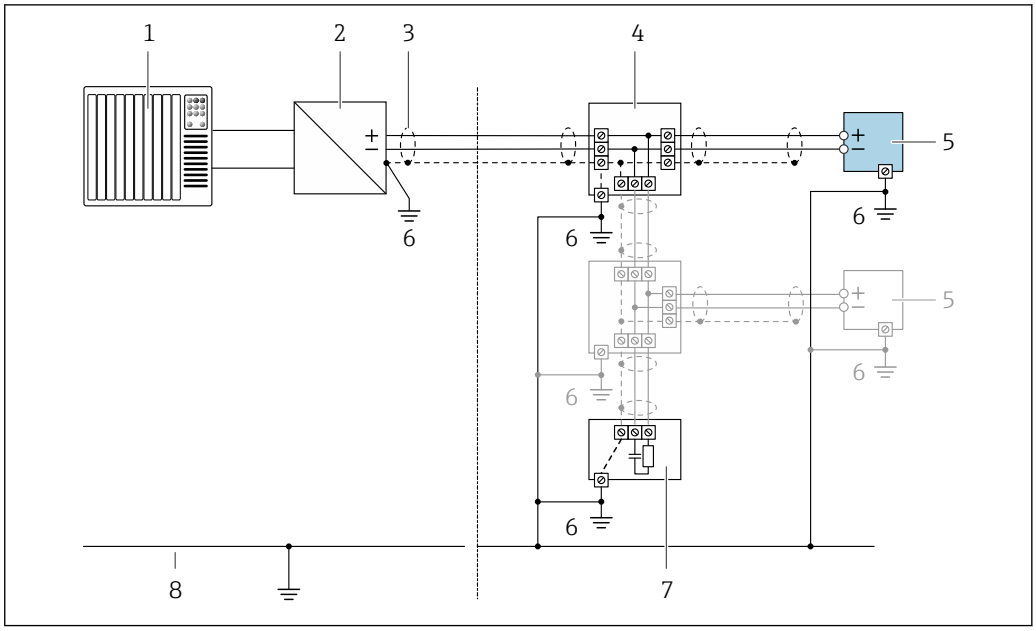
PROFIBUS PA

See https://www.profibus.com "PROFIBUS Installation Guidelines".

PROFIBUS DP

See https://www.profibus.com "PROFIBUS Installation Guidelines".

FOUNDATION Fieldbus



12 *Connection example for FOUNDATION Fieldbus*

1 *Automation system (e.g. PLC)*
2 *Power Conditioner (FOUNDATION Fieldbus)*
3 *Cable shield provided at one end. The cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications*
4 *T-box*
5 *Measuring instrument*
6 *Local grounding*
7 *Bus terminator*
8 *Potential equalization conductor*

PROFINET

See https://www.profibus.com "PROFINET Planning guideline".

EtherNet/IP

See https://www.odva.org"EtherNet/IP Media Planning & Installation Manual".

Ethernet-APL

See https://www.profibus.com Ethernet-APL White Paper "

Ensuring potential equalization

Requirements

For potential equalization:
- Pay attention to in-house grounding concepts
- Take account of operating conditions like the pipe material and grounding
- Connect the medium, sensor and transmitter to the same electric potential
- Use a ground cable with a minimum cross-section of 6 mm^2 (10 AWG) and a cable lug for potential equalization connections

Connection example, standard scenario

Metal process connections

Potential equalization is generally via the metal process connections that are in contact with the medium and mounted directly on the sensor. Therefore there is generally no need for additional potential equalization measures.

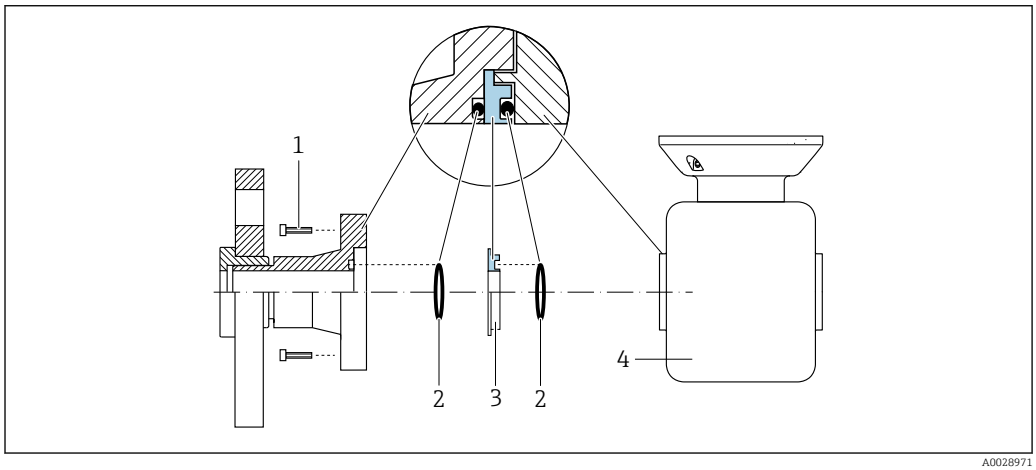
Connection example in special situations

Plastic process connections

In the case of plastic process connections, additional grounding rings or process connections with an integrated grounding electrode must be used to ensure potential matching between the sensor and the fluid. If there is no potential matching, this can affect the measuring accuracy or cause the destruction of the sensor as a result of the electrochemical decomposition of the electrodes.

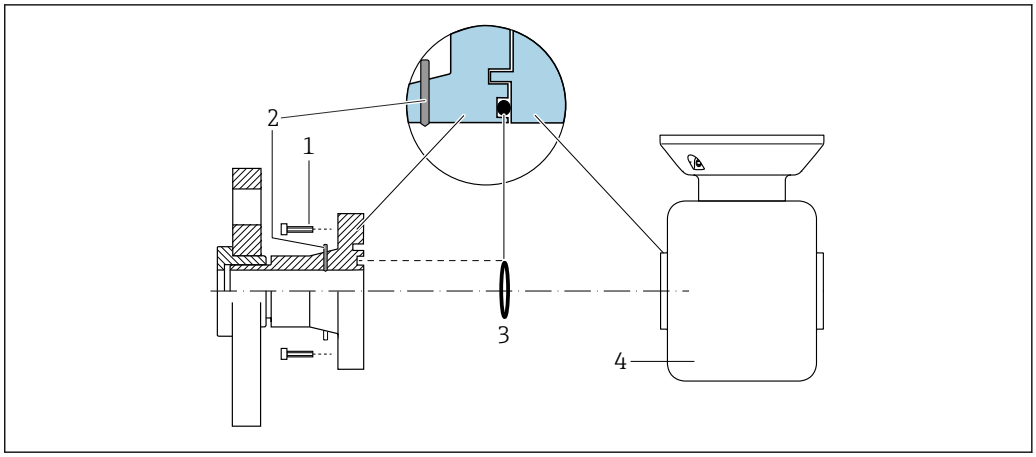
Note the following when using grounding rings:
- Depending on the option ordered, plastic disks are used instead of grounding rings on some process connections. These plastic disks only act as "spacers" and do not have any potential matching function. Furthermore, they also perform a significant sealing function at the sensor/connection interface. Therefore, in the case of process connections without metal grounding rings, these plastic disks/seals should never be removed and should always be installed!
- Grounding rings can be ordered separately as accessory DK5HR* from Endress+Hauser (does not contain any seals). When ordering make sure that the grounding rings are compatible with the material used for the electrodes, as otherwise there is the danger that the electrodes could be destroyed by electrochemical corrosion!
- If seals are required, they can be additionally ordered with seal set DK5G*.
- Grounding rings including seals are mounted inside the process connections. This does not affect the installed length.

Potential equalization via additional grounding ring



1 *Hexagonal-headed bolts of process connection*
2 *O-ring seals*
3 *Plastic disk (spacer) or grounding ring*
4 *Sensor*

Potential equalization via grounding electrodes on process connection



1 Hexagonal-headed bolts of process connection
2 Integrated grounding electrodes
3 O-ring seal
4 Sensor

Terminals

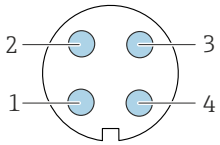
Spring-loaded terminals: Suitable for strands and strands with ferrules.
Conductor cross-section 0.2 to 2.5 mm² (24 to 12 AWG).

Cable entries

- Cable gland: M20 × 1.5 with cable Ø 6 to 12 mm (0.24 to 0.47 in)
- Thread for cable entry:
  - NPT ½"
  - G ½"
  - M20
- Device plug for digital communication: M12
  Only available for certain device versions → 🖹 37.

Pin assignment, device plug

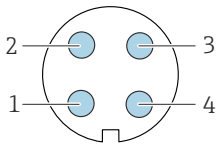
FOUNDATION Fieldbus



Pin	Assignment		Coding	Plug/socket
1	+	Signal +	A	Plug
2	-	Signal −		
3		Cable shield[1]		
4		Not used		
Metal plug housing		Cable shield		

[1] If a cable shield is used

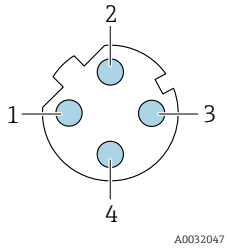
PROFIBUS PA



Pin	Assignment		Coding	Plug/socket
1	+	PROFIBUS PA +	A	Plug
2		Grounding		
3	-	PROFIBUS PA −		
4		Not used		
Metal plug housing		Cable shield		

Recommended plug:
- Binder, series 713, part no. 99 1430 814 04
- Phoenix, part no. 1413934 SACC-FS-4QO SH PBPA SCO

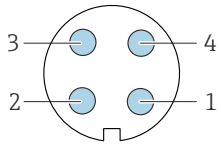
PROFINET



Pin		Assignment	Coding	Plug/socket
1	+	TD +	D	Socket
2	+	RD +		
3	-	TD –		
4	-	RD –		
Metal plug housing		Cable shield		

Recommended plug:
- Binder, series 825, part no. 99 3729 810 04
- Phoenix, part no. 1543223 SACC-M12MSD-4Q

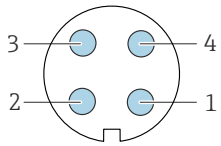
PROFINET over Ethernet-APL



Pin	Assignment	Coding	Plug/socket
1	Ethernet-APL signal -	A	Socket
2	Ethernet-APL signal +		
3	Cable shield[1]		
4	Not used		
Metal plug housing	Cable shield		
[1]If a cable shield is used			

Recommended plug:
- Binder, series 713, part no. 99 1430 814 04
- Phoenix, part no. 1413934 SACC-FS-4QO SH PBPA SCO

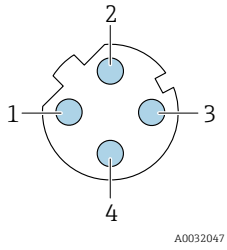
Modbus TCP over Ethernet-APL 10 Mbit/s



Pin	Assignment	Coding	Plug/socket
1	Ethernet-APL signal -	A	Socket
2	Ethernet-APL signal +		
3	Cable shield[1]		
4	Not used		
Metal plug housing	Cable shield		
[1]If a cable shield is used			

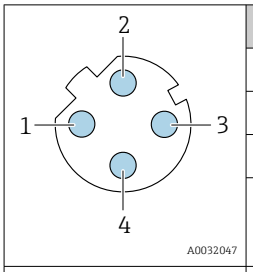
Recommended plug:
- Binder, series 713, part no. 99 1430 814 04
- Phoenix, part no. 1413934 SACC-FS-4QO SH PBPA SCO

Modbus TCP over Ethernet 100 Mbit/s



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

EtherNet/IP

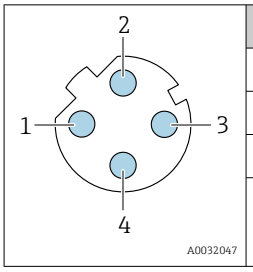


Pin	Assignment		Coding	Plug/socket
1	+	Tx	D	Socket
2	+	Rx		
3	-	Tx		
4	-	Rx		
Metal plug housing		Cable shield		

Recommended plug:
- Binder, series 825, part no. 99 3729 810 04
- Phoenix, part no. 1543223 SACC-M12MSD-4Q

Service interface

Order code for "Accessory mounted", option **NB**: "Adapter RJ45 M12 (service interface)"



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

Recommended plug:
- Binder, series 825, part no. 99 3729 810 04
- Phoenix, part no. 1543223 SACC-M12MSD-4Q

Cable specifications

Permitted temperature range

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

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

Standard installation cable is sufficient.

Protective grounding cable for the outer ground terminal

Conductor cross-section < 6 mm^2 (10 AWG)

Larger cross-sections can be connected using a cable lug.

The grounding impedance must be less than 2 Ω.

Signal cable

4 to 20 mA current input

Standard installation cable is sufficient.

Pulse/frequency/switch output

Standard installation cable is sufficient.

Relay output

Standard installation cable is sufficient.

Status input

Standard installation cable is sufficient.

Current output 4 to 20 mA HART

Shielded twisted-pair cable.

See https://www.fieldcommgroup.org "HART PROTOCOL SPECIFICATIONS".

Modbus RS485

Shielded twisted-pair cable.

See https://modbus.org "MODBUS over Serial Line Specification and Implementation Guide".

PROFIBUS PA

Shielded twisted-pair cable. Cable type A is recommended.

See https://www.profibus.com "PROFIBUS Installation Guidelines".

PROFIBUS DP

Shielded twisted-pair cable. Cable type A is recommended.

See https://www.profibus.com "PROFIBUS Installation Guidelines".

PROFINET

Only PROFINET cables.

See https://www.profibus.com "PROFINET Planning guideline".

EtherNet/IP

Twisted-pair Ethernet CAT 5 or better.

See https://www.odva.org"EtherNet/IP Media Planning & Installation Manual".

Ethernet-APL

Shielded twisted-pair cable. Cable type A is recommended.

See https://www.profibus.com Ethernet-APL White Paper "

FOUNDATION Fieldbus

Twisted, shielded two-wire cable.

For further information on planning and installing FOUNDATION Fieldbus networks see:

- Operating Instructions for "FOUNDATION Fieldbus Overview" (BA00013S)
- FOUNDATION Fieldbus Guideline
- IEC 61158-2 (MBP)

Connecting cable for transmitter - remote display and operating module DKX001

Standard cable

A standard cable can be used as the connecting cable.

Standard cable	4 cores (2 pairs); pair-stranded with common shield
Shielding	Tin-plated copper-braid, optical cover ≥ 85 %
Capacitance: core/shield	Maximum 1 000 nF for Zone 1; Class I, Division 1
L/R	Maximum 24 µH/Ω for Zone 1; Class I, Division 1
Cable length	Maximum 300 m (1 000 ft), see the following table

Cross-section	Cable length for use in: ▪ Non-hazardous area ▪ Hazardous area: Zone 2; Class I, Division 2 ▪ Hazardous area: Zone 1; Class I, Division 1
0.34 mm² (22 AWG)	80 m (270 ft)
0.50 mm² (20 AWG)	120 m (400 ft)
0.75 mm² (18 AWG)	180 m (600 ft)
1.00 mm² (17 AWG)	240 m (800 ft)
1.50 mm² (15 AWG)	300 m (1 000 ft)

Optionally available connecting cable

Standard cable	2 × 2 × 0.34 mm² (22 AWG) PVC cable [1] with common shield (2 pairs, pair-stranded)
Flame resistance	According to DIN EN 60332-1-2
Oil-resistance	According to DIN EN 60811-2-1
Shielding	Tin-plated copper-braid, optical cover ≥ 85 %
Capacitance: core/shield	≤200 pF/m
L/R	≤24 µH/Ω
Available cable length	10 m (35 ft)
Operating temperature	When mounted in a fixed position: −50 to +105 °C (−58 to +221 °F); when cable can move freely: −25 to +105 °C (−13 to +221 °F)

1) UV radiation can impair the cable outer sheath. Protect the cable from direct sunshine where possible.

Overvoltage protection

Mains voltage fluctuations	→ 39
Overvoltage category	Overvoltage category II
Short-term, temporary overvoltage	Between cable and ground up to 1200 V, for max. 5 s
Long-term, temporary overvoltage	Between cable and ground up to 500 V

Performance characteristics

Reference operating conditions

- Error limits following DIN EN 29104, in future ISO 20456
- Water, typically: +15 to +45 °C (+59 to +113 °F); 0.5 to 7 bar (73 to 101 psi)
- Data as indicated in the calibration protocol
- Accuracy based on accredited calibration rigs according to ISO 17025
- Reference temperature for conductivity measurement: 25 °C (77 °F)

Maximum measurement error

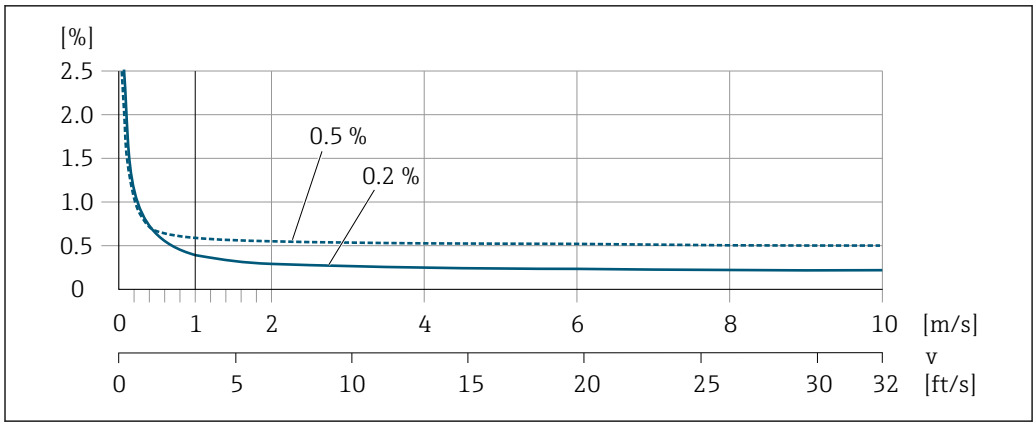
o.r. = of reading

Maximum permissible error under reference operating conditions

Volume flow

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

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



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

Temperature

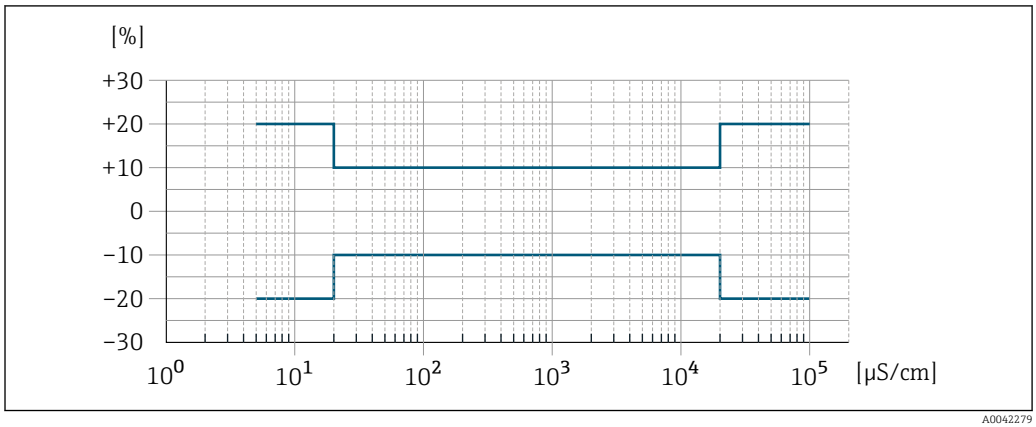
±3 °C (±5.4 °F)

Electrical conductivity

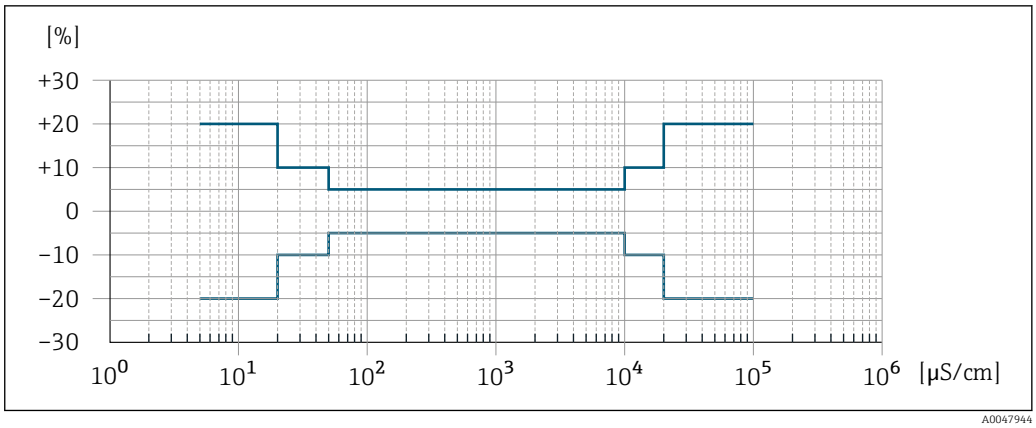
The values apply for:
- Devices with stainless steel process connections
- Measurements at a reference temperature of 25 °C (77 °F). At different temperatures, attention must be paid to the temperature coefficient of the medium (typically 2.1 %/K)

Conductivity [µS/cm]	Nominal diameter		Measurement error [%] of reading
	[mm]	[in]	
5 to 20	15 to 150	½ to 6	± 20%
> 20 to 50	15 to 150	½ to 6	± 10%
> 50 to 10 000	2 to 8	1/12 to 5/16	± 10%
	15 to 150	½ to 6	▪ Standard: ± 10% ▪ Optional [1]: ± 5%
> 10 000 to 20 000	2 to 150	1/12 to 6	± 10%
> 20 000 to 100 000	2 to 150	1/12 to 6	± 20%

1) Order code for "Calibrated conductivity measurement", option CW



14 *Measurement error (standard)*



15 *Measurement error (optional: order code for "Calibrated conductivity measurement", option CW)*

Accuracy of outputs

The outputs have the following base accuracy specifications:

Current output

Accuracy	±5 µA

Pulse/frequency output

o.r. = of reading

Accuracy	Max. ±50 ppm o.r. (over the entire ambient temperature range)

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.
- Max. ±1 % o.r. for DN 15 to 150 in conjunction with process connections made of stainless steel 1.4404 (F316L)

Temperature measurement response time

T_{90} < 15 s

Influence of ambient temperature

Current output

Temperature coefficient	Max. 1 µA/°C

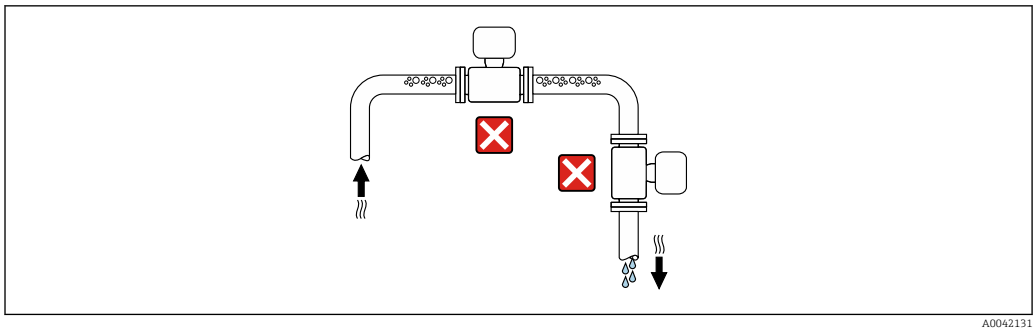
Pulse/frequency output

Temperature coefficient	No additional effect. Included in accuracy.

Installation

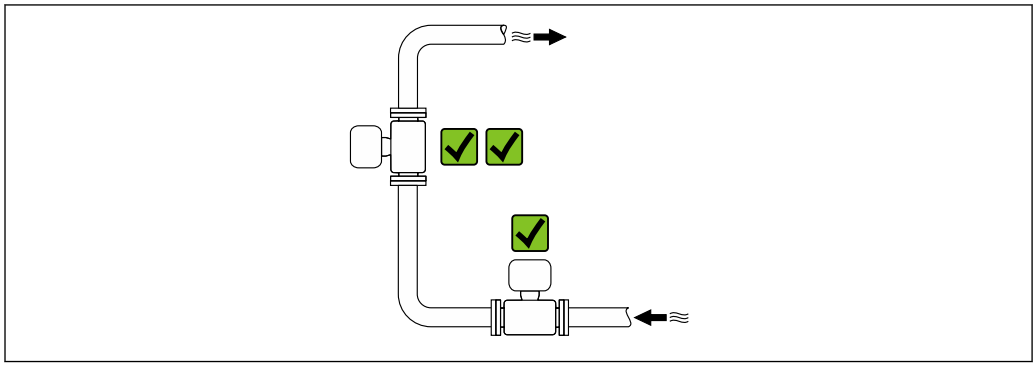
Installation location

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



A0042131

The device should ideally be installed in an ascending pipe.



A0042317

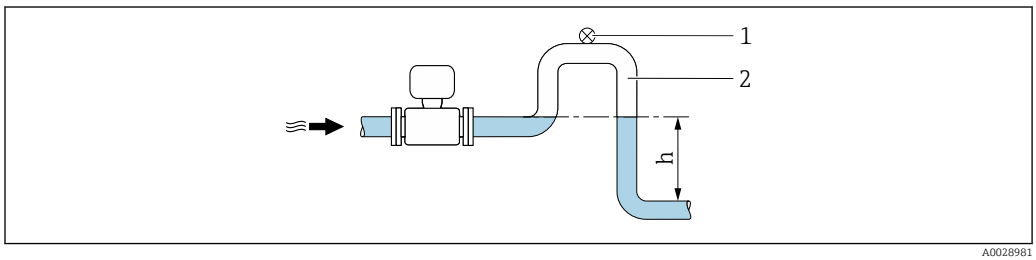
Installation upstream from a down pipe

NOTICE

A vacuum in the measuring tube can damage the liner!

- ▶ If installing upstream of down pipes whose length h ≥ 5 m (16.4 ft): install a siphon with a vent valve downstream of the device.

This arrangement prevents the flow of liquid stopping in the pipe and the formation of air pockets.

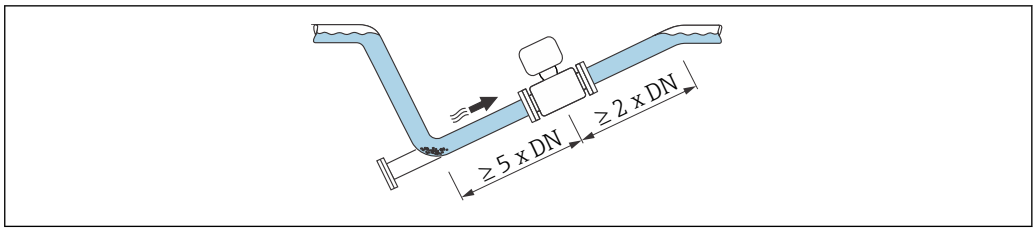


A0028981

1 Vent valve
2 Pipe siphon
h Length of down pipe

Installation with partially filled pipes

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



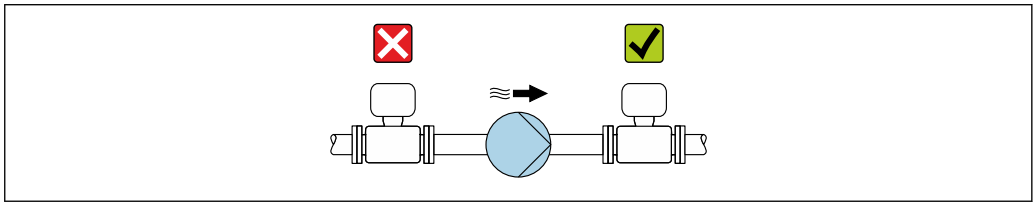
A0041088

Installation near pumps

NOTICE

A vacuum in the measuring tube can damage the liner!

- ▶ In order to maintain the static pressure, install the device in the flow direction downstream from the pump.
- ▶ Install pulsation dampers if reciprocating, diaphragm or peristaltic pumps are used.



A0041083

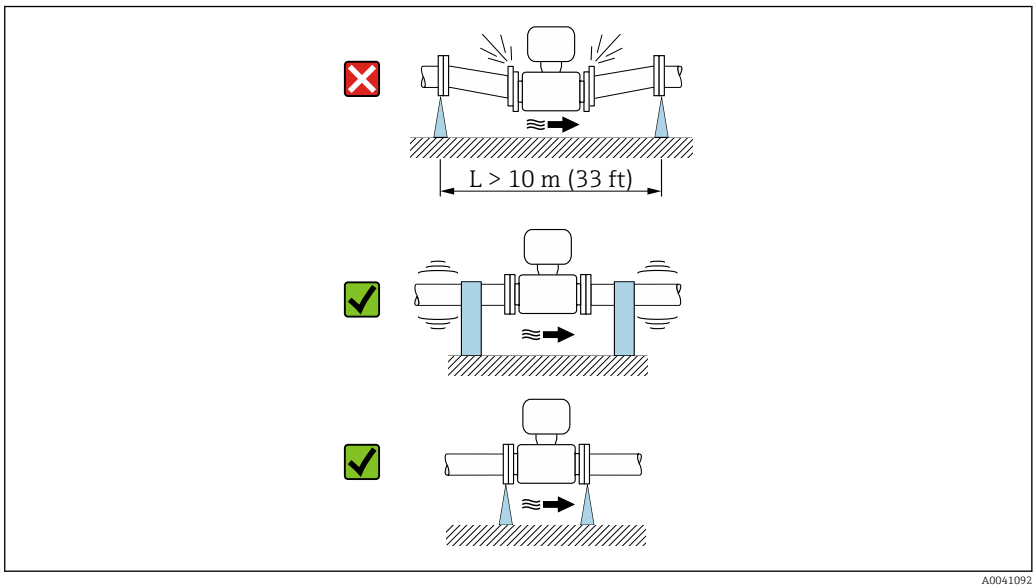
- Information on the liner's resistance to partial vacuum
- Information on the measuring system's resistance to vibration and shock → 60

Installation in event of pipe vibrations

NOTICE

Pipe vibrations can damage the device!

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

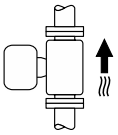
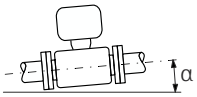
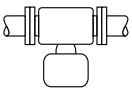
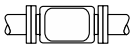


A0041092

Information on the measuring system's resistance to vibration and shock → 60

Orientation

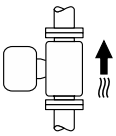
The direction of the arrow on the nameplate helps you to install the measuring instrument according to the flow direction (direction of medium flow through the piping).

Orientation		Recommendation
Vertical orientation	 A0015591	✓✓
Horizontal orientation	 A0041328	✓ 1)
Horizontal orientation, transmitter at bottom	 A0015590	✓✓ 2) 3) ✗ 4)
Horizontal orientation, transmitter at side	 A0015592	✗

1) The measuring instrument should be self-draining for hygiene applications. A vertical orientation is recommended for this. If only a horizontal orientation is possible, an angle of inclination $\alpha \geq 10°$ is recommended.
2) Applications with high process temperatures may increase the ambient temperature. To maintain the maximum ambient temperature for the transmitter, this orientation is recommended.
3) To prevent the electronics module from overheating in the case of a sharp rise in temperature (e.g. CIP or SIP processes), install the measuring instrument with the transmitter component pointing downwards.
4) With the empty pipe detection function switched on: empty pipe detection only works if the transmitter housing is pointing upwards.

Vertical

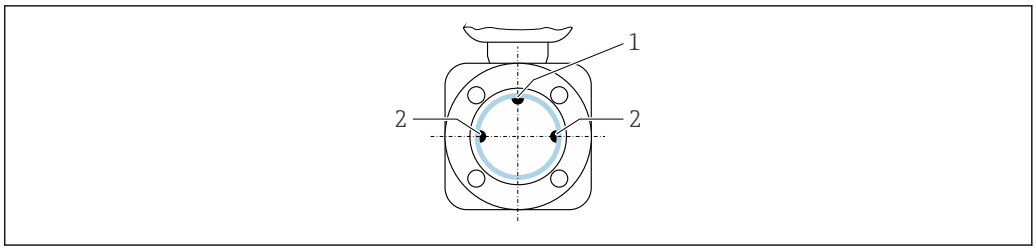
Optimum for self-emptying pipe systems and for use in conjunction with empty pipe detection.



A0015591

Horizontal

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



A0028998

1 EPD electrode for empty pipe detection, available from ≥ DN 15 (½")
2 Measuring electrodes for signal detection

Measuring instruments with a nominal diameter < DN 15 (½") do not have an EPD electrode. In this case, empty pipe detection is performed via the measuring electrodes.

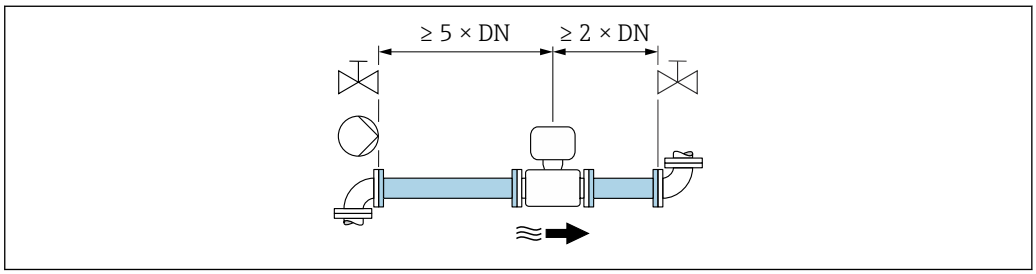
Inlet and outlet runs

Installation with inlet and outlet runs

Installation is carried out with inlet and outlet runs.

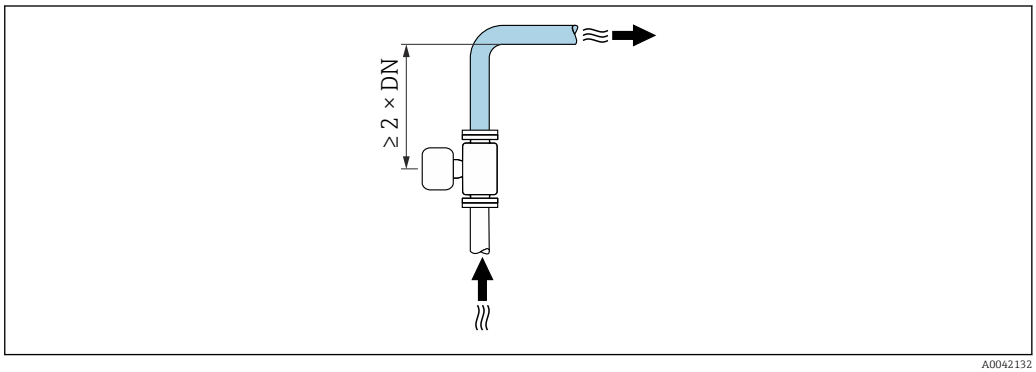
Maintain straight, unimpeded inlet and outlet runs.

To avoid a vacuum and to maintain the specified level of measurement accuracy, if possible install the device upstream from assemblies that produce turbulence (e.g. valves, T-sections) and downstream from pumps.



A0028997

Keep a sufficient distance to the next pipe elbow.



A0042132

Installation without inlet and outlet runs

Depending on the device design and installation location, the inlet and outlet runs can be reduced or omitted entirely.

Maximum measurement error
When the device is installed with the inlet and outlet runs described, a maximum measurement error of ±0.5 % of measured value ±1 mm/s (0.04 in/s) can be ensured.

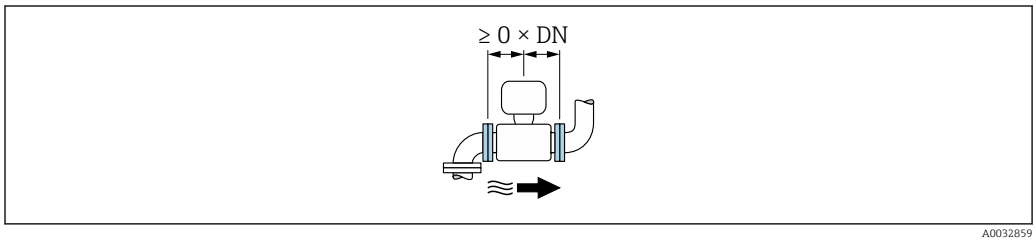
Devices and possible order options

Order code for "Electrodes"		
Option	**Description**	**Design**
J	1.4435/316L, pointed for 0 x DN inlet/outlet runs	0 x DN full-bore design [1]
L	1.4435/316L for 0 x DN inlet/outlet runs	
M	Alloy C22 for 0 x DN inlet/outlet runs	
N	Tantalum for 0 x DN inlet/outlet runs	

1) "Full-bore" indicates a measuring tube cross-section corresponding to the nominal diameter without constriction. This means there is no pressure loss.

Installation before or after bends

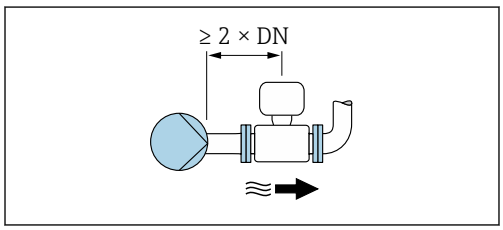
Installation without inlet and outlet runs is possible.



A0032859

Installation downstream of pumps

Installation without inlet and outlet runs is possible.

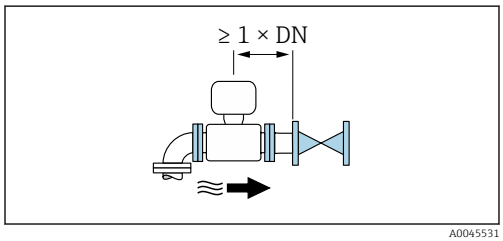


A0045530

An inlet run of ≥ 2 x DN is recommended.

Installation upstream of valves

Installation without inlet and outlet runs is possible.

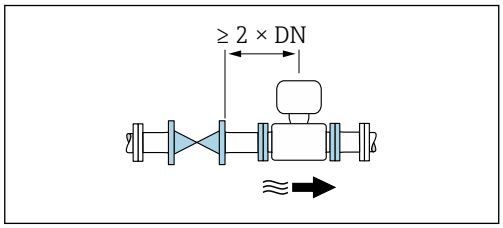


A0045531

An outlet run of ≥ 1 x DN is recommended.

Installation downstream of valves

The device can be installed without inlet and outlet runs if the valve is 100% open during operation.



An inlet run of ≥ 2 x DN is recommended if the valve is 100% open during operation.

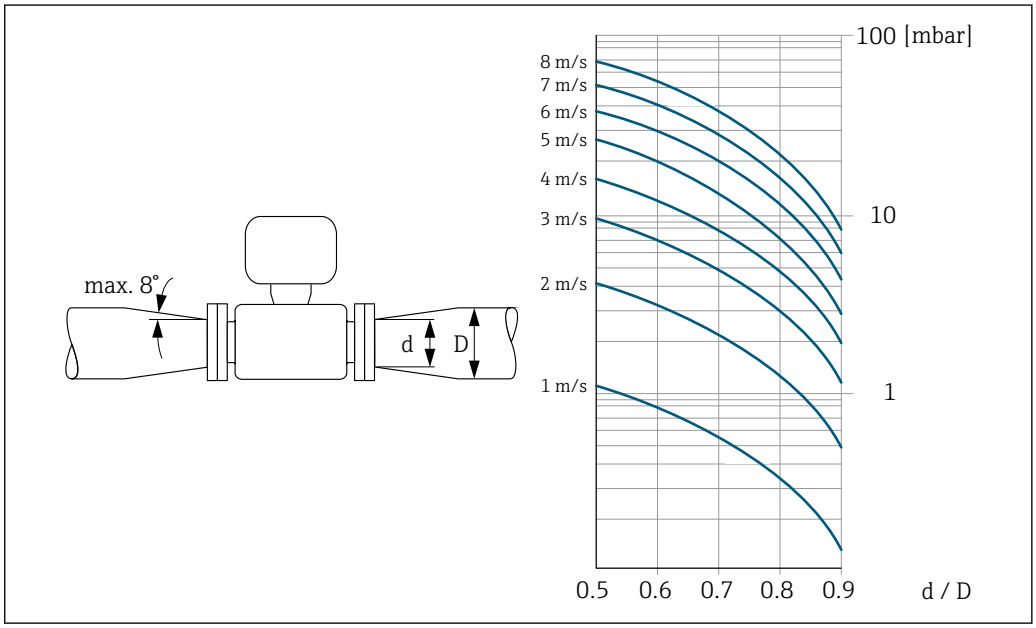
Adapters

The sensor can also be installed in larger-diameter pipes with the aid of suitable adapters according to DIN EN 545 (double-flange reducers). The resultant increase in the rate of flow improves measurement accuracy with very slow-moving fluids.

The nomogram shown here can be used to calculate the pressure loss caused by reducers and expanders:

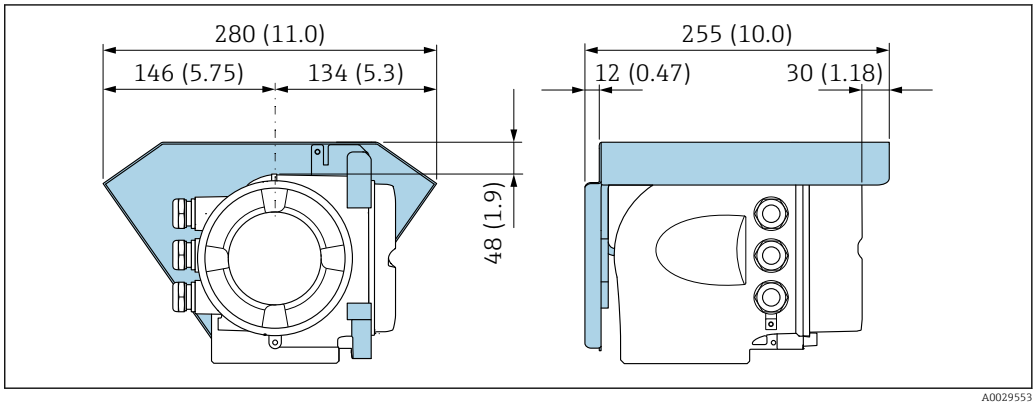
- Calculate the ratio of the diameters d/D.
- From the nomogram read off the pressure loss as a function of flow velocity (downstream from the reduction) and the d/D ratio.

- The nomogram only applies to liquids with a viscosity similar to that of water.
- If the medium has a high viscosity, a larger measuring tube diameter can be considered in order to reduce pressure loss.



Special installation instructions

Protective cover



16 *Unit mm (in)*

Hygienic compatibility

- When installing in hygienic applications, please refer to the information in the "Certificates and approvals/hygienic compatibility" section → 🖹 119
- In the case of measuring devices with the order code for "Housing", option B "Stainless, hygienic", to seal the connection compartment cover, screw it closed finger-tight and tighten it by another 45° (corresponds to 15 Nm).

Environment

Ambient temperature range

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

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.

You can order a weather protection cover from Endress+Hauser. → 🖹 123.

Storage temperature

The storage temperature corresponds to the operating temperature range of the transmitter and the sensor → 🖹 60.

- 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.

Atmosphere

Additional protection against condensation and moisture: the sensor housing is potted with a gel.

Order code for "Sensor option", option CF "Harsh environment".

Relative humidity

The device is suitable for use in outdoor and indoor areas with a relative humidity of 4 to 95%.

Operating height

According to EN 61010-1
≤ 2 000 m (6 562 ft)

Degree of protection

Transmitter

- IP66/67, Type 4X enclosure, suitable for pollution degree 4
- When the housing is open: IP20, Type 1 enclosure, suitable for pollution degree 2
- Display module: IP20, Type 1 enclosure, suitable for pollution degree 2

Optional

External WLAN antenna

IP67

Vibration resistance and shock resistance

Sinusoidal vibration similar to IEC 60068-2-6

- 2 to 8.4 Hz, 3.5 mm peak
- 8.4 to 2 000 Hz, 1 g peak

Broadband random vibration similar to IEC 60068-2-64

- 10 to 200 Hz, 0.003 g^2/Hz
- 200 to 2 000 Hz, 0.001 g^2/Hz
- Total: 1.54 g rms

Half-sine shocks similar to IEC 60068-2-27

6 ms 30 g

Rough handling shocks similar to IEC 60068-2-31

Mechanical load

Transmitter housing:
- Protect against mechanical effects, such as shock or impact
- Do not use as a ladder or climbing aid

Electromagnetic compatibility (EMC)

- As per IEC/EN 61326 and NAMUR Recommendation 21 (NE 21), NAMUR Recommendation 21 (NE 21) is fulfilled when the device is installed in accordance with NAMUR Recommendation 98 (NE 98).
- As per IEC/EN 61000-6-2 and IEC/EN 61000-6-4
- 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.

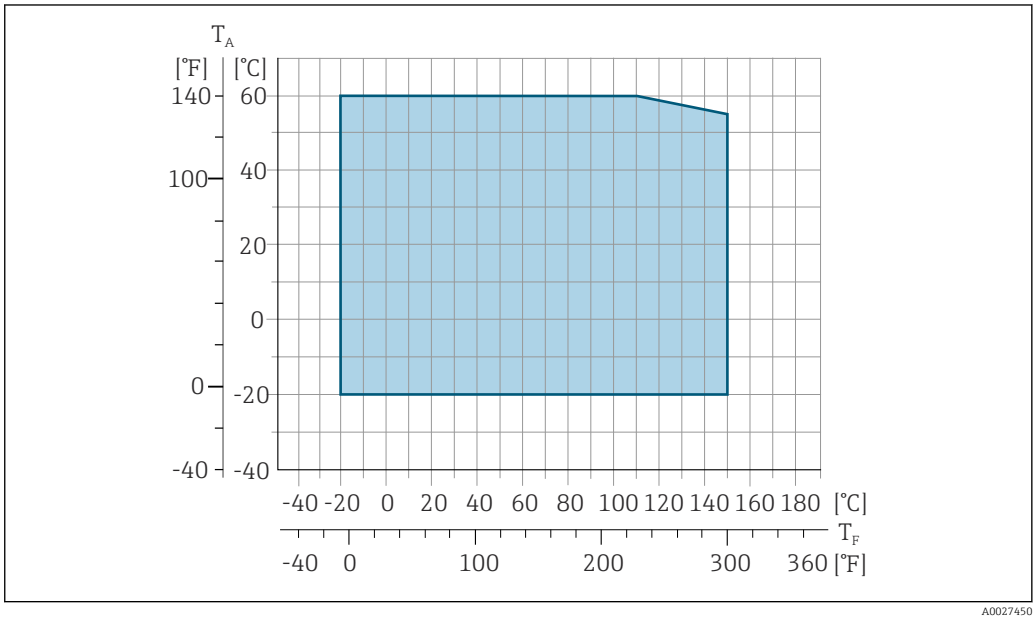
This unit is not intended for use in residential environments and cannot guarantee adequate protection of the radio reception in such environments.

The selection of a sensor with a steel housing is recommended for use in the vicinity of electrical power supply lines with strong currents.

Process

Medium temperature range

−20 to +150 °C (−4 to +302 °F)



T_A *Ambient temperature range*
T_F *Fluid temperature*

The permitted fluid temperature in custody transfer is 0 to +50 °C (+32 to +122 °F).

Conductivity

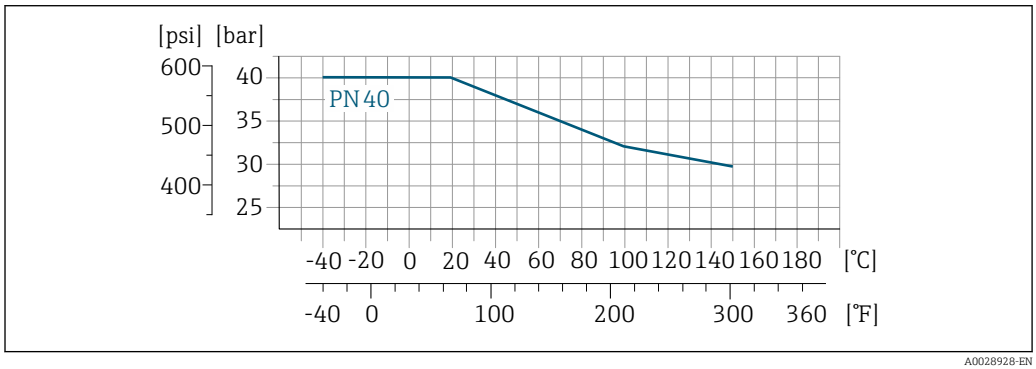
≥5 µS/cm for liquids in general.

Pressure-temperature ratings

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

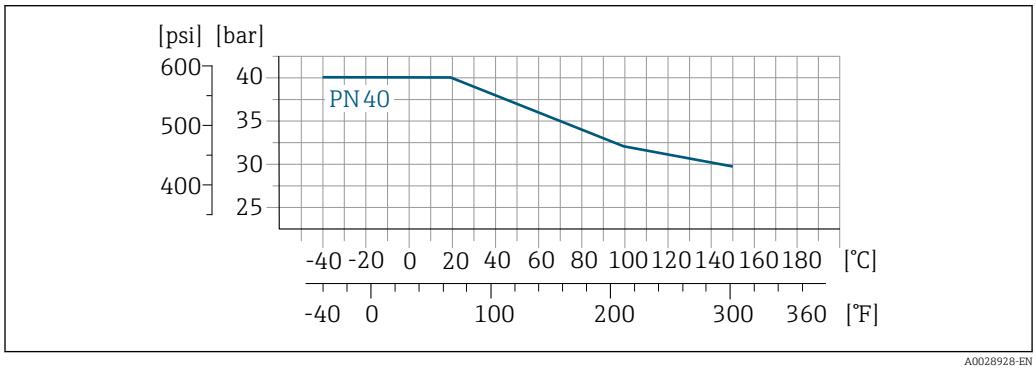
Process connections with O-ring seal, DN 2 to 25 (1/12 to 1")

Process connection: welding nipple similar to DIN EN ISO 1127, ISO 2037; coupling similar to ISO 228/DIN 2999, NPT

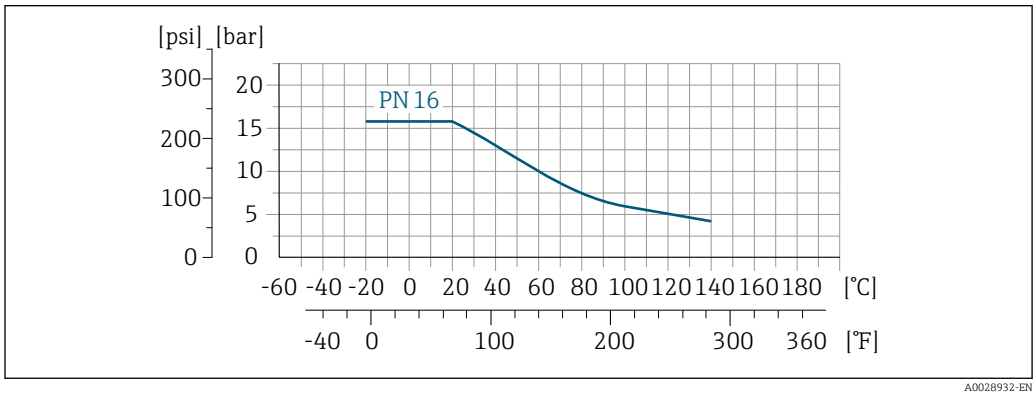


17 *Process connection material: stainless steel, 1.4404 (F316L)*

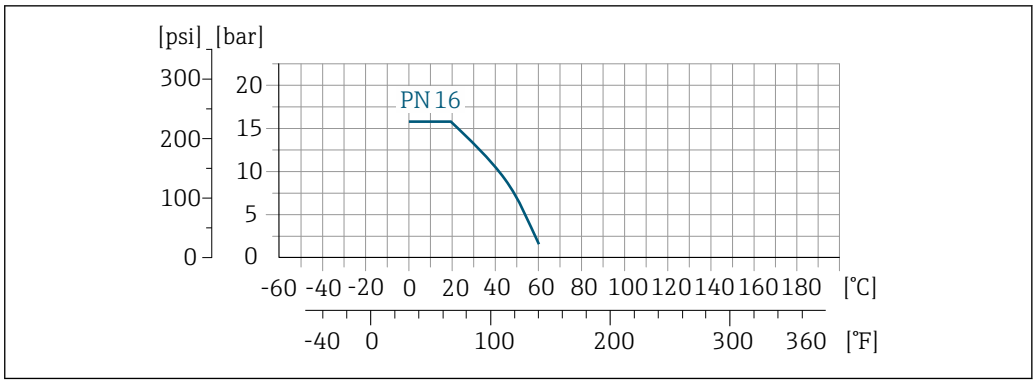
Process connection: flange similar to EN 1092-1 (DIN 2501), adhesive fitting



18 *Process connection material: stainless steel, 1.4404 (F316L)*

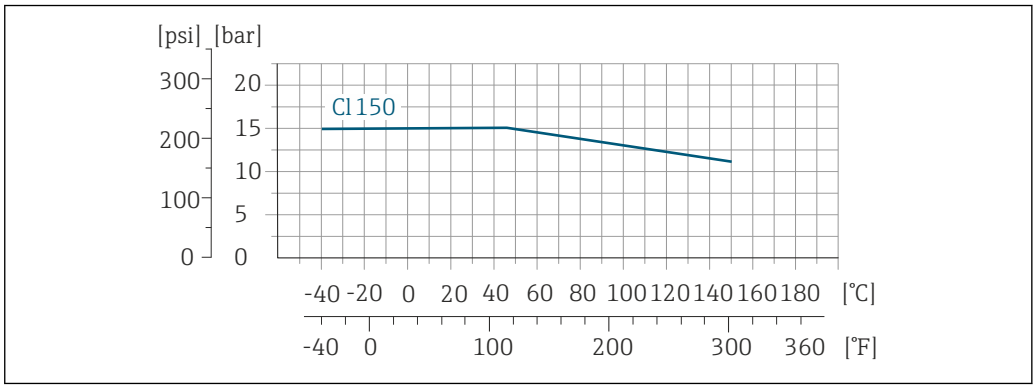


19 *Process connection material: PVDF*

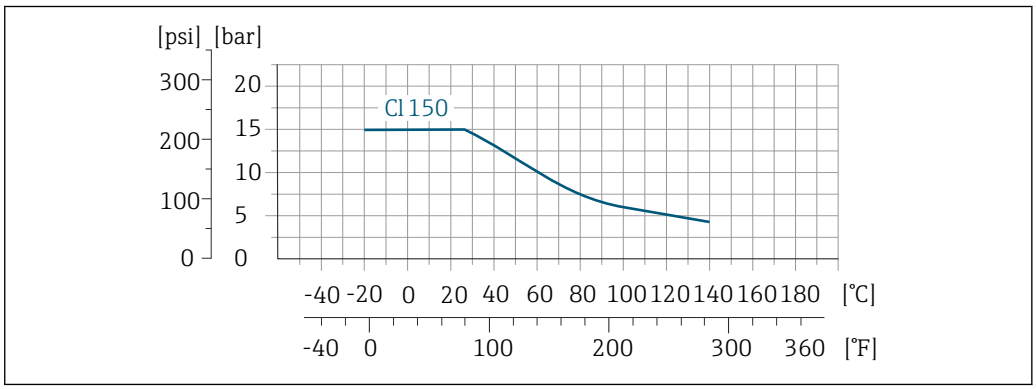


20 *Process connection material: PVC-U*

Process connection: flange similar to ASME B16.5

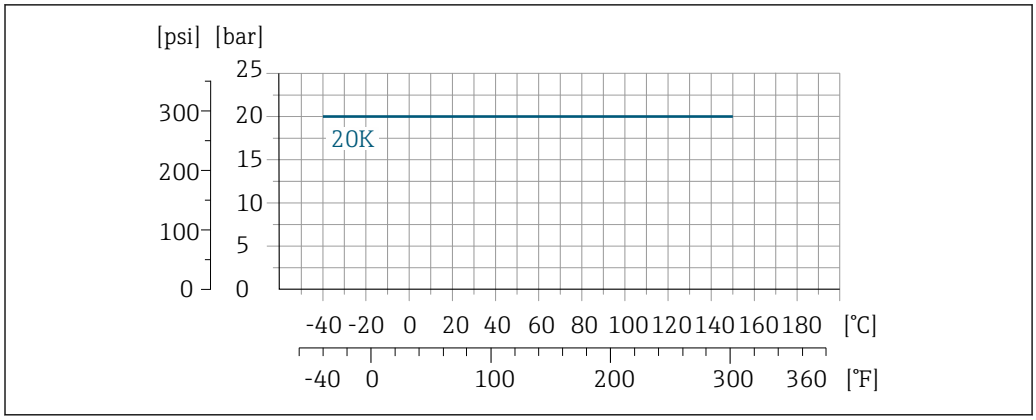


21 *Process connection material: stainless steel, 1.4404 (F316L)*

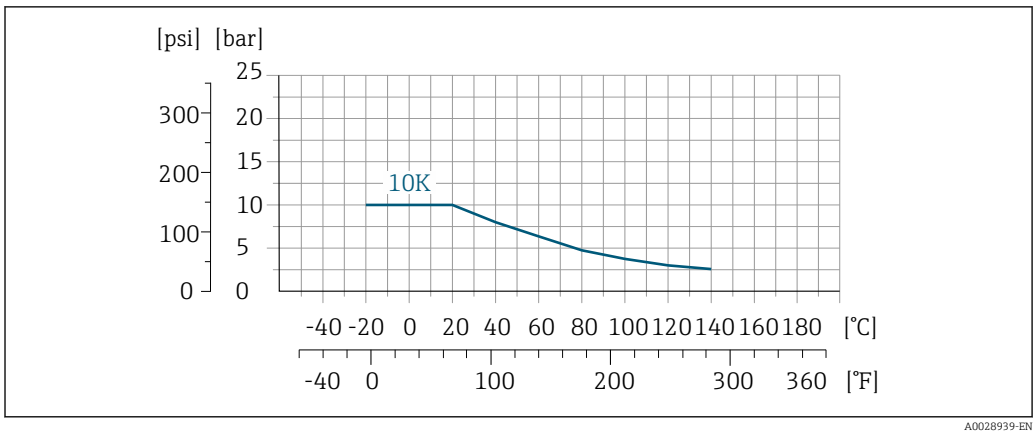


22 *Process connection material: PVDF*

Process connection: flange similar to JIS B2220



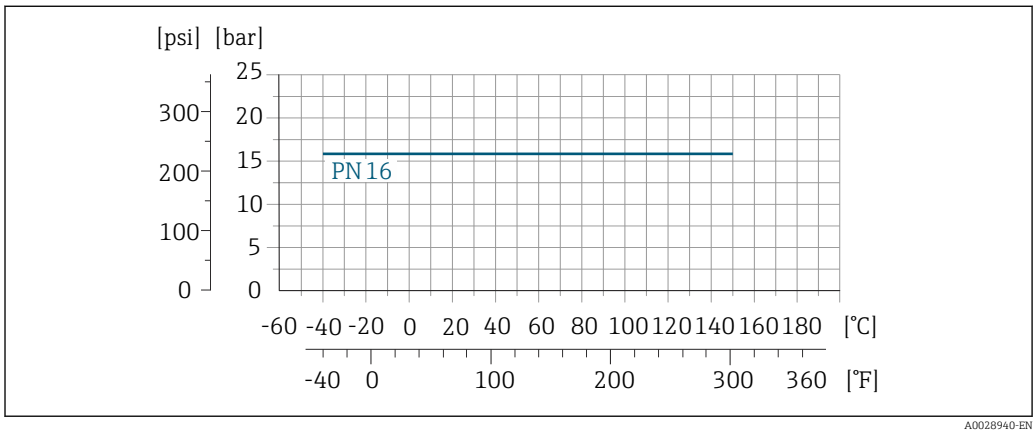
23 Process connection material: stainless steel, 1.4404 (F316L)



24 Process connection material: PVDF

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

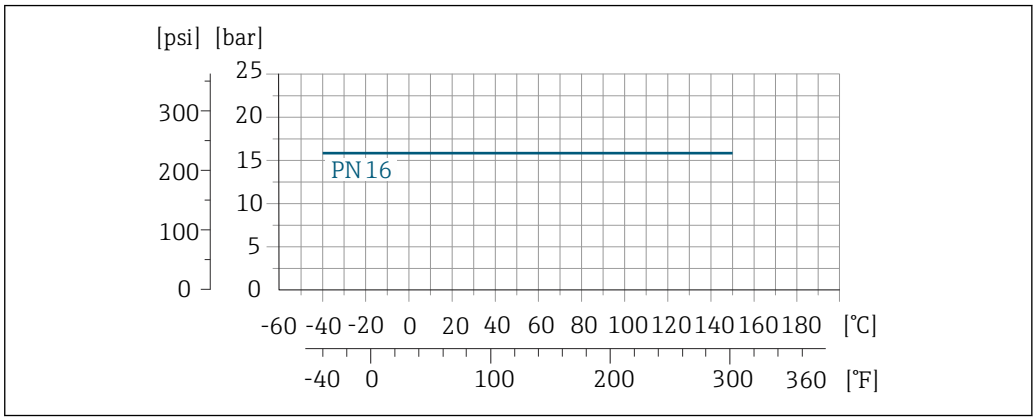
Process connection: welding nipple similar to EN 10357, ASME BPE, ISO 2037; clamp similar to ISO 2852, DIN 32676; coupling similar to DIN 11851, DIN 11864-1, SMS 1145; flange similar to DIN 11864-2



25 Process connection material: stainless steel, 1.4404 (F316L)

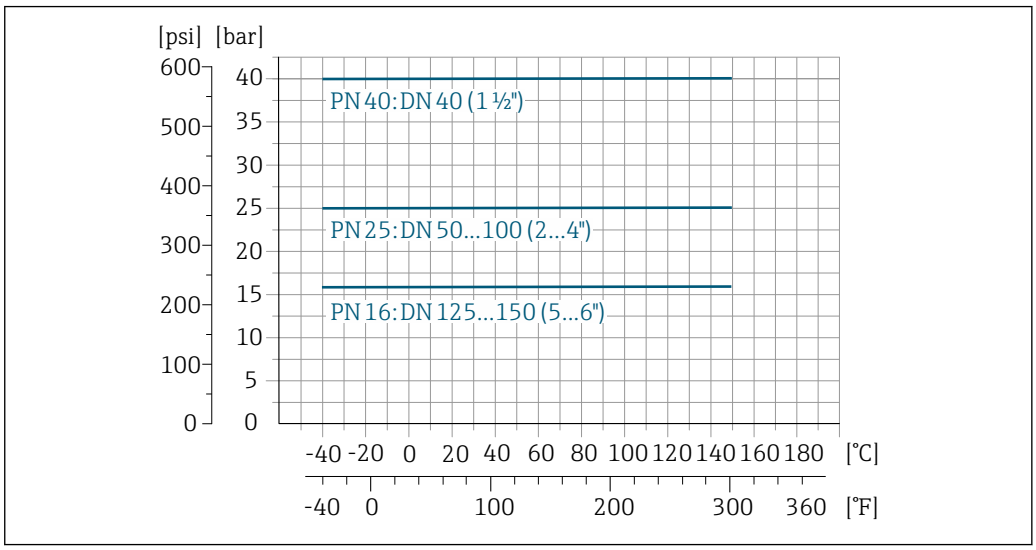
Process connections with aseptic gasket seal, DN 40 to 150 (1 ½ to 6")

Process connection: coupling similar to SMS 1145



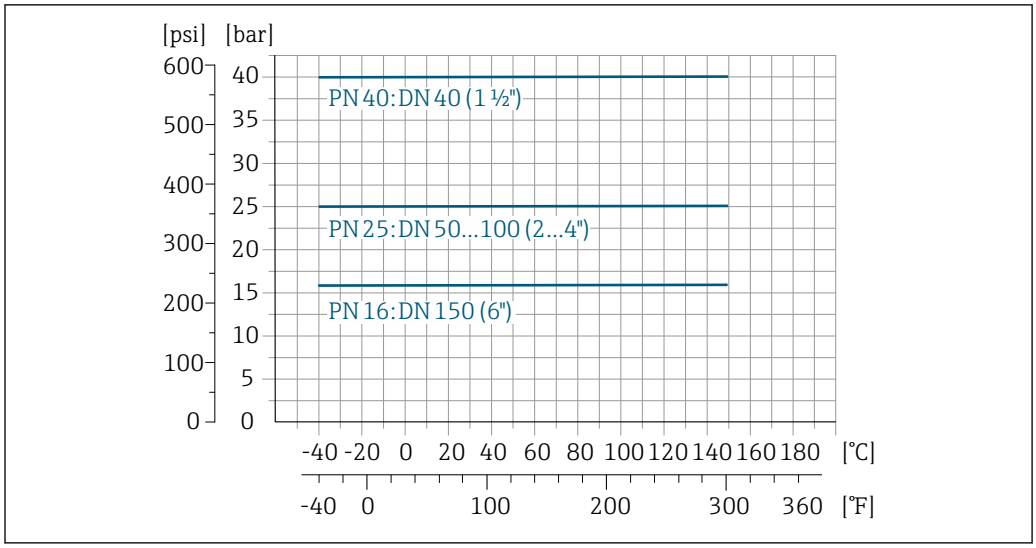
26 *Process connection material: stainless steel, 1.4404 (F316L)*

Process connection: welding nipple similar to EN 10357; coupling similar to DIN 11851

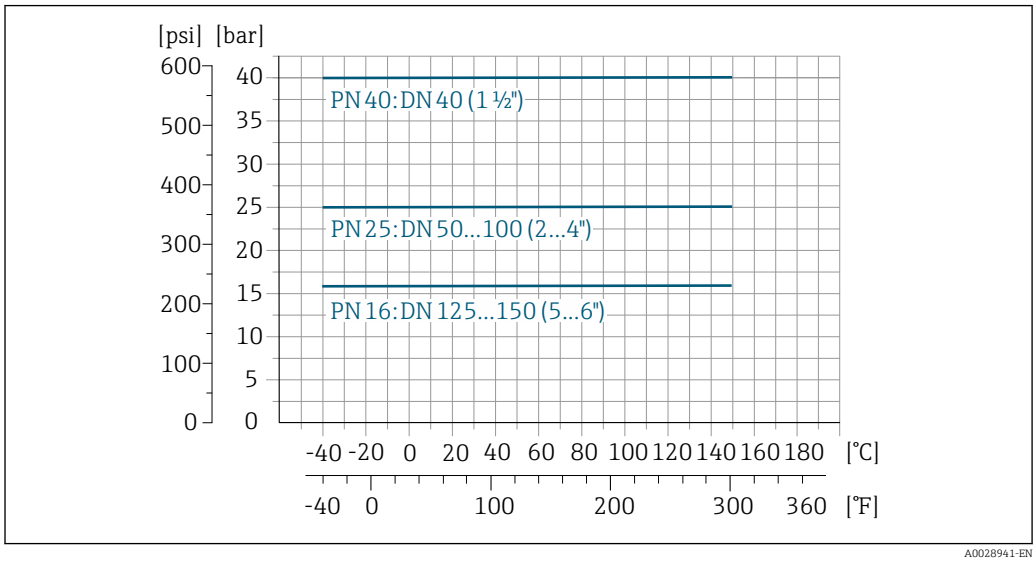


27 *Process connection material: stainless steel, 1.4404 (F316L)*

Process connection: welding nipple similar to ASME BPE

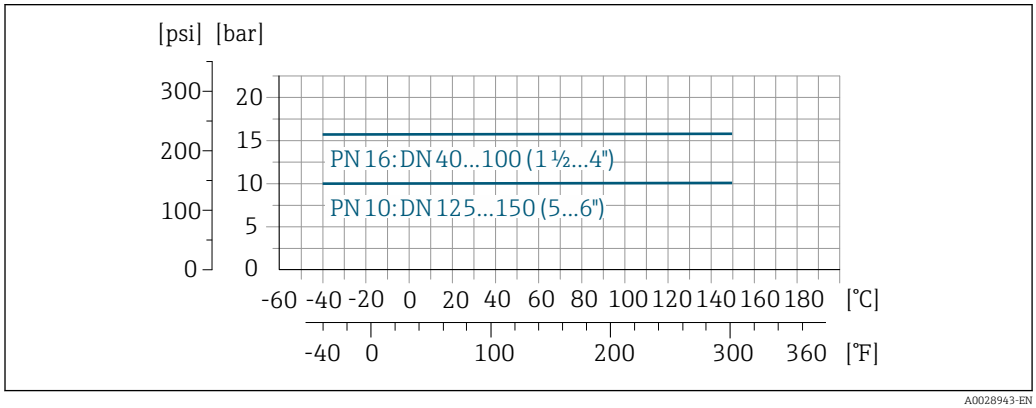


Process connection: welding nipple similar to ISO 2037



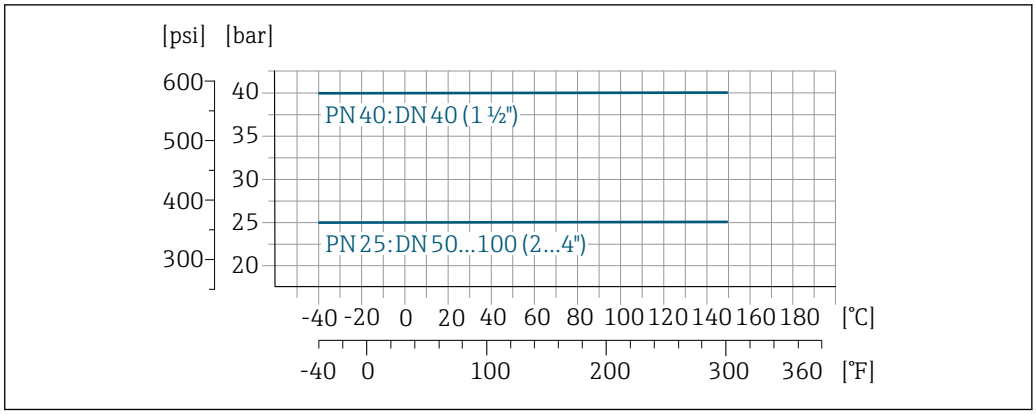
28 *Process connection material: stainless steel, 1.4404 (F316L)*

Process connection: clamp similar to ISO 2852, DIN 32676



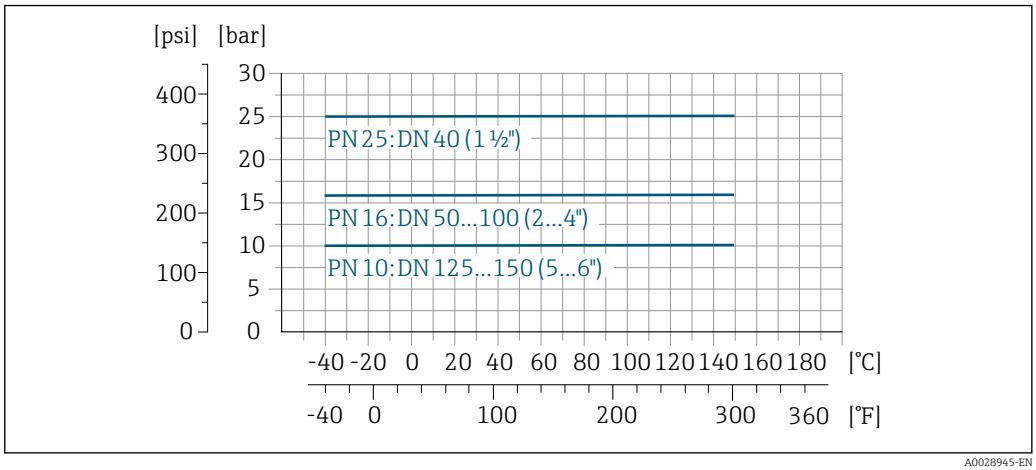
29 *Process connection material: stainless steel, 1.4404 (F316L)*

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



30 *Process connection material: stainless steel, 1.4404 (F316L)*

Process connection: flange similar to DIN 11864-2



31 *Process connection material: stainless steel, 1.4404 (F316L)*

Pressure tightness

Liner: PFA

Nominal diameter		Limit values for absolute pressure in [mbar] ([psi]) for medium 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 velocity of flow is between 2 to 3 m/s (6.56 to 9.84 ft/s). Also match the velocity of flow (v) to the physical properties of the medium:

- v < 2 m/s (6.56 ft/s): for low conductivity values
- v > 2 m/s (6.56 ft/s): for media producing buildup (e.g. milk with a high fat content)

- A necessary increase in the flow velocity can be achieved by reducing the sensor nominal diameter.
- In the case of media with a high solids content, a sensor with a nominal diameter > DN 8 (3/8") can improve the signal stability and cleanability due to the larger electrodes.

Pressure loss

- No pressure loss occurs as of nominal diameter DN 8 (5/16") if the sensor is installed in a pipe with the same nominal diameter.
- Pressure losses for configurations incorporating adapters according to DIN EN 545 → 59

System pressure

Installation near pumps → 55

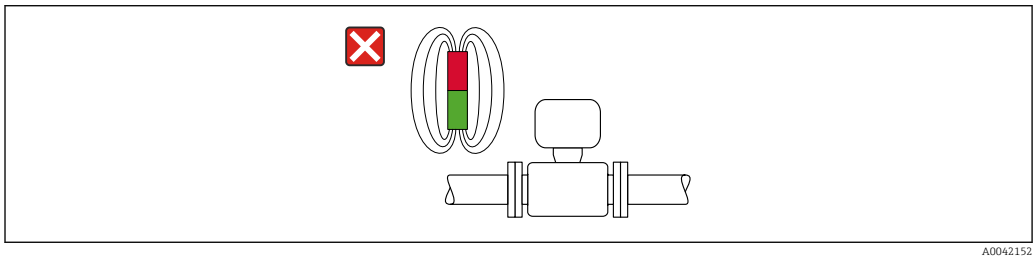
Internal cleaning

- CIP cleaning
- SIP cleaning

Vibrations

Installation in event of pipe vibrations → 55

Magnetism and static electricity



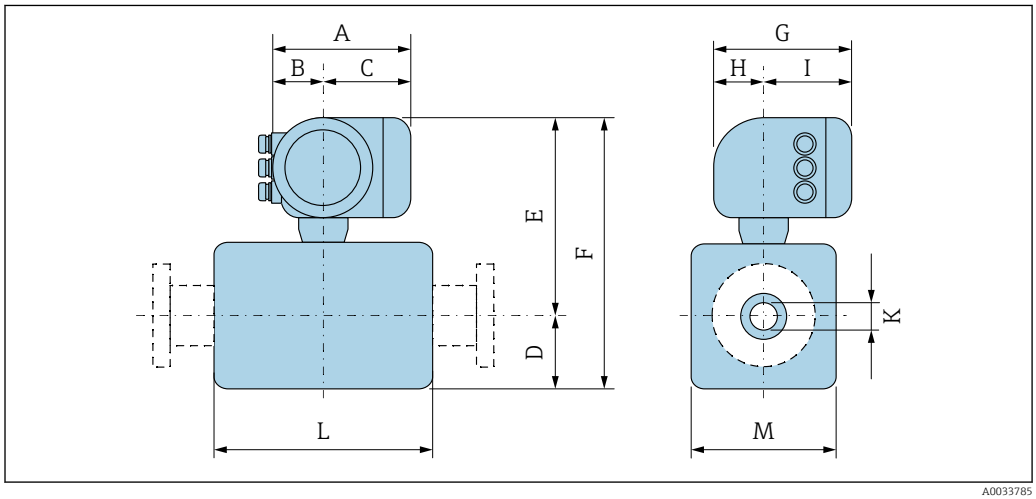
A0042152

32 *Avoid magnetic fields*

Mechanical construction

Dimensions in SI units

Compact version



A0033785

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

DN [mm]	A [1] [mm]	B [1] [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [2] [mm]	H [mm]	I [2] [mm]	K [mm]	L [3] [mm]	M [mm]
2	169	68	101	55	240	295	200	59	141	2.25	86	43
4	169	68	101	55	240	295	200	59	141	4.5	86	43
8	169	68	101	55	240	295	200	59	141	9	86	43
15	169	68	101	55	240	295	200	59	141	16	86	43
25	169	68	101	55	240	295	200	59	141	22.6	86	56
40	169	68	101	54	239	293	200	59	141	34.8	140	107
50	169	68	101	60	246	306	200	59	141	47.5	140	120
65	169	68	101	68	254	322	200	59	141	60.2	140	135
80	169	68	101	74	260	334	200	59	141	72.9	140	148
100	169	68	101	87	273	360	200	59	141	97.4	140	174

DN [mm]	A [1] [mm]	B [1] [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [2] [mm]	H [mm]	I [2] [mm]	K [mm]	L [3] [mm]	M [mm]
125	169	68	101	103	289	392	200	59	141	120.0	200	206
150	169	68	101	117	303	420	200	59	141	146.9	200	234

1) Depending on the cable gland used: values up to + 30 mm
2) For version without local display: values − 30 mm
3) Total installed length depends on process connections.→ 🖹 71

Order code for "Housing", option A "Aluminum, coated"; Ex d

DN [mm]	A [1] [mm]	B [1] [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [2] [mm]	H [mm]	I [2] [mm]	K [mm]	L [3] [mm]	M [mm]
2	188	85	103	55	269	324	217	58	159	2.25	86	43
4	188	85	103	55	269	324	217	58	159	4.5	86	43
8	188	85	103	55	269	324	217	58	159	9	86	43
15	188	85	103	55	269	324	217	58	159	16	86	43
25	188	85	103	55	269	324	217	58	159	22.6	86	56
40	188	85	103	54	270	324	217	58	159	34.8	140	107
50	188	85	103	60	276	336	217	58	159	47.5	140	120
65	188	85	103	67	284	351	217	58	159	60.2	140	135
80	188	85	103	74	290	364	217	58	159	72.9	140	148
100	188	85	103	87	303	390	217	58	159	97.4	140	174
125	188	85	103	103	319	422	217	58	159	120.0	200	206
150	188	85	103	117	333	450	217	58	159	146.9	200	234

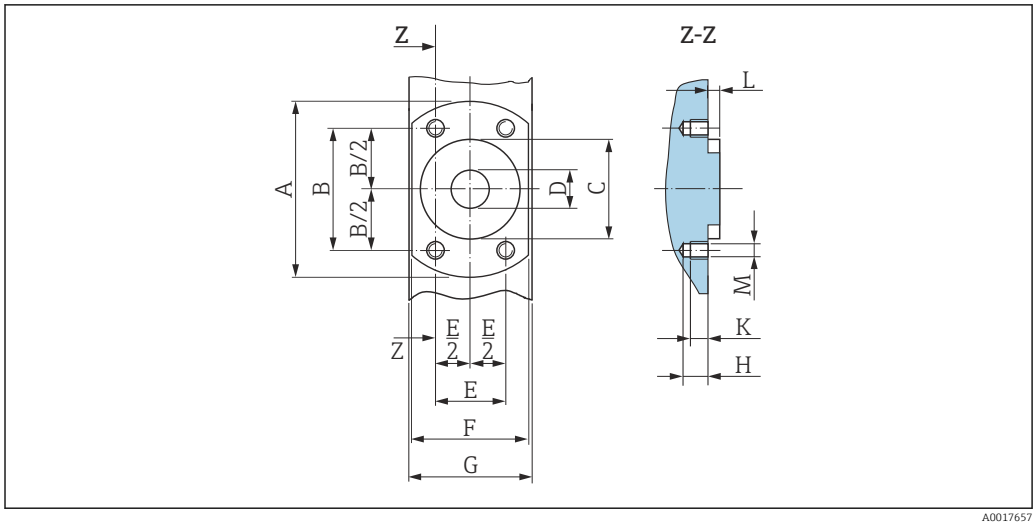
1) Depending on the cable gland used: values up to + 30 mm
2) For version without local display: values − 40 mm
3) Total installed length depends on process connections.→ 🖹 71

Order code for "Housing", option B "Stainless, hygienic"

DN [mm]	A [1] [mm]	B [1] [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [2] [mm]	H [mm]	I [2] [mm]	K [mm]	L [3] [mm]	M [mm]
2	183	73	110	55	254	309	207	65	142	2.25	86	43
4	183	73	110	55	254	309	207	65	142	4.5	86	43
8	183	73	110	55	254	309	207	65	142	9	86	43
15	183	73	110	55	254	309	207	65	142	16	86	43
25	183	73	110	55	254	309	207	65	142	22.6	86	56
40	183	73	110	54	255	309	207	65	142	34.8	140	107
50	183	73	110	60	261	321	207	65	142	47.5	140	120
65	183	73	110	67	269	336	207	65	142	60.2	140	135
80	183	73	110	74	275	349	207	65	142	72.9	140	148
100	183	73	110	87	288	375	207	65	142	97.4	140	174
125	183	73	110	103	304	407	207	65	142	120.0	200	206
150	183	73	110	117	318	435	207	65	142	146.9	200	234

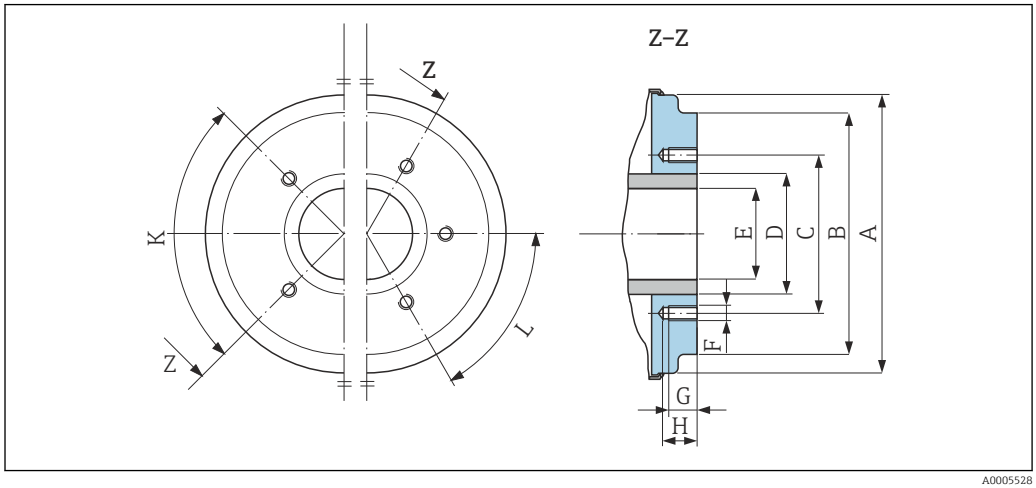
1) Depending on the cable gland used: values up to + 30 mm
2) For version without local display: values − 30 mm
3) Total installed length depends on process connections.→ 🖹 71

Sensor flange connection



33 *Front view without process connections*

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



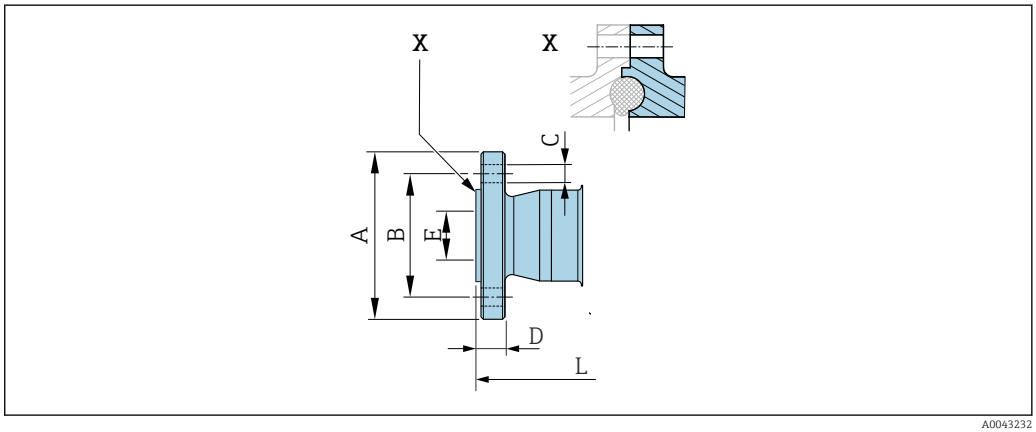
34 *Front view without process connections*

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

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
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

Flange connections

Female with aseptic gasket seal



35 *Detail X: Asymmetrical process connection; the part shown in blue is provided by the supplier.*

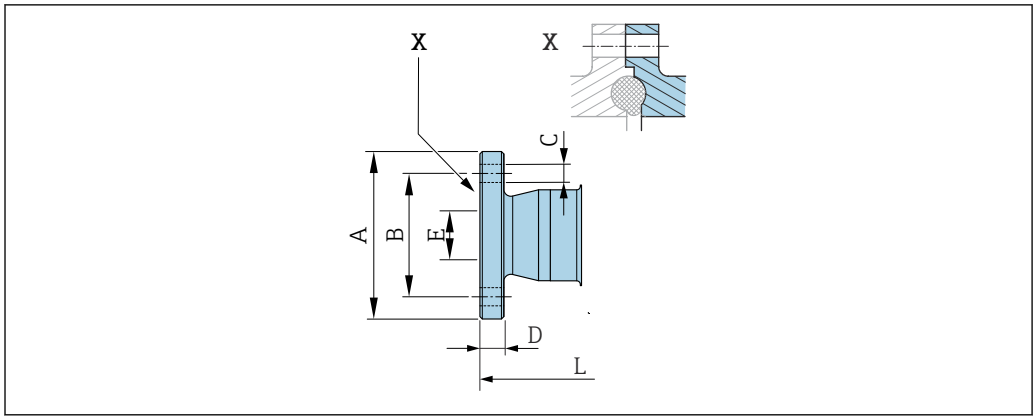
Flange DIN 11864-2, aseptic female, Form A
1.4404 (316L), suitable for pipe according to EN 10357 series A, female
Order code for "Process connection", option **DES/DQS**

DN [mm]	Suitable for pipe according to EN 10357 series A [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
2 to 8 [1]	13 × 1.5 (DN 10)	54	37	4 × Ø9	10	10	183
15	19 × 1.5 (DN 15)	59	42	4 × Ø9	10	16	183
25	29 × 1.5 (DN 25)	70	53	4 × Ø9	10	26	183

Surface roughness: Ra_{max} = 0.76 µm, optional order code for "Service", option HJ: Ra_{max} = 0.38 µm electropolished
Please note the internal diameters of the measuring tube and process connection (E) when cleaning with pigs.

1) With DN 10 flanges as standard

Flange with notch with aseptic gasket seal



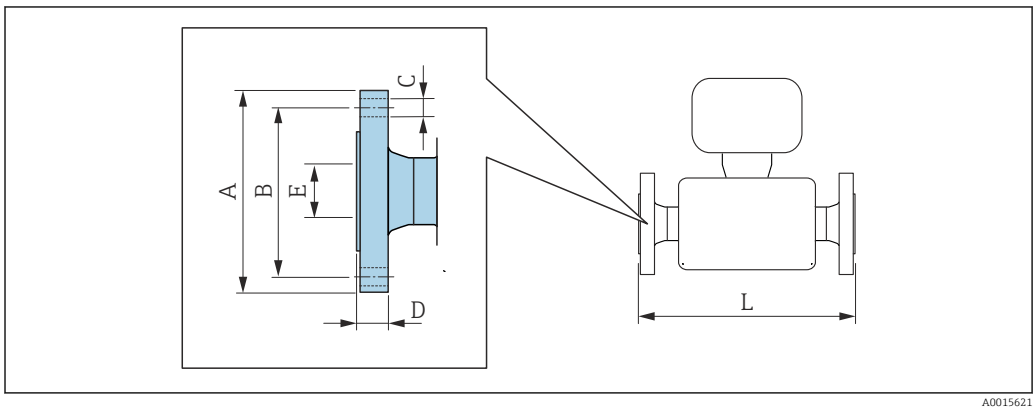
36 *Detail X: Asymmetrical process connection; the part shown in blue is provided by the supplier.*

Flange DIN 11864-2, aseptic flange with notch, Form A
1.4404 (316L), suitable for pipe according to EN 10357 series A, flange with notch
Order code for "Process connection", option **DES/DRS**

DN [mm]	Suitable for pipe according to EN 10357 series A [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
40	41 × 1.5	82	65	4 × Ø9	10	38	246
50	53 × 1.5	94	77	4 × Ø9	10	50	246
65	70 × 2	113	95	8 × Ø9	10	66	246
80	85 × 2	133	112	8 × Ø11	10	81	270
100	104 × 2	159	137	8 × Ø11	10	100	278
125	129 × 2	183	161	8 × Ø11	10	125	362
150	154 × 2	213	188	8 × Ø14	10	150	362

Surface roughness: Ra_{max} = 0.76 µm, optional order code for "Service", option HJ: Ra_{max} = 0.38 µm electropolished
Please note the internal diameters of the measuring tube and process connection (E) when cleaning with pigs.

Flanges with O-ring seal



Flange similar to EN 1092-1 (DIN 2501), Form B: PN 40
1.4404 (316L)
Order code for "Process connection", option **D5S**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
2 to 8 [1]	95	65	4 × Ø14	16	17.3	198.4
15	95	65	4 × Ø14	16	17.3	198.4
25	115	85	4 × Ø14	18	28.5	198.4
Surface roughness: Ra_{max} = 1.6 µm						

1) DN 2 to 8 with DN 15 flanges as standard

Flange similar to ASME B16.5: Class 150
1.4404 (316L)
Order code for "Process connection", option **A1S**

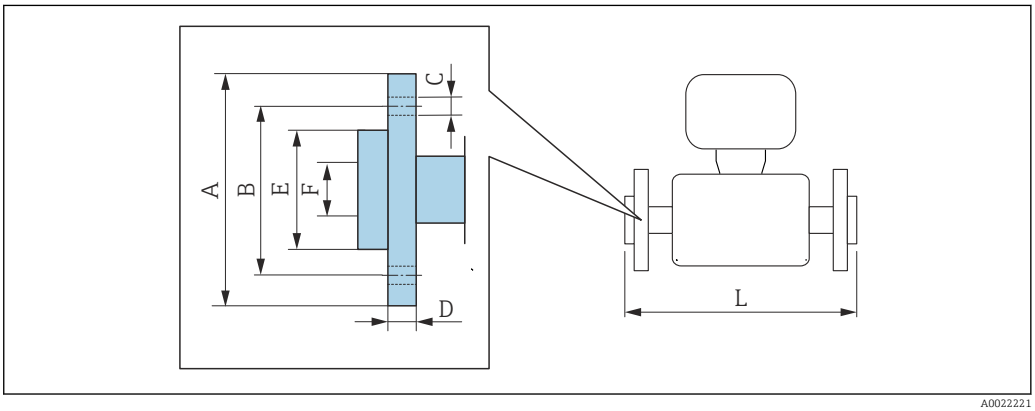
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
2 to 8 [1]	90	60.3	4 × Ø15.7	11.2	15.7	218
15	90	60.3	4 × Ø15.7	11.2	15.7	218
25	110	79.4	4 × Ø15.7	14.2	26.7	230
Surface roughness: Ra_{max} = 1.6 µm						

1) DN 2 to 8 with DN 15 flanges as standard

Flange similar to JIS/t20615, 20 K
1.4404 (316L)
Order code for "Process connection", option **N4S**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	L [mm]
2 to 8 [1]	95	70	4 × Ø15	14	15	220
15	95	70	4 × Ø15	14	15	220
25	125	90	4 × Ø19	16	25	220
Surface roughness: Ra_{max} = 1.6 µm						

1) DN 2 to 8 with DN 15 flanges as standard



A0022221

Lap joint flange similar to EN 1092-1 (DIN 2501): PN 16
PVDF
Order code for "Process connection", option **D3P**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	L [mm]
2 to 8 [1]	95	65	4 x Ø14	14.5	45	17.3	200
15	95	65	4 x Ø14	14.5	45	17.3	200
25	115	85	4 x Ø14	16.5	68	28.5	200

Surface roughness: Ra_{max} = 1.6 µm
The required grounding rings can be ordered as accessories (order code: DK5HR-****).

1) DN 2 to 8 with DN 15 flanges as standard

Lap joint flange with grounding electrode similar to EN 1092-1 (DIN 2501): PN 16
PVDF
Order code for "Process connection", option **D4P**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	L [mm]
2 to 8 [1]	95	65	4 x Ø14	14.5	45	17.3	200
15	95	65	4 x Ø14	14.5	45	17.3	200
25	115	85	4 x Ø14	16.5	68	28.5	200

Surface roughness: Ra_{max} = 1.6 µm
Grounding rings are not necessary.

1) DN 2 to 8 with DN 15 flanges as standard

Lap joint flange similar to ASME B16.5: Class 150
PVDF
Order code for "Process connection", option **A1P**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	L [mm]
2 to 8 [1]	90	60.3	4 × Ø 15.7	15	35.1	15.7	200
15	90	60.3	4 × Ø 15.7	15	35.1	15.7	200
25	110	79.4	4 × Ø 15.7	16	50.8	26.7	200

Surface roughness: Ra_{max} = 1.6 µm
The required grounding rings can be ordered as accessories (order code: DK5HR-****).

1) DN 2 to 8 with DN 15 flanges as standard

Lap joint flange with grounding electrode similar to ASME B16.5: Class 150
PVDF
Order code for "Process connection", option **A4P**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	L [mm]
2 to 8 [1]	90	60.3	4 × Ø 15.7	15	35.1	15.7	200
15	90	60.3	4 × Ø 15.7	15	35.1	15.7	200
25	110	79.4	4 × Ø 15.7	16	50.8	26.7	200

Surface roughness: Ra_{max} = 1.6 µm
Grounding rings are not necessary.

1) DN 2 to 8 with DN 15 flanges as standard

Lap joint flange similar to JIS B2220: 10K
PVDF
Order code for "Process connection", option **N3P**

DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	L [mm]
2 to 8 [1]	95	70	4 × Ø 15.7	15	35.1	15	200
15	95	70	4 × Ø 15.7	15	35.1	15	200
25	125	90	4 × Ø 15.7	16	50.8	19	200

Surface roughness: Ra_{max} = 1.6 µm
The required grounding rings can be ordered as accessories (order code: DK5HR-****).

1) DN 2 to 8 with DN 15 flanges as standard

Lap joint flange with grounding electrode similar to JIS B2220: 10K
PVDF
Order code for "Process connection", option **N4P**

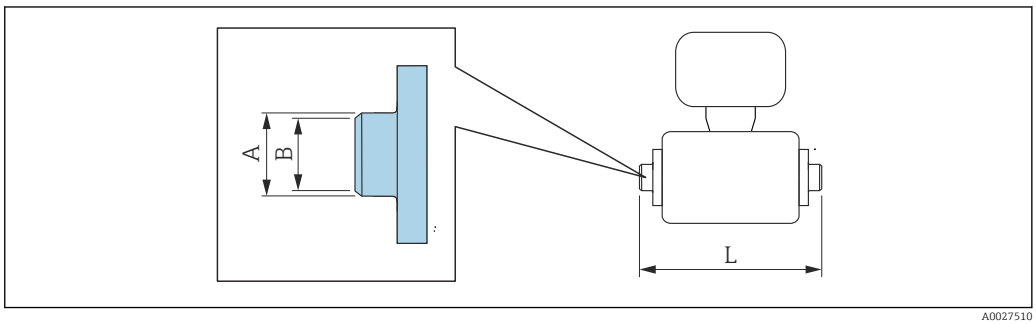
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	L [mm]
2 to 8 [1]	95	70	4 × Ø 15.7	15	35.1	15	200
15	95	70	4 × Ø 15.7	15	35.1	15	200
25	125	90	4 × Ø 15.7	16	50.8	19	200

Surface roughness: Ra_{max} = 1.6 µm
Grounding rings are not necessary.

1) DN 2 to 8 with DN 15 flanges as standard

Welding nipple

Welding nipple with aseptic gasket seal



A0027510

Welding nipple according to EN 10357
1.4404 (316L), suitable for pipe EN 10357 series A
Order code for "Process connection", option **DAS**

DN [mm]	Suitable for pipe EN 10357 series A [mm]	A [mm]	B [mm]	L [mm]
2 to 8	13 × 1.5	13	10	132.6
15	19 × 1.5	19	16	132.6
25	29 × 1.5	29	26	132.6
40	41 × 1.5	41	38	220
50	53 × 1.5	53	50	220
65	70 × 2	70	66	220
80	85 × 2	85	81	220

Welding nipple according to EN 10357
1.4404 (316L), suitable for pipe EN 10357 series A
Order code for "Process connection", option **DAS**

DN [mm]	Suitable for pipe EN 10357 series A [mm]	A [mm]	B [mm]	L [mm]
100	104 × 2	104	100	220
125	129 × 2	129	125	300
150	154 × 2	154	150	300

Surface roughness: Ra_{max} = 0.76 µm, optional order code for "Service", option HJ: Ra_{max} = 0.38 µm electropolished
Please note the internal diameters of the measuring pipe and process connection (B) when cleaning with pigs.

Welding nipple according to ISO 2037
1.4404 (316L), suitable for pipe ISO 2037
Order code for "Process connection", option **IAS**

DN [mm]	Suitable for pipe ISO 2037 [mm]	A [mm]	B [mm]	L [mm]
2 to 8	12.7 × 1.65	12	10	118.2
15	19.05 × 1.65	18	16	118.2
25	25.4 × 1.60	25	22.6	118.2
40	38 × 1.2	38	35.6	220
50	51 × 1.2	51	48.6	220
65	63.5 × 1.6	63.5	60.3	220
80	76.1 × 1.6	76.1	72.9	220
100	101.6 × 2	101.6	97.6	220
125	139.7 × 2	139.7	135.7	380
150	168.3 × 2.6	168.3	163.1	380

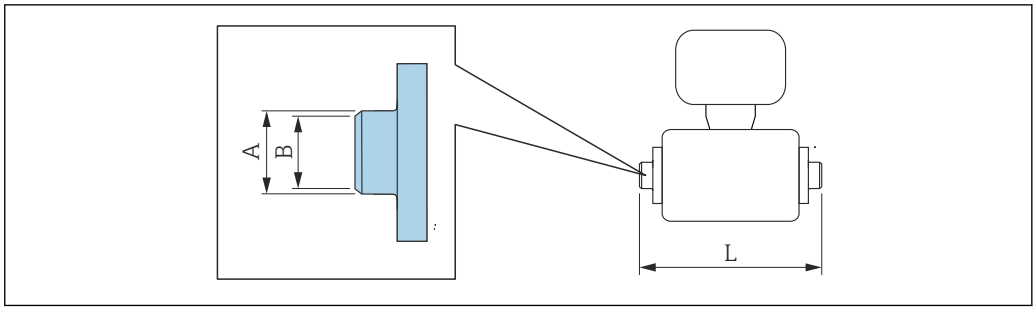
Surface roughness: Ra_{max} = 0.76 µm, optional order code for "Service", option HJ: Ra_{max} = 0.38 µm electropolished
Please note the internal diameters of the measuring pipe and process connection (B) when cleaning with pigs.

Welding nipple according to ASME BPE
1.4404 (316L), suitable for pipe according to ASME BPE and DIN 11866 series C
Order code for "Process connection", option **AAS**

DN [mm]	Suitable for pipe according to ASME BPE [mm]	A [mm]	B [mm]	L [mm]
2 to 8	12.7 × 1.65	12.7	9	118.2
15	19.1 × 1.65	19.1	16	118.2
25	25.4 × 1.65	25.4	22.6	118.2
40	38.1 × 1.65	38.1	34.8	220
50	50.8 × 1.65	50.8	47.5	220
65	63.5 × 1.65	63.5	60.2	220
80	76.2 × 1.65	76.2	72.9	220
100	101.6 × 1.65	101.6	97.4	220
150	152.4 × 2.77	152.4	146.9	300

Surface roughness: Ra_{max} = 0.76 µm, optional order code for "Service", option HJ: Ra_{max} = 0.38 µm electropolished
Please note the internal diameters of the measuring pipe and process connection (B) when cleaning with pigs.

Welding nipple with O-ring seal



A0027510

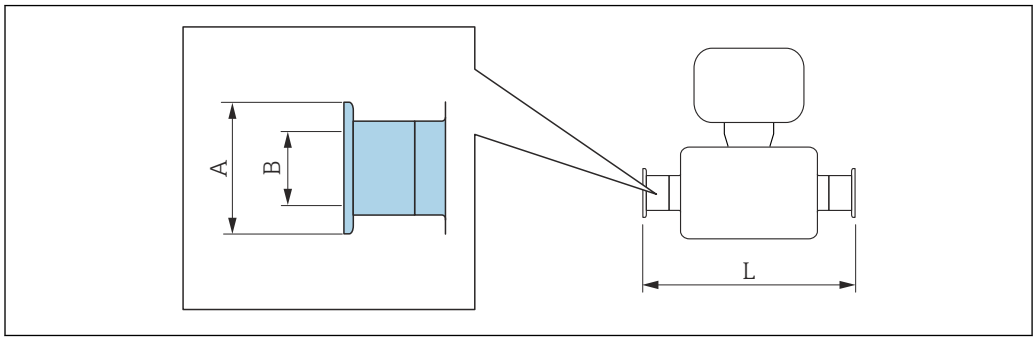
Welding nipple according to ISO 1127 **1.4404 (316L), suitable for pipe according to ISO 1127 series 1** *Order code for "Process connection", option* **A2S**				
DN [mm]	**Suitable for pipe according to ISO 1127 series 1 [mm]**	**A [mm]**	**B [mm]**	**L [mm]**
2 to 8	13.5 × 2.30	13.5	9	126.6
15	21.3 × 2.65	21.3	16	126.6
25	33.7 × 3.25	33.7	27.2	126.6
Surface roughness: Ra_{max} = 1.6 µm				

Welding nipple according to ISO 1127 **1.4404 (316L), suitable for pipe according to ISO 1127 series 1 and DIN 11866 series B** *Order code for "Process connection", option* **D1S**				
DN [mm]	**Suitable for pipe according to ISO 1127 series 1 and DIN 11866 series B [mm]**	**A [mm]**	**B [mm]**	**L [mm]**
2 to 8	13.5 × 1.6	13.5	10.3	126.6
15	21.3 × 1.6	21.3	18.1	126.6
25	33.7 × 2.0	33.7	29.7	126.6
Surface roughness: Ra_{max} = 1.6 µm				

Welding nipple according to ISO 2037 **1.4404 (316L), suitable for pipe ISO 203** *Order code for "Process connection", option* **I1S**				
DN [mm]	**Suitable for pipe ISO 2037 [mm]**	**A [mm]**	**B [mm]**	**L [mm]**
2 to 8	13.5 × 2.3	13.5	9	126.6
15	21.3 × 2.65	21.3	16	126.6
25	33.7 × 3.25	33.7	27.2	126.6
Surface roughness: Ra_{max} = 1.6 µm				

Clamp connections

Clamp connections with aseptic gasket seal



A0015625

Clamp according to DIN 32676 series A **1.4404 (316L)** *Order code for "Process connection", option* **DBS**				
DN [mm]	**Suitable for pipe [mm]**	**A [mm]**	**B [mm]**	**L [mm]**
2 to 8	14 × 2 (DN 10)	34	10	168
15	20 × 2 (DN 15)	34	16	168
25	30 × 2 (DN 25)	50.5	26	175
40	41 × 1.5	50.5	38	220
50	53 × 1.5	64	50	220
65	70 × 2	91	66	220
80	85 × 2	106	81	220
100	104 × 2	119	100	220
125	129 × 2	155	125	300
150	154 × 2	183	150	300
Surface roughness: Ra_{max} = 0.76 µm, optional order code for "Service", option HJ: Ra_{max} = 0.38 µm electropolished Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.				

Tri-Clamp **1.4404 (316L), suitable for pipe according to ASME BPE and DIN 11866 series C** *Order code for "Process connection", option* **FAS**				
DN [mm]	**Suitable for pipe according to ASME BPE [mm]**	**A [mm]**	**B [mm]**	**L [mm]**
2 to 8	12.7 × 1.65	25	9.4	143
15	19.1 × 1.65	25	15.8	143
25	25.4 × 1.65	50.4	22.1	143
40	38.1 × 1.65	50.4	34.8	220
50	50.8 × 1.65	63.9	47.5	220
65	63.5 × 1.65	77.4	60.2	220
80	76.2 × 1.65	90.9	72.9	220
100	101.6 × 2.11	118.9	97.4	220

Tri-Clamp
1.4404 (316L), suitable for pipe according to ASME BPE and DIN 11866 series C
Order code for "Process connection", option **FAS**

DN [mm]	Suitable for pipe according to ASME BPE [mm]	A [mm]	B [mm]	L [mm]
150	152.4 × 2.77	166.9	146.9	300

Surface roughness: Ra_{max} = 0.76 µm, optional order code for "Service", option HJ: Ra_{max} = 0.38 µm electropolished
Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.

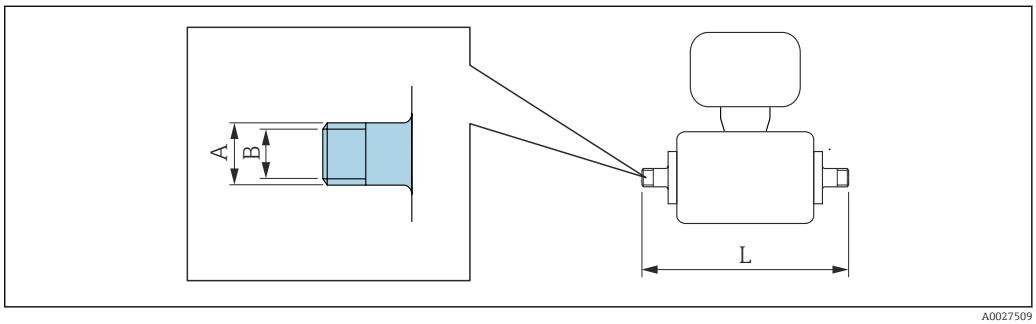
Clamp according to ISO 2852, Fig. 2
1.4404 (316L)
Order code for "Process connection", option **IBS**

DN [mm]	Suitable for pipe ISO 2037 [mm]	A [mm]	B [mm]	L [mm]
25	24.5 × 1.65	50.5	22.6	174.6
40	38 × 1.6	50.5	35.6	220
50	51 × 1.6	64	48.6	220
65	63.5 × 1.6	77.5	60.3	220
80	76.1 × 1.6	91	72.9	220
100	101.6 × 2	119	97.6	220
125	139.7 × 2	155	135.7	300
150	168.3 × 2.6	183	163.1	300

Surface roughness: Ra_{max} = 0.76 µm, optional order code for "Service", option HJ: Ra_{max} = 0.38 µm electropolished
Please note the internal diameters of the measuring tube and process connection (B) when cleaning with pigs.

Couplings

Thread with aseptic gasket seal



A0027509

Coupling DIN 11851, thread
1.4404 (316L), suitable for pipe EN 10357 series B
Order code for "Process connection", option **DCS**

DN [mm]	Suitable for pipe EN 10357 series B [mm]	A [mm]	B [mm]	L [mm]
2 to 8	12 × 1 (DN 10)	Rd 28 × ⅛	10	174
15	18 × 1.5	Rd 34 × ⅛	16	174
25	28 × 1 or 28×1.5	Rd 52 × ⅙	26	190

Surface roughness: Ra_{max} = 0.76 µm, optional order code for "Service", option HJ: Ra_{max} = 0.38 µm electropolished
Please note the internal diameters of the measuring pipe and process connection (B) when cleaning with pigs.

Coupling DIN 11851, thread
1.4404 (316L), suitable for pipe EN 10357 series A
Order code for "Process connection", option **DCS**

DN [mm]	Suitable for pipe EN 10357 series A [mm]	A [mm]	B [mm]	L [mm]
40	41 × 1.5	Rd 65 × 1/6	38	260
50	53 × 1.5	Rd 78 × 1/6	50	260
65	70 × 2	Rd 95 × 1/6	66	270
80	85 × 2	Rd 110 × 1/4	81	280
100	104 × 2	Rd 130 × 1/4	100	290
125	129 × 2	Rd 160 × 1/4	125	380
150	154 × 2	Rd 160 × 1/4	150	390

Surface roughness: Ra_{max} = 0.76 µm, optional order code for "Service", option HJ: Ra_{max} = 0.38 µm electropolished
Please note the internal diameters of the measuring pipe and process connection (B) when cleaning with pigs.

Coupling DIN 11864-1, aseptic thread, Form A
1.4404 (316L), suitable for pipe EN 10357 series A
Order code for "Process connection", option **DDS**

DN [mm]	Suitable for pipe EN 10357 series A [mm]	A [mm/in]	B [mm]	L [mm]
2 to 8	13 × 1.5 (DN 10)	Rd 28 × 1/8	10	170
15	19 × 1.5	Rd 34 × 1/8	16	170
25	29 × 1.5	Rd 52 × 1/6	26	184
40	41 × 1.5	Rd 65 × 1/6	38	256
50	53 × 1.5	Rd 78 × 1/6	50	256
65	70 × 2	Rd 95 × 1/6	66	266
80	85 × 2	Rd 110 × 1/4	81	276
100	104 × 2	Rd 130 × 1/4	100	286

Surface roughness: Ra_{max} = 0.76 µm, optional order code for "Service", option HJ: Ra_{max} = 0.38 µm electropolished
Please note the internal diameters of the measuring pipe and process connection (B) when cleaning with pigs.

Coupling ISO 2853, thread
1.4404 (316L)
Order code for "Process connection", option **ICS**

DN [mm]	Suitable for pipe ISO 2037 [mm]	DN Clamp ISO 2853 [mm]	A [mm/in]	B [mm]	L [mm]
40	38 × 1.6	38	Tr 50.5 × 3.175	35.6	256
50	51 × 1.6	51	Tr 64 × 3.175	48.6	256
65	63.5 × 1.6	63.5	Tr 77.5 × 3.175	60.3	266
80	76.1 × 1.6	76.1	Tr 91 × 3.175	72.9	276
100	101.6 × 2	101.6	Tr 118 × 3.175	97.6	286

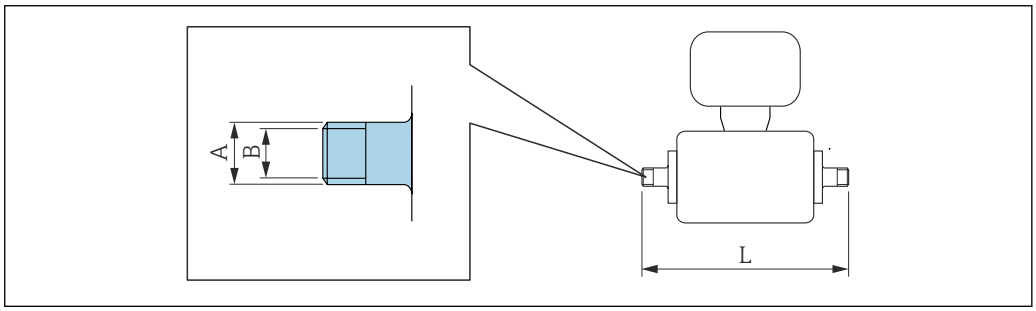
Surface roughness: Ra_{max} = 0.76 µm, optional order code for "Service", option HJ: Ra_{max} = 0.38 µm electropolished
Please note the internal diameters of the measuring pipe and process connection (B) when cleaning with pigs.

Coupling SMS 1145, thread
1.4404 (316L)
Order code for "Process connection", option **SAS**

DN [mm]	Suitable for pipe [mm]	DN SMS 1145 [mm]	A [mm/in]	B [mm]	L [mm]
25	1	25	Rd 40 × 1/6	22.6	147.6
40	38.1 × 1.65	38	Rd 60 × 1/6	34.8	256
50	50.8 × 1.65	51	Rd 70 × 1/6	47.5	256
65	63.5 × 1.65	63.5	Rd 85 × 1/6	60.2	266
80	76.2 × 1.65	76	Rd 98 × 1/6	72.6	276
100	101.6 × 1.65	101.6	Rd 132 × 1/6	97.4	286

Surface roughness: Ra_{max} = 0.76 µm, optional order code for "Service", option HJ: Ra_{max} = 0.38 µm electropolished
Please note the internal diameters of the measuring pipe and process connection (B) when cleaning with pigs.

Thread with O-ring seal



A0027509

External thread according to 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]	A [mm/in]	B [mm]	L [mm]
2 to 8	R 3/8	R 10.1 × 3/8	10	166
15	R 1/2	R 13.2 × 1/2	16	166
25	R 1	R 16.5 × 1	25	170

Surface roughness: Ra_{max} = 1.6 µm

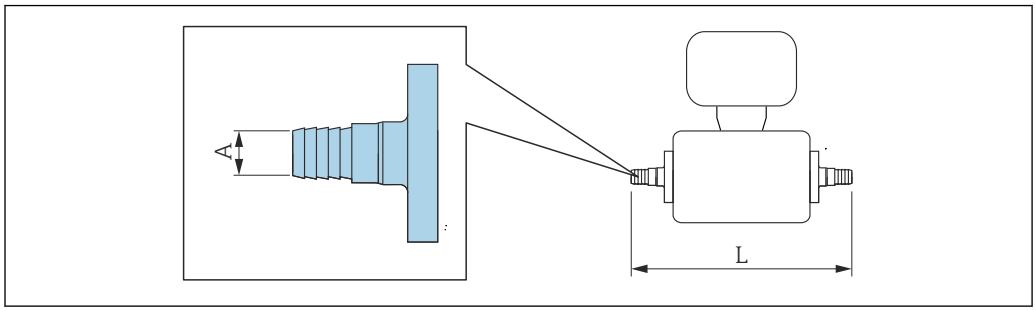
Internal thread according to ISO 228/DIN 2999
1.4404 (316L)
Order code for "Process connection", option **I3S**

DN [mm]	Suitable for external thread ISO 228/DIN 2999 [in]	A [mm/in]	B [mm]	L [mm]
2 to 8	Rp 3/8	Rp 13 × 3/8	9	176
15	Rp 1/2	Rp 14 × 1/2	16	176
25	Rp 1	Rp 17 × 1	27.2	188

Surface roughness: Ra_{max} = 1.6 µm

Hose adapter

Hose adapter with O-ring seal

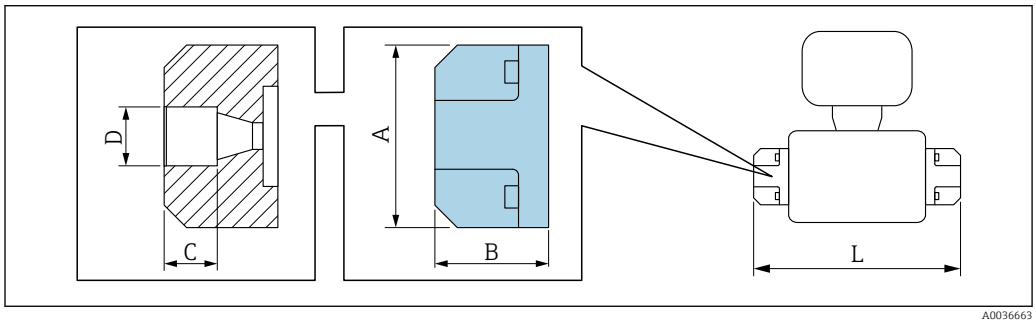


A0027511

Hose adapter 1.4404 (316L) *Order code for "Process connection", options* **O1S, O2S, O3S**			
DN [mm]	**Suitable for internal diameter [mm]**	**A [mm]**	**L [mm]**
2 to 8	13	10	184
15	16	12.6	184
25	19	16	184
Surface roughness: Ra_{max} = 1.6 µm			

Adhesive sleeves

Adhesive sleeves with O-ring seal

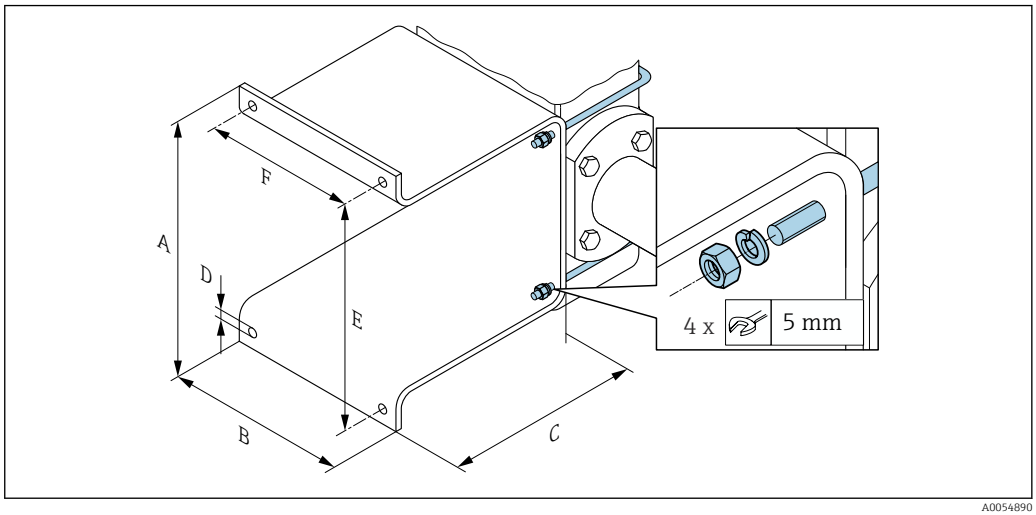


A0036663

Adhesive sleeve PVC *Order code for "Process connection", option* **O2V**						
DN [mm]	**Suitable for pipe [mm] / [in]**	**A [mm]**	**B [mm]**	**C [mm]**	**D [mm]**	**L [mm]**
2 to 8	20 × 2 (DIN 8062)	62	38.5	18	20.2	163
15			28.0			142
Surface roughness: Ra_{max} = 1.6 µm The required grounding rings can be ordered as accessories (order code: DK5HR-****).						

Mounting kits

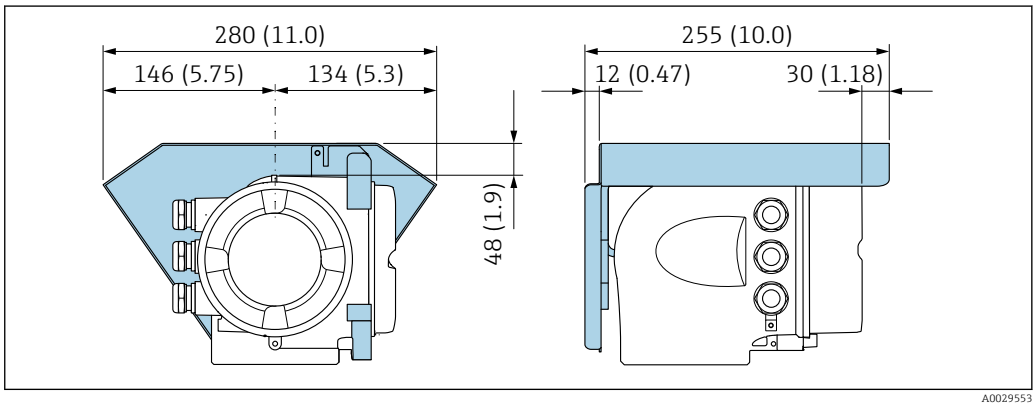
Wall mounting kit



A [mm]	B [mm]	C [mm]	Ø D [mm]	E [mm]	F [mm]
137	110	120	7	125	88

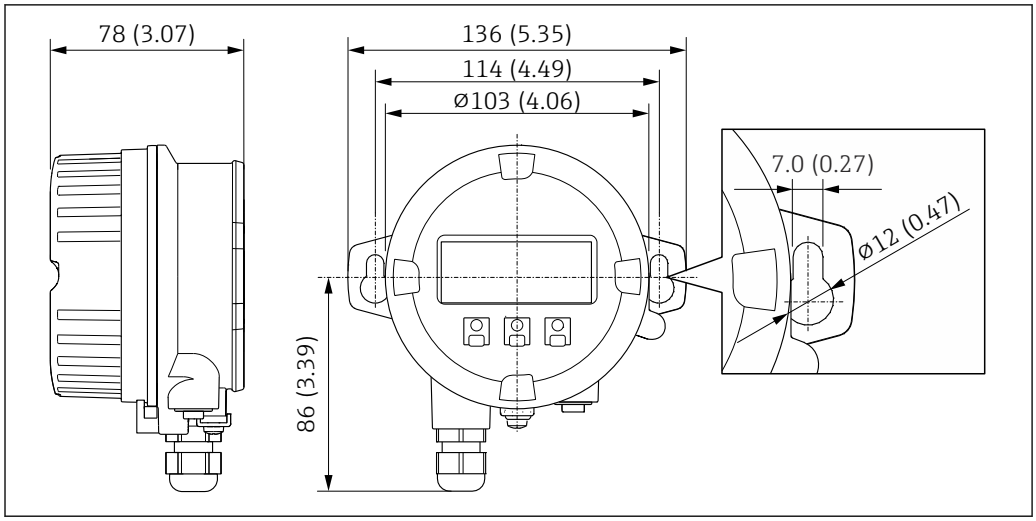
Accessories

Protective cover



37 *Unit mm (in)*

Remote display and operating module DKX001

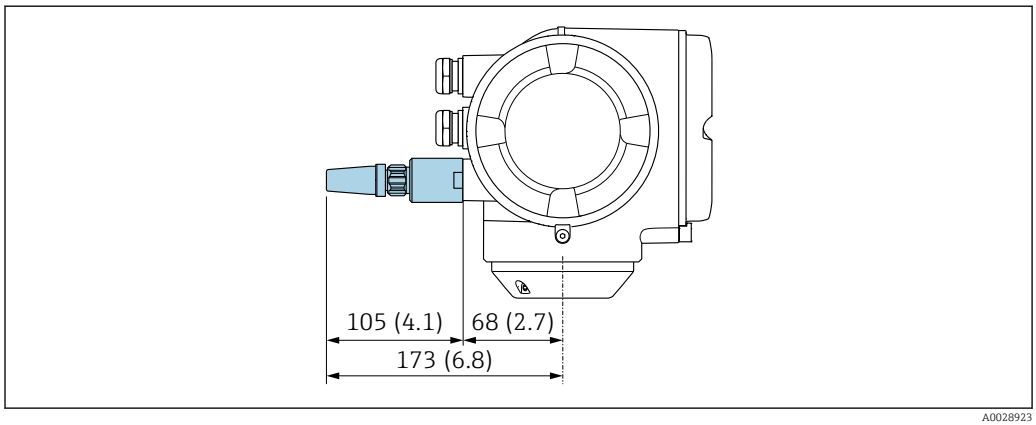


38 *Unit mm (in)*

External WLAN antenna

The external WLAN antenna is not suitable for use in hygienic applications.

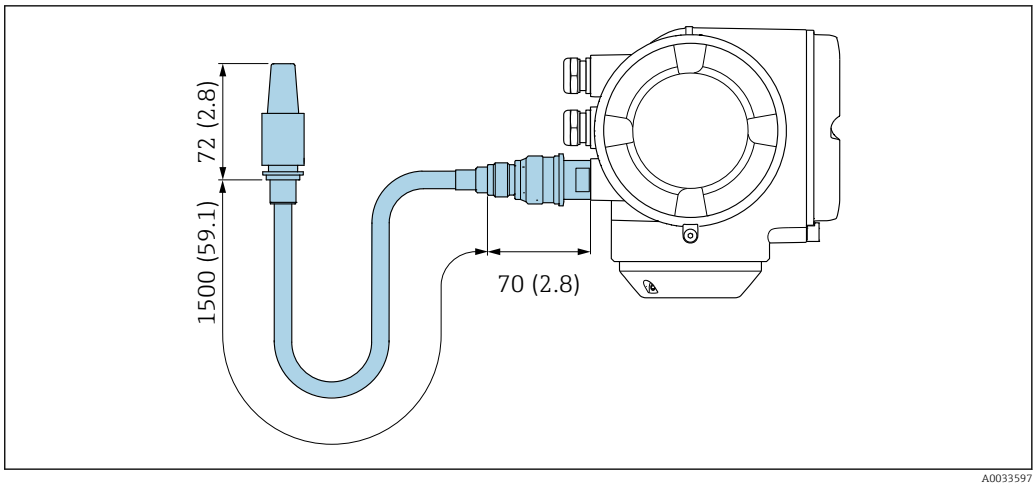
External WLAN antenna mounted on device



39 *Unit mm (in)*

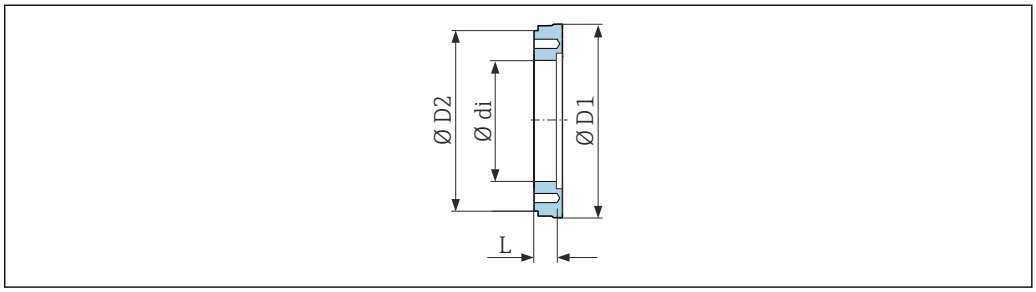
External WLAN antenna mounted with cable

The external WLAN antenna can be mounted separately from the transmitter if the transmission/ reception conditions at the transmitter mounting location are poor.



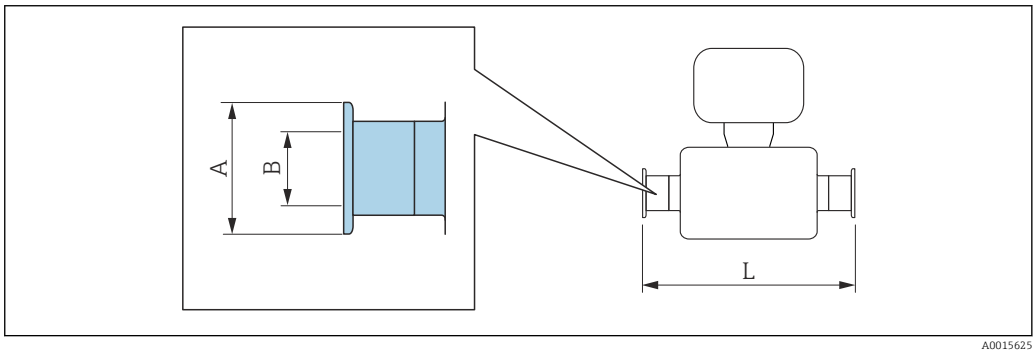
40 Unit mm (in)

Spacer



Order code: DK5HB-****				
DN [mm]	**di [mm]**	**D1 [mm]**	**D2 [mm]**	**L [mm]**
80	72.9	140.7	141	30
100	97.4	166.7	162	30

Clamp connections with aseptic gasket seal available for order

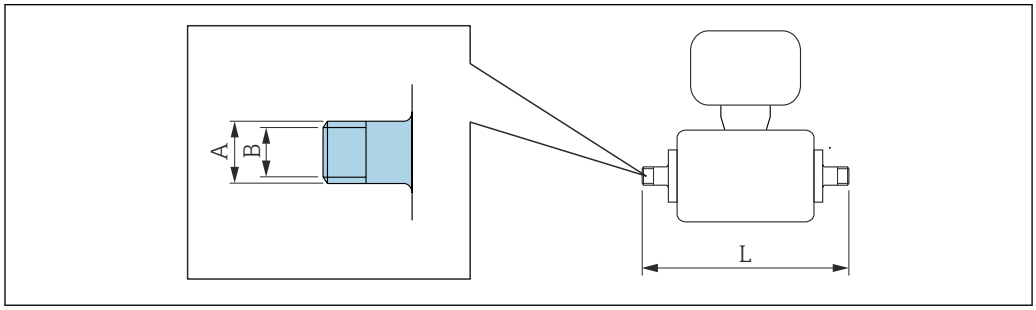


Tri-Clamp
1.4404 (316L), suitable for pipe according to ASME BPE and BS 4825, reduction from pipe OD 1" (Tri-Clamp connection) to device DN 15
Order code: DKH-HF****

DN [mm]	Suitable for pipe according to ASME BPE and BS 4825 (reduction) [mm]	A [mm]	B [mm]	L [mm]
15	Pipe OD 1"	50.4	22.1	143

Surface roughness: Ra_{max} = 0.76 µm, optional order code for "Design", option CB: Ra_{max} = 0.38 µm electropolished
Please note the internal diameters of the measuring pipe and process connection (B) when cleaning with pigs.

Couplings with O-ring seal available for order



A0027509

External thread
1.4404 (316L)
Order code: DKH-GD****

DN [mm]	Suitable for internal thread NPT [in]	A [mm/in]	B [mm]	L [mm]
2 to 8	NPT 3/8	R 15.5 × 3/8	10	186
15	NPT ½	R 20 × ½	16	186
25	NPT 1	R 25 × 1	25	196

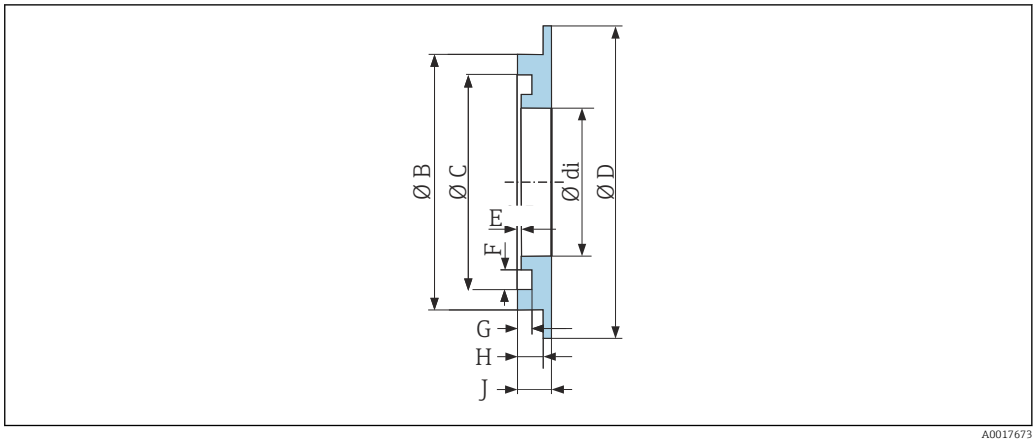
Surface roughness: Ra_{max} = 1.6 µm

Internal thread
1.4404 (316L)
Order code: DKH-GC****

DN [mm]	Suitable for external thread NPT [in]	A [mm/in]	B [mm]	L [mm]
2 to 8	NPT 3/8	R 13 × 3/8	8.9	176
15	NPT ½	R 14 × ½	16	176
25	NPT 1	R 17 × 1	27.2	188

Surface roughness: Ra_{max} = 1.6 µm

Grounding rings

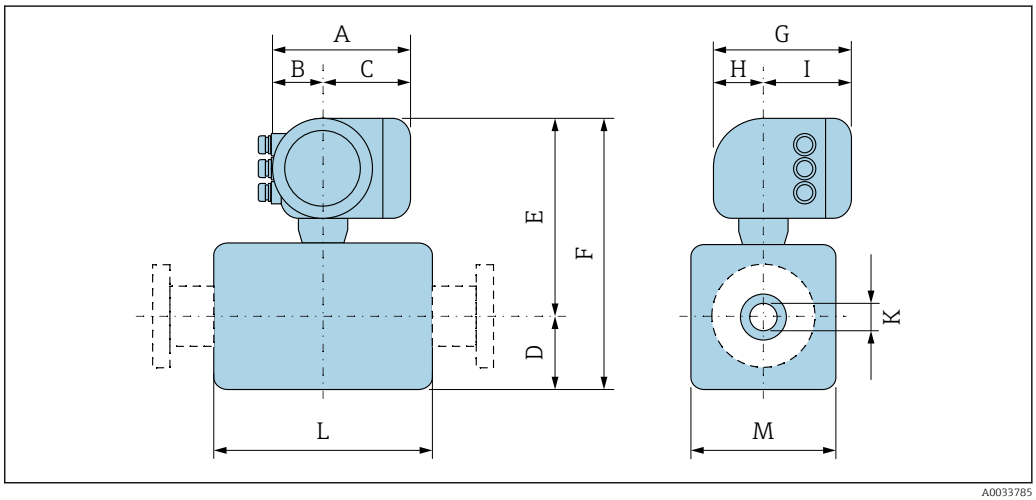


A0017673

For lap joint flange made of PVDF and PVC adhesive sleeve 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	26	39	34.6	43.9	0.5	3.5	1.9	3.4	4.5

Dimensions in US units

Compact version



A0033785

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

DN **[in]**	**A** [1] **[in]**	**B** [1] **[in]**	**C** **[in]**	**D** **[in]**	**E** **[in]**	**F** **[in]**	**G** [2] **[in]**	**H** **[in]**	**I** [2] **[in]**	**K** **[in]**	**L** [3] **[in]**	**M** **[in]**
1/12	6.65	2.68	3.98	2.17	9.45	11.6	7.87	2.32	5.55	0.09	3.39	1.69
1/8	6.65	2.68	3.98	2.17	9.45	11.6	7.87	2.32	5.55	0.18	3.39	1.69
3/8	6.65	2.68	3.98	2.17	9.45	11.6	7.87	2.32	5.55	0.35	3.39	1.69
1/2	6.65	2.68	3.98	2.17	9.45	11.6	7.87	2.32	5.55	0.63	3.39	1.69
1	6.65	2.68	3.98	2.17	9.45	11.6	7.87	2.32	5.55	0.89	3.39	2.20

DN [in]	A [1] [in]	B [1] [in]	C [in]	D [in]	E [in]	F [in]	G [2] [in]	H [in]	I [2] [in]	K [in]	L [3] [in]	M [in]
1 ½	6.65	2.68	3.98	2.13	9.41	11.5	7.87	2.32	5.55	1.37	5.51	4.21
2	6.65	2.68	3.98	2.36	9.69	12.1	7.87	2.32	5.55	1.87	5.51	4.72
3	6.65	2.68	3.98	2.91	10.2	13.2	7.87	2.32	5.55	2.87	5.51	5.83
4	6.65	2.68	3.98	3.43	10.8	14.2	7.87	2.32	5.55	3.83	5.51	6.85
6	6.65	2.68	3.98	4.61	11.9	16.5	7.87	2.32	5.55	5.78	7.87	9.21

1) Depending on the cable gland used: values up to + 1.18 in
2) For version without local display: values − 1.18 in
3) Total installed length depends on process connections.→ 🖹 90

Order code for "Housing", option A "Aluminum, coated"; Ex d

DN [in]	A [1] [in]	B [1] [in]	C [in]	D [in]	E [in]	F [in]	G [2] [in]	H [in]	I [2] [in]	K [in]	L [3] [in]	M [in]
1/12	7.40	3.35	4.06	2.17	10.6	12.8	8.54	2.28	6.26	0.09	3.39	1.69
1/8	7.40	3.35	4.06	2.17	10.6	12.8	8.54	2.28	6.26	0.18	3.39	1.69
3/8	7.40	3.35	4.06	2.17	10.6	12.8	8.54	2.28	6.26	0.35	3.39	1.69
½	7.40	3.35	4.06	2.17	10.6	12.8	8.54	2.28	6.26	0.63	3.39	1.69
1	7.40	3.35	4.06	2.17	10.6	12.8	8.54	2.28	6.26	0.89	3.39	2.20
1 ½	7.40	3.35	4.06	2.13	10.6	12.8	8.54	2.28	6.26	1.37	5.51	4.21
2	7.40	3.35	4.06	2.36	10.9	13.2	8.54	2.28	6.26	1.87	5.51	4.72
3	7.40	3.35	4.06	2.91	11.4	14.3	8.54	2.28	6.26	2.87	5.51	5.83
4	7.40	3.35	4.06	3.43	11.9	15.4	8.54	2.28	6.26	3.83	5.51	6.85
6	7.40	3.35	4.06	4.61	13.1	17.7	8.54	2.28	6.26	5.78	7.87	9.21

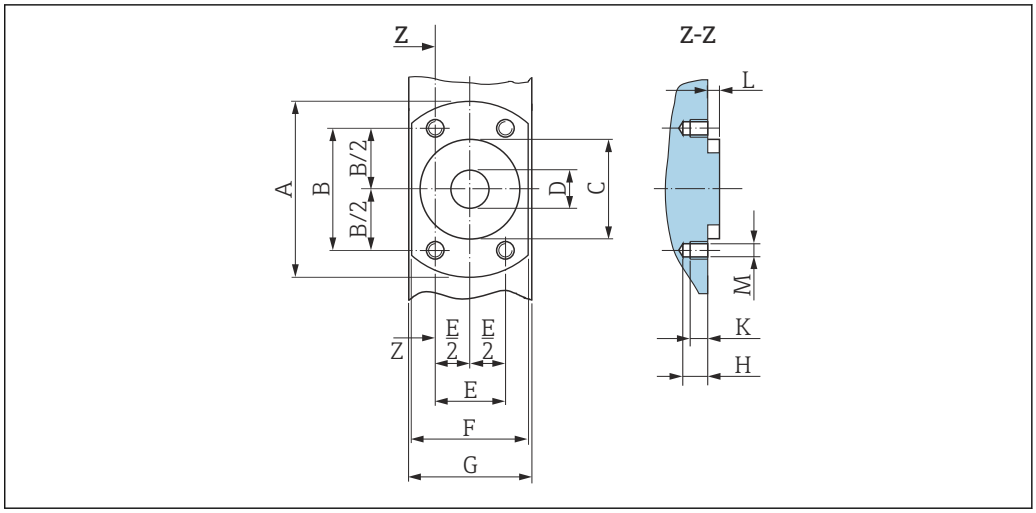
1) Depending on the cable gland used: values up to + 1.18 in
2) For version without local display: values − 1.57 in
3) Total installed length depends on process connections.→ 🖹 90

Order code for "Housing", option B "Stainless, hygienic"

DN [in]	A [1] [in]	B [1] [in]	C [in]	D [in]	E [in]	F [in]	G [2] [in]	H [in]	I [2] [in]	K [in]	L [3] [in]	M [in]
1/12	7.20	2.87	4.33	2.17	10.0	12.2	8.15	2.56	5.59	0.09	3.39	1.69
1/8	7.20	2.87	4.33	2.17	10.0	12.2	8.15	2.56	5.59	0.18	3.39	1.69
3/8	7.20	2.87	4.33	2.17	10.0	12.2	8.15	2.56	5.59	0.35	3.39	1.69
½	7.20	2.87	4.33	2.17	10.0	12.2	8.15	2.56	5.59	0.63	3.39	1.69
1	7.20	2.87	4.33	2.17	10.0	12.2	8.15	2.56	5.59	0.89	3.39	2.20
1 ½	7.20	2.87	4.33	2.13	10.0	12.2	8.15	2.56	5.59	1.37	5.51	4.21
2	7.20	2.87	4.33	2.63	10.3	12.6	8.15	2.56	5.59	1.87	5.51	4.72
3	7.20	2.87	4.33	2.91	10.8	13.7	8.15	2.56	5.59	2.87	5.51	5.83
4	7.20	2.87	4.33	3.43	11.3	14.8	8.15	2.56	5.59	3.83	5.51	6.85
6	7.20	2.87	4.33	4.61	12.5	17.1	8.15	2.56	5.59	5.78	7.87	9.21

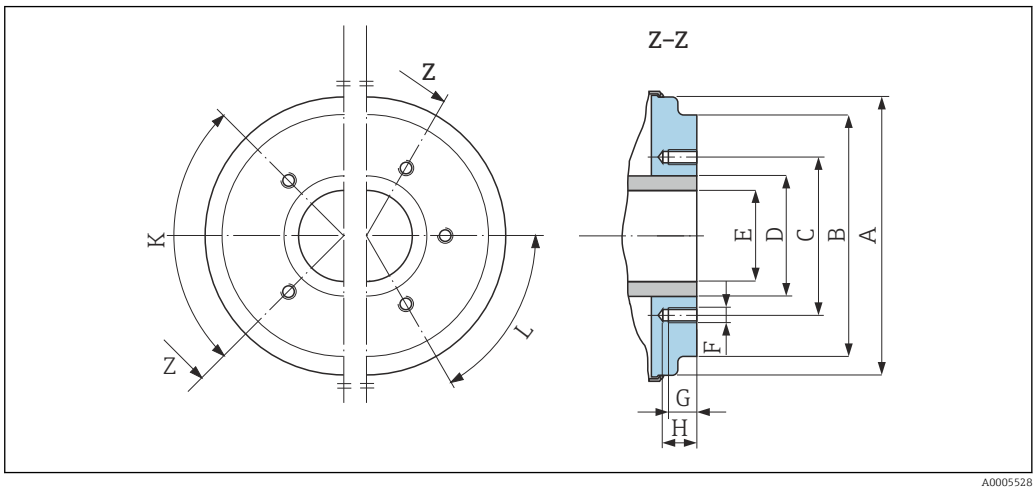
1) Depending on the cable gland used: values up to + 1.18 in
2) For version without local display: values − 1.18 in
3) Total installed length depends on process connections.→ 🖹 90

Sensor flange connection



41 *Front view without process connections*

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
5/32	2.44	1.64	1.34	0.35	0.94	1.65	1.69	0.33	0.24	0.16	M6
5/16	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



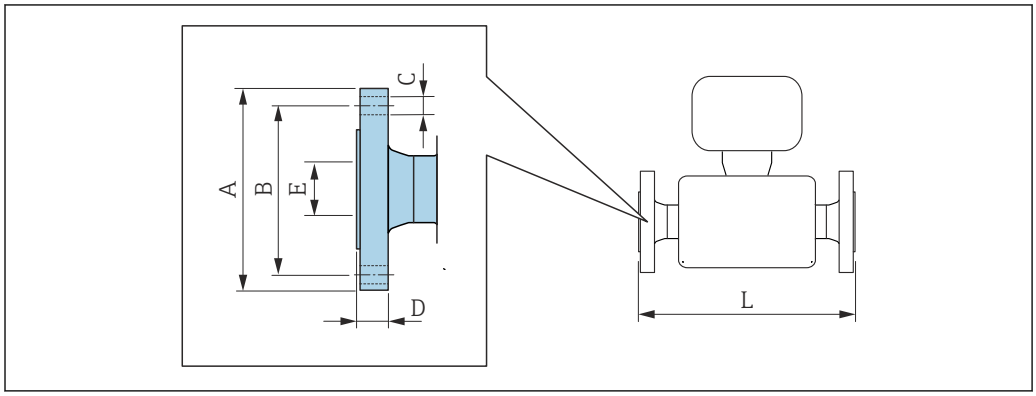
42 *Front view without process connections*

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [mm]	G [in]	H [in]	K 90° ±0.5° Tapped holes	L 60° ±0.5° 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

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	
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

Flange connections

Flanges with O-ring seal

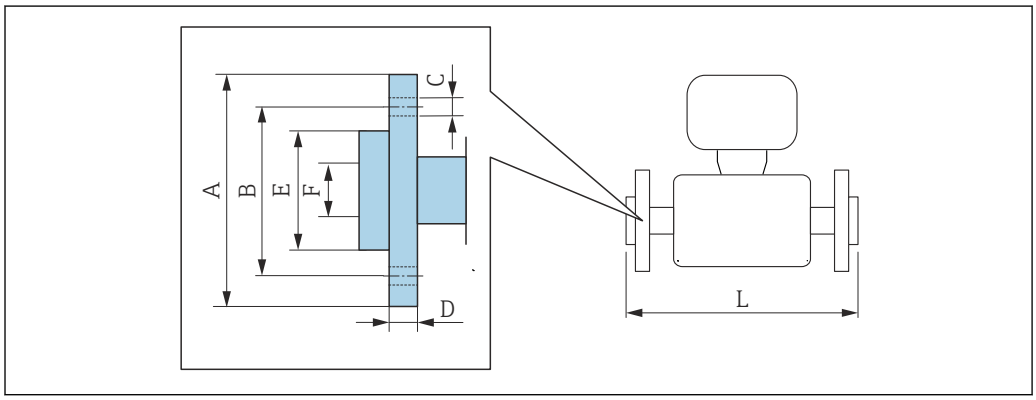


A0015621

Flange similar to ASME B16.5: Class 150
1.4404 (316L)
Order code for "Process connection", option **A1S**

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	L [in]
1/12 to 3/8 1)	3.50	2.38	4 × Ø0.62	0.44	0.62	8.59
½	3.50	2.38	4 × Ø0.62	0.44	0.63	8.59
1	4.25	3.12	4 × Ø0.62	0.56	1.05	9.05
Surface roughness: Ra_{max} = 63 µin						

1) DN 1/12 to 3/8 with DN ½" flanges as standard



A0022221

Lap joint flange similar to ASME B16.5: Class 150
PVDF
Order code for "Process connection", option **A1P**

DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	L [in]
1/12 to 3/8 [1]	3.74	2.36	4 × Ø 0.62	0.59	1.38	0.63	7.87
½	3.74	2.36	4 × Ø 0.62	0.59	1.38	0.63	7.87

Surface roughness: Ra_{max} = 63 µin
The required grounding rings can be ordered as accessories (order code: DK5HR-****).

1) DN 1/12 to 3/8 with DN ½" flanges as standard

Lap joint flange similar to ASME B16.5: Class 150
PVDF
Order code for "Process connection", option **A4P**

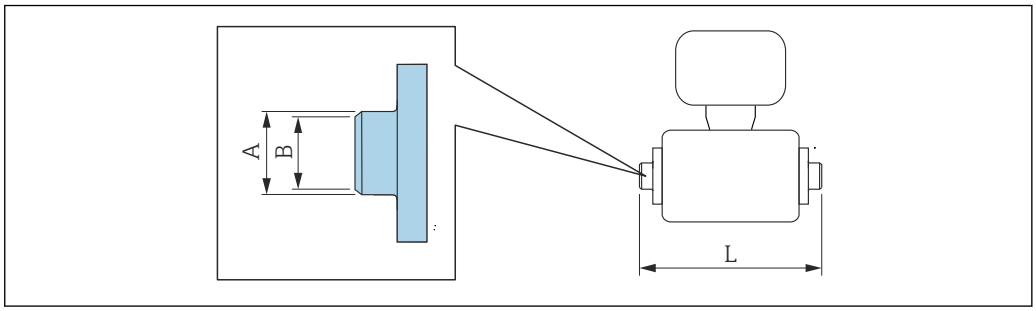
DN [in]	A [in]	B [in]	C [in]	D [in]	E [in]	F [in]	L [in]
1/12 to 3/8 [1]	3.74	2.36	4 × Ø 0.62	0.59	1.38	0.63	7.87
½	3.74	2.36	4 × Ø 0.62	0.59	1.38	0.63	7.87

Surface roughness: Ra_{max} = 63 µin
Grounding rings are not necessary.

1) DN 1/12 to 3/8 with DN ½" flanges as standard

Welding nipple

Welding nipple with aseptic gasket seal



A0027510

Welding nipple according to ISO 2037
1.4404 (316L), suitable for pipe ISO 2037
Order code for "Process connection", option **IAS**

DN [in]	Suitable for pipe ISO 2037 [in]	A [in]	B [in]	L [in]
1/12 to 3/8	0.50 × 0.06	0.47	0.39	4.65
½	0.75 × 0.06	0.71	0.63	4.65
1	1.00 × 0.06	0.98	0.89	4.65
1 ½	1.50 × 0.05	1.50	1.40	8.66
2	2.00 × 0.05	2.01	1.91	8.66
3	3.00 × 0.06	3.00	2.87	8.66
4	2.50 × 0.08	4.00	3.84	8.66
5	4.00 × 0.08	5.50	5.34	15.00

Welding nipple according to ISO 2037
1.4404 (316L), suitable for pipe ISO 2037
Order code for "Process connection", option **IAS**

DN [in]	Suitable for pipe ISO 2037 [in]	A [in]	B [in]	L [in]
6	6.63 × 0.10	6.63	6.42	15.00

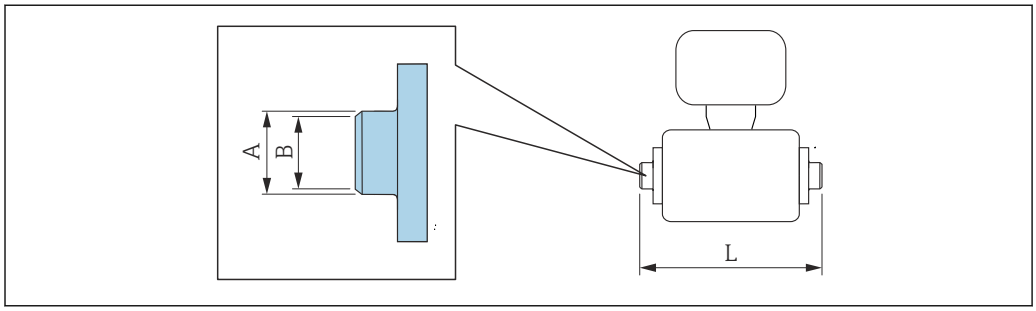
Surface roughness: Ra_{max} = 31.5 µin, optional order code for "Service", option HJ: Ra_{max} = 15 µin electropolished
Please note the internal diameters of the measuring pipe and process connection (B) when cleaning with pigs.

Welding nipple according to ASME BPE
1.4404 (316L), suitable for pipe according to ASME BPE and DIN 11866 series C
Order code for "Process connection", option **AAS**

DN [in]	Suitable for pipe according to ASME BPE [in]	A [in]	B [in]	L [in]
1/12 to 3/8	0.50 × 0.06	0.50	0.35	4.65
½	0.75 × 0.06	0.75	0.63	4.65
1	1.00 × 0.06	1.00	0.89	4.65
1 ½	1.50 × 0.06	1.50	1.37	8.66
2	2.00 × 0.06	2.00	1.87	8.66
3	3.00 × 0.06	3.00	2.87	8.66
4	4.00 × 0.08	4.00	3.83	8.66
6	6.00 × 0.11	6.00	5.78	11.80

Surface roughness: Ra_{max} = 31.5 µin, optional order code for "Service", option HJ: Ra_{max} = 15 µin electropolished
Please note the internal diameters of the measuring pipe and process connection (B) when cleaning with pigs.

Welding nipple with O-ring seal



A0027510

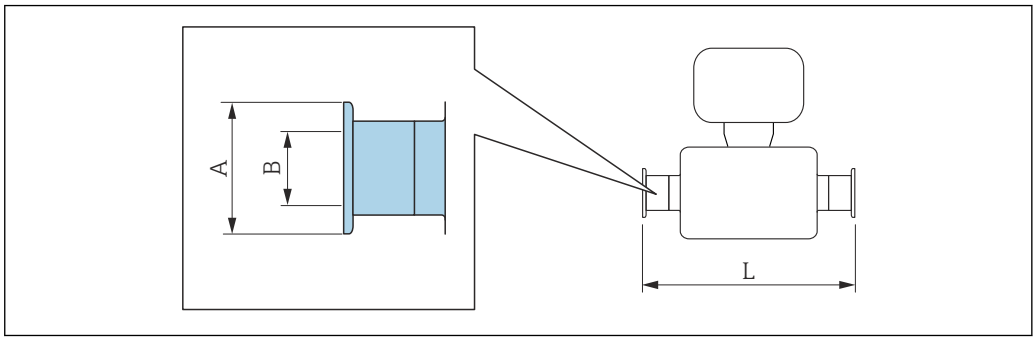
Welding nipple according to ISO 1127
1.4404 (316L), suitable for pipe according to ISO 1127 series 1
Order code for "Process connection", option **A2S**

DN [in]	Suitable for pipe according to ISO 1127 series 1 [in]	A [in]	B [in]	L [in]
1/12 to 3/8	0.53 × 0.09	0.53	0.35	4.99
½	0.84 × 0.10	0.84	0.63	4.99

Surface roughness: Ra_{max} = 63 µin

Clamp connections

Clamp connections with aseptic gasket seal



A0015625

Tri-Clamp
1.4404 (316L), suitable for pipe according to ASME BPE and DIN 11866 series C
Order code for "Process connection", option **FAS**

DN [in]	Suitable for pipe according to ASME BPE [in]	A [in]	B [in]	L [in]
1/12 to 3/8	½	1	0.37	5.63
½	¾	1	0.62	5.63
1	1	2	0.87	5.63
1 ½	1.50 × 0.06	1.98	1.37	8.66
2	2.00 × 0.06	2.52	1.87	8.66
3	3.00 × 0.06	3.58	2.87	8.66
4	4.00 × 0.08	4.68	3.83	8.66
6	6.00 × 0.11	6.57	5.90	11.80

Surface roughness: Ra_{max} = 31.5 µin, optional order code for "Service", option HJ: Ra_{max} = 15 µin electropolished
Please note the internal diameters of the measuring pipe and process connection (B) when cleaning with pigs.

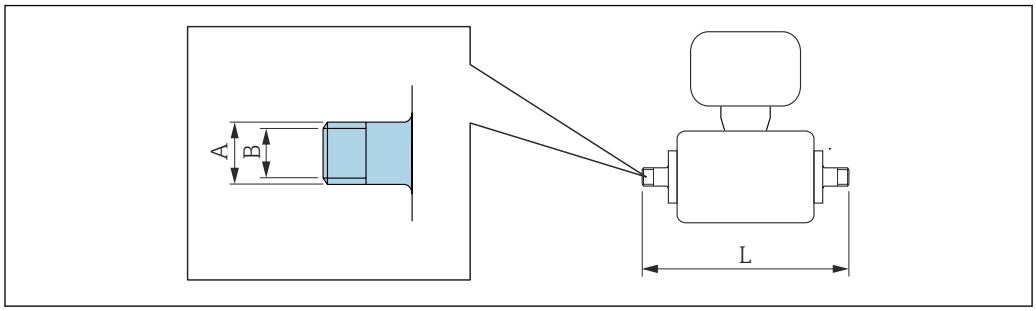
Clamp according to ISO 2852, Fig. 2
1.4404 (316L)
Order code for "Process connection", option **IBS**

DN [in]	Suitable for pipe ISO 2037 [in]	DN Clamp ISO 2852 [in]	A [in]	B [in]	L [in]
1	0.96 × 0.06	1	2.00	0.89	6.87
1 ½	1.50 × 0.06	1.50	1.99	1.40	8.66
2	2.00 × 0.06	2.01	2.52	1.91	8.66
3	3.00 × 0.06	3.00	3.58	2.87	8.66
4	2.50 × 0.08	4.00	4.69	3.84	8.66
5	4.00 × 0.08	5.50	6.10	5.34	11.80
6	6.63 × 0.10	6.63	7.20	6.42	11.80

Surface roughness: Ra_{max} = 31.5 µin, optional order code for "Service", option HJ: Ra_{max} = 15 µin electropolished
Please note the internal diameters of the measuring pipe and process connection (B) when cleaning with pigs.

Couplings

Thread with aseptic gasket seal



A0027509

Coupling DIN 11851, thread
1.4404 (316L), suitable for pipe EN 10357 series B
Order code for "Process connection", option **DCS**

DN [in]	Suitable for pipe EN 10357 series B [in]	A [in]	B [in]	L [in]
1/12 to 5/16	0.47 × 0.04 (DN 1/8)	Rd 1.10 × 1/8	0.39	6.85
½	0.71 × 0.06	Rd 1.34 × 1/8	0.63	6.85
1	1.10 × 0.04 or 1.10×0.06	Rd 2.05 × 1/6	1.02	7.48

Surface roughness: Ra_{max} = 31.5 µin, optional order code for "Service", option HJ: Ra_{max} = 15 µin electropolished
Please note the internal diameters of the measuring pipe and process connection (B) when cleaning with pigs.

Coupling DIN 11851, thread
1.4404 (316L), suitable for pipe EN 10357 series A
Order code for "Process connection", option **DCS**

DN [in]	Suitable for pipe EN 10357 series A [in]	A [in]	B [in]	L [in]
1 ½	1.65 × 0.06	Rd 2.56 × 1/6	1.50	10.20
2	2.13 × 0.06	Rd 3.07 × 1/6	1.97	10.20
3	3.35 × 0.08	Rd 4.33 × ¼	3.19	11.00
4	4.09 × 0.08	Rd 5.12× ¼	3.94	11.40
5	5.08 × 0.08	Rd 6.30 × ¼	4.92	15.00
6	6.06 × 0.08	Rd 6.30 × ¼	5.91	15.40

Surface roughness: Ra_{max} = 31.5 µin, optional order code for "Service", option HJ: Ra_{max} = 15 µin electropolished
Please note the internal diameters of the measuring pipe and process connection (B) when cleaning with pigs.

Coupling ISO 2853, thread
1.4404 (316L)
Order code for "Process connection", option **ICS**

DN [in]	Suitable for pipe EN 10357 (DIN 11850) [in]	DN Clamp ISO 2853 [in]	A [in]	B [in]	L [in]
1 ½	1.50 × 0.06	1.50	Tr 2.00 × 0.13	1.40	10.80
2	2.00 × 0.06	2.01	Tr 2.52 × 0.13	1.91	10.80
3	3.00 × 0.06	3.00	Tr 3.58 × 0.13	2.87	10.90
4	2.50 × 0.08	4.00	Tr 4.65 × 0.13	3.84	11.30

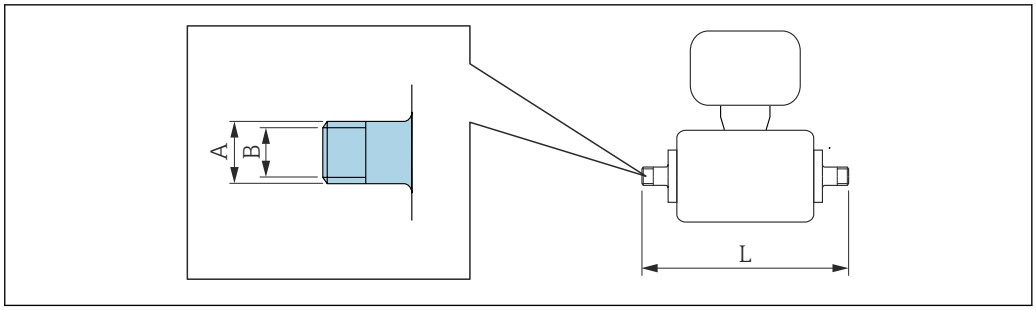
Surface roughness: Ra_{max} = 31.5 µin, optional order code for "Service", option HJ: Ra_{max} = 15 µin electropolished
Please note the internal diameters of the measuring pipe and process connection (B) when cleaning with pigs.

Coupling SMS 1145, thread
1.4404 (316L)
Order code for "Process connection", option **SAS**

DN [in]	Suitable for pipe [in]	DN SMS 1145 [in]	A [in]	B [in]	L [in]
1	1	1	Rd1.57 × 0.17	0.89	5.81
1 ½	1.50 × 0.06	1.50	Rd 2.36 × ⅙	1.37	10.10
2	2.00 × 0.06	2.00	Rd 2.76 × ⅙	1.87	10.10
3	3.00 × 0.06	3.00	Rd 3.86 × ⅙	2.86	10.90
4	4.00 × 0.08	4.00	Rd 5.20 × ⅙	3.83	11.30

Surface roughness: Ra_{max} = 31.5 µin, optional order code for "Service", option HJ: Ra_{max} = 15 µin electropolished
Please note the internal diameters of the measuring pipe and process connection (B) when cleaning with pigs.

Thread with O-ring seal



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External thread according to 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]	A [in]	B [in]	L [in]
1/12 to ⅜	R ⅜	R 0.40 × ⅜	0.39	6.53
½	R ½	R 0.52 × ½	0.63	6.53
1	R 1	R 0.66 × 1	0.98	6.69

Surface roughness: Ra_{max} = 63 µin

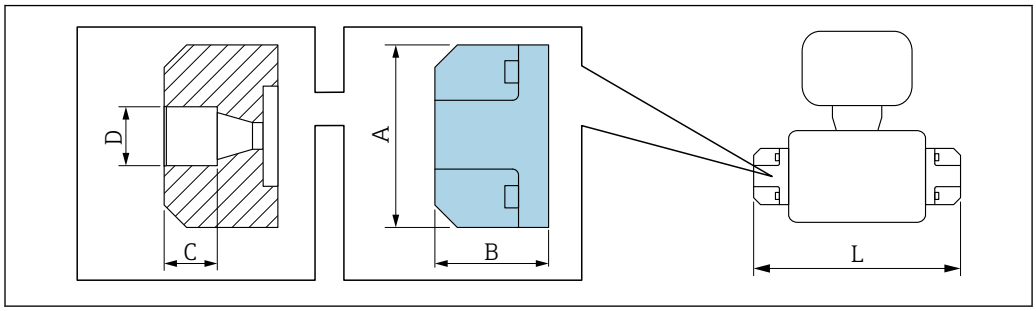
Internal thread according to ISO 228/DIN 2999
1.4404 (316L)
Order code for "Process connection", option **I3S**

DN [in]	Suitable for external thread ISO 228/DIN 2999 [in]	A [in]	B [in]	L [in]
1/12 to ⅜	Rp ⅜	Rp 0.51 × ⅜	0.35	6.93
½	Rp ½	Rp 0.55 × ½	0.63	6.93
1	Rp 1	Rp 0.67 × 1	1.07	7.41

Surface roughness: Ra_{max} = 63 µin

Adhesive sleeves

Adhesive sleeves with O-ring seal



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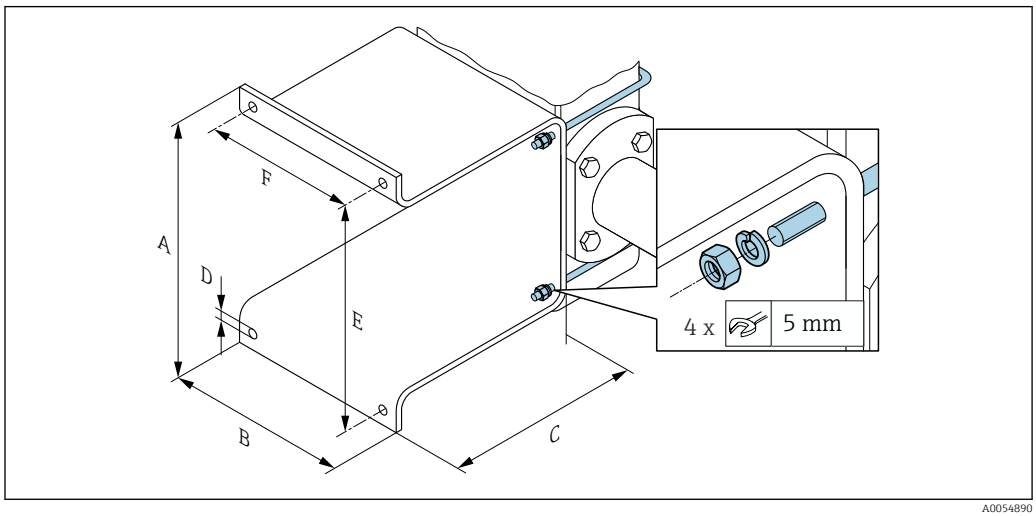
Adhesive sleeve **PVC** *Order code for "Process connection", option* **O1V**						
DN [in]	**Suitable for pipe [in]**	**A [in]**	**B [in]**	**C [in]**	**D [in]**	**L [in]**
1/12 to 3/8	½	2.44	1.52	0.71	0.85	6.42
Surface roughness: Ra_{max} = 63 µin The required grounding rings can be ordered as accessories (order code: DK5HR-****).						

Mounting kits

Wall mounting kit



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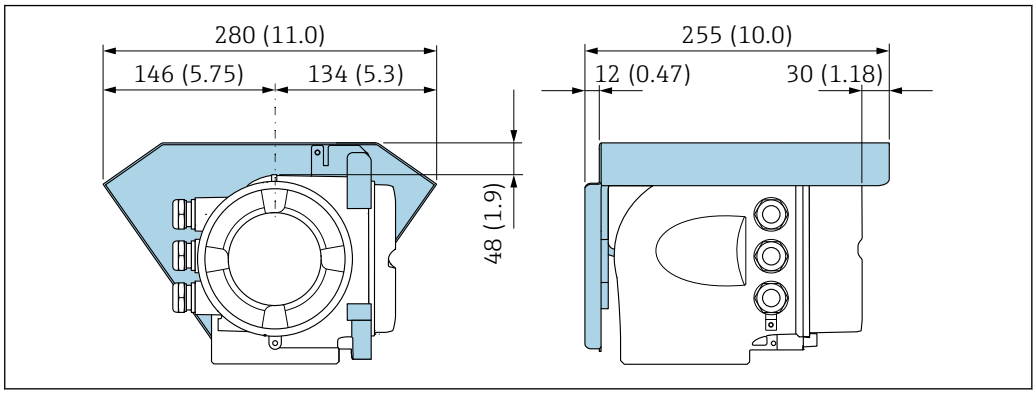
A [in]	**B** [in]	**C** [in]	**Ø D** [in]	**E** [in]	**F** [in]
5.39	4.33	4.72	0.28	4.92	3.46

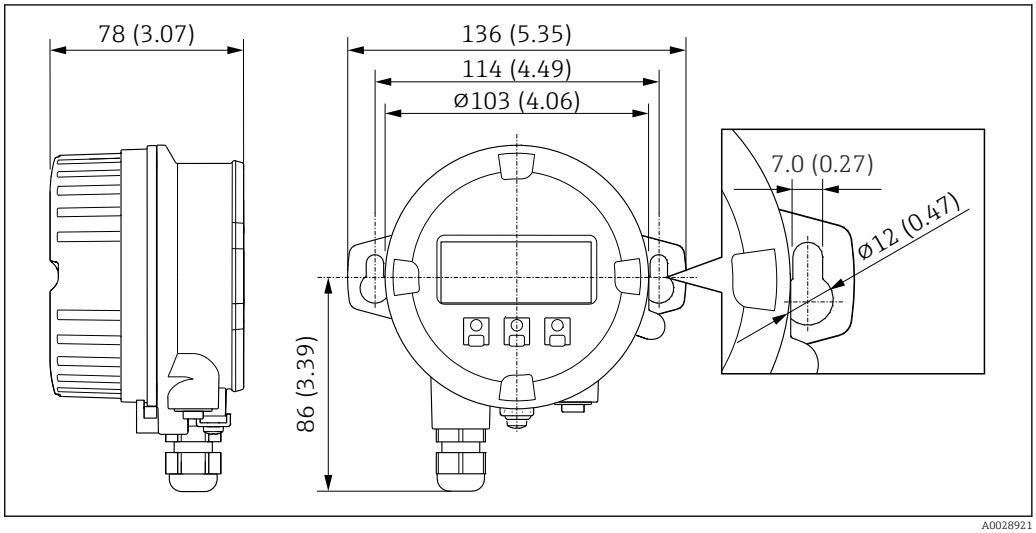
Accessories

Protective cover



43 *Unit mm (in)*

Remote display and operating module DKX001

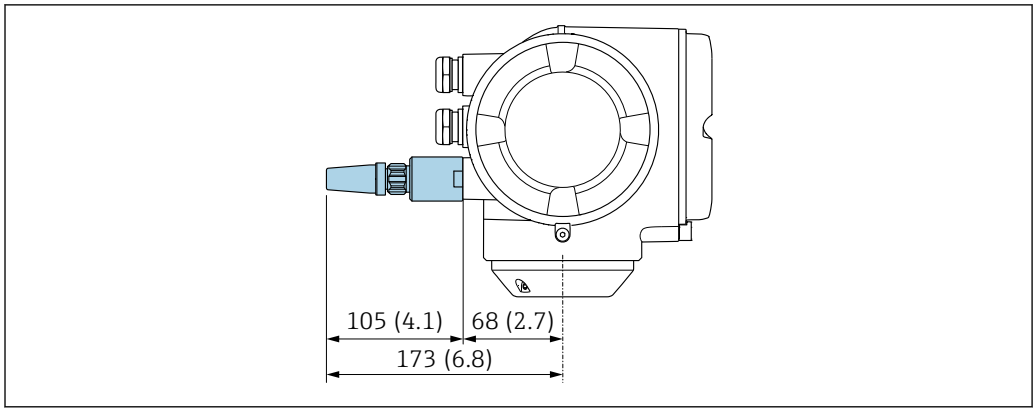


44 *Unit mm (in)*

External WLAN antenna

The external WLAN antenna is not suitable for use in hygienic applications.

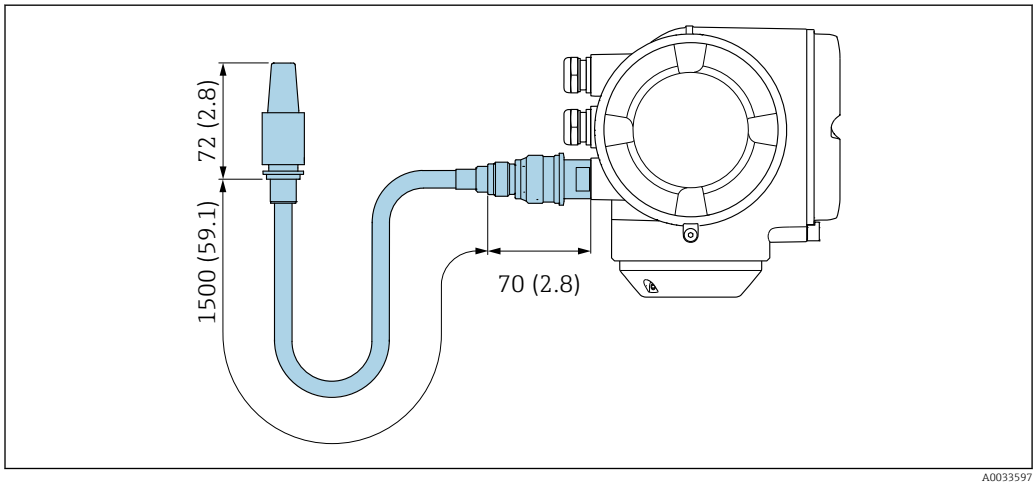
External WLAN antenna mounted on device



45 Unit mm (in)

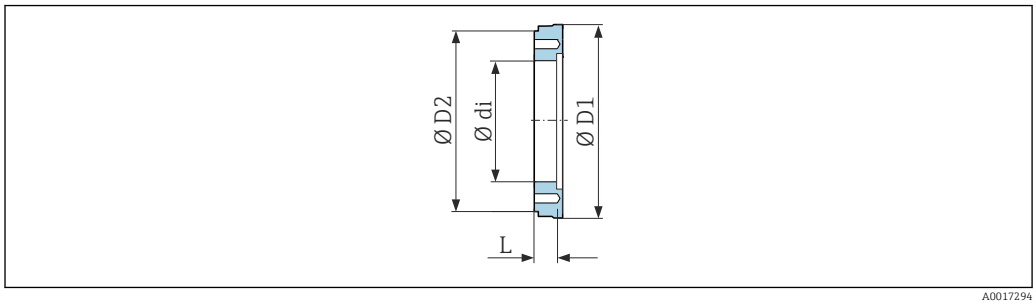
External WLAN antenna mounted with cable

The external WLAN antenna can be mounted separately from the transmitter if the transmission/ reception conditions at the transmitter mounting location are poor.



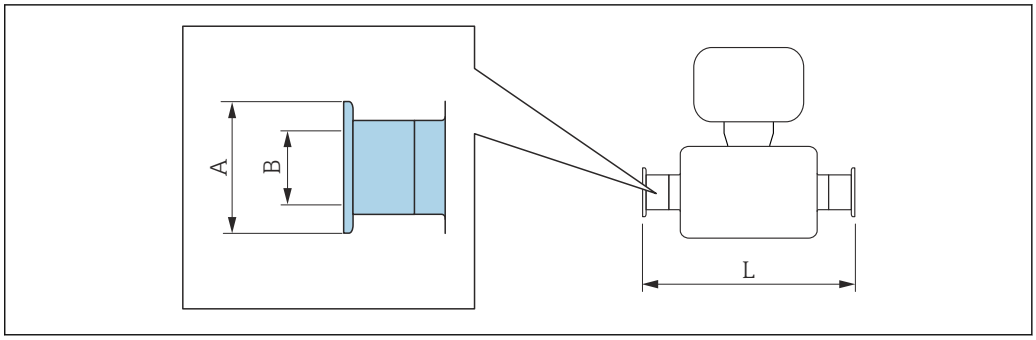
46 Unit mm (in)

Spacer



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

Clamp connections with aseptic gasket seal available for order



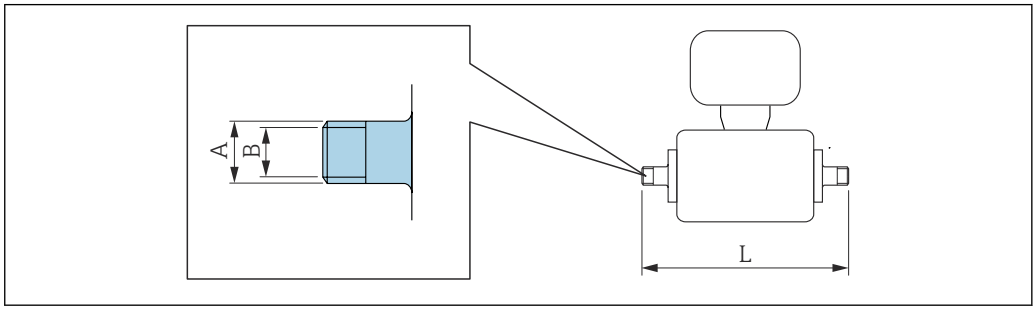
47 *Hygienic clamp adapter connection suitable for pipes with connection according to ASME BPE (reduction)*

Tri-Clamp
1.4404 (316L), suitable for pipe according to ASME BPE and BS 4825, reduction from pipe OD 1" (Tri-Clamp connection) to device DN 15
Order code: DKH-HF****

DN [in]	Suitable for pipe according to ASME BPE and BS 4825 (reduction) [in]	A [in]	B [in]	L [in]
½	Pipe OD 1"	2	0.87	5.63

Surface roughness: Ra_{max} = 31.5 µin, optional order code for "Design", option CB: Ra_{max} = 15 µin electropolished
Please note the internal diameters of the measuring pipe and process connection (B) when cleaning with pigs.

Couplings with O-ring seal available for order



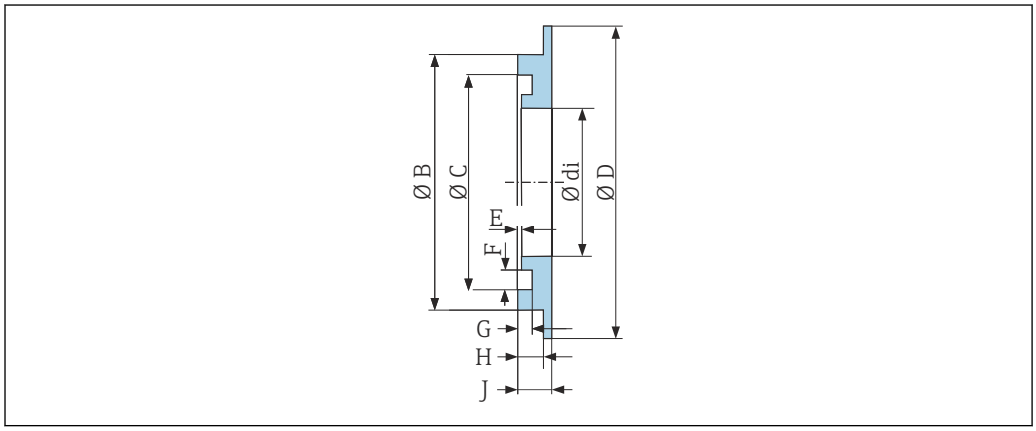
External thread
1.4404 (316L)
Order code: DKH-GD****

DN [in]	Suitable for internal thread NPT [in]	A [in]	B [in]	L [in]
1/12 to 3/8	NPT 3/8	R 0.61 × 3/8	0.39	7.39
½	NPT ½	R 0.79 × ½	0.63	7.39
1	NPT 1	R 1 × 1	1.00	7.73

Surface roughness: Ra_{max} = 63 µin

Internal thread 1.4404 (316L) Order code: DKH**-GC**				
DN [in]	**Suitable for external thread NPT [in]**	**A [in]**	**B [in]**	**L [in]**
1/12 to 3/8	NPT 3/8	R 0.51 × 3/8	0.35	6.93
½	NPT ½	R 0.55 × ½	0.63	6.93
1	NPT 1	R 0.67 × 1	1.07	7.41
Surface roughness: Ra_{max} = 63 µin				

Grounding rings



A0017673

For lap joint flange made of PVDF and PVC adhesive sleeve 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 3/8	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

All values (weight exclusive of packaging material) refer to devices with flanges of the standard pressure rating.
The weight may be lower than indicated depending on the pressure rating and design.
Weight specifications including transmitter as per order code for "Housing", option A "Aluminum, coated".

Different values due to different transmitter versions:
- Transmitter version for the hazardous area
  (Order code for "Housing", option A "Aluminum, coated"; Ex d): +2 kg (+4.4 lbs)
- Transmitter version for hygienic area
  (Order code for "Housing", option B "Stainless, hygienic"): +0.2 kg (+0.44 lbs)

Nominal diameter		Weight	
[mm]	**[in]**	**[kg]**	**[lbs]**
2	1/12	4.7	10.4
4	5/32	4.7	10.4
8	5/16	4.7	10.4
15	½	4.6	10.1

Nominal diameter		Weight	
[mm]	[in]	[kg]	[lbs]
25	1	5.5	12.1
40	1 ½	6.8	15.0
50	2	7.3	16.1
65	–	8.1	17.9
80	3	8.7	19.2
100	4	10.0	22.1
125	5	15.4	34.0
150	6	17.8	39.3

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	5/32	PN 16/40	4.5	0.18
8	5/16	PN 16/40	9.0	0.35
15	½	PN 16/40	16.0	0.63
–	1	PN 16/40	22.6 [2]	0.89 [2]
25	–	PN 16/40	26.0 [3]	1.02 [3]
40	1 ½	PN 16/25/40	34.8	1.37
50	2	PN 16/25	47.5	1.87
65	–	PN 16/25	60.2	2.37
80	3	PN 16/25	72.9	2.87
100	4	PN 16/25	97.4	3.83
125	5	PN 10/16	120.0	4.72
150	6	PN 10/16	146.9	5.78

1) Depending on process connection and seals used
2) Order code 5H**22
3) Order code 5H**26

Materials

Transmitter housing

Order code for "Housing":
- Option **A** "Aluminum, coated": aluminum, AlSi10Mg, coated
- Option **B** "Stainless, hygienic": stainless steel, 1.4404 (316L)

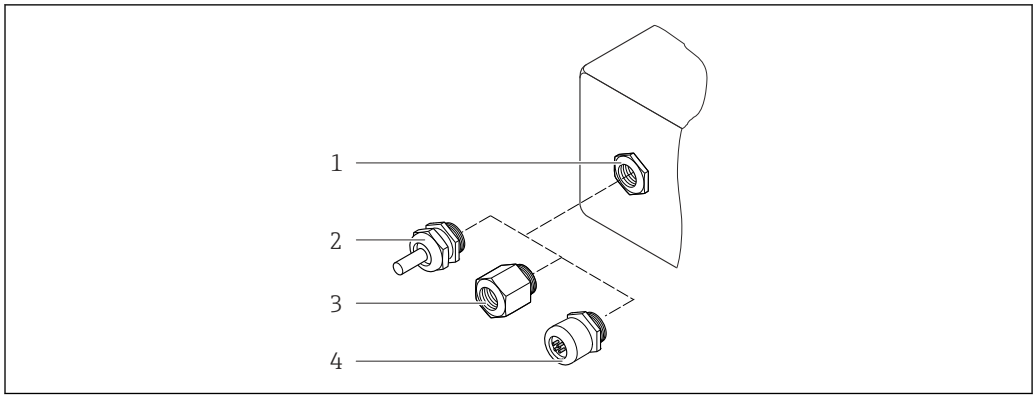
Window material

Order code for "Housing":
- Option **A** "Aluminum, coated": glass
- Option **B** "Stainless, hygienic": polycarbonate

Seals

Order code for "Housing":
Option **B** "Stainless, hygienic": EPDM and silicone

Cable entries/cable glands



48 Possible cable entries/cable glands

1 Internal thread M20 × 1.5
2 Cable gland M20 × 1.5
3 Adapter for cable entry with internal thread G ½" or NPT ½"
4 Device plug

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

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

Cable entry/cable gland	Material
Gland M20 × 1.5	Non-Ex: plastic
	Z2, D2, Ex d/de: brass with plastic
Adapter for cable entry with internal thread G ½"	Nickel-plated brass
Adapter for cable entry with internal thread NPT ½"	

Order code for "Housing", option B "Stainless, hygienic"

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

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

Process connections

- Stainless steel, 1.4404 (F316L)
- PVDF
- PVC adhesive sleeve

Electrodes

- Standard: stainless steel, 1.4435 (316 L)
- Optional: Alloy C22, 2.4602 (UNS N06022); tantalum (Ta 2.5 W); platinum (Pl/Ir 20%) (only up to DN 25 (1"))

Seals

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

Accessories

Protective cover

Stainless steel, 1.4404 (316L)

External WLAN antenna

- Antenna: ASA plastic (acrylonitrile styrene acrylate) and nickel-plated brass
- Adapter: Stainless steel and nickel-plated brass
- Cable: Polyethylene
- Plug: Nickel-plated brass
- Angle bracket: Stainless steel

Grounding rings

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

Wall mounting kit

Stainless steel, 1.4301 (304) [3]

Spacer

1.4435 (F316L)

Fitted electrodes

- Working electrodes for signal detection
- Medium monitoring electrode for empty pipe detection/temperature measurement (DN 15 to 150 (½ to 6") only)

Process connections

With O-ring seal:
- Welding nipple
- Flange
- Male thread
- Female thread
- Hose connection
- PVC adhesive sleeve

With aseptic gasket seal:
- Clamp
- Coupling
- Flange

- For information on the different materials used in the process connections → 103
- For information on the mechanical construction of the process connections → 68

2) In this context, aseptic means hygienic design
3) Does not meet the hygienic design installation guidelines.

Surface roughness

Electrodes:
- Stainless steel, 1.4435 (316 L) electropolished ≤ 0.5 µm (19.7 µin)
- Alloy C22, 2.4602 (UNS N06022); Tantal (Ta 2,5W) ≤ 0.5 µm (19.7 µin); Platin (Pl/Ir 20%) ≤ 0.5 µm (19.7 µin)

(All data refer to parts in contact with the medium).

Liner with PFA:
≤ 0.4 µm (15.7 µin)

(All data refer to parts in contact with the medium).

Stainless steel process connections:
- With O-ring seal: ≤ 1.6 µm (63 µin)
- With aseptic seal: Ra_{max} = 0.76 µm (31.5 µin)
  Optional: Ra_{max} = 0.38 µm (15 µin) electropolished

(All data refer to parts in contact with the medium).

User interface

Operation concept

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

Quick and safe commissioning
- Guided menus ("Make-it-run" wizards) for applications
- Menu guidance with brief descriptions of the individual parameter functions
- Access to the device via web server
- WLAN access to the device via mobile handheld terminal, tablet or smart phone

Reliable operation
- Operation in local language
- Uniform operating philosophy applied to device and operating tools
- If replacing electronic modules, transfer the device configuration via the integrated memory (HistoROM backup) which contains the process and measuring device data and the event logbook. No need to reconfigure.

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

Languages

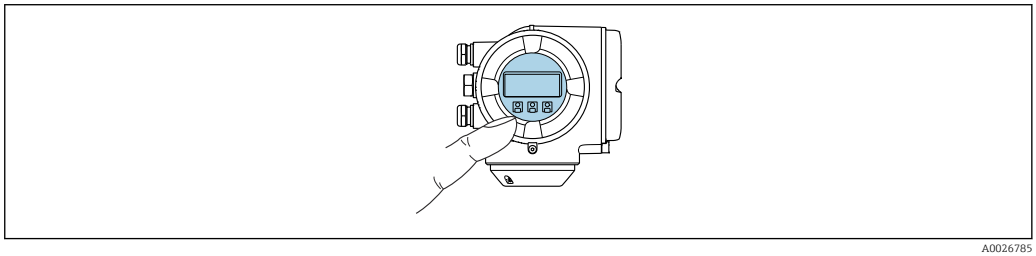
Can be operated in the following languages:
- Via local operation
  English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Korean, Vietnamese, Czech, Swedish
- Via web browser
  English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Vietnamese, Czech, Swedish
- Via "FieldCare", "DeviceCare" operating tool: English, German, French, Spanish, Italian, Chinese, Japanese

Local operation

Via display module

Equipment level:
- Order code for "Display; operation", option F "4-line, illuminated, graphic display; touch control"
- Order code for "Display; operation", option G "4-line, illuminated, graphic display; touch control + WLAN"

Information about WLAN interface → 113



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49 *Operation with touch control*

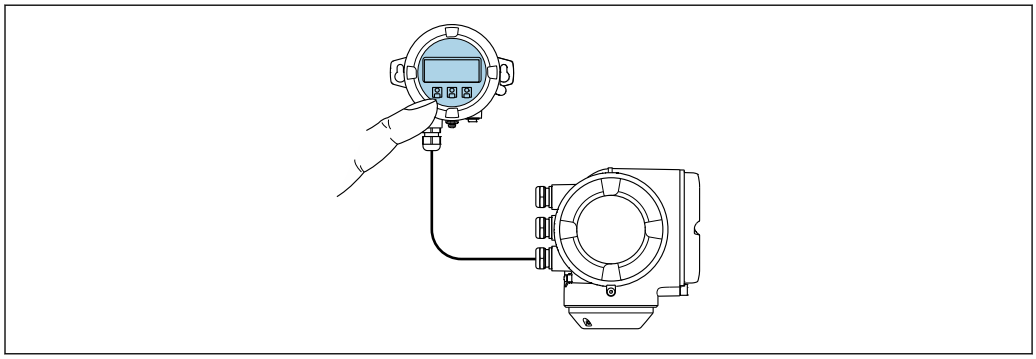
Display elements
- 4-line, illuminated, graphic display
- White background lighting; switches to red in event of device errors
- Format for displaying measured variables and status variables can be individually configured

Operating elements
- External operation via touch control (3 optical keys) without opening the housing: ⊞, ⊟, Ⓔ
- Operating elements also accessible in the various zones of the hazardous area

Via remote display and operating module DKX001

The remote display and operating module DKX001 is available as an optional extra → 123..

- The remote display and operating module DKX001 is only available for the following housing version: order code for "Housing": option A "Aluminum, coated"
- The measuring instrument is always supplied with a dummy cover when the remote display and operating module DKX001 is ordered directly with the measuring instrument. Display or operation at the transmitter is not possible in this case.
- If ordered subsequently, the remote display and operating module DKX001 may not be connected at the same time as the existing measuring instrument display module. Only one display or operation unit may be connected to the transmitter at any one time.



A0026786

50 *Operation via remote display and operating module DKX001*

Display and operating elements

The display and operating elements correspond to those of the display module → 105.

Housing material

The housing material of the display and operating module DKX001 corresponds to the selected material of the transmitter housing.

Transmitter housing		Remote display and operating module
Order code for "Housing"	Material	Material
Option **A** "Aluminum, coated"	AlSi10Mg, coated	AlSi10Mg, coated

Cable entry

Corresponds to the choice of transmitter housing, order code for "Electrical connection".

Connecting cable

→ 50

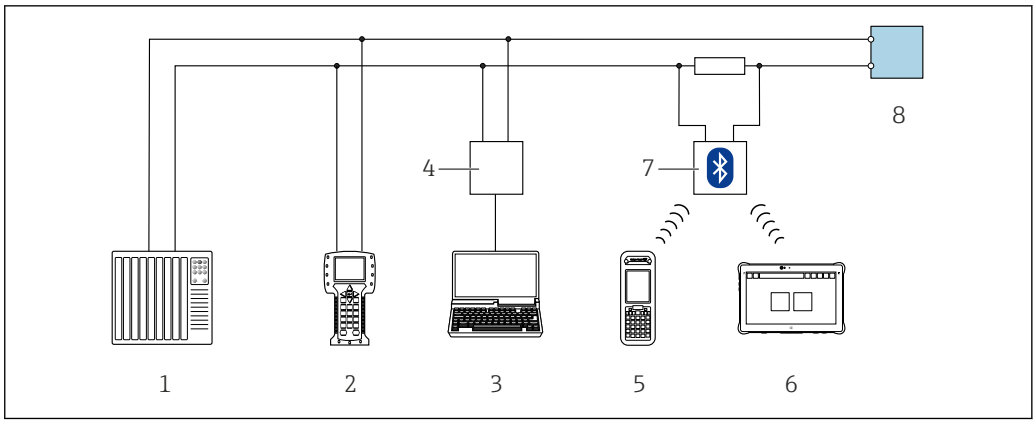
Dimensions

→ 84

Remote operation

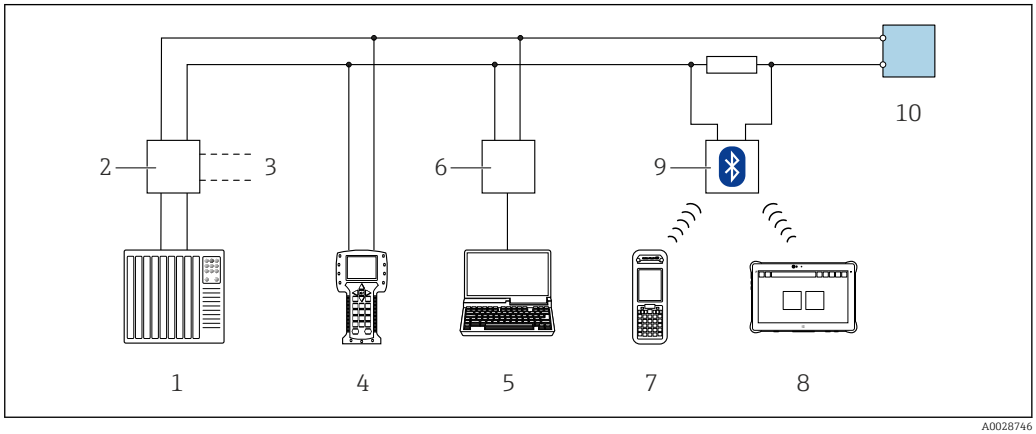
Via HART protocol

This communication interface is available in device versions with a HART output.



51 *Options for remote operation via HART protocol (active)*

1 *Automation system (e.g. PLC)*
2 *Field Communicator 475*
3 *Computer with web browser for accessing the integrated device web server or computer with operating tool (e.g. FieldCare, DeviceCare, AMS Device Manager, SIMATIC PDM) with COM DTM "CDI Communication TCP/IP"*
4 *Commubox FXA195 (USB)*
5 *Field Xpert SFX350 or SFX370*
6 *Field Xpert SMT70*
7 *VIATOR Bluetooth modem with connection cable*
8 *Transmitter*

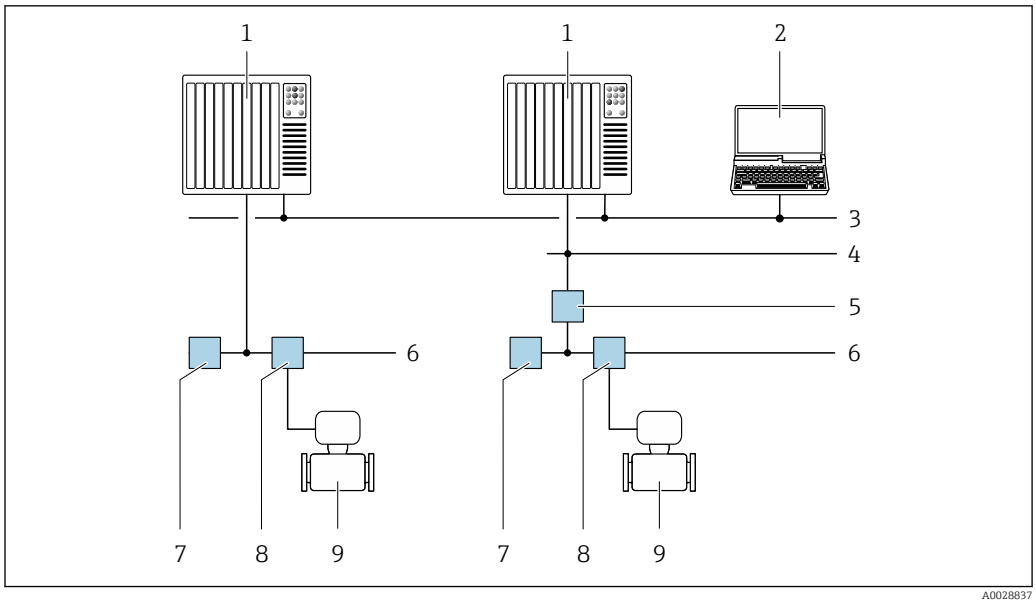


52 *Options for remote operation via HART protocol (passive)*

1 *Automation system (e.g. PLC)*
2 *Transmitter power supply unit, e.g. RN221N (with communication resistor)*
3 *Connection for Commubox FXA195 and Field Communicator 475*
4 *Field Communicator 475*
5 *Computer with web browser for accessing the integrated device web server or computer with operating tool (e.g. FieldCare, DeviceCare, AMS Device Manager, SIMATIC PDM) with COM DTM "CDI Communication TCP/IP"*
6 *Commubox FXA195 (USB)*
7 *Field Xpert SFX350 or SFX370*
8 *Field Xpert SMT70*
9 *VIATOR Bluetooth modem with connection cable*
10 *Transmitter*

Via FOUNDATION Fieldbus network

This communication interface is available in device versions with FOUNDATION Fieldbus.

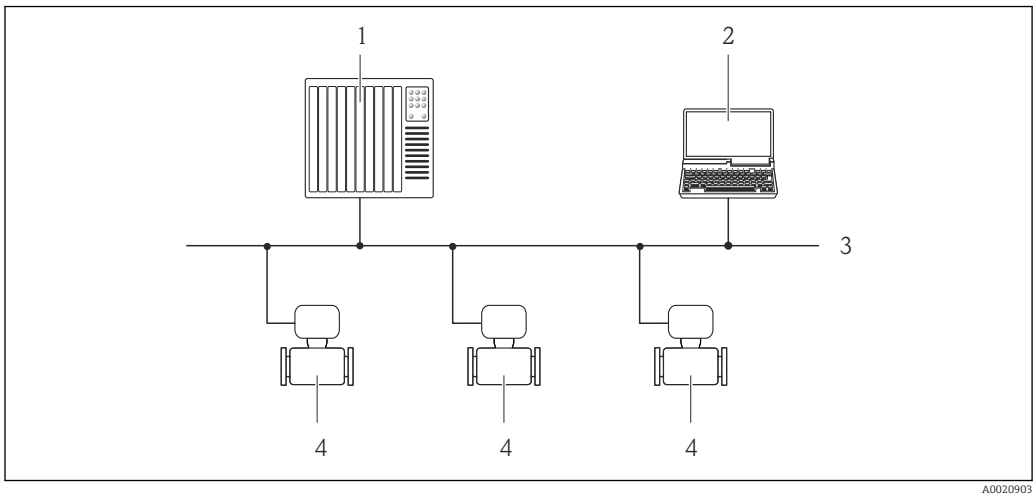


53 Options for remote operation via FOUNDATION Fieldbus network

1 Automation system
2 Computer with FOUNDATION Fieldbus network card
3 Industry network
4 High Speed Ethernet FF-HSE network
5 Segment coupler FF-HSE/FF-H1
6 FOUNDATION Fieldbus FF-H1 network
7 Power supply FF-H1 network
8 T-box
9 Measuring instrument

Via PROFIBUS DP network

This communication interface is available in device versions with PROFIBUS DP.

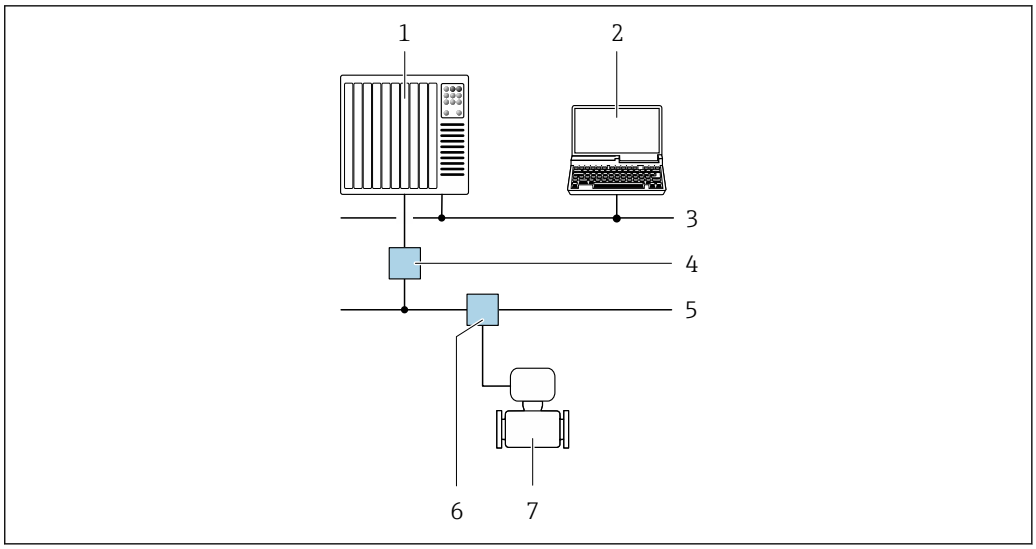


54 Options for remote operation via PROFIBUS DP network

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

Via PROFIBUS PA network

This communication interface is available in device versions with PROFIBUS PA.

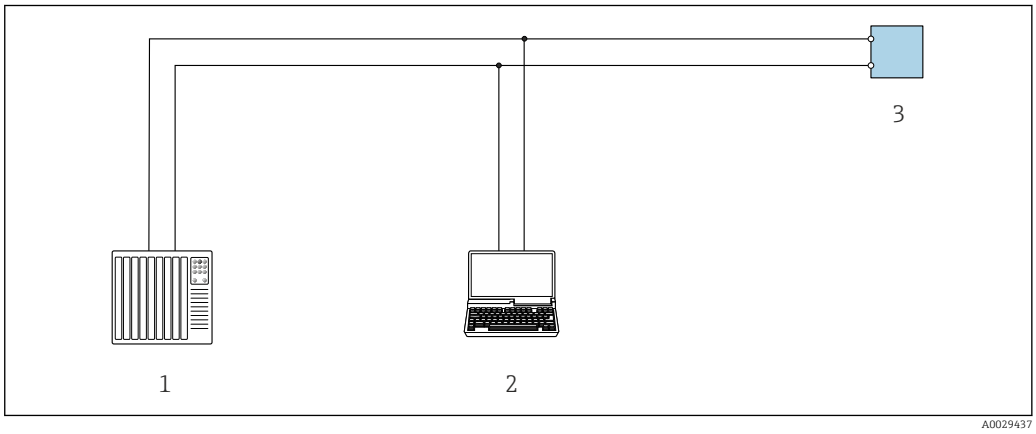


55 *Options for remote operation via PROFIBUS PA network*

1 *Automation system*
2 *Computer with PROFIBUS network card*
3 *PROFIBUS DP network*
4 *Segment coupler PROFIBUS DP/PA*
5 *PROFIBUS PA network*
6 *T-box*
7 *Measuring instrument*

Via Modbus RS485 protocol

This communication interface is available in device versions with a Modbus RS485 output.

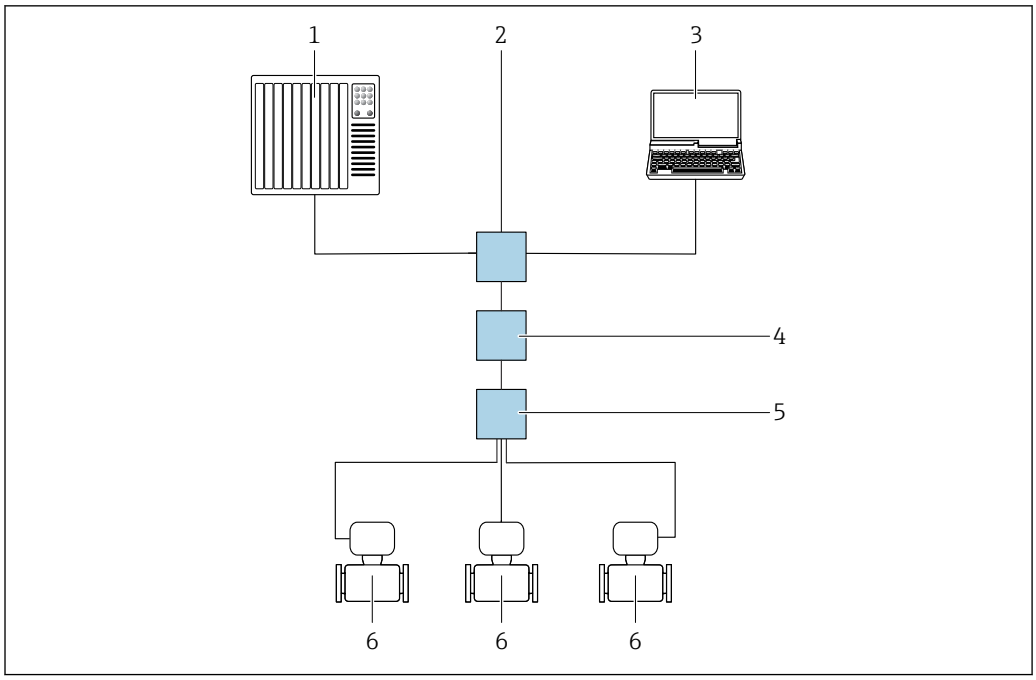


56 *Options for remote operation via Modbus RS485 protocol (active)*

1 *Automation system (e.g. PLC)*
2 *Computer with web browser for accessing the integrated device web server or with operating tool (e.g. FieldCare, DeviceCare) with COM DTM "CDI Communication TCP/IP" or Modbus DTM*
3 *Transmitter*

Via Modbus TCP over Ethernet-APL 10 Mbit/s, SPE 10 Mbit/s

This communication interface is available on port 1 in device versions with a Modbus TCP over Ethernet-APL output.



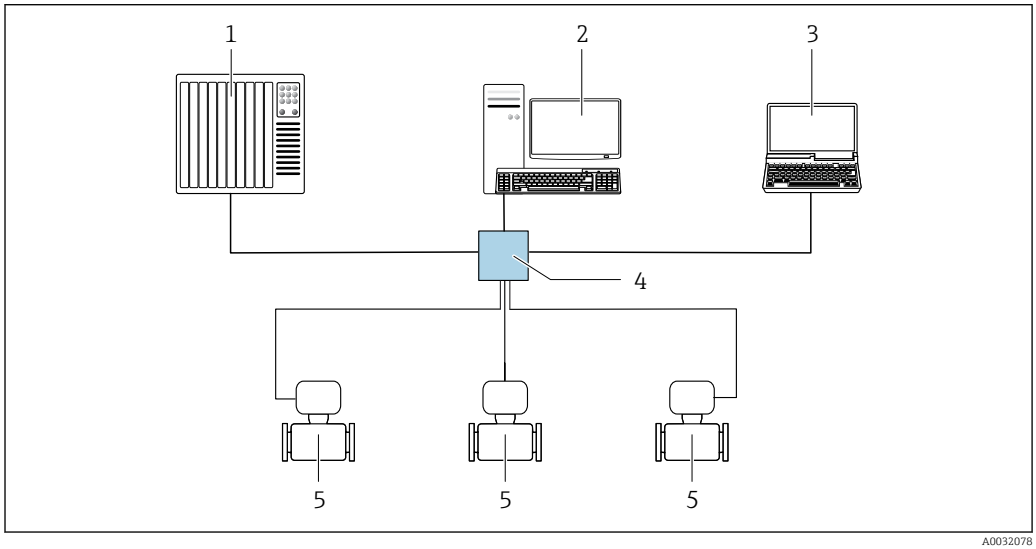
57 Options for remote operation via Modbus TCP over Ethernet-APL protocol (active)

1 Automation system, e.g. Simatic S7 (Siemens)
2 Ethernet switch, e.g. Scalance X204 (Siemens)
3 Computer with web browser or operating tool
4 APL power switch/SPE power switch (optional)
5 APL field switch/SPE field switch
6 Measuring instrument/communication via port 1 (terminal 26 + 27)

Via Modbus TCP over Ethernet 100 Mbit/s

This communication interface is available on port 2 in device versions with a Modbus TCP over Ethernet-APL output.

Star topology



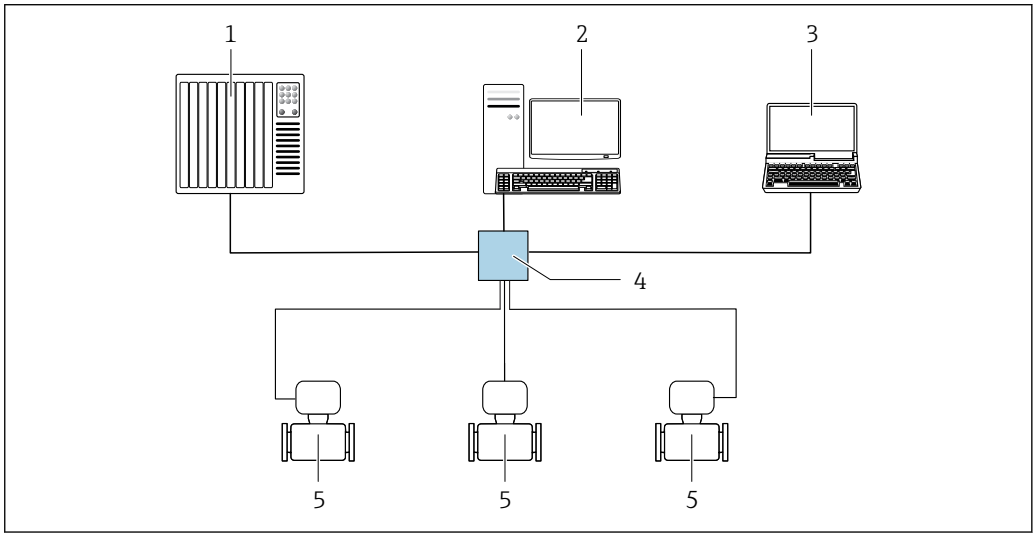
58 Options for remote operation via Modbus TCP over Ethernet - 100 Mbit/s: Star topology

1 Automation system, z. B. RSLogix (Rockwell Automation)
2 Workstation for measuring instrument operation: with Custom Add-On Profile for "RSLogix 5000" (Rockwell Automation) or with Electronic Data Sheet (EDS)
3 Computer with web browser or operating tool
4 Standard Ethernet switch, e.g. Stratix (Rockwell Automation)
5 Measuring instrument/communication via port 2 (RJ45 connector)

Via EtherNet/IP network

This communication interface is available in device versions with EtherNet/IP.

Star topology

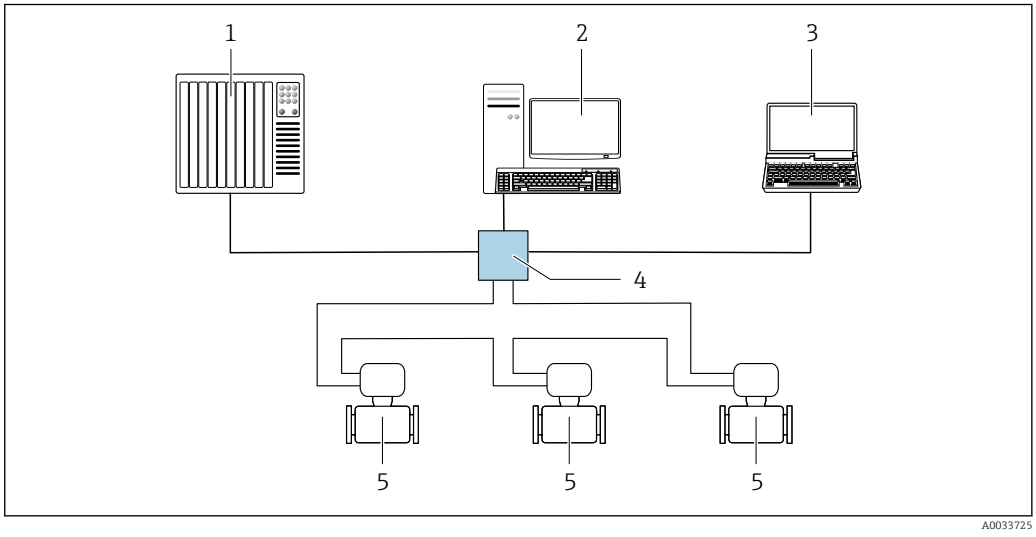


59 *Options for remote operation via Ethernet/IP network: star topology*

1 *Automation system, z. B. "RSLogix" (Rockwell Automation)*
2 *Workstation for measuring instrument operation: with Custom Add-On Profile for "RSLogix 5000" (Rockwell Automation) or with Electronic Data Sheet (EDS)*
3 *Computer with web browser for accessing the integrated web server or computer with operating tool (e.g. FieldCare, DeviceCare) with COM DTM "CDI Communication TCP/IP"*
4 *Standard Ethernet switch, e.g. Scalance X204 (Siemens)*
5 *Measuring instrument*

Ring topology

The device is integrated via the terminal connection for signal transmission (output 1) and the service interface (CDI-RJ45).



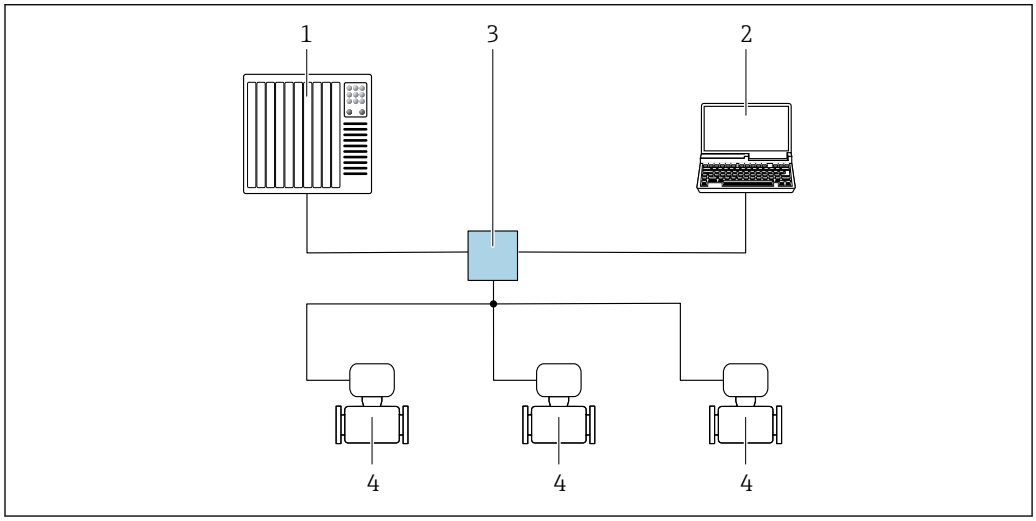
60 *Options for remote operation via EtherNet/IP network: ring topology*

1 *Automation system, z. B. "RSLogix" (Rockwell Automation)*
2 *Workstation for measuring instrument operation: with Custom Add-On Profile for RSLogix 5000 (Rockwell Automation) or with Electronic Data Sheet (EDS)*
3 *Computer with web browser for accessing the integrated web server or computer with operating tool (e.g. FieldCare, DeviceCare) with COM DTM "CDI Communication TCP/IP"*
4 *Standard Ethernet switch, e.g. Scalance X204 (Siemens)*
5 *Measuring instrument*

Via PROFINET network

This communication interface is available in device versions with PROFINET.

Star topology

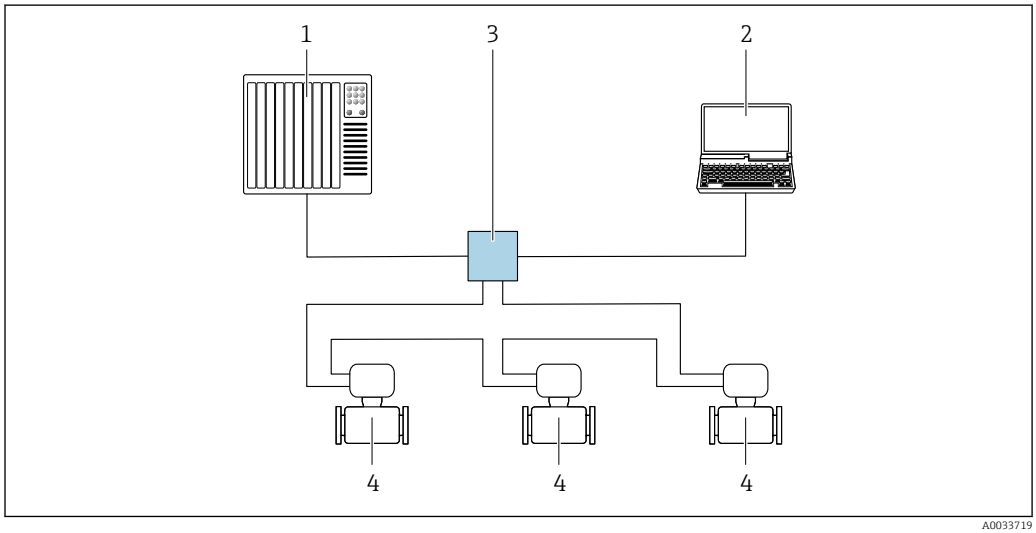


61 Options for remote operation via PROFINET network: star topology

1 Automation system, e.g. Simatic S7 (Siemens)
2 Computer with web browser for accessing integrated web server or computer with operating tool (e.g. FieldCare, DeviceCare, SIMATIC PDM) with COM DTM "CDI Communication TCP/IP"
3 Standard Ethernet switch, e.g. Scalance X204 (Siemens)
4 Measuring instrument

Ring topology

The device is integrated via the terminal connection for signal transmission (output 1) and the service interface (CDI-RJ45).



62 Options for remote operation via PROFINET network: ring topology

1 Automation system, e.g., Simatic S7 (Siemens)
2 Computer with web browser for accessing integrated web server or computer with operating tool (e.g. FieldCare, DeviceCare, SIMATIC PDM) with COM DTM "CDI Communication TCP/IP"
3 Standard Ethernet switch, e.g. Scalance X204 (Siemens)
4 Measuring instrument

Service interface

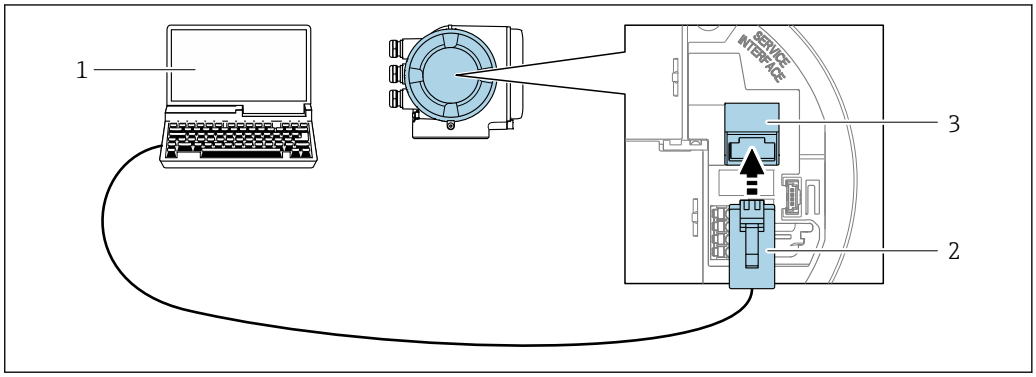
Via service interface (CDI-RJ45)

To configure the device on site, a point-to-point connection can be established. Alternatively, a connection via Modbus TCP can be used.The connection is made with the housing open, directly via the device's service interface (CDI-RJ45).

An adapter for the RJ45 to the M12 connector is optionally available for the non-hazardous area:

Order code for "Accessories", option **NB**: "Adapter RJ45 M12 (service interface)"

The adapter connects the service interface (CDI-RJ45) to an M12 connector mounted in the cable entry. The connection to the service interface can be established via an M12 connector without opening the device.

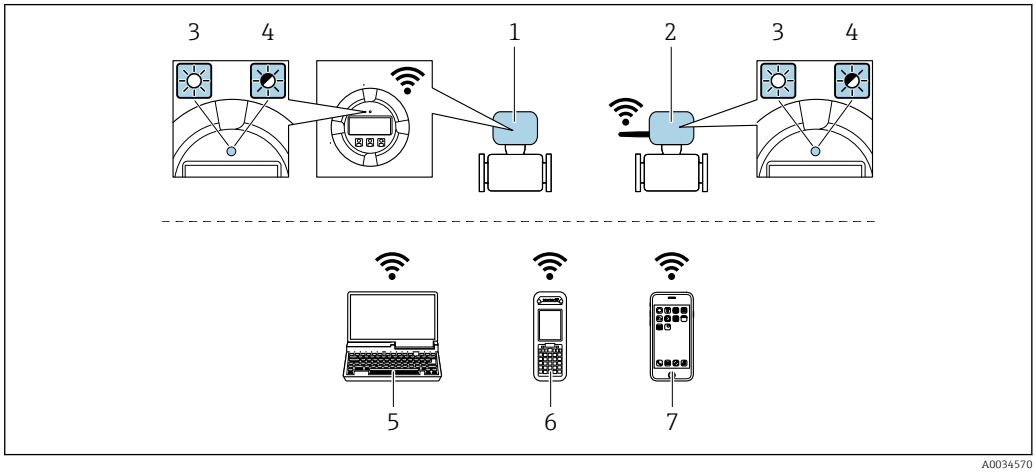


63 Connection via service interface (CDI-RJ45)

1 *Computer with web browser for accessing the integrated web server or computer with operating tool, e.g. "FieldCare", "DeviceCare", with COM DTM "CDI Communication TCP/IP" or Modbus DTM or operating tool*
2 *Standard Ethernet connecting cable with RJ45 connector*
3 *Service interface (CDI-RJ45) of the measuring instrument with access to the integrated web server*

Via WLAN interface

The optional WLAN interface is available on the following device version:
Order code for "Display; operation", option G "4-line, illuminated; touch control + WLAN"



1 *Transmitter with integrated WLAN antenna*
2 *Transmitter with external WLAN antenna*
3 *LED lit constantly: WLAN reception is enabled on measuring instrument*
4 *LED flashing: WLAN connection established between operating unit and measuring instrument*
5 *Computer with WLAN interface and web browser for accessing integrated device web server or with operating tool e.g FieldCare, DeviceCare)*
6 *Mobile handheld terminal with WLAN interface and web browser for accessing integrated device web server or operating tool (e.g. FieldCare, DeviceCare)*
7 *Smartphone or tablet (e.g. Field Xpert SMT70)*

Function	WLAN: IEEE 802.11 b/g (2.4 GHz) ▪ Access point with DHCP server (factory setting) ▪ Network
Encryption	WPA2-PSK AES-128 (in accordance with IEEE 802.11i)
Configurable WLAN channels	1 to 11
Degree of protection	IP66/67
Available antennas	▪ Internal antenna ▪ External antenna (optional) In the event of poor transmission/reception conditions at the place of installation. Available as an accessory → 🖹 123. Only 1 antenna is active at any one time!
Range	▪ Internal antenna: typically 10 m (32 ft) ▪ External antenna: typically 50 m (164 ft)
Materials (external antenna)	▪ Antenna: ASA plastic (acrylonitrile styrene acrylate) and nickel-plated brass ▪ Adapter: Stainless steel and nickel-plated brass ▪ Cable: Polyethylene ▪ Plug: Nickel-plated brass ▪ Angle bracket: Stainless steel

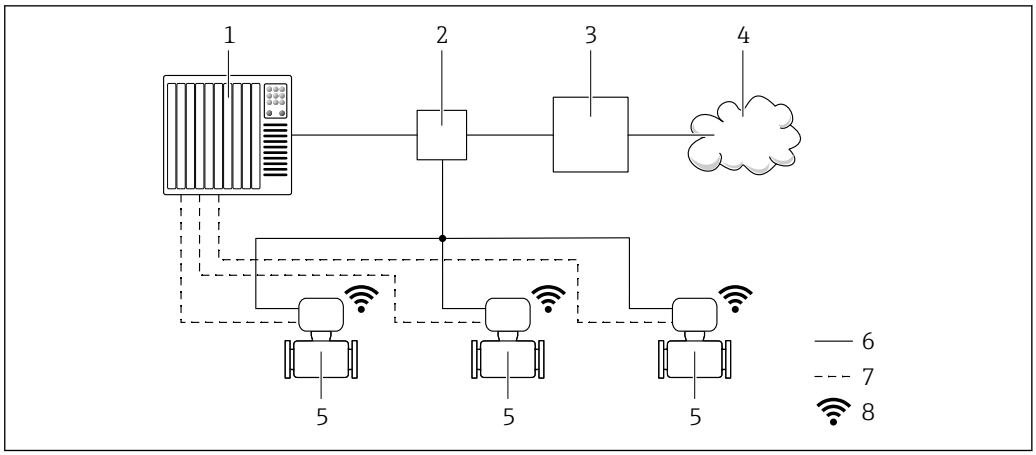
Network integration

Network integration is only available for the HART communication protocol.

With the optional "OPC UA Server" application package, the device can be integrated into an Ethernet network via the service interface (CDI-RJ45 and WLAN) and communicate with OPC UA clients. If the device is used in this way, IT security must be considered.

For detailed information on connecting transmitters with an Ex de approval, see separate document "Safety instructions" (XA) for the device.

For permanent access to device data and for device configuration via the web server, the device is incorporated directly in a network via the service interface (CDI-RJ45). In this way, the device can be accessed any time from the control station. The measured values are processed separately via the inputs and outputs through the automation system.



1 *Automation system, e.g. Simatic S7 (Siemens)*
2 *Ethernet switch*
3 *Edge Gateway*
4 *Cloud*
5 *Measuring instrument*
6 *Ethernet network*
7 *Measured values via inputs and outputs*
8 *Optional WLAN interface*

The optional WLAN interface is available on the following device version:
Order code for "Display; operation", option **G** "4-line, backlit, graphic display; touch control + WLAN"

Special Documentation for the OPC UA Server application package → 🖹 128.

Supported operating tools

Different operating tools can be used for local or remote access to the measuring device. Depending on the operating tool used, access is possible with different operating units and via a variety of interfaces.

Supported operating tools	Operating unit	Interface	Additional information
Web browser	Notebook, PC or tablet with web browser	▪ Service interface CDI-RJ45 ▪ WLAN interface ▪ Ethernet-based fieldbus (EtherNet/IP, PROFINET, Modbus TCP over Ethernet-APL)	Special Documentation for device
DeviceCare SFE100	Notebook, PC or tablet with Microsoft Windows system	▪ Service interface CDI-RJ45 ▪ WLAN interface ▪ Fieldbus protocol ▪ Modbus TCP over Ethernet-APL	→ 🖹 125

Supported operating tools	Operating unit	Interface	Additional information
FieldCare SFE500	Notebook, PC or tablet with Microsoft Windows system	▪ Service interface CDI-RJ45 ▪ WLAN interface ▪ Fieldbus protocol	→ 🖹 125
Field Xpert	SMT70/77/50	▪ All fieldbus protocols ▪ WLAN interface ▪ Bluetooth ▪ Service interface CDI-RJ45	Operating Instructions BA01202S Device description files: Use update function of handheld terminal

Other operating tools based on FDT technology with a device driver such as DTM/iDTM or DD/EDD can be used for device operation. These operating tools are available from the individual manufacturers. Integration into the following operating tools, among others, is supported:

- FactoryTalk AssetCentre (FTAC) from Rockwell Automation → www.rockwellautomation.com
- Process Device Manager (PDM) from Siemens → www.siemens.com
- Asset Management Solutions (AMS) from Emerson → www.emersonprocess.com
- FieldCommunicator 375/475 from Emerson → www.emersonprocess.com
- Emersons TREX → www.emerson.com
- Field Device Manager (FDM) from Honeywell → www.process.honeywell.com
- FieldMate from Yokogawa → www.yokogawa.com
- PACTWare → www.pactware.com

The related device description files are available: www.endress.com → Download Area

Web server

The integrated web server can be used to operate and configure the device via a web browser via Ethernet-APL, via service interface (CDI-RJ45) or via WLAN interface . The structure of the operating menu is the same as for the local display. In addition to the measured values, status information on the device is displayed and can be used to monitor device health. Furthermore the device data can be managed and the network parameters can be configured.

A device that has a WLAN interface (can be ordered as an option) is required for the WLAN connection: order code for "Display; Operation", option G "4-line, illuminated; touch control + WLAN". The device acts as an Access Point and enables communication by computer or a mobile handheld terminal.

Supported functions
Data exchange between the operating unit (such as a notebook, for example,) and measuring instrument:
- Upload the configuration from the measuring instrument (XML format, configuration backup)
- Save the configuration to the measuring instrument (XML format, restore configuration)
- Export event list (.csv file)
- Export parameter settings (.csv file or PDF file, document the measuring point configuration)
- Export the Heartbeat Technology verification report (PDF file, only available with the **Heartbeat Verification** → 🖹 122 application package)
- Flash firmware version for device firmware upgrade, for example
- Download driver for system integration
- Visualize up to 1000 saved measured values (only available with the **Extended HistoROM** application package→ 🖹 122)

HistoROM data management

The measuring instrument features HistoROM data management. HistoROM data management comprises both the storage and import/export of key device and process data, making operation and servicing far more reliable, secure and efficient.

When the device is delivered, the factory settings of the configuration data are stored as a backup in the device memory. This memory can be overwritten with an updated data record, for example after commissioning.

Additional information on the data storage concept

There are different types of data storage units in which device data are stored and used by the device:

	HistoROM backup	T-DAT	S-DAT

Available data	▪ Event logbook, e.g. diagnostic events
	▪ Parameter data record backup
	▪ Device firmware package
	▪ Driver for system integration for exporting via web server, e.g.:
	  ▪ GSD for PROFIBUS DP
	  ▪ GSD for PROFIBUS PA
	  ▪ GSD for PROFINET
	  ▪ EDS for EtherNet/IP
	  ▪ DD for FOUNDATION Fieldbus
		▪ Measured value logging ("Extended HistoROM" order option)
		▪ Current parameter data record (used by firmware at run time)
		▪ Indicator (minimum/maximum values)
		▪ Totalizer value
			▪ Sensor data: e.g. nominal diameter
			▪ Serial number
			▪ Calibration data
			▪ Device configuration (e.g. SW options, fixed I/O or multi I/O)

Storage location	Fixed on the user interface PC board in the connection compartment	Can be plugged into the user interface PC board in the connection compartment	In the sensor plug in the transmitter neck part

Data backup

Automatic
- The most important device data (sensor and transmitter) are automatically saved in the DAT modules
- If the transmitter or measuring device is replaced: once the T-DAT containing the previous device data has been exchanged, the new measuring device is ready for operation again immediately without any errors
- If exchanging the electronics module (e.g. I/O electronics module): Once the electronics module has been replaced, the software of the module is compared against the current device firmware. The module software is upgraded or downgraded where necessary. The electronics module is available for use immediately afterwards and no compatibility problems occur.

Manual
Additional parameter data record (complete parameter settings) in the integrated device memory HistoROM backup for:
- Data backup function
  Backup and subsequent restoration of a device configuration in the device memory HistoROM backup
- Data comparison function
  Comparison of the current device configuration with the device configuration saved in the device memory HistoROM backup

Data transmission

Manual
- Transfer of a device configuration to another device using the export function of the specific operating tool, e.g. with FieldCare, DeviceCare or web server: to duplicate the configuration or to store in an archive (e.g. for backup purposes)
- Transmission of the drivers for system integration via web server, e.g.:
  - GSD for PROFIBUS DP
  - GSD for PROFIBUS PA
  - GSD for PROFINET
  - EDS for Ethernet/IP
  - DD for FOUNDATION fieldbus

Event list

Automatic
- Chronological display of up to 20 event messages in the events list
- If the **Extended HistoROM** application package (order option) is enabled: up to 100 event messages are displayed in the events list along with a time stamp, plain text description and remedial measures
- The events list can be exported and displayed via a variety of interfaces and operating tools e.g. DeviceCare, FieldCare or Web server

Data logging

Manual
If the **Extended HistoROM** application package (order option) is enabled:
- Recording of 1 to 4 channels of up to 1 000 measured values (up to 250 measured values per channel)
- User configurable recording interval
- Export the measured value log via a variety of interfaces and operating tools e.g. FieldCare, DeviceCare or web server

Certificates and approvals

Current certificates and approvals for the product are available at www.endress.com on the relevant product page:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Downloads**.

CE mark

The device meets the legal requirements of the applicable EU Directives. These are listed in the corresponding EU Declaration of Conformity along with the standards applied.

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

UKCA marking

The device meets the legal requirements of the applicable UK regulations (Statutory Instruments). These are listed in the UKCA Declaration of Conformity along with the designated standards. By selecting the order option for UKCA marking, Endress+Hauser confirms a successful evaluation and testing of the device by affixing the UKCA mark.

Contact address Endress+Hauser UK:
Endress+Hauser Ltd.
Floats Road
Manchester M23 9NF
United Kingdom
www.uk.endress.com

RCM marking

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.

Sanitary compatibility

- 3-A approval
  - Confirmation by affixing the 3-A symbol for measuring instruments with the order code for "Additional approval", option LP " 3-A".
  - When installing the measuring instrument, ensure that no liquid can accumulate on the outside of the measuring instrument.
    Remote transmitters must be installed in accordance with the 3-A Standard.
  - Accessories and process connections (e.g. weather protection cover, wall holder unit) must be selected and installed in accordance with the 3-A Standard.
    Each accessory can be cleaned. Disassembly may be necessary under certain circumstances.
- EHEDG-certified (Type EL Class I)
  - Confirmation by affixing the EHEDG symbol for measuring instruments with the order code for "Additional approval", option LT "EHEDG".
  - EPDM is not a suitable seal material for media with a fat content > 8 %.
  - To meet the requirements for EHEDG certification, the device must be used with process connections in accordance with the EHEDG position paper entitled "Easy cleanable Pipe couplings and Process connections" (www.ehedg.org).
  - The EHEDG cleanability test requires a flow velocity of 1.5 m/s in the process line. This velocity must be ensured for EHEDG-compliant cleaning.
- The requirements of the Food Contact Material Regulations must be observed when selecting the materials used.
- FDA 21 CFR 177.1550
- Food Contact Materials Regulation (EC) 1935/2004
- Food Contact Materials Regulation GB 4806
- Pasteurized Milk Ordinance (PMO)

Binding information on the applicable conformities can be found in the relevant applicable Declaration of Conformity.

Pharmaceutical compatibility

- USP <87>
- USP <88> Class VI 121 °C
- TSE/BSE Certificate of Suitability
- cGMP
  Devices with the order code for "Test, certificate", option JG "Conformity with cGMP-derived requirements, declaration" comply with the requirements of cGMP with regard to the surfaces of parts in contact with the medium, design, material conformity, USP Class VI tests and TSE/BSE conformity.
  A serial number-specific declaration is generated.

Binding information on the applicable conformities can be found in the relevant applicable Declaration of Conformity.

Functional safety

The measuring instrument can be used for flow monitoring systems (min., max., range) up to SIL 2 (single-channel architecture; order code for "Additional approval", option LA) and SIL 3 (multi-channel architecture with homogeneous redundancy) and is independently evaluated and certified in accordance with IEC 61508.

The following types of monitoring in safety equipment are possible:

Functional safety manual with information for the SIL device → 📄 127

HART certification

HART interface

The measuring device is certified and registered by the FieldComm Group. The measuring system meets all the requirements of the following specifications:
- Certified according to HART 7
- The device can also be operated with certified devices of other manufacturers (interoperability)

FOUNDATION Fieldbus certification

FOUNDATION Fieldbus interface

The measuring device is certified and registered by the FieldComm Group. The measuring system meets all the requirements of the following specifications:
- Certified in accordance with FOUNDATION Fieldbus H1
- Interoperability Test Kit (ITK), revision version 6.2.0 (certificate available on request)
- Physical Layer Conformance Test
- The device can also be operated with certified devices of other manufacturers (interoperability)

Certification PROFIBUS

PROFIBUS interface

The measuring device is certified and registered by the PNO (PROFIBUS Nutzerorganisation e.V./ PROFIBUS User Organization). The measuring system meets all the requirements of the following specifications:
- Certified according to PA Profile 3.02
- The device can also be operated with certified devices of other manufacturers (interoperability)

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)

Certification PROFINET

PROFINET interface

The measuring instrument is certified and registered by the PROFIBUS Nutzerorganisation e.V. (PNO). The measuring system meets all the requirements of the following specifications:
- Certified according to:
  - Test specification for PROFINET devices
  - PROFINET Netload Class 2 100 Mbit/s
- The device can also be operated with certified devices of other manufacturers (interoperability).
- The device supports PROFINET S2 system redundancy.

PROFINET over Ethernet-APL certification

PROFINET interface

The measuring instrument is certified and registered by the PROFIBUS Nutzerorganisation e.V. (PNO). The measuring system meets all the requirements of the following specifications:
- Certified according to:
  - Test specification for PROFINET devices
  - PROFINET PA Profile 4.02
  - PROFINET Netload Robustness Class 2 10 Mbit/s
  - APL conformance test
- The device can also be operated with certified devices of other manufacturers (interoperability)
- The device supports PROFINET S2 system redundancy.

Radio approval

The measuring instrument has radio approval.

For detailed information on the radio approval, see the Special Documentation

Pressure Equipment Directive

The measuring instruments can be ordered with or without PED or PESR. If a device with PED or PESR is required, this must be ordered explicitly. For devices with nominal diameters less than or equal to DN 25 (NPS 1"), this is neither possible nor necessary. A UK order option must be selected for PESR under the order code for "Approvals".

- With the marking
  a) PED/G1/x (x = category) or
  b) PESR/G1/x (x = category)
  on the sensor nameplate, Endress+Hauser confirms compliance with the "Essential Safety Requirements"
  a) specified in Annex I of the Pressure Equipment Directive 2014/68/EU or
  b) Schedule 2 of Statutory Instruments 2016 No. 1105.
- Devices bearing this marking (PED or PESR) are suitable for the following types of medium:
  Media in Group 1 and 2 with a vapor pressure greater than, or smaller and equal to 0.5 bar (7.3 psi)
- Devices not bearing this marking (without PED or PESR) are designed and manufactured according to sound engineering practice. They meet the requirements of
  a) Art. 4, Section 3 of the Pressure Equipment Directive 2014/68/EU or
  b) Part 1, Section 8 of Statutory Instruments 2016 No. 1105.
  The scope of application is indicated
  a) in diagrams 6 to 9 in Annex II of the Pressure Equipment Directive 2014/68/EU or
  b) in Schedule 3, Section 2 of Statutory Instruments 2016 No. 1105.

Additional certification

Marine approval

Currently valid certificates are available:
- In the Downloads area of the Endress+Hauser website: www.endress.com → Downloads
- Specify the following details:
  - Product root: e.g. 5H3B
  - Search: Approval & Certificates → Marine

PWIS-free

PWIS = paint-wetting impairment substances

Order code for "Service":
- Option **HC**: PWIS-free (version A)
- Option **HD**: PWIS-free (version B)
- Option **HE**: PWIS-free (version C)

For more information on PWIS-free certification, see "Test specification" document TS01028D

Tests and certificates

- EN10204-3.1 material certificate, wetted parts and sensor housing (order code for "Test, certificate", option JA)
- Pressure test, internal process, test report (order code for "Test, certificate", option JB)

External standards and guidelines

- EN 60529
  Degrees of protection provided by enclosure (IP code)
- EN 61010-1
  Safety requirements for electrical equipment for measurement, control and laboratory use - general requirements
- GB 30439.5
  Safety requirements for industrial automation products - Part 5: Flowmeter safety requirements
- EN 61326-1/-2-3
  EMC requirements for electrical equipment for measurement, control and laboratory use
- 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 diagnostics of field devices
- NAMUR NE 131
  Requirements for field devices for standard applications
- ETSI EN 300 328
  Guidelines for 2.4 GHz radio components.
- EN 301489
  Electromagnetic compatibility and radio spectrum matters (ERM).

Ordering information

Detailed ordering information is available from your nearest sales organization www.addresses.endress.com or in the Product Configurator at www.endress.com:

1. Select the product using the filters and search field.
2. Open the product page.

3. Select **Configuration**.

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

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 with the device or subsequently from Endress+Hauser. 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.

Diagnostic functionality

Order code for "Application package", option EA "Extended HistoROM"

Comprises extended functions concerning the event log and the activation of the measured value memory.

Event log:
Memory volume is extended from 20 message entries (standard version) to up to 100 entries.

Data logging (line recorder):
- Memory capacity for up to 1000 measured values is activated.
- 250 measured values can be output via each of the 4 memory channels. The recording interval can be defined and configured by the user.
- Measured value logs can be accessed via the local display or operating tool e.g. FieldCare, DeviceCare or Web server.

For detailed information, see the Operating Instructions for the device.

Heartbeat Technology

Order code for "Application package", option EB "Heartbeat Verification + Monitoring"

Heartbeat Verification
Meets the requirement for traceable verification in accordance with DIN ISO 9001:2015 Clause 7.6 a) "Control of monitoring and measuring equipment".
- Functional testing in the installed state without interrupting the process.
- Traceable verification results on request, including a report.
- Simple testing process via local operation or other operating interfaces.
- Clear measuring point assessment (pass/fail) with high total test coverage within the framework of manufacturer specifications.
- Extension of calibration intervals according to operator's risk evaluation.

Heartbeat Monitoring
Continuously supplies data, which are characteristic of the measuring principle, to an external condition monitoring system for the purpose of preventive maintenance or process analysis. These data enable the operator to:
- Draw conclusions - using these data and other information - about the impact the process influences (e.g. buildup, magnetic field interferences) have on measuring performance over time.
- Schedule servicing in time.
- Monitor the process or product quality.

Detailed information on Heartbeat Technology:
Special Documentation

Cleaning

Order code for "Application package", option EC "ECC electrode cleaning "

The electrode cleaning circuit (ECC) function has been developed to have a solution for applications where magnetite (Fe_3O_4) deposits frequently occur (e.g. hot water). Since magnetite is highly conductive this build up leads to measuring errors and ultimately to the loss of signal. The

application package is designed to avoid build-up of very conductive matter and thin layers (typical of magnetite).

For detailed information, see the Operating Instructions for the device.

OPC-UA Server

Order code for "Application package", option EL "OPC-UA Server"

The application package provides an integrated OPC-UA server for comprehensive device services for IoT and SCADA applications.

For detailed information, see the Special Documentation for the device.

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

Accessory	Description
Proline 300 transmitter	Transmitter for replacement or storage. Use the order code to define the following specifications: ▪ Approvals ▪ Output ▪ Input ▪ Display/operation ▪ Housing ▪ Software Order code: 5X3BXX Installation Instructions EA01199D
Remote display and operating module DKX001	▪ If ordered directly with the measuring instrument: Order code for "Display; operation", option O "Remote display 4-line, illuminated; 10 m (30 ft) cable; touch control" ▪ If ordered separately: ▪ Measuring instrument: order code for "Display; operation", option M "W/o, prepared for remote display" ▪ DKX001: Via the separate product structure DKX001 ▪ If ordered subsequently: DKX001: Via the separate product structure DKX001 **Mounting bracket for DKX001** ▪ If ordered directly: order code for "Accessory enclosed", option RA "Mounting bracket, pipe 1/2"' ▪ If ordered subsequently: order number: 71340960 **Connecting cable (replacement cable)** Via the separate product structure: DKX002 Further information on display and operating module DKX001→ 106. Special Documentation SD01763D

External WLAN antenna	External WLAN antenna with 1.5 m (59.1 in) connecting cable and two angle brackets. Order code for "Accessory enclosed", option P8 "Wireless antenna wide area". ▪ The external WLAN antenna is not suitable for use in hygienic applications. ▪ Further information on the WLAN interface → 113. Order number: 71351317 Installation Instructions EA01238D
Protective cover	Is used to protect the measuring instrument from the effects of the weather: e.g. rainwater, excess heating from direct sunlight. Order number: 71343505 Installation Instructions EA01160D

For the sensor

Accessory	Description
Adapter set	Adapter connections for installing a Promag H instead of a Promag 30/33 A or Promag 30/33 H (DN 25). Scope of delivery: ▪ 2 process connections ▪ Screws ▪ 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	Welding nipple as process connection: welding jig for installation in pipe.
Grounding rings	Used to ground the medium in lined measuring tubes to ensure proper measurement. Grounding rings can be ordered via the device order structure or configured and ordered as an accessory via the DK5HR order structure.
Mounting kit	Scope of delivery: ▪ 2 process connections ▪ Screws ▪ Seals
Wall mounting kit	Wall mounting kit for measuring instrument (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. Technical Information TI00404F
HART loop converter HMX50	Is used to evaluate and convert dynamic HART process variables to analog current signals or limit values. ▪ Technical Information TI00429F ▪ Operating Instructions BA00371F
Fieldgate FXA42	Transmission of the measured values of connected 4 to 20 mA analog measuring instruments, as well as digital measuring instruments ▪ Technical Information TI01297S ▪ Operating Instructions BA01778S ▪ Product page: www.endress.com/fxa42

Field Xpert SMT50	The Field Xpert SMT50 tablet PC for device configuration enables mobile plant asset management in non-hazardous areas. It is suitable for commissioning and maintenance staff to manage field instruments with a digital communication interface and to record progress. This tablet PC is designed as an all-in-one solution with a preinstalled driver library and is an easy-to-use, touch-sensitive tool which can be used to manage field instruments throughout their entire life cycle. ▪ Technical Information TI01555S ▪ Operating Instructions BA02053S ▪ Product page: www.endress.com/smt50
Field Xpert SMT70	The Field Xpert SMT70 tablet PC for device configuration enables mobile plant asset management in hazardous and non-hazardous areas. It is suitable for commissioning and maintenance staff to manage field instruments with a digital communication interface and to record progress. This tablet PC is designed as an all-in-one solution with a preinstalled driver library and is an easy-to-use, touch-sensitive tool which can be used to manage field instruments throughout their entire life cycle. ▪ Technical Information TI01342S ▪ Operating Instructions BA01709S ▪ Product page: www.endress.com/smt70
Field Xpert SMT77	The Field Xpert SMT77 tablet PC for device configuration enables mobile plant asset management in areas categorized as Ex Zone 1. ▪ Technical Information TI01418S ▪ Operating Instructions BA01923S ▪ Product page: www.endress.com/smt77

Service-specific accessories

Accessories	Description
Applicator	Software for selecting and sizing Endress+Hauser measuring instruments: ▪ Choice of measuring instruments for industrial requirements ▪ Calculation of all the necessary data for identifying the optimum flowmeter: e.g. nominal diameter, pressure loss, flow velocity and measurement accuracy. ▪ Graphic display of the calculation results ▪ Determining the partial order code. 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://portal.endress.com/webapp/applicator
Netilion	IIoT ecosystem: Unlock knowledge With the Netilion IIoT ecosystem, Endress+Hauser allows you to optimize your plant performance, digitize workflows, share knowledge, and enhance collaboration. Drawing on decades of experience in process automation, Endress+Hauser offers process industries an IIoT ecosystem that provides customers with data-driven insights. These insights can be used to optimize processes, leading to increased plant availability, efficiency, and reliability - ultimately resulting in a more profitable plant. www.netilion.endress.com
FieldCare	FDT-based plant asset management tool from Endress+Hauser. It can configure all intelligent 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. Operating Instructions BA00027S and BA00059S
DeviceCare	Tool to connect and configure Endress+Hauser field devices. ▪ Technical Information: TI01134S ▪ Innovation brochure: IN01047S

System components

Accessories	Description
Memograph M graphic data manager	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. ▪ Technical Information TI00133R ▪ Operating Instructions BA00247R
iTEMP	The temperature transmitters can be used in all applications and are suitable for the measurement of gases, steam and liquids. They can be used to read in the medium temperature. "Fields of Activity" document FA00006T

Documentation

For an overview of the scope of the associated Technical Documentation, refer to the following:
- *Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from the nameplate
- *Endress+Hauser Operations app*: Enter serial number from nameplate or scan matrix code on nameplate.

Standard documentation

Supplementary information on the semi-standard options is available in the relevant Special Documentation in the TSP database.

Brief Operating Instructions

Brief Operating Instructions for the sensor

Measuring device	Documentation code
Proline Promag H	KA01289D

Brief Operating Instructions for the transmitter

Measuring instrument	Documentation code				
	HART	FOUNDATION Fieldbus	PROFIBUS PA	PROFIBUS DP	Modbus RS485
Proline 300	KA01308D	KA01294D	KA01405D	KA01385D	KA01310D

Brief Operating Instructions for the transmitter

Measuring instrument	Documentation code			
	EtherNet/IP	PROFINET	PROFINET over Ethernet-APL	Modbus TCP
Proline 300	KA01338D	KA01340D	KA01516D	KA01732D

Operating instructions

Measuring instrument	Documentation code				
	HART	FOUNDATION fieldbus	PROFIBUS PA	PROFIBUS DP	Modbus RS485
Promag H 300	BA01392D	BA01477D	BA01396D	BA01865D	BA01394D

Measuring instrument	Documentation code			
	Ethernet/IP	PROFINET	PROFINET over Ethernet-APL	Modbus TCP
Promag H 300	BA01716D	BA01718D	BA02106D	BA02391D

Description of device parameters

Measuring instrument	Documentation code				
	HART	FOUNDATION fieldbus	PROFIBUS PA	PROFIBUS DP	Modbus RS485
Promag 300	GP01051D	GP01098D	GP01052D	GP01135D	GP01053D

Measuring instrument	Documentation code			
	Ethernet/IP	PROFINET	PROFINET over Ethernet-APL	Modbus TCP
Promag 300	GP01113D	GP01112D	GP01172D	GP01238D

Device-dependent additional documentation

Safety instructions

Safety instructions for electrical equipment for hazardous areas.

Contents	Documentation code
ATEX/IECEx Ex d	XA01414D
ATEX/IECEx Ex ec	XA01514D
cCSAus XP	XA01515D
cCSAus Ex d	XA01516D
cCSAus Ex ec	XA01517D
EAC Ex d	XA01656D
EAC Ex ec	XA01657D
JPN Ex d	XA01775D
KCs Ex d	XA03279D
INMETRO Ex d	XA01518D
INMETRO Ex ec	XA01519D
NEPSI Ex d	XA01520D
NEPSI Ex ec	XA01521D
UKEX Ex d	XA02558D
UKEX Ex ec	XA02559D

Remote display and operating module DKX001

Contents	Documentation code
ATEX/IECEx Ex i	XA01494D
ATEX/IECEx Ex ec	XA01498D
cCSAus IS	XA01499D
cCSAus Ex nA	XA01513D
EAC Ex i	XA01664D
EAC Ex ec	XA01665D
INMETRO Ex i	XA01500D

Contents	Documentation code
INMETRO Ex ec	XA01501D
JPN	XA01781D
KCs Ex i	XA03280D
NEPSI Ex i	XA01502D
NEPSI Ex nA	XA01503D
UKCA Ex i	XA01494D
UKCA Ex ec	XA01498D

Functional Safety Manual

Contents	Documentation code
Promag 300	SD01740D

Special documentation

Contents	Documentation code
Information on the Pressure Equipment Directive	SD01614D
Radio approvals for WLAN interface for A309/A310 display module	SD01793D
Remote display and operating module DKX001	SD01763D
Modbus TCP system integration	SD03383D

Contents	Documentation code							
	HART	FOUNDATION fieldbus	PROFIBUS PA	PROFIBUS DP	Modbus RS485	PROFINET	Ethernet/IP	PROFINET over Ethernet-APL
Heartbeat Technology	SD01640D	SD01742D	SD01744D	SD02206D	SD01743D	SD01986D	SD01980D	SD02729D
Web server	SD01654D	SD01657D	SD01656D	SD02235D	SD01655D	SD01977D	SD01976D	SD02768D
OPC-UA server [1)]	SD02043D	-	-	-	-	-	-	-

1) This Special Documentation is only available for device versions with a HART output.

Installation instructions

Contents	Comment
Installation instructions for spare part sets and accessories	The corresponding documentation code is listed with the relevant accessory.→ 🖹 123.

Registered trademarks

HART®
Registered trademark of the FieldComm Group, Austin, Texas USA

PROFIBUS®
Registered trademark of the PROFIBUS Nutzerorganisation e.V. (PROFIBUS User Organization), Karlsruhe, Germany

FOUNDATION™ fieldbus
Registration-pending trademark of the FieldComm Group, Austin, Texas, USA

Modbus®
Registered trademark of SCHNEIDER AUTOMATION, INC.

Ethernet/IP™
Trademark of ODVA, Inc.

Ethernet-APL™
Registered trademark of the PROFIBUS Nutzerorganisation e.V. (PROFIBUS User Organization), Karlsruhe, Germany

PROFINET®
Registered trademark of the PROFIBUS Nutzerorganisation e.V. (PROFIBUS User Organization), Karlsruhe, Germany

TRI-CLAMP®
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