Technical Information
Proline Promag P 300

Electromagnetic flowmeter

The flowmeter for highest medium temperatures with a compact, easily accessible transmitter

Application

- The measuring principle is virtually independent of pressure, density, temperature and viscosity
- Dedicated for chemical and process applications with corrosive liquids and high medium temperatures

Device properties
- Nominal diameter: max. DN 600 (24")
- All common Ex approvals
- Liner made of PTFE or PFA
- Compact dual-compartment housing with up to 3 I/Os
- Backlit display with touch control and WLAN access
- Remote display available

Your benefits

- Versatile applications – wide variety of wetted materials
- 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 fieldbuses
- Reduced complexity and variety – freely configurable I/O functionality
- Integrated verification – Heartbeat Technology

Endress+Hauser

People for Process Automation

Table of contents

Document information

Symbols used

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 ground connection** A terminal which must be connected to ground prior to establishing any other connections.
▽	**Equipotential connection** A connection that has to be connected to the plant grounding system: This may be a potential equalization line or a star grounding system depending on national or company codes of practice.

Communication symbols

Symbol	Meaning
📶	**Wireless Local Area Network (WLAN)** Communication via a wireless, local network.
❂	**Bluetooth** Wireless data transmission between devices over a short distance.
⬤	**LED** Light emitting diode is off.
☼	**LED** Light emitting diode is on.
☼	**LED** Light emitting diode is 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.
ℹ	**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
⚠️ EX	Hazardous area
⚠️ EX	Safe area (non-hazardous area)
≈➡	Flow direction

Function and system design

Measuring principle

Following *Faraday's law of magnetic induction*, a voltage is induced in a conductor moving through a magnetic field.
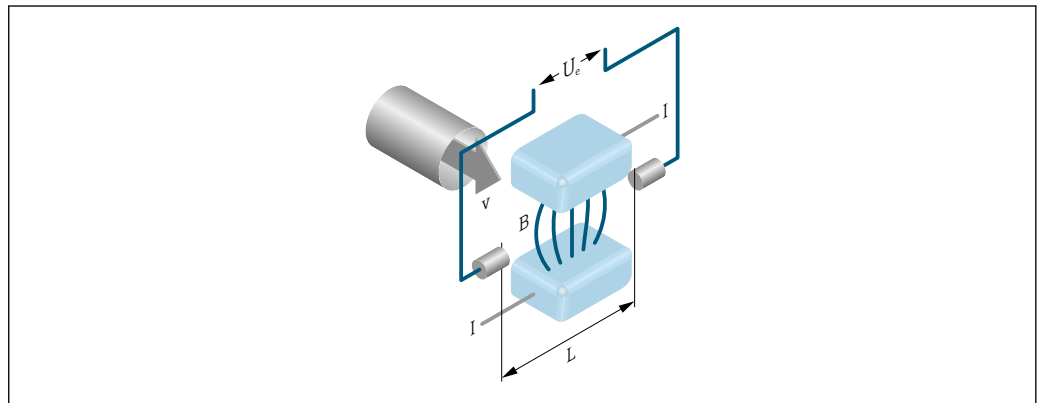
A0028962

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

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

Formulae for calculation
- Induced voltage $U_e = B \cdot L \cdot v$
- Volume flow $Q = A \cdot v$
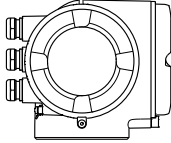
Measuring system	The device consists of a transmitter and a sensor.
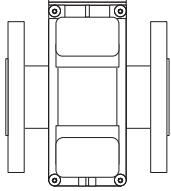
The device is available as a compact version:
The transmitter and sensor form a mechanical unit.

Transmitter

Promag 300	Device versions and materials:

A0026708
	• Transmitter housing
	Aluminum, coated: aluminum, AlSi10Mg, coated
	• Material of window in transmitter housing:
	Aluminum, coated: glass
	
	Configuration:
	• External operation via 4-line, backlit, graphic local display 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, e.g. Microsoft Internet Explorer, Microsoft Edge)

Sensor

Promag P	Nominal diameter range: DN 15 to 600 (½ to 24")

A0017703
	Materials:
	• Sensor housing:
	  – Aluminum, AlSi10Mg, coated
	  – DN 15 to 300 (½ to 12"): aluminum, AlSi10Mg, coated
	  – DN 350 to 600 (14 to 24"): carbon steel with protective varnish
	• Measuring tubes [1]: stainless steel, 1.4301/1.4306
	• Liner: PFA, PTFE
	• Electrodes: stainless steel, 1.4435 (F316L); Alloy C22, 2.4602 (UNS N06022); platinum; tantalum; titanium
	• Process connections: stainless steel, 1.4404 [2]/1.4571/F316L [2]; carbon steel, A105/FE410WB [2]/HII/S235JRG2/S275JR; Alloy C22, 2.4602 (UNS N06022)
	• Seals: as per DIN EN 1514-1
	• Ground disks: stainless steel, 1.4435 (316L); Alloy C22, 2.4602 (UNS N06022); tantalum; titanium

1)   For flanges made of carbon steel with Al/Zn protective coating (DN 15 to 300 (½ to 12")) or protective varnish (DN 350 to 600 (14 to 24"))

2)   With Al/Zn protective coating (DN 15 to 300 (½ to 12")) or protective varnish (DN 350 to 600 (14 to 24"))

Equipment architecture
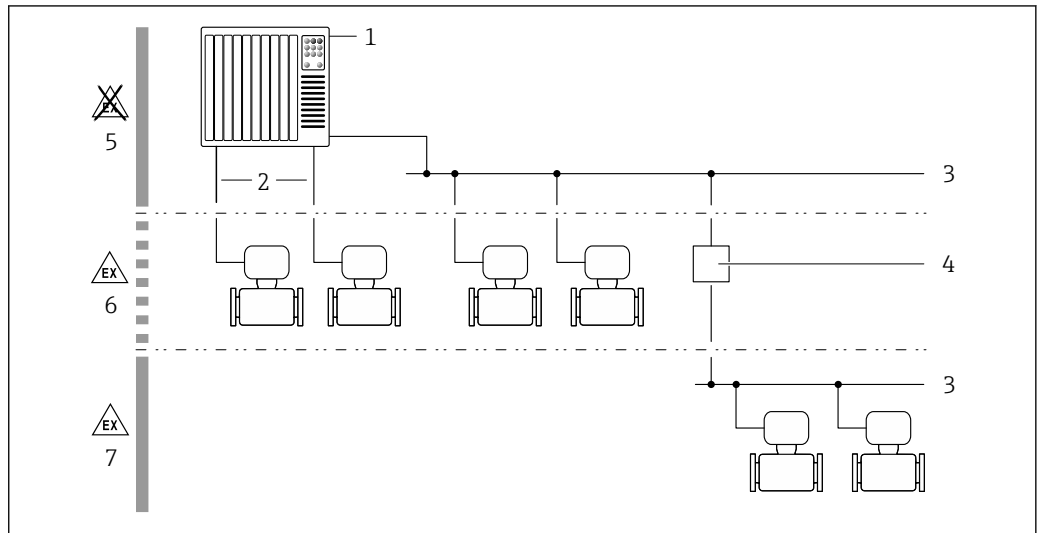
⊞ 1   *Possibilities for integrating measuring devices into a system*

1   Control system (e.g. PLC)
2   Connecting cable (0/4 to 20 mA HART etc.)
3   Fieldbus
4   Segment coupler
5   Non-hazardous area
6   Non-hazardous area and Zone 2/Div. 2
7   Hazardous area and Zone 1/Div. 1

| Safety | **IT security** |

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

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

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. An overview of the most important functions is provided in the following section.

Protecting access via hardware write protection

Write access to the device parameters 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 motherboard). 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). Is equivalent to hardware write protection in terms of functionality.
- 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.

User-specific access code

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 the device is delivered, the device does not have an access code and is equivalent to *0000* (open).

WLAN passphrase

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 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.

General notes on the use of passwords

- The access code and network key supplied with the device should be changed during commissioning.
- 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 fieldbus

When communicating via fieldbus, access to the device parameters can be restricted to *"Read only"* access. The option can be changed in the **Fieldbus writing access** parameter.

This does not affect cyclic measured value transmission to the higher-order system, which is always guaranteed.

> Additional information: "Description of Device Parameters" document pertaining to the device → 🖹 71.

Access via Web server

The device can be operated and configured via a Web browser with the integrated Web server . The connection is via the service interface (CDI-RJ45) or the WLAN interface.

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

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

> Additional information: "Description of Device Parameters" document pertaining to the device → 🖹 71.

Input

Measured variable	**Direct measured variables** - Volume flow (proportional to induced voltage) - Electrical conductivity **Calculated measured variables** - Mass flow - Corrected volume flow
Measuring range	Typically v = 0.01 to 10 m/s (0.03 to 33 ft/s) with the specified accuracy

Flow characteristic values in SI units

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Current output full scale value [1] (v ~ 2.5 m/s)	Pulse value [1] (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[mm]	[in]	[dm³/min]	[dm³/min]	[dm³]	[dm³/min]
15	½	4 to 100	25	0.2	0.5
25	1	9 to 300	75	0.5	1
32	–	15 to 500	125	1	2
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	–	220 to 7 500	1850	15	30
150	6	20 to 600 m³/h	150 m³/h	0.03 m³	2.5 m³/h
200	8	35 to 1 100 m³/h	300 m³/h	0.05 m³	5 m³/h
250	10	55 to 1 700 m³/h	500 m³/h	0.05 m³	7.5 m³/h
300	12	80 to 2 400 m³/h	750 m³/h	0.1 m³	10 m³/h
350	14	110 to 3 300 m³/h	1 000 m³/h	0.1 m³	15 m³/h
400	16	140 to 4 200 m³/h	1 200 m³/h	0.15 m³	20 m³/h
450	18	180 to 5 400 m³/h	1 500 m³/h	0.25 m³	25 m³/h
500	20	220 to 6 600 m³/h	2 000 m³/h	0.25 m³	30 m³/h
600	24	310 to 9 600 m³/h	2 500 m³/h	0.3 m³	40 m³/h

1) HART only

Flow characteristic values in US units

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Current output full scale value [1] (v ~ 2.5 m/s)	Pulse value [1] (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[in]	[mm]	[gal/min]	[gal/min]	[gal]	[gal/min]
½	15	1.0 to 27	6	0.1	0.15
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
6	150	90 to 2 650	600	5	12
8	200	155 to 4 850	1200	10	15
10	250	250 to 7 500	1500	15	30
12	300	350 to 10 600	2400	25	45
14	350	500 to 15 000	3600	30	60
16	400	600 to 19 000	4800	50	60

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Current output full scale value [1] (v ~ 2.5 m/s)	Pulse value [1] (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[in]	[mm]	[gal/min]	[gal/min]	[gal]	[gal/min]
18	450	800 to 24000	6000	50	90
20	500	1000 to 30000	7500	75	120
24	600	1400 to 44000	10500	100	180

1)   HART only

ℹ️ To calculate the measuring range, use the *Applicator* sizing tool → 🖺 69

Recommended measuring range

"Flow limit" section → 🖺 47

Operable flow range   Over 1000 : 1

Input signal   **Input and output versions**

→ 🖺 12

External measured values

To increase the accuracy of certain measured variables or to calculate the corrected volume flow, the automation system can continuously write different measured values to the measuring device:
- Fluid temperature to increase the accuracy of the electrical conductivity (e.g. iTEMP)
- Reference density for calculating the corrected volume flow

ℹ️ Various pressure transmitters and temperature measuring devices can be ordered from Endress +Hauser: see "Accessories" section → 🖺 70

It is recommended to read in external measured values to calculate the following measured variables: 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 → 🖺 10.

Digital communication

The measured values can be written from the automation system to the measuring via:
- FOUNDATION Fieldbus
- PROFIBUS PA
- Modbus RS485

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	• Pressure • Temperature • Density

Status input

Maximum input values	• DC −3 to 30 V • If status input is active (ON): R_i >3 kΩ
Response time	Adjustable: 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 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 table must be read vertically (↓).

Example: If the option **BA** (current output 4 to 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.

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	↓	CA					
FOUNDATION Fieldbus		↓	SA				
FOUNDATION Fieldbus Ex i			↓	TA			
PROFIBUS PA				↓	GA		
PROFIBUS PA Ex i					↓	HA	
Modbus RS485						↓	MA
Order code for "Output; input 2" (021) →	↓	↓	↓	↓	↓	↓	↓
Not assigned	A	A	A	A	A	A	A
Current output 0/4 to 20 mA	B		B		B		B
Current output 0/4 to 20 mA (Ex i)		C		C		C	
User configurable input/output [1]	D		D		D		D
Pulse/frequency/switch output	E		E		E		E
Double pulse output [2]	F						F
Pulse/frequency/switch output (Ex i)		G		G		G	
Relay output	H		H		H		H
Current input 0/4 to 20 mA	I		I		I		I
Status input	J		J		J		J
Order code for "Output; input 3" (022) →	↓	↓	↓	↓	↓	↓	↓
Not assigned	A	A	A	A	A	A	A
Current output 0/4 to 20 mA	B						B
Current output 0/4 to 20 mA (Ex i)		C					
User configurable input/output	D						D
Pulse/frequency/switch output	E						E
Double pulse output (slave) [2]	F						F
Pulse/frequency/switch output (Ex i)		G					
Relay output	H						H
Current input 0/4 to 20 mA	I						I
Status input	J						J

1)   A specific input or output can be assigned to a user configurable input/output → 🖹 16.
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 signal	HART current output

Current output	4 to 20 mA HART
Current span	Can be set to: 4 to 20 mA (active/passive)
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	Adjustable: 0.07 to 999 s
Assignable measured variables	• Volume flow • Mass flow • Corrected volume flow • Flow velocity • Conductivity • Corrected conductivity • Temperature • Electronic temperature

PROFIBUS PA

PROFIBUS PA	In accordance with EN 50170 Volume 2, IEC 61158-2 (MBP), 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

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

Modbus RS485

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

Current output 0/4 to 20 mA

Current output	0/4 to 20 mA
Maximum output values	22.5 mA
Current span	Can be set to: • 4 to 20 mA (active) • 0/4 to 20 mA (passive)
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	Adjustable: 0.07 to 999 s
Assignable measured variables	• Volume flow • Mass flow • Corrected volume flow • Flow velocity • Conductivity • Corrected conductivity • Temperature • Electronic temperature

Pulse/frequency/switch output

Function	Can be set to pulse, frequency or switch output
Version	Open collector Can be set to: • Active • 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	Adjustable: 0.05 to 2 000 ms
Maximum pulse rate	10 000 Impulse/s
Pulse value	Adjustable
Assignable measured variables	• Volume flow • Mass flow • Corrected volume flow
Frequency output	
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	Adjustable: end value frequency 2 to 10 000 Hz (f_{max} = 12 500 Hz)
Damping	Adjustable: 0 to 999 s
Pulse/pause ratio	1:1
Assignable measured variables	• Volume flow • Mass flow • Corrected volume flow • Flow velocity • Conductivity • Corrected conductivity • Temperature • Electronic 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	Adjustable: 0 to 100 s
Number of switching cycles	Unlimited

Assignable functions	• Off
	• On
	• Diagnostic behavior
	• Limit value:
	  – Off
	  – Volume flow
	  – Mass flow
	  – Corrected volume flow
	  – Flow velocity
	  – Conductivity
	  – Corrected conductivity
	  – Totalizer 1-3
	  – Temperature
	  – Electronic temperature
	• Flow direction monitoring
	• Status
	  – Empty pipe detection
	  – Low flow cut off

Double pulse output

Function	Double pulse
Version	Open collector Can be set to: • Active • 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
Output frequency	Adjustable: 0 to 1 000 Hz
Damping	Adjustable: 0 to 999 s
Pulse/pause ratio	1:1
Assignable measured variables	• Volume flow • Mass flow • Corrected volume flow • Flow velocity • Conductivity • Corrected conductivity • Temperature • Electronic temperature

Relay output

Function	Switch 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
	  – Electronic temperature
	• Flow direction monitoring
	• Status
	  – Empty pipe detection
	  – 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.

Signal on alarm 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
Error current FDE (Fault Disconnection Electronic)	0 mA

FOUNDATION Fieldbus

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

Modbus RS485

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

Current output 0/4 to 20 mA

4 to 20 mA

Failure mode	Choose from: • 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 • Freely definable value between: 3.59 to 22.5 mA • Actual value • Last valid value

0 to 20 mA

Failure mode	Choose from: • Maximum alarm: 22 mA • Freely definable value between: 0 to 20.5 mA

Pulse/frequency/switch output

Pulse output	
Failure mode	Choose from: • Actual value • No pulses
Frequency output	
Failure mode	Choose from: • Actual value • 0 Hz • Defined value (f_{max} 2 to 12 500 Hz)
Switch output	
Failure mode	Choose from: • 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 backlighting indicates a device error.

Status signal as per NAMUR recommendation NE 107

Interface/protocol

• Via digital communication:
  – HART protocol
  – FOUNDATION Fieldbus
  – PROFIBUS PA
  – Modbus RS485
• Via service interface

Plain text display	With information on cause and remedial measures

ℹ️ Additional information on remote operation → 🕮 59

Web server

Plain text display	With information on cause and remedial measures

Light emitting diodes (LED)

Status information	Status indicated by various light emitting diodes
	The following information is displayed depending on the device version: • Supply voltage active • Data transmission active • Device alarm/error has occurred

Ex connection data

Safety-related values

Order code for "Output; input 1"	Output type	Safety-related values "Output; input 1"	
		26 (+)	27 (−)
Option **BA**	Current output 4 to 20 mA HART	U_{nom} = 30 V U_{max} = 250 V	
Option **GA**	PROFIBUS PA	U_{nom} = 32 V U_{max} = 250 V	
Option **MA**	Modbus RS485	U_{nom} = 30 V U_{max} = 250 V	
Option **SA**	FOUNDATION Fieldbus	U_{nom} = 32 V U_{max} = 250 V	

Order code for "Output; input 2"; "Output; input 3"	Output type	Safety-related values			
		Output; input 2		Output; input 3	
		24 (+)	25 (−)	22 (+)	23 (−)
Option **B**	Current output 4 to 20 mA	U_{nom} = 30 V U_{max} = 250 V			
Option **D**	User configurable input/output	U_{nom} = 30 V U_{max} = 250 V			
Option **E**	Pulse/frequency/switch output	U_{nom} = 30 V U_{max} = 250 V			
Option **F**	Double pulse output	U_{nom} = 30 V U_{max} = 250 V			
Option **H**	Relay output	U_{nom} = 30 V I_{nom} = 100 mA DC/500 mA AC U_{max} = 250 V			
Option **I**	Current input 4 to 20 mA	U_{nom} = 30 V U_{max} = 250 V			
Option **J**	Status input	U_{nom} = 30 V U_{max} = 250 V			

Intrinsically safe values

Order code for "Output; input 1"	Output type	Intrinsically safe values "Output; input 1"	
		26 (+)	27 (−)
Option **CA**	Current output 4 to 20 mA HART Ex i	U_i = 30 V l_i = 100 mA P_i = 1.25 W L_i = 0 C_i = 0	
Option **HA**	PROFIBUS PA Ex i	**Ex ia** [1] U_i = 30 V l_i = 570 mA P_i = 8.5 W L_i = 10 µH C_i = 5 nF	**Ex ic** [2] U_i = 32 V l_i = 570 mA P_i = 8.5 W L_i = 10 µH C_i = 5 nF
Option **TA**	FOUNDATION Fieldbus Ex i	**Ex ia** [1] U_i = 30 V l_i = 570 mA P_i = 8.5 W L_i = 10 µH C_i = 5 nF	**Ex ic** [2] U_i = 32 V l_i = 570 mA P_i = 8.5 W L_i = 10 µH C_i = 5 nF

1) Only available for the Zone 1, Class I, Division 1 version
2) Only available for the Zone 2, Class I, Division 2 version transmitter

Order code for "Output; input 2"; "Output; input 3"	Output type	Intrinsically safe values			
		Output; input 2		Output; input 3	
		24 (+)	25 (−)	22 (+)	23 (−)
Option **C**	Current output 4 to 20 mA Ex i	U_i = 30 V l_i = 100 mA P_i = 1.25 W L_i = 0 C_i = 0			
Option **G**	Pulse/frequency/switch output Ex i	U_i = 30 V l_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 one another and from earth (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

Dynamic variables	Read out the dynamic variables: HART command 3 The measured variables can be freely assigned to the dynamic variables. **Measured variables for PV (primary dynamic variable)** • Off • Volume flow • Mass flow • Corrected volume flow • Flow velocity • Temperature • Electronic temperature **Measured variables for SV, TV, QV (secondary, tertiary and quaternary dynamic variable)** • Volume flow • Mass flow • Corrected volume flow • Flow velocity • Temperature • Electronic temperature • Totalizer 1 • Totalizer 2 • Totalizer 3
Device variables	Read out the device variables: HART command 9 The device variables are permanently assigned. A maximum of 8 device variables can be transmitted: • 0 = volume flow • 1 = mass flow • 2 = corrected volume flow • 3 = flow velocity • 4 = conductivity • 5 = corrected conductivity • 6 = temperature • 7 = electronic temperature • 8 = totalizer 1 • 9 = totalizer 2 • 10 = totalizer 3

PROFIBUS PA

Manufacturer ID	0x11
Ident number	0x156C
Profile version	3.02
Device description files (GSD, DTM, DD)	Information and files under: • www.endress.com • www.profibus.org

Output values (from measuring device to automation system)	**Heartbeat Technology Application Package** Additional measured variables are available with the Heartbeat Technology application package: **Analog input 1 to 4** • Volume flow • Mass flow • Corrected volume flow • Flow velocity • Conductivity • Corrected conductivity • Temperature • Electronic temperature • Current input **Digital input 1 to 2** • Empty pipe detection • Low flow cut off • Status verification **Totalizer 1 to 3** • Mass flow • Volume flow • Corrected volume flow

Input values
(from automation system to measuring device)
	Analog output 1 to 2 (fixed assignment)
	• Analog output 1: external density
	• Analog output 2: external temperature
	Digital output 1 to 3 (fixed assignment)
	• Digital output 1: switch positive zero return on/off
	• Digital output 2: start verification
	• Digital output 3: relay output non-conductive/conductive
	Totalizer 1 to 3
	• Totalize
	• Reset and hold
	• Preset and hold
	• Operating mode configuration:
	  – Net flow total
	  – Forward flow total
	  – Reverse flow total
	  – Last valid value

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 Promag 300 measuring device supports the compatibility of the cyclic data with earlier 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 → 🗎 70.

FOUNDATION Fieldbus

Manufacturer ID	0x452B48
Ident number	0x103C
Device revision	1
DD revision	Information and files under:
CFF revision	• www.endress.com • www.fieldbus.org
Interoperability Test Kit (ITK)	Version 6.1.2
ITK Test Campaign Number	Information: • www.endress.com • www.fieldbus.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
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	20

Transducer Blocks

Block	Contents	Output values
Setup Transducer Block (TRDSUP)	All parameters for standard commissioning.	No output values
Advanced Setup Transducer Block (TRDASUP)	All parameters for more accurate measurement configuration.	No output values
Display Transducer Block (TRDDISP)	Parameters for configuring the local display.	No output values
HistoROM Transducer Block (TRDHROM)	Parameters for using the HistoROM function.	No output values

Block	Contents	Output values
Diagnostic Transducer Block (TRDDIAG)	Diagnostics information.	Process variables (AI Channel) • Temperature (7) • Volume flow (9) • Mass flow (11) • Corrected volume flow (13) • Flow velocity (37) • Electronic temperature (39) • Conductivity (70) • Corrected conductivity (71)
Expert Configuration Transducer Block (TRDEXP)	Parameters that require the user to have in-depth knowledge of the operation of the device in order to configure the parameters appropriately.	No output values
Expert Information Transducer Block (TRDEXPIN)	Parameters that provide information about the state of the device.	No output values
Service Sensor Transducer Block (TRDSRVS)	Parameters that can only be accessed by Endress+Hauser Service.	No output values
Service Information Transducer Block (TRDSRVIF)	Parameters that provide Endress+Hauser Service with information about the state of the device.	No output values
Total Inventory Counter Transducer Block (TRDTIC)	Parameters for configuring all the totalizers and the inventory counter.	Process variables (AI Channel) • Totalizer 1 (16) • Totalizer 2 (17) • Totalizer 3 (18)
Heartbeat Technology Transducer Block (TRDHBT)	Parameters for the configuration and comprehensive information about the results of the verification.	No output values
Heartbeat Results 1 Transducer Block (TRDHBTR1)	Information about the results of the verification.	No output values
Heartbeat Results 2 Transducer Block (TRDHBTR2)	Information about the results of the verification.	No output values
Heartbeat Results 3 Transducer Block (TRDHBTR3)	Information about the results of the verification.	No output values
Heartbeat Results 4 Transducer Block (TRDHBTR4)	Information about the results of the verification.	No output values

Function blocks

Block	Number blocks	Execution times	Process variables (Channel)
Resource Block (RB)	1	This Block (extended functionality) contains all the data that uniquely identify the device; it is the equivalent of an electronic nameplate for the device.	–
Analog Input Block (AI)	4	7 ms	Process variables (AI Channel) • Temperature (7) • Volume flow (9) • Mass flow (11) • Corrected volume flow (13) • Totalizer 1 (16) • Totalizer 2 (17) • Totalizer 3 (18) • Flow velocity (37) • Electronic temperature (39) • Conductivity (70) • Corrected conductivity (71)
Discrete Input Block (DI)	2	5 ms	• Switch output state (101) • Low flow cut off (103) • Empty pipe detection (104) • Status verification (105)
PID Block (PID)	1	6 ms	–
Multiple Analog Output Block (MAO)	1	5 ms	Channel_0 (121) • Value 1: External compensation variable, temperature • Value 2: External compensation variable, density The compensation variables must be transmitted to the device in the SI basic units.
Multiple Digital Output Block (MDO)	1	5 ms	Channel_DO (122) • Value 1: Reset totalizer 1 • Value 2: Reset totalizer 2 • Value 3: Reset totalizer 3 • Value 4: Flow override • Value 5: Start heartbeat verification • Value 6: Status switch output • Value 7: Not assigned • Value 8: Not assigned
Integrator Block (IT)	1	6 ms	–

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	• 1 200 BAUD • 2 400 BAUD • 4 800 BAUD • 9 600 BAUD • 19 200 BAUD • 38 400 BAUD • 57 600 BAUD • 115 200 BAUD
Data transfer mode	• ASCII • RTU
Data access	Each device parameter can be accessed via Modbus RS485. 　For Modbus register information
Compatibility with earlier model	If the device is replaced, the Promag 300 measuring device supports the compatibility of the Modbus registers for process variables and diagnostic information with the earlier Promag 53 model. It is not necessary to change the engineering parameters in the automation system. 　Description of the function scope of compatibility: 　Operating Instructions → 🖹 70.

Power supply

Terminal assignment　Transmitter: supply voltage, input/outputs

HART

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (−)	26 (+)	27 (−)	24 (+)	25 (−)	22 (+)	23 (−)
		The terminal assignment depends on the specific device version ordered → 🖹 12.					

FOUNDATION Fieldbus

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (−)	26 (A)	27 (B)	24 (+)	25 (−)	22 (+)	23 (−)
		The terminal assignment depends on the specific device version ordered → 🖹 12.					

PROFIBUS PA

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (−)	26 (B)	27 (A)	24 (+)	25 (−)	22 (+)	23 (−)
		The terminal assignment depends on the specific device version ordered → 🖹 12.					

Modbus RS485

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (−)	26 (B)	27 (A)	24 (+)	25 (−)	22 (+)	23 (−)
		The terminal assignment depends on the specific device version ordered → 🖹 12.					

ℹ️ Terminal assignment of the remote display and operating module: → 🖹 27

Device plugs available ℹ️ Device plugs may not be used in hazardous areas!

Device plugs are only available for the following device versions:
Order code for "Input; output 1"
- Option GA "PROFIBUS PA" → 🖹 26
- Option SA "FOUNDATION Fieldbus" → 🖹 26

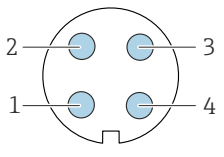**Order code for "Input; output 1", option GA "PROFIBUS PA"**

Order code for "Electrical connection"	Cable entry 2	Cable entry 3
L, N, P, U	Plug M12 × 1	–

Order code for "Input; output 1", option SA "FOUNDATION Fieldbus"
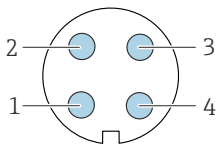
Order code for "Electrical connection"	Cable entry 2	Cable entry 3
M, 3, 4, 5	7/8" plug	–

Pin assignment, device plug PROFIBUS PA

Pin		Assignment	Coding	Plug/socket
1	+	PROFIBUS PA +	A	Plug
2		Grounding		
3	-	PROFIBUS PA −		
4		Not assigned		

FOUNDATION Fieldbus

Pin		Assignment	Coding	Plug/socket
1	+	Signal +	A	Plug
2	-	Signal −		
3		Grounding		
4		Not assigned		

Supply voltage

Order code for "Power supply"	terminal voltage		Frequency range
Option **D**	DC 24 V	±20%	–
Option **E**	AC100 to 240 V	−15...+10%	50/60 Hz, ±4 Hz
Option **I**	DC 24 V	±20%	–
	AC100 to 240 V	−15...+10%	50/60 Hz, ±4 Hz

Power consumption	**Transmitter**
	Max. 10 W (active power)

| 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.
	• Configuration is retained in the plug-in memory (HistoROM DAT).
	• Error messages (incl. total operated hours) are stored.

Electrical connection	**Connecting the transmitter**

• Terminal assignment→ 🖻 25
• Device plugs available→ 🖻 26
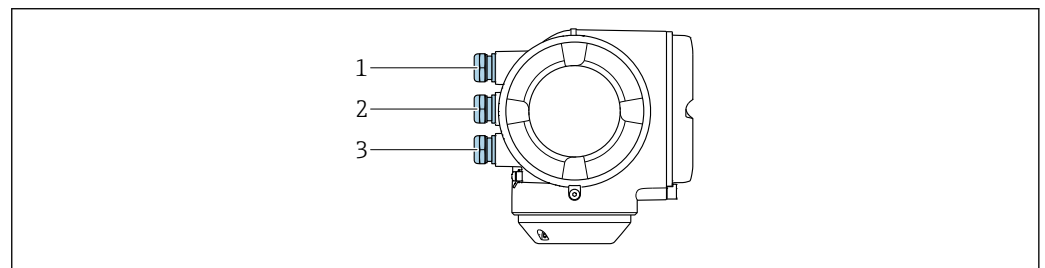
1 Cable entry for supply voltage
2 Cable entry for input/output signal transmission
3 Cable entry for input/output signal transmission; Optional: connection of external WLAN antenna, connection of remote display and operating module DKX001 or service plug

Connection of remote display and operating module DKX001
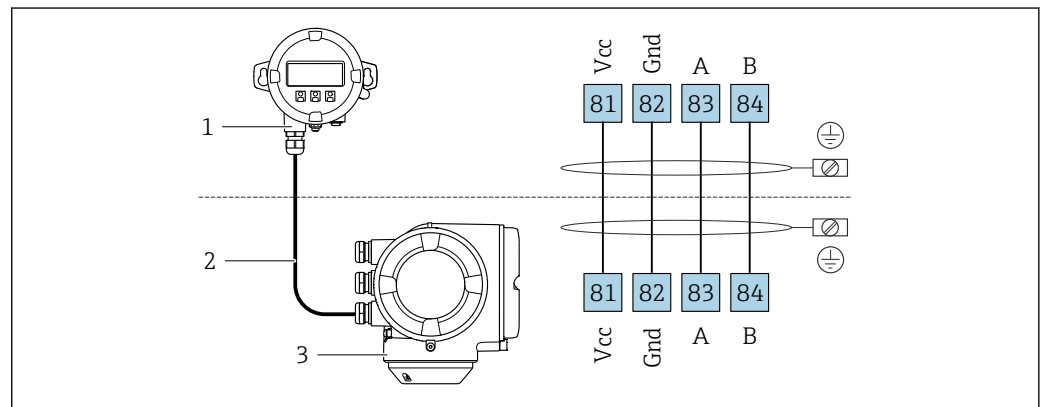
1 Remote display and operating module DKX001
2 Connecting cable
3 Measuring device

Remote display and operating module DKX001 → 🖻 68

Connection examples

Current output 4 to 20 mA HART

A0029055

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

1   Automation system with current input (e.g. PLC)
2   Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications → 🖺 35
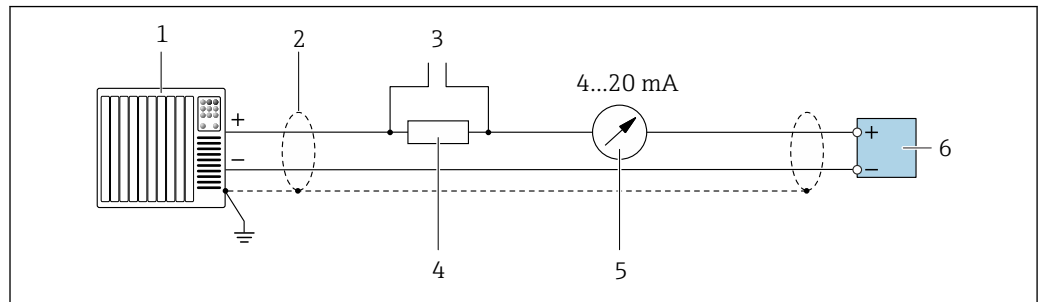*3   Connection for HART operating devices → 🖺 59*
4   Resistor for HART communication (≥ 250 Ω): observe maximum load → 🖺 13
5   Analog display unit: observe maximum load → 🖺 13
6   Transmitter
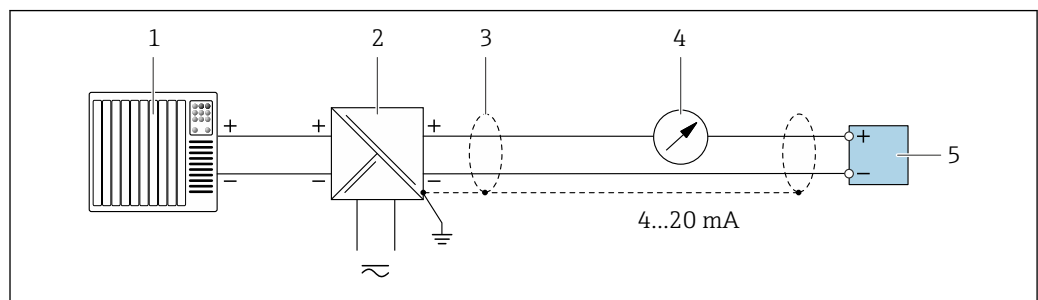
A0028762
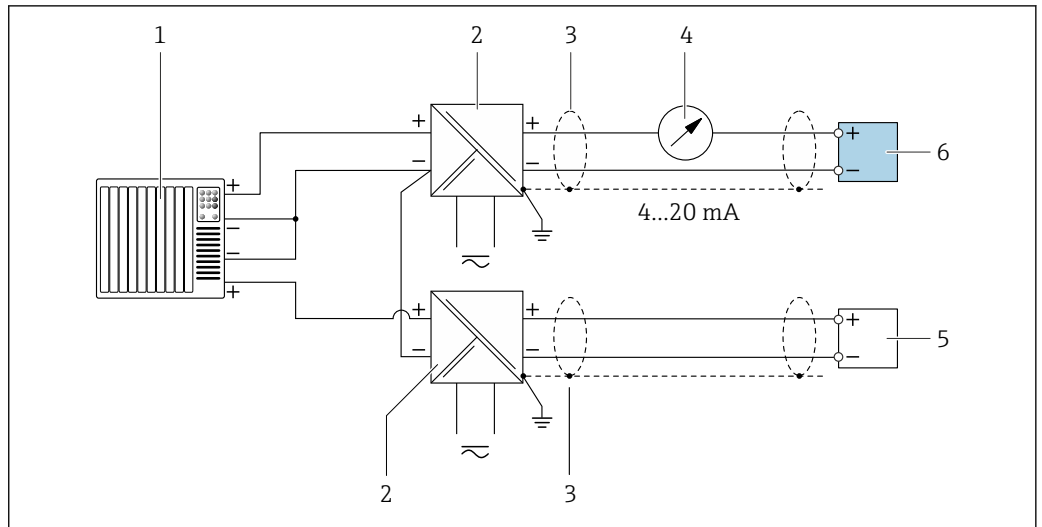
⊡ *3   Connection example for 4 to 20 mA HART current output (passive)*

1   Automation system with current input (e.g. PLC)
2   Power supply
3   Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications → 🖺 35
4   Analog display unit: observe maximum load → 🖺 13
5   Transmitter

HART input

A0028763

🖼 *4   Connection example for HART input with a common negative (passive)*

1   Automation system with HART output (e.g. PLC)
2   Active barrier for power supply (e.g. RN221N)
3   Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications
4   Analog display unit: observe maximum load
5   Pressure transmitter (e.g. Cerabar M, Cerabar S): see requirements
6   Transmitter

PROFIBUS-PA
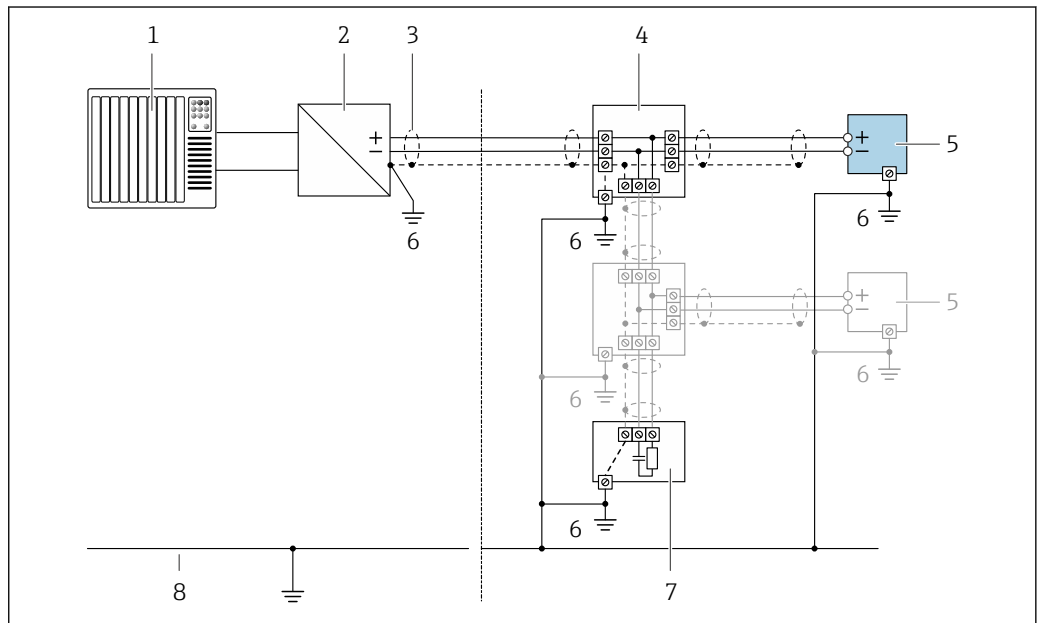
A0028768

🖼 *5   Connection example for PROFIBUS-PA*

1   Control system (e.g. PLC)
2   PROFIBUS PA segment coupler
3   Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications
4   T-box
5   Measuring device
6   Local grounding
7   Bus terminator
8   Potential matching line

FOUNDATION Fieldbus
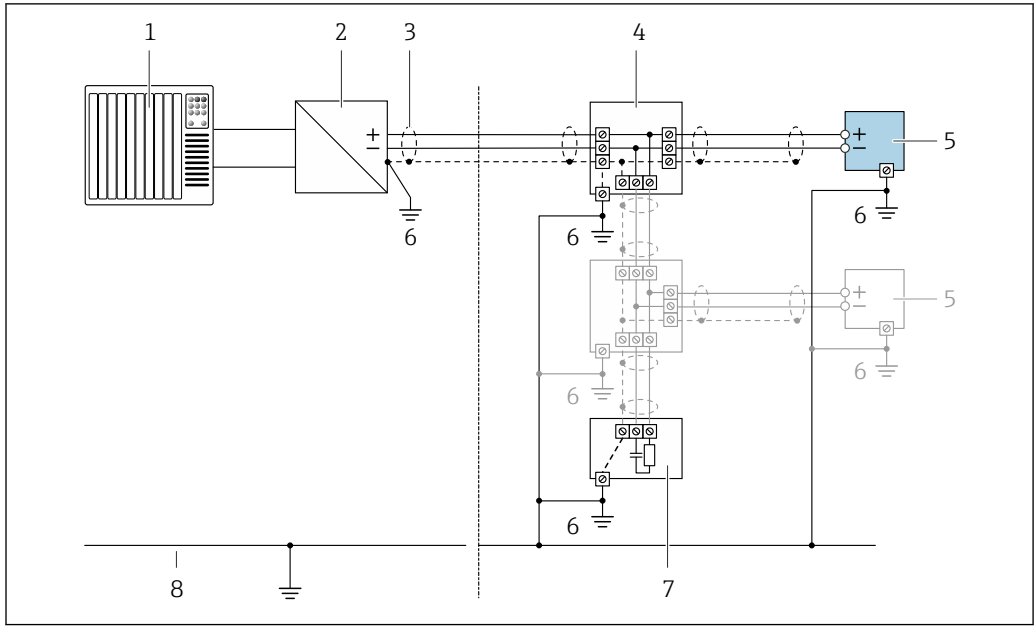
A0028768

⊠ *6*   *Connection example for FOUNDATION Fieldbus*

1   Control system (e.g. PLC)
2   Power Conditioner (FOUNDATION Fieldbus)
3   Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications
4   T-box
5   Measuring device
6   Local grounding
7   Bus terminator
8   Potential matching line

Modbus RS485
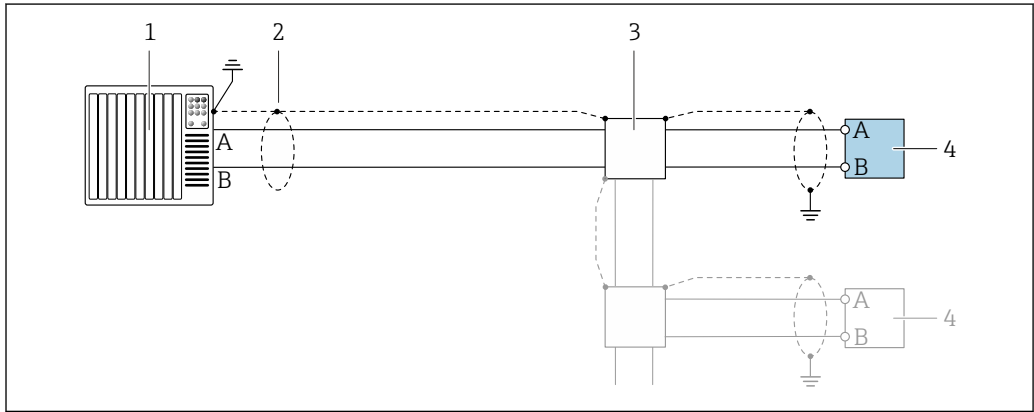
A0028765

⊠ *7*   *Connection example for Modbus RS485, non-hazardous area and Zone 2/Div. 2*

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

Current output 4-20 mA
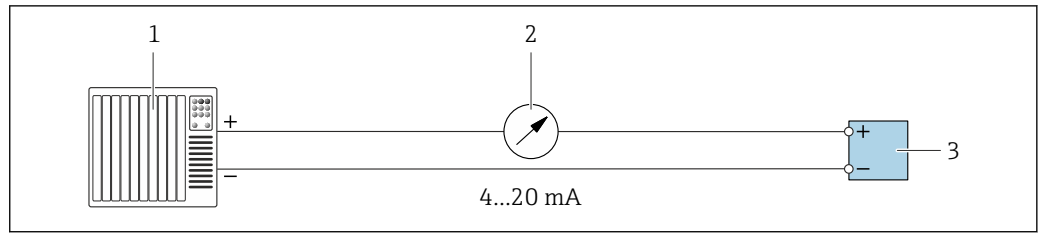
A0028758

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

1   Automation system with current input (e.g. PLC)
2   Analog display unit: observe maximum load
3   Transmitter
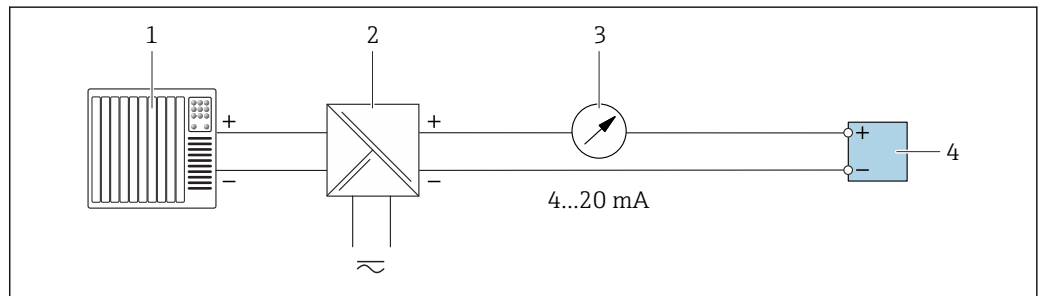
A0028759

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

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

Pulse/frequency output
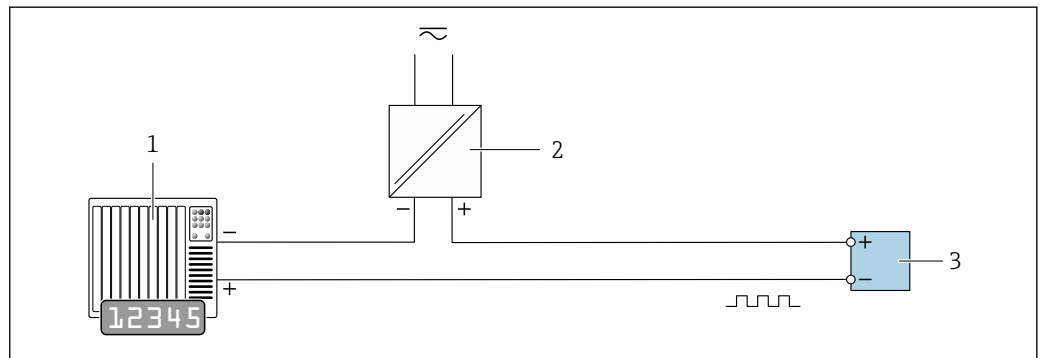
A0028761

 10   Connection example for pulse/frequency output (passive)

1   Automation system with pulse/frequency input (e.g. PLC)
2   Power supply
3   Transmitter: Observe input values → 14

Switch output
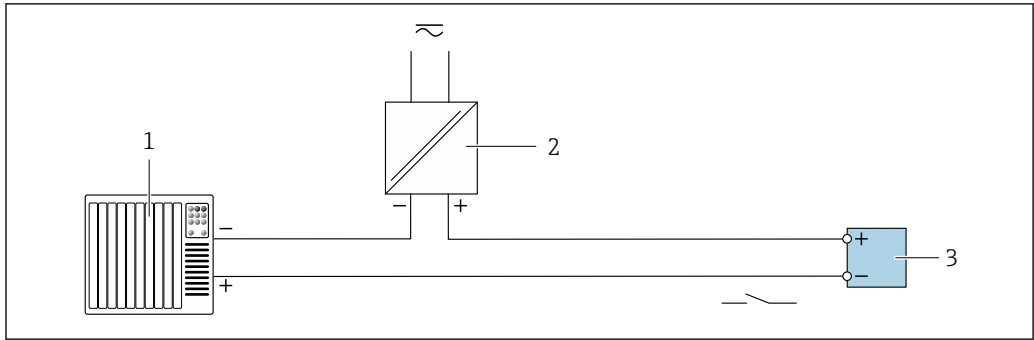
🖾 *11   Connection example for switch output (passive)*

1   Automation system with switch input (e.g. PLC)
2   Power supply
3   Transmitter: Observe input values → 🖹 14

Double pulse output
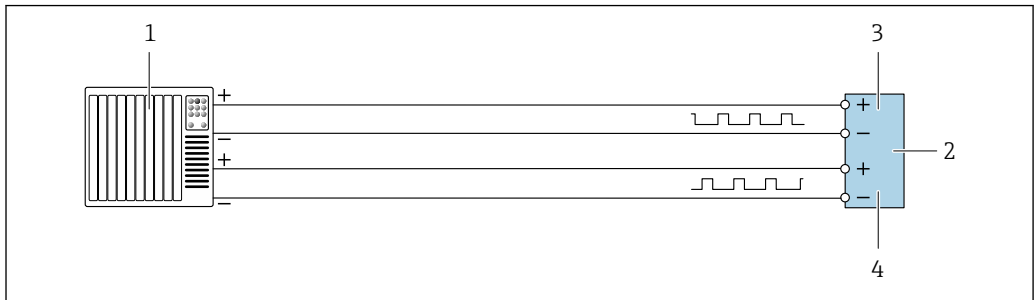
🖾 *12   Connection example for double pulse output (active)*

1   Automation system with double pulse input (e.g. PLC)
2   Transmitter: Observe input values → 🖹 15
3   Double pulse output
4   Double pulse output (slave), phase-shifted
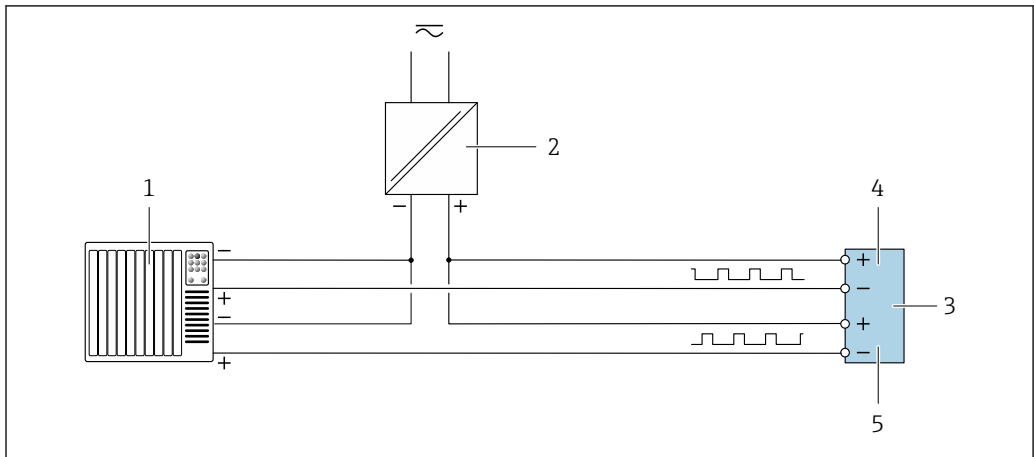
🖾 *13   Connection example for double pulse output (passive)*

1   Automation system with double pulse input (e.g. PLC)
2   Power supply
3   Transmitter: Observe input values → 🖹 15
4   Double pulse output
5   Double pulse output (slave), phase-shifted

Relay output
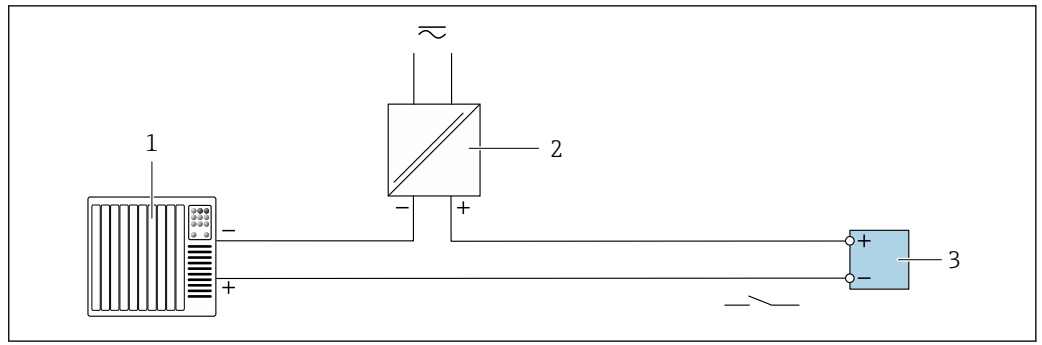
🔲 *14   Connection example for relay output (passive)*

1   Automation system with relay input (e.g. PLC)
2   Power supply
3   Transmitter: Observe input values → 🔲 15

Current input
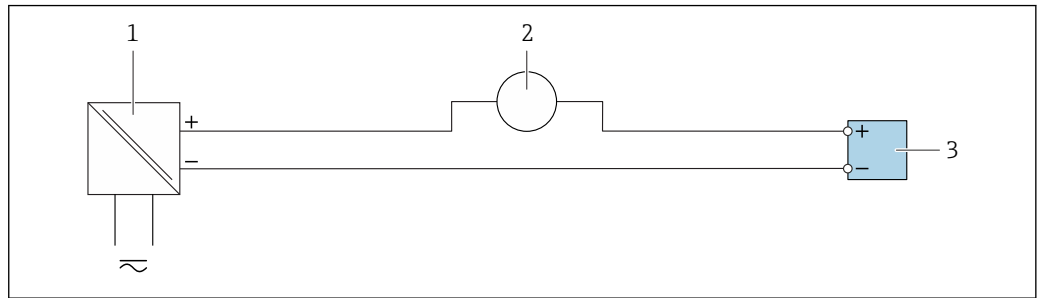
🔲 *15   Connection example for 4 to 20 mA current input*

1   Power supply
2   External measuring device (for reading in pressure or temperature, for instance)
3   Transmitter: Observe input values

Status input
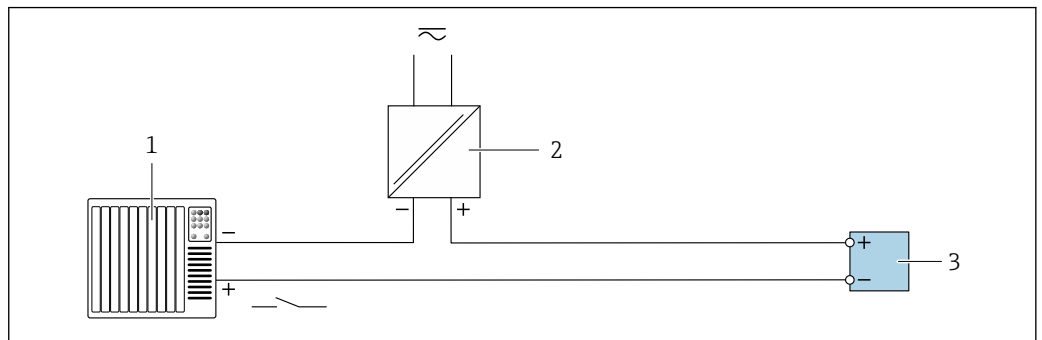
🔲 *16   Connection example for status input*

1   Automation system with status output (e.g. PLC)
2   Power supply
3   Transmitter: Observe input values

Potential equalization

Requirements

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

Connection example, standard scenario

Metal, grounded pipe
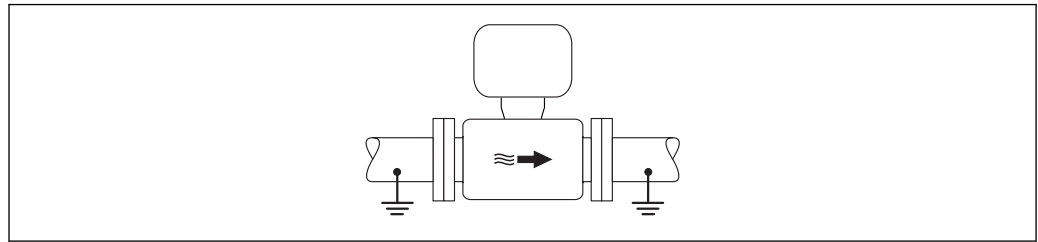
🖾 *17 Potential equalization via measuring tube*

Connection example in special situations

Unlined and ungrounded metal pipe

This connection method also applies in situations where:
• The customary potential equalization is not used
• Equalizing currents are present

Ground cable	Copper wire, at least 6 mm² (0.0093 in²)
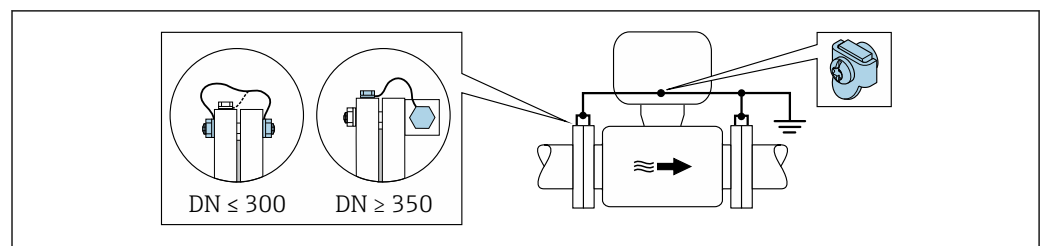
🖾 *18 Potential equalization via ground terminal and pipe flanges*

Note the following when installing:
• Connect both sensor flanges to the pipe flange via a ground cable and ground them.
• Connect the connection housing of the transmitter or sensor to ground potential by means of the ground terminal provided for the purpose. To mount the ground cable:
  – If DN ≤ 300 (12"): Mount the ground cable directly on the conductive flange coating of the sensor with the flange screws.
  – If DN ≥ 350 (14"): Mount the ground cable directly on the metal transport bracket.

> ℹ️ You can order the necessary ground cable from Endress+Hauser: → 🖺 68.

Plastic pipe or pipe with insulating liner

This connection method also applies in situations where:
• The customary potential equalization is not used
• Equalizing currents are present

Ground cable	Copper wire, at least 6 mm² (0.0093 in²)
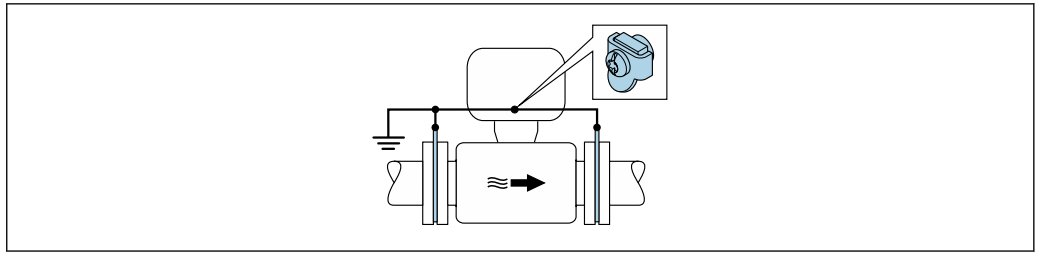
◈ 19   Potential equalization via ground terminal and ground disks

Note the following when installing:
The ground disks must be connected to the ground terminal via the ground cable and be connected to ground potential.

> The ground cable and ground disks can be ordered from Endress+Hauser .

Pipe with a cathodic protection unit

This connection method is only used if the following two conditions are met:
- Metal pipe without liner or pipe with electrically conductive liner
- Cathodic protection is integrated in the personal protection equipment

Ground cable	Copper wire, at least 6 mm² (0.0093 in²)
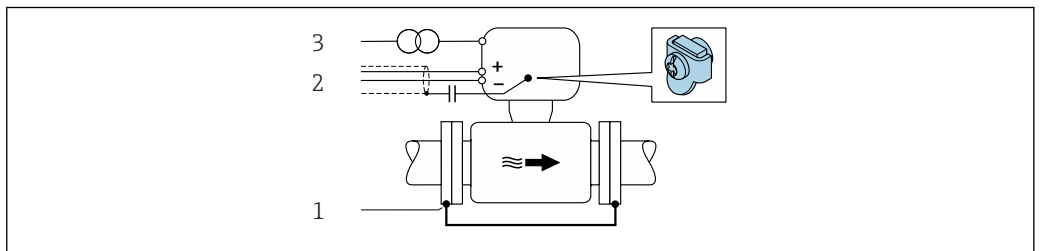
1   Connection of the two flanges of the pipe via a ground cable
2   Signal line shielding via a capacitor
3   Measuring device connected to power supply such that it is floating in relation to the protective ground (isolation transformer)

Note the following when installing:
The sensor is installed in the pipe in a way that provides electrical insulation.

> You can order the necessary ground cable from Endress+Hauser: → 🖹 68.

Terminals	**Transmitter** Spring terminals for 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 → 🖹 26.

Cable specification	**Permitted temperature range** Minimum requirement: cable temperature range ≥ ambient temperature +20 K **Power supply cable** Standard installation cable is sufficient.

Protective ground cable

Cable: 2.1 mm^2 (14 AWG)

The grounding impedance must be less than 1 Ω.

Signal cable

Current output 4 to 20 mA HART

A shielded cable is recommended. Observe grounding concept of the plant.

PROFIBUS PA

Twisted, shielded two-wire cable. Cable type A is recommended .

📖 For further information on planning and installing PROFIBUS PA networks see:
- Operating Instructions "PROFIBUS DP/PA: Guidelines for planning and commissioning" (BA00034S)
- PNO Directive 2.092 "PROFIBUS PA User and Installation Guideline"
- IEC 61158-2 (MBP)

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)

Modbus RS485

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

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

Current output 0/4 to 20 mA

Standard installation cable is sufficient.

Pulse/frequency/switch output

Standard installation cable is sufficient.

Double pulse output

Standard installation cable is sufficient.

Relay output

Standard installation cable is sufficient.

Current input 0/4 to 20 mA

Standard installation cable is sufficient.

Status input

Standard installation cable is sufficient.

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, Ex Zone 2, Class I, Division 2 Ex 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 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 ℃ (−58 to +221 ℉); when cable can move freely: −25 to +105 ℃ (−13 to +221 ℉)

Performance characteristics

Reference operating conditions	• Error limits following DIN EN 29104, in future ISO 20456 • Water, typically +15 to +45 ℃ (+59 to +113 ℉); 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
Maximum measured error	**Error limits under reference operating conditions** o.r. = of reading

Volume flow

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

ℹ️ Fluctuations in the supply voltage do not have any effect within the specified range.
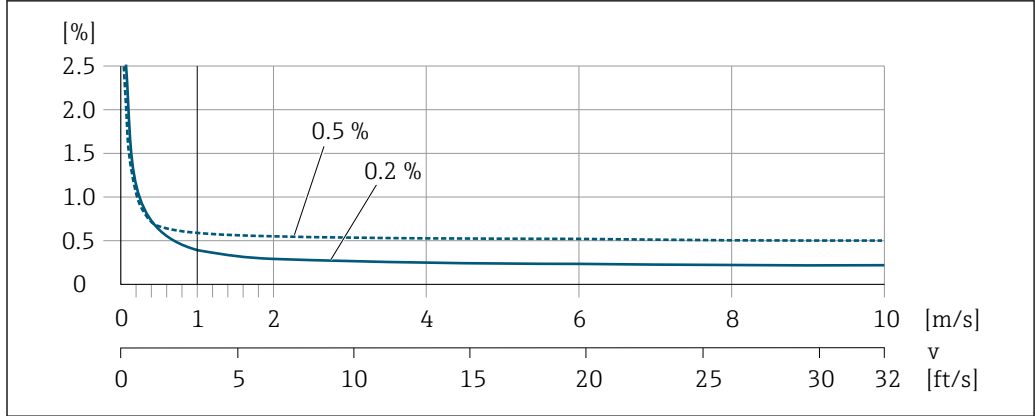
🖾 20   Maximum measured error in % o.r.

Electrical conductivity

Max. measured error not specified.

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. (across 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)

Electrical conductivity
Max. ±5 % o.r.

Influence of ambient temperature

Current output

o.r. = of reading

Temperature coefficient	Typically 1 µA/°C

Pulse/frequency output

Temperature coefficient	No additional effect. Included in accuracy.

Installation

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

Mounting location
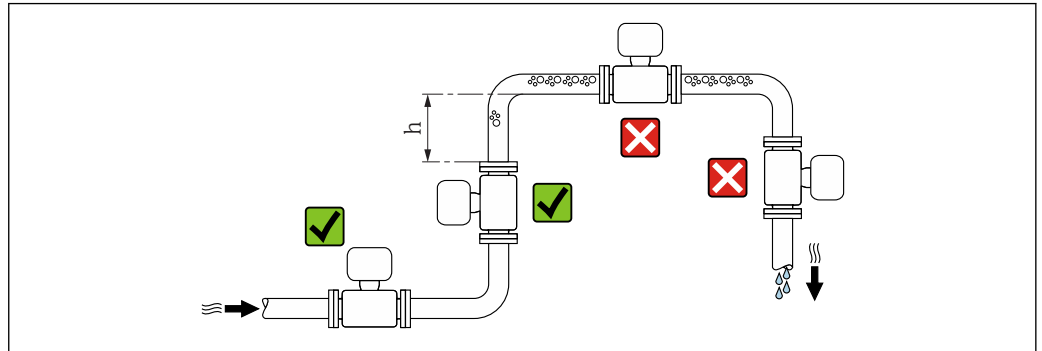
A0029343

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

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

Installation in down pipes

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

For information on the liner's resistance to partial vacuum
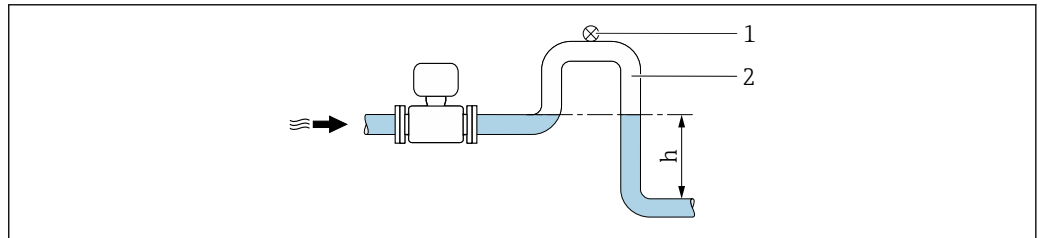
A0028981

21   Installation in a down pipe

1   Vent valve
2   Pipe siphon
h   Length of down pipe

Installation in partially filled pipes

A partially filled pipe with a gradient necessitates a drain-type configuration. The empty pipe detection (EPD) function offers additional protection by detecting empty or partially filled pipes.
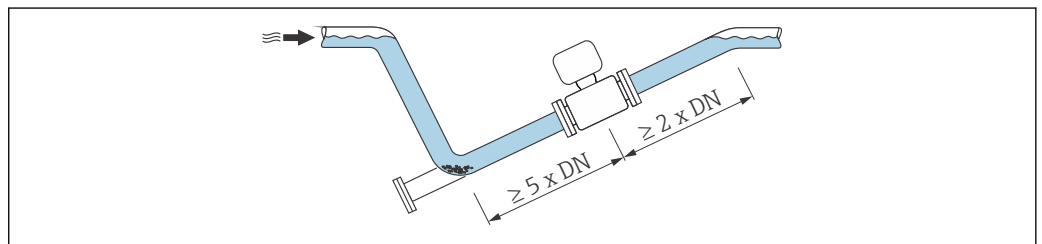
A0029257

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

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

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

                             Vertical
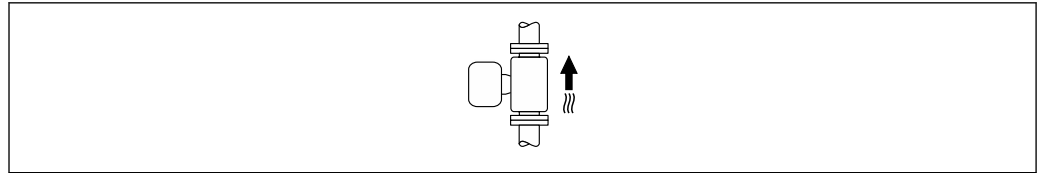
A0015591

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

                             Horizontal
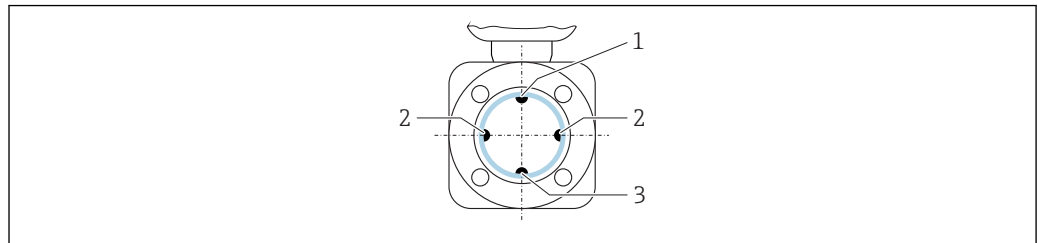
A0029344

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

                             • Ideally, the measuring electrode plane should be horizontal. This prevents brief insulation of
                               the two 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.

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

                             Observe the following inlet and outlet runs to comply with accuracy specifications:
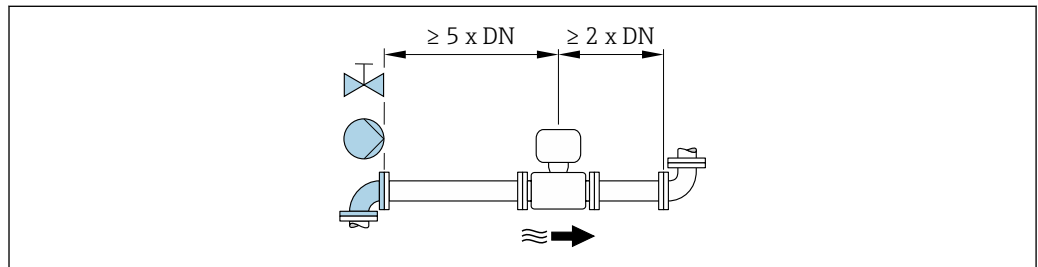
A0028997

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

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

ℹ The nomogram only applies to liquids with a viscosity similar to that of water.
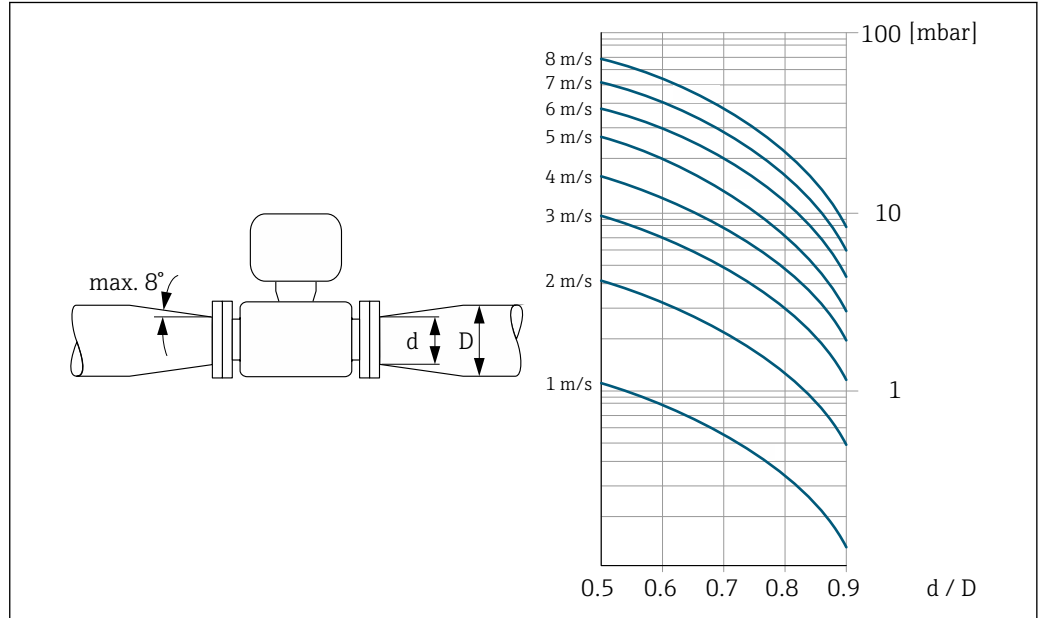
A0029002

| Special mounting instructions | Protective cover |
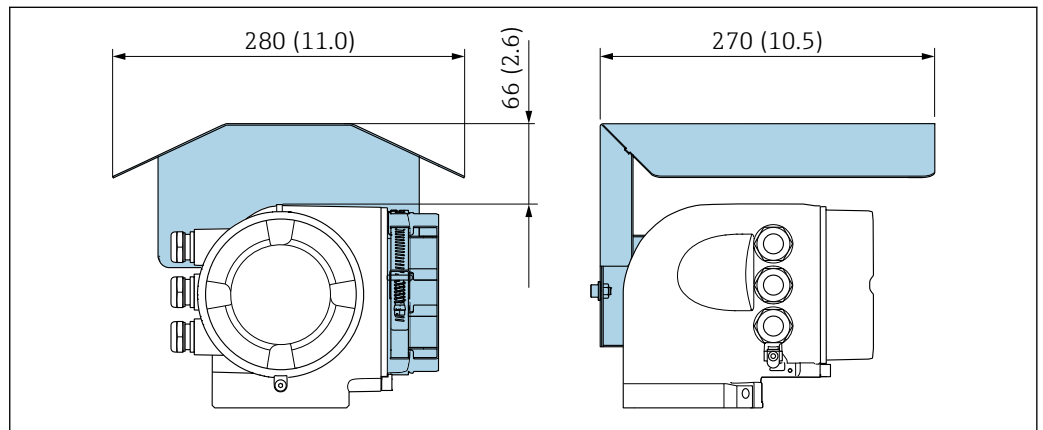
A0029553

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	• Process connection material, carbon steel: −10 to +60 °C (+14 to +140 °F) • Process connection material, stainless steel: −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.

ℹ️ You can order a weather protection cover from Endress+Hauser : → 🕮 68

Storage temperature	−50 to +80 ℃ (−58 to +176 ℉)

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

Degree of protection	**Transmitter and sensor** • As standard: IP66/67, type 4X enclosure • When housing is open: IP20, type 1 enclosure • Display module: IP20, type 1 enclosure **External WLAN antenna** IP67
Vibration resistance	• Vibration, sinusoidal according to IEC 60068-2-6 – 2 to 8.4 Hz, 3.5 mm peak – 8.4 to 2 000 Hz, 1 g peak • Vibration broad-band random, according 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
Shock resistance	Shock, half-sine according to IEC 60068-2-27 6 ms 30 g
Impact resistance	Rough handling shocks according to IEC 60068-2-31
Mechanical load	• Protect the transmitter housing against mechanical effects, such as shock or impact. • Never use the transmitter housing as a ladder or climbing aid.
Electromagnetic compatibility (EMC)	As per IEC/EN 61326 and NAMUR Recommendation 21 (NE 21) 📖 For details, refer to the Declaration of Conformity.

Process

Medium temperature range	• −20 to +150 ℃ (−4 to +302 ℉) for PFA, DN 25 to 200 (1 to 8") • −20 to +180 ℃ (−4 to +356 ℉) for PFA high-temperature, DN 25 to 200 (1 to 8") • −40 to +130 ℃ (−40 to +266 ℉) for PTFE, DN 15 to 600 (½ to 24")
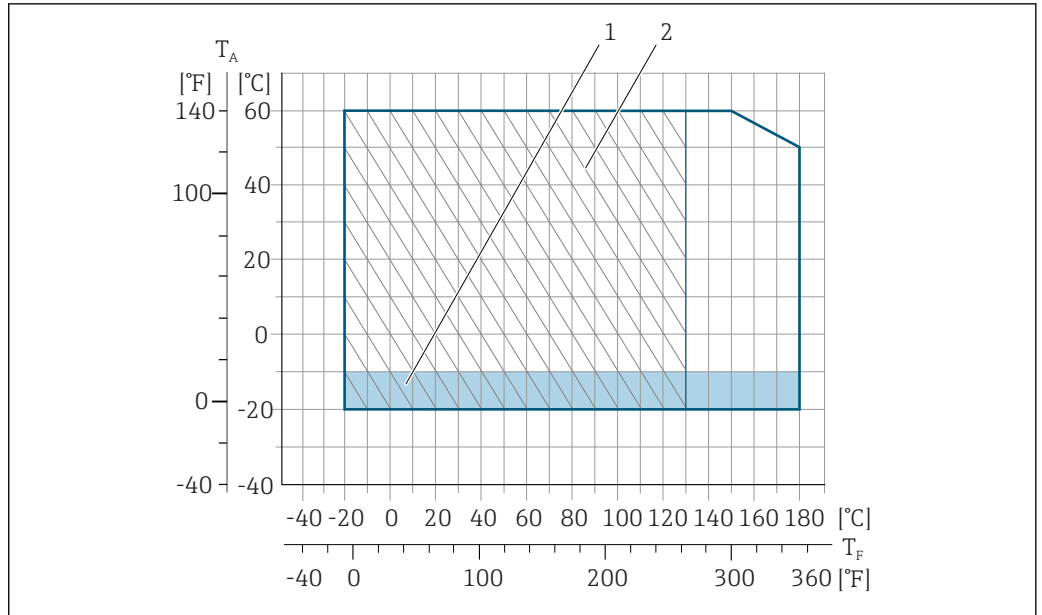
◫ 22   PFA

T_A   Ambient temperature range
T_F   Fluid temperature
1   Colored area: the ambient temperature range –10 to –20 ℃ (+14 to –4 ℉) applies to stainless flanges only
2   Hatched area: harsh environment only for fluid temperature range –20 to +130 ℃ (–4 to +266 ℉)
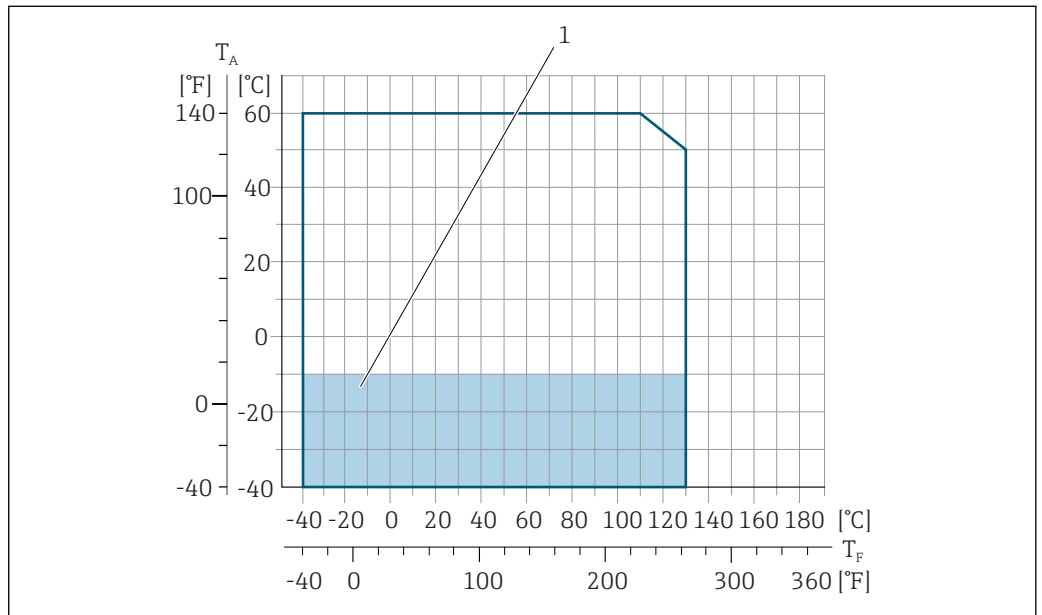
◫ 23   PTFE

T_A   Ambient temperature range
T_F   Fluid temperature
1   Colored area: the ambient temperature range of –10 to –40 ℃ (+14 to –40 ℉) applies to stainless flanges only

Conductivity	≥ 5 µS/cm for liquids in general. Stronger filter damping is required for very low conductivity values.
Pressure-temperature ratings	The following pressure/temperature diagrams apply to all pressure-bearing parts of the device and not just the process connection.

Process connection: flange according to EN 1092-1 (DIN 2501)
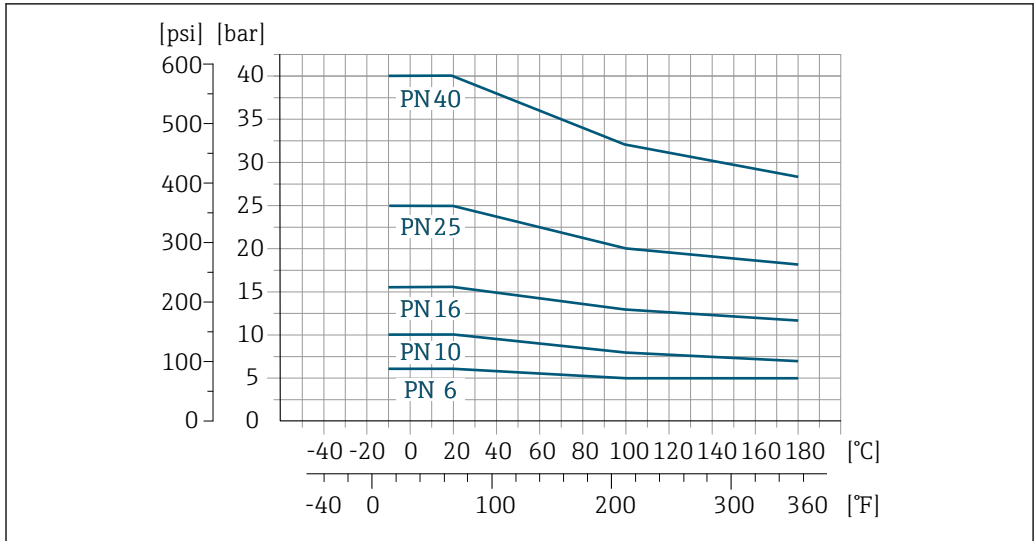
⊡ 24   Process connection material: carbon steel, FE410WB/S235JRG2; Alloy C22, 2.4602 (UNS N06022)
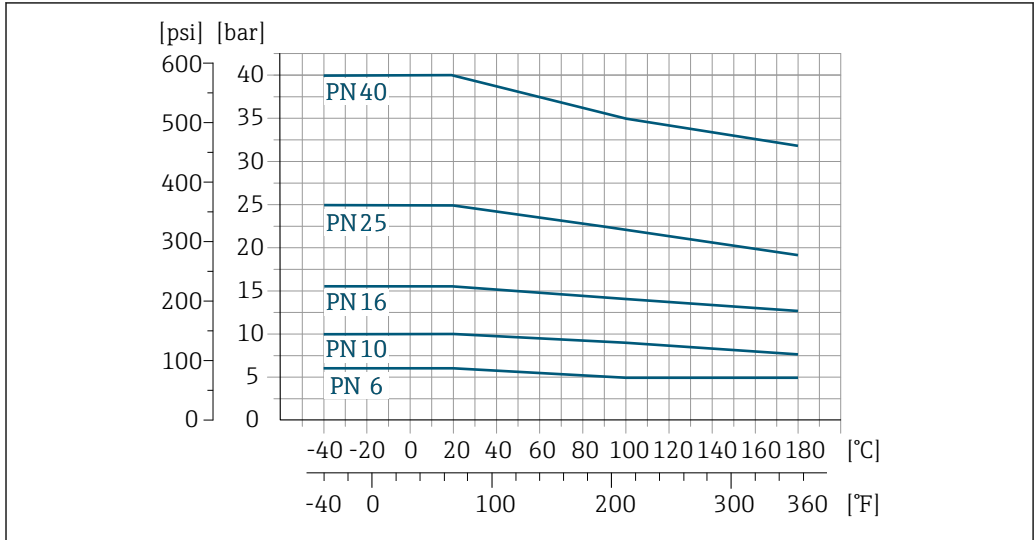
⊡ 25   Process connection material: stainless steel, 1.4571 (F316L)

Process connection: flange according to ASME B16.5
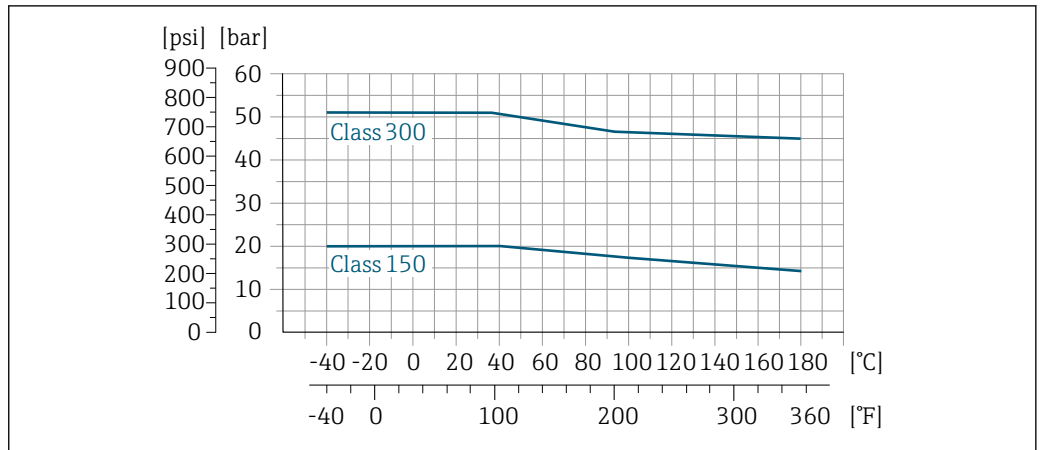
⊡ *26   Process connection material: carbon steel, A105*
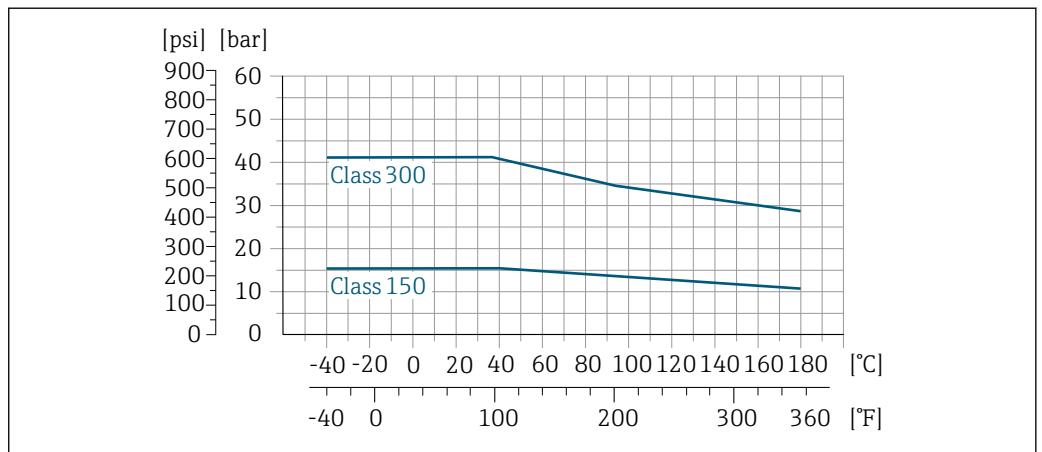
⊡ *27   Process connection material: stainless steel, F316L*

Process connection: flange according to JIS B2220
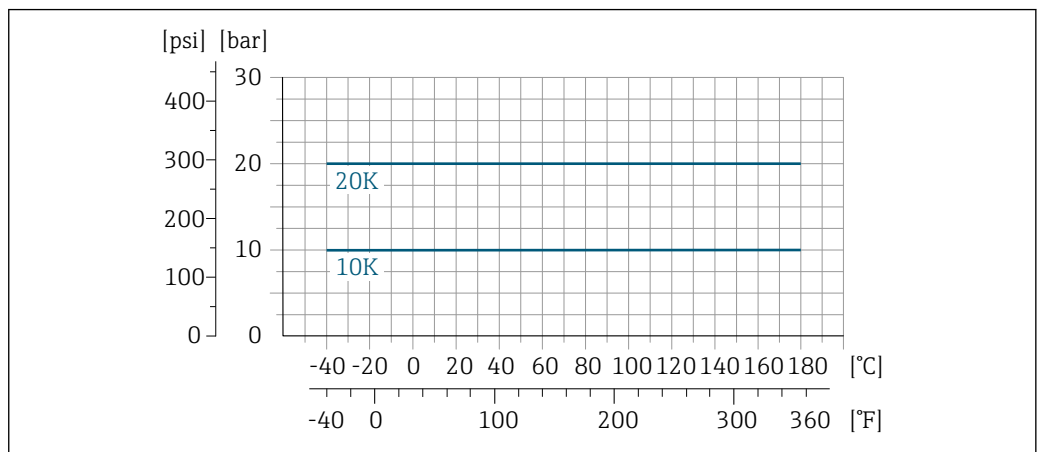
⊡ *28   Process connection material: stainless steel, 1.0425 (F316L); carbon steel, S235JRG2/HII*

Process connection: flange according to AS 2129 (Table E) or AS 4087 (PN 16)
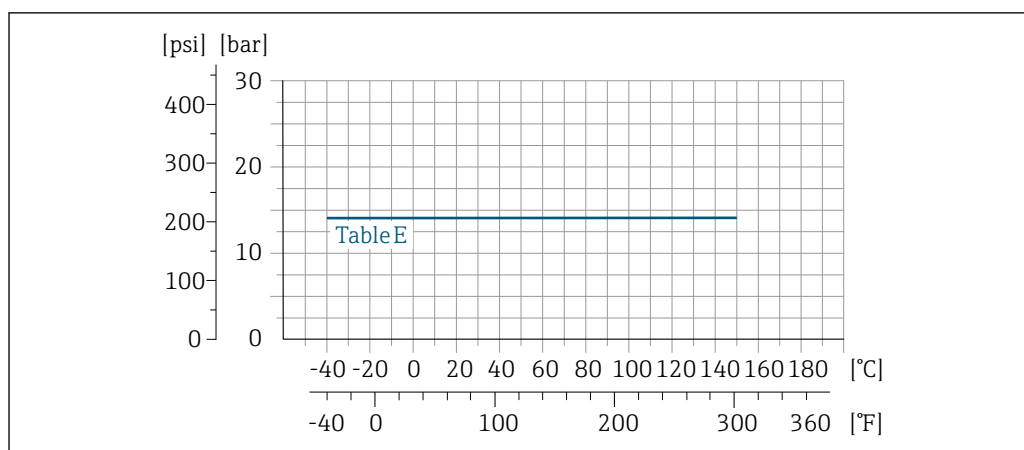
⊠ 29   Process connection material: carbon steel, A105/S235JRG2/S275JR

Pressure tightness   "–" = no specifications possible

Liner: PFA

Nominal diameter		Limit values for absolute pressure in [mbar] ([psi]) for fluid temperatures:		
[mm]	[in]	+25 °C (+77 °F)	+80 °C (+176 °F)	+100 to +180 °C (+212 to +356 °F)
25	1	0 (0)	0 (0)	0 (0)
32	–	0 (0)	0 (0)	0 (0)
40	1 ½	0 (0)	0 (0)	0 (0)
50	2	0 (0)	0 (0)	0 (0)
65	–	0 (0)	–	0 (0)
80	3	0 (0)	–	0 (0)
100	4	0 (0)	–	0 (0)
125	–	0 (0)	–	0 (0)
150	6	0 (0)	–	0 (0)
200	8	0 (0)	–	0 (0)

Liner: PTFE

Nominal diameter		Limit values for absolute pressure in [mbar] ([psi]) for fluid temperatures:			
[mm]	[in]	+25 °C (+77 °F)	+80 °C (+176 °F)	+100 °C (+212 °F)	+130 °C (+266 °F)
15	½	0 (0)	0 (0)	0 (0)	100 (1.45)
25	1	0 (0)	0 (0)	0 (0)	100 (1.45)
32	–	0 (0)	0 (0)	0 (0)	100 (1.45)
40	1 ½	0 (0)	0 (0)	0 (0)	100 (1.45)
50	2	0 (0)	0 (0)	0 (0)	100 (1.45)
65	–	0 (0)	–	40 (0.58)	130 (1.89)
80	3	0 (0)	–	40 (0.58)	130 (1.89)
100	4	0 (0)	–	135 (1.96)	170 (2.47)
125	–	135 (1.96)	–	240 (3.48)	385 (5.58)
150	6	135 (1.96)	–	240 (3.48)	385 (5.58)
200	8	200 (2.90)	–	290 (4.21)	410 (5.95)

Nominal diameter		Limit values for absolute pressure in [mbar] ([psi]) for fluid temperatures:			
[mm]	[in]	+25 ℃ (+77 ℉)	+80 ℃ (+176 ℉)	+100 ℃ (+212 ℉)	+130 ℃ (+266 ℉)
250	10	330 (4.79)	–	400 (5.80)	530 (7.69)
300	12	400 (5.80)	–	500 (7.25)	630 (9.14)
350	14	470 (6.82)	–	600 (8.70)	730 (10.6)
400	16	540 (7.83)	–	670 (9.72)	800 (11.6)
450	18	No negative pressure permitted!			
500	20				
600	24				

Flow limit

The diameter of the pipe and the flow rate determine the nominal diameter of the sensor. The optimum velocity of flow is between 2 to 3 m/s (6.56 to 9.84 ft/s). Also match the velocity of flow (v) to the physical properties of the fluid:
• v < 2 m/s (6.56 ft/s): for abrasive fluids (e.g. potter's clay, lime milk, ore slurry)
• v > 2 m/s (6.56 ft/s): for fluids producing buildup (e.g. wastewater sludge)

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

For an overview of the full scale values for the measuring range, see the "Measuring range" section → 🗏 8

Pressure loss

• No pressure loss occurs if the sensor is installed in a pipe with the same nominal diameter.
• Pressure losses for configurations incorporating adapters according to DIN EN 545 → 🗏 40

System pressure
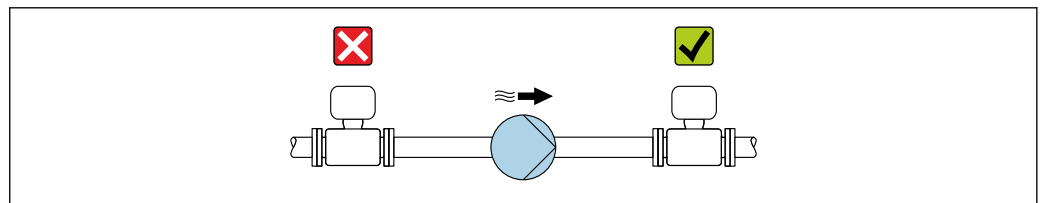
A0028777

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

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

• For information on the liner's resistance to partial vacuum
• For information on the shock resistance of the measuring system
• For information on the vibration resistance of the measuring system

Thermal insulation

Pipes generally have to be insulated if they carry very hot fluids to avoid energy losses and prevent accidental contact with pipes at temperatures that could cause injury. Guidelines regulating the insulation of pipes have to be taken into account.

⚠ WARNING

Electronics overheating on account of thermal insulation!
▶ The housing support dissipates heat and its entire surface area must remain uncovered. Make sure that the sensor insulation does not extend past the top of the two sensor half-shells.
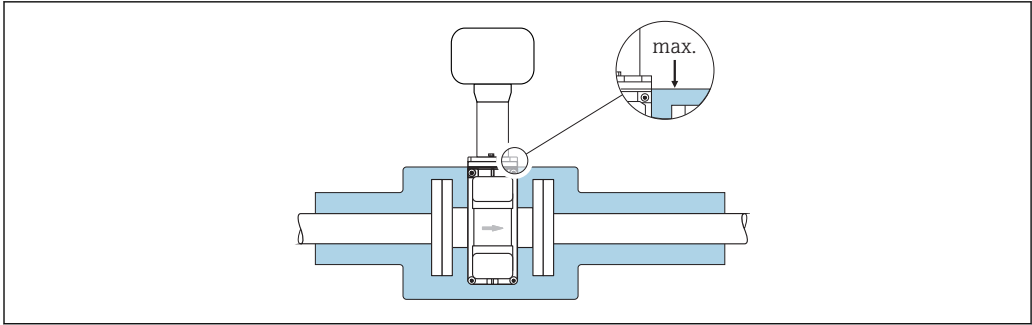
A0031216

Vibrations

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

ℹ️ • For information on the shock resistance of the measuring system
• For information on the vibration resistance of the measuring system
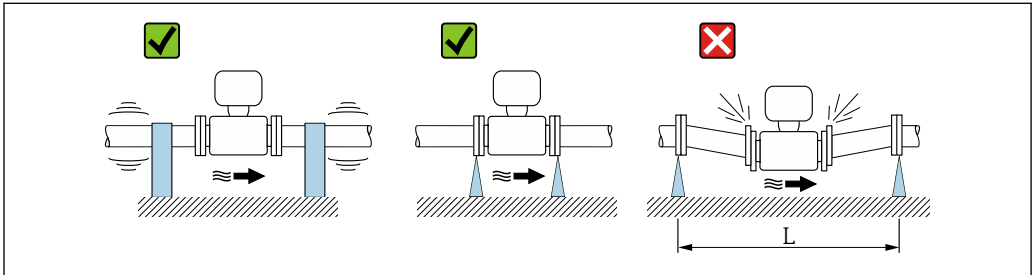
A0029004

⊠ *30 Measures to avoid device vibrations (L > 10 m (33 ft))*

Mechanical construction

Dimensions in SI units

Compact version
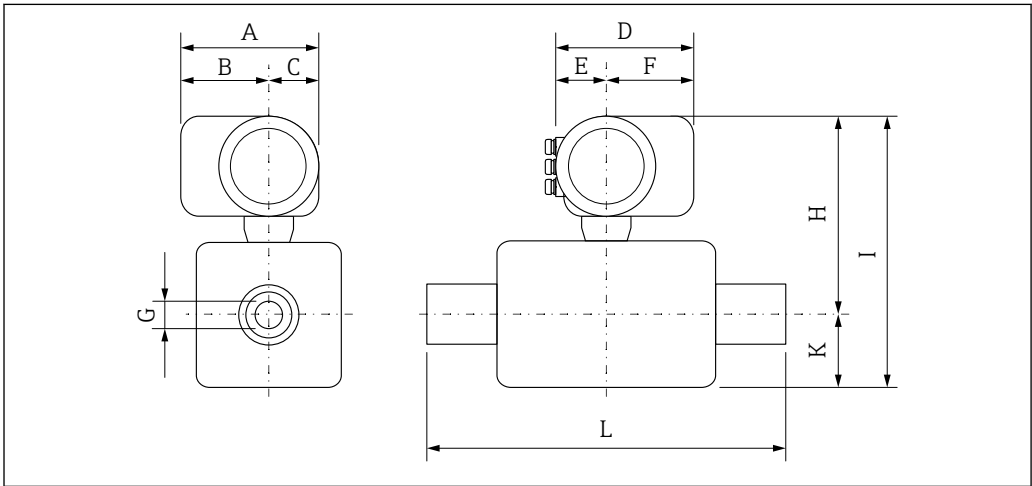
A0029789

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

DN	L [1]	A [2]	B [2]	C	D [3]	E	F	G	H [4]	I [4]	K
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
15	200	200	141	59	169	68	101		271	355	84
25	200	200	141	59	169	68	101	[5]	271	355	84
32	200	200	141	59	169	68	101		271	355	84

DN	L [1)	A [2)	B [2)	C	D [3)	E	F	G	H [4)	I [4)	K
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
40	200	200	141	59	169	68	101		271	355	84
50	200	200	141	59	169	68	101		271	355	84
65	200	200	141	59	169	68	101		296	405	109
80	200	200	141	59	169	68	101		296	405	109
100	250	200	141	59	169	68	101		296	405	109
125	250	200	141	59	169	68	101		336	486	150
150	300	200	141	59	169	68	101		336	486	150
200	350	200	141	59	169	68	101		361	541	180
250	450	200	141	59	169	68	101		386	591	205
300	500	200	141	59	169	68	101		411	641	230
350	550	200	141	59	169	68	101		469	751	282
400	600	200	141	59	169	68	101		496	804	308
450	650	200	141	59	169	68	101		521	854	333
500	650	200	141	59	169	68	101		546	905	359
600	780	200	141	59	169	68	101		594	1005	411

1) Total length (L) is independent of the process connections.
2) For version without local display: values - 30 mm
3) Depending on the cable gland used: values up to + 30 mm
4) For order code for "Sensor option", option CG "Sensor extension neck for insulation": values + 110 mm
5) Depends on the liner

Accessories
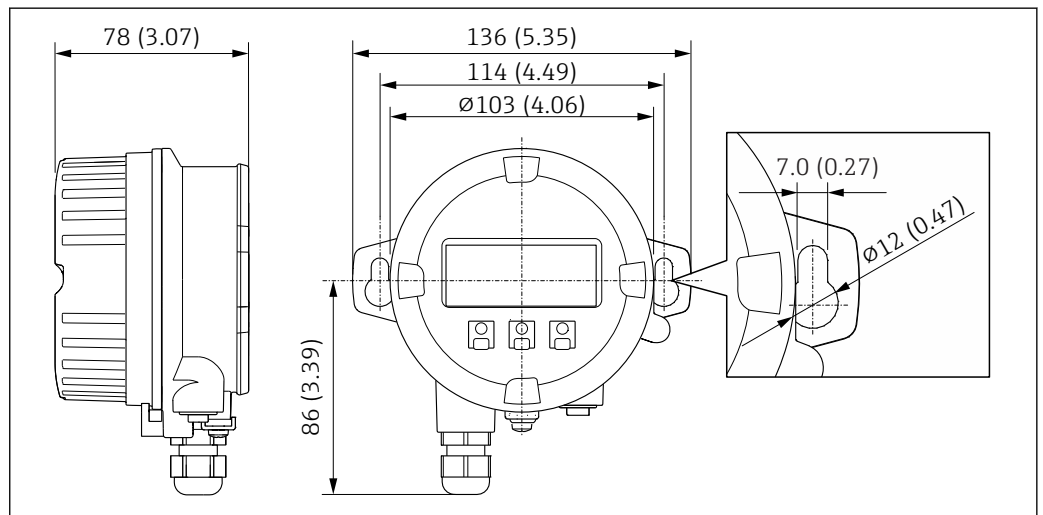
Remote display and operating module DKX001

⊞ *31   Engineering unit mm (in)*

A0028921

External WLAN antenna
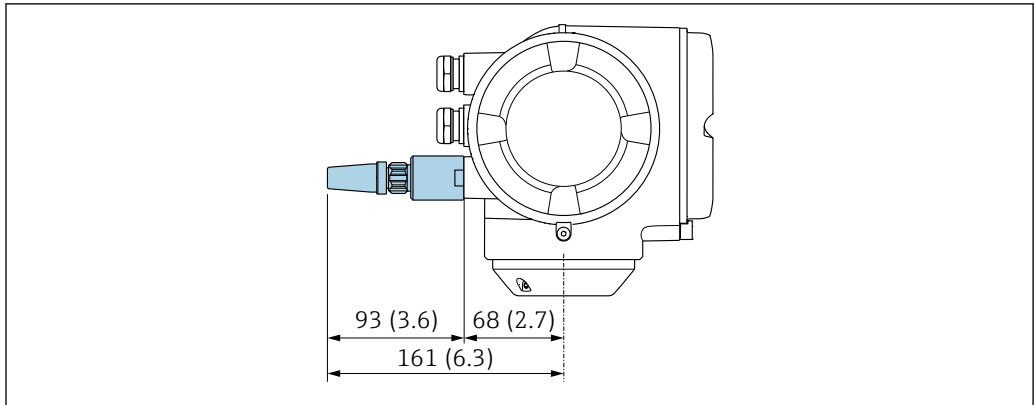
⊠ 32   Engineering unit mm (in)

Ground disk for flange connection
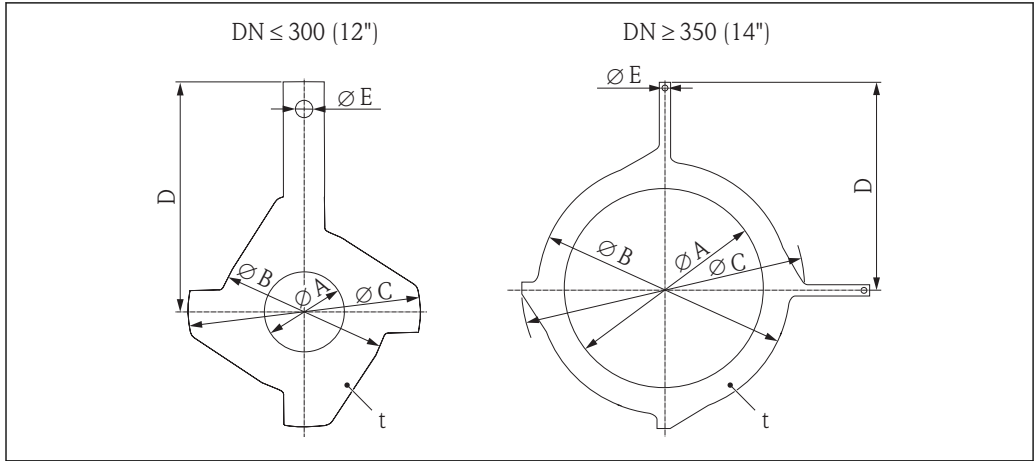
DN [1) EN (DIN), JIS, AS [2) [mm]	A PFA, PTFE [mm]	B [mm]	C [mm]	D [mm]	E [mm]	t [mm]
15	16	43	61.5	73	6.5	2
25	26	62	77.5	87.5	6.5	2
32	35	80	87.5	94.5	6.5	2
40	41	82	101	103	6.5	2
50	52	101	115.5	108	6.5	2
65	68	121	131.5	118	6.5	2
80	80	131	154.5	135	6.5	2
100	104	156	186.5	153	6.5	2
125	130	187	206.5	160	6.5	2
150	158	217	256	184	6.5	2
200	206	267	288	205	6.5	2
250	260	328	359	240	6.5	2
300 [3)	312	375	413	273	6.5	2
300 [4)	310	375	404	268	6.5	2

DN [1] EN (DIN), JIS, AS [2] [mm]	A PFA, PTFE [mm]	B [mm]	C [mm]	D [mm]	E [mm]	t [mm]
350 [3]	343	433	479	365	9.0	2
400 [3]	393	480	542	395	9.0	2
450 [3]	439	538	583	417	9.0	2
500 [3]	493	592	650	460	9.0	2
600 [3]	593	693	766	522	9.0	2

1) Ground disks DN 15 to 250 (½ to 10") can be used for all available flange standards/pressure ratings.
2) For flanges to AS, only DN 25 and DN 50 are available.
3) PN 10/16
4) PN 25, JIS 10K/20K

Dimensions in US units　　**Compact version**

A0029789

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

DN [in]	L [1] [in]	A [2] [in]	B [2] [in]	C [in]	D [3] [in]	E [in]	F [in]	G [in]	H [4] [in]	I [4] [in]	K [in]
½	7.87	7.87	5.55	2.32	6.65	2.68	3.98		10.7	14.0	3.31
1	7.87	7.87	5.55	2.32	6.65	2.68	3.98		10.7	14.0	3.31
1 ½	7.87	7.87	5.55	2.32	6.65	2.68	3.98		10.7	14.0	3.31
2	7.87	7.87	5.55	2.32	6.65	2.68	3.98		10.7	14.0	3.31
3	7.87	7.87	5.55	2.32	6.65	2.68	3.98		11.6	15.9	4.29
4	9.84	7.87	5.55	2.32	6.65	2.68	3.98		11.6	15.9	4.29
6	11.8	7.87	5.55	2.32	6.65	2.68	3.98	5)	13.4	19.3	5.91
8	13.8	7.87	5.55	2.32	6.65	2.68	3.98		14.2	21.3	7.09
10	17.7	7.87	5.55	2.32	6.65	2.68	3.98		15.2	23.3	8.07
12	19.7	7.87	5.55	2.32	6.65	2.68	3.98		16.1	25.2	9.06
14	21.7	7.87	5.55	2.32	6.65	2.68	3.98		18.5	29.6	11.1
16	23.6	7.87	5.55	2.32	6.65	2.68	3.98		19.6	31.7	12.1
18	25.6	7.87	5.55	2.32	6.65	2.68	3.98		20.5	33.6	13.1

DN	L [1)	A [2)	B [2)	C	D [3)	E	F	G	H [4)	I [4)	K
[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]
20	25.6	7.87	5.55	2.32	6.65	2.68	3.98		21.5	35.6	14.1
24	30.7	7.87	5.55	2.32	6.65	2.68	3.98		23.4	39.6	16.2

1)   Total length (L) is independent of the process connections.

2)   For version without local display: values - 1.18 in

3)   Depending on the cable gland used: values up to+1.18 in

4)   For order code for "Sensor option", option CG "Sensor extension neck for insulation": values + 4.33 in

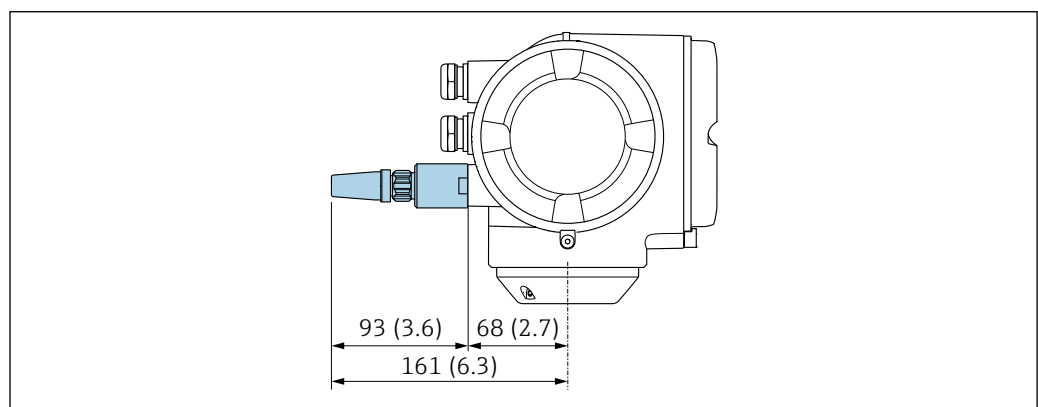5)   Depends on the liner

Accessories
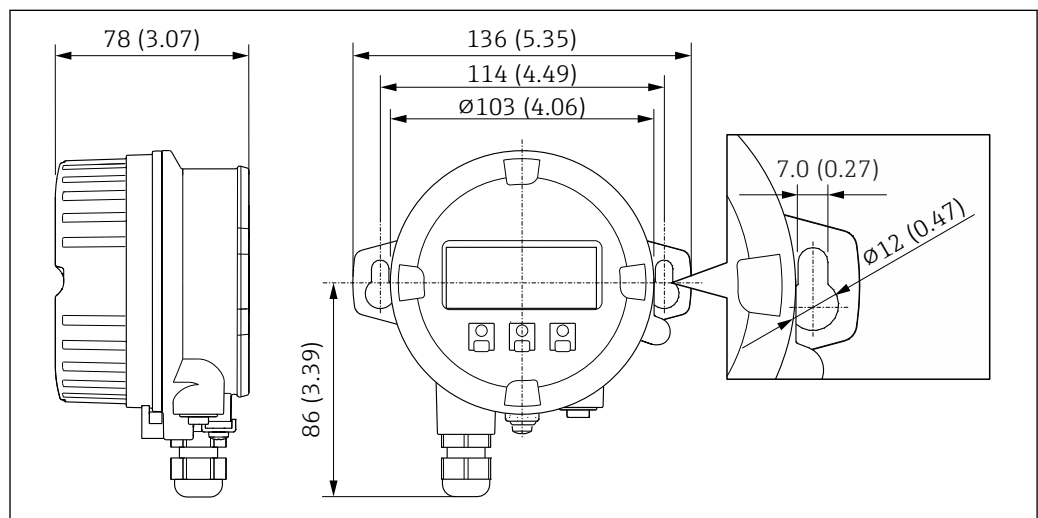
Remote display and operating module DKX001
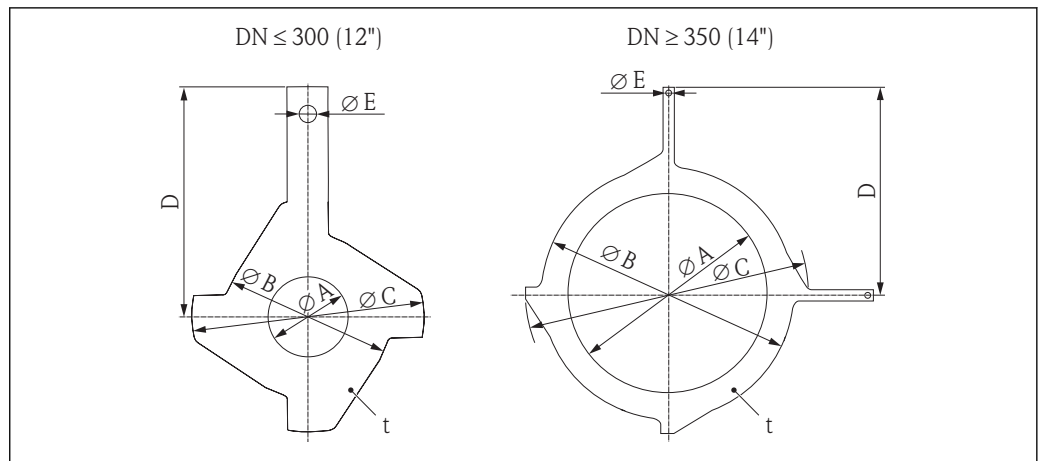

⊞ *33   Engineering unit mm (in)*

External WLAN antenna

⊞ *34   Engineering unit mm (in)*

Ground disk for flange connection

A0003221

DN [1)	A	B	C	D	E	t
ASME	PFA, PTFE					
[in]	[in]	[in]	[in]	[in]	[in]	[in]
½	0.63	1.69	2.42	2.87	0.26	0.08
1	1.02	2.44	3.05	3.44	0.26	0.08
1 ½	1.61	3.23	3.98	4.06	0.26	0.08
2	2.05	3.98	4.55	4.25	0.26	0.08
3	3.15	5.16	6.08	5.31	0.26	0.08
4	4.09	6.14	7.34	6.02	0.26	0.08
6	6.22	8.54	10.08	7.24	0.26	0.08
8	8.11	10.51	11.34	8.07	0.26	0.08
10	10.24	12.91	14.13	9.45	0.26	0.08
12	12.28	14.76	16.26	10.75	0.26	0.08
14	13.50	17.05	18.86	14.37	0.35	0.08
16	15.47	18.90	21.34	15.55	0.35	0.08
18	17.28	21.18	22.95	16.42	0.35	0.08
20	19.41	23.31	25.59	18.11	0.35	0.08
24	23.35	27.28	30.16	20.55	0.35	0.08

1) Ground disks can be used for all available pressure ratings.

Weight

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

Transmitter version for the hazardous area: +2 kg (+4.4 lbs)

Weight in SI units

Nominal diameter		EN (DIN), AS [1)		ASME		JIS	
[mm]	[in]	Pressure rating	[kg]	Pressure rating	[kg]	Pressure rating	[kg]
15	½	PN 40	7.2	Class 150	7.2	10K	4.5
25	1	PN 40	8.0	Class 150	8.0	10K	5.3
32	–	PN 40	8.7	Class 150	–	10K	5.3
40	1 ½	PN 40	10.1	Class 150	10.1	10K	6.3

Nominal diameter		EN (DIN), AS [1]		ASME		JIS	
[mm]	[in]	Pressure rating	[kg]	Pressure rating	[kg]	Pressure rating	[kg]
50	2	PN 40	11.3	Class 150	11.3	10K	7.3
65	–	PN 16	12.7	Class 150	–	10K	9.1
80	3	PN 16	14.7	Class 150	14.7	10K	10.5
100	4	PN 16	16.7	Class 150	16.7	10K	12.7
125	–	PN 16	22.2	Class 150	–	10K	19
150	6	PN 16	26.2	Class 150	26.2	10K	22.5
200	8	PN 10	45.7	Class 150	45.7	10K	39.9
250	10	PN 10	65.7	Class 150	75.7	10K	67.4
300	12	PN 10	70.7	Class 150	111	10K	70.3
350	14	PN 10	105.7	Class 150	176		
400	16	PN 10	120.7	Class 150	206		
450	18	PN 10	161.7	Class 150	256		
500	20	PN 10	156.7	Class 150	286		
600	24	PN 10	208.7	Class 150	406		

1) For flanges to AS, only DN 25 and 50 are available.

Weight in US units

Nominal diameter		ASME	
[mm]	[in]	Pressure rating	[lbs]
15	½	Class 150	15.9
25	1	Class 150	17.6
40	1 ½	Class 150	22.3
50	2	Class 150	24.9
80	3	Class 150	32.4
100	4	Class 150	36.8
150	6	Class 150	57.7
200	8	Class 150	101
250	10	Class 150	167
300	12	Class 150	244
350	14	Class 150	387
400	16	Class 150	454
450	18	Class 150	564
500	20	Class 150	630
600	24	Class 150	895

Measuring tube specification

Nominal diameter		Pressure rating					Process connection internal diameter			
		EN (DIN)	ASME	AS 2129	AS 4087	JIS	PFA		PTFE	
[mm]	[in]	[bar]	[psi]	[bar]	[bar]	[bar]	[mm]	[in]	[mm]	[in]
15	½	PN 40	Class 150	–	–	20K	–	–	15	0.59
25	1	PN 40	Class 150	Table E	–	20K	23	0.91	26	1.02

Nominal diameter		Pressure rating					Process connection internal diameter			
		EN (DIN)	ASME	AS 2129	AS 4087	JIS	PFA		PTFE	
[mm]	[in]	[bar]	[psi]	[bar]	[bar]	[bar]	[mm]	[in]	[mm]	[in]
32	–	PN 40	–	–	–	20K	32	1.26	35	1.38
40	1 ½	PN 40	Class 150	–	–	20K	36	1.42	41	1.61
50	2	PN 40	Class 150	Table E	PN 16	10K	48	1.89	52	2.05
65	–	PN 16	–	–	–	10K	63	2.48	67	2.64
80	3	PN 16	Class 150	–	–	10K	75	2.95	80	3.15
100	4	PN 16	Class 150	–	–	10K	101	3.98	104	4.09
125	–	PN 16	–	–	–	10K	126	4.96	129	5.08
150	6	PN 16	Class 150	–	–	10K	154	6.06	156	6.14
200	8	PN 10	Class 150	–	–	10K	201	7.91	202	7.95

Materials

Transmitter housing

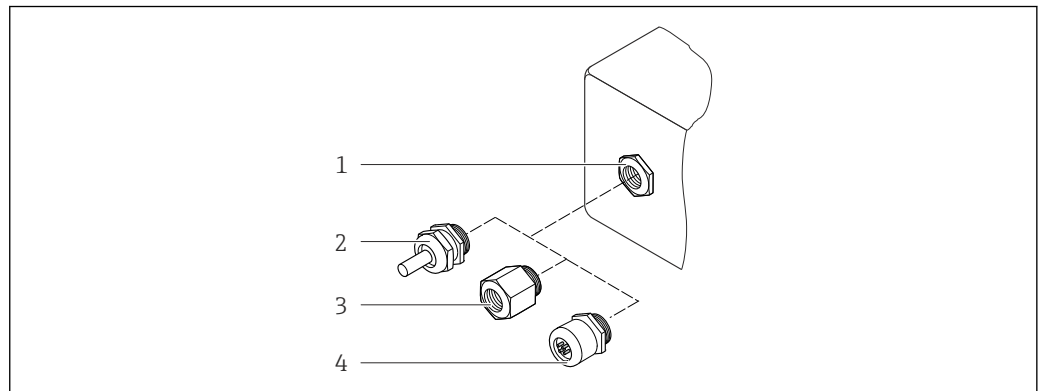Order code for "Housing":
Option **A** "Aluminum, coated": aluminum, AlSi10Mg, coated

Window material

Order code for "Housing":
Option **A** "Aluminum, coated": glass

Cable entries/cable glands

⊞ *35   Possible cable entries/cable glands*

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

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

Cable entry/cable gland	Material
Adapter for cable entry with internal thread NPT ½"	
Device plug coupling	Plug M12 × 1 • Socket: Stainless steel, 1.4404 (316L) • Contact housing: Polyamide • Contacts: Gold-plated brass

Device plug

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

Sensor housing

- DN 15 to 300 (½ to 12"): coated aluminum AlSi10Mg
- DN 350 to 600 (14 to 24"): carbon steel with protective varnish

Measuring tubes

Stainless steel, 1.4301/304/1.4306/304L; for flanges made of carbon with Al/Zn protective coating (DN 15 to 300 (½ to 12")) or protective varnish (DN 350 to 600 (14 to 24"))

Liner

- PFA
- PTFE

Process connections

EN 1092-1 (DIN 2501)
Stainless steel, 1.4571 (F316L); carbon steel, FE410WB [1]/S235JRG2; Alloy C22, 2.4602 (UNS N06022)

ASME B16.5
Stainless steel, F316L; carbon steel, A105 [1]

JIS B2220
Stainless steel, 1.0425 (F316L) [1]; carbon steel, S235JRG2/HII

AS 2129 Table E
- DN 25 (1"): carbon steel, A105/S235JRG2
- DN 40 (1 ½"): carbon steel, A105/S275JR

AS 4087 PN 16
Carbon steel, A105/S275JR

Electrodes

Stainless steel, 1.4435 (F316L); Alloy C22, 2.4602 (UNS N06022); platinum; tantalum; titanium

Seals

In accordance with DIN EN 1514-1

Accessories

Protective cover

Stainless steel, 1.4404 (316L)

---

1) DN 15 to 300 (½ to 12") with Al/Zn protective coating; DN 350 to 600 (14 to 24") with protective varnish

External WLAN antenna

- WLAN antenna:
  ASA plastic (acrylic ester-styrene-acrylonitrile) and nickel-plated brass
- Adapter:
  Stainless steel and copper

Ground disks

Stainless steel, 1.4435 (F316L); Alloy C22, 2.4602 (UNS N06022); tantalum; titanium

Fitted electrodes	Measuring electrodes, reference electrodes and electrodes for empty pipe detection: • Standard: stainless steel, 1.4435 (F316L); Alloy C22, 2.4602 (UNS N06022); tantalum, titanium • Optional: only platinum measuring electrodes
Process connections	• ASME B16.5 • JIS B2220 • AS 2129 Table E • AS 4087 PN 16 For information on the different materials used in the process connections → 🖹 56
Surface roughness	Stainless steel electrodes, 1.4435 (F316L); Alloy C22, 2.4602 (UNS N06022); platinum; tantalum; titanium: ≤ 0.3 to 0.5 μm (11.8 to 19.7 μin) (All data relate to parts in contact with fluid) Liner with PFA: ≤ 0.4 μm (15.7 μin) (All data relate to parts in contact with fluid)

Operability

Operating concept	**Operator-oriented menu structure for user-specific tasks** • Commissioning • Operation • Diagnostics • Expert level **Fast and safe commissioning** • Guided menus ("Make-it-run" wizards) for applications • Menu guidance with brief explanations of the individual parameter functions • Device access via Web server • Optional: WLAN access to device via mobile handheld terminal **Reliable operation** • Operation in local language → 🖹 58 • Uniform operating philosophy applied to device and operating tools • If replacing electronic modules, transfer the device configuration via the integrated memory (integrated HistoROM) which contains the process and measuring device data and the event logbook. No need to reconfigure. **Efficient diagnostics increase measurement availability** • Troubleshooting measures can be called up via the device and in the operating tools • Diverse simulation options, logbook for events that occur and optional line recorder functions

| Languages	Can be operated in the following languages:

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

Local operation

Via display module

Two display modules are available:
- Order code for "Display; operation", option **F** "4-line, backlit, graphic display; touch control"
- Order code for "Display; operation", option **G** "4-line, backlit, graphic display; touch control + WLAN"

Information about WLAN interface → 🖺 62
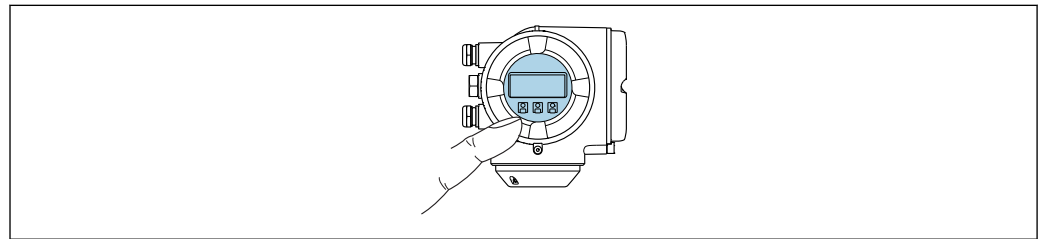
A0026785

🖼 *36   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
- Permitted ambient temperature for the display: –20 to +60 °C (–4 to +140 °F)
  The readability of the display may be impaired at temperatures outside the temperature range.
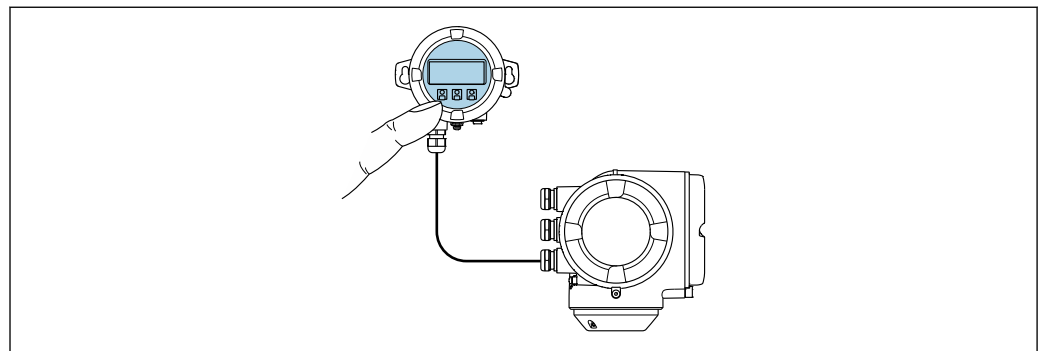
Operating elements

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

Via remote display and operating module DKX001

The remote display and operating module DKX001 is available as an optional extra:
Order code for "Display; operation", option **O** "Separate backlit, 4-line display; 10 m (30 ft) Cable; touch control"

Another device version, e.g. other housing material, other cable length etc., can be ordered via the separate product structure DKX001. The measuring device is ordered with:
Order code for "Display; operation", option **M** "None, prepared for remote display"

A0026786

🖼 *37   Operation via remote display and operating module DKX001*

Display and operating elements

The display and operating elements correspond to those of the display module → 🖺 58.

ℹ️ • The measuring device is always supplied with a dummy cover when the remote display and operating module DKX001 is used. Display or operation at the transmitter is not possible in this case.
 • The remote display and operating module DKX001 can also be ordered separately and subsequently as an accessory without a measuring device → 🖺 68.
 • If ordered subsequently: The remote display and operating module DKX001 cannot be connected at the same time as the existing display or operation unit. Only one display or operation unit may be connected to the transmitter at any one time.

Material

The housing material of the display and operating module DKX001 depends on the choice of transmitter housing material.

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".
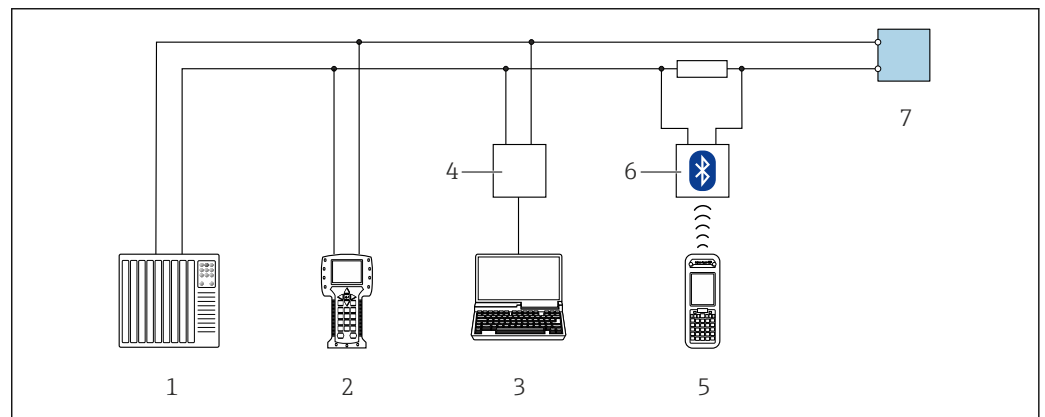
Connecting cable

→ 🖺 37

Dimensions

→ 🖺 49

Remote operation   **Via HART protocol**

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

A0028747

🖼 *38   Options for remote operation via HART protocol (active)*

1   Control system (e.g. PLC)
2   Field Communicator 475
3   Computer with Web browser (e.g. Internet Explorer) 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   VIATOR Bluetooth modem with connecting cable*
7   Transmitter
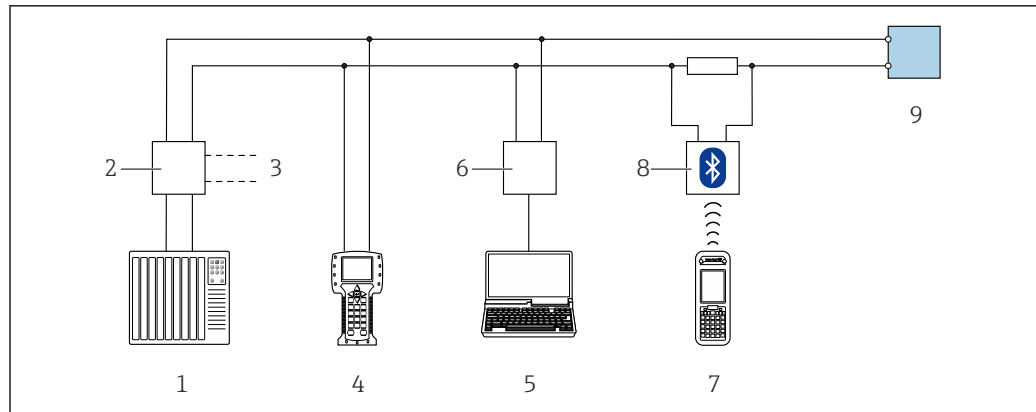
🔲 *39   Options for remote operation via HART protocol (passive)*

1   Control system (e.g. PLC)
2   Transmitter power supply unit, e.g. RN221N (with communication resistor)
3   Connection for Commubox FXA195 and Field Communicator 475
4   Field Communicator 475
5   Computer with Web browser (e.g. Internet Explorer) 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   VIATOR Bluetooth modem with connecting cable
9   Transmitter

Via FOUNDATION Fieldbus network

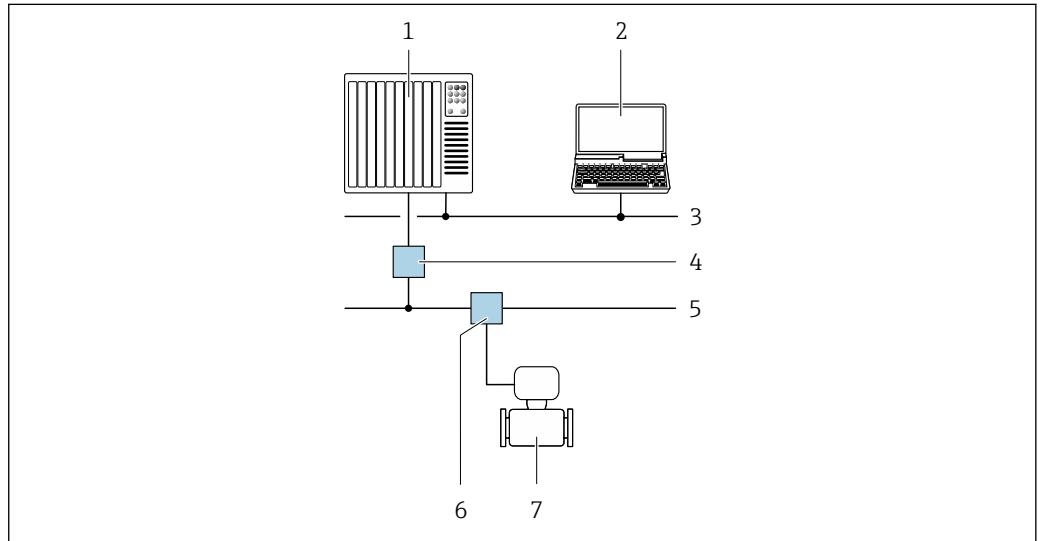This communication interface is available in device versions with FOUNDATION Fieldbus.
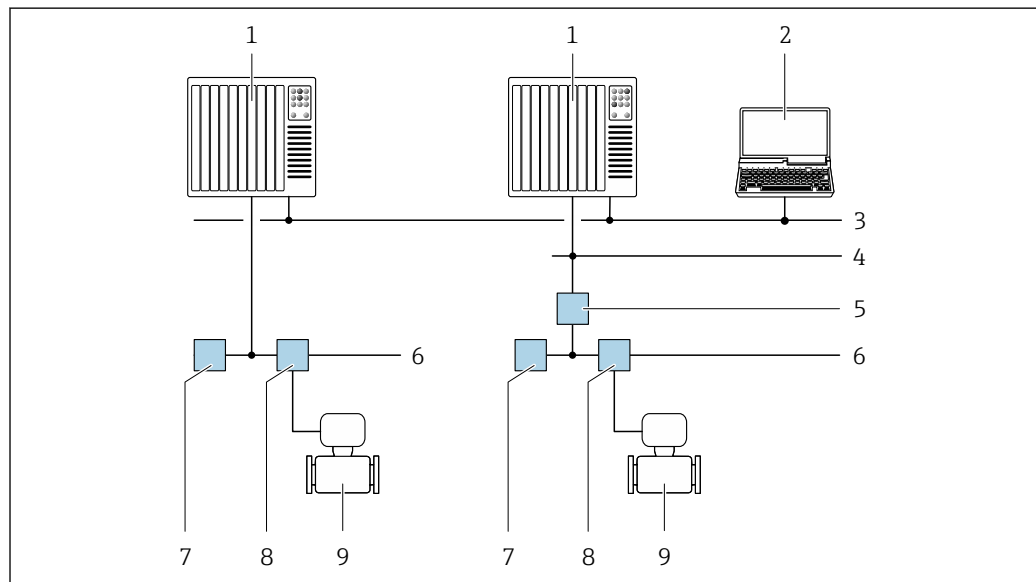
🔲 *40   Options for remote operation via FOUNDATION Fieldbus network*

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 device

Via PROFIBUS PA network

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

 41   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 device

Via Modbus RS485 protocol

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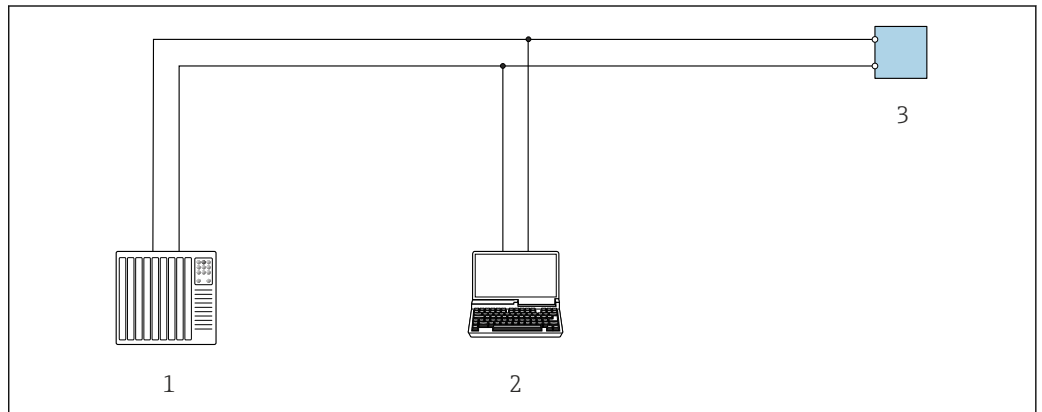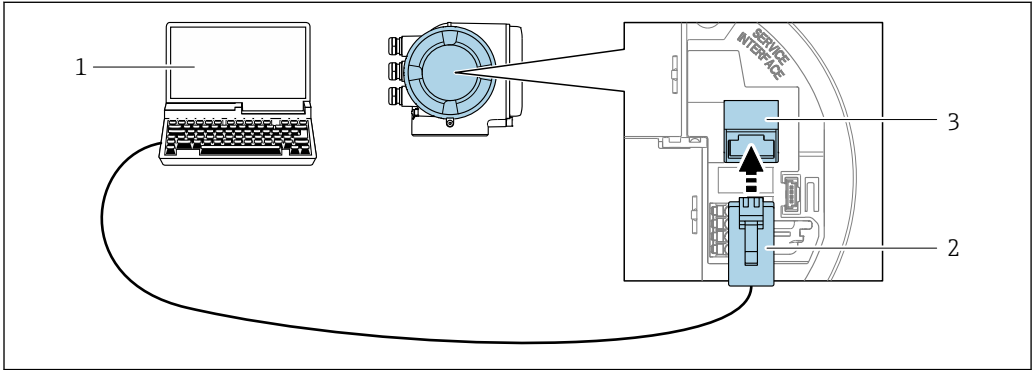

 42   Options for remote operation via Modbus-RS485 protocol (active)

1   Control system (e.g. PLC)
2   Computer with Web browser (e.g. Internet Explorer) 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

| Service interface | **Via service interface (CDI-RJ45)** |

🔲 *43   Connection via service interface (CDI-RJ45)*

1   Computer with Web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated device Web server or with "FieldCare", "DeviceCare" operating tool with COM DTM "CDI Communication TCP/IP" or Modbus DTM
2   Standard Ethernet connecting cable with RJ45 connector
3   Service interface (CDI-RJ45) of the measuring device 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, backlit, graphic display; touch control + WLAN"
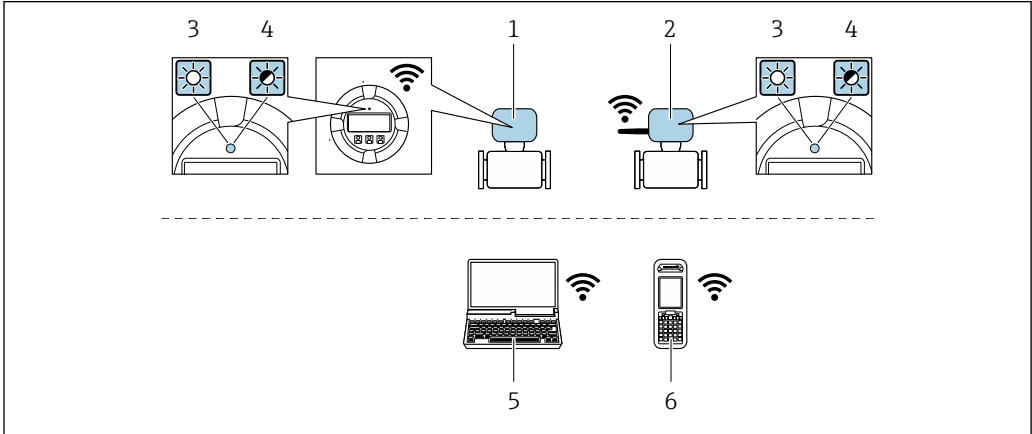

1   Transmitter with integrated WLAN antenna
2   Transmitter with external WLAN antenna
3   LED lit constantly: WLAN reception is enabled on measuring device
4   LED flashing: WLAN connection established between operating unit and measuring device
5   Computer with WLAN interface and Web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated device Web server or with operating tool (e.g. FieldCare, DeviceCare)
6   Mobile handheld terminal with WLAN interface and Web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated device Web server or operating tool (e.g. FieldCare, DeviceCare)

Wireless LAN	IEEE 802.11 b/g (2.4 GHz) WLAN
Encryption	WPA2 PSK/TKIP AES-128
Configurable channels	1 to 11
Function	Access point with DHCP
Range with integrated antenna	Max. 10 m (32 ft)
Range with external antenna	Max. 50 m (164 ft)

Supported operating tools	Operating unit	Interface	Additional information
Web browser	Notebook, PC or tablet with Web browser	• CDI-RJ45 service interface • WLAN interface	Special Documentation for the device → 🗎 71
DeviceCare SFE100	Notebook, PC or tablet with Microsoft Windows system	• CDI-RJ45 service interface • WLAN interface • Fieldbus protocol	→ 🗎 69
FieldCare SFE500	Notebook, PC or tablet with Microsoft Windows system	• CDI-RJ45 service interface • WLAN interface • Fieldbus protocol	→ 🗎 69
Device Xpert	Field Xpert SFX 100/350/370	HART and FOUNDATION Fieldbus fieldbus protocol	Operating Instructions BA01202S Device description files: Use update function of handheld terminal

Supported operating tools is shown in the left margin.

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:

- Process Device Manager (PDM) by Siemens → www.siemens.com
- Asset Management Solutions (AMS) by Emerson → www.emersonprocess.com
- FieldCommunicator 375/475 by Emerson → www.emersonprocess.com
- Field Device Manager (FDM) by Honeywell → www.honeywellprocess.com
- FieldMate by Yokogawa → www.yokogawa.com
- PACTWare → www.pactware.com

The associated device description files are available at: www.endress.com → Downloads

Web server

Thanks to the integrated Web server, the device can be operated and configured via a Web browser and via a service interface (CDI-RJ45) or a 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 also displayed and allows the user to monitor the status of the device. Furthermore the measuring device data can be managed and the network parameters can be configured. The WLAN connection requires a device that acts as an access point to enable communication via a computer or mobile handheld terminal.

Supported functions
Data exchange between the operating unit (such as a notebook for example) and the measuring device:
– Uploading the configuration from the measuring device (XML format, configuration backup)
– Save the configuration to the measuring device (XML format, restore configuration)
– Export event list (.csv file)
– Export parameter settings (.csv file, create documentation of the measuring point configuration)
– Export the Heartbeat verification log (PDF file, only available with the "Heartbeat Verification" application package)
– Flash firmware version for device firmware upgrade, for instance

HistoROM data management is shown in the left margin. The measuring device 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:

	Device memory	T-DAT	S-DAT

Available data	• Event history, such as diagnostic events
	• Parameter data record backup
	• Device firmware package
	• Driver for system integration e.g.:
	  – DD for HART
	  – GSD for PROFIBUS PA
	  – DD for FOUNDATION Fieldbus
		• Measured value memory ("Extended HistoROM" order option)
		• Current parameter data record (used by firmware at run time)
		• Maximum indicators (min/max values)
		• Totalizer values
			• Sensor data: diameter etc.
			• Serial number
			• User-specific access code (to use the "Maintenance" user role)
			• Calibration data
			• Device configuration (e.g. SW options, fixed I/O or multi I/O)

Storage location	Fixed on the user interface board in the connection compartment	Can be plugged into the user interface 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 the sensor is replaced: once the sensor has been replaced, new sensor data are transferred from the S-DAT in the measuring device and the measuring device is ready for operation again immediately without any errors

Manual

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

Data transfer

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)

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:
• Record up to 1000 measured values via 1 to 4 channels
• User configurable recording interval
• Record up to 250 measured values via each of the 4 memory channels
• Export the measured value log via a variety of interfaces and operating tools e.g. FieldCare, DeviceCare or Web server
• Use the recorded measured value data in the integrated device simulation function in the **Diagnostics** submenu.

Service logbook

Manual
- Create up to 20 user-specific events with a date and customized text in a separate logbook for documentation of the measuring point
- Use for calibration or service operations, for example, or for maintenance or revision work that has been performed

Certificates and approvals

CE mark	The measuring system is in conformity with the statutory 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.
C-Tick symbol	The measuring system meets the EMC requirements of the "Australian Communications and Media Authority (ACMA)".
Ex approval	The measuring device is certified for use in hazardous areas and the relevant safety instructions are provided in the separate "Safety Instructions" (XA) document. Reference is made to this document on the nameplate.

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

ATEX, IECEx

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

Ex db eb

Category	Type of protection
II2G	Ex db eb ia IIC T6…T1 Gb

Ex tb

Category	Type of protection
II2D	Ex tb IIIC Txxx Db

Ex ec

Category	Type of protection
II3G	Ex ec ic IIC T5…T1 Gc

cCSAus

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

IS (Ex i) and XP (Ex d)
Class I, II, III Division 1 Groups A-G

NI (Ex nA)
Class I Division 2 Groups A - D

Ex de
Class I, Zone 1 AEx/ Ex de ia IIC T6…T1 Gb

Ex nA
Class I, Zone 2 AEx/Ex nA ic IIC T5…T1 Gc

Ex tb
Zone 21 AEx/ Ex tb IIIC T** °C Db

Functional safety	The measuring device 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 (multichannel architecture with homogeneous redundancy) and is independently evaluated and certified by the TÜV in accordance with IEC 61508.
	The following types of monitoring in safety equipment are possible: Volume flow
	ⓘ Functional Safety Manual with information on the SIL device → 🖺 71
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 6.1.2 (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 PROFIBUS User Organization (PNO). The measuring system meets all the requirements of the following specifications: • Certified in accordance with PROFIBUS PA Profile 3.02 • The device can also be operated with certified devices of other manufacturers (interoperability)
Modbus RS485 certification	The measuring device meets all the requirements of the MODBUS/TCP conformity test and has the "MODBUS/TCP Conformance Test Policy, Version 2.0". The measuring device has successfully passed all the test procedures carried out.
Radio approval	Europe: RED 2014/53/EU
	United States of America: CFR Title 47, FCC Part 15.247
	Canada: RSS-247 Issue 1
	Japan: Article 2 clause 1 item 19
	ⓘ Additional country-specific approvals on request.
Other standards and guidelines	• EN 60529 Degrees of protection provided by enclosures (IP code) • EN 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use - general requirements • IEC/EN 61326 Emission in accordance with Class A requirements. Electromagnetic compatibility (EMC requirements). • NAMUR NE 21 Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment • NAMUR NE 32 Data retention in the event of a power failure in field and control instruments with microprocessors • NAMUR NE 43 Standardization of the signal level for the breakdown information of digital transmitters with analog output signal.

- NAMUR NE 53
  Software of field devices and signal-processing devices with digital electronics
- NAMUR NE 105
  Specifications for integrating fieldbus devices in engineering tools for field devices
- NAMUR NE 107
  Self-monitoring and diagnosis of field devices
- NAMUR NE 131
  Requirements for field devices for standard applications
- 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 the following sources:
- In the Product Configurator on the Endress+Hauser website: www.endress.com -> Click "Corporate" -> Select your country -> Click "Products" -> Select the product using the filters and search field -> Open product page -> The "Configure" button to the right of the product image opens the Product Configurator.
- From your Endress+Hauser Sales Center: www.addresses.endress.com

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

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.

Diagnostics functions

Package	Description
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.

| Heartbeat Technology	Package	Description
	Heartbeat Verification +Monitoring	**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 process influences (such as corrosion, abrasion, buildup etc.) have on the measuring performance over time. • Schedule servicing in time. • Monitor the process or product quality, e.g. gas pockets. **Heartbeat Verification** Meets the requirement for traceable verification to DIN ISO 9001:2008 Chapter 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 test coverage within the framework of manufacturer specifications. • Extension of calibration intervals according to operator's risk assessment.

Cleaning	Package	Description
	Electrode cleaning circuit (ECC)	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 highly conductive matter and thin layers (typical of magnetite).

Accessories

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

Device-specific accessories

For the transmitter

Accessories	Description
Promag 300 transmitter	Transmitter for replacement or storage. Use the order code to define the following specifications: • Approvals • Output • Input • Display / operation • Housing • Software 📖 For details, see Installation Instructions EA01150
Remote display and operating module DKX001	The remote display and operating module DKX001 is available as an optional extra: Order code for "Display; operation", option **O** "Separate backlit, 4-line display; 10 m (30 ft) Cable; touch control" The remote display and operating module DKX001 can also be ordered separately and subsequently as an accessory without a measuring device . ℹ️ Further information on display and operating module DKX001 → 🖺 58. 📖 For details, see Special Documentation SD01763D
WLAN antenna Wide range	External WLAN antenna for a range of up to 50 m (165 ft). ℹ️ Further information on the WLAN interface → 🖺 62.

Protective cover	Is used to protect the measuring device from the effects of the weather: e.g. rainwater, excess heating from direct sunlight. 📖 For details, see Installation Instructions EA01160
Ground cable	Set, consisting of two ground cables for potential equalization.

For the sensor

Accessories	Description
Ground disks	Are used to ground the fluid in lined measuring tubes to ensure proper measurement. 📖 For details, see Installation Instructions EA00070D

Communication-specific accessories

Accessories	Description
Commubox FXA195 HART	For intrinsically safe HART communication with FieldCare via the USB interface. 📖 For details, see "Technical Information" TI00404F
HART Loop Converter HMX50	Is used to evaluate and convert dynamic HART process variables to analog current signals or limit values. 📖 For details, see "Technical Information" TI00429F and Operating Instructions BA00371F
Fieldgate FXA320	Gateway for the remote monitoring of connected 4 to 20 mA measuring devices via a Web browser. 📖 For details, see "Technical Information" TI00025S and Operating Instructions BA00053S
Fieldgate FXA520	Gateway for the remote diagnostics and remote configuration of connected HART measuring devices via a Web browser. 📖 For details, see "Technical Information" TI00025S and Operating Instructions BA00051S
Field Xpert SFX350	Field Xpert SFX350 is a mobile computer for commissioning and maintenance. It enables efficient device configuration and diagnostics for HART and FOUNDATION Fieldbus devices in the **non-Ex area**. 📖 For details, see Operating Instructions BA01202S
Field Xpert SFX370	Field Xpert SFX370 is a mobile computer for commissioning and maintenance. It enables efficient device configuration and diagnostics for HART and FOUNDATION Fieldbus devices in the **non-Ex area** and the **Ex area**. 📖 For details, see Operating Instructions BA01202S

Service-specific accessories

Accessories	Description
Applicator	Software for selecting and sizing Endress+Hauser measuring devices: • Choice of measuring devices for industrial requirements • Calculation of all the necessary data for identifying the optimum flowmeter: e.g. nominal diameter, pressure loss, flow velocity and accuracy. • Graphic illustration of the calculation results • Determination of 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://wapps.endress.com/applicator • As a downloadable DVD for local PC installation.

W@M	W@M Life Cycle Management Improved productivity with information at your fingertips. Data relevant to a plant and its components is generated from the first stages of planning and during the asset's complete life cycle. W@M Life Cycle Management is an open and flexible information platform with online and on-site tools. Instant access for your staff to current, in-depth data shortens your plant's engineering time, speeds up procurement processes and increases plant uptime. Combined with the right services, W@M Life Cycle Management boosts productivity in every phase. For more information, visit www.endress.com/lifecyclemanagement
FieldCare	FDT-based plant asset management tool from Endress+Hauser. It can configure all smart field units in your system and helps you manage them. By using the status information, it is also a simple but effective way of checking their status and condition. For details, see Operating Instructions BA00027S and BA00059S
DeviceCare	Tool for connecting and configuring Endress+Hauser field devices. For details, see Innovation brochure IN01047S

System components

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

Supplementary documentation

For an overview of the scope of the associated Technical Documentation, refer to the following:
- The *W@M Device Viewer* : Enter the serial number from the nameplate (www.endress.com/deviceviewer)
- The *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2-D matrix code (QR code) on the nameplate.

Standard documentation

Brief Operating Instructions

Part 1 of 2: Sensor

Measuring device	Documentation code
Proline Promag	KA01216D

Part 2 of 2: Transmitter

Measuring device	Documentation code			
	HART	FOUNDATION Fieldbus	PROFIBUS PA	Modbus RS485
Proline 300	KA01226D	KA01229D	KA01227D	KA01228D

Operating Instructions

Measuring device	Documentation code			
	HART	FOUNDATION Fieldbus	PROFIBUS PA	Modbus RS485
Promag P 300	BA01393D	BA01478D	BA01397D	BA01395D

Description of device parameters

Measuring device	Documentation code			
	HART	FOUNDATION Fieldbus	PROFIBUS PA	Modbus RS485
Promag 300	GP01051D	GP01098D	GP01052D	GP01053D

Supplementary device-dependent documentation

Safety Instructions

Contents	Documentation code
ATEX/IECEx Ex d/Ex de	XA01414D
ATEX/IECEx Ex ec	XA01514D
cCSAus XP	XA01515D
cCSAus Ex d/ Ex de	XA01516D
cCSAus Ex nA	XA01517D
INMETRO Ex d/Ex de	XA01518D
INMETRO Ex ec	XA01519D
NEPSI Ex d/Ex de	XA01520D
NEPSI Ex nA	XA01521D

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
INMETRO Ex i	XA01500D
INMETRO Ex ec	XA01501D
NEPSI Ex i	XA01502D
NEPSI Ex nA	XA01503D

Special Documentation

Contents	Documentation code			
Information on the Pressure Equipment Directive	SD01614D			
Functional Safety Manual	SD01740D			
Remote display and operating module DKX001	SD01763D			
Contents	**Documentation code**			
	HART	FOUNDATION Fieldbus	PROFIBUS PA	Modbus RS485
Heartbeat Technology	SD01640D	SD01742D	SD01744D	SD01743D
Contents	**Documentation code**			
	HART	FOUNDATION Fieldbus	PROFIBUS PA	Modbus RS485
Web server	SD01654D	SD01657D	SD01656D	SD01655D

Installation Instructions

Contents	Documentation code
Installation Instructions for spare part sets	Specified for each individual accessory

Registered trademarks

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

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

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

Modbus®
Registered trademark of SCHNEIDER AUTOMATION, INC.

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

www.addresses.endress.com

Endress+Hauser

People for Process Automation