TI01142D/06/EN/02.23-00
71606265
2023-03-15

Technical Information
CNGmass

Coriolis flowmeter

The refueling application flowmeter with seamless system integration

Application

- Measuring principle operates independently of physical fluid properties such as viscosity or density
- Accurate measurement of compressed natural gas (CNG) in high pressure refueling applications

Device properties

- Flow rates up to 150 kg/min (330 lb/min)
- Process pressure up to 350 bar (5080 psi)
- Rupture disc available
- Robust, compact transmitter housing
- Modbus RS485
- Designed to meet application needs

Your benefits

- Excellent operational safety – reliable under extreme process conditions
- Fewer process measuring points – multivariable measurement (flow, density, temperature)
- Space-saving installation – no in-/outlet run needs
- Space-saving transmitter – full functionality on smallest footprint
- Fast commissioning – pre-configured devices
- Automatic recovery of data for servicing

Endress+Hauser
People for Process Automation

Table of contents

About this document

Symbols

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.
	**Potential equalization connection (PE: protective earth)** Ground terminals that must be connected to ground prior to establishing any other connections. The ground terminals are located on the interior and exterior of the device: ▪ Interior ground terminal: potential equalization is connected to the supply network. ▪ Exterior ground terminal: device is connected to the plant grounding system.

Symbols for certain types of information

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

Symbols in graphics

Symbol	Meaning
1, 2, 3, ...	Item numbers
1., 2., 3., ...	Series of steps
A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections
	Hazardous area
	Safe area (non-hazardous area)
	Flow direction

Function and system design

Measuring principle

The measuring principle is based on the controlled generation of Coriolis forces. These forces are always present in a system when both translational and rotational movements are superimposed.

$F_c = 2 \cdot \Delta m\ (v \cdot \omega)$

F_c = Coriolis force

Δm = moving mass

ω = rotational velocity

v = radial velocity in rotating or oscillating system

The amplitude of the Coriolis force depends on the moving mass Δm, its velocity v in the system and thus on the mass flow. Instead of a constant rotational velocity ω, the sensor uses oscillation.

Density measurement
The measuring tube is continuously excited at its resonance frequency. A change in the mass and thus the density of the oscillating system (comprising measuring tube and fluid) results in a corresponding, automatic adjustment in the oscillation frequency. The resonance frequency is thus a function of the medium density. The microprocessor utilizes this relationship to obtain a density signal.

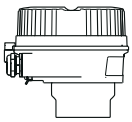
Temperature measurement
The temperature of the measuring tube is determined in order to calculate the compensation factor due to temperature effects. This signal corresponds to the process temperature and is also available as an output signal.

Measuring system

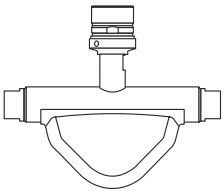
The device consists of a transmitter and a sensor. If a device with Modbus RS485 intrinsically safe is ordered, the Safety Barrier Promass 100 is part of the scope of supply and must be implemented to operate the device.

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

Transmitter

CNGmass  A0016693	Device versions and materials: Compact, aluminum, coated: Aluminum, AlSi10Mg, coated Configuration: Via operating tools (e.g. FieldCare, DeviceCare)

Sensor

CNGmass
 
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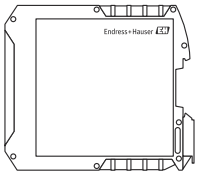
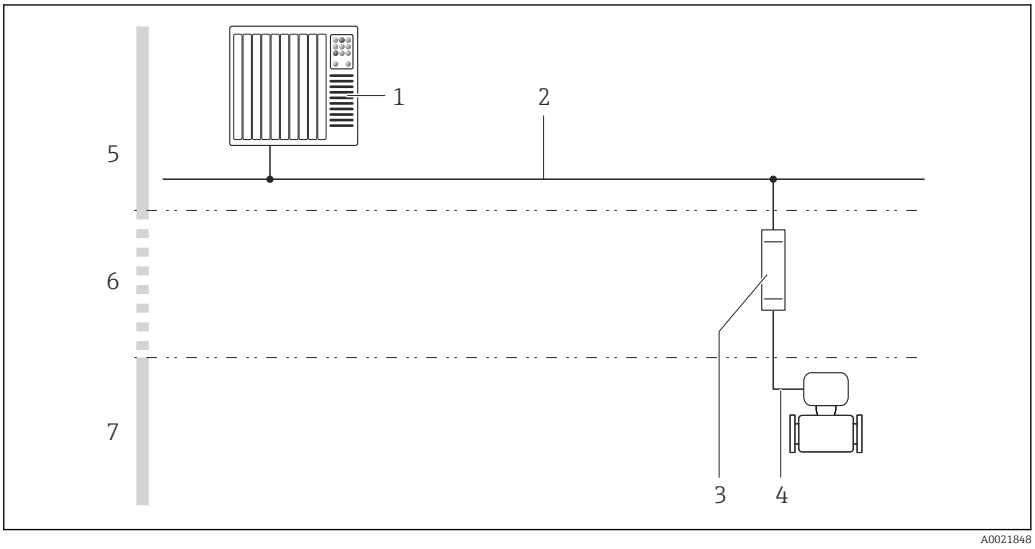
	▪ Simultaneous measurement of flow, density and temperature (multivariable)
	▪ Nominal diameter range: DN 8 to 25 (⅜ to 1")
	▪ Materials:
	  ▪ Sensor: stainless steel, 1.4301 (304)
	  ▪ Measuring tubes: stainless steel, 1.4435 (316L)
	  ▪ Process connections: stainless steel, 1.4404 (316/316L)
	▪ Maximum working pressure: 350 bar (5 080 psi)
	▪ Overpressure limit: 525 bar (7 614 psi)

Safety Barrier Promass 100



- Dual-channel safety barrier for installation in non-hazardous locations or zone 2/div. 2:
  - Channel 1: DC 24 V power supply
  - Channel 2: Modbus RS485
- In addition to current, voltage and power limitation, it offers galvanic isolation of circuits for explosion protection.
- Easy top-hat rail mounting (DIN 35 mm) for installation in control cabinets

Equipment architecture



1 Possibilities for integrating measuring devices into a system

1 *Control system (e.g. PLC)*
2 *Modbus RS485*
3 *Safety Barrier Promass 100*
4 *Modbus RS485 intrinsically safe*
5 *Non-hazardous area*
6 *Non-hazardous area and Zone 2/Div. 2*
7 *Hazardous area and Zone 1/Div. 1*

Security

IT security

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

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

Input

Measured variable

Direct measured variables

- Mass flow
- Density
- Temperature

Calculated measured variables

–

Measuring range

Measuring ranges for Compressed Natural Gas (CNG), non-custody transfer operation

DN		Measuring range full scale values $\dot{m}_{min(F)}$ to $\dot{m}_{max(F)}$	
[mm]	[in]	[kg/min]	[lb/min]
8	⅜	0 to 30	0 to 66
15	½	0 to 80	0 to 175
25	1	0 to 150	0 to 330

The values of the corresponding custody transfer certificate apply in custody transfer mode.

Recommended measuring range

Flow limit → 🖹 18

Operable flow range

Over 1000 : 1.

Flow rates above the preset full scale value do not override the electronics unit, with the result that the totalizer values are registered correctly.

Output

Output signal

Modbus RS485

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

Signal on alarm

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

Modbus RS485

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

Interface/protocol

- Via digital communication:
  Modbus RS485
- Via service interface
  CDI-RJ45 service interface

Plain text display	With information on cause and remedial measures

Additional information on remote operation

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

These values only apply for the following device version:
Order code for "Output", option M "Modbus RS485", for use in intrinsically safe areas

Safety Barrier Promass 100

Safety-related values

Terminal numbers			
Supply voltage		Signal transmission	
2 (L-)	1 (L+)	26 (B)	27 (A)
U_{nom} = DC 24 V U_{max} = AC 260 V		U_{nom} = DC 5 V U_{max} = AC 260 V	

Intrinsically safe values

Terminal numbers			
Supply voltage		Signal transmission	
20 (L-)	10 (L+)	62 (B)	72 (A)
U_o = 16.24 V I_o = 623 mA P_o = 2.45 W			
For an overview and for information on the interdependencies between the gas group - sensor - nominal diameter, see the "Safety Instructions" (XA) document for the measuring device			

Transmitter

Intrinsically safe values

Order code "Approval"	Terminal numbers			
	Supply voltage		Signal transmission	
	20 (L-)	10 (L+)	62 (B)	72 (A)
▪ Option **BM**: ATEX II2G + IECEx Z1 Ex ia, II2D Ex tb ▪ Option **BU**: ATEX II2G + IECEx Z1 Ex ia ▪ Option **C2**: CSA C/US IS Cl. I, II, III Div. 1 ▪ Option **MM**: INMETRO Ex ia Zone 1 ▪ Option **NG**: NEPSI Ex ia Zone 1 ▪ Option **85**: ATEX II2G + IECEx Z1 Ex ia + CSA C/US IS Cl. I, II, III Div. 1	U_i = 16.24 V I_i = 623 mA P_i = 2.45 W L_i = 0 µH C_i = 6 nF			
For an overview and for information on the interdependencies between the gas group - sensor - nominal diameter, see the "Safety Instructions" (XA) document for the measuring device				

Low flow cut off

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

Protocol-specific data

Modbus RS485

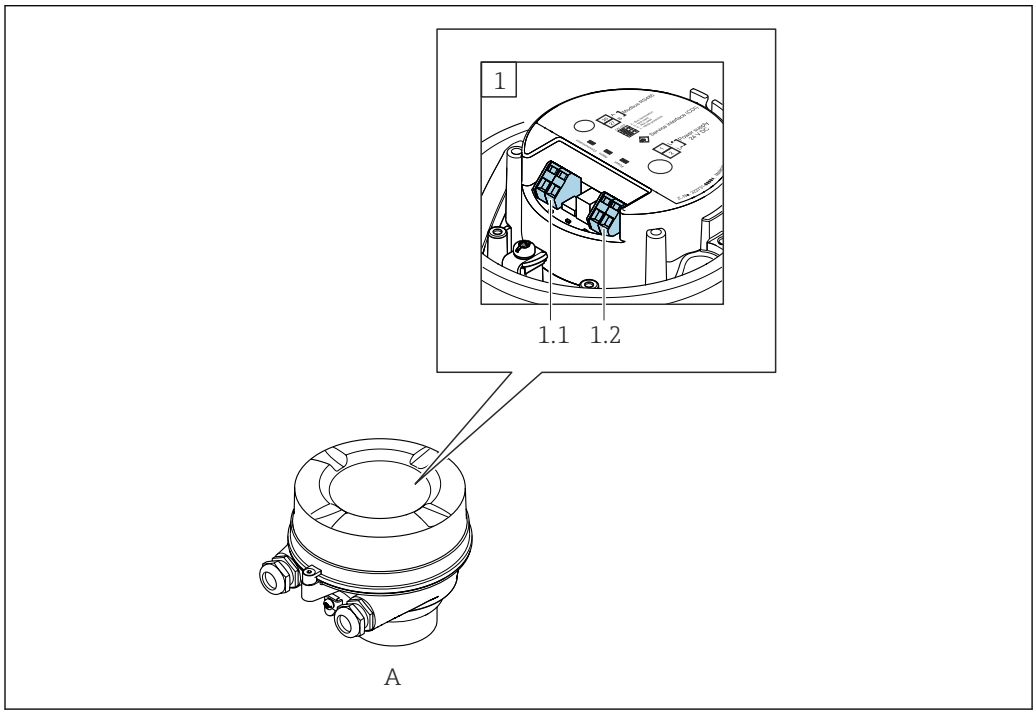
Protocol	Modbus Applications Protocol Specification V1.1
Device type	Slave
Slave address range	1 to 247
Broadcast address range	0
Function codes	▪ 03: Read holding register ▪ 04: Read input register ▪ 06: Write single registers ▪ 08: Diagnostics ▪ 16: Write multiple registers ▪ 23: Read/write multiple registers

Broadcast messages	Supported by the following function codes: ▪ 06: Write single registers ▪ 16: Write multiple registers ▪ 23: Read/write multiple registers
Supported baud rate	▪ 1200 BAUD ▪ 2400 BAUD ▪ 4800 BAUD ▪ 9600 BAUD ▪ 19200 BAUD ▪ 38400 BAUD ▪ 57600 BAUD ▪ 115200 BAUD
Data transfer mode	▪ ASCII ▪ RTU
Data access	Each device parameter can be accessed via Modbus RS485. For Modbus register information, see "Description of device parameters" documentation → 🖹 26

Power supply

Terminal assignment

Overview: housing version and connection versions



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A Housing version: compact, aluminum coated
1 Connection version: Modbus RS485
1.1 Signal transmission
1.2 Supply voltage

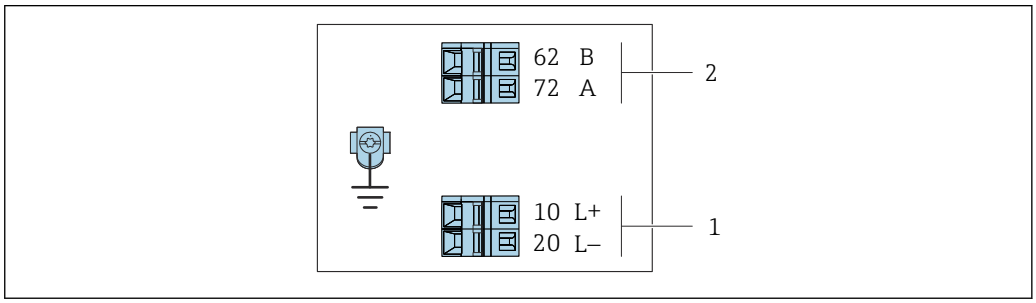
Transmitter

Modbus RS485 connection version

For use in the intrinsically safe area. Connection via Safety Barrier Promass 100.

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

Order code "Housing"	Connection methods available		Possible options for order code "Electrical connection"
	Output	Power supply	
Options **A**	Terminals	Terminals	▪ Option **B**: thread M20x1 ▪ Option **C**: thread G ½" ▪ Option **D**: thread NPT ½"
Order code for "Housing": Option **A**: compact, coated aluminum			

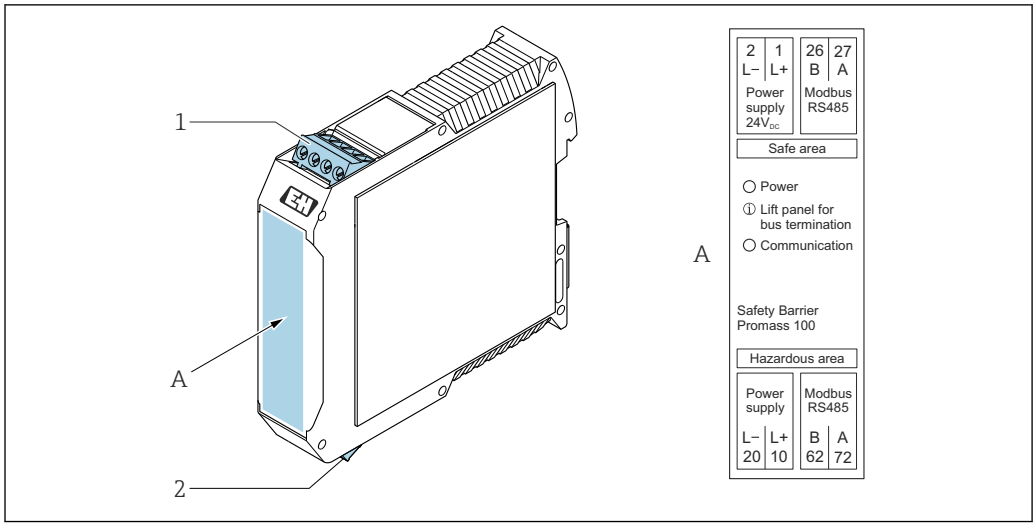


2 *Modbus RS485 terminal assignment, connection version for use in intrinsically safe areas (connection via Safety Barrier Promass 100)*

1 *Intrinsically safe power supply*
2 *Modbus RS485*

Order code "Output"	10 (L+)	20 (L-)	62 (B)	72 (A)
Option **M**	Intrinsically safe supply voltage		Modbus RS485 intrinsically safe	
Order code for "Output": Option **M**: Modbus RS485, for use in the intrinsically safe area (connection via Safety Barrier Promass 100)				

Safety Barrier Promass 100



3 Safety Barrier Promass 100 with terminals

1 Non-hazardous area, Zone 2, Class I Division 2
2 Intrinsically safe area

Supply voltage

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

Transmitter

For device version with communication type:
Modbus RS485, device version:
- For use in the non-hazardous area and Zone 2/Div. 2: DC 20 to 30 V
- For use in the intrinsically safe area: power supply via Safety Barrier Promass 100

Promass 100 safety barrier

DC 20 to 30 V

Power consumption

Transmitter

Order code for "Output"	Maximum Power consumption
Option **M**: Modbus RS485, for use in intrinsically safe areas	2.45 W

Promass 100 safety barrier

Order code for "Output"	Maximum Power consumption
Option **M**: Modbus RS485, for use in intrinsically safe areas	4.8 W

Current consumption

Transmitter

Order code for "Output"	Maximum Current consumption	Maximum switch-on current
Option **M**: Modbus RS485, for use in intrinsically safe areas	145 mA	16 A (< 0.4 ms)

Promass 100 safety barrier

Order code for "Output"	Maximum Current consumption	Maximum switch-on current
Option **M**: Modbus RS485, for use in intrinsically safe areas	230 mA	10 A (< 0.8 ms)

Device fuse

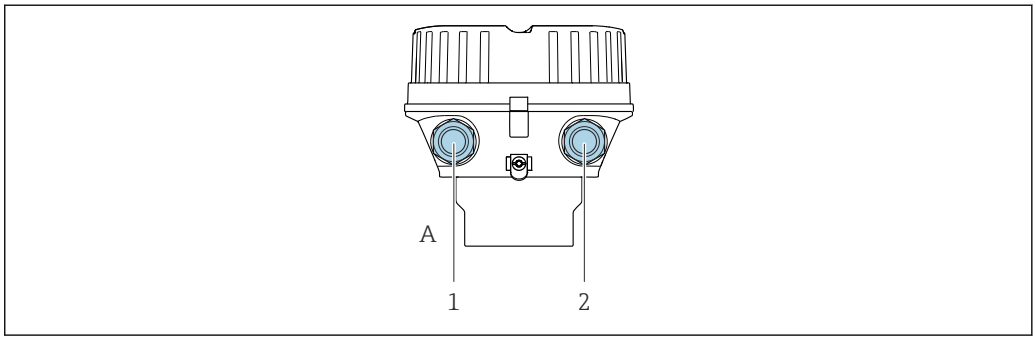
Fine-wire fuse (slow-blow) T2A

Power supply failure

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

Electrical connection

Connecting the transmitter



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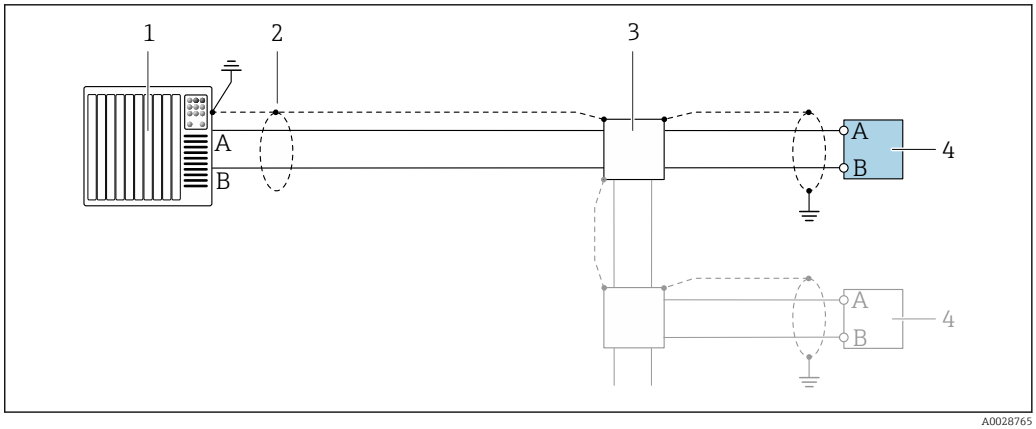
A Housing version: compact, coated, aluminum
1 Cable entry for signal transmission
2 Cable entry for supply voltage

Terminal assignment→ 8

Connection examples

Modbus RS485

Modbus RS485, non-hazardous area and Zone 2/Div. 2



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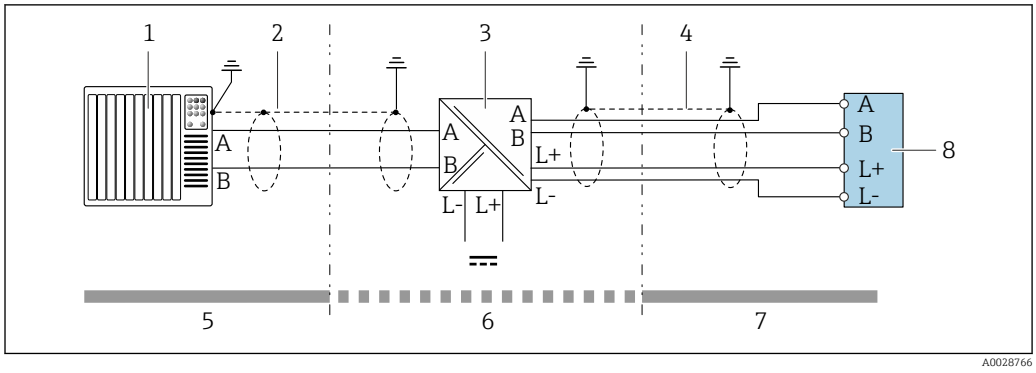
4 *Connection example for Modbus RS485, non-hazardous area and Zone 2/Div. 2*

1 Control system (e.g. PLC)
2 Cable shield provided at one end. The cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications → 12
3 Distribution box
4 Transmitter

Modbus RS485 intrinsically safe



5 Connection example for Modbus RS485 intrinsically safe

1 *Control system (e.g. PLC)*
2 *Cable shield provided at one end. Observe cable specifications*
3 *Safety Barrier Promass 100*
4 *Observe cable specifications*
5 *Non-hazardous area*
6 *Non-hazardous area and Zone 2/Div. 2*
7 *Intrinsically safe area*
8 *Transmitter*

Potential equalization

Requirements

For potential equalization:
- Pay attention to in-house grounding concepts
- Take account of operating conditions like the pipe material and grounding
- Connect the medium, sensor and transmitter to the same electrical potential
- Use a ground cable with a minimum cross-section of 6 mm² (0.0093 in²) and a cable lug for potential equalization connections

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

Terminals

Transmitter

Spring terminals for wire cross-sections0.5 to 2.5 mm² (20 to 14 AWG)

Promass 100 safety barrier

Plug-in screw terminals for wire cross-sections0.5 to 2.5 mm² (20 to 14 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:
  - M20
  - G ½"
  - NPT ½"

Cable specification

Permitted temperature range

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

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

Standard installation cable is sufficient.

Signal cable

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 mm² (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.

Connecting cable between Safety Barrier Promass 100 and measuring device

Cable type	Shielded twisted-pair cable with 2x2 wires. When grounding the cable shield, observe the grounding concept of the plant.
Maximum cable resistance	2.5 Ω, one side

Comply with the maximum cable resistance specifications to ensure the operational reliability of the measuring device.

The maximum cable length for individual wire cross-sections is specified in the table below. Observe the maximum capacitance and inductance per unit length of the cable and connection values for hazardous areas .

Wire cross-section		Maximum cable length	
[mm²]	[AWG]	[m]	[ft]
0.5	20	70	230
0.75	18	100	328
1.0	17	100	328
1.5	16	200	656
2.5	14	300	984

Performance characteristics

Reference operating conditions

- Error limits based on ISO 11631
- Water with +15 to +45 °C (+59 to +113 °F) at 2 to 6 bar (29 to 87 psi)
- Specifications as per calibration protocol
- Accuracy based on accredited calibration rigs that are traced to ISO 17025.

To obtain measured errors, use the *Applicator* sizing tool → 📄 25

Maximum measured error

Base accuracy

Mass flow (gases)

±0.50 % of the quantity filled in typical CNG refueling with the coefficients determined during factory recalibration.

Density (liquids)

Temperature

±0.5 °C ± 0.005 · T °C (±0.9 °F ± 0.003 · (T − 32) °F)

Accuracy of outputs

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

The outputs have the following base accuracy specifications.

Repeatability

Base repeatability

Mass flow (gases)

±0.25 % of the quantity filled in typical CNG refueling

Temperature

±0.25 °C ± 0.0025 · T °C (±0.45 °F ± 0.0015 · (T–32) °F)

Response time

- The response time depends on the configuration (damping).
- Response time in the event of erratic changes in the measured variable (mass flow only): After 100 ms → 95 % of full scale value

Influence of medium temperature

Mass flow
If there is a difference between the temperature during zero adjustment and the process temperature, the additional measured error of the sensors is typically ±0.0003 % of the full scale value/°C (±0.00015 % of the full scale value/°F).

The influence is reduced when the zero adjustment is performed at process temperature.

Influence of medium pressure

A difference between the calibration pressure and process pressure does not affect accuracy.

Design fundamentals

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

BaseAccu = base accuracy in % o.r., BaseRepeat = base repeatability in % o.r.

MeasValue = measured value; ZeroPoint = zero point stability

Calculation of the maximum measured error as a function of the flow rate

Flow rate	Maximum measured error in % o.r.
$\geq \frac{\text{ZeroPoint}}{\text{BaseAccu}} \cdot 100$ A0021332	$\pm$ BaseAccu A0021339
$< \frac{\text{ZeroPoint}}{\text{BaseAccu}} \cdot 100$ A0021333	$\pm \frac{\text{ZeroPoint}}{\text{MeasValue}} \cdot 100$ A0021334

Calculation of the maximum repeatability as a function of the flow rate

Flow rate	Maximum repeatability in % o.r.
$\geq \frac{½ \cdot \text{ZeroPoint}}{\text{BaseRepeat}} \cdot 100$ A0021335	$\pm$ BaseRepeat A0021340
$< \frac{½ \cdot \text{ZeroPoint}}{\text{BaseRepeat}} \cdot 100$ A0021336	$\pm ½ \cdot \frac{\text{ZeroPoint}}{\text{MeasValue}} \cdot 100$ A0021337

Mounting

Inlet and outlet runs

No special precautions need to be taken for fittings that create turbulence, such as valves, elbows or T-pieces, as long as no cavitation occurs .

Special mounting instructions

Rupture disk

Process-related information: → 18.

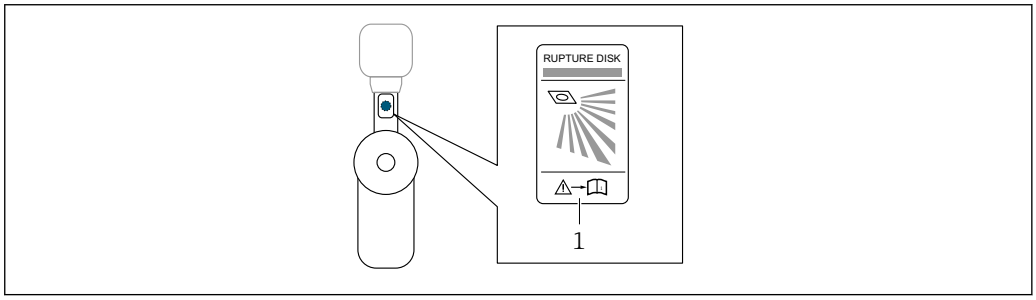
WARNING

Danger from medium escaping!

Medium escaping under pressure can cause injury or material damage.

- Take precautions to prevent danger to persons and damage if the rupture disk is actuated.
- Observe the information on the rupture disk sticker.
- Make sure that the function and operation of the rupture disk is not impeded through the installation of the device.
- Do not use a heating jacket.
- Do not remove or damage the rupture disk.

The position of the rupture disk is indicated on a sticker applied over it. If the rupture disk is triggered, the sticker is destroyed. The disk can therefore be visually monitored.



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1 Rupture disk label

Zero point verification and zero adjustment

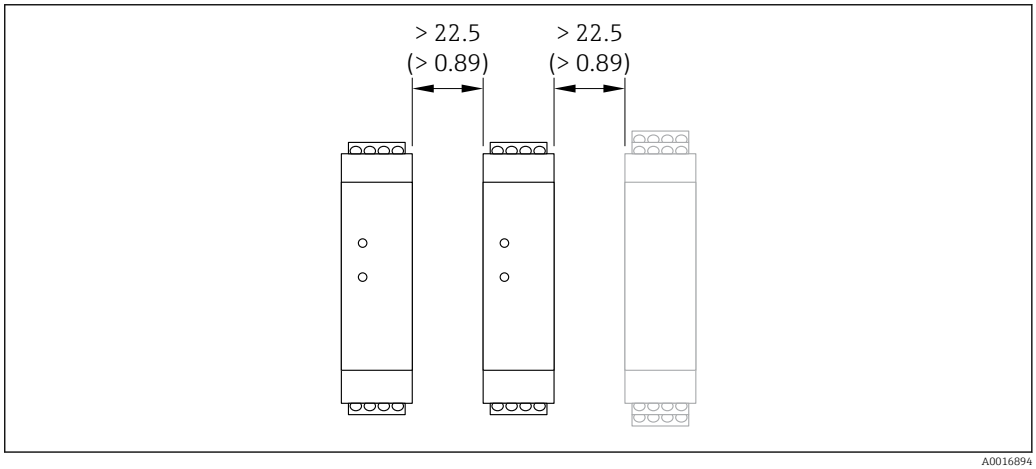
All measuring devices are calibrated in accordance with state-of-the-art technology. Calibration takes place under reference conditions → 13. Therefore, a zero adjustment in the field is generally not required.

Experience shows that zero adjustment is advisable only in special cases:

- To achieve maximum measuring accuracy even with low flow rates.
- Under extreme process or operating conditions (e.g. very high process temperatures or very high-viscosity fluids).

For information on checking the zero point and performing a zero adjustment, see the Operating Instructions for the device.

Installing the Safety Barrier Promass 100



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6 Minimum distance between additional Safety Barrier Promass 100 or other modules. Engineering unit mm (in)

Environment

Ambient temperature range

Measuring device	−40 to +60 °C (−40 to +140 °F)
Safety Barrier Promass 100	−40 to +60 °C (−40 to +140 °F)

▶ If operating outdoors:
Avoid direct sunlight, particularly in warm climatic regions.

Storage temperature

−40 to +60 °C (−40 to +140 °F)

Climate class

DIN EN 60068-2-38 (test Z/AD)

Degree of protection

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

Safety Barrier Promass 100
IP20

Vibration- and shock-resistance

Vibration sinusoidal, in accordance with IEC 60068-2-6

Vibration broad-band random, according to IEC 60068-2-64

Shock half-sine, according to IEC 60068-2-27

Rough handling shocks, according to IEC 60068-2-31

Electromagnetic compatibility (EMC)
- Depends on the communication protocol:
  Modbus RS485:
  As per IEC/EN 61326 and NAMUR Recommendation 21 (NE 21)
- Complies with emission limits for industry as per EN 55011 (Class A)

Details are provided in the Declaration of Conformity.

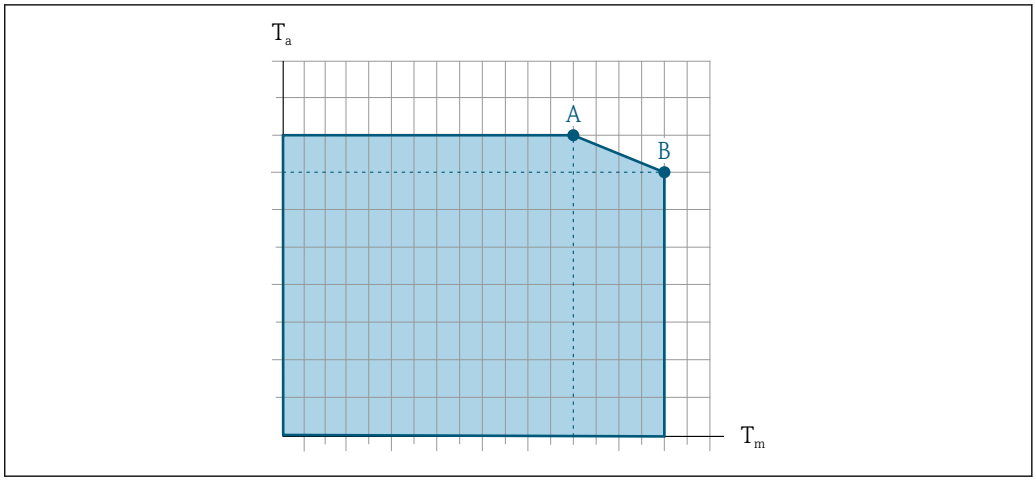
This unit is not intended for use in residential environments and cannot guarantee adequate protection of the radio reception in such environments.

Process

Medium temperature range

−50 to +125 °C (−58 to +257 °F)

Dependency of ambient temperature on medium temperature



7 *Exemplary representation, values in the table below.*

T_a *Ambient temperature*
T_m *Medium temperature*
A *Maximum permitted medium temperature T_m at $T_{a\,max}$ = 60 °C (140 °F); higher medium temperatures T_m require a reduction in the ambient temperature T_a*
B *Maximum permitted ambient temperature T_a for the maximum specified medium temperature T_m of the sensor*

Values for devices that are used in the hazardous area:
Separate Ex documentation (XA) for the device .

Maximum working pressure

350 bar (5 080 psi)

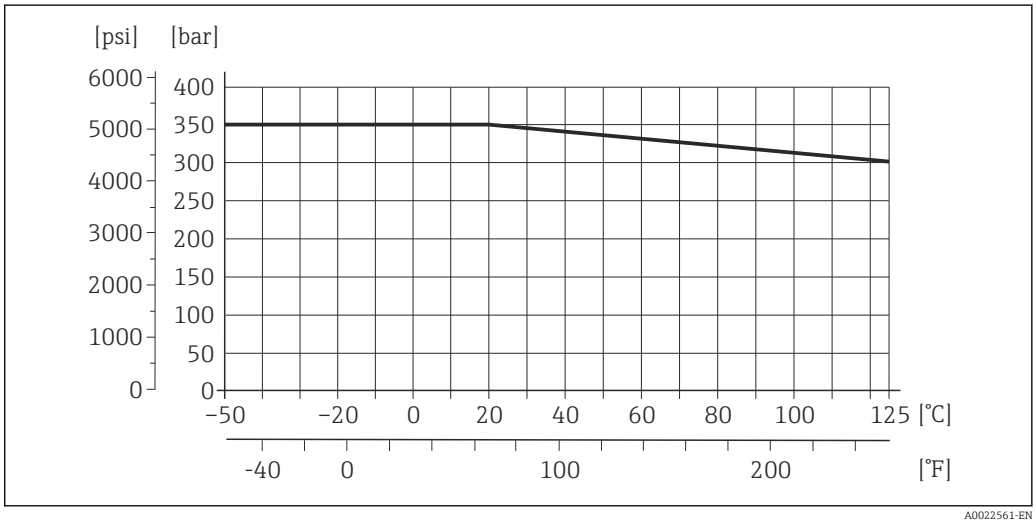
Density

0 to 5 000 kg/m³ (0 to 312 lb/cf)

Pressure/temperature ratings

The following pressure/temperature diagrams apply to all pressure-bearing parts of the device and not just the process connection. The diagrams show the maximum permissible medium pressure depending on the specific medium temperature.

Process connection: cylindrical internal thread BSP (G) according to ISO 228-1



8 *Process connection material: 1.4404 (316/316L)*

Sensor housing

The sensor housing is filled with dry nitrogen gas and protects the electronics and mechanics inside.

Burst pressure of the sensor housing

The device is always fitted with a rupture disk. Trigger pressure:

Rupture disk

Trigger pressure in housing: 10 to 15 bar (145 to 218 psi)

Flow limit

Select the nominal diameter by optimizing between the required flow range and permissible pressure loss.

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

- The minimum recommended full scale value is approx. 1/20 of the maximum full scale value
- In most applications, 20 to 50 % of the maximum full scale value can be considered ideal
- A low full scale value must be selected for abrasive media (such as liquids with entrained solids): flow velocity < 1 m/s (< 3 ft/s).

To calculate the flow limit, use the *Applicator* sizing tool → 25

Pressure loss

To calculate the pressure loss, use the *Applicator* sizing tool → 25

Vibrations

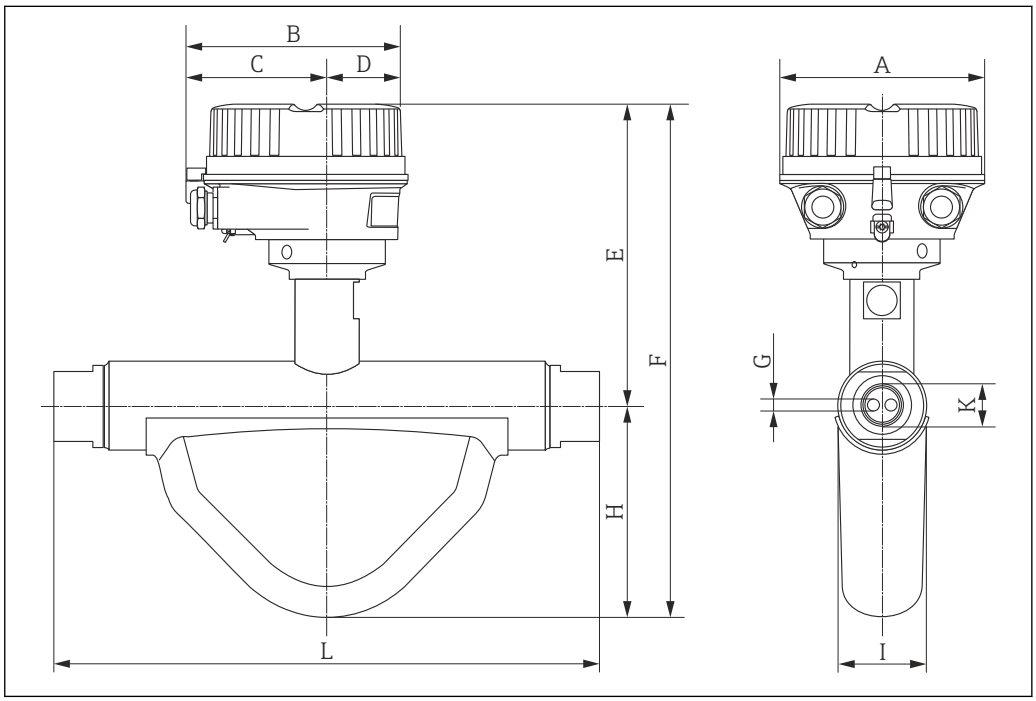
The high oscillation frequency of the measuring tubes ensures that the correct operation of the measuring system is not influenced by plant vibrations.

Mechanical construction

Dimensions in SI units

Compact version

Order code for "Housing", option A "Alu"



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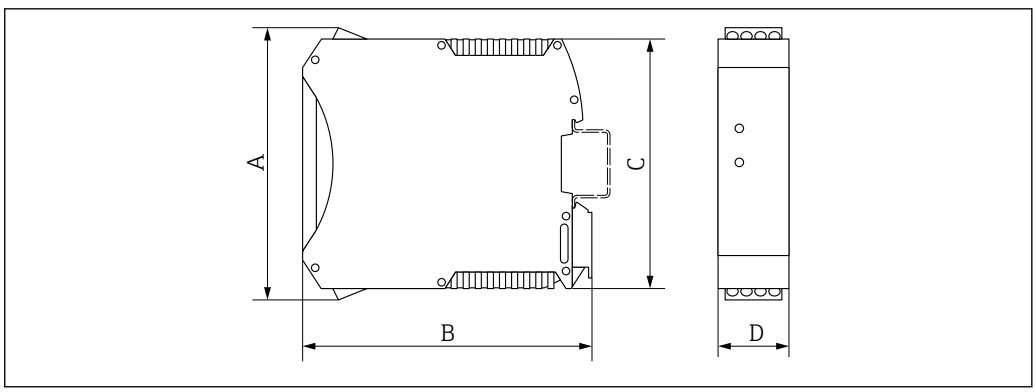
DN [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E E [mm]	F [mm]	G [mm]	H [mm]	I [mm]	K [in]	L [mm]
8	136	147.5	93.5	54	177	266	3.87	89	40	G½	214
15	136	147.5	93.5	54	177	277	6.23	100	38	G¾	267
25	136	147.5	93.5	54	174	276	8.80	102	48	G1	316

Safety Barrier Promass 100

Top-hat rail EN 60715:
- TH 35 x 7.5
- TH 35 x 15



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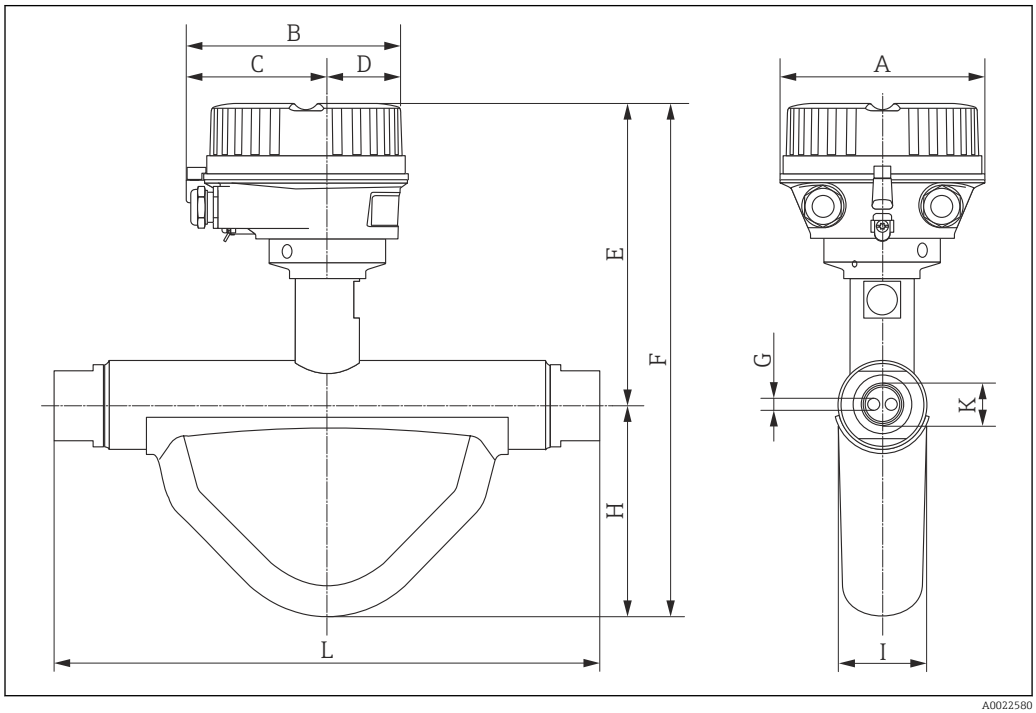
A	B	C	D
[mm]	[mm]	[mm]	[mm]
108	114.5	99	22.5

Dimensions in US units

Compact version

Order code for "Housing", option A "Alu"



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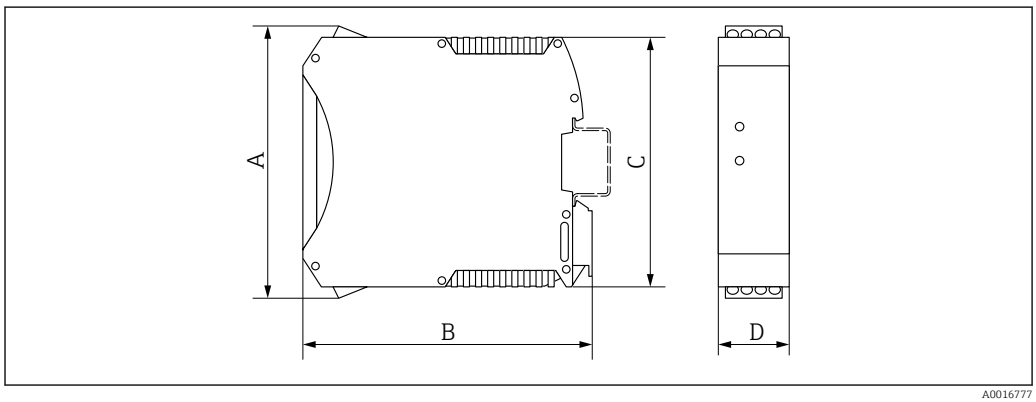
DN [in]	A [in]	B [in]	C [in]	D [in]	E E [in]	F [in]	G [in]	H [in]	I [in]	K [in]	L [in]
⅜	5.35	5.81	3.68	2.13	6.97	10.47	0.15	3.50	1.57	G½	8.43
½	5.35	5.81	3.68	2.13	6.97	10.91	0.25	3.94	1.50	G¾	10.5
1	5.35	5.81	3.68	2.13	6.85	10.87	0.35	4.02	1.89	G1	12.4

Safety Barrier Promass 100

Top-hat rail EN 60715:
- TH 35 x 7.5
- TH 35 x 15



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A	B	C	D
[in]	[in]	[in]	[in]
4.25	4.51	3.9	0.89

Design, dimensions

For the dimensions and installation lengths of the device, see the "Technical Information" document, "Mechanical construction" section .

Weight

Compact version

Weight in SI units

DN [mm]	Weight [kg]
8	3.8
15	4.4
25	5.1

Weight in US units

DN [in]	Weight [lbs]
⅜	8.4
½	9.7
1	11.3

Safety Barrier Promass 100

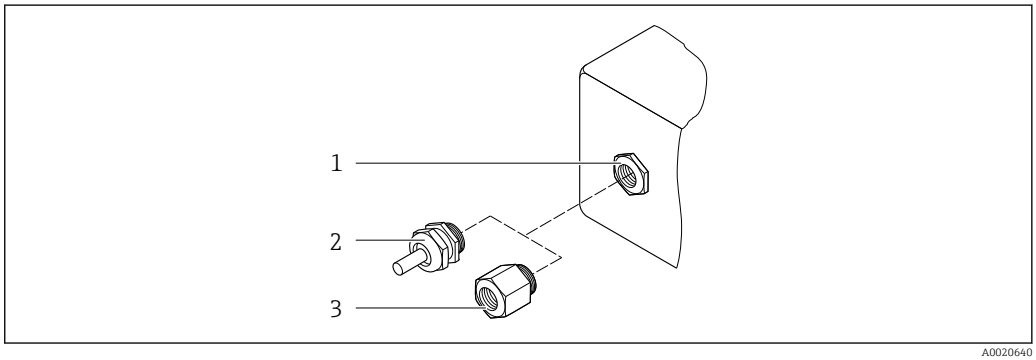
49 g (1.73 ounce)

Materials

Transmitter housing

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

Cable entries/cable glands



9 *Possible cable entries/cable glands*

1 *Female thread M20 × 1.5*
2 *Cable gland M20 × 1.5*
3 *Adapter for cable entry with female thread G ½" or NPT ½"*

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

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

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

Device plug

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

Sensor housing

- Acid and alkali-resistant outer surface
- Stainless steel 1.4301 (304)

Measuring tubes

Stainless steel, 1.4435 (316L)

Process connections/manifolds

For all process connections/manifolds:
Stainless steel, 1.4404 (316/316L)

Available process connections→ 22

Seals

Welded process connections without internal seals

Safety Barrier Promass 100

Housing: Polyamide

Process connections

- Fixed flange connections:
- Internal thread:
  Cylindrical internal thread BSPP (G) in accordance with ISO 228-1 with sealing surfaces in accordance with DIN 3852-2/ISO 1179-1

Sealed with profile seal (not included in scope of delivery) in accordance with DIN 3869 or copper disk or steel gasket with plastic lip.

Process connection materials → 22

Surface roughness

All data refer to parts in contact with the medium. The following surface roughness categories can be ordered.
Ra_{max} = 0.8 µm (32 µin)

Operability

Operating concept

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

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

Reliable operation
Operation in the following languages:
Via "FieldCare", "DeviceCare" operating tool:
English, German

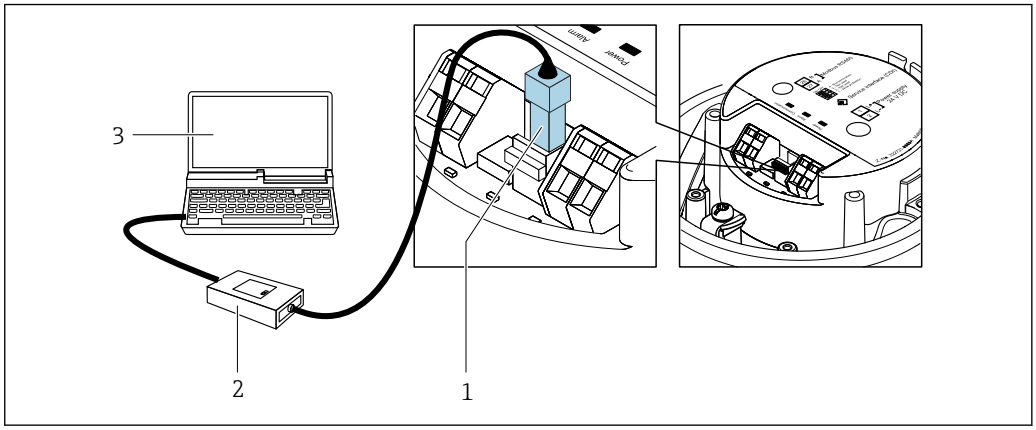
Efficient diagnostics increase measurement availability
- Troubleshooting measures can be called up via the operating tools
- Diverse simulation options
- Status indicated by several light emitting diodes (LEDs) on the electronic module in the housing compartment

Service interface

Via service interface (CDI)

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

Modbus RS485



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

Certificates and approvals

Current certificates and approvals that are available for the product can be selected via the Product Configurator at www.endress.com:

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

CE mark

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

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

UKCA marking

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

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

RCM mark

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 ia

Category (ATEX)	Type of protection
II2G	Ex ia IIC T6...T1 Gb or Ex ia IIB T6...T1 Gb
II1/2G, II2D	Ex ia IIC T6...T1 Ga/Gb or Ex ia IIB T6...T1 Ga/Gb Ex tb IIIC Txx °C Db
II2G, II2D	Ex ia IIC T6...T1 Gb or Ex ia IIB T6...T1 Gb Ex tb IIIC Txx °C Db

$_{C}$CSA$_{US}$

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

IS (Ex i)
- Class I Division 1 Groups ABCD
- Class II Division 1 Groups EFG and Class III

Modbus RS485 certification

The measuring device meets all the requirements of the MODBUS RS485 conformity test and has the "MODBUS RS485 Conformance Test Policy, Version 2.0". The measuring device has successfully passed all the test procedures carried out.

Ordering information

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

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

3. Select **Configuration**.

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

Accessories

Various accessories, which can be ordered 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.

Communication-specific accessories

Accessories	Description
Commubox FXA291	Connects Endress+Hauser field devices with a CDI interface (= Endress+Hauser Common Data Interface) and the USB port of a computer or laptop. Technical Information TI405C/07

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://portal.endress.com/webapp/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, see: 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. Operating Instructions BA00027S and BA00059S
DeviceCare	Tool to connect and configure Endress+Hauser field devices. Innovation brochure IN01047S
Commubox FXA291	Connects Endress+Hauser field devices with a CDI interface (= Endress +Hauser Common Data Interface) and the USB port of a computer or laptop. Technical Information TI00405C

Supplementary documentation

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

Standard documentation

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

Brief Operating Instructions

Measuring device	Documentation code
CNGmass	KA01170D

Operating Instructions

Measuring device	Documentation code
CNGmass	BA01283D

Supplementary device-dependent documentation

Safety instructions

Contents	Documentation code
ATEX/IECEx Ex i	XA01251D
cCSAus IS	XA01252D
INMETRO Ex i	XA01253D
NEPSI Ex i	XA01254D

Special Documentation

Contents	Documentation code
Modbus RS485 register information	SD01166D

Installation Instructions

Contents	Comment
Installation instructions for spare part sets and accessories	Documentation code: specified for each individual accessory .

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www.addresses.endress.com

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People for Process Automation