



Level



Pressure



Flow



Temperature

Liquid
Analysis

Registration

Systems
Components

Services



Solutions

Technical Information

Proline Promass 840

Coriolis Mass Flow Measuring System

The universal and multivariable flowmeter for liquids and gases



Application

The Coriolis measuring principle operates independently of the physical fluid properties, such as viscosity and density.

- Extremely accurate measurement of liquids and gases such as oils, lubricants, fuels, liquefied gases, solvents, and compressed gases
- Fluid temperatures up to +200 °C (+392°F)
- Process pressures up to 258.6 bar (3750 psi)
- Mass flow measurement up to 800 t/h (29 400 lb/min)

Approvals for hazardous area:

- ATEX, FM, CSA, TIIS, IECEx, NEPSI

Connection to all common process control systems:

- HART, Modbus

Relevant safety aspects:

- Secondary containment up to 16 bar (232 psi), Pressure Equipment Directive, AD 2000
- Purge connections or rupture disk

Your benefits

The Promass measuring devices make it possible to simultaneously record several process variables (mass/density/temperature) for various process conditions during measuring operation.

The **Proline transmitter concept** comprises:

- Modular device and operating concept resulting in a higher degree of efficiency
- Software options for batching and concentration measurement for extended range of application
- Diagnostic ability and data back-up for increased process quality

The **Promass sensors**, tried and tested in over 100 000 applications, offer:

- Best performance due to PremiumCal
- Multivariable flow measurement in compact design
- Insensitivity to vibrations thanks to balanced two-tube measuring system
- Immune from external piping forces due to robust design
- Easy installation without taking inlet and outlet runs into consideration

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Function and system design

Measuring principle

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

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

F_C = Coriolis force

Δm = moving mass

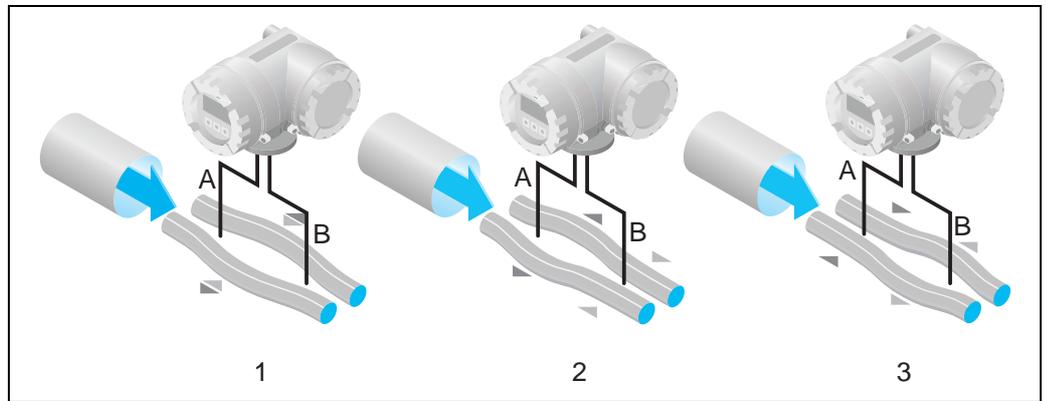
ω = rotational velocity

v = velocity of the moving mass in a 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 angular velocity ω , the Promass sensor uses oscillation.

The measuring tubes through which the measured material flows are brought into oscillation. The Coriolis forces produced at the measuring tubes cause a phase shift in the tube oscillations (see illustration):

- At zero flow, in other words when the fluid is at a standstill, the two tubes oscillate in phase (1).
- Mass flow causes deceleration of the oscillation at the inlet of the tubes (2) and acceleration at the outlet (3).



The phase difference (A-B) increases with increasing mass flow. Electrodynamic sensors register the tube oscillations at the inlet and outlet.

System balance is ensured by the antiphase oscillation of the two measuring tubes. The measuring principle operates independently of temperature, pressure, viscosity, conductivity and flow profile.

Density measurement

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

Temperature measurement

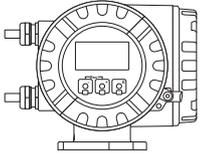
The temperature of the measuring tubes is determined in order to calculate the compensation factor due to temperature effects. This signal corresponds to the process temperature and is also available as an output.

Measuring system

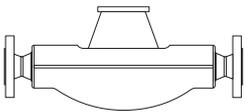
The measuring system consists of a transmitter and a sensor. Two versions are available:

- Compact version: transmitter and sensor form a mechanical unit
- Remote version: transmitter and sensor are mounted physically separate from one another

Transmitter

<p>Promass 84</p>  <p style="text-align: right; font-size: small;">a0003672</p>	<ul style="list-style-type: none"> ■ Four-line liquid-crystal display ■ Operation with "Touch control" ■ Application-specific Quick Setup ■ Mass flow, volume flow, density and temperature measurement as well as calculated variables (e.g. fluid concentrations)
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Sensor Promass O

 <p style="text-align: right; font-size: small;">a0003673</p>	<ul style="list-style-type: none"> ■ Universal sensor for fluid temperatures up to +200 °C (+392 °F). ■ Nominal diameters DN 80 to 150 (3" to 6"). ■ Material: Stainless Steel <ul style="list-style-type: none"> – 25Cr duplex EN 1.4410/ASTM UNS S32750 (superduplex) – EN1.4404/ASTM 316L
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Input**Measured variable**

- Mass flow (proportional to the phase difference between two sensors mounted on the measuring tube to register a phase shift in the oscillation)
- Fluid density (proportional to resonance frequency of the measuring tube)
- Fluid temperature (measured with temperature sensors)

Measuring range**Measuring ranges for liquids**

DN		Range for full scale values (liquids) $\dot{m}_{\min(F)}$ to $\dot{m}_{\max(F)}$	
[mm]	[inch]	[kg/h]	[lb/min]
80	3	0 to 180000	0 to 6600
100	4	0 to 350000	0 to 12860
150	6	0 to 800000	0 to 29400

Measuring ranges for gases

The full scale values depend on the density of the gas. Use the formula below to calculate the full scale values:

$$\dot{m}_{\max(G)} = \dot{m}_{\max(F)} \cdot \rho_{(G)} \div x \text{ [kg/m}^3 \text{ (lb/ft}^3\text{)]}$$

$$\dot{m}_{\max(G)} = \text{max. full scale value for gas [kg/h (lb/min)]}$$

$$\dot{m}_{\max(F)} = \text{max. full scale value for liquid [kg/h (lb/min)]}$$

$$\rho_{(G)} = \text{gas density in [kg/m}^3 \text{ (lb/ft}^3\text{)] under process conditions}$$

DN		X
[mm]	[inch]	
80	3	110
100	4	130
150	6	200

Here, $\dot{m}_{\max(G)}$ can never be greater than $\dot{m}_{\max(F)}$

Calculation example for gas:

- Sensor type: Promass O, DN 80
- Gas: air with a density of 60.3 kg/m³ (at 20 °C and 50 bar)
- Measuring range (liquid): 180000 kg/h
- x = 130 (for Promass O, DN 80)

Max. possible full scale value:

$$\dot{m}_{\max(G)} = \dot{m}_{\max(F)} \cdot \rho_{(G)} \div x \text{ [kg/m}^3\text{]} = 180000 \text{ kg/h} \cdot 60.3 \text{ kg/m}^3 \div 130 \text{ kg/m}^3 = 83500 \text{ kg/h}$$

Recommended measuring ranges:

See information in the "Limiting flow" Section →  16

Measuring range in custody transfer mode
MI-005 Evaluation Certificate

The following are example data for MI-005 Evaluation Certificate (liquids other than water).

Measuring ranges for liquids in mass flow

DN		Mass flow (liquids) Q _{min} to Q _{max}		Smallest measured quantity	
[mm]	[inch]	[t/h]	[tn. sh./h]	[kg]	[lbs]
80	3	9 to 80	9.92 to 198.42	200	441
100	4	12 to 270	12.33 to 297.62	200	441
150	6	15 to 720	16.54 to 793.66	500	1102.5

Measuring ranges for liquids in volume flow

DN		Volume flow Q _{min} to Q _{max}		Smallest measured quantity	
[mm]	[inch]	[m ³ /h]	[gal/h]	[l]	[gal]
80	3	9 to 180	2378 to 47551	200	52.8
100	4	12 to 270	3170 to 71326	200	52.8
150	6	15 to 720	3963 to 190200	500	132



Note!

For information about the other approvals → see corresponding certificate.

Operable flow range

Greater than 1000 :1. Flow rates above the preset full scale value do not overload the amplifier, i.e. the totalizer values are registered correctly.

Input signal

Status input (auxiliary input)

U = 3 to 30 V DC, R_i = 5 kΩ, galvanically isolated.

Configurable for: totalizer reset, positive zero return, error message reset, zero point adjustment start, batching start/stop (optional), totalizer reset for batching (optional).

Status input (auxiliary input) with Modbus RS485

U = 3 to 30 V DC, R_i = 3 kΩ, galvanically isolated.

Switch level: ±3 to ±30 V DC, independent of polarity.

Configurable for: totalizer reset, positive zero return, error message reset, zero point adjustment start.

Current input

Active/passive selectable, galvanically isolated, resolution: 2 μA

- Active: 4 to 20 mA, R_L < 700 Ω, U_{out} = 24 V DC, short-circuit proof
- Passive: 0/4 to 20 mA, R_i = 150 Ω, U_{max} = 30 V DC

Output

Output signal

Current output

Active/passive selectable, galvanically isolated, time constant selectable (0.05 to 100 s), full scale value selectable, temperature coefficient: typically 0.005% o.r./°C, resolution: 0.5 μ A (o.r. = of reading)

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

Pulse/frequency output

active/passive selectable, galvanically isolated

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

Modbus interface

- Modbus device type: slave
- Address range: 1 to 247
- Supported function codes: 03, 04, 06, 08, 16, 23
- Broadcast: supported with the function codes 06, 16, 23
- Physical interface: RS485 in accordance with EIA/TIA-485 standard
- Supported baud rate: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud
- Transmission mode: RTU or ASCII
- Response times:
 - Direct data access = typically 25 to 50 ms
 - Auto-scan buffer (data range) = typically 3 to 5 ms
- Possible output combinations →  8

Signal on alarm

Current output

Failsafe mode selectable (e.g. in accordance with NAMUR Recommendation NE 43)

Pulse/frequency output

Failsafe mode selectable

Relay output

Dead in the event of a fault or if the power supply fails

Load

see "Output signal"

Low flow cutoff

Switch points for low flow are selectable.

Galvanic isolation

All circuits for inputs, outputs, and power supply are galvanically isolated from each other.

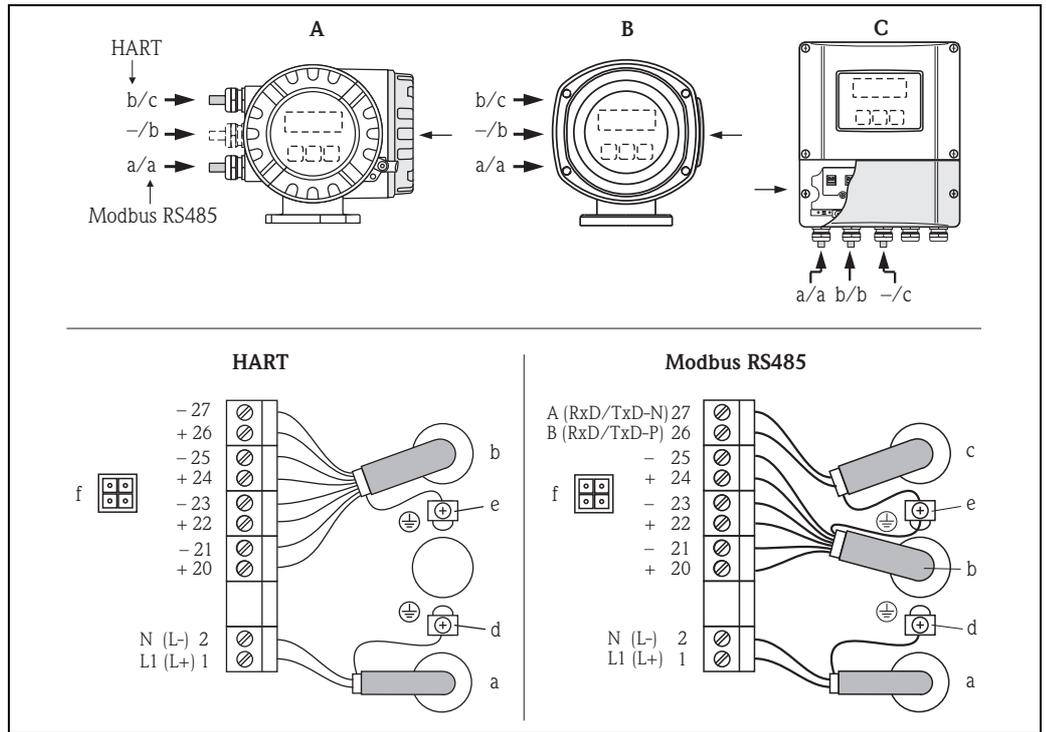
Switching output

Relay output

- max. 30 V / 0.5 A AC; 60 V / 0.1 A DC
- galvanically isolated
- Normally closed (NC or break) or normally open (NO or make) contacts available (factory setting: relay 1 = NO, relay 2 = NC)

Power supply

Electrical connection Measuring unit



Connecting the transmitter, cable cross-section: max. 2.5 mm²

A View A (field housing)

B View B (stainless steel field housing)

C View C (wall-mount housing)

a Cable for power supply: 85 to 260 V AC, 20 to 55 V AC, 16 to 62 V DC

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

– Terminal No 2: N for AC, L- for DC

b Signal cable: Terminal assignment → 8

c Fieldbus cable: Terminal assignment → 8

d Ground terminal for protective earth

e Ground terminal for Signal cable/Modbus RS485 cable

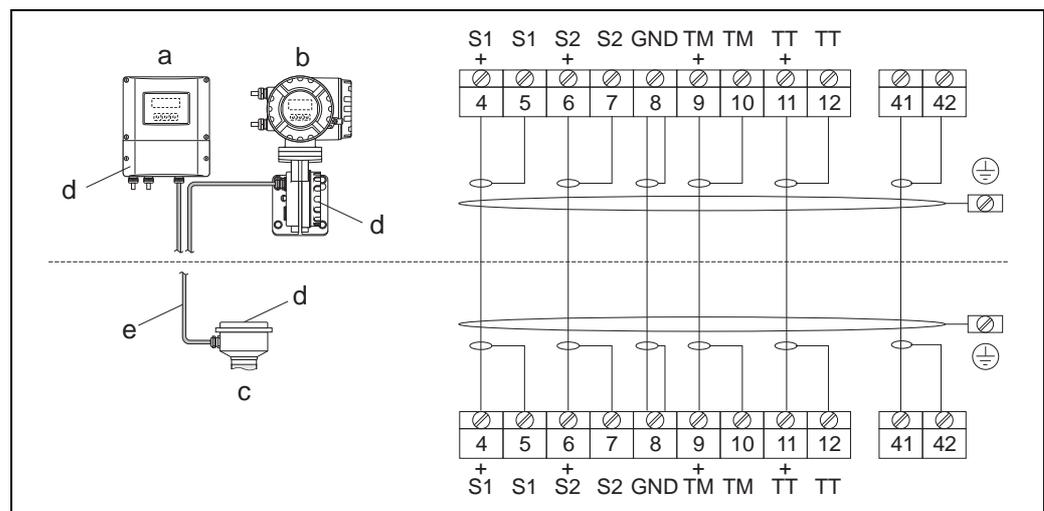
f Service connector for connecting service interface FXA 193 with Proline adapter cable (Fieldcheck, FieldCare)

Electrical connection, terminal assignment

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

Order characteristic for "inputs/outputs"	Terminal No. (inputs/outputs)			
	20 (+) / 21 (-)	22 (+) / 23 (-)	24 (+) / 25 (-)	26 (+) / 27 (-)
<i>Fixed communication boards (permanent assignment)</i>				
S	-	-	Frequency output Ex i, passive	Current output Ex i Active, HART
T	-	-	Frequency output Ex i, passive	Current output Ex i Passive, HART
<i>Flexible communication boards</i>				
D	Status input	Relay output	Frequency output	Current output, HART
M	Status input	Frequency output 2	Frequency output 1	Current output, HART
N	Current output	Frequency output	Status input	Modbus RS485
Q	-	-	Status input	Modbus RS485
1	Relay output	Frequency output 2	Frequency output 1	Current output 1, HART
2	Relay output	Current output 2	Frequency output	Current output 1, HART
7	Relay output 2	Relay output 1	Status input	Modbus RS485

Electrical connection Remote version



Connecting the remote version

- a Wall-mount housing: non-hazardous area and ATEX II3G / zone 2 → see separate "Ex documentation"
- b Wall-mount housing: ATEX II2G / Zone 1 /FM/CSA → see separate "Ex documentation"
- c Connection housing sensor
- d Cover for connection compartment or connection housing
- e Connecting cable

Terminal No.: 4/5 = gray; 6/7 = green; 8 = yellow; 9/10 = pink; 11/12 = white; 41/42 = brown

Supply voltage	85 to 260 V AC, 45 to 65 Hz 20 to 55 V AC, 45 to 65 Hz 16 to 62 V DC
Cable entries	<p><i>Power-supply and signal cables (inputs/outputs):</i></p> <ul style="list-style-type: none"> ■ Cable entry M20 × 1.5 (8 to 12 mm / 0.31" to 0.47") ■ Thread for cable entries, ½" NPT, G ½" <p><i>Connecting cable for remote version:</i></p> <ul style="list-style-type: none"> ■ Cable entry M20 × 1.5 (8 to 12 mm / 0.31" to 0.47") ■ Thread for cable entries, ½" NPT, G ½"
Remote version cable specification	<ul style="list-style-type: none"> ■ 6 × 0.38 mm² (PVC cable with common shield and individually shielded cores) ■ Conductor resistance: ≤ 50 Ω/km (≤0.015 Ω/ft) ■ Capacitance: core/shield: ≤ 420 pF/m (≤128 pF/ft) ■ Cable length: max. 20 m (65 ft) ■ Permanent operating temperature: max. +105 °C (+221 °F) <p>Operation in zones of severe electrical interference: The measuring device complies with the general safety requirements in accordance with EN 61010, the EMC requirements of EN 61326/A1, and NAMUR recommendation NE 21/43.</p>
Power consumption	<p>AC: <15 VA (including sensor) DC: <15 W (including sensor)</p> <p><i>Switch-on current:</i></p> <ul style="list-style-type: none"> ■ Max. 13.5 A (<50 ms) at 24 V DC ■ Max. 3 A (<5 ms) at 260 V AC
Power supply failure	<p>Lasting min. 1 power cycle:</p> <ul style="list-style-type: none"> ■ EEPROM and T-DAT save the measuring system data if the power supply fails. ■ HistoROM/S-DAT: exchangeable data storage chip with sensor specific data (nominal diameter, serial number, calibration factor, zero point, etc.)
Potential equalization	<p>No special measures for potential equalization are required. For instruments for use in hazardous areas, observe the corresponding guidelines in the specific Ex documentation.</p>

Performance characteristics

o.r. = of reading; $1 \text{ g/cm}^3 = 1 \text{ kg/l}$; T = medium temperature

Reference operating conditions

- Error limits following ISO/DIN 11631
- Water, typically +15 to +45 °C (+59 to +113 °F); 2 to 6 bar (29 to 87 psi)
- Data according to calibration protocol $\pm 5 \text{ °C}$ ($\pm 9 \text{ °F}$) and $\pm 2 \text{ bar}$ ($\pm 29 \text{ psi}$)
- Accuracy based on accredited calibration rigs according to ISO 17025

Maximum measured error

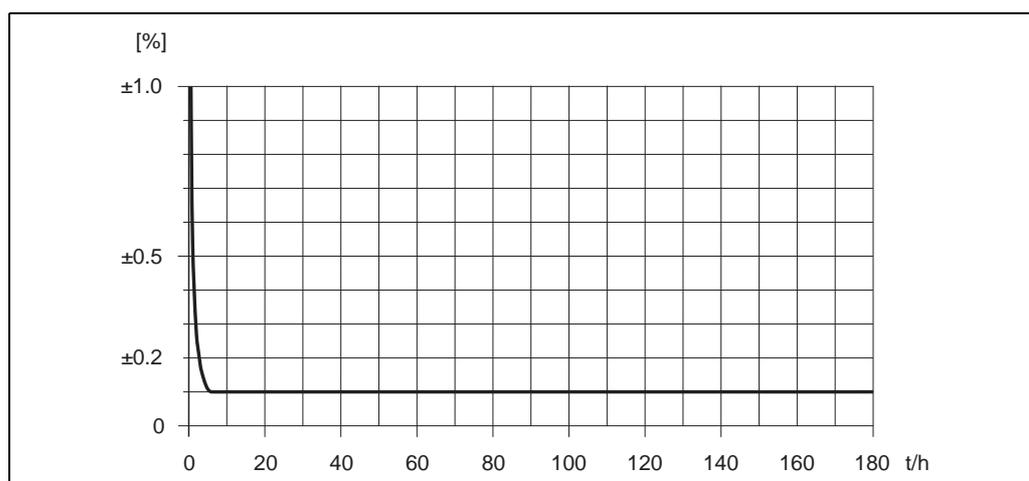
The following values refer to the pulse/frequency output.
The additional measured error at the current output is typically $\pm 5 \text{ }\mu\text{A}$.
Design fundamentals → [11](#).

- Mass flow and volume flow (liquids):
 - $\pm 0.05\%$ o.r. (PremiumCal, for mass flow)
 - $\pm 0.10\%$ o.r.
- Mass flow (gases): $\pm 0.35\%$ o.r.
- Density (liquids)
 - Reference conditions: $\pm 0.0005 \text{ g/cm}^3$
 - Field density calibration: $\pm 0.0005 \text{ g/cm}^3$
(valid after a field density calibration under process conditions)
 - Standard density calibration: $\pm 0.01 \text{ g/cm}^3$
(valid over the entire measuring range and density range → [15](#))
 - Special density calibration: $\pm 0.001 \text{ g/cm}^3$
(optional, valid range: +5 to +80 °C (+41 to +176 °F) and 0.0 to 2.0 g/cm^3)
- Temperature: $\pm 0.5 \text{ °C} \pm 0.005 \cdot T \text{ °C}$; ($\pm 1 \text{ °F} \pm 0.003 \cdot (T - 32) \text{ °F}$)

Zero point stability

DN		Zero point stability	
[mm]	[inch]	[kg/h] or [l/h]	[lb/min]
80	3	9.00	0.330
100	4	14.00	0.514
150	6	32.00	1.17

Example for max. measured error



Max. measured error in % o.r. (example: DN 80)

A0015774

Flow values (example: DN 80)

Design fundamentals → 11

Turn down	Flow		Max. measured error [% o.r.]
	[kg/h]	[lb/min]	
500 : 1	360	13.23	1.5
100 : 1	1800	66.15	0.3
25 : 1	7200	264.6	0.1
10 : 1	18000	661.5	0.1
2 : 1	90000	3307.5	0.1

Repeatability

Design fundamentals → 11.

- Mass flow and volume flow (liquids):
±0.025% o.r. (PremiumCal, for mass flow)
±0.05% o.r.
- Mass flow (gases): ±0.25% o.r.
- Density (liquids): ±0.00025 g/cc
- Temperature: ±0.25 °C ± 0.0025 · T °C; (±0.5 °F ± 0.0015 · (T - 32) °F)

Influence of medium temperature

When there is a difference between the temperature for zero point adjustment and the process temperature, the typical measured error of the Promass sensor is ±0.0002% of the full scale value/°C (±0.0001% of the full scale value / °F).

Influence of medium pressure

The table below shows the effect on accuracy of mass flow due to a difference between calibration pressure and process pressure.

DN		[% o.r./bar]
[mm]	[inch]	
80	3	-0.0055
100	4	-0.0035
150	6	-0.002

Design fundamentals

Dependent on the flow:

- Flow ≥ Zero point stability ÷ (base accuracy ÷ 100)
 - Max. measured error: ±base accuracy in % o.r.
 - Repeatability: ± ½ · base accuracy in % o.r.
- Flow < Zero point stability ÷ (base accuracy ÷ 100)
 - Max. measured error: ± (zero point stability ÷ measured value) · 100% o.r.
 - Repeatability: ± ½ · (zero point stability ÷ measured value) · 100% o.r.

Base accuracy	
Mass flow liquids, PremiumCal	0.05
Mass flow liquids	0.10
Volume flow liquids	0.10
Mass flow gases	0.35

Operating conditions: Installation

Installation instructions

Note the following points:

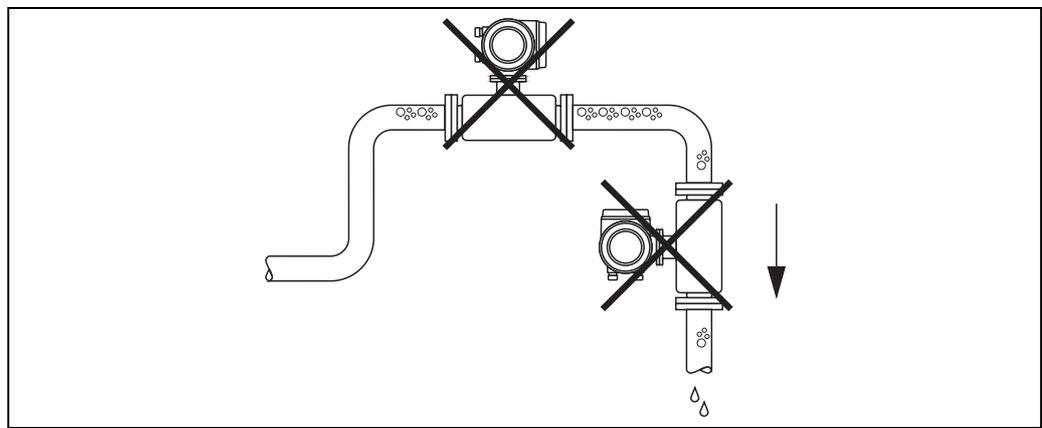
- No special measures such as supports are necessary. External forces are absorbed by the construction of the instrument, for example the secondary containment.
- The high oscillation frequency of the measuring tubes ensures that the correct operation of the measuring system is not influenced by pipe vibrations.
- No special precautions need to be taken for fittings which create turbulence (valves, elbows, T-pieces, etc.), as long as no cavitation occurs.
- For mechanical reasons and to protect the pipe, support is recommended for heavy sensors.

Mounting location

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

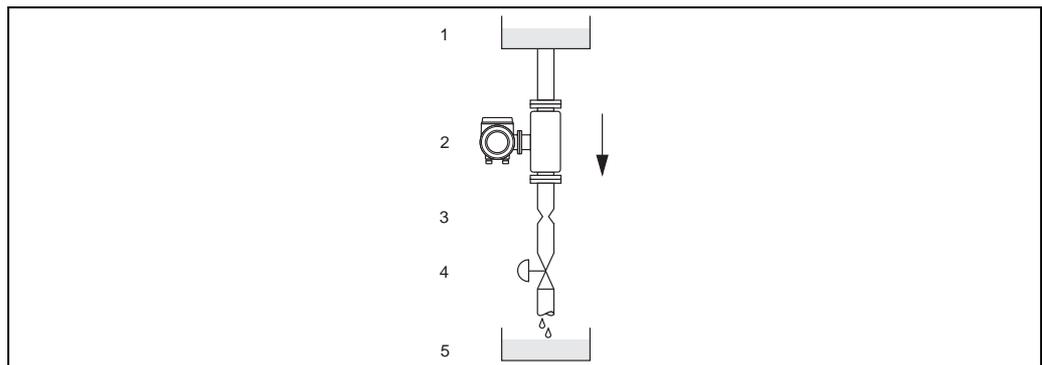
Avoid the following mounting locations in the pipe:

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



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Notwithstanding the above, the installation proposal below permits installation in an open vertical pipeline. Pipe restrictions or the use of an orifice with a smaller cross-section than the nominal diameter prevent the sensor running empty while measurement is in progress.



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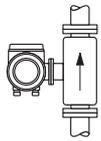
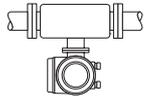
Installation in a down pipe (e.g. for batching applications)

1 = Supply tank, 2 = Sensor, 3 = Orifice plate, pipe restriction (see table on following page), 4 = Valve, 5 = Batching tank

DN		Ø Orifice plate, pipe restriction	
[mm]	[inch]	mm	inch
80	3	50	2.00
100	4	65	2.60
150	6	90	3.54

Orientation

Make sure that the direction of the arrow on the nameplate of the sensor matches the direction of flow (direction in which the fluid flows through the pipe).

Orientation	Vertical	Horizontal, Transmitter head up	Horizontal, Transmitter head down
	 <p><i>Fig. V</i></p> <p>a0004572</p>	 <p><i>Fig. H1</i></p> <p>a0004576</p>	 <p><i>Fig. H2</i></p> <p>a0004580</p>
Standard, Compact version	✓✓	✓✓	✓✓
Standard, Remote version	✓✓	✓✓	✓✓

✓✓ = Recommended orientation; ✓ = Orientation recommended in certain situations; ✗ = Impermissible orientation

Vertical (Fig. V)

Recommended orientation with upward direction of flow (Fig. V). When fluid is not flowing, entrained solids will sink down and gases will rise away from the measuring tube. The measuring tubes can be completely drained and protected against solids build-up.

Horizontal (Fig. H1, H2)

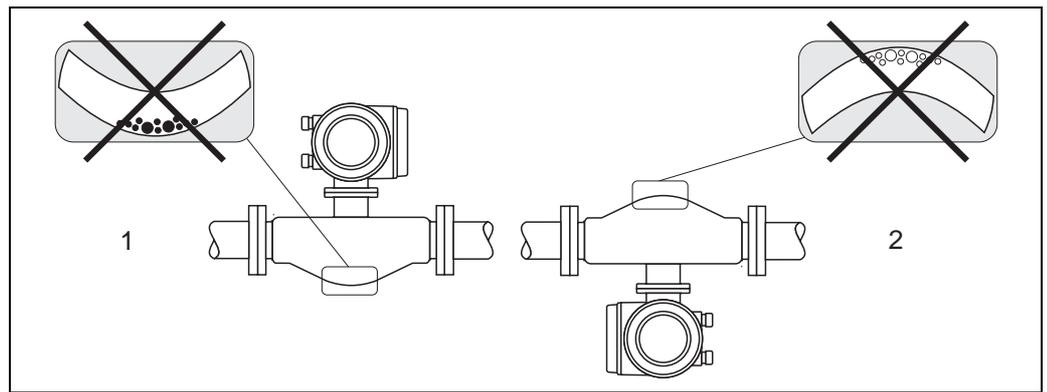
The measuring tubes must be horizontal and beside each other. When installation is correct the transmitter housing is above or below the pipe (Fig. H1, H2). Always avoid having the transmitter housing in the same horizontal plane as the pipe. Please note the special installation instructions → 13.

Special installation instructions



Caution!

Both measuring tubes are slightly curved. The position of the sensor, therefore, has to be matched to the fluid properties when the sensor is installed horizontally.



Horizontal installation

- 1 Not suitable for fluids with entrained solids. Risk of solids accumulating.
- 2 Not suitable for outgassing fluids. Risk of air accumulating.

Heating

Some fluids require suitable measures to avoid loss of heat at the sensor. Heating can be electric, e.g. with heated elements, or by means of hot water or steam pipes made of copper or heating jackets.



Caution!

- Risk of electronics overheating! Make sure that the maximum permissible ambient temperature for the transmitter is not exceeded. Consequently, make sure that the adapter between sensor and transmitter and the connection housing of the remote version always remain free of insulating material. Note that a certain orientation might be required, depending on the fluid temperature → 13.

For fluid temperature of 150°C (302°F) or above the usage of the remote version with separate connection housing is recommended.

- When using electrical heat tracing whose heat is regulated using phase control or by pulse packs, it cannot be ruled out that the measured values are influenced by magnetic fields which may occur, (i.e. at values greater than those permitted by the EC standard (Sinus 30 A/m)). In such cases, the sensor must be magnetically shielded.

The secondary containment can be shielded with tin plates or electric sheets without privileged direction (e.g. V330-35A) with the following properties:

- Relative magnetic permeability $\mu_r \geq 300$
- Plate thickness $d \geq 0.35 \text{ mm}$ ($d \geq 0.01''$)

- Information on permissible temperature ranges → 15

Zero point adjustment

All devices are calibrated to state-of-the-art technology. The zero point determined in this way is imprinted on the nameplate of the device.

Calibration takes place under reference conditions. → 10

Promass therefore does **not** require zero point adjustment!

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

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

Inlet and outlet runs

There are no installation requirements regarding inlet and outlet runs.

Length of connecting cable

max. 20 m (65 ft), remote version

System pressure

It is important to ensure that cavitation does not occur, because it would influence the oscillation of the measuring tube. No special measures need to be taken for fluids which have properties similar to water under normal conditions.

In the case of liquids with a low boiling point (hydrocarbons, solvents, liquefied gases) or in suction lines, it is important to ensure that pressure does not drop below the vapor pressure and that the liquid does not start to boil. It is also important to ensure that the gases that occur naturally in many liquids do not outgas. Such effects can be prevented when system pressure is sufficiently high.

For this reason, the following mounting locations are preferred:

- Downstream from pumps (no risk of partial vacuum)
- At the lowest point in a vertical pipe

Operating conditions: Environment

Ambient temperature range	Sensor and transmitter <ul style="list-style-type: none"> ■ Standard: -20 to +60 °C (-4 to +140 °F) ■ Optional: -40 to +60 °C (-40 to +140 °F)
	 <p>Note!</p> <ul style="list-style-type: none"> ■ Install the device at a shady location. Avoid direct sunlight, particularly in warm climatic regions. ■ At ambient temperatures below -20 °C (-4 °F) the readability of the display may be impaired.
Storage temperature	-40 to +80 °C (-40 to +176 °F), preferably +20 °C (+68 °F)
Degree of protection	Standard: IP 67 (NEMA 4X) for transmitter and sensor
Shock resistance	In accordance with IEC 68-2-31
Vibration resistance	Acceleration up to 1 g, 10 to 150 Hz, following IEC 68-2-6
Electromagnetic compatibility (EMC)	To IEC/EN 61326 and NAMUR Recommendation NE 21

Operating conditions: Process

Medium temperature range	Sensor -40 to +200 °C (-40 to +392 °F)
Fluid density range	0 to 5000 kg/m ³ (0 to 312 lb/cf)
Medium pressure range (nominal pressure)	Flanges <ul style="list-style-type: none"> ■ according to DIN PN 160, PN 250 ■ according to ASME B16.5 Cl 900, Cl 1500 Pressure ranges of secondary containment Type approved according to ASME BPVC: 16 bar (232 psi) The secondary containment is equipped with special pressure monitoring connections. With the help of these connections, fluid collected in the secondary containment in the event of tube failure can be bled off. This is especially important in high pressure gas applications. These connections can also be used for gas circulation and/or gas detection (dimensions →  20).
Rupture disk	Further information →  30

Limiting flow

See information in the "Measuring range" Section → 4

Select nominal diameter by optimizing between required flow range and permissible pressure loss. An overview of max. possible full scale values can be found in the "Measuring range" Section.

- The minimum recommended full scale value is approx. 1/20 of the max. full scale value.
- In most applications, 20 to 50% of the maximum full scale value can be considered ideal.
- Select a lower full scale value for abrasive substances such as fluids with entrained solids (flow velocity <1 m/s (<3 ft/s)).
- For gas measurement the following rules apply:
 - Flow velocity in the measuring tubes should not be more than half the sonic velocity (0.5 Mach).
 - The maximum mass flow depends on the density of the gas: formula → 4

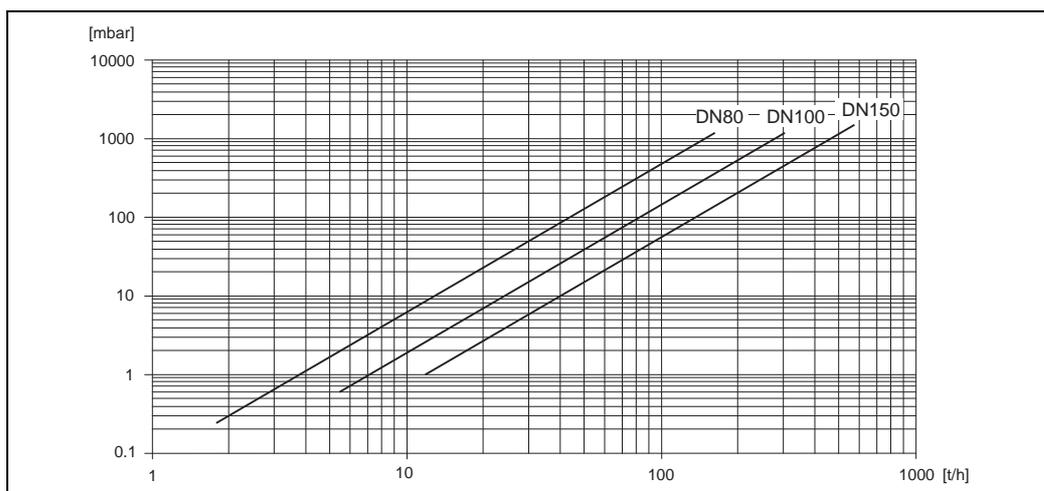
Pressure loss

Pressure loss depends on the fluid properties and on the flow rate. The following formulae can be used to approximately calculate the pressure loss:

Reynolds number	$Re = \frac{4 \cdot \dot{m}}{\pi \cdot d \cdot v \cdot \rho \cdot n}$ <p style="text-align: right; font-size: small;">A0015582</p>
Pressure loss	$\Delta p = (A_0 + A_1 \cdot Re^{A_2})^{1/A_3} \cdot \frac{1}{\rho} \cdot \left(\frac{2 \cdot \dot{m}}{5 \cdot \pi \cdot n \cdot d^2} \right)^2$ <p style="text-align: right; font-size: small;">A0015583</p>
Δp = pressure loss [mbar] v = kinematic viscosity [m ² /s] \dot{m} = Mass flow [kg/s] ρ = fluid density [kg/m ³]	d = inside diameter of measuring tubes [m] A_0 to A_3 = constants (depending on nominal diameter) n = number of tubes

Pressure loss coefficient

DN		d [mm]	A ₀	A ₁	A ₂	A ₃
[mm]	[inch]					
80	3	38.5	0.72	4.28	-0.36	0.24
100	4	49.0	0.70	3.75	-0.35	0.22
150	6	66.1	0.75	2.81	-0.33	0.19



Pressure loss diagram for water

Pressure loss (US units)

Pressure loss is dependent on fluid properties nominal diameter. Consult Endress+Hauser for Applicator PC software to determine pressure loss in US units. All important instrument data is contained in the Applicator software program in order to optimize the design of measuring system. The software is used for following calculations:

- Nominal diameter of the sensor with fluid characteristics such as viscosity, density, etc.
- Pressure loss downstream to the measuring point.
- Converting mass flow to volume flow, etc.
- Simultaneous display of various meter size.
- Determining measuring ranges.

The Applicator runs on any IBM compatible PC with windows.

Custody transfer measurement

Promass 84 is a flowmeter suitable for custody transfer measurement for liquids (other than water) and gases.

Custody transfer variables

- Mass flow
- Volume flow
- Density

Suitability for custody transfer, metrological control, obligation to subsequent verification

Promass 84 flowmeters are usually verified on site using reference measurements. Only once it has been verified on site by the Verification Authority for legal metrology controls may the measuring device be regarded as verified and used for applications subject to legal metrology controls. The associated seal (stamp) on the measuring device ensures this status.



Caution!

Only flowmeters verified by the Verification Authorities may be used for invoicing in applications subject to legal metrology controls. For all verification processes, both the corresponding approvals and the country-specific requirements resp. regulations (e.g. such as the German Verification Act) must be observed. The owner / user of the instrument is obliged to subsequent verification.

Approval for custody transfer

The requirements of the following legal metrology authorities are taken into consideration:

- **PTB**, Germany; (www.eichamt.de)
- **METAS**, Switzerland; (www.metas.ch)
- **BEV**, Austria; (www.bev.gv.at)
- **NTEP**, USA; (www.ncwm.net)
- **MC**, Canada; (www.ic.gc.ca)

Switching on the power supply in custody transfer mode

If the device is started in custody transfer mode, for example also after a power outage, system error No. 271 "POWER BRK. DOWN" flashes on the local display. The fault message can be acknowledged or reset using the "Enter" key or by means of the status input configured accordingly.



Note!

For correct measuring operation, it is not mandatory to reset the fault message.

Verification (Example)

Type-approved measuring systems for liquids other than water are always verified at their place of deployment. For this purpose, the facility's owner-operator must make everything available when the Verification Authorities come to inspect and verify the system. This includes:

- Scales or container with a reading unit with a load or volumetric capacity that corresponds to the operation of the system at Q_{max} for one minute. The resolution of the scales display or the reading unit must be at least 0.1 % of the minimum measured quantity.
- Unit for removing the medium being measured after the totalizer to fill the scales or the container.
- Making a sufficient quantity of the medium being measured available. The quantity is derived from the operation of the system. The following rule of thumb applies - quantity at:
 - 3×1 minute at Q_{min} ,
 - plus 3×1 minute at $\frac{1}{2} Q_{max}$,
 - plus 3×1 minute at Q_{max} ,
 - plus adequate quantity in reserve.
- Approval certificates



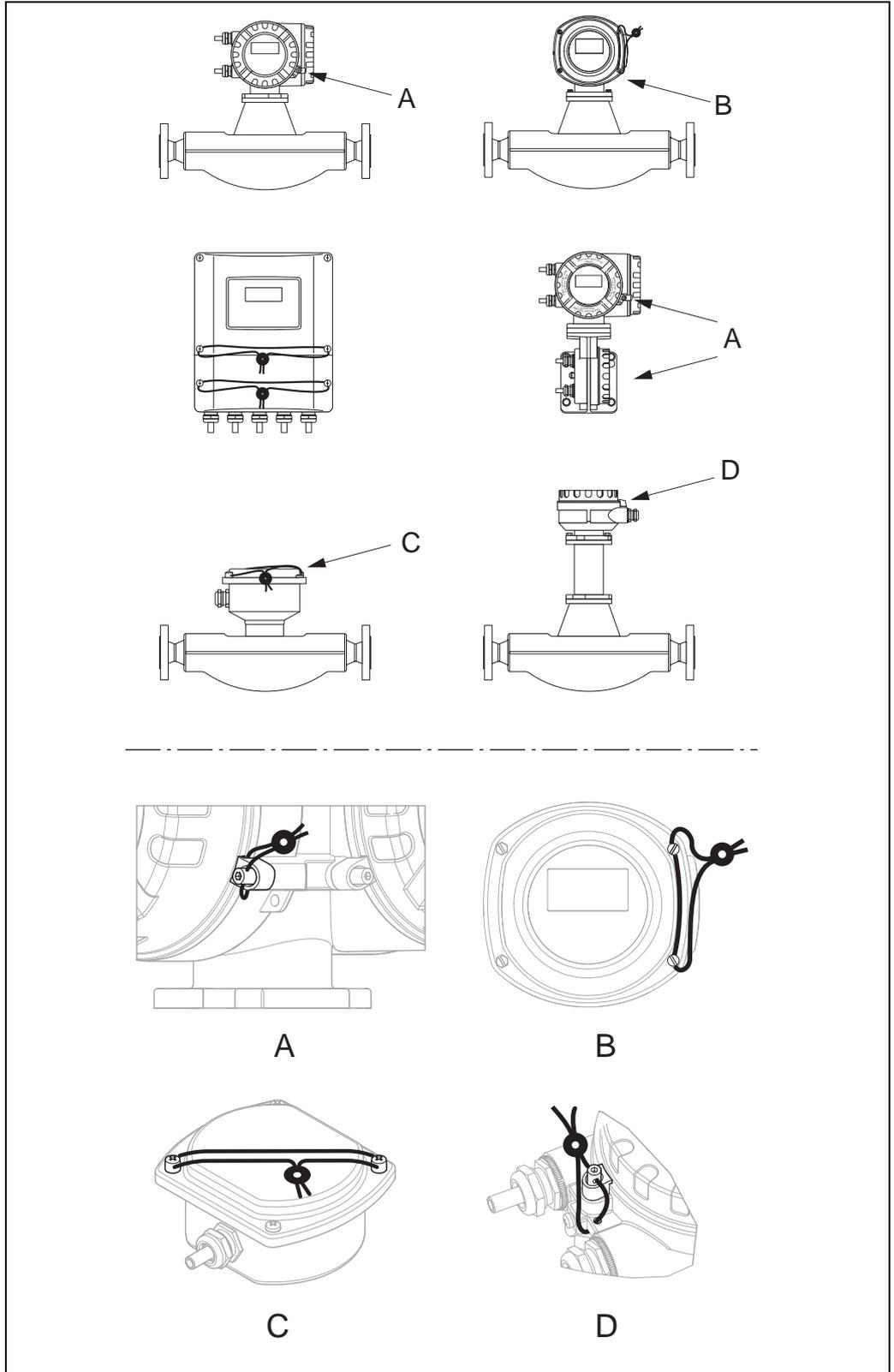
Note!

All issues should be clarified in advance with the authority responsible to ensure the successful verification of the measuring system.

Setting up custody transfer mode

A detailed description of the "setting up custody transfer mode" process is provided in the Operating Instructions supplied with the device.

Stamp points



Examples of how to seal the various device versions.

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Disabling custody transfer mode

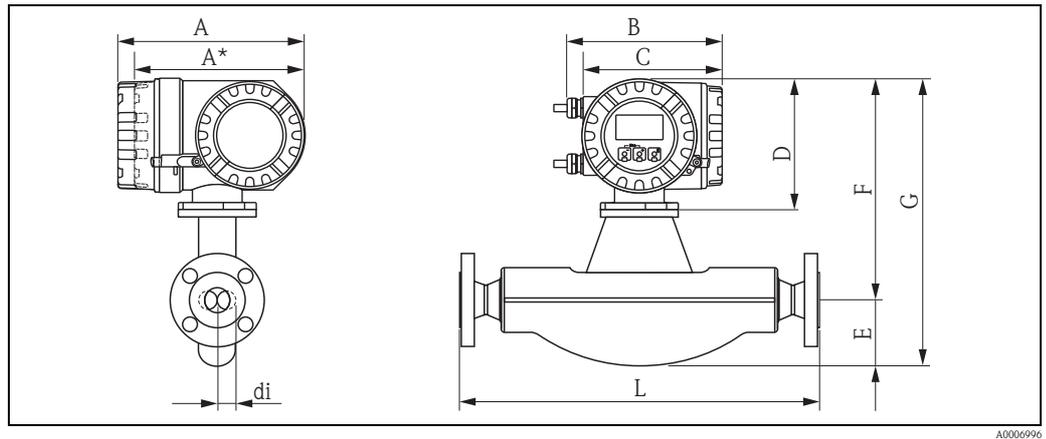
A detailed description of the "disabling custody transfer mode" process is provided in the Operating Instructions supplied with the device.

Mechanical construction

Design, dimensions

Dimensions:	
Field housing compact version, powder-coated die-cast aluminum	→ 21
Field housing compact version, powder-coated die-cast aluminum (II2G/Zone1)	→ 22
Transmitter compact version, stainless steel	→ 23
Transmitter remote version, connection housing (II2G/Zone 1)	→ 23
Transmitter remote version, wall-mount housing (non Ex-zone and II3G/Zone 2)	→ 24
Sensor remote version, connection housing	→ 25
Process connections in SI units	
Flange connections EN (DIN)	→ 26
Flange connections ASME B16.5	→ 27
Process connection in US units	
Process connections in US units	→ 28
Purge connections / secondary containment monitoring	→ 29
Rupture disk	→ 30

Field housing compact version, powder-coated die-cast aluminum



Dimensions in SI units

DN	A	A*	B	C	D	E	F	G	L	di
80	227	207	187	168	160	200	305	505	1)	1)
100	227	207	187	168	160	254	324	578	1)	1)
150	227	207	187	168	160	378	362	740	1)	1)

*Blind version (without display)

¹⁾ dependent on respective process connection

All dimensions in [mm];

Dimensions in US units

DN	A	A*	B	C	D	E	F	G	L	di
3"	8.94	8.15	7.68	6.61	6.30	7.87	12.0	19.9	1)	1)
4"	8.94	8.15	7.68	6.61	6.30	10.0	12.8	22.8	1)	1)
6"	8.94	8.15	7.68	6.61	6.30	14.9	14.3	29.1	1)	1)

*Blind version (without display)

¹⁾ dependent on respective process connection

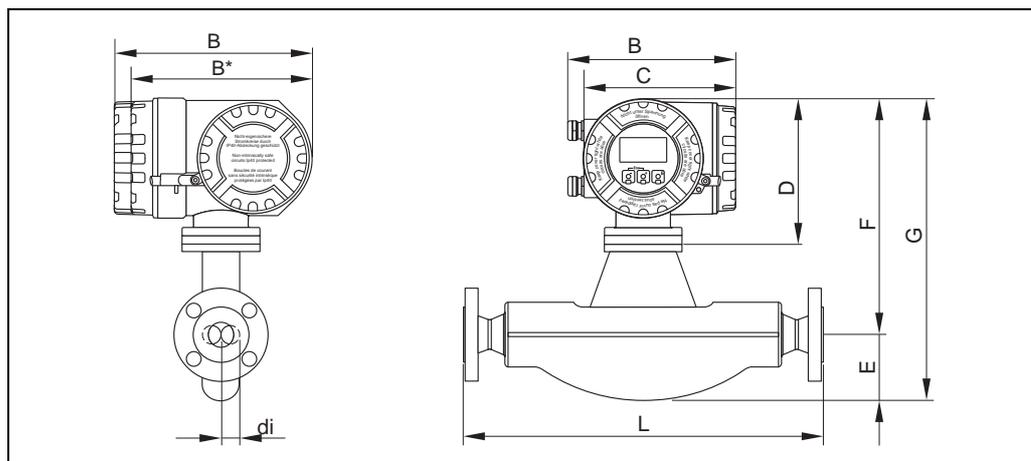
All dimensions in [inch];



Note!

Dimensions for transmitters II2G/Zone 1 → 22

Field housing compact version, powder-coated die-cast aluminum (II2G/Zone1)



Dimensions in SI units

DN	A	A*	B	C	D	E	F	G	L	di
80	240	217	206	186	178	200	323	523	1)	1)
100	240	217	206	186	178	254	342	589	1)	1)
150	240	217	206	186	178	378	380	758	1)	1)

*Blind version (without display)

¹⁾ dependent on respective process connection

All dimensions in [mm];

Dimensions in US units

DN	A	A*	B	C	D	E	F	G	L	di
3"	9.45	8.54	8.11	7.32	7.01	7.87	12.72	20.59	1)	1)
4"	9.45	8.54	8.11	7.32	7.01	10.00	13.46	23.19	1)	1)
6"	9.45	8.54	8.11	7.32	7.01	14.88	14.96	29.84	1)	1)

*Blind version (without display)

¹⁾ dependent on respective process connection

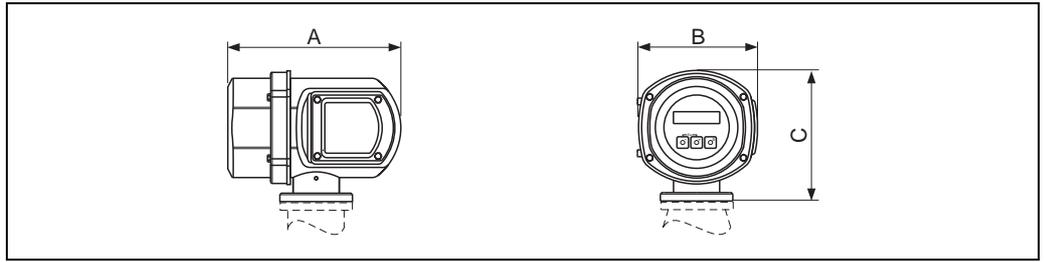
All dimensions in [inch];



Note!

Dimensions for remote version II2G/Zone 1 → 23

Transmitter compact version, stainless steel

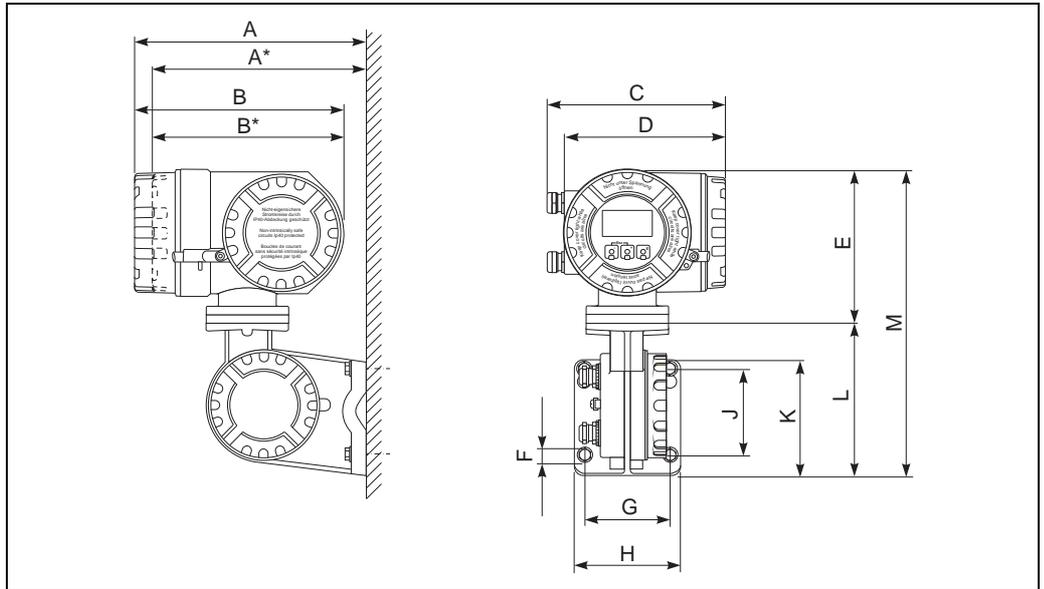


a0002245

Dimensions in SI and US units

A		B		C	
[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
225	8.86	153	6.02	168	6.61

Transmitter remote version, connection housing (II2G/Zone 1)



a0002128

Dimensions in SI units

A	A*	B	B*	C	D	E	F Ø	G	H	J	K	L	M
265	242	240	217	206	186	178	8.6 (M8)	100	130	100	144	170	348

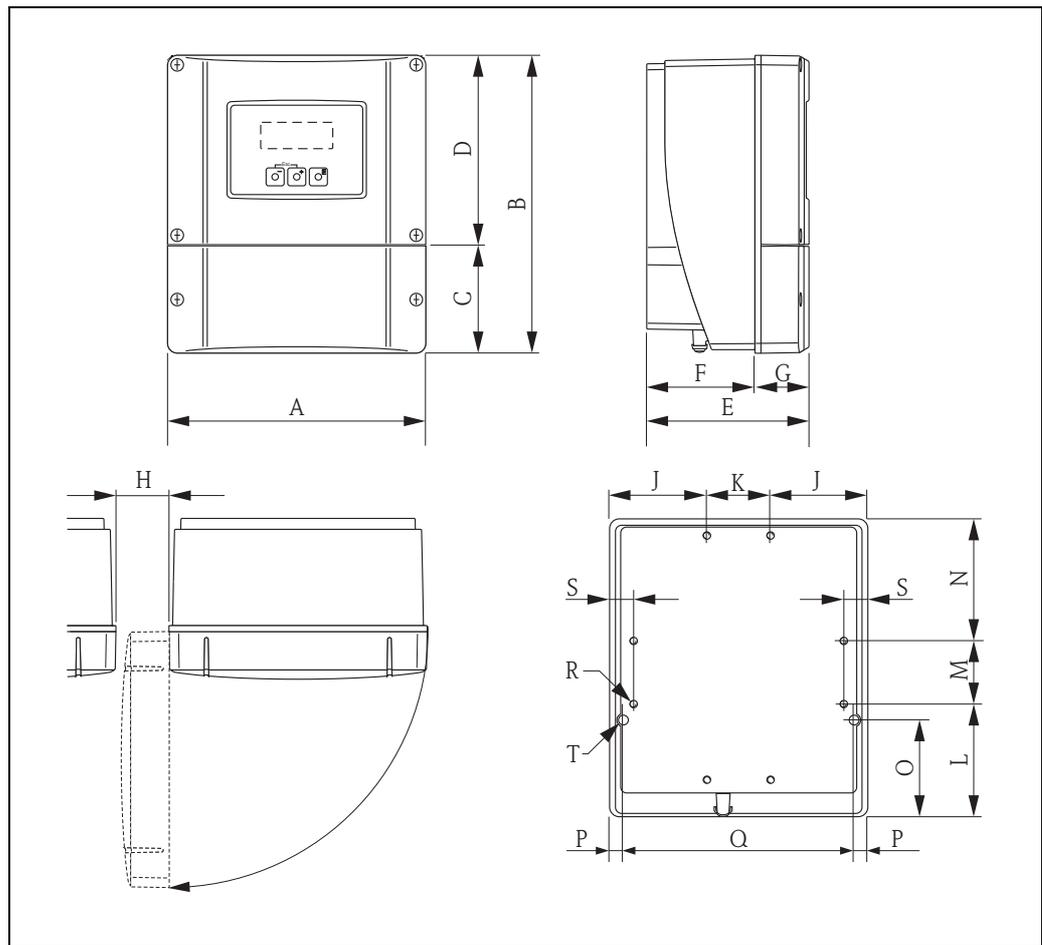
* Blind version (without display)
All dimensions in [mm]

Dimensions in US units

A	A*	B	B*	C	D	E	F Ø	G	H	J	K	L	M
10.4	9.53	9.45	8.54	8.11	7.32	7.01	0.34 (M8)	3.94	5.12	3.94	5.67	6.69	13.7

* Blind version (without display)
All dimensions in [inch]

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



a0001150

Dimensions in SI units

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

¹⁾ Fixing bolt for wall assembly: M6 (screw head max. 10.5 mm)

All dimensions in [mm]

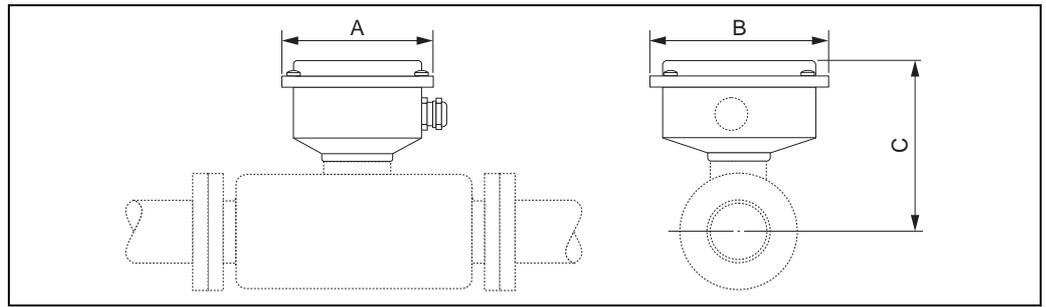
Dimensions in US units

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

¹⁾ Fixing bolt for wall assembly: M6 (screw head max. 0.41 inch)

All dimensions in [inch]

Sensor remote version, connection housing



a0002516

Dimensions in SI units

DN	A	B	C
80	118.5	137.5	152
100	118.5	137.5	171
150	118.5	137.5	209

All dimensions in [mm]

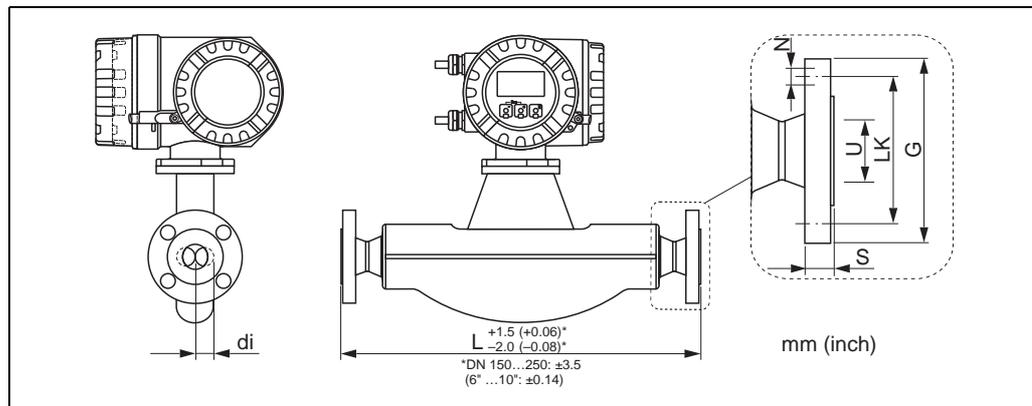
Dimensions in US units

DN	A	B	C
3"	4.67	5.41	6.08
4"	4.67	5.41	6.84
6"	4.67	5.41	8.36

All dimensions in [inch]

Process connections in SI units

Flange connections EN (DIN), ASME B16.5



a0002501-ae

Flange connections EN (DIN)

Flange according to EN 1092-1 (DIN 2501) / PN 160: 25Cr duplex F53/EN 1.4410 Optionally supplied with or without notch (Form D).							
Surface roughness (flange): EN 1092-1 Form B2 or Form D (DIN 2526 Form E), Ra 0.8 to 3.2 µm							
DN	G	L	N	S	LK	U	di
80	230	916	8 × Ø 26	36	180	80.9	38.5
100	265	1208	8 × Ø 30	40	210	104.3	49.0
150	355	1476	12 × Ø 33	50	290	155.7	66.1

All dimensions in [mm]

Flange according to EN 1092-1 (DIN 2501) / PN 250: 25Cr duplex F53/EN 1.4410 Optionally supplied with or without notch (Form D).							
Surface roughness (flange): EN 1092-1 Form B2 or Form D (DIN 2526 Form E), Ra 0.8 to 3.2 µm							
DN	G	L	N	S	LK	U	di
80	255	948	8 × Ø 30	46	200	77.7	38.5
100	300	1248	8 × Ø 33	54	235	100.3	49.0
150	390	1540	12 × Ø 36	68	320	148.3	66.1

All dimensions in [mm]

Flange connections ASME B16.5

Flange according to ASME B16.5 / CI 900 Sched 40/Sched 80: 25Cr duplex F53/EN 1.4410								
Surface roughness (flange): Ra 3.2 to 6.3 µm								
DN	G	L	N	S	LK	U		di
						Sched 40	Sched 80	
80	241.3	962	8 × Ø 25.4	45.1	190.5	78.0	73.7	38.5
100	292.1	1251	8 × Ø 31.8	51.4	234.9	102.4	97.3	49.0
150	381.0	1513	12 × Ø 31.8	62.6	317.5	154.1	146.3	66.1

All dimensions in [mm]

Flange according to ASME B16.5 / CI 1500 Sched 80: 25Cr duplex F53/EN 1.4410								
Surface roughness (flange): Ra 3.2 to 6.3 µm								
DN	G	L	N	S	LK	U		di
80	266.7	993	8 × Ø 31.8	54.8	203.2	73.7		38.5
100	311.2	1270	8 × Ø 35.1	60.8	241.3	97.3		49.0
150	393.7	1577	12 × Ø 38.1	89.6	317.5	146.3		66.1

All dimensions in [mm]

RTJ-Flange according to ASME B16.5 / CI 900 Sched 40/Sched 80: 25Cr duplex F53/EN 1.4410								
Surface roughness (flange): Ra 3.2 to 6.3 µm								
DN	G	L	N	S	LK	U		di
						Sched 40	Sched 80	
80	241.3	963	8 × Ø 25.4	46.0	190.5	78.0	73.7	38.5
100	292.1	1252	8 × Ø 31.8	52.3	234.9	102.4	97.3	49.0
150	381.0	1515	12 × Ø 31.8	63.5	317.5	154.1	146.3	66.1

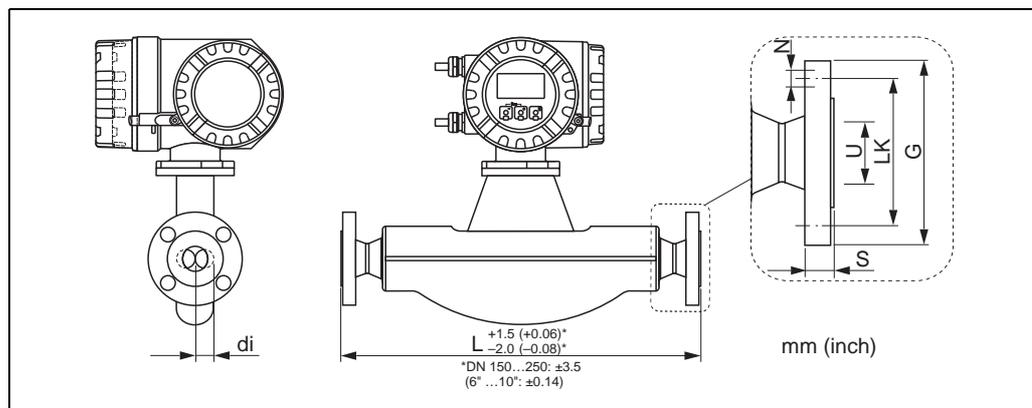
All dimensions in [mm]

RTJ-Flange according to ASME B16.5 / CI 1500 Sched 80: 25Cr duplex F53/EN 1.4410								
Surface roughness (flange): Ra 3.2 to 6.3 µm								
DN	G	L	N	S	LK	U		di
80	266.7	995	8 × Ø 31.8	55.7	203.2	73.7		38.5
100	311.2	1272	8 × Ø 35.1	61.7	241.3	97.3		49.0
150	393.7	1582	12 × Ø 38.1	92.1	317.5	146.3		66.1

All dimensions in [mm]

Process connections in US units

Flange connections ASME B16.5



a0002501-ae

Flange according to ASME B16.5 / CI 900 Sched 40/Sched 80: 25Cr duplex F53/EN 1.4410
 Surface roughness (flange): Ra 3.2 to 6.3 µm

DN	G	L	N	S	LK	U		di
						Sched 40	Sched 80	
3"	9.50	37.87	8 × Ø 1.00	1.78	7.50	3.07	2.90	1.52
4"	11.50	49.25	8 × Ø 1.25	2.02	9.25	4.03	3.83	1.93
6"	15.00	59.57	12 × Ø 1.25	2.46	12.50	6.07	5.76	2.60

All dimensions in [inch]

Flange according to ASME B16.5 / CI 1500 Sched 80: 25Cr duplex F53/EN 1.4410
 Surface roughness (flange): Ra 3.2 to 6.3 µm

DN	G	L	N	S	LK	U	di
3"	10.50	39.09	8 × Ø 1.00	2.16	8.00	2.90	1.52
4"	12.25	50.00	8 × Ø 1.38	2.39	9.50	3.83	1.93
6"	15.50	62.09	12 × Ø 1.50	3.53	12.50	5.76	2.60

All dimensions in [inch]

RTJ-Flange according to ASME B16.5 / CI 900 Sched 40/Sched 80: 25Cr duplex F53/EN 1.4410
 Surface roughness (flange): Ra 3.2 to 6.3 µm

DN	G	L	N	S	LK	U		di
						Sched 40	Sched 80	
3"	9.50	37.91	8 × Ø 1.00	1.81	7.50	3.07	2.90	1.52
4"	11.50	49.29	8 × Ø 1.25	2.06	9.25	4.03	3.83	1.93
6"	15.00	59.65	12 × Ø 1.25	2.50	12.50	6.07	5.76	2.60

All dimensions in [inch]

RTJ-Flange according to ASME B16.5 / Cl 1500 Sched 80: 25Cr duplex F53/EN 1.4410
 Surface roughness (flange): Ra 3.2 to 6.3 µm

DN	G	L	N	S	LK	U	di
80	10.50	39.17	8 × Ø 1.00	2.19	8.00	2.90	1.52
100	12.25	50.08	8 × Ø 1.38	2.43	9.50	3.83	1.93
150	15.50	62.28	12 × Ø 1.50	3.63	12.50	5.76	2.60

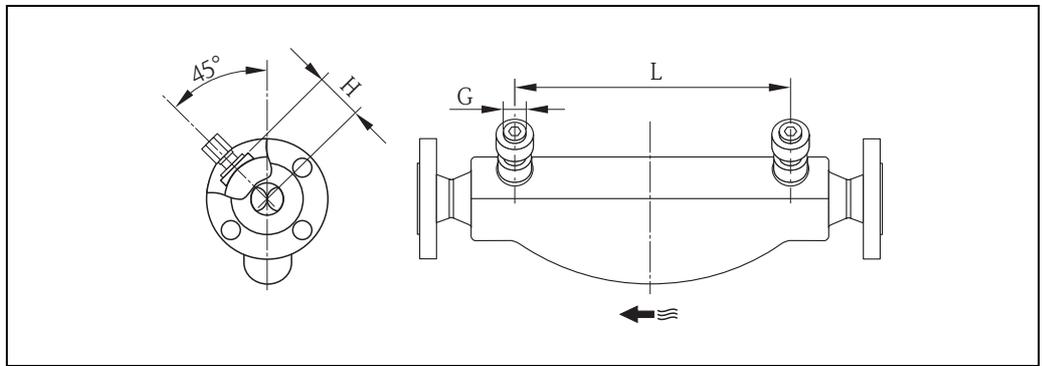
All dimensions in [inch]

Purge connections / secondary containment monitoring



Caution!

- The secondary containment is filled with dry nitrogen (N₂). Do not open the purge connections unless the containment can be filled immediately with a dry inert gas. Use only low gauge pressure to purge. Maximum pressure: 5 bar (72.5 psi).



a0002537

DN		G	H		L	
[mm]	[inch]		[mm]	[inch]	[mm]	[inch]
80	3	½"-NPT	101	3.98	560	22.0
100	4	½"-NPT	120	4.72	684	27.0
150	6	½"-NPT	141	5.55	880	34.6

Rupture disk

Sensor housings with integrated rupture disks are optionally available.



Warning!

- Make sure that the function and operation of the rupture disk is not impeded through the installation. Triggering overpressure in the housing as stated on the indication label. Take adequate precautions to ensure that no damage occurs, and risk to human life is ruled out, if the rupture disk is triggered.
- Rupture disk: Burst pressure 10 to 15 bar (145 to 217 psi).
- Please note that the housing can no longer assume a secondary containment function if a rupture disk is used.
- It is not permitted to open the connections or remove the rupture disk.



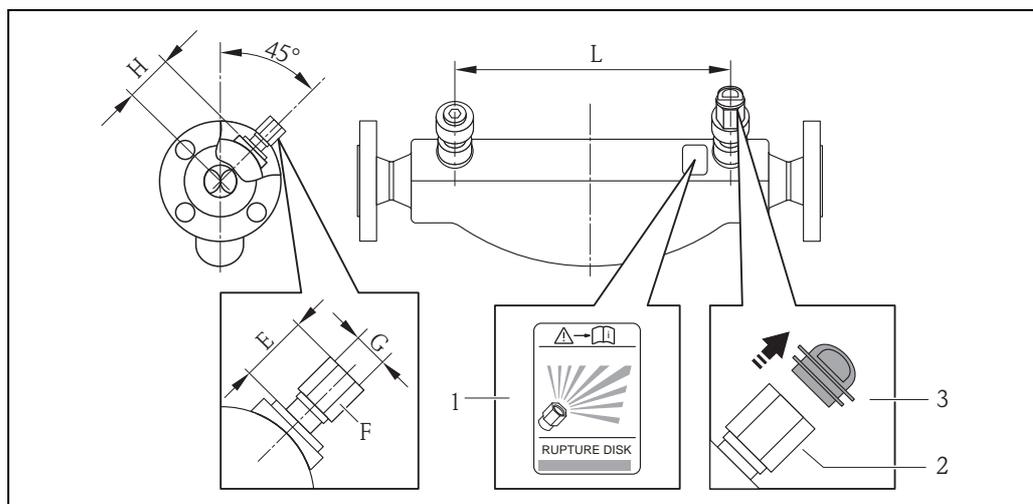
Caution!

- The existing connection nozzles are not designed for a rinse or pressure monitoring function.



Note!

- Before commissioning, please remove the transport protection of the rupture disk.
- Please note the indication labels.



A0008361

- 1 Indication label for the rupture disk
- 2 1/2" NPT internal screw thread with 1" width across flat
- 3 Transport protection

DN		E		F	G	H		L	
[mm]	[inch]	[mm]	[inch]			[mm]	[inch]	[mm]	[inch]
80	3	approx. 42	approx. 1.65	SW 1"	1/2"-NPT	101	3.98	560	22.0
100	4	approx. 42	approx. 1.65	SW 1"	1/2"-NPT	120	4.72	684	27.0
150	6	approx. 42	approx. 1.65	SW 1"	1/2"-NPT	141	5.55	880	34.6

Weight

- Compact version: see tables below
- Remote version
 - Transmitter: see the tables below
 - Wall-mount housing: 5 kg (11 lbs)
 - Compact version Ex d (stainless steel): + 9 kg (+ 20 lb)

Weight information in SI units

DN [mm]	80	100	150
Compact version	75	141	246
Remote version	73	139	244

All values (weight) refer to devices with Cl 900 flanges according to ASME
Weight information in [kg].

Weight information in US

DN [inch]	3	4	6
Compact version	165	311	542
Remote version	161	306	538

All values (weight) refer to devices with Cl 900 flanges according to ASME
Weight information in [lbs].

Material**Transmitter housing**

Compact version

- Stainless steel housing: stainless steel 1.4301/304
- Stainless steel housing Ex d: stainless steel 1.4404/CF3M
- Powder coated die-cast aluminum
- Window material: Glass or polycarbonate

Remote version

- Remote field housing: powder coated die-cast aluminum
- Wall-mount housing: powder coated die-cast aluminum
- Window material: Glass

Sensor housing / containment

- Acid and alkali-resistant outer surface
- Stainless Steel 1.4404/316L

Connection housing, sensor (remote version)

- Stainless Steel 1.4301/304 (standard)
- Powder coated die-cast aluminum

Process connections

- Flanges according to EN 1092-1 (DIN 2501) / according to ASME B16.5
→ stainless steel 25Cr duplex F53/EN 1.4410 (superduplex)

Measuring tubes

Stainless Steel 25Cr duplex EN 1.4410/UNS S32750 (superduplex)

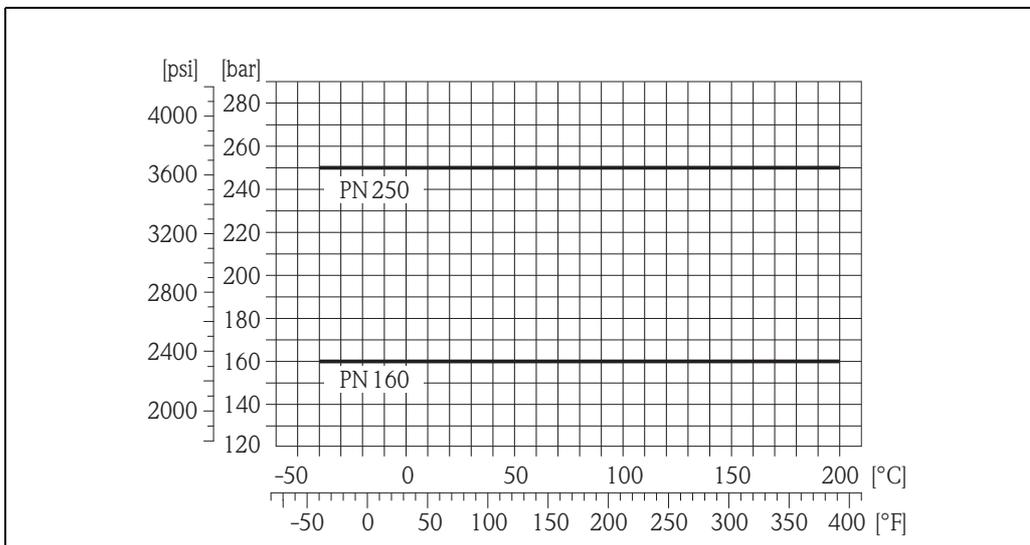
Material load diagram



Warning!
The following material load curves refer to the entire sensor and not just the process connection.

Flange connection according to EN 1092-1 (DIN 2501)

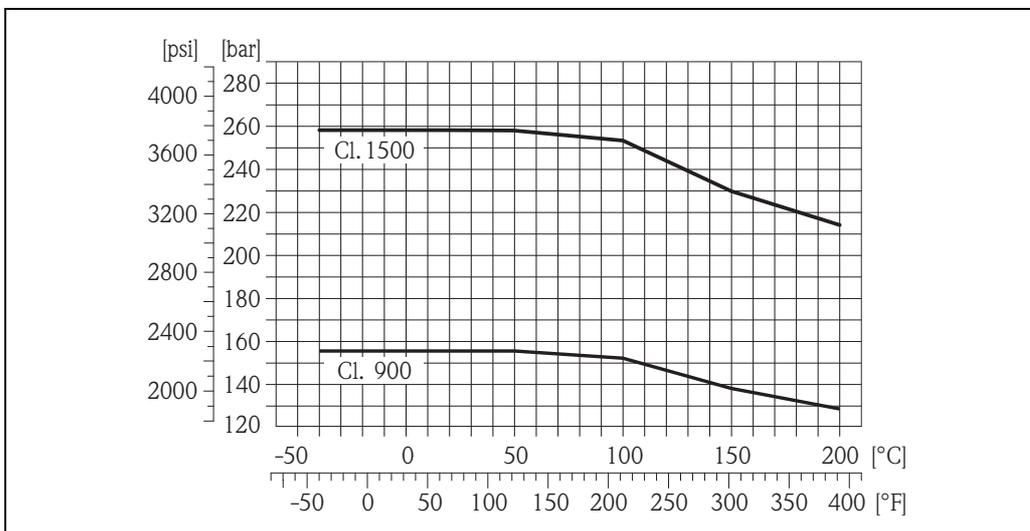
Flange material: 1.4410/F53



A0015620

Flange connection according to ASME B16.5

Flange material: 1.4410/F53



A0015622

Process connections

Welded process connections

Flanges according to EN 1092-1 (DIN 2501) and according to ASME B16.5

Human interface

Display elements	<ul style="list-style-type: none"> ■ Liquid-crystal display: backlit and four lines with 16 characters per line ■ Selectable display of different measured values and status variables ■ At ambient temperatures below -20 °C (-4 °F) the readability of the display may be impaired.
Operating elements	<ul style="list-style-type: none"> ■ Local operation with three optical keys (□/□/□) ■ Application-specific Quick Setup menus for straightforward commissioning
Language group	<p>Language groups available for operation in different countries:</p> <ul style="list-style-type: none"> ■ Western Europe and America (WEA): English, German, Spanish, Italian, French, Dutch and Portuguese ■ Eastern Europe/Scandinavia (EES): English, Russian, Polish, Norwegian, Finnish, Swedish and Czech ■ South and Eastern Asia (SEA): English, Japanese, Indonesian ■ China (CN): English, Chinese <p>The language group is changed using the "FieldCare" operating program.</p>
Remote operation	Remote operation via HART, Modbus RS485

Certificates and approvals

CE mark	The measuring system is in conformity with the statutory requirements of the EC Directives. Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.
C-Tick symbol	The measuring system complies with the EMC requirements of the "Australian Communications and Media Authority (ACMA)"
Ex approval	Information about currently available Ex versions (ATEX, FM, CSA, IECEx, NEPSI) can be supplied by your Endress+Hauser Sales Center on request. All explosion protection data are contained in separate explosion protection documentation which you can order if required.
Modbus certification	The measuring device meets all the requirements of the Modbus/TCP conformity and integration test and has the "Modbus/TCP Conformance Test Policy, Version 2.0". The measuring device has successfully passed all the test procedures carried out and is certified by the "Modbus/TCP Conformance Test Laboratory" of the University of Michigan.
Pressure equipment directive	<p>The measuring devices can be ordered with or without PED (Pressure Equipment Directive). If a device with PED is required, this must be ordered explicitly.</p> <ul style="list-style-type: none"> ■ With the identification PED/G1/III on the sensor nameplate, Endress+Hauser confirms conformity with the "Basic safety requirements" of Appendix I of the Pressure Equipment Directive 97/23/EC. ■ Devices with this identification (with PED) are suitable for the following types of fluid: <ul style="list-style-type: none"> - Fluids of Group 1 and 2 with a steam pressure of greater, or less than and equal to 0.5 bar (7.3 psi) - Unstable gases ■ Devices without this identification (without PED) are designed and manufactured according to good engineering practice. They correspond to the requirements of Art. 3, Section 3 of the Pressure Equipment Directive 97/23/EC. Their application is illustrated in Diagrams 6 to 9 in Appendix II of the Pressure Equipment Directive 97/23/EC. <p>Optionally flowmeters in accordance to the guidelines AD 2000 are available on request.</p>

Other standards and guidelines

- EN 60529
Degrees of protection by housing (IP code)
- EN 61010-1
Protection Measures for Electrical Equipment for Measurement, Control, Regulation and Laboratory Procedures.
- IEC/EN 61326
"Emission in accordance with Class A requirements".
Electromagnetic compatibility (EMC requirements).
- NAMUR NE 21
Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment.
- NAMUR NE 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

Messgerätezulassung**Messgeräterichtlinie 2004/22/EG (MID)***Anhang MI-002 (Gaszähler)*

Das Messgerät ist als Gaszähler für den gesetzlich kontrollierten Betrieb gemäß Anhang MI-002 der europäischen Messgeräterichtlinie (MID) zugelassen (DE-08-MI002-PTB014).

Anhang MI-005 (Flüssigkeiten ausser Wasser)

- Das Messgerät ist als Komponente in gesetzlich kontrollierten Messanlagen gemäß Anhang MI-005 der europäischen Messgeräterichtlinie 2004/22/EG (MID) geeignet.
Hinweis: Nach der Messgeräterichtlinie ist nur die komplette Messanlage zulassungsfähig, durch eine EG-Baumusterprüfbescheinigung abgedeckt und mit Konformitätszeichen gekennzeichnet.
- Das Messgerät ist nach OIML R117-1 qualifiziert und verfügt über ein MID-Evaluation Certificate, welches die Konformität mit den grundlegenden Anforderungen der Messgeräterichtlinie bestätigt.
Das Evaluation Certificate resultiert aus dem WELMEC-Ansatz (Europäische Zusammenarbeit im gesetzlichen Messwesen) zur modularen Komponenten-Zertifizierung bei Messanlagen gemäß Anhang MI-005 (Messanlagen für die kontinuierliche und dynamische Messung von Mengen von Flüssigkeiten ausser Wasser) der Messgeräterichtlinie 2004/22/EG.

Suitability for custody transfer measurement**MID approval, Annex MI-002 (gas meter)**

The device is qualified to OIML R137/D11.

DN		MID Type Examination Certificate MI-002 (Europe)		
[mm]	[inch]	Mass	Gases Volume	Density
80 to 150	3 to 6	YES	YES *	NO

* at pure gases only (invariable gas density)

MID approval, Annex MI-005 (liquids other than water)

The device is qualified to OIML R117-1.

DN		OIML R117-1/MID Evaluation Certificate (Europe)		
[mm]	[inch]	Mass	Liquids other than water Volume	Density
80 to 150	3 to 6	YES	YES	YES

Approval for custody transfer Promass 84 is a flowmeter suitable for custody transfer measurement for liquids (other than water) and for fuel gases. The requirements of the following test centres are taken into consideration:

- PTB, Germany
- NMI, The Netherlands
- METAS, Switzerland
- BEV, Austria
- NTEP, USA
- MC, Canada

Information on custody transfer measurement →  18

Ordering Information

The Endress +Hauser service organization can provide detailed ordering information and information on the order codes upon request.

Accessories

Various accessories, which can be ordered separately from Endress+Hauser, are available for the transmitter and the sensor.

Documentation

- Flow measuring technology (FA00005D)
- Operating Instructions/Description of Device Functions
 - Promass 84 HART (BA00109D/BA00110D)
 - Promass 84 Modbus RS485 (BA00129D/BA00130D)
- Supplementary documentation on Ex-ratings: ATEX, FM, CSA, IECEx NEPSI

Registered trademarks

HART®

Registered trademark of HART Communication Foundation, Austin, USA

Modbus®

Registered trademark of SCHNEIDER AUTOMATION, INC.

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

Registered or registration-pending trademarks of Endress+Hauser Flowtec AG, Reinach, CH

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