

Technical Information

Proline Promass 80M, 83M

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, foodstuffs and compressed gases
- Fluid temperatures up to +150 °C (+302 °F)
- Process pressures up to 350 bar (5075 psi)
- Mass flow measurement up to 2200 t/h (80840 lb/min)

Approvals for hazardous area:

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

Approvals in the food industry/hygiene sector:

- 3A

Connection to all common process control systems:

- HART, PROFIBUS DP/PA, FOUNDATION Fieldbus, MODBUS

Relevant safety aspects:

- Secondary containment up to 100 bar (1450 psi), Pressure Equipment Directive, AD 2000 SIL-2
- Purge connections (optional)

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 100000 applications, offer:

- 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

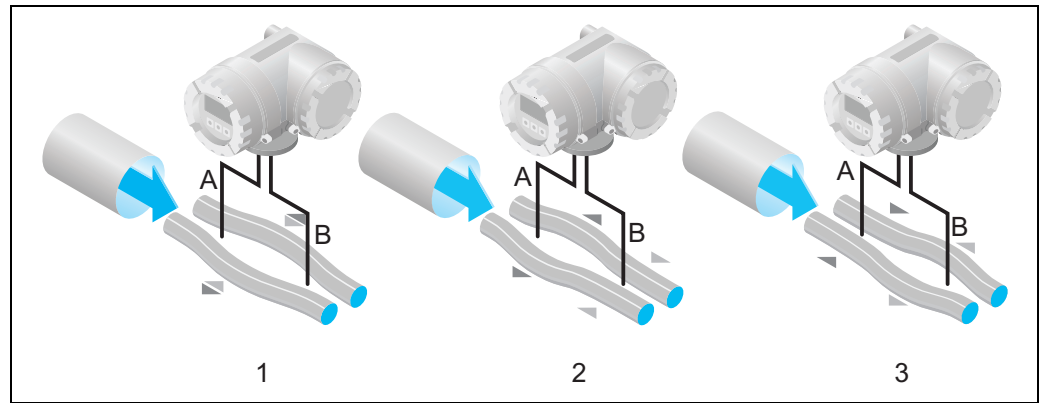
ω = rotational velocity

v = 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 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).



a0003385

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

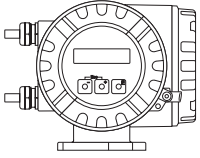
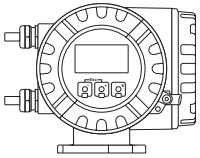
The temperature of the measuring tubes is determined in order to calculate the compensation factor due to temperature effects. This signal corresponds to the process temperature and is also available as an output.

Measuring system

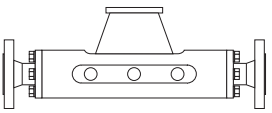
The measuring system consists of a transmitter and a sensor. Two versions are available:

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

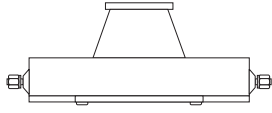
Transmitter

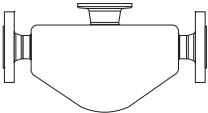
<p>Promass 80</p>  <p style="text-align: right; font-size: small;">a0003671</p>	<ul style="list-style-type: none"> ■ Two-line liquid-crystal display ■ Operation with push buttons
<p>Promass 83</p>  <p style="text-align: right; font-size: small;">a0003672</p>	<ul style="list-style-type: none"> ■ Four-line 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)

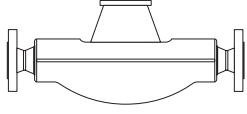
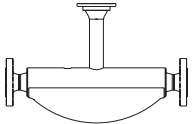
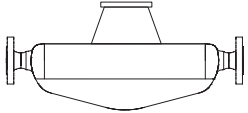
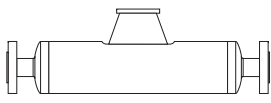
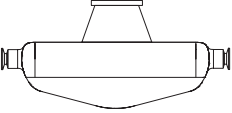
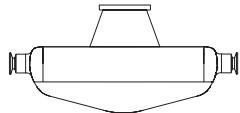
Sensor

<p>M</p>  <p style="text-align: right; font-size: small;">a0003676</p>	<ul style="list-style-type: none"> ■ Robust sensor for extreme process pressures, high requirements for the secondary containment and fluid temperatures up to +150 °C (+302 °F) ■ Nominal diameters DN 8 to 80 (3/8" to 3") ■ Material: Titanium, Ti Grade 2, Ti Grade 9 	<p>Documentation No. TI102D</p>
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Other sensors can be found in the separate documentation

<p>A</p>  <p style="text-align: right; font-size: small;">a0003679</p>	<ul style="list-style-type: none"> ■ Single-tube system for highly accurate measurement of very small flows ■ Nominal diameters DN 1 to 4 (1/24" to 1/8") ■ Material: Stainless steel EN 1.4539/ASTM 904L, EN 1.4404/ASTM 316L, Alloy C-22 DIN 2.4602 (process connection) 	<p>Documentation No. TI054D</p>
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<p>E</p>  <p style="text-align: right; font-size: small;">a0002271</p>	<ul style="list-style-type: none"> ■ General purpose sensor, ideal replacement for volumetric flowmeters. ■ Nominal diameters DN DN 8 to 80 (3/8" to 3") ■ Material: Stainless steel EN 1.4539/ASTM 904L, EN 1.4404/ASTM 316L 	<p>Documentation No. TI061D</p>
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<p>F</p>  <p>a0003673</p>	<ul style="list-style-type: none"> ■ Universal sensor for fluid temperatures up to +200 °C (+392 °F). ■ Nominal diameters DN 8 to 250 (3/8" to 10"). ■ Material: Stainless steel EN 1.4539/ASTM 904L, EN 1.4404/ASTM 316L, Alloy C-22 DIN 2.4602 	<p>Documentation No. TI101D</p>
<p>F (High-temperature)</p>  <p>a0003675</p>	<ul style="list-style-type: none"> ■ Universal high-temperature sensor for fluid temperatures up to +350 °C (+662 °F). ■ Nominal diameters DN 25, 50, 80 (1", 2", 3") ■ Material: Alloy C-22, DIN 2.4602, EN 1.4404/ASTM 316L 	
<p>H</p>  <p>a0003677</p>	<ul style="list-style-type: none"> ■ Single bent tube. Low pressure loss and chemically resistant material ■ Nominal diameters DN 8 to 50 (3/8" to 2") ■ Material: Zirconium 702/R 60702, Tantalum 2.5W 	<p>Documentation No. TI074D</p>
<p>I</p>  <p>a0003678</p>	<ul style="list-style-type: none"> ■ Straight single-tube instrument. Minimal shear stress on fluid, hygienic design, low pressure loss ■ Nominal diameters DN 8 to 80 (3/8" to 3") ■ Material: Titanium, Ti Grade 2, Ti Grade 9 	<p>Documentation No. TI075D</p>
<p>P</p>  <p>a0006828</p>	<ul style="list-style-type: none"> ■ Single bent tube, minimal shear stress on fluid. Hygienic design with documents for Life Science Industries applications, low pressure loss, for fluid temperatures up to +200 °C (+392 °F). ■ Nominal diameters DN 8 to 50 (3/8" to 2") ■ Material: Stainless steel EN 1.4435/ASTM 316L 	<p>Documentation No. TI078D</p>
<p>S</p>  <p>a0006828</p>	<ul style="list-style-type: none"> ■ Single bent tube. Hygienic design, low pressure loss, for fluid temperatures up to +150 °C (+302 °F) ■ Nominal diameters DN 8 to 50 (3/8" to 2") ■ Material: Stainless steel, EN 1.4539/ASTM 904L, EN 1.4435/ASTM 316L 	<p>Documentation No. TI076D</p>

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]
8	3/8"	0 to 2000	0 to 73.5
15	1/2"	0 to 6500	0 to 238
25	1"	0 to 18000	0 to 660
40	1 1/2"	0 to 45000	0 to 1650
50	2"	0 to 70000	0 to 2570
80	3"	0 to 180000	0 to 6600

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]	
8	3/8"	60
15	1/2"	80
25	1"	90
40	1 1/2"	90
50	2"	90
80	3"	110

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

Calculation example for gas:

- Sensor type: Promass M, DN 50
- Gas: air with a density of 60.3 kg/m³ (at 20 °C and 50 bar)
- Measuring range (liquid): 70000 kg/h
- x = 90 (for Promass M DN 50)

Max. possible full scale value:

$$\dot{m}_{\max(G)} = \dot{m}_{\max(F)} \cdot \rho_{(G)} \div x \text{ [kg/m}^3\text{]} = 70000 \text{ kg/h} \cdot 60.3 \text{ kg/m}^3 \div 90 \text{ kg/m}^3 = 46900 \text{ kg/h}$$

Recommended measuring ranges:

See information in the "Limiting flow" Section → [19](#)

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, $R_i = 5$ k Ω , 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 PROFIBUS DP

$U = 3$ to 30 V DC, $R_i = 3$ k Ω , galvanically isolated.

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

Configurable for: 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, $R_i = 3$ k Ω , 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 (only Promass 83)

Active/passive selectable, galvanically isolated, resolution: 2 μ A

- 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**Promass 80***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.f.s./ $^{\circ}$ C, resolution: 0.5 μ A

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

Pulse/frequency output

Passive, open collector, 30 V DC, 250 mA, galvanically isolated.

- Frequency output: full scale frequency 2 to 1000 Hz ($f_{max} = 1250$ Hz), on/off ratio $1:1$, pulse width max. 2 s
- Pulse output: pulse value and pulse polarity selectable, pulse width configurable (0.5 to 2000 ms)

PROFIBUS PA interface

- PROFIBUS PA in accordance with EN 50170 Volume 2, IEC 61158-2 (MBP), galvanically isolated
- Profile Version 3.0
- Current consumption: 11 mA
- Permitted supply voltage: 9 to 32 V
- Bus connection with integrated reverse polarity protection
- Error current FDE (Fault Disconnection Electronic) = 0 mA
- Data transmission rate: 31.25 kBit/s
- Signal encoding: Manchester II
- Function blocks: $4 \times$ Analog Input, $2 \times$ Totalizer
- Output data: Mass flow, Volume flow, Density, Temperature, Totalizer
- Input data: Positive zero return (ON/OFF), Zero point adjustment, Measuring mode, Totalizer control
- Bus address can be configured via miniature switches or via the local display (optional)

Promass 83*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.f.s./°C, resolution: 0.5 μ A

- 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)

PROFIBUS DP interface

- PROFIBUS DP in accordance with EN 50170 Volume 2
- Profile Version 3.0
- Data transmission rate: 9.6 kBaud to 12 MBaud
- Automatic data transmission rate recognition
- Signal encoding: NRZ Code
- Function blocks: 6 \times Analog Input, 3 \times Totalizer
- Output data: Mass flow, Volume flow, Corrected volume flow, Density, Reference density, Temperature, Totalizers 1 to 3
- Input data: Positive zero return (ON/OFF), Zero point adjustment, Measuring mode, Totalizer control
- Bus address can be configured via miniature switches or via the local display (optional)
- Available output combination \rightarrow 11

PROFIBUS PA interface

- PROFIBUS PA in accordance with EN 50170 Volume 2, IEC 61158-2 (MBP), galvanically isolated
- Data transmission rate: 31.25 kBit/s
- Current consumption: 11 mA
- Permitted supply voltage: 9 to 32 V
- Bus connection with integrated reverse polarity protection
- Error current FDE (Fault Disconnection Electronic): 0 mA
- Signal encoding: Manchester II
- Function blocks: 6 \times Analog Input, 3 \times Totalizer
- Output data: Mass flow, Volume flow, Corrected volume flow, Density, Reference density, Temperature, Totalizers 1 to 3
- Input data: Positive zero return (ON/OFF), Zero point adjustment, Measuring mode, Totalizer control
- Bus address can be configured via miniature switches or via the local display (optional)
- Available output combination \rightarrow 11

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 \rightarrow 11

FOUNDATION Fieldbus interface

- FOUNDATION Fieldbus H1, IEC 61158-2, galvanically isolated
- Data transmission rate: 31.25 kBit/s
- Current consumption: 12 mA
- Permitted supply voltage: 9 to 32 V
- Error current FDE (Fault Disconnection Electronic): 0 mA
- Bus connection with integrated reverse polarity protection
- Signal encoding: Manchester II
- ITK Version 5.01
- Function blocks:
 - 8 × Analog Input (Execution time: each 18 ms)
 - 1 × Digital Output (18 ms)
 - 1 × PID (25 ms)
 - 1 × Arithmetic (20 ms)
 - 1 × Input Selector (20 ms)
 - 1 × Signal Characterizer (20 ms)
 - 1 × Integrator (18 ms)
- Number of VCRs: 38
- Number of link objects in VFD: 40
- Output data: Mass flow, Volume flow, Corrected volume flow, Density, Reference density, Temperature, Totalizers 1 to 3
- Input data: Positive zero return (ON/OFF), Zero point adjustment, Measuring mode, Reset totalizer
- Link Master (LM) function is supported

Signal on alarm

Current output

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

Pulse/frequency output

Failsafe mode selectable

Status output (Promass 80)

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

Relay output (Promass 83)

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

Status output (Promass 80)

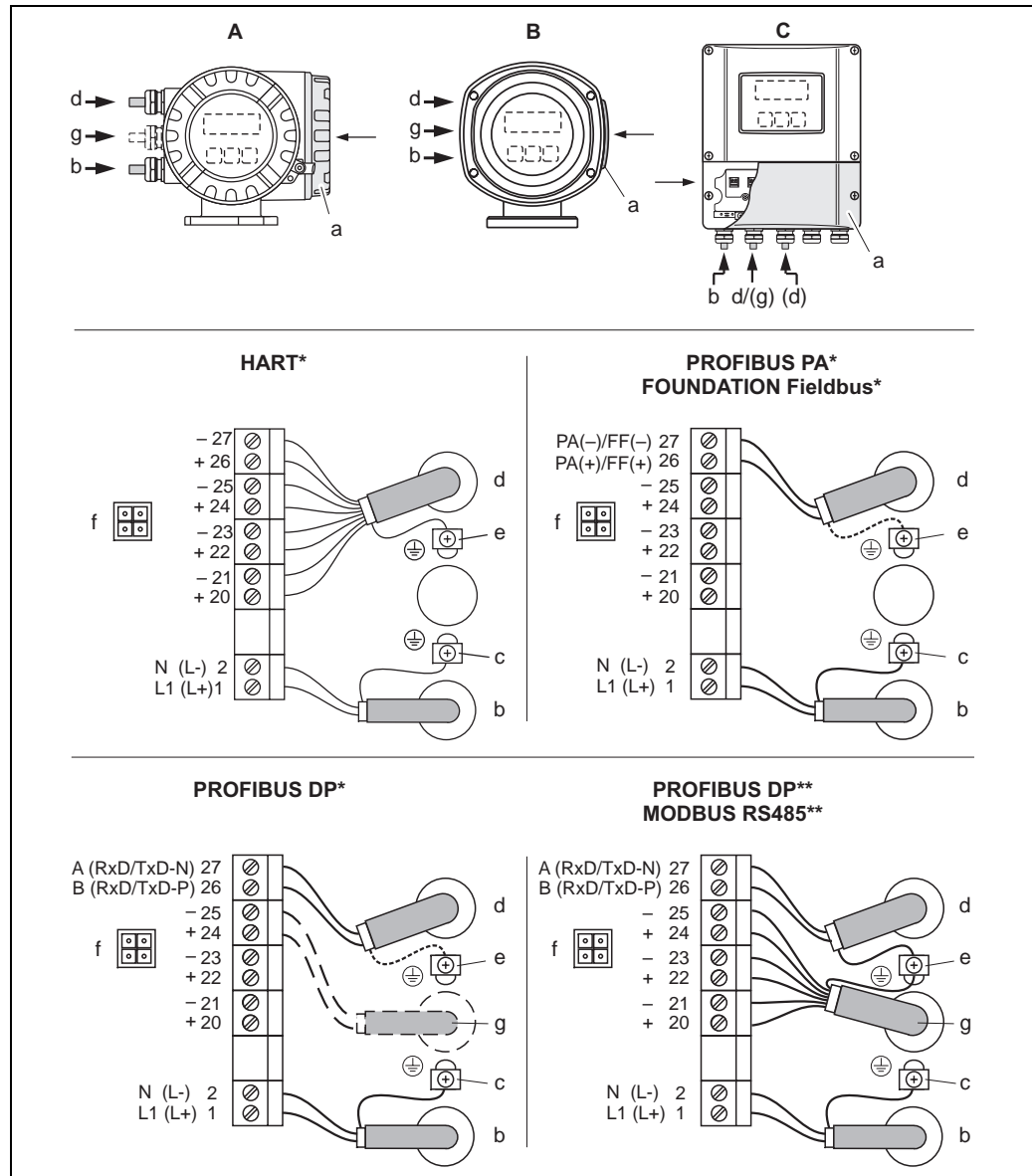
- Open collector
- max. 30 V DC / 250 mA
- galvanically isolated
- Configurable for: error messages, Empty Pipe Detection (EPD), flow direction, limit values

Relay output (Promass 83)

- 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)

*) fixed communication board

**) flexible communication board

a Connection compartment cover

b 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

c Ground terminal for protective ground

d Signal cable: see Terminal assignment → 11

Fieldbus cable:

Terminal No. 26: DP (B) / PA (+) / FF (+) / MODBUS RS485 (B) / (PA, FF: with reverse polarity protection)

Terminal No. 27: DP (A) / PA (-) / FF (-) / MODBUS RS485 (A) / (PA, FF: with reverse polarity protection)

e Ground terminal for signal cable shield / fieldbus cable / RS485 line

f Service adapter for connecting service interface FXA 193 (Fieldcheck, FieldCare)

g Signal cable: see Terminal assignment → 11

g Cable for external termination (only for PROFIBUS DP with permanent assignment communication board):

Terminal No. 24: +5 V

Terminal No. 25: DGND

**Electrical connection,
terminal assignment**

Promass 80

Order version	Terminal No. (inputs/outputs)			
	20 (+) / 21 (-)	22 (+) / 23 (-)	24 (+) / 25 (-)	26 (+) / 27 (-)
80***_*****A	-	-	Frequency output	Current output, HART
80***_*****D	Status input	Status output	Frequency output	Current output, HART
80***_*****H	-	-	-	PROFIBUS PA
80***_*****S	-	-	Frequency output Ex i, passive	Current output Ex i Active, HART
80***_*****T	-	-	Frequency output Ex i, passive	Current output Ex i Passive, HART
80***_*****8	Status input	Frequency output	Current output 2	Current output 1, HART

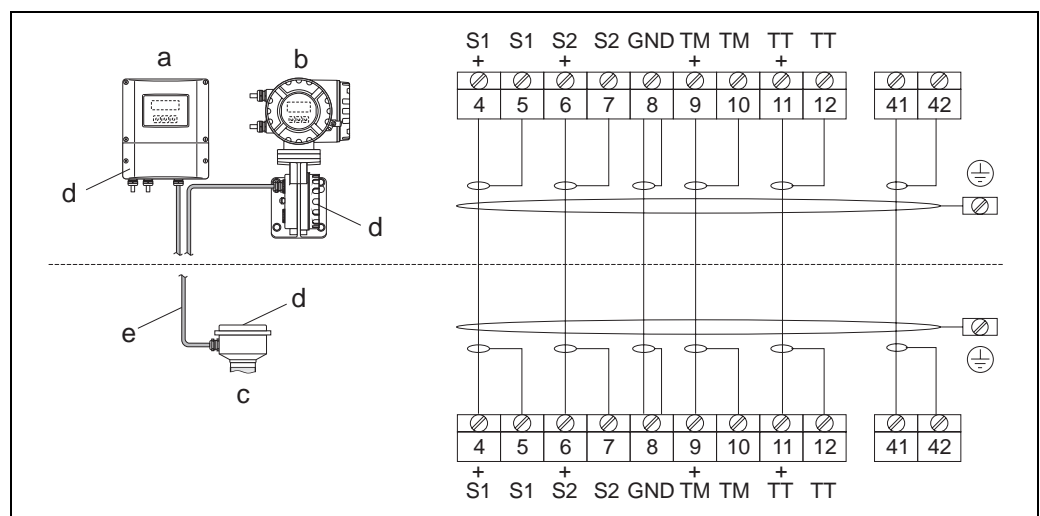
Promass 83

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 version	Terminal No. (inputs/outputs)			
	20 (+) / 21 (-)	22 (+) / 23 (-)	24 (+) / 25 (-)	26 (+) / 27 (-)
<i>Fixed communication boards (permanent assignment)</i>				
83***_*****A	-	-	Frequency output	Current output, HART
83***_*****B	Relay output	Relay output	Frequency output	Current output, HART
83***_*****F	-	-	-	PROFIBUS PA, Ex i
83***_*****G	-	-	-	FOUNDATION Fieldbus Ex i
83***_*****H	-	-	-	PROFIBUS PA
83***_*****J	-	-	+5V (ext. termination)	PROFIBUS DP
83***_*****K	-	-	-	FOUNDATION Fieldbus
83***_*****Q	-	-	Status input	MODBUS RS485
83***_*****R	-	-	Current output 2 Ex i, active	Current output 1 Ex i active, HART
83***_*****S	-	-	Frequency output Ex i, passive	Current output Ex i Active, HART
83***_*****T	-	-	Frequency output Ex i, passive	Current output Ex i Passive, HART
83***_*****U	-	-	Current output 2 Ex i, passive	Current output 1 Ex i passive, HART
<i>Flexible communication boards</i>				
83***_*****C	Relay output 2	Relay output 1	Frequency output	Current output, HART
83***_*****D	Status input	Relay output	Frequency output	Current output, HART
83***_*****E	Status input	Relay output	Current output 2	Current output, HART
83***_*****L	Status input	Relay output 2	Relay output 1	Current output, HART
83***_*****M	Status input	Frequency output 2	Frequency output 1	Current output, HART
83***_*****N	Current output	Frequency output	Status input	MODBUS RS485
83***_*****P	Current output	Frequency output	Status input	PROFIBUS DP

Order version	Terminal No. (inputs/outputs)			
	20 (+) / 21 (-)	22 (+) / 23 (-)	24 (+) / 25 (-)	26 (+) / 27 (-)
83***_*****V	Relay output 2	Relay output 1	Status input	PROFIBUS DP
83***_*****W	Relay output	Current output 3	Current output 2	Current output 1, HART
83***_*****0	Status input	Current output 3	Current output 2	Current output 1, HART
83***_*****2	Relay output	Current output 2	Frequency output	Current output 1, HART
83***_*****3	Current input	Relay output	Current output 2	Current output 1, HART
83***_*****4	Current input	Relay output	Frequency output	Current output, HART
83***_*****5	Status input	Current input	Frequency output	Current output, HART
83***_*****6	Status input	Current input	Current output 2	Current output 1, HART
83***_*****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

Power-supply and signal cables (inputs/outputs):

- Cable entry M20 × 1.5 (8 to 12 mm / 0.31" to 0.47")
- Thread for cable entries, 1/2" NPT, G 1/2"

Connecting cable for remote version:

- Cable entry M20 × 1.5 (8 to 12 mm / 0.31" to 0.47")
- Thread for cable entries, 1/2" NPT, G 1/2"

**Remote version
cable specification**

- $6 \times 0.38 \text{ mm}^2$ (PVC cable with common shield and individually shielded cores)
- Conductor resistance: $\leq 50 \text{ } \Omega/\text{km}$ ($\leq 0,015 \text{ } \Omega/\text{ft}$)
- Capacitance: core/shield: $\leq 420 \text{ pF/m}$ ($\leq 128 \text{ pF/ft}$)
- Cable length: max. 20 m (65 ft)
- Permanent operating temperature: max. $+105 \text{ } ^\circ\text{C}$ ($+221 \text{ } ^\circ\text{F}$)

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.

Power consumption

AC: $<15 \text{ VA}$ (including sensor)

DC: $<15 \text{ W}$ (including sensor)

Switch-on current:

- Max. 13.5 A ($<50 \text{ ms}$) at 24 V DC
- Max. 3 A ($<5 \text{ ms}$) at 260 V AC

Power supply failure**Promass 80**

Lasting min. 1 power cycle:

- EEPROM saves 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.)

Promass 83

Lasting min. 1 power cycle:

- 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

No special measures for potential equalization are required. For instruments for use in hazardous areas, observe the corresponding guidelines in the specific Ex documentation.

Performance characteristics

**Reference operating
conditions**

- Error limits following ISO/DIS 11631
- Water, typically $+20$ to $+30 \text{ } ^\circ\text{C}$ ($+68$ to $+86 \text{ } ^\circ\text{F}$); 2 to 4 bar (30 to 60 psi)
- Data according to calibration protocol $\pm 5 \text{ } ^\circ\text{C}$ ($\pm 9 \text{ } ^\circ\text{F}$) and $\pm 2 \text{ bar}$ ($\pm 30 \text{ psi}$)
- 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 $\pm 5 \text{ } \mu\text{A}$.

o.r. = of reading

Mass flow (liquids)

- Promass 83M: $\pm 0.10\% \pm [(\text{zero point stability} \div \text{measured value}) \cdot 100]\% \text{ o.r.}$
- Promass 80M: $\pm 0.15\% \pm [(\text{zero point stability} \div \text{measured value}) \cdot 100]\% \text{ o.r.}$

Mass flows (gases)

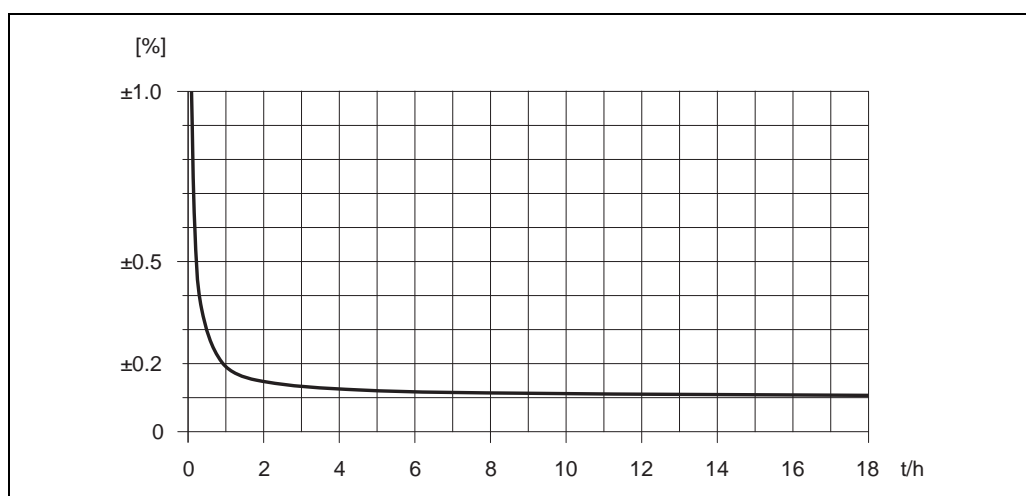
Promass 83M, 80M: $\pm 0.50\% \pm [(\text{zero point stability} \div \text{measured value}) \cdot 100]\% \text{ o.r.}$

Volume flow (liquids)

Promass 83M, 80M: $\pm 0.25\% \pm [(\text{zero point stability} \div \text{measured value}) \cdot 100]\% \text{ o.r.}$

Zero point stability

DN		Max. full scale value		Zero point stability	
[mm]	[inch]	[kg/h] or [l/h]	[lb/min]	[kg/h] or [l/h]	[lb/min]
8	3/8"	2000	73.5	0.100	0.004
15	1/2"	6500	238	0.325	0.012
25	1"	18000	660	0.90	0.033
40	1 1/2"	45000	1650	2.25	0.083
50	2"	70000	2570	3.50	0.129
80	3"	180000	6600	9.00	0.330

Sample calculation

Max. measured error in % of measured value (example: Promass 83 M / DN 25 (1"))

Calculation example (mass flow, liquid):

Given: Promass 83M / DN 25, measured value flow = 8000 kg/h

Max. measured error: $\pm 0.10\% \pm [(zero\ point\ stability \div measured\ value) \cdot 100]\%$ o.r.

Max. measured error: $\pm 0.10\% \pm 0.90\ kg/h \div 8000\ kg/h \cdot 100\% = \pm 0.111\%$

Density (liquid)

- $\pm 0.0010\ g/cc$ (under reference conditions)
- $\pm 0.0010\ g/cc$ (after field density calibration under process conditions)
- $\pm 0.002\ g/cc$ (after special density calibration)
- $\pm 0.02\ g/cc$ (over the entire measuring range of the sensor)

1 g/cc = 1 kg/l

Special density calibration (optional):

- Calibration range: 0.8 to 1.8 g/cc, +5 to +80 °C (+41 to +176 °F)
- Operation range: 0.0 to 5.0 g/cc, -50 to 150 °C (-58 to +302 °F)

Temperature

$\pm 0.5\ ^\circ C \pm 0.005 \cdot T\ ^\circ C$
 $(\pm 1\ ^\circ F \pm 0.003 \cdot (T - 32)\ ^\circ F)$

T = medium temperature

Repeatability

o.r. = of reading

Mass flow (liquids)

Promass 83M, 80M: $\pm 0.05\% \pm [\frac{1}{2} \cdot (\text{zero point stability} \div \text{measured value}) \cdot 100]\%$ o.r.

Mass flow (gases)

Promass 83M, 80M: $\pm 0.25\% \pm [\frac{1}{2} \cdot (\text{zero point stability} \div \text{measured value}) \cdot 100]\%$ o.r.

Volume flow (liquids)

Promass 83M, 80M: $\pm 0.10\% \pm [\frac{1}{2} \cdot (\text{zero point stability} \div \text{measured value}) \cdot 100]\%$ o.r.

Calculation example (Mass flow liquid):

Given: Promass 83M / DN 25. measured value flow = 8000 kg/h
 Repeatability: $\pm 0.05\% \pm [\frac{1}{2} \cdot (\text{zero point stability} \div \text{measured value}) \cdot 100]\%$ o.r.
 Repeatability: $\pm 0.05\% \pm [\frac{1}{2} \cdot (0.90 \text{ kg/h} \div 8000 \text{ kg/h}) \cdot 100\%] = \pm 0.056\%$

Density (liquid)

$\pm 0.0005 \text{ g/cc}$
 $1 \text{ g/cc} = 1 \text{ kg/l}$

Temperature

$\pm 0.25 \text{ }^\circ\text{C} \pm 0.0025 \cdot T \text{ }^\circ\text{C}$
 $(\pm 1 \text{ }^\circ\text{F} \pm 0.003 \cdot (T - 32) \text{ }^\circ\text{F})$
 T = medium temperature

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 $\pm 0.0002\%$ of the full scale value/ $^\circ\text{C}$ ($\pm 0.0001\%$ of the full scale value / $^\circ\text{F}$).

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		Promass M	Promass M high-pressure version
[mm]	[inch]	[% o.r./bar]	[% o.r./bar]
8	3/8"	0.009	0.006
15	1/2"	0.008	0.005
25	1"	0.009	0.003
40	1 1/2"	0.005	-
50	2"	no influence	-
80	3"	no influence	-

o.r.. = of reading

Operating conditions: Installation

Installation instructions

Note the following points:

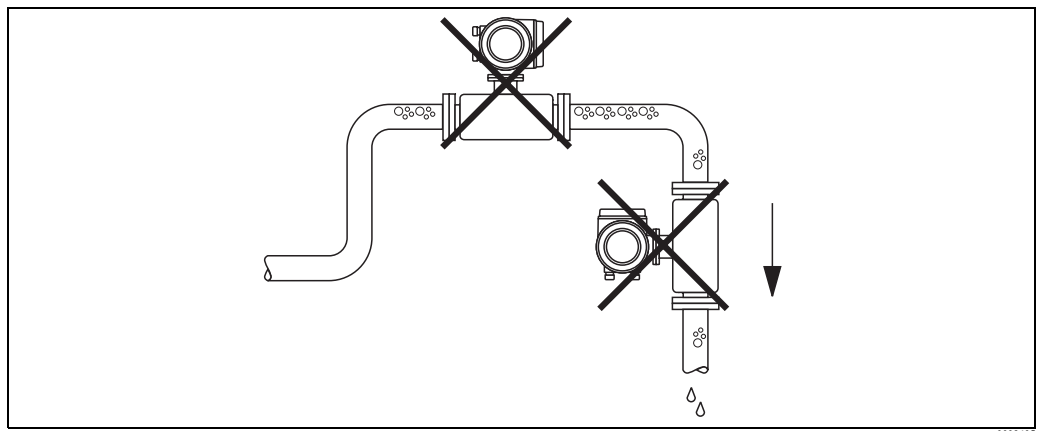
- No special measures such as supports are necessary. External forces are absorbed by the construction of the instrument, for example the secondary containment.
- The high oscillation frequency of the measuring tubes ensures that the correct operation of the measuring system is not influenced by pipe 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:

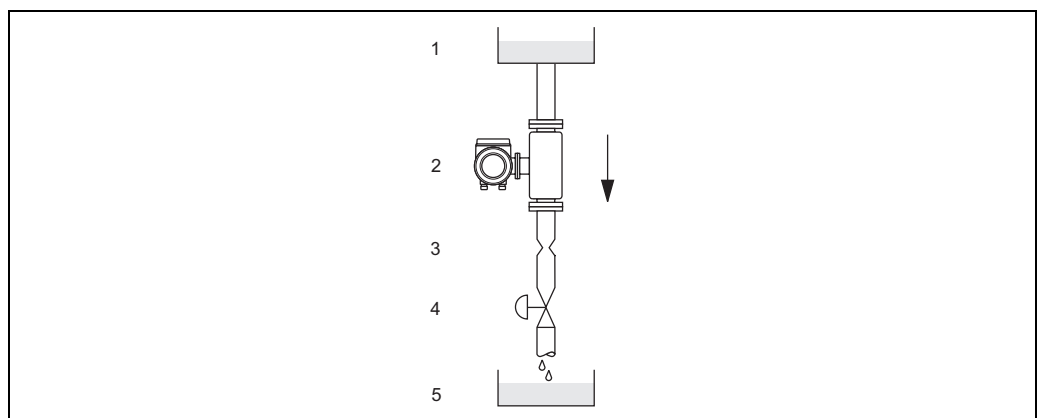
- Highest point of a pipeline. Risk of air accumulating.
- Directly upstream from a free pipe outlet in a vertical pipeline



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Mounting location

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
8	3/8"	6	0.24
15	1/2"	10	0.40
25	1"	14	0.55
40	1 1/2"	22	0.87
50	2"	28	1.10
80	3"	50	2.00

Orientation

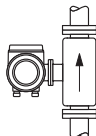
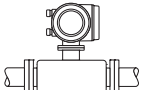
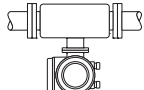
Make sure that the direction of the arrow on the nameplate of the sensor matches the direction of flow (direction in which the fluid flows through the pipe).

Vertical (View V)

Recommended orientation with upward direction of flow (View 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 (Views 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 (Views H1, H2). Always avoid having the transmitter housing in the same horizontal plane as the pipe.

Orientation:	Vertikal	Horizontal, Transmitter head up	Horizontal, Transmitter head down
	 <small>a0004572</small> <i>View V</i>	 <small>a0004576</small> <i>View H1</i>	 <small>a0004580</small> <i>View H2</i>
Standard, Compact version	✓✓	✓✓ ①	✓✓ ②
Standard, Remote version	✓✓	✓✓ ①	✓✓ ②

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

In order to ensure that the maximum permissible ambient temperature for the transmitter is not exceeded, we recommend the following orientations:

① = For fluids with low temperatures, we recommend the horizontal orientation with the transmitter head pointing upwards (View H1) or the vertical orientation (View V).


② = For fluids with high-temperatures, we recommend the horizontal orientation with the transmitter head pointing downwards (View H2) or the vertical orientation (View V).

Thermal insulation

Some fluids require suitable measures to avoid loss of heat at the sensor. A wide range of materials can be used to provide the required thermal insulation.

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. →  13

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

- Standard: -20 to +60 °C (-4 to +140 °F)
- Optional: -40 to +60 °C (-40 to +140 °F)



Note!

- 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 +175 °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

–50 to +150 °C (–58 to +302 °F)

Seals

- EPDM –40 to +160 °C (–40 to +320 °F)
- Kalrez –20 to +275 °C (–4 to +528 °F)
- Silikon –60 to +200 °C (–76 to +392 °F)
- Viton –15 to +200 °C (+5 to +392 °F)
- FEP sheathed (not for gas applications): –60 to +200 °C (–76 to +392 °F)

Medium pressure range (nominal pressure)

Flanges

- Standard:
 - according to DIN PN 40 to 100
 - according to ASME B16.5 Cl 150, Cl 300, Cl 600
 - JIS 10K, 20K, 40K, 63K
- High-pressure version: measuring tubes, connector, thread connections max. 350 bar (5075 psi)

Pressure ranges of secondary containment

100 bar (1450 psi)



Warning!

In case a danger of measuring tube failure exists due to process characteristics, e.g. with corrosive process fluids, we recommend the use of sensors whose secondary containment is equipped with special pressure monitoring connections (ordering option). 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 → [21](#)

Limiting flow

See information in the "Measuring range" Section → [6](#)

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 → [6](#)

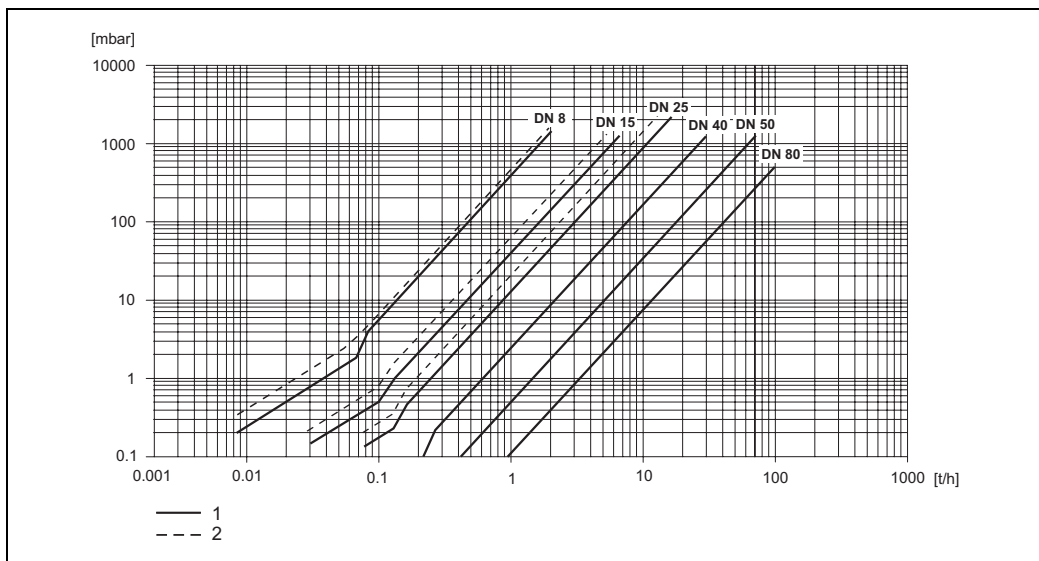
Pressure loss

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	$Re = \frac{2 \cdot \dot{m}}{\pi \cdot d \cdot \nu \cdot \rho}$	a0004623
$Re \geq 2300^1)$	$\Delta p = K \cdot \nu^{0.25} \cdot \dot{m}^{1.85} \cdot \rho^{-0.86}$	a0004626
$Re < 2300$	$\Delta p = K1 \cdot \nu \cdot \dot{m} + \frac{K2 \cdot \nu^{0.25} \cdot \dot{m}^2}{\rho}$	a0004628
Δp = pressure loss [mbar] ν = kinematic viscosity [m ² /s] \dot{m} = mass flow [kg/s] ρ = fluid density [kg/m ³] d = inside diameter of measuring tubes [m] K to $K2$ = constants (depending on nominal diameter)		
¹⁾ To compute the pressure loss for gases, always use the formula for $Re \geq 2300$.		

Pressure loss coefficient

DN		d[m]	K	K1	K2
[mm]	[inch]				
8	3/8"	$5.53 \cdot 10^{-3}$	$5.2 \cdot 10^7$	$8.6 \cdot 10^7$	$1.7 \cdot 10^7$
15	1/2"	$8.55 \cdot 10^{-3}$	$5.3 \cdot 10^6$	$1.7 \cdot 10^7$	$9.7 \cdot 10^5$
25	1"	$11.38 \cdot 10^{-3}$	$1.7 \cdot 10^6$	$5.8 \cdot 10^6$	$4.1 \cdot 10^5$
40	1 1/2"	$17.07 \cdot 10^{-3}$	$3.2 \cdot 10^5$	$1.2 \cdot 10^6$	$1.2 \cdot 10^5$
50	2"	$25.60 \cdot 10^{-3}$	$6.4 \cdot 10^4$	$4.5 \cdot 10^5$	$1.3 \cdot 10^4$
80	3"	$38.46 \cdot 10^{-3}$	$1.4 \cdot 10^4$	$8.2 \cdot 10^4$	$3.7 \cdot 10^4$
High-pressure version					
8	3/8"	$4.93 \cdot 10^{-3}$	$6.0 \cdot 10^7$	$1.4 \cdot 10^8$	$2.8 \cdot 10^7$
15	1/2"	$7.75 \cdot 10^{-3}$	$8.0 \cdot 10^6$	$2.5 \cdot 10^7$	$1.4 \cdot 10^6$
25	1"	$10.20 \cdot 10^{-3}$	$2.7 \cdot 10^6$	$8.9 \cdot 10^6$	$6.3 \cdot 10^5$



Pressure loss diagram for water

- 1 Promass M
- 2 Promass M (high-pressure version)

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:

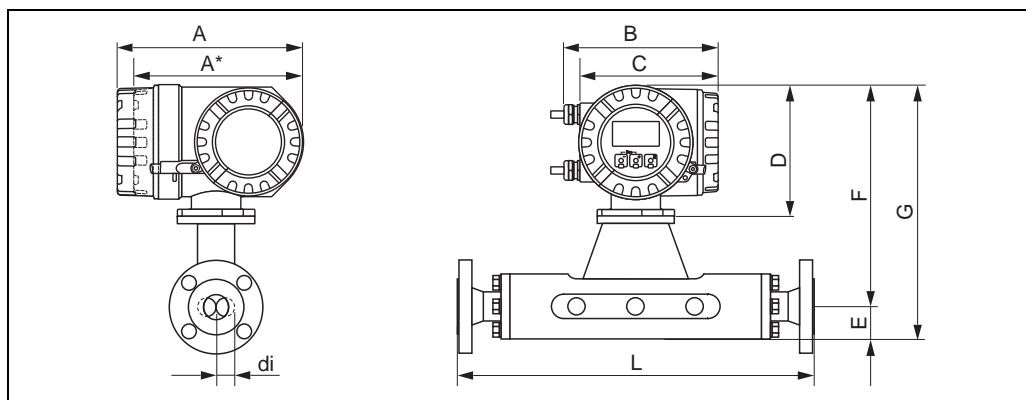
- Nominal diameter of the sensor with fluid characteristics such as viscosity, density, etc.
- Pressure loss downstream of the measuring point.
- Converting mass flow to volume flow, etc.
- Simultaneous display of various meter size.
- Determining measuring ranges.

The Applicator runs on any IBM compatible PC with windows.

Mechanical construction**Design, dimensions**

Dimensions:	
Field housing compact version, powder-coated die-cast aluminum	→ 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 connection SI units	
Flange connections EN (DIN)	→ 26
Flange connections ASME B16.5	→ 27
Flange connection JIS B2220	→ 28
Tri-Clamp	→ 30
DIN 11851 (threaded hygienic connection)	→ 31
DIN 11864-1 Form A (threaded hygienic connection)	→ 31
DIN 11864-2 Form A (flat flange with groove)	→ 32
ISO 2853 (threaded hygienic connection)	→ 33
SMS 1145 (threaded hygienic connection)	→ 33
High-pressure: 1/2"-NPT, 3/8"-NPT and G 3/8"	→ 34
High-pressure: 1/2"-SWAGELOK	→ 35
High-pressure: Connector with internal thread 7/8-14 UNF	→ 35
Process connection in US units	
Flange connections ASME B16.5	→ 36
Tri-Clamp	→ 38
SMS 1145 (threaded hygienic connection)	→ 39
High-pressure version: 1/2"-NPT, 3/8"-NPT and G 3/8"	→ 40
High-pressure version: 1/2"-SWAGELOK	→ 41
High-pressure version: Connector with internal thread 7/8-14 UNF	→ 41
Promass M without process connections (SI units)	→ 42
Promass M without process connections (US units)	→ 43
Purge connections / secondary containment monitoring	→ 44

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



Dimensions in SI units

DN	A	A*	B	C	D	E	F	G	L	di
8	227	207	187	168	160	75	266	341	¹⁾	¹⁾
15	227	207	187	168	160	75	266	341	¹⁾	¹⁾
25	227	207	187	168	160	75	266	341	¹⁾	¹⁾
40	227	207	187	168	160	105	271	376	¹⁾	¹⁾
50	227	207	187	168	160	141	283	424	¹⁾	¹⁾
80	227	207	187	168	160	200	305	505	¹⁾	¹⁾

* Blind version (without local 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"	8.94	8.15	7.68	6.61	6.30	2.95	10.5	13.4	¹⁾	¹⁾
1/2"	8.94	8.15	7.68	6.61	6.30	2.95	10.5	13.4	¹⁾	¹⁾
1"	8.94	8.15	7.68	6.61	6.30	2.95	10.5	13.4	¹⁾	¹⁾
1 1/2"	8.94	8.15	7.68	6.61	6.30	4.13	10.7	14.8	¹⁾	¹⁾
2"	8.94	8.15	7.68	6.61	6.30	5.55	11.1	16.7	¹⁾	¹⁾
3"	8.94	8.15	7.68	6.61	6.30	7.87	12.0	19.9	¹⁾	¹⁾

* Blind version (without local display)

¹⁾ dependent on respective process connection

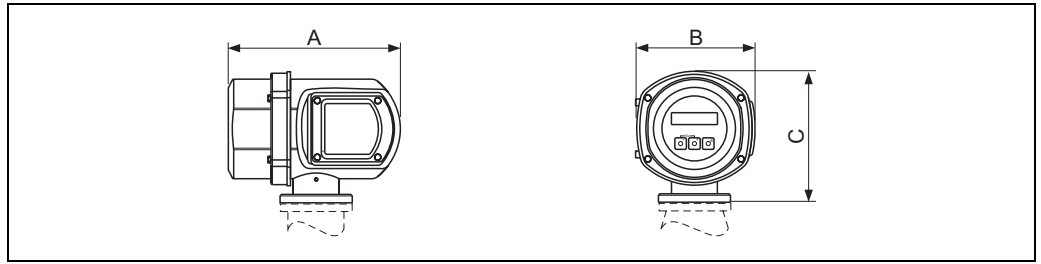
All dimensions in [inch]



Note!

Dimensions for transmitters II2G/Zone 1 → 23.

Transmitter compact version, stainless steel

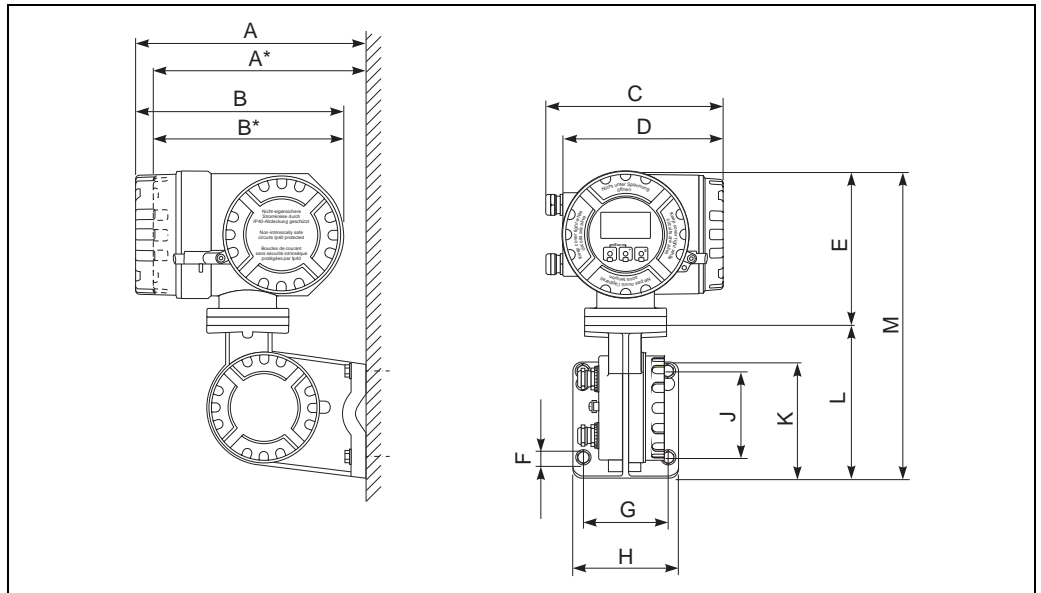


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Dimensions in SI and US units

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

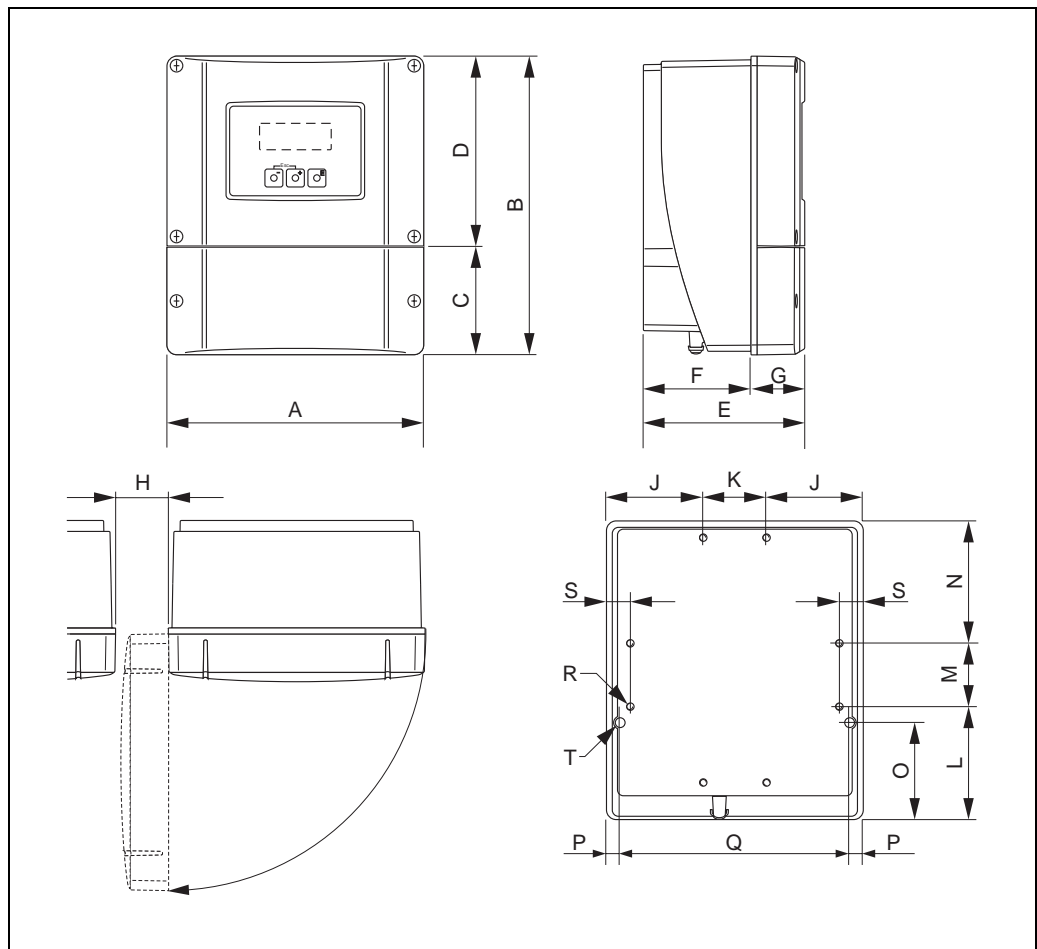
* Blind version (without display)
All dimensions in [mm]

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
215	250	90.5	159.5	135	90	45	>50	81
K	L	M	N	O	P	Q	R	S
53	95	53	102	81.5	11.5	192	8 × M5	20

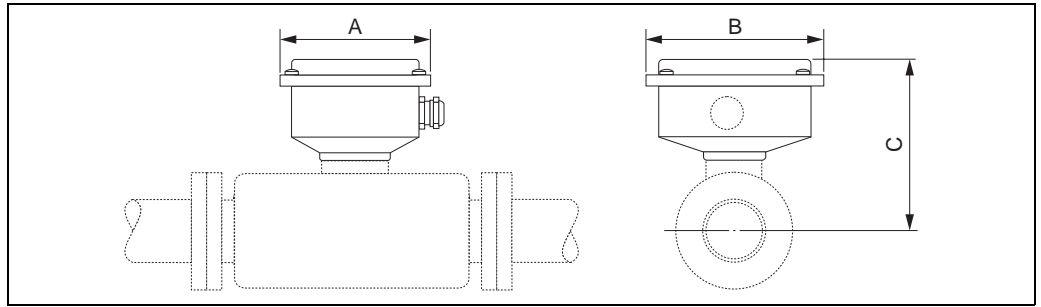
All dimensions in [mm]

Dimensions in US units

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

All dimensions in [inch]

Sensor remote version, connection housing



a0002516

Dimensions in SI units

DN	A	B	C
8	118.5	137.5	113
15	118.5	137.5	115
25	118.5	137.5	119
40	118.5	137.5	130
50	118.5	137.5	140
80	118.5	137.5	156

All dimensions in [mm]

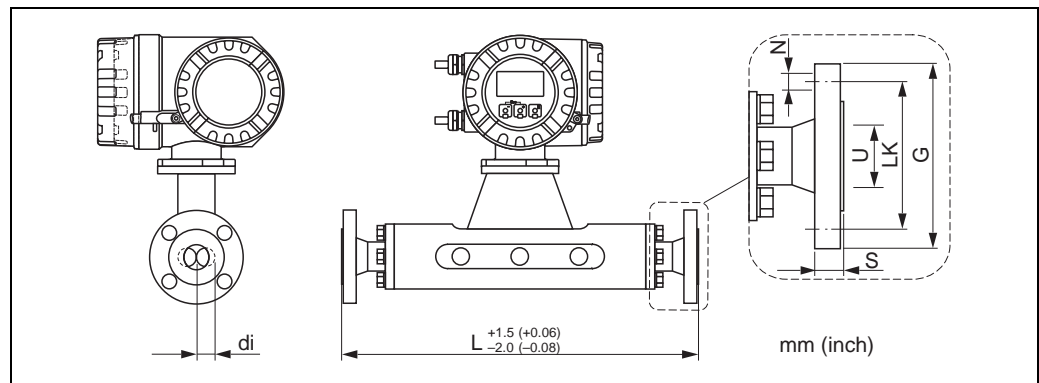
Dimensions in US units

DN	A	B	C
3/8"	4.67	5.41	4.52
1/2"	4.67	5.41	4.60
1"	4.67	5.41	4.76
1 1/2"	4.67	5.41	5.20
2"	4.67	5.41	5.60
3"	4.67	5.41	6.24

All dimensions in [inch]

Process connections in SI units

Flange connections EN (DIN), ASME B16.5, JIS B2220



Flange connections EN (DIN)

Flange according to EN 1092-1 (DIN 2501) / PN 16: PVDF							
DN	G	L	N	S	LK	U	di
8	95	370	4 × Ø14	16	65	16.1	5.53
15	95	404	4 × Ø14	16	65	16.1	8.55
25	115	440	4 × Ø14	18	85	28.5	11.38
40	150	550	4 × Ø18	18	110	43.1	17.07
50	165	715	4 × Ø18	20	125	54.5	25.60

All dimensions in [mm]

Flange according to EN 1092-1 (DIN 2501 / DIN 2512N ¹⁾) / PN 40: 1.4404/316L, Titanium							
Surface roughness (flange): EN 1092-1 Form B1 (DIN 2526 Form C), Ra 3.2 to 12.5 µm							
DN	G	L	N	S	LK	U	di
8	95	370	4 × Ø14	16	65	17.3	5.53
15	95	404	4 × Ø14	16	65	17.3	8.55
25	115	440	4 × Ø14	18	85	28.5	11.38
40	150	550	4 × Ø18	18	110	43.1	17.07
50	165	715	4 × Ø18	20	125	54.5	25.60
80	200	840	8 × Ø18	24	160	82.5	38.46

¹⁾ Flange with groove according to EN 1092-1 Form D (DIN 2512N) available

All dimensions in [mm]

Flange according to EN 1092-1 (DIN 2501) / PN 40 (mit DN 25-Flanschen): 1.4404/316L							
Surface roughness (flange): EN 1092-1 Form B1 (DIN 2526 Form C), Ra 3.2 to 12.5 µm							
DN	G	L	N	S	LK	U	di
8	115	440	4 × Ø14	18	85	28.5	5.53
15	115	440	4 × Ø14	18	85	28.5	8.55

All dimensions in [mm]

Flange according to EN 1092-1 (DIN 2501 / DIN 2512N ¹⁾) / PN 63: 1.4404/316L, Titanium							
Surface roughness (flange): EN 1092-1 Form B2 (DIN 2526 Form E), Ra 0.8 to 3.2 µm							
DN	G	L	N	S	LK	U	di
50	180	724	4 × Ø22	26	135	54.5	25.60
80	215	875	8 × Ø22	28	170	81.7	38.46

¹⁾ Flange with groove according to EN 1092-1 Form D (DIN 2512N) available
All dimensions in [mm]

Flange according to EN 1092-1 (DIN 2501 / DIN 2512N ¹⁾) / PN 100: 1.4404/316L, Titanium							
Surface roughness (flange): EN 1092-1 Form B2 (DIN 2526 Form E), Ra 0.8 to 3.2 µm							
DN	G	L	N	S	LK	U	di
8	95	400	4 × Ø14	20	65	17.3	5.53
15	95	420	4 × Ø14	20	65	17.3	8.55
25	115	470	4 × Ø14	24	85	28.5	11.38
40	150	590	4 × Ø18	26	110	43.1	17.07
50	165	740	4 × Ø18	28	125	54.5	25.60
80	230	885	8 × Ø26	32	180	80.9	38.46

¹⁾ Flange with groove according to EN 1092-1 Form D (DIN 2512N) available
All dimensions in [mm]

Flange connections ASME B16.5

Flange according to ASME B16.5 / CI 150: 1.4404/316L, Titanium							
Surface roughness (flange): Ra 3.2 to 6.3 µm							
DN	G	L	N	S	LK	U	di
8	88.9	370	4 × Ø15.7	11.2	60.5	15.7	5.53
15	88.9	404	4 × Ø15.7	11.2	60.5	15.7	8.55
25	108.0	440	4 × Ø15.7	14.2	79.2	26.7	11.38
40	127.0	550	4 × Ø15.7	17.5	98.6	40.9	17.07
50	152.4	715	4 × Ø19.1	19.1	120.7	52.6	25.60
80	190.5	840	4 × Ø19.1	23.9	152.4	78.0	38.46

All dimensions in [mm]

Flange according to ASME B16.5 / CI 150: PVDF							
DN	G	L	N	S	LK	U	di
8	88.9	370	4 × Ø15.7	16	60.5	15.7	5.53
15	88.9	404	4 × Ø15.7	16	60.5	15.7	8.55
25	108.0	440	4 × Ø15.7	18	79.2	26.7	11.38
40	127.0	550	4 × Ø15.7	21	98.6	40.9	17.07
50	152.4	715	4 × Ø19.1	28	120.7	52.6	25.60

All dimensions in [mm]

Flange according to ASME B16.5 / Cl 300: 1.4404/316L, Titanium							
Surface roughness (flange): Ra 3.2 to 6.3 µm							
DN	G	L	N	S	LK	U	di
8	95.2	370	4 × Ø15.7	14.2	66.5	15.7	5.53
15	95.2	404	4 × Ø15.7	14.2	66.5	15.7	8.55
25	123.9	440	4 × Ø19.0	17.5	88.9	26.7	11.38
40	155.4	550	4 × Ø22.3	20.6	114.3	40.9	17.07
50	165.1	715	8 × Ø19.0	22.3	127.0	52.6	25.60
80	209.5	840	8 × Ø22.3	28.4	168.1	78.0	38.46

All dimensions in [mm]

Flange according to ASME B16.5 / Cl 600: 1.4404/316L, Titanium							
Surface roughness (flange): Ra 3.2 to 6.3 µm							
DN	G	L	N	S	LK	U	di
8	95.3	400	4 × Ø15.7	20.6	66.5	13.8	5.53
15	95.3	420	4 × Ø15.7	20.6	66.5	13.8	8.55
25	124.0	490	4 × Ø19.1	23.6	88.9	24.4	11.38
40	155.4	600	4 × Ø22.4	28.7	114.3	38.1	17.07
50	165.1	742	8 × Ø19.1	31.8	127.0	49.3	25.60
80	209.6	900	8 × Ø22.4	38.2	168.1	73.7	38.46

All dimensions in [mm]

Flange connection JIS B2220

Flange JIS B2220 / 10K: 1.4404/316L, Titanium							
Surface roughness (flange): Ra 3.2 to 6.3 µm							
DN	G	L	N	S	LK	U	di
50	155	715	4 × Ø19	16	120	50	25.60
80	185	832	8 × Ø19	18	150	80	38.46

All dimensions in [mm]

Flange JIS B2220 / 10K: 1.4404/316L, PVDF							
DN	G	L	N	S	LK	U	di
8	95	370	4 × Ø15	16	70	15	5.53
15	95	404	4 × Ø15	16	70	15	8.55
25	125	440	4 × Ø19	18	90	25	11.38
40	140	550	4 × Ø19	21	105	40	17.07
50	155	715	4 × Ø19	22	120	50	25.60

All dimensions in [mm]

Flange JIS B2220 / 20K: 1.4404/316L, Titanium							
Surface roughness (flange): Ra 3.2 to 6.3 µm							
DN	G	L	N	S	LK	U	di
8	95	370	4 × Ø15	16	70	15	5.53
15	95	404	4 × Ø15	16	70	15	8.55
25	125	440	4 × Ø19	18	90	25	11.38
40	140	550	4 × Ø19	21	105	40	17.07
50	155	715	4 × Ø19	22	120	50	25.60
80	200	832	8 × Ø23	22	160	80	38.46

All dimensions in [mm]

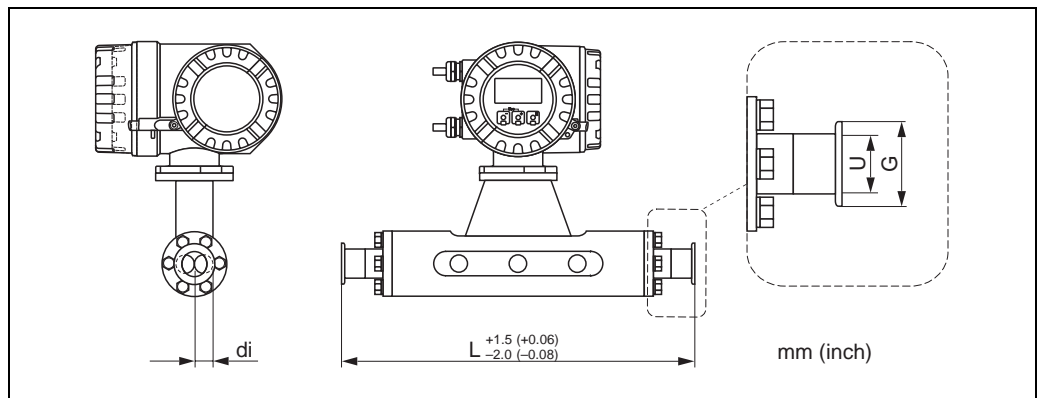
Flange JIS B2220 / 40K: 1.4404/316L, Titanium							
Surface roughness (flange): Ra 3.2 to 6.3 µm							
DN	G	L	N	S	LK	U	di
8	115	400	4 × Ø19	20	80	15	5.35
15	115	425	4 × Ø19	20	80	15	8.55
25	130	485	4 × Ø19	22	95	25	11.38
40	160	600	4 × Ø23	24	120	38	17.07
50	165	760	8 × Ø19	26	130	50	25.60
80	210	890	8 × Ø23	32	170	75	38.46

All dimensions in [mm]

Flange JIS B2220 / 63K: 1.4404/316L, Titanium							
Surface roughness (flange): Ra 3.2 to 6.3 µm							
DN	G	L	N	S	LK	U	di
8	120	420	4 × Ø19	23	85	12	5.53
15	120	440	4 × Ø19	23	85	12	8.55
25	140	494	4 × Ø23	27	100	22	11.38
40	175	620	4 × Ø25	32	130	35	17.07
50	185	775	8 × Ø23	34	145	48	25.60
80	230	915	8 × Ø25	40	185	73	38.46

All dimensions in [mm]

Tri-Clamp



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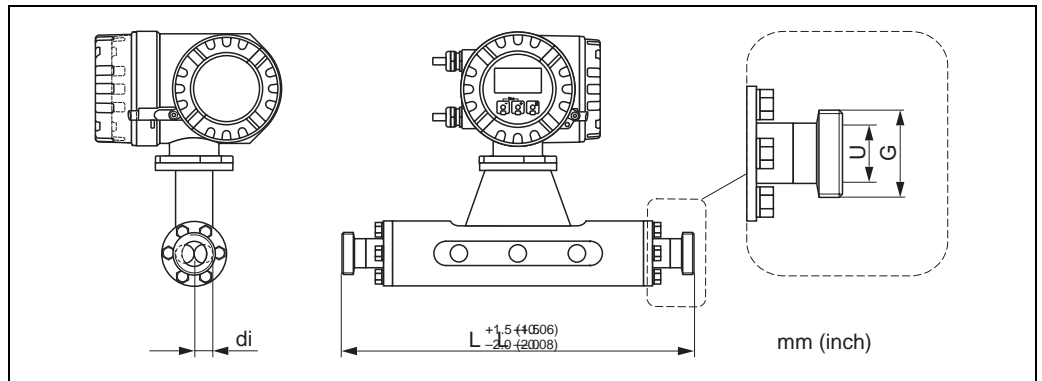
Tri-Clamp: 1.4404/316L					
DN	Clamp	G	L	U	di
8	1"	50.4	367	22.1	5.53
15	1"	50.4	398	22.1	8.55
25	1"	50.4	434	22.1	11.38
40	1½"	50.4	560	34.8	17.07
50	2"	63.9	720	47.5	25.60
80	3"	90.9	801	72.9	38.46

3A version also available (Ra ≤ 0.8 µm/150 grit)
All dimensions in [mm]

½"-Tri-Clamp: 1.4404/316L					
DN	Clamp	G	L	U	di
8	½"	25.0	36	9.5	5.53
15	½"	25.0	398	9.5	8.55

3A version also available (Ra ≤ 0.8 µm/150 grit)
All dimensions in [mm]

DIN 11851 (threaded hygienic connection)



a0002527-ae

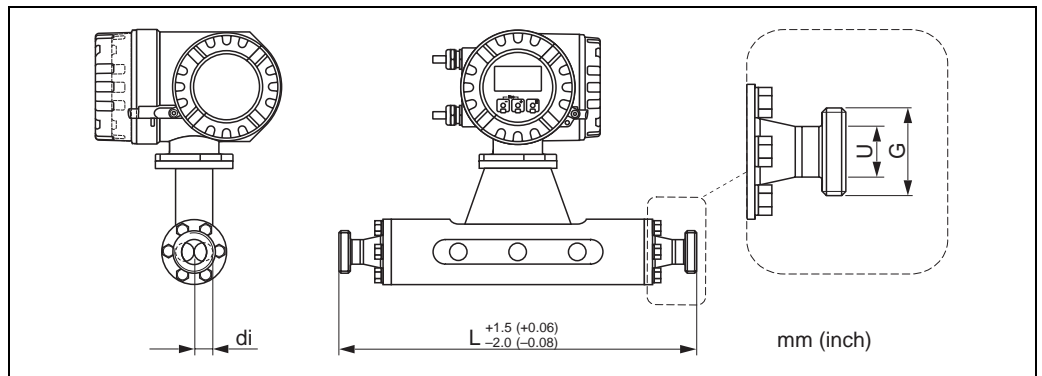
Threaded hygienic connection DIN 11851: 1.4404/316L

DN	G	L	U	di
8	Rd 34 × 1/8"	367	16	5.53
15	Rd 34 × 1/8"	398	16	8.55
25	Rd 52 × 1/6"	434	26	11.38
40	Rd 65 × 1/6"	560	38	17.07
50	Rd 78 × 1/6"	720	50	25.60
80	Rd 110 × 1/4"	815	81	38.46

3A version also available ($Ra \leq 0.8 \mu\text{m}/150$ grit)

All dimensions in [mm]

DIN 11864-1 Form A (threaded hygienic connection)



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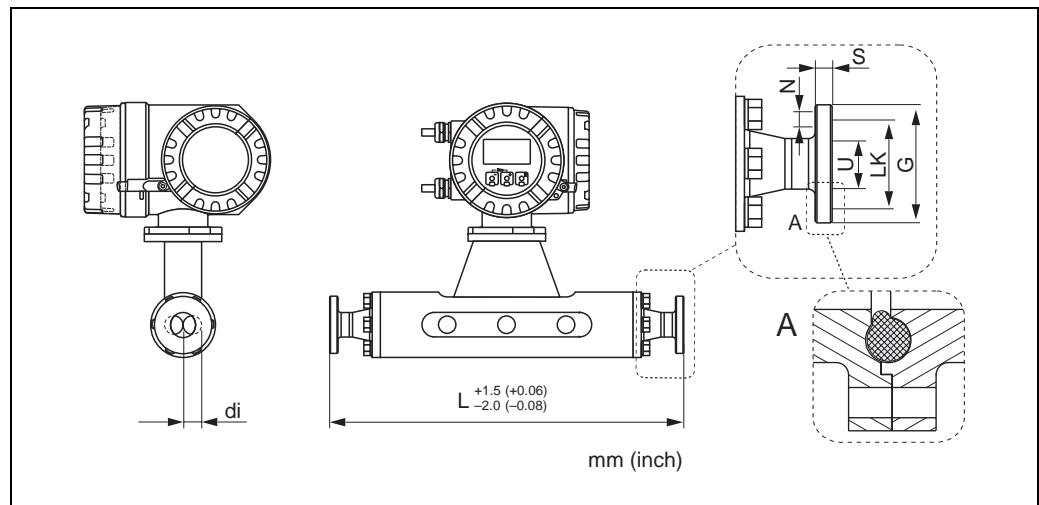
Threaded hygienic connection DIN 11864-1 Form A: 1.4404/316L

DN	G	L	U	di
8	Rd 28x 1/8"	367	10	5.53
15	Rd 34 × 1/8"	398	16	8.55
25	Rd 52 × 1/6"	434	26	11.38
40	Rd 65 × 1/6"	560	38	17.07
50	Rd 78 × 1/6"	720	50	25.60
80	Rd 110 × 1/4"	815	81	38.46

3A version also available ($Ra \leq 0.8 \mu\text{m}/150$ grit)

All dimensions in [mm]

DIN 11864-2 Form A (flat flange with groove)

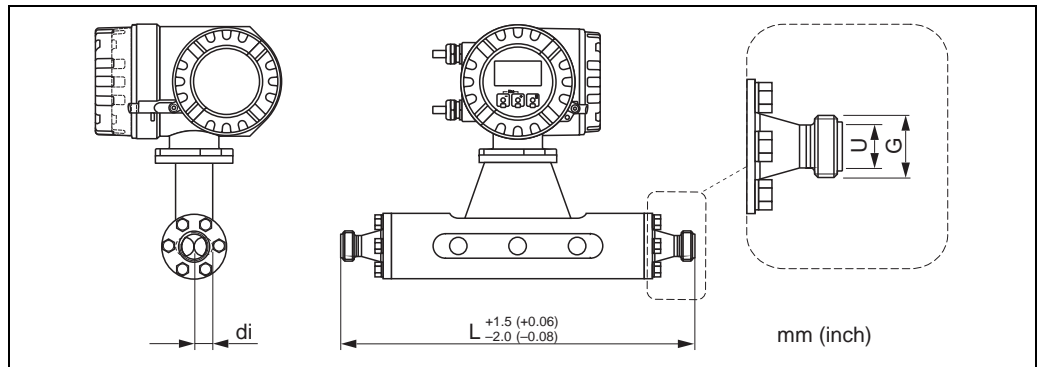


Detail A: The flange has the smaller groove for the O-ring on the sensor side. When mounting the sensor the corresponding flange must have accordingly a larger groove.

DIN 11864-2 Form A (flat flange with groove): 1.4404/316L							
DN	G	L	N	S	LK	U	di
8	54	367	4 × Ø9	10	37	10	5.53
15	59	398	4 × Ø9	10	42	16	8.55
25	70	434	4 × Ø9	10	53	26	11.38
40	82	560	4 × Ø9	10	65	38	17.07
50	94	720	4 × Ø9	10	77	50	25.60
80	133	815	8 × Ø11	12	112	81	38.46

3A version also available (Ra ≤ 0.8 µm/150 grit)
All dimensions in [mm]

ISO 2853 (threaded hygienic connection)



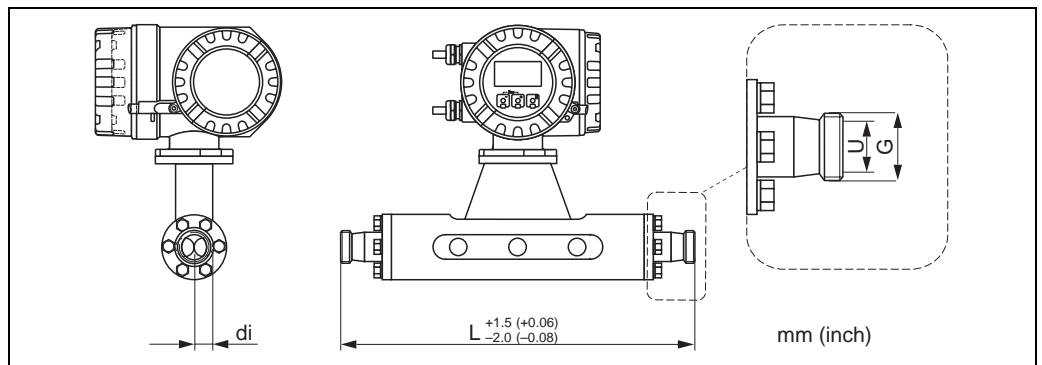
a0002530-ae

Threaded hygienic connection ISO 2853: 1.4404/316L

DN	G ¹⁾	L	N	di
8	37.13	367	22.6	5.53
15	37.13	398	22.6	8.55
25	37.13	434	22.6	11.38
40	52.68	560	35.6	17.07
50	64.16	720	48.6	25.60
80	91.19	815	72.9	38.46

¹⁾ Max. thread diameter to ISO 2853 Annex A
 3A version also available (Ra ≤ 0.8 µm/150 grit)
 All dimensions in [mm]

SMS 1145 (threaded hygienic connection)



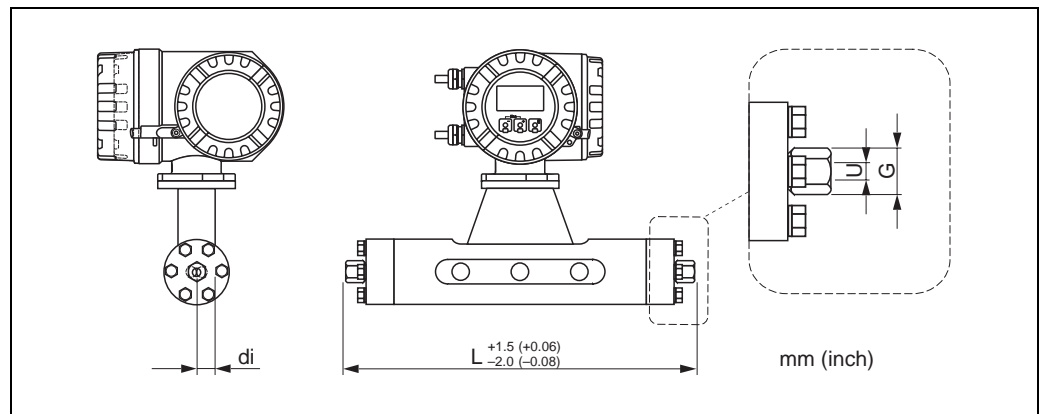
a0002531-ae

Threaded hygienic connection SMS 1145: 1.4404/316L

DN	G	L	U	di
8	Rd 40 × 1/6"	367	22.5	5.53
15	Rd 40 × 1/6"	398	22.5	8.55
25	Rd 40 × 1/6"	434	22.5	11.38
40	Rd 60 × 1/6"	560	35.5	17.07
50	Rd 70 × 1/6"	720	48.5	25.60
80	Rd 98 × 1/6"	792	72.0	38.46

3A version also available (Ra ≤ 0.8 µm/150 grit)
 All dimensions in [mm]

High-pressure: 1/2"-NPT, 3/8"-NPT and G 3/8"



1/2"-NPT: 1.4404/316L				
DN	G	L	U	di
8	AF 1 1/16"	370	10.2	4.93
15	AF 1 1/16"	400	10.2	7.75
25	AF 1 1/16"	444	10.2	10.20

3A version also available ($R_a \leq 0.8 \mu\text{m}/150$ grit)
All dimensions in [mm]

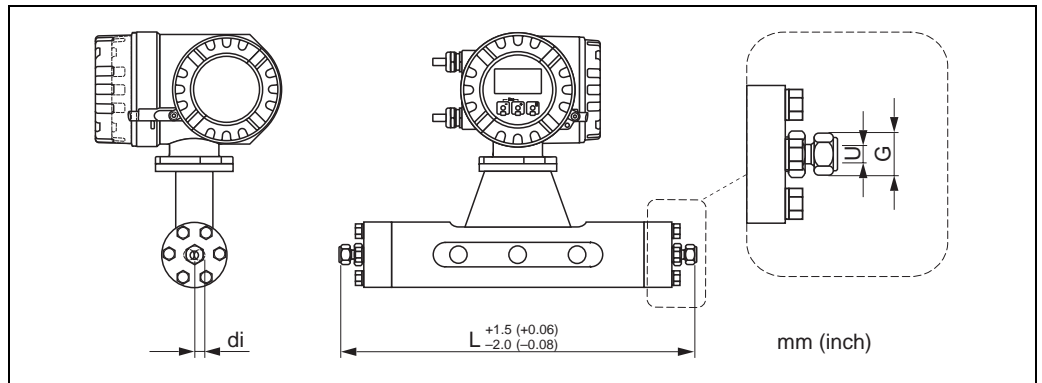
3/8"-NPT: 1.4404/316L				
DN	G	L	U	di
8	AF 1 5/16"	355.8	10.2	4.93
15	AF 1 5/16"	385.8	10.2	7.75
25	AF 1 5/16"	429.8	10.2	10.20

3A version also available ($R_a \leq 0.8 \mu\text{m}/150$ grit)
All dimensions in [mm]

G 3/8": 1.4404/316L				
DN	G	L	U	di
8	AF 24	355.8	10.2	4.93
15	AF 24	385.8	10.2	7.75
25	AF 24	429.8	10.2	10.20

3A version also available ($R_a \leq 0.8 \mu\text{m}/150$ grit)
All dimensions in [mm]

High-pressure: 1/2"-SWAGELOK

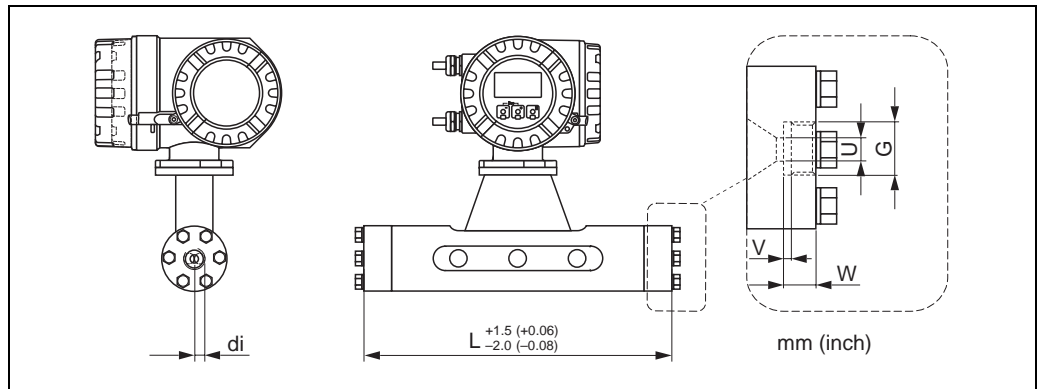


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1/2"-SWAGELOK: 1.4404/316L				
DN	G	L	U	di
8	7/8"	366.4	10.2	4.93
15	7/8"	396.4	10.2	7.75
25	7/8"	440.4	10.2	10.20

3A version also available (Ra ≤ 0.8 μm/150 grit)
All dimensions in [mm]

High-pressure: Connector with internal thread 7/8-14 UNF



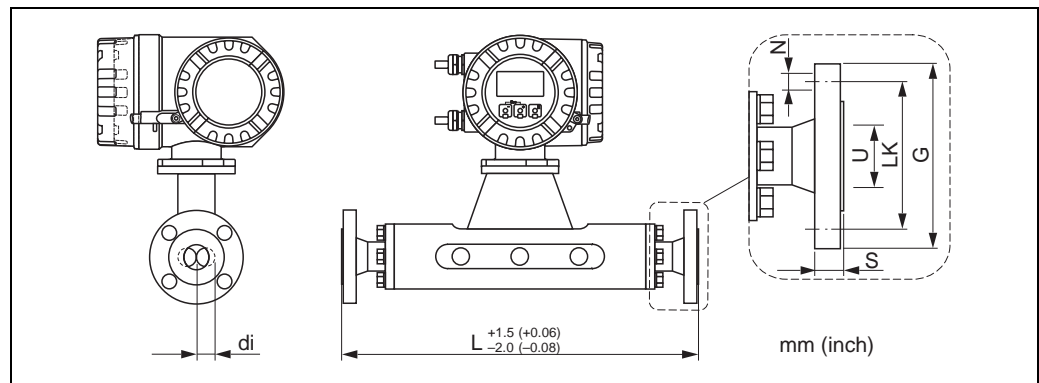
a0002534-ae

Internal thread 7/8-14-UNF: 1.4404/316L						
DN	G	L	U	V	W	di
8	7/8-14UNF	304	10.2	3	14	4.93
15	7/8-14UNF	334	10.2	3	14	7.75
25	7/8-14UNF	378	10.2	3	14	10.20

3A version also available (Ra ≤ 0.8 μm/150 grit)
All dimensions in [mm]

Process connections in US units

Flange connections ASME B16.5



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Flange according to ASME B16.5 / Cl 150: 1.4404/316L, Titanium							
Surface roughness (flange): Ra 3.2 to 6.3 µm							
DN	G	L	N	S	LK	U	di
3/8"	3.50	14.6	4 × Ø 0.62	0.44	2.38	0.62	0.22
1/2"	3.50	15.9	4 × Ø 0.62	0.44	2.38	0.62	0.34
1"	4.25	17.3	4 × Ø 0.62	0.56	3.12	1.05	0.45
1 1/2"	5.00	21.7	4 × Ø 0.62	0.69	3.88	1.61	0.67
2"	6.00	28.1	4 × Ø 0.75	0.75	4.75	2.07	1.01
3"	7.50	33.1	4 × Ø 0.75	0.94	6.00	3.07	1.51

All dimensions in [inch]

Flange according to ASME B16.5 / Cl 150: PVDF							
DN	G	L	N	S	LK	U	di
3/8"	3.50	14.6	4 × Ø 0.62	0.63	2.38	0.62	0.22
1/2"	3.50	15.9	4 × Ø 0.62	0.63	2.38	0.62	0.34
1"	4.25	17.3	4 × Ø 0.62	0.81	3.12	1.05	0.45
1 1/2"	5.00	21.7	4 × Ø 0.62	0.83	3.88	1.61	0.67
2"	6.00	28.1	4 × Ø 0.75	1.10	4.75	2.07	1.01

All dimensions in [inch]

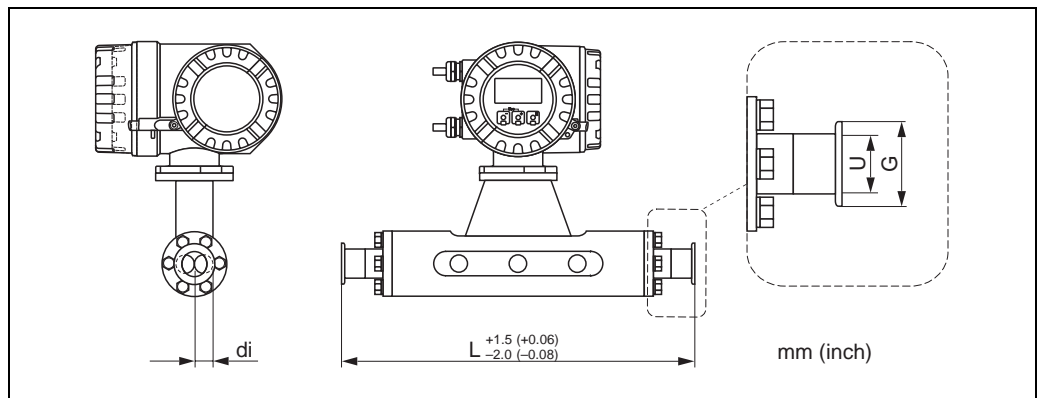
Flange according to ASME B16.5 / Cl 300: 1.4404/316L, Titanium							
Surface roughness (flange): Ra 3.2 to 6.3 µm							
DN	G	L	N	S	LK	U	di
3/8"	3.75	14.6	4 × Ø 0.62	0.56	2.62	0.62	0.22
½"	3.75	15.9	4 × Ø 0.62	0.56	2.62	0.62	0.34
1"	4.88	17.3	4 × Ø 0.75	0.69	3.50	1.05	0.45
1½"	6.12	21.7	4 × Ø 0.88	0.81	4.50	1.51	0.67
2"	6.50	28.1	8 × Ø 0.75	0.88	5.00	2.07	1.01
3"	8.25	33.1	8 × Ø 0.88	1.12	6.62	3.07	1.51

All dimensions in [inch]

Flange according to ASME B16.5 / Cl 600: 1.4404/316L, Titanium							
Surface roughness (flange): Ra 3.2 to 6.3 µm							
DN	G	L	N	S	LK	U	di
3/8"	3.75	15.7	4 × Ø 0.62	0.81	2.62	0.54	0.22
½"	3.75	16.5	4 × Ø 0.62	0.81	2.62	0.54	0.34
1"	4.88	19.3	4 × Ø 0.75	0.93	3.50	0.96	0.45
1½"	6.12	23.6	4 × Ø 0.88	1.13	4.50	1.50	0.67
2"	6.50	29.2	8 × Ø 0.75	1.25	5.00	1.94	1.01
3"	8.25	35.1	8 × Ø 0.88	1.50	6.62	2.90	1.51

All dimensions in [inch]

Tri-Clamp



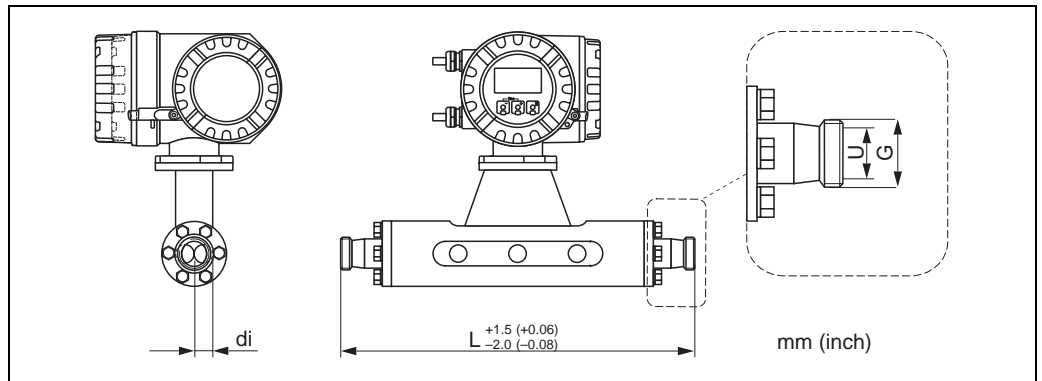
Tri-Clamp: 1.4404/316L					
DN	Clamp	G	L	U	di
3/8"	1"	1.98	14.4	0.87	0.22
1/2"	1"	1.98	15.7	0.87	0.34
1"	1"	1.98	17.1	0.87	0.45
1 1/2"	1 1/2"	1.98	22.0	1.37	0.67
2"	2"	2.52	28.3	1.87	1.01
3"	3"	3.60	32.5	2.87	1.51

3A version also available ($R_a \leq 0.8 \mu\text{m}/150$ grit)
 All dimensions in [inch]

1/2"-Tri-Clamp: 1.4404/316L					
DN	Clamp	G	L	U	di
3/8"	1/2"	1.98	14.4	0.37	0.22
1/2"	1/2"	1.98	15.7	0.37	0.34

3A version also available ($R_a \leq 0.8 \mu\text{m}/150$ grit)
 All dimensions in [inch]

SMS 1145 (threaded hygienic connection)



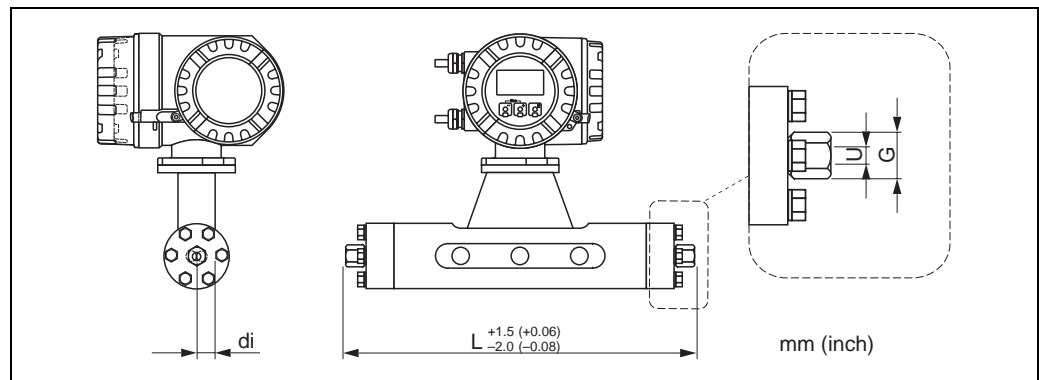
a0002531-ae

Threaded hygienic connection SMS 1145: 1.4404/316L				
DN	G	L	U	di
3/8"	Rd 40 × 1/6"	14.68	0.90	0.221
1/2"	Rd 40 × 1/6"	15.92	0.90	0.342
1"	Rd 40 × 1/6"	17.36	0.90	0.455
1 1/2"	Rd 60 × 1/6"	22.40	1.42	0.683
2"	Rd 70 × 1/6"	28.80	1.94	1.024
3"	Rd 98 × 1/6"	31.68	2.88	1.538

3A version also available (Ra ≤ 0.8 μm/150 grit)

All dimensions in [inch]

High-pressure version: 1/2"-NPT, 3/8"-NPT and G 3/8"



1/2"-NPT: 1.4404/316L				
DN	G	L	U	di
3/8"	AF 1 1/16"	14.5	0.40	0.19
1/2"	AF 1 1/16"	15.7	0.40	0.31
1"	AF 1 1/16"	17.5	0.40	0.40

3A version also available ($Ra \leq 0.8 \mu\text{m}/150$ grit)
All dimensions in [inch]

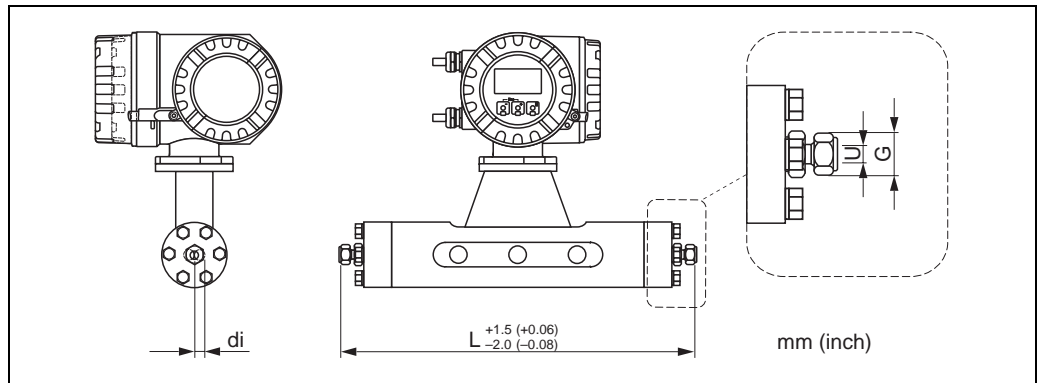
3/8"-NPT: 1.4404/316L				
DN	G	L	U	di
3/8"	AF 1 5/16"	14.0	0.40	0.19
1/2"	AF 1 5/16"	15.2	0.40	0.31
1"	AF 1 5/16"	16.9	0.40	0.40

3A version also available ($Ra \leq 0.8 \mu\text{m}/150$ grit)
All dimensions in [inch]

G 3/8": 1.4404/316L				
DN	G	L	U	di
3/8"	AF 24	14.2	0.40	0.19
1/2"	AF 24	15.4	0.40	0.31
1"	AF 24	17.2	0.40	0.40

3A version also available ($Ra \leq 0.8 \mu\text{m}/150$ grit)
All dimensions in [inch]

High-pressure version: 1/2"-SWAGELOK

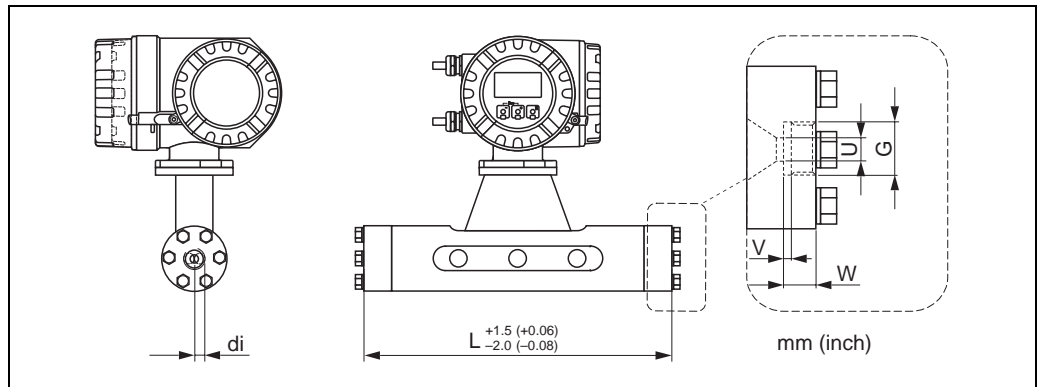


a0002533-ae

1/2"-SWAGELOK: 1.4404/316L				
DN	G	L	U	di
3/8"	7/8"	14.4	0.55	0.16
1/2"	7/8"	15.6	0.55	0.31
1"	7/8"	17.3	0.55	0.40

3A version also available (Ra ≤ 0.8 μm/150 grit)
All dimensions in [inch]

High-pressure version: Connector with internal thread 7/8-14 UNF

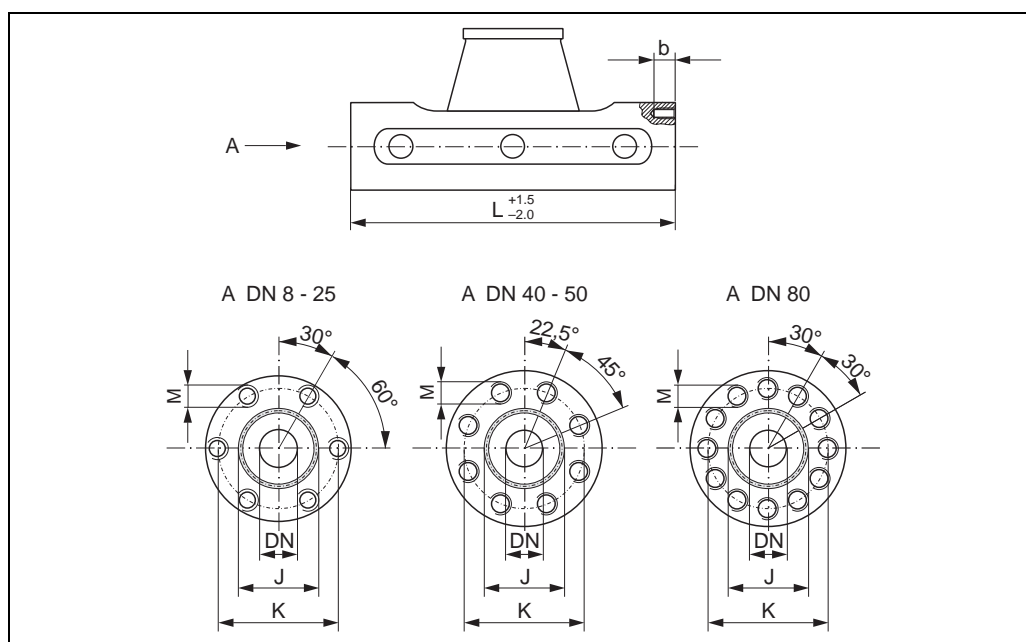


a0002534-ae

Internal thrad 7/8-14-UNF: 1.4404/316L						
DN	G	L	U	V	W	di
3/8"	7/8-14UNF	12.0	0.40	0.12	0.55	0.16
1/2"	7/8-14UNF	13.1	0.40	0.12	0.55	0.31
1"	7/8-14UNF	14.9	0.40	0.12	0.55	0.40

3A version also available (Ra ≤ 0.8 μm/150 grit)
All dimensions in [inch]

Promass M without process connections (SI units)



a0002535-en

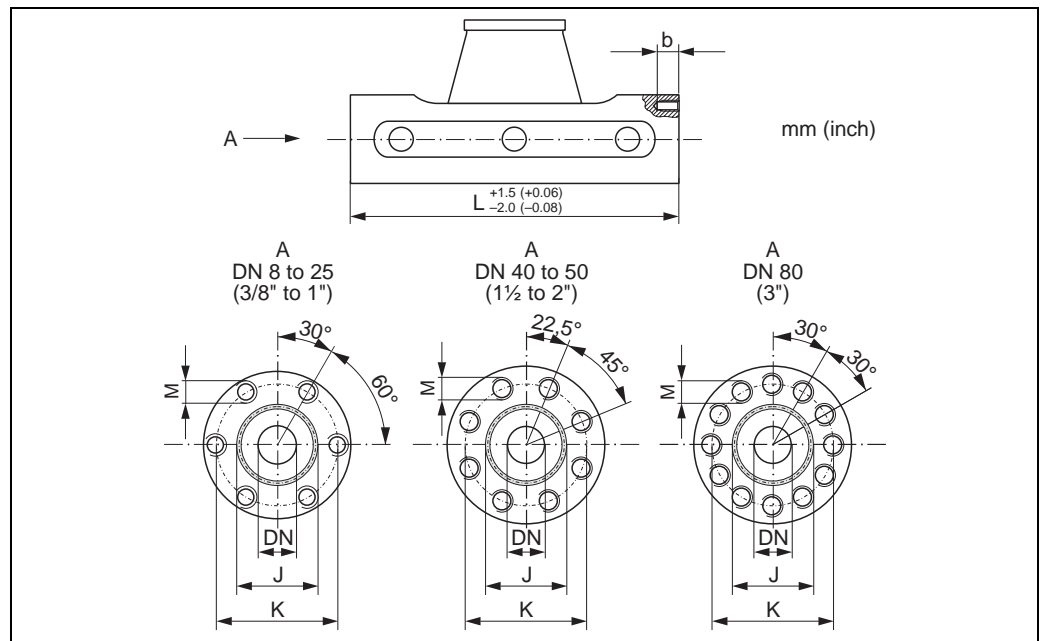
DN	L	J	K	M	b _{max.}	b _{min.}
8	256	27	54	6 × M8	12	10
8 ¹⁾	256	27	54	6 × M8	12	10
15	286	35	56	6 × M8	12	10
15 ¹⁾	286	35	56	6 × M8	12	10
25	310	40	62	6 × M8	12	10
25 ¹⁾	310	40	62	6 × M8	12	10
40	410	53	80	8 × M10	15	13
50	544	73	94	8 × M10	15	13
80	644	102	128	12 × M12	18	15

¹⁾ High-pressure version; permitted screws: A4 - 80; lubricant: Molykote P37
All dimensions in [mm]

DN	Tightening torque Nm	Lubricated thread yes/no	O-ring	
			Thickness	Inside Ø
8	30.0	no	2.62	21.89
8 ¹⁾	19.3	yes	2.62	21.89
15	30.0	no	2.62	29.82
15 ¹⁾	19.3	yes	2.62	29.82
25	30.0	no	2.62	34.60
25 ¹⁾	19.3	yes	2.62	34.60
40	60.0	no	2.62	47.30
50	60.0	yes	2.62	67.95
80	100.0	yes	3.53	94.84

¹⁾ High-pressure version; permitted screws: A4 - 80; lubricant: Molykote P37
All dimensions in [mm]

Promass M without process connections (US units)



a0002535-ae

DN	L	J	K	M	b _{max.}	b _{min.}
3/8"	10.1	1.06	2.12	6 × M8	0.47	0.39
3/8" ¹⁾	10.1	1.06	2.12	6 × M8	0.47	0.39
1/2"	11.3	1.38	2.20	6 × M8	0.47	0.39
1/2" ¹⁾	11.3	1.38	2.20	6 × M8	0.47	0.39
1"	12.2	1.57	2.44	6 × M8	0.47	0.39
1" ¹⁾	12.2	1.57	2.44	6 × M8	0.47	0.39
1 1/2"	16.1	2.09	3.15	8 × M10	0.59	0.51
2"	21.4	2.87	3.70	8 × M10	0.59	0.51
3"	25.5	4.01	5.04	12 × M12	0.71	0.59

¹⁾ High-pressure version; permitted screws: A4 - 80; lubricant: Molykote P37
All dimensions in [inch]

DN	Tightening torque lbf ft	Lubricated thread yes/no	O-ring	
			Thickness	Inside Ø
3/8"	22	no	0.103	0.86
3/8" ¹⁾	14	yes	0.103	0.86
1/2"	22	no	0.103	1.17
1/2" ¹⁾	14	yes	0.103	1.17
1"	22	no	0.103	1.36
1" ¹⁾	14	yes	0.103	1.36
1 1/2"	44	no	0.103	1.86
2"	44	yes	0.103	2.68
3"	74	yes	0.139	3.73

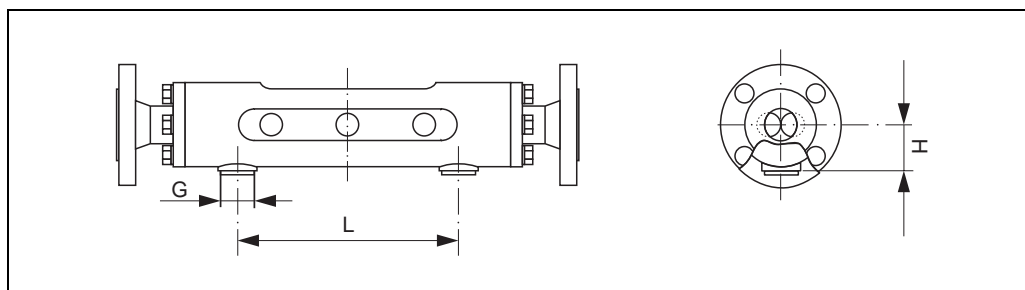
¹⁾ High-pressure version; permitted screws: A4 - 80; lubricant: Molykote P37
All dimensions in [inch]

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).
- Purge connections or secondary containment monitoring can not be combined with separately available heating jacket.



a0002536

DN		G	H		L	
[mm]	[inch]		[mm]	[inch]	[mm]	[inch]
8	3/8"	1/2"-NPT	44.0	1.73	170	6.70
15	1/2"	1/2"-NPT	46.5	1.83	200	7.88
25	1"	1/2"-NPT	50.0	1.97	220	8.66
40	1 1/2"	1/2"-NPT	59.0	2.32	310	12.20
50	2"	1/2"-NPT	67.5	2.66	420	16.54
80	3"	1/2"-NPT	81.5	3.21	420	16.54

Weight

- Compact version: see tables below
- Remote version
 - Transmitter: see the tables below
 - Wall-mount housing: 5 kg (11 lbs)

Weight information in SI units

DN [mm]	8	15	25	40	50	80
Compact version	11	12	15	24	41	67
Remote version	9	10	13	22	39	65

All values (weight) refer to devices with EN/DIN PN 40 flanges.
Weight information in [kg].

Weight information in US

DN [inch]	3/8"	1/2"	1"	1 1/2"	2"	3"
Compact version	24	26	33	53	90	148
Remote version	20	22	29	48	86	143

All values (weight) refer to devices with EN/DIN PN 40 flanges.
Weight information in [lbs].

Material**Transmitter housing**

Compact version

- Powder coated die-cast aluminium
- Stainless steel housing: stainless steel 1.4301/ASTM 304
- Window material: Glass or polycarbonate

Remote version

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

Sensor housing / containment

- Acid and alkali-resistant outer surface
- DN 8 to 50 (3/8" to 2"): steel, chemically nickel-plated
- DN 80 (3"): stainless steel

Connection housing, sensor (remote version)

- Stainless steel 1.4301/304 (standard)
- Powder coated die-cast aluminum (version for heating)

Process connections

- Stainless steel 1.4404/316L
 - Flanges according to EN 1092-1 (DIN 2501) / according to ASME B16.5 / JIS B2220
 - DIN 11864-2 Form A (flat flange with groove)
 - PVDF coupling to DIN / according to ASME B16.5 / JIS
 - Threaded hygienic connection:
 - DIN 11851
 - SMS 1145
 - ISO 2853
 - DIN 11864-1 Form A
 - Tri-Clamp (OD-Tubes)
- Titanium Grade 2
 - Flanges according to EN 1092-1 (DIN 2501) / according to ASME B16.5 / JIS B2220

High-pressure version:

- Connector → Stainless steel 1.4404/316L
- Coupling → Stainless steel 1.4401/316

Measuring tubes

- DN 8 to 50 (3/8" to 2"): Titanium grade 9
- DN 80 (3"): Titanium grade 2

High-pressure version:

- Titanium Grade 9

Seals

- Viton
- EPDM
- Silikon
- Kalrez 6375
- FEP sheathing (not for gas applications)

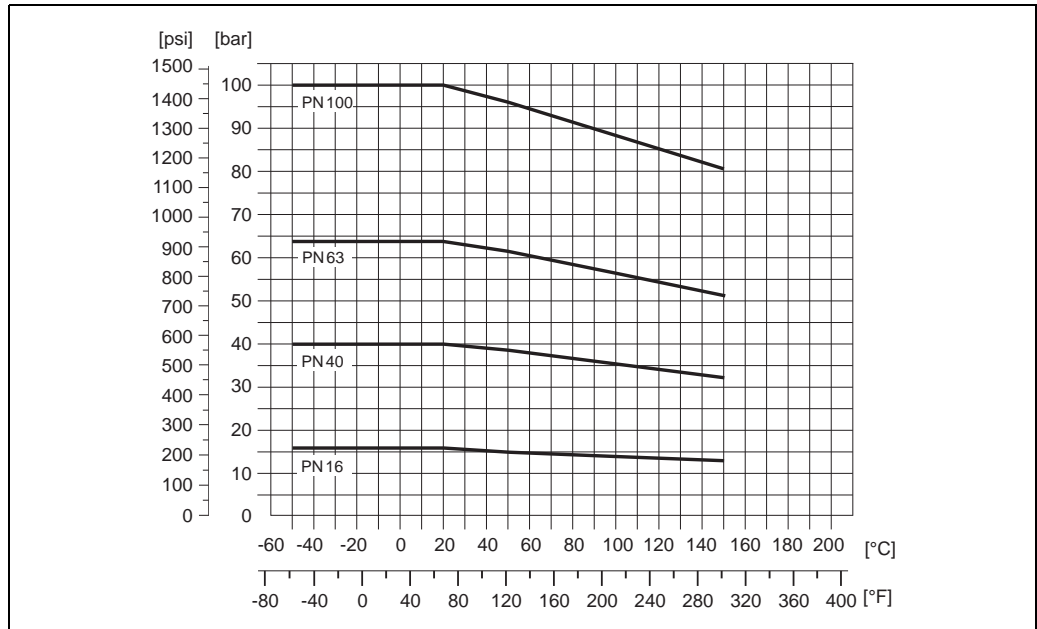
Material load diagram



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)

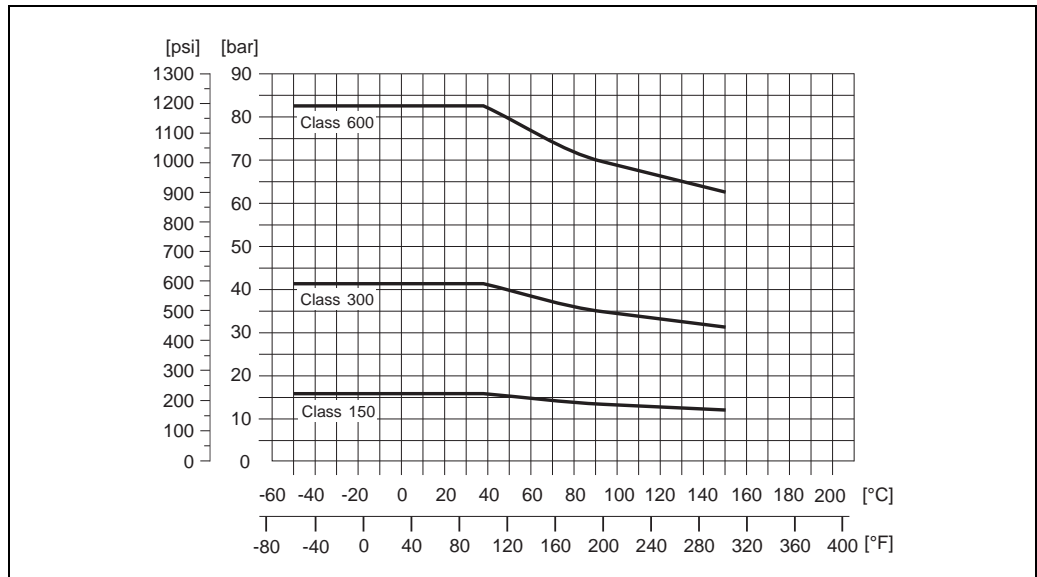
Flange material: 1.4404/316L, titanium grade 2



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Flange connection according to ASME B16.5

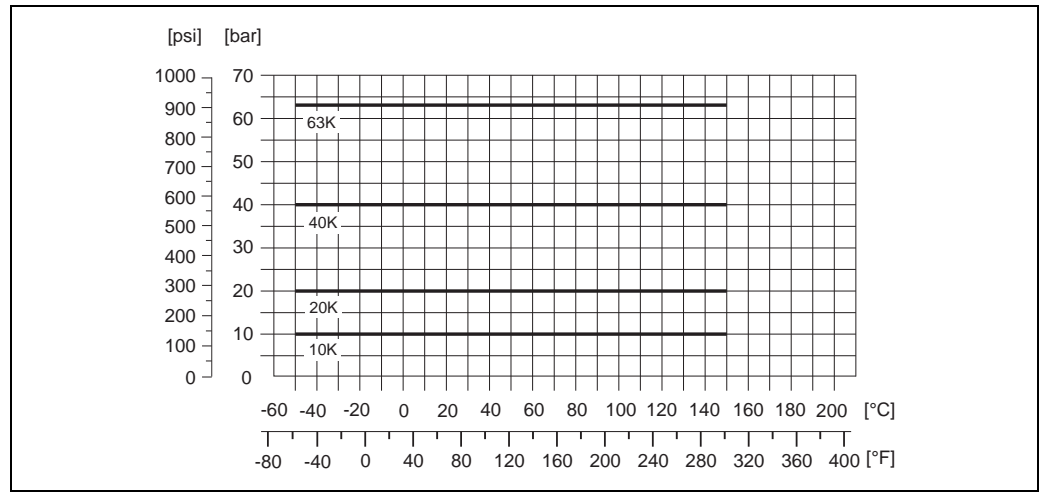
Flange material: 1.4404/316L, titanium grade 2



a0003297-ae

Flange connection to JIS B2220

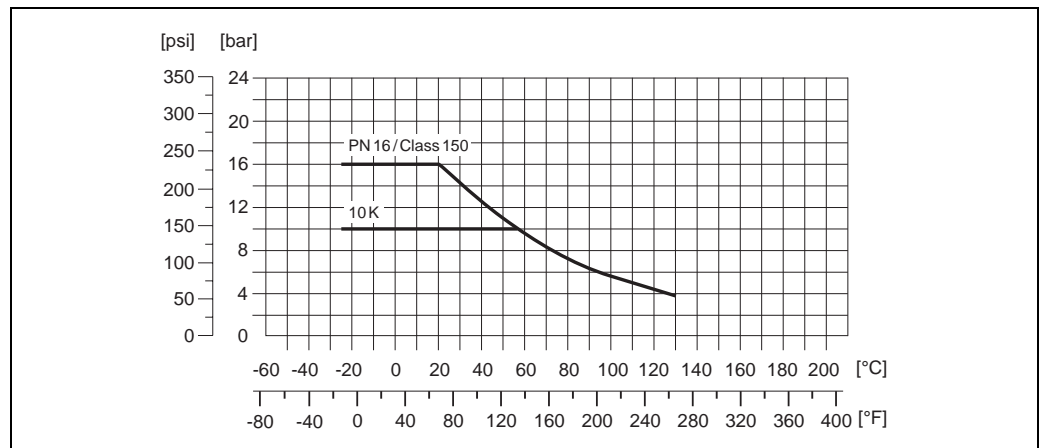
Flange material: 1.4404/316L, titanium grade 2



a0003304-ae

PVDF flange connection (to DIN 2501, according to ASME B16.5, JIS B2220)

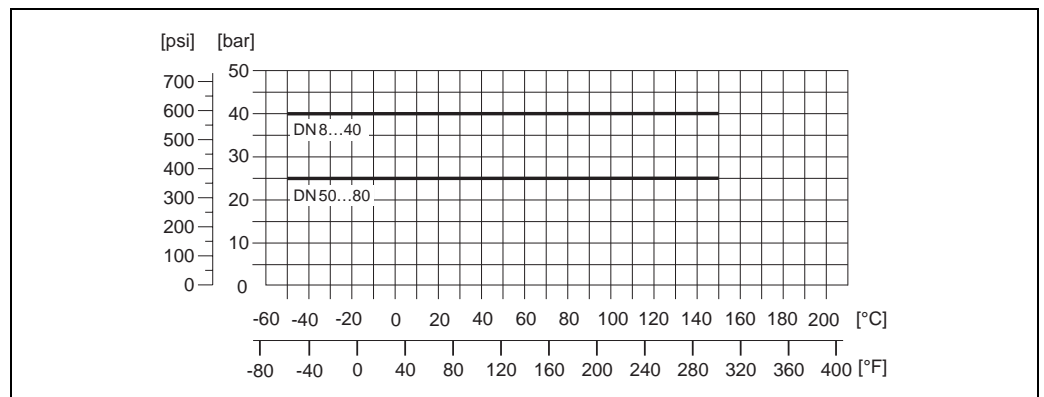
Flange material: PVDF



a0004601-ae

Process connection to DIN 11851

Connection material: 1.4404/316L

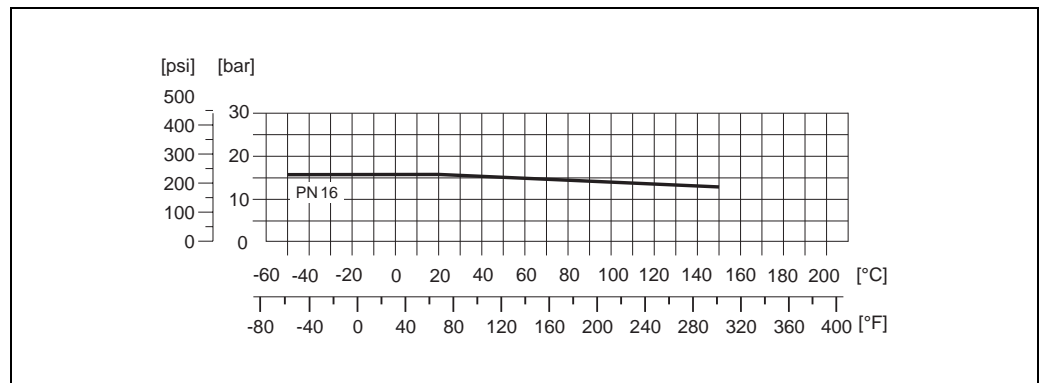


A0012480

DIN 11851 allows for applications up to +140 °C (+284 °F) if suitable sealing materials are used. Please take this into account when selecting seals and counterparts as these components can limit the pressure and temperature range.

Process connection to SMS 1145

Connection material: 1.4404/316L



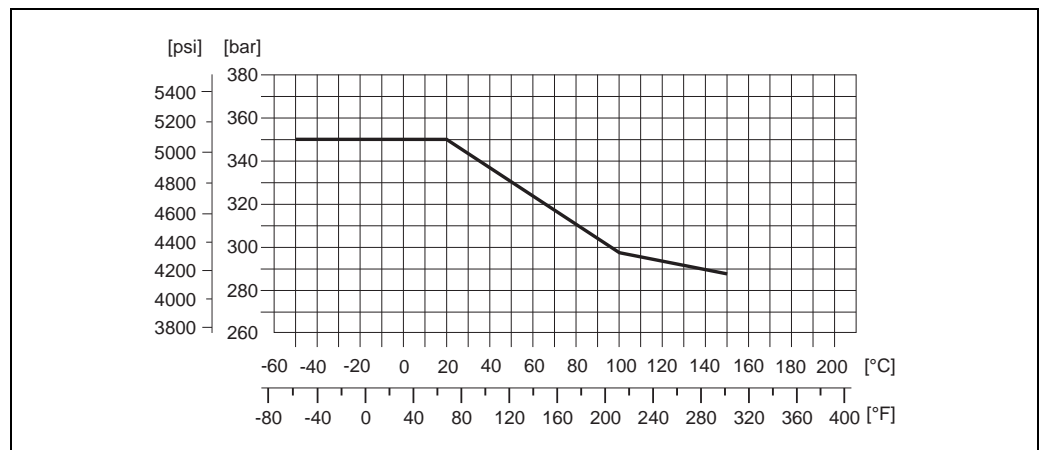
A0003305

SMS 1145 allows for applications up to 6 bar (87 psi) if suitable sealing materials are used. Please take this into account when selecting seals and counterparts as these components can limit the pressure and temperature range.

Process connections for high-pressure version

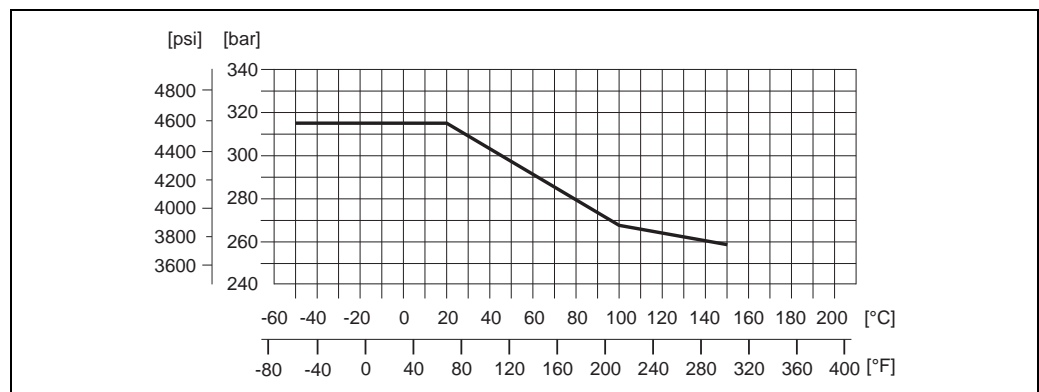
Connector material: 1.4404/316L

Material of thread connections (G 3/8", VCO with 1/2" SWAGELOK, NPT 3/8"): 1.4401/316



20004662-ae

Material of thread connections (NPT 1/2"): 1.4401/316



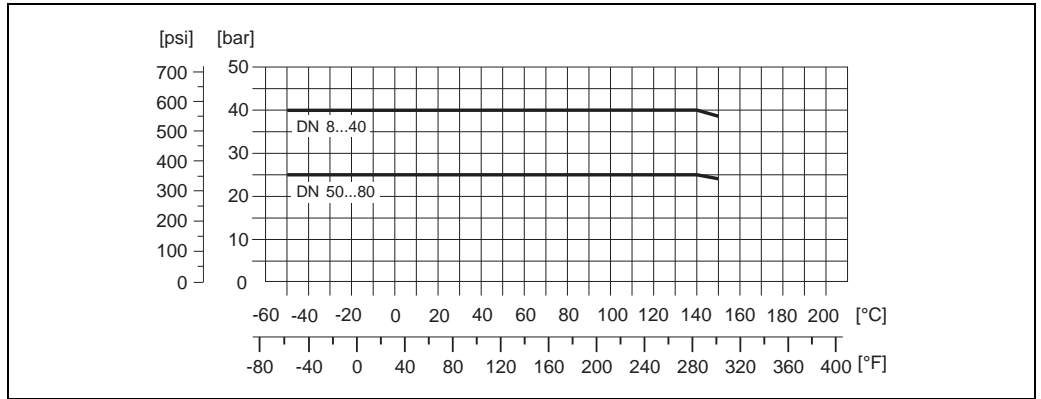
20004663-ae

Tri-Clamp process connection

The Clamp connections are suited up to a maximum pressure of 16 bar (232 psi). Please observe the operating limits of the clamp and seal used as they could be under 16 bar (232 psi). The clamp and the seal are not included in the scope of supply.

Threaded hygienic connection to DIN 11864-1 Form A

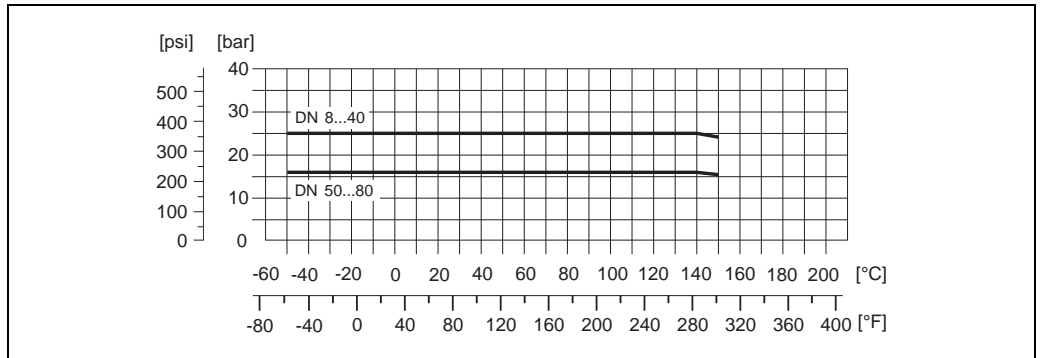
Connection material: 1.4404/316L



a0004604-ae

Flange connection to DIN 11864-2 Form A (flat flange)

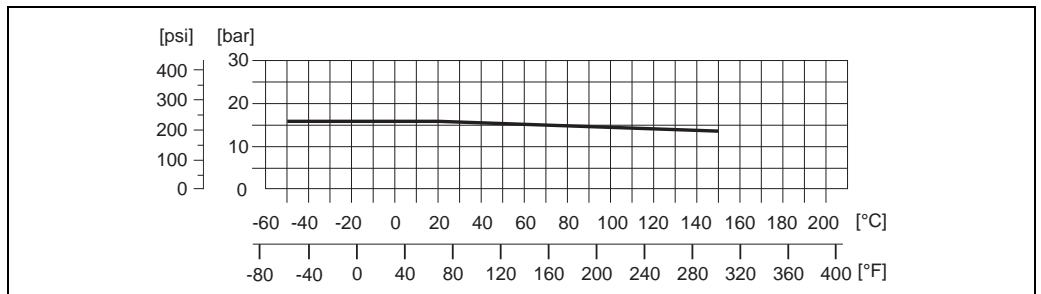
Flange material: 1.4404/316L



a0004605-ae

Threaded hygienic connection to ISO 2853

Connection material: 1.4404/316L



a0003308-ae

Process connections

Threaded process connections

- Flanges according to EN 1092-1 (DIN 2501), according to ASME B16.5, JIS B2220
- Sanitary connections: Tri-Clamp, threaded hygienic connections (DIN 11851, SMS 1145, ISO 2853, DIN 11864-1 Form A), flange to DIN 11864-2 Form A (flat flange with groove)

High-pressure version

Thread connections: 3/8", 1/2" NPT, 3/8" NPT and 1/2" SWAGELOK couplings; connector with 7/8-14UNF internal thread

Human interface

Display elements

- Liquid-crystal display: backlit, two lines (Promass 80) or four lines (Promass 83) 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

Promass 80

- Local operation with three keys (-, +, E)
- Quick Setup menus for straightforward commissioning

Promass 83

- Local operation with three optical keys (□/+/E)
- Application-specific Quick Setup menus for straightforward commissioning

Language group

Language groups available for operation in different countries:

- 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

Only Promass 83

- China (CN):
English, Chinese

The language group is changed using the "FieldCare" operating program.

Remote operation

Promass 80

Remote operation via HART, PROFIBUS PA

Promass 83

Remote operation via HART, PROFIBUS DP/PA, FOUNDATION Fieldbus, 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.
Sanitary compatibility	3A approval
FOUNDATION Fieldbus certification	<p>The flowmeter has passed all the test procedures implemented and has been certified and registered by the Fieldbus Foundation. The flowmeter thus meets all the requirements of the specifications listed below:</p> <ul style="list-style-type: none"> ■ Certified to FOUNDATION Fieldbus specification ■ The flowmeter meets all the specifications of the FOUNDATION Fieldbus-H1. ■ Interoperability Test Kit (ITK), revision status 5.01 (Certification on request) ■ The device can also be operated in conjunction with other-make certified devices. ■ Physical Layer Conformance Test of the Fieldbus Foundation
PROFIBUS DP/PA certification	<p>The flow device has successfully passed all the test procedures carried out and is certified and registered by the PNO (PROFIBUS User Organization). The device thus meets all the requirements of the following specifications:</p> <ul style="list-style-type: none"> ■ Certified to PROFIBUS Profile Version 3.0 (device certification number: on request) ■ The device can also be operated with certified devices of other manufacturers (interoperability)
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.
Other standards and guidelines	<ul style="list-style-type: none"> ■ 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
Pressure measuring device approval	<p>Flowmeters with a nominal diameter smaller or equal DN 25 are covered by Art. 3(3) of the European directive 97/23/EC (Pressure Equipment Directive) and are designed according to sound engineering practice. For larger nominal diameters, optional approvals according to Cat. II/III are available if required (depends on fluid and process pressure).</p> <p>Optionally flowmeters in accordance to the guidelines AD 2000 are available on request.</p>

Functional safety

SIL -2: accordance IEC 61508/IEC 61511-1 (FDIS)
 "4–20 mA" - output according to the following order code:

Promass 80

Promass80***_*****A
 Promass80***_*****D
 Promass80***_*****S
 Promass80***_*****T
 Promass80***_*****8

Promass 83

Promass83***_*****A	Promass83***_*****M	Promass83***_*****Ø
Promass83***_*****B	Promass83***_*****R	Promass83***_*****2
Promass83***_*****C	Promass83***_*****S	Promass83***_*****3
Promass83***_*****D	Promass83***_*****T	Promass83***_*****4
Promass83***_*****E	Promass83***_*****U	Promass83***_*****5
Promass83***_*****L	Promass83***_*****W	Promass83***_*****6

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 (FA005D)
- Technical Information
 - Promass 80A, 83A (T054D)
 - Promass 80E, 83E (TI061D)
 - Promass 80F, 83F (TI101D)
 - Promass 80H, 83H (TI074D)
 - Promass 80I, 83I (TI075D)
 - Promass 80P, 83P (TI078D)
 - Promass 80S, 83S (TI076D)
- Operating Instructions/Description of Device Functions
 - Promass 80 HART (BA057D/BA058D)
 - Promass 80 PROFIBUS PA (BA072D/BA073D)
 - Promass 83 HART (BA059D/BA060D)
 - Promass 83 FOUNDATION Fieldbus (BA065D/BA066D)
 - Promass 83 PROFIBUS DP/PA (BA063D/BA064D)
 - Promass 83 MODBUS (BA107D/BA108D)
- Supplementary documentation on Ex-ratings: ATEX, FM, CSA, IECEx NEPSI
- Functional safety manual Promass 80, 83 (SD077D)

Registered trademarks

KALREZ® and VITON®

Registered trademarks of E.I. Du Pont de Nemours & Co., Wilmington, USA

TRI-CLAMP®

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SWAGELOK®

Registered trademark of Swagelok & Co., Solon, USA

HART®

Registered trademark of HART Communication Foundation, Austin, USA

PROFIBUS®

Registered trademark of the PROFIBUS User Organization, Karlsruhe, Germany

FOUNDATION™ Fieldbus

Registered trademark of the Fieldbus FOUNDATION, Austin, USA

MODBUS®

Registered trademark of the MODBUS Organization

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

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