Technical Information
LPGmass
Coriolis flowmeter

The refueling and distribution application flowmeter with easy system integration

Application

- Measuring principle operates independently of physical fluid properties such as viscosity or density
- Accurate measurement of liquefied petroleum gas in refueling and distribution applications

Device properties

- Flow rates up to 45000 kg/h (1654 lb/min)
  D: Flow rates up to 180000 kg/h (6600 lb(min)
- Volume flow calculation according to API table 53
- Worldwide metrological approvals
- Robust, ultra-compact transmitter housing
- Pulse output and Modbus RS485
- Transmitter for custody transfer

Your benefits

- Excellent operational safety - reliable under extreme ambient conditions
- Fewer process measuring points - multivariable measurement (flow, density, temperature)
- Space-saving installation - no in/outlet run needs
- Easy operation - reduced to application needs
- Fast commissioning - pre-configured devices
- Automatic recovery of data for servicing

Endress+Hauser
People for Process Automation

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Function and system design

Measuring principle

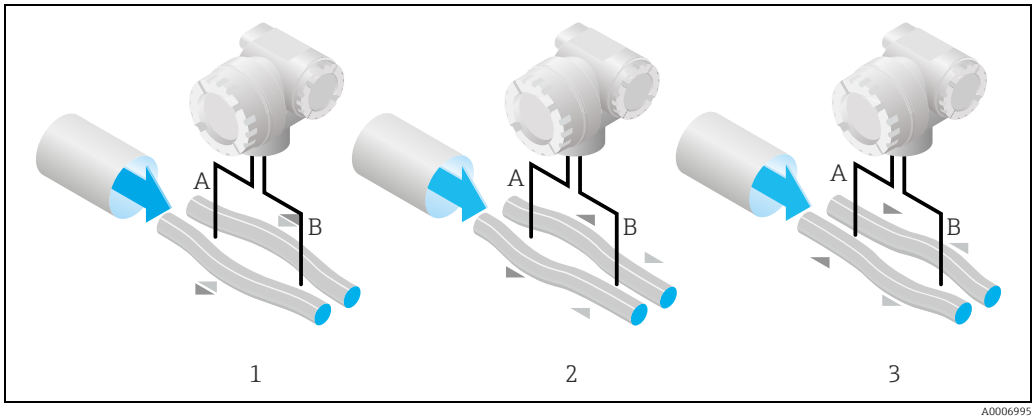
The measuring principle is based on the controlled generation of Coriolis forces. These forces always occur in a system where translational (linear) and rotational movements are superimposed simultaneously.

$F_C = 2 \cdot \Delta m\ (v \cdot \omega)$
F_C = Coriolis force
Δm = moving mass
ω = rotational velocity
v = radial velocity in rotating or oscillating system

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

In the sensor, two parallel measuring tubes containing flowing fluid oscillate in antiphase, acting like a tuning fork. 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 tube oscillation at the inlet (2) and acceleration at the outlet (3).



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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 works independently of temperature, pressure, viscosity, conductivity and flow profile.

Density measurement

The measuring tubes are always 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 exciter frequency. Resonance frequency is thus a function of fluid density. The microprocessor utilizes this relationship to obtain a density signal.

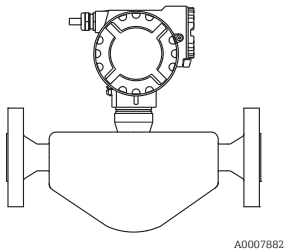
Temperature measurement

To make calculations to compensate for temperature effects, the temperature of the measuring tubes is measured. This signal corresponds to the process temperature and is also available as an output signal.

Measuring system

The measuring system consists of the transmitter and sensor which together form a mechanical unit.

Measuring system

 A0007882	▪ Without onsite operation ▪ Configuration via Modbus RS485 and "FieldCare" ▪ Limiting medium pressure range max. 100 bar (1450 psi) (dependent on process connection) ▪ Ambient temperature range: −40 to +60 °C (−40 to +140 °F)

Input

Measured variable

- Mass flow (proportional to the phase difference between two sensors mounted on the measuring tube which record differences in the pipe oscillation geometry during flow)
- Volume flow (measured from the mass flow and density)
- Fluid density (proportional to the resonance frequency of the measuring tube)
- Fluid temperature (measured with temperature sensors)

Measuring ranges

Measuring ranges for non-custody transfer operation:

DN		$\dot{m}_{min}$ to $\dot{m}_{max}$	
[mm]	[in]	[kg/h]	[lb/min]
8	⅜"	0 to 2000	0 to 73.50
15	½"	0 to 6500	0 to 238.9
25	1"	0 to 18000	0 to 661.5
40	1 ½"	0 to 45000	0 to 1654

Note!
The values of the corresponding custody transfer certificate apply for custody transfer operation.

Operable flow range

1:100

Output

Output signal

Pulse / frequency output
- Passive
- Galvanically isolated
- Open Collector
- Max. 30 V DC
- Max. 25 mA
- Frequency output: end frequency 100 to 5000 Hz, on/off ratio 1:1
- Pulse output: pulse value and pulse polarity selectable, pulse width configurable (0.1 to 1000 ms)

Status output
- Passive
- Open Collector
- Max. 30 V DC
- Max. 25 mA

Modbus interface
- Modbus device type: slave
- Address range: 1 to 247
- Functions codes supported: 03, 04, 06, 08, 16, 23
- Broadcast: supported with the function codes 06, 16, 23
- Physical interface: RS485 in accordance with standard EIA/TIA-485
- Baud rates supported: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud
- Transmission mode: RTU or ASCII
- Response time = typically 5 ms

Signal on alarm

Pulse / frequency output
- Behavior can be selected

Status output
- Behavior can be selected

Modbus RS485
- Behavior can be selected

Galvanic isolation

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

Power supply

Terminal assignment

Order characteristic for "inputs/outputs"	Terminal No. (outputs)		
	22 (+) / 23 (-)	24 (+) / 25 (-)	26 (+) / 27 (–)
N	Pulse/frequency/status output 2	Pulse/frequency/status output 1	Modbus RS485

Supply voltage

24 V DC nominal voltage (10 to 30 V DC)
24 V AC nominal voltage (20 to 28 V AC)

Power consumption

AC: < 4 VA
DC: < 3.2 W

Typical switch-on current at 24 V DC nominal voltage at R_i = 0.1 Ω of the source.

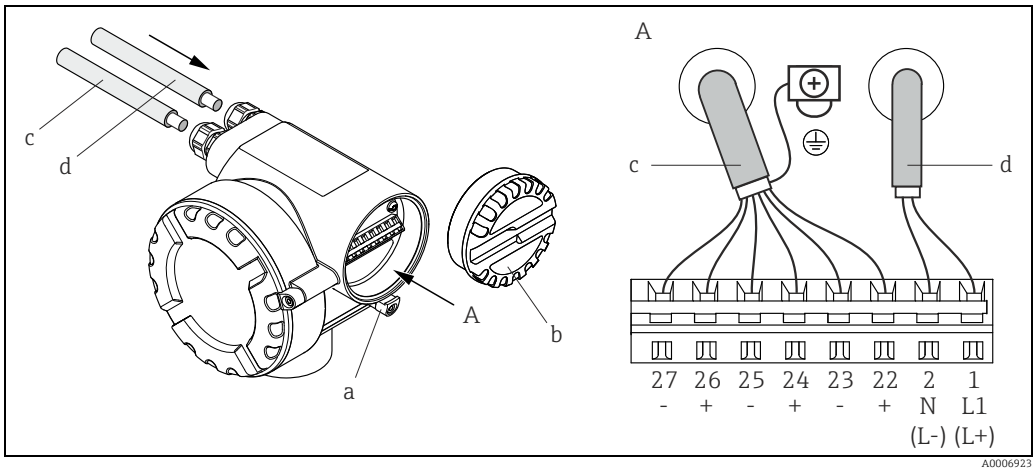
t [ms]	I [A]
0	10
0.1	8
0.2	7.5
0.5	7
1	6
2	4
5	1.5
10	0.125 (operating current)

Note!
The internal resistance of the source may not exceed R_i = 10 Ω.

Power supply failure

Bridging of at least 20 ms.
All measuring cell and measuring point data are maintained.

Electrical connection



Connecting the transmitter, cable cross-section: max. 2.5 mm² (14 AWG)

A View A
a Safety claw
b Terminal compartment cover
c Signal cable: terminal Nos. 22 to 27 (shield for Modbus RS485 is mandatory; shield for pulse, frequency and status outputs is not required, but recommended)
d Cable for power supply: 20 to 28 V AC, 10 to 30 V DC
- Terminal No. 1: L1 for AC, L+ for DC
- Terminal No. 2: N for AC, L- for DC

Potential equalization

This measuring instrument is suitable for potentially explosive atmospheres; refer to the correspondingly information in the specific Ex-specific supplementary documentation.

Cable entries

Power supply and signal cables (outputs):
- Cable entry M20 × 1.5 (8 to 12 mm / 0.32 to 0.47")
- Threads for cable entries, ½" NPT, G ½"

Cable specifications

Each compatible cable, with a temperature specification at least +20 °C (+68 °F) higher than the ambient temperature prevailing in the application. We recommend using a cable with a temperature specification of +80 °C (+176 °F).

Modbus RS485 (cable type A):

- Characteristic impedance: 120 Ω
- Cable capacity: < 30 pF/m (< 9.2 pF/ft)
- Core cross-section: > 0.34 mm² (AWG 22)
- Cable type: twisted pairs
- Loop-resistance: ≤110 Ω/km (≤0.034 Ω/ft)
- Signal damping: max. 9 dB along the entire length of the cable cross-section
- Shield: Copper braided shielding or braided shielding and foil shielding

Performance characteristics

Reference operating conditions

Error limits following ISO/DIS 11631:
- Fluid: water
- +15 to +45 °C (+59 to +113 °F); 2 to 6 bar (29 to 87 psi)
- Calibration rigs traced to national metrology standards
- Zero point calibrated under operating conditions
- Density adjustment performed

To obtain measured errors, use the Applicator sizing tool *Applicator*: → 🖹 26.

Maximum measured error

o.r. = of reading

Mass flow:

±0.2% ± [(zero point stability ÷ measured value) · 100]% o.r.

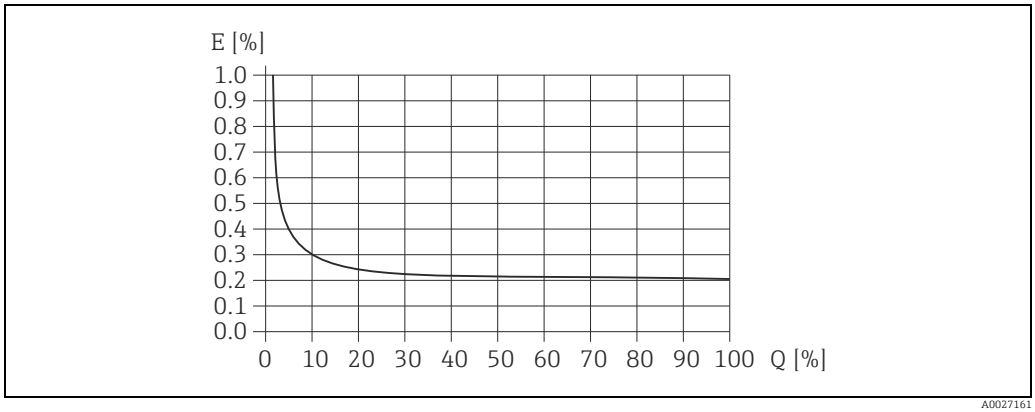
Volume flow:

±0.3% ± [(zero point stability ÷ measured value) · 100]% o.r.

Zero point stability

DN		Zero point stability	
		[kg/h]	[lb/min]
8	⅜"	0.200	0.007
15	½"	0.650	0.024
25	1"	1.80	0.066
40	1½"	4.50	0.165

Example maximum measured error (mass flow)



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E = Error: Maximum measured error as % o.r.

Q = Flow rate as %

Calculation example

Given:
- DN 25 (1")
- Mass flow = 5000 kg/h (183,75 lb/min)

Max. measured error:
- ±0,2% ± [(zero point stability ÷ measured value) · 100]% o. r.
- ±0,2% ± 1,80 kg/h (0,066 lb/min) ÷ 5000 kg/h (183,75 lb/min) · 100% = ±0,236% o.r.

Repeatability

o.r. = of reading

Mass flow:

±0.10% ± [½ · (zero point stability ÷ measured value) · 100]% o.r.

Volume flow:

±0.15% ± [½ · (zero point stability ÷ measured value) · 100]% o.r.

Influence of medium temperature

When there is a difference between the temperature for zero point adjustment and the process temperature, the typical measured error is ±0.0003% of the full scale value/°C.

Influence of medium pressure

The following section shows the effect on accuracy of mass flow due to a difference between calibration pressure and process pressure is negligible.

Installation

Installation instructions

Note the following points:
- No special measures such as supports are necessary. The housing absorbs external forces.
- 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.).

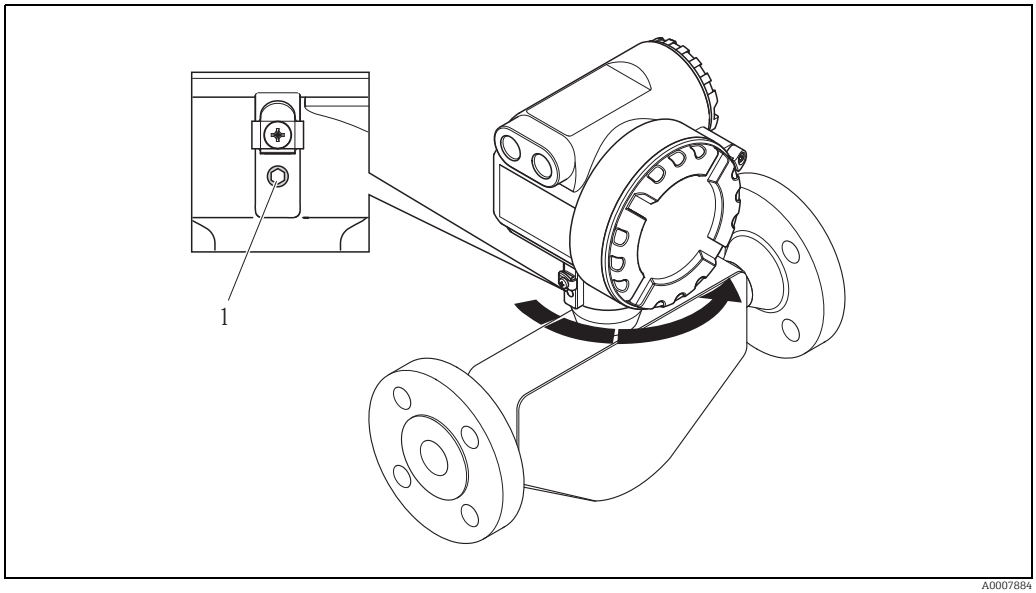
Inlet and outlet runs

There are no installation requirements regarding inlet and outlet runs.

Special installation instructions

Turning the transmitter housing

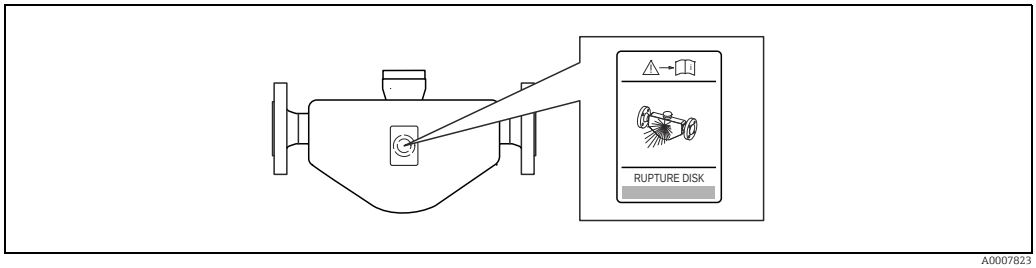
The transmitter housing can be rotated counterclockwise continuously up to 360°.



1 = Allen screw

Rupture disk

Make sure that the function and operation of the rupture disk is not impeded through the installation of the device. The position of the rupture disk is indicated on a sticker applied over it. If the rupture disk is triggered, the sticker is destroyed. The disk can therefore be visually monitored. For additional information that is relevant to the process (→ 🖹 11).



Additional sign regarding the position of the rupture disk

Environment

Ambient temperature range	−40 to +60 °C (−40 to +140 °F) (sensor, transmitter) Note! Install the device at a shady location. Avoid direct sunlight, particularly in warm climatic regions.
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	According to IEC/EN 60068-2-31 and EN 60721 (Class 2M3)
Vibration resistance	According to IEC/EN 60068-2-31 and EN 60721 (Class 2M3)
Electromagnetic compatibility (EMC)	As per IEC/EN 61326 and NAMUR recommendation NE 21

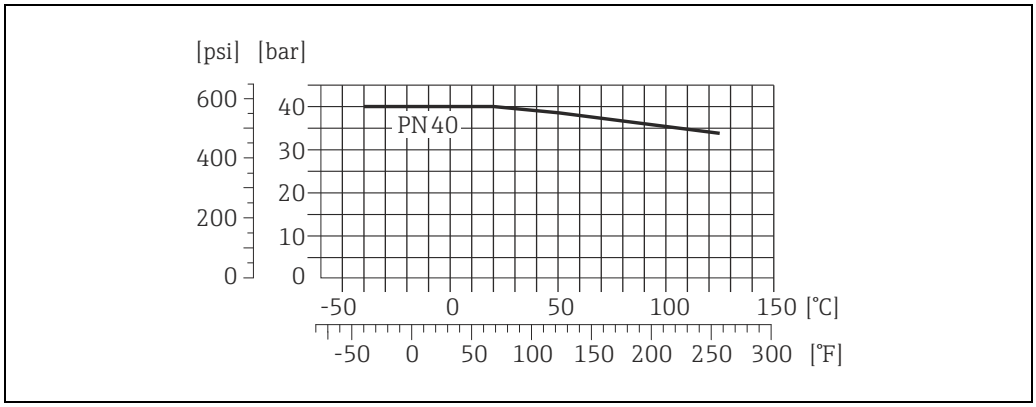
Process

Medium temperature range	−40 to +125 °C (−40 to +257 °F)
Medium pressure range (nominal pressure)	Measuring tubes, connector: max. 100 bar (1450 psi) (dependent on process connection)

Pressure-temperature ratings

Flange according to EN 1092-1 (DIN 2501, DIN 2512 N)

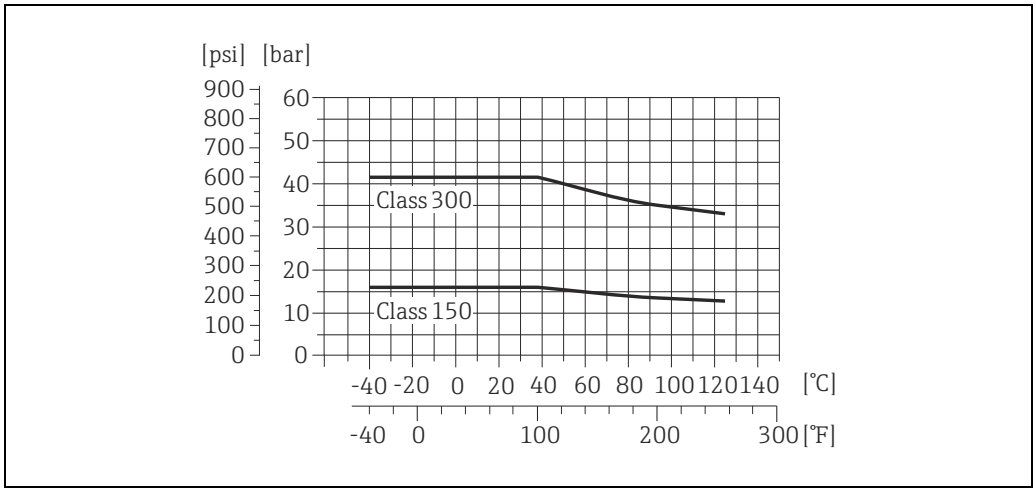
Connection material: 1.4404 (F316/F316L)



A0023189-EN

Flange according to ASME B16.5

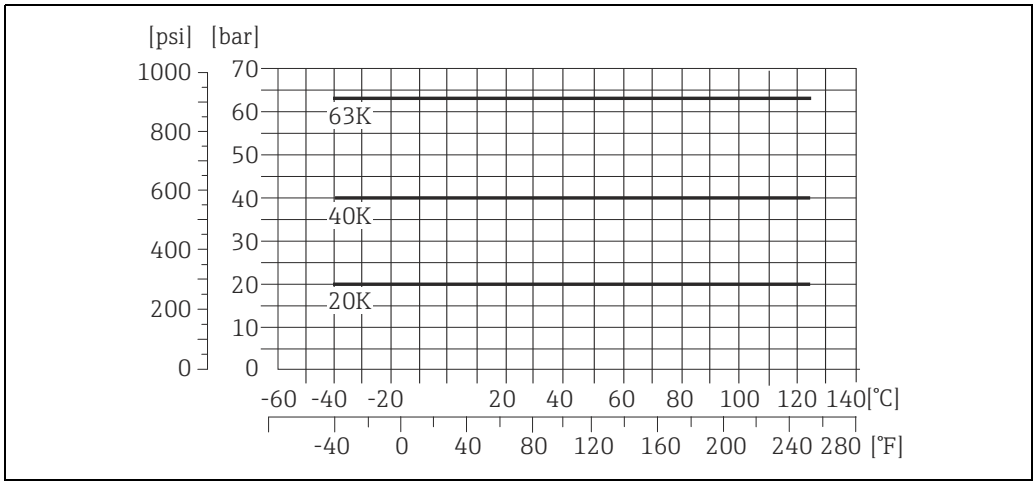
Connection material: 1.4404 (F316/F316L)



A0023190-EN

JIS B2220, flange

Connection material: 1.4404 (F316/F316L)



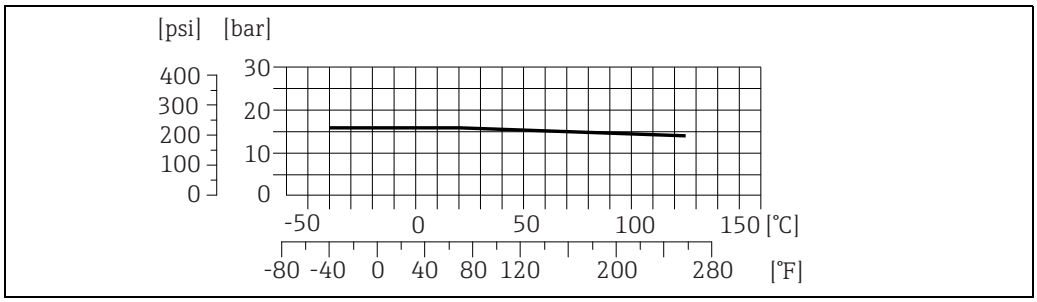
A0027079-EN

Tri-Clamp, DIN 11866 line C

The clamp connections are suitable 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 seal do not form part of the scope of supply.

DIN 11851, thread

Connection material: 1.4404 (316/316L)



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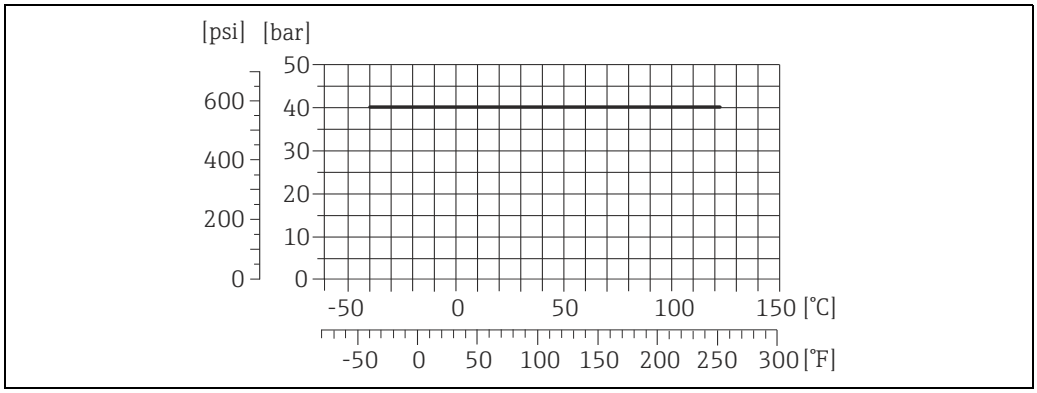
DIN 11864-1 form A, thread, DIN 11866 line A

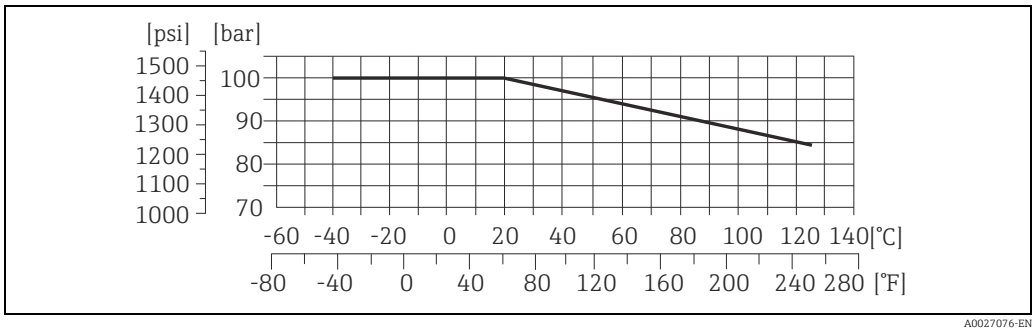
Connection material: 1.4404 (316/316L)



A0027077-EN

VCO, coupling

Connection material: 1.4404 (316/316L)



A0027076-EN

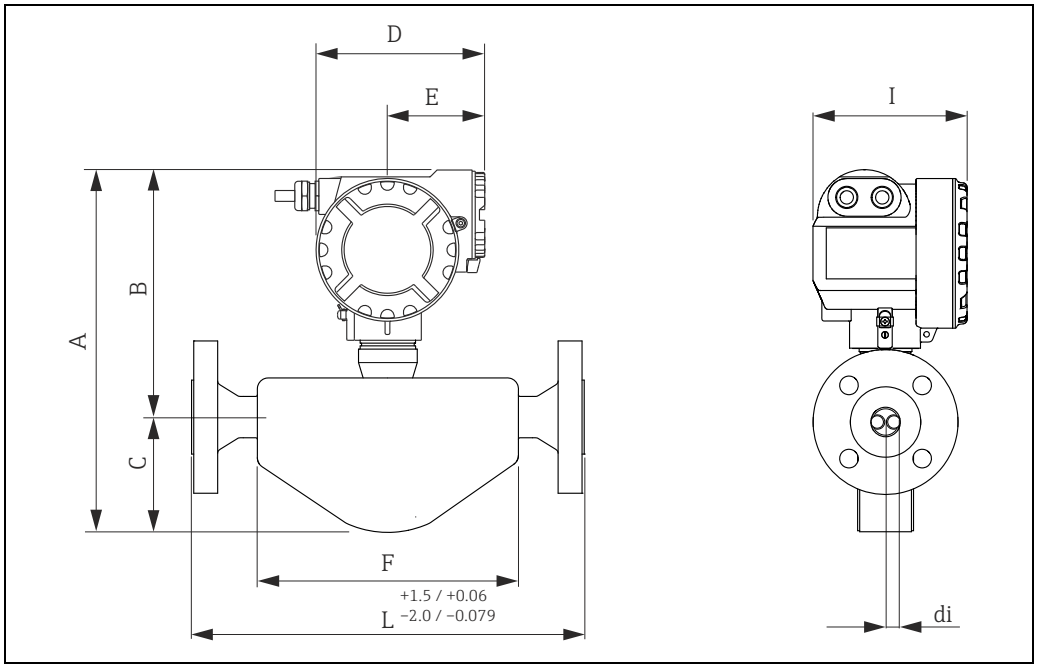
Rupture disk	To increase the level of safety, a device version with a rupture disk with a triggering pressure of 10 to 15 bar (145 to 217.5 psi) can be used. Special mounting instructions: (→ 🖹 9).
Pressure loss	To calculate the pressure loss, use the *Applicator* sizing tool (→ 🖹 26).
Limiting flow	See information in the "Measuring range" Section → 🖹 4

Mechanical construction

Design/dimensions

Dimensions	
Field housing compact version	→ 🖹 13
Process connections in SI units	
Flange according to EN 1092-1 (DIN 2501, DIN 2512 N), PN 40	→ 🖹 14
Flange according to ASME B16.5, Cl 150 Flange according to ASME B16.5, Cl 300	→ 🖹 15
JIS B2220, flange, 20K JIS B2220, flange, 40K JIS B2220, flange, 63K	→ 🖹 16
Tri-Clamp, DIN 11866 line C	→ 🖹 17
DIN 11851, thread	→ 🖹 18
DIN 11864-1 form A, thread, DIN 11866 line A	→ 🖹 19
8-VCO-4, ½", coupling 12-VCO-4, ¾", coupling	→ 🖹 20
Process connections in US units	
Flange according to ASME B16.5, Cl 150 Flange according to ASME B16.5, Cl 300	→ 🖹 21
Tri-Clamp, DIN 11866 line C	→ 🖹 22
8-VCO-4, ½", coupling 12-VCO-4, ¾", coupling	→ 🖹 23

Field housing compact version



Dimensions in SI units

DN	A	B	C	D	E	F	L	I	2 × di
8	314	221	93	160	92	146	*	139	5.35
15	330	225	105	160	92	189	*	139	8.30
25	338	232	106	160	92	240	*	139	12.00
40	359	238	121	160	92	337	*	139	17.60

All dimensions in [mm]
* dependent on respective flange connection

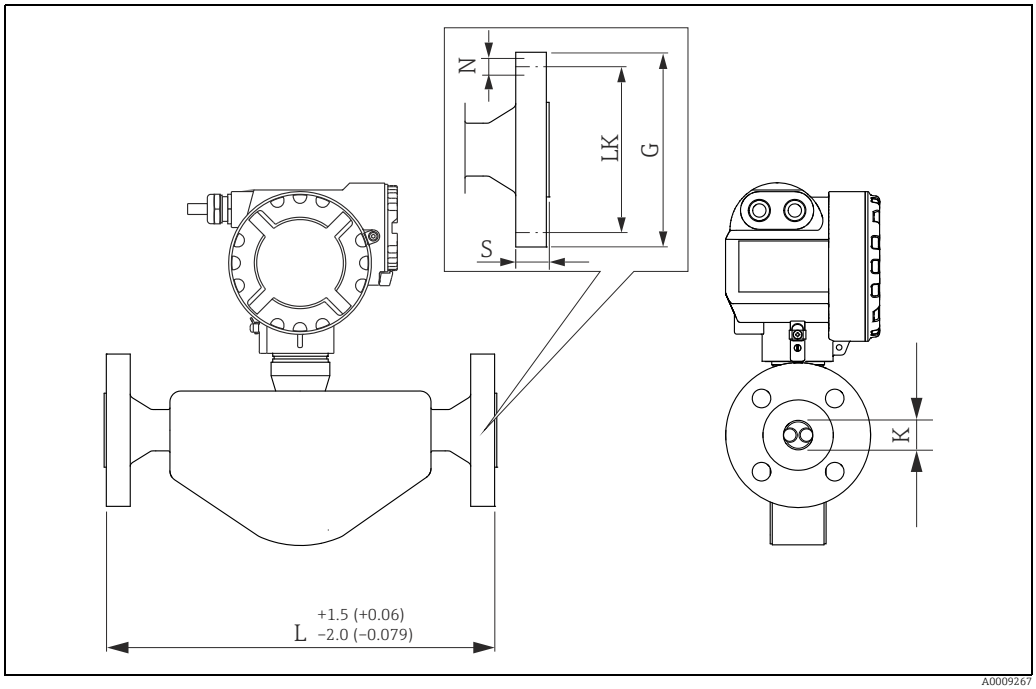
Dimensions in US units

DN	A	B	C	D	E	F	L	I	2 × di
8	8.70	3.66	6.30	3.62	5.75	*	5.47	0.21	12.36
15	8.86	4.13	6.30	3.62	7.44	*	5.47	0.33	12.99
25	9.13	4.17	6.30	3.62	9.45	*	5.47	0.47	13.31
40	9.37	4.76	6.30	3.62	13.27	*	5.47	0.69	14.13

All dimensions in [in]
* dependent on respective flange connection

Process connections in SI units

Flange according to EN 1092-1 (DIN 2501, DIN 2512 N), PN 40

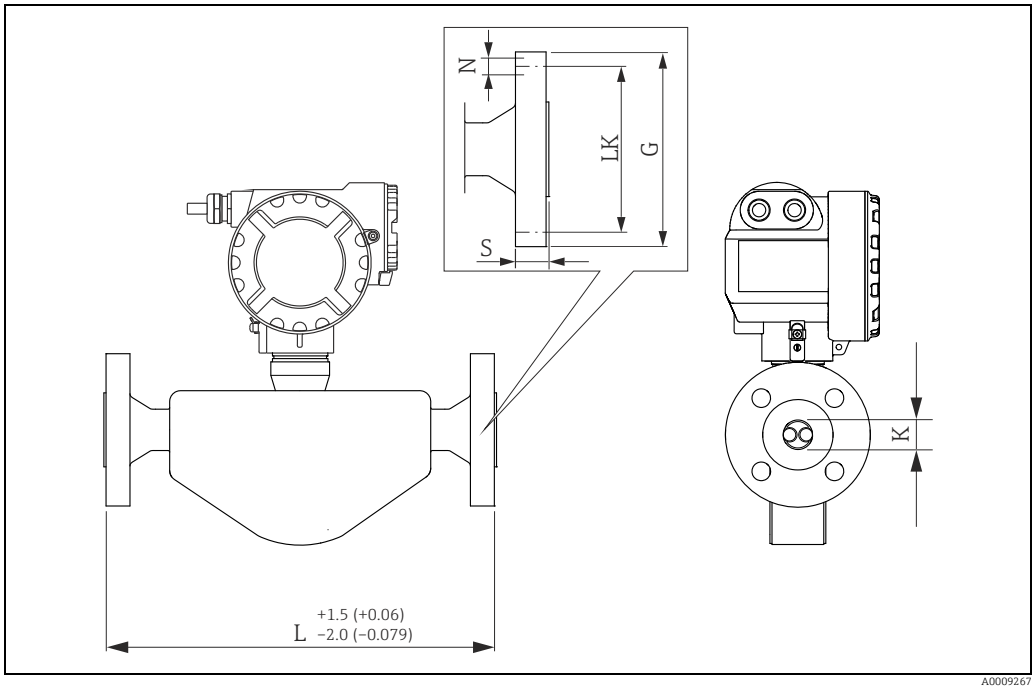


Engineering unit mm (in)

Flange according to EN 1092-1 (DIN 2501), PN 40: 1.4404 (F316/F316L) Order code for "Process connection", option D2S Flange according to EN 1092-1 (DIN 2512 N[1]), PN 40: 1.4404 (F316/F316L) Order code for "Process connection", option D6S						
DN	**G**	**K**	**L**	**LK**	**N**	**S**
8	95	17.3	232	65	4 × Ø 14	16
15	95	17.3	279	65	4 × Ø 14	16
25	115	28.5	329	85	4 × Ø 14	18
40	150	43.1	445	110	4 × Ø 18	18

[1] Flange with groove to EN 1092-1 Form D (DIN 2512 N)
All dimensions in [mm]; other dimensions → 🖹 13

Flange according to ASME B16.5, Cl 150
Flange according to ASME B16.5, Cl 300



Engineering unit mm (in)

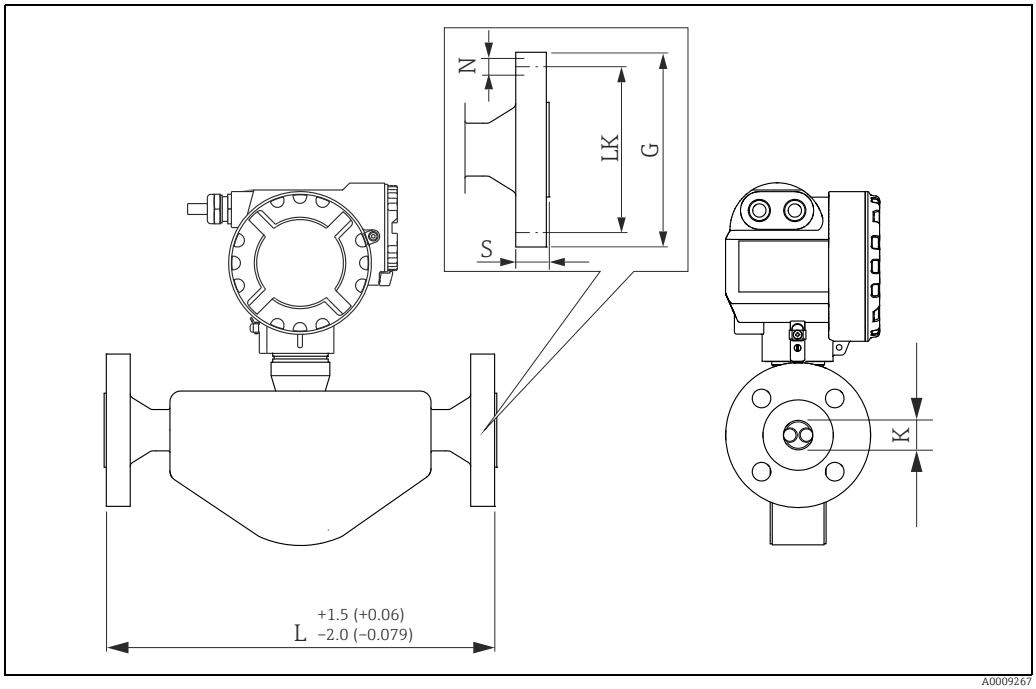
Flange according to ASME B16.5, Cl. 150: 1.4404 (F316/F316L) Order code for "Process connection", option AAS						
DN	**G**	**K**	**L**	**LK**	**N**	**S**
8	88.9	15.7	232	60.5	4 × Ø 15.7	11.2
15	88.9	15.7	279	60.5	4 × Ø 15.7	11.2
25	108.0	26.7	329	79.2	4 × Ø 15.7	14.2
40	127.0	40.9	445	98.6	4 × Ø 15.7	17.5

All dimensions in [mm]; other dimensions → 🖹 13

Flange according to ASME B16.5, Cl. 300: 1.4404 (F316/F316L) Order code for "Process connection", option ABS						
DN	**G**	**K**	**L**	**LK**	**N**	**S**
8	95.2	15.7	232	66.5	4 × Ø 15.7	14.2
15	95.2	15.7	279	66.5	4 × Ø 15.7	14.2
25	123.9	26.7	329	88.9	4 × Ø 19.0	17.5
40	155.4	40.9	445	114.3	4 × Ø 22.3	20.6

All dimensions in [mm]; other dimensions → 🖹 13

JIS B2220, flange, 20K
JIS B2220, flange, 40K
JIS B2220, flange, 63K



Engineering unit mm (in)

JIS B2220, flange, 20K: 1.4404 (F316/F316L) Order code for "Process connection", option NES						
DN	**G**	**K**	**L**	**LK**	**N**	**S**
8	95	15	232	70	4 × Ø 15	14
15	95	15	279	70	4 × Ø 15	14
25	125	25	329	90	4 × Ø 19	16
40	140	40	445	105	4 × Ø 19	18

All dimensions in [mm]; other dimensions → 🖹 13

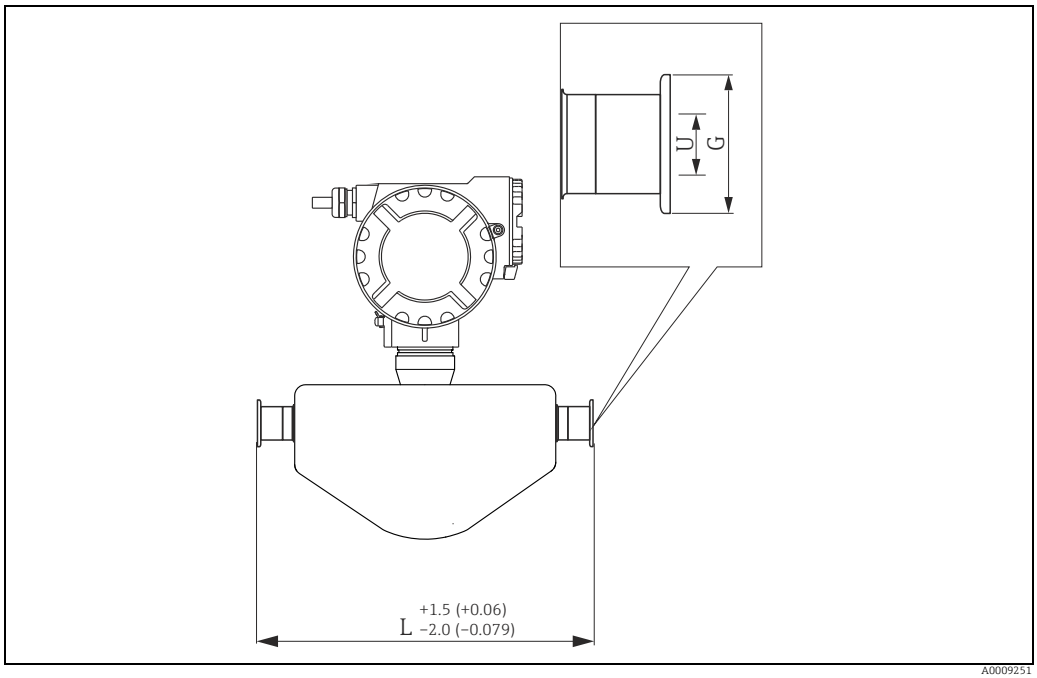
JIS B2220, flange, 40K: 1.4404 (F316/F316L) Order code for "Process connection", option NGS						
DN	**G**	**K**	**L**	**LK**	**N**	**S**
8	115	15	261	80	4 × Ø 19	20
15	115	15	300	80	4 × Ø 19	20
25	130	25	375	95	4 × Ø 19	22
40	160	38	496	120	4 × Ø 23	24

All dimensions in [mm]; other dimensions → 🖹 13

JIS B2220, flange, 63K: 1.4404 (F316/F316L) Order code for "Process connection", option NHS						
DN	**G**	**K**	**L**	**LK**	**N**	**S**
8	120	12	282	85	4 × Ø 19	23
15	120	12	315	85	4 × Ø 19	23
25	140	22	383	100	4 × Ø 23	27
40	175	35	515	130	4 × Ø 25	32

All dimensions in [mm]; other dimensions → 🖹 13

Tri-Clamp, DIN 11866 line C

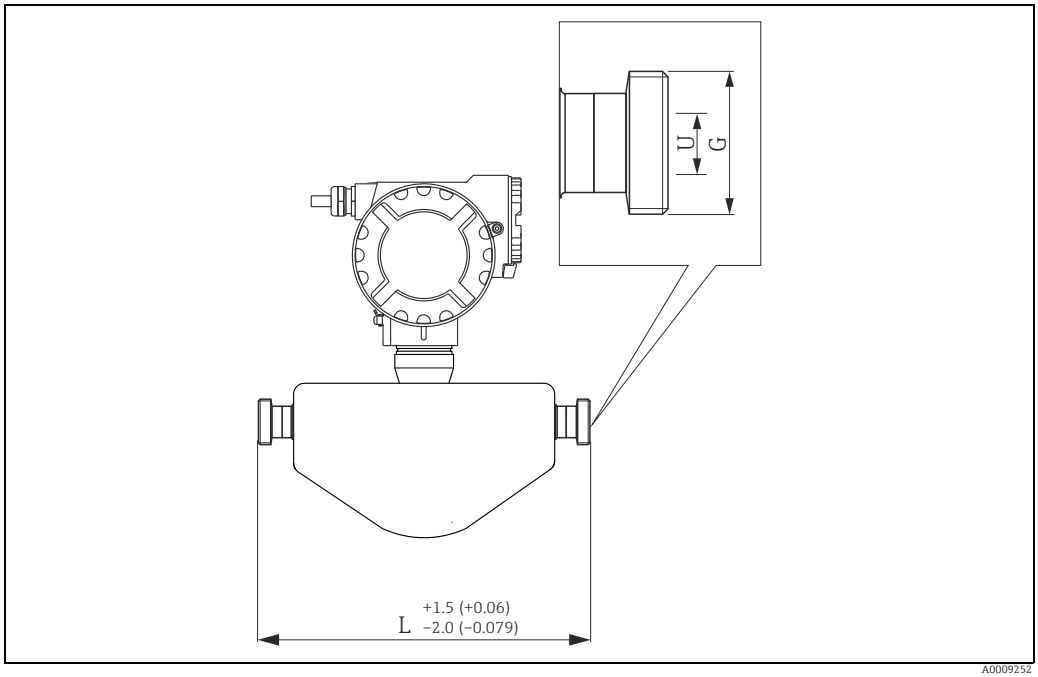


Engineering unit mm (in)

Tri-Clamp, DIN 11866 line C: 1.4404 (316/316L)					
DN	**Clamp**	**Order code for "Process connection", option**	**G**	**L**	**U**
8	½"	FUW/FUA[1)]	25.0	229	9.5
	¾"	FWW/FWA[1)]	25.0	229	16
	1"	FTS/FTA[1)]	50.4	229	22.1
15	½"	FUW/FUA[1)]	25.0	273	9.5
	¾"	FWW/FWA[1)]	25.0	273	16
	1"	FTS/FTA[1)]	50.4	273	22.1
25	1"	FTS/FTA[1)]	50.4	324	22.1
40	1½"	FTS/FTA[1)]	50.4	456	34.8

All dimensions in [mm]; other dimensions → 🖹 13
[1)] 3A-version, surface roughness Ra ≤ 0.8 µm/150 grit)

DIN 11851, thread

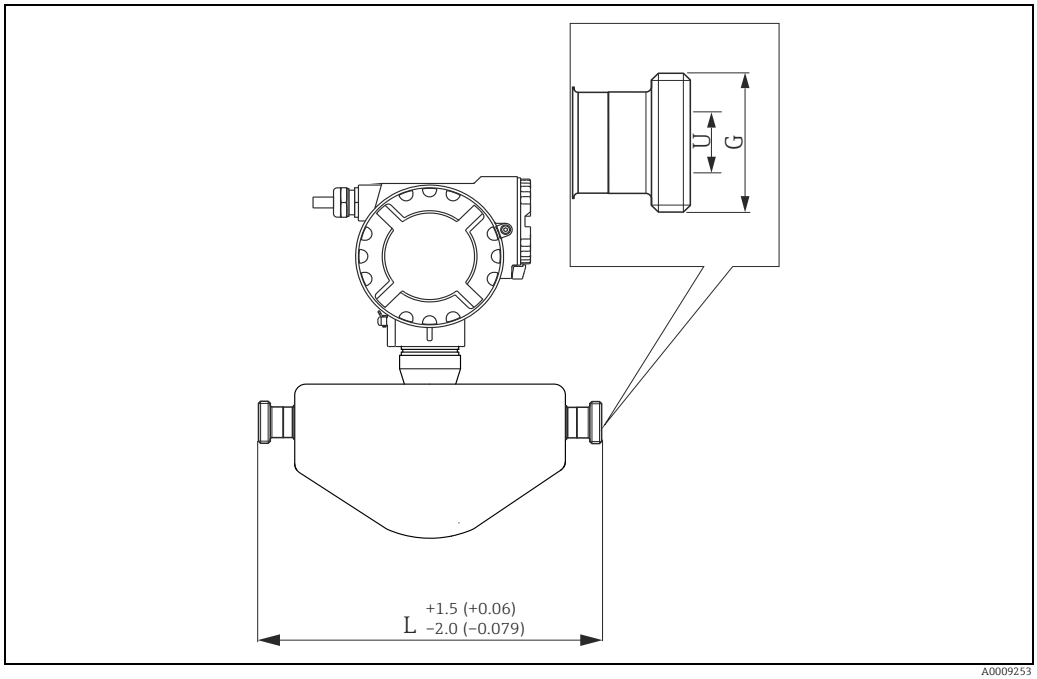


Engineering unit mm (in)

DIN 11851, thread: 1.4404 (316/316L) **Order code for "Process connection", option FMW**			
DN	**G**	**L**	**U**
8	Rd 34 × 1/8"	229	16
15	Rd 34 × 1/8"	273	16
25	Rd 52 × 1/6"	324	26
40	Rd 65 × 1/6"	456	38

All dimensions in [mm]; other dimensions → 🖹 13
3A-version, surface roughness Ra ≤ 0.8 µm/150 grit: Order code for "Process connection", option FMA

DIN 11864-1 form A, thread, DIN 11866 line A

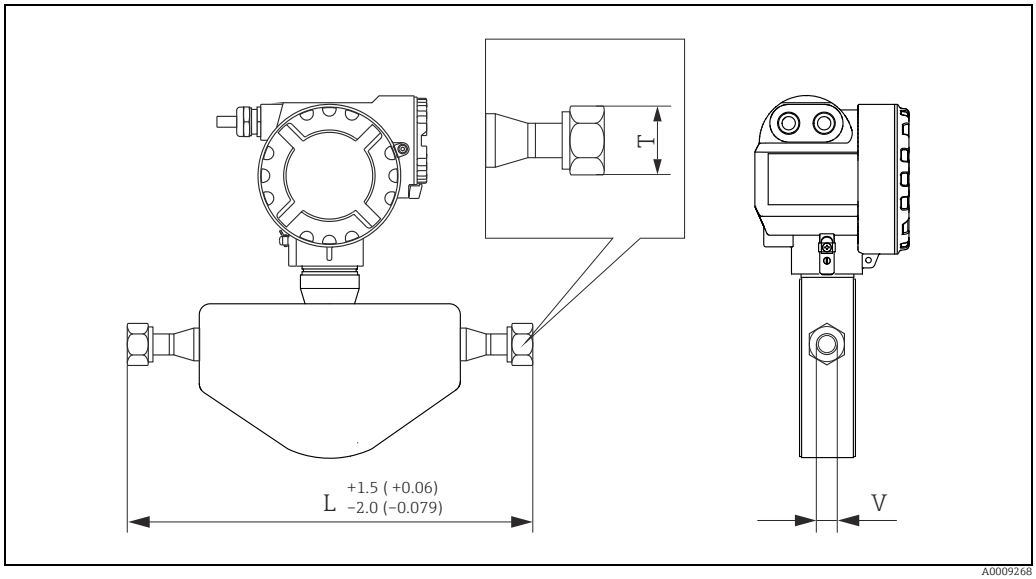


Engineering unit mm (in)

DIN 11864-1 form A, thread, DIN 11866 line A: 1.4404 (316/316L) Order code for "Process connection", option FLW			
DN	**G**	**L**	**U**
8	Rd 28 × 1/8"	229	10
15	Rd 34 × 1/8"	273	16
25	Rd 52 × 1/6"	324	26
40	Rd 65 × 1/6"	456	38

All dimensions in [mm]; other dimensions → 🖹 13
3A-version, surface roughness Ra ≤ 0.8 µm/150 grit: Order code for "Process connection", option FLA

8-VCO-4, ½", coupling
12-VCO-4, ¾", coupling



Engineering unit mm (in)

8-VCO-4, ½", coupling: 1.4404 (316/316L) Order code for "Process connection", option CVS			
DN	**L**	**T**	**V**
8	252	SW 1"	10.2

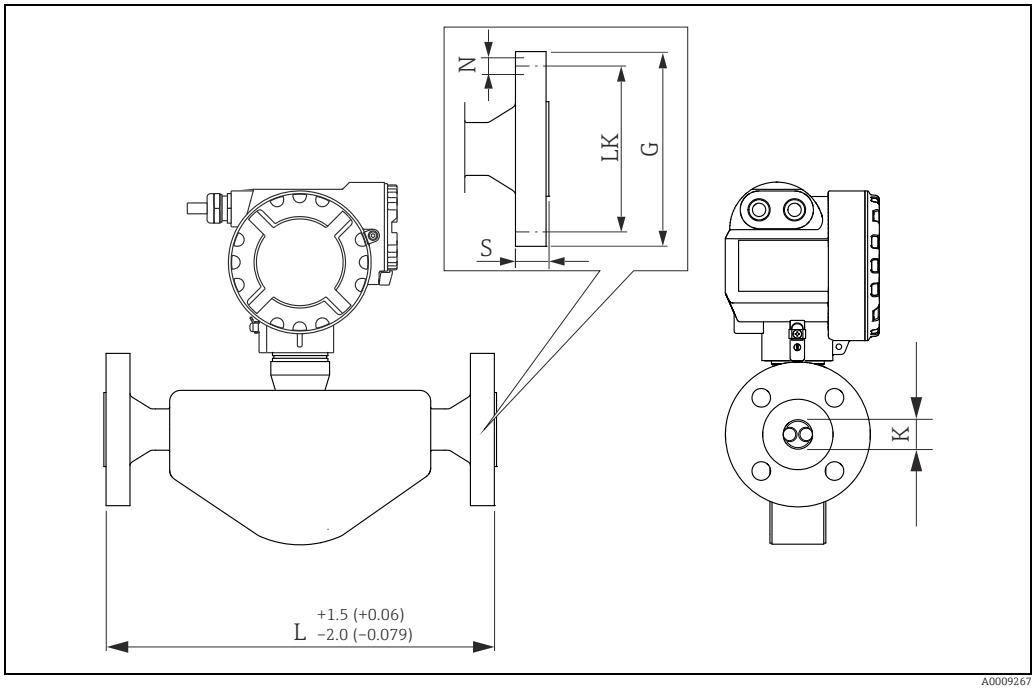
All dimensions in [mm]; other dimensions → 🖹 13

12-VCO-4, ¾", coupling: 1.4404 (316/316L) Order code for "Process connection", option CWS			
DN	**L**	**T**	**V**
15	305	SW 1½"	15.7

All dimensions in [mm]; other dimensions → 🖹 13

Process connections in US units

Flange according to ASME B16.5, Cl 150
Flange according to ASME B16.5, Cl 300



Engineering unit mm (in)

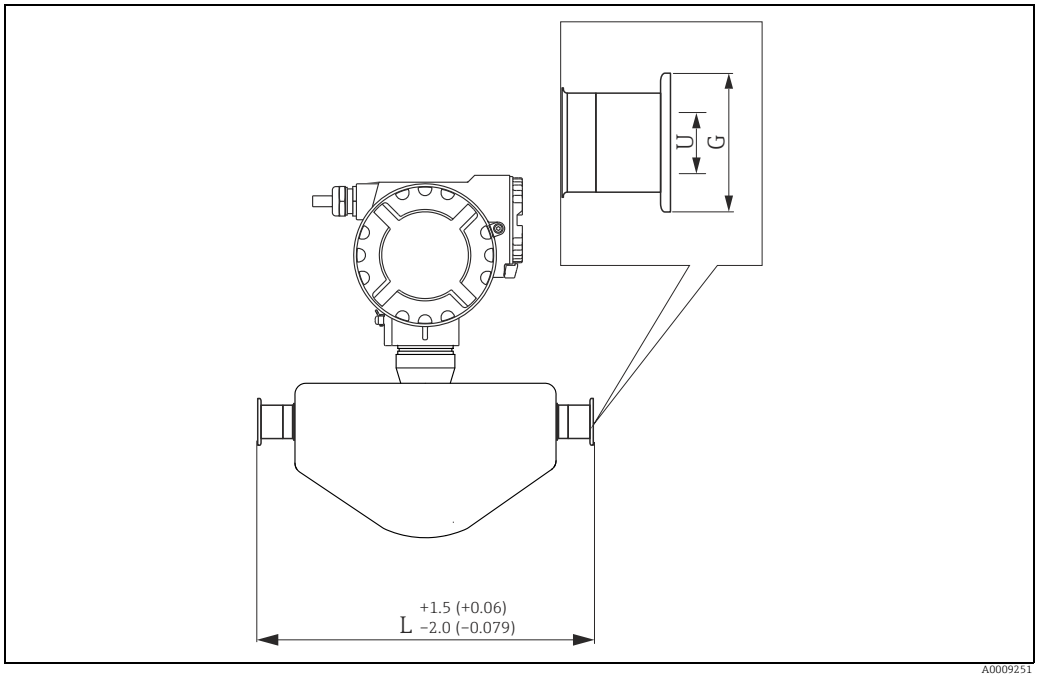
Flange according to ASME B16.5, Cl. 150: 1.4404 (F316/F316L) Order code for "Process connection", option AAS						
DN	**G**	**K**	**L**	**LK**	**N**	**S**
8	3.75	0.62	9.13	2.62	4 × 0.62	0.44
15	3.75	0.62	10.98	2.62	4 × 0.62	0.44
25	4.88	1.05	12.95	3.50	4 × 0.75	0.56
40	6.12	1.61	17.52	4.50	4 × 0.88	0.69

All dimensions in [in]; other dimensions → 🖹 13

Flange according to ASME B16.5, Cl. 300: 1.4404 (F316/F316L) Order code for "Process connection", option ABS						
DN	**G**	**K**	**L**	**LK**	**N**	**S**
8	3.75	0.62	9.13	2.62	4 × 0.62	0.56
15	3.75	0.62	10.98	2.62	4 × 0.62	0.56
25	4.88	1.05	12.95	3.50	4 × 0.62	0.69
40	6.12	1.61	17.52	4.50	4 × 0.62	0.81

All dimensions in [in]; other dimensions → 🖹 13

Tri-Clamp, DIN 11866 line C



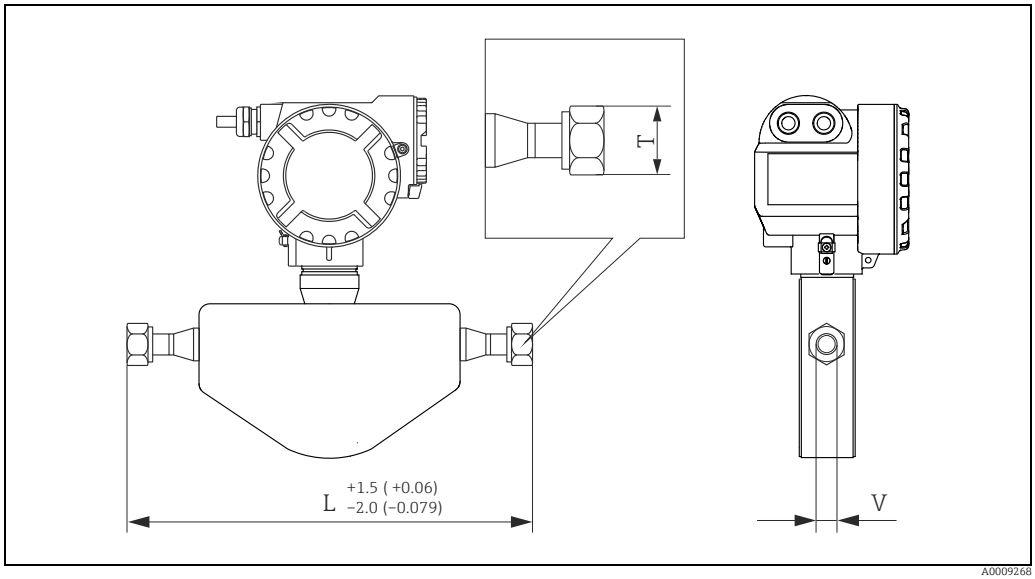
Engineering unit mm (in)

Tri-Clamp, DIN 11866 line C: 1.4404 (316/316L)					
DN	**Clamp**	**Order code for "Process connection", option**	**G**	**L**	**U**
8	½"	FUW/FUA[1)]	0.98	9.02	0.37
	¾"	FWW/FWA[1)]	0.98	9.02	0.63
	1"	FTS/FTA[1)]	1.98	9.02	0.87
15	½"	FUW/FUA[1)]	0.98	10.75	0.37
	¾"	FWW/FWA[1)]	0.98	10.75	0.63
	1"	FTS/FTA[1)]	1.98	10.75	0.87
25	1"	FTS/FTA[1)]	1.98	12.76	0.87
40	1½"	FTS/FTA[1)]	1.98	17.95	1.37

All dimensions in [in]; other dimensions → 🖹 13

[1)] 3A-version, surface roughness Ra ≤ 0.8 µm/150 grit

8-VCO-4, ½", coupling
12-VCO-4, ¾", coupling



Engineering unit mm (in)

8-VCO-4, ½", coupling: 1.4404 (316/316L) Order code for "Process connection", option CVS			
DN	**L**	**T**	**V**
8	9.92	SW 1"	0.4

All dimensions in [in]; other dimensions → 🖹 13

12-VCO-4, ¾", coupling: 1.4404 (316/316L) Order code for "Process connection", option CWS			
DN	**L**	**T**	**V**
15	12.01	SW 1½"	0.62

All dimensions in [in]; other dimensions → 🖹 13

Weight

DN in mm	8	15	25	40
Weight in kg	6.7	7.2	8.8	13.7

DN in inch	⅜"	½"	1"	1½"
Weight in lbs	14.7	15.8	19.4	30.2

The weights refer to devices with DIN flanges PN 40.

Material

Transmitter housing

Powder coated die-cast aluminum

Sensor housing, containment

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

Process connections

Stainless steel 1.4404 (316/316L):

Measuring tubes

Stainless steel 1.4539 (904L)

Process connections

- Threaded hygienic connection:
  - DIN 11864-1 form A, DIN 11866 line A
  - DIN 11851
- Clamp:
  - Tri-Clamp, DIN 11866 line C
- Flanges:
  - according to EN 1092-1 (DIN 2501)
  - according to ASME B16.5
  - JIS B2220

Surface roughness

All data relate to parts in contact with fluid.
- Not polished
- Ra_{max} = 0,8 µm (32 µin) mechanically polished

Operability

Local display

Display element

Status LED: There is a Light Emitting Diode (LED) on the meter electronics board that allows simple fault diagnostics.

Control elements

Device-internal DIP switch.

Remote operation

Operating via Modbus RS485 and serviceinterface FXA291 (e.g. FieldCare)

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) can be supplied by your E+H Sales Center on request. All explosion protection data are given in a separate Ex documentation, which is available upon request.

Approval for custody transfer

Information about currently available approvals for custody transfer can be supplied by your E+H Sales Center on request.

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

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. For devices with nominal diameters less than or equal to DN 25 (1"), this is neither possible nor necessary.

- 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:
  - Fluids of Group 1 and 2 with a steam pressure greater than, or smaller 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.

Other standards and guidelines

- EN 60529:
  Degrees of protection by housing (IP code)
- EN 61010-1:
  Safety requirements for electrical equipment for measurement, control and laboratory use
- IEC/EN 61326:
  "Emission in accordance with Class A requirements". Electromagnetic compatibility (EMC requirements)
- EN 60721:
  Shock and vibration resistance
- OIML R117-1:
  Requirements for measuring systems for liquids apart from water
- NAMUR NE 21
  Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment

Ordering Information

Detailed ordering information is available from the following sources:
- In the Product Configurator on the Endress+Hauser website: www.endress.com → Select country → Instruments → Select device → Product page function: Configure this product
- From your Endress+Hauser Sales Center: www.endress.com/worldwide

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

Accessories

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

Device-specific accessories

For the Transmitter

Accessories	Description
Electronics module	Complete plug-in electronics module.

Service-specific accessories

Accessories	Description
Applicator	Software for selecting and sizing Endress+Hauser measuring devices: ▪ Calculation of all the necessary data for identifying the optimum flowmeter: e.g. nominal diameter, pressure loss, accuracy or process connections ▪ Graphic illustration of the calculation results Administration, documentation and access to all project-related data and parameters over the entire life cycle of a project. Applicator is available: ▪ Via the Internet: https://wapps.endress.com/applicator ▪ On CD-ROM for local PC installation
W@M	Life cycle management for your plant. W@M supports you with a wide range of software applications over the entire process: from planning and procurement, to the installation, commissioning and operation of the measuring devices. All the relevant device information, such as the device status, spare parts and device-specific documentation, is available for every device over the entire life cycle. The application already contains the data of your Endress+Hauser device. Endress+Hauser also takes care of maintaining and updating the data records. W@M is available: ▪ Via the Internet: www.endress.com/lifecyclemanagement ▪ On CD-ROM for local PC installation
Fieldcheck	Tester/simulator for testing flowmeters in the field. When used in conjunction with the "FieldCare" software package, test results can be imported into a database, printed and used for official certification. Contact your Endress+Hauser representative for more information.
FieldCare	FieldCare is Endress+Hauser's FDT-based plant asset management tool and allows the configuration and diagnosis of intelligent field devices. By using status information, you also have a simple but effective tool for monitoring devices. The Proline flowmeters are accessed via a service interface or via the service interface FXA193.
FXA291	Service interface from the measuring device to the PC for operation via FieldCare.

System components

Accessories	Description
Memograph M graphic display recorder	The Memograph M graphic display recorder provides information on all the relevant process variables. Measured values are recorded correctly, limit values are monitored and measuring points analyzed. The data are stored in the 256 MB internal memory and also on a DSD card or USB stick. Memograph M boasts a modular design, intuitive operation and a comprehensive security concept. The ReadWin® 2000 PC software is part of the standard package and is used for configuring, visualizing and archiving the data captured. The mathematics channels which are optionally available enable continuous monitoring of specific power consumption, boiler efficiency and other parameters which are important for efficient energy management.

Documentation

- Operating Instructions (BA00133D)
- Ex supplementary documentation ATEX (II2G): (XA00117D)
- Ex supplementary documentation FM, CSA (Div. 1): (XA00118D)
- Special documentation on Pressure Equipment Directive: (SD00118D)
- Flow measuring technology (FA00005D)

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Endress+Hauser

People for Process Automation