

Ultrasonic flowmeter FFU

Non-contact flow measurement

The non-contact, ultrasonic flow sensor FFU detects the flow volumes of conductive and non-conductive liquids. Swimming against the current requires more strength than with the current – this is the simple fact on which ultrasonic flow measurement according to the phase difference process is based.

The device has a compact design, and its wide range of possible applications means it can also be used in restricted spaces. The seal-free sensor design, with high-quality polysulfone (Ultrason S) combined with enclosure rating IP 67, not only makes it possible to use the device in harsh ambient conditions, but also guarantees high process reliability. The large text display also helps ensure simple, fast and problem-free commissioning.

At a glance

- Flow sensor for conductive and nonconductive liquids
- No moving parts, compact design
- Process temperature up to 80 °C, process pressure up to 16 bar
- High chemical resistance thanks to seal-free sensor design
- Large display with membrane keyboard
- Integrated teaching tube detection
- Easy-to-clean, hygienic variants available (FDA-compliant), CIP capable

Your benefits

- Maintenance-free flow sensor; saves maintenance costs
- Adjustable measuring ranges, reduced number of variants
- Can be used for conductive and nonconductive liquids – fewer variants and lower storage costs
- Straight measuring tube reduces pressure loss, thus saving energy costs
- Sensor without seals increases process reliability and availability
- Flexible measurement system for all industries



Detailed technical data

Features

	NW 10	NW 15	NW 20	NW 25
Measuring principle	Ultrasonic sensor			
Medium	Fluids			
Nominal width measuring tube	NW 10	NW 15	NW 20	NW 25
Process temperature	0 °C ... +80 °C			
Process pressure	Max. 16 bar		Max. 10 bar	
EHEDG approval	✓			

Performance

	NW 10	NW 15	NW 20	NW 25
Minimum flow ¹⁾	0.3 l/min	0.9 l/min	3.5 l/min	5 l/min
Maximum flow	21 l/min	36 l/min	60 l/min	240 l/min
Inlet zone	20 cm	30 cm	50 cm	60 cm
Outlet zone	0 cm	5 cm	10 cm	10 cm
Conductivity	No limitation			
Accuracy ²⁾	2 % (of final value) optional 1% of reading +/- 3 mm/s (with calibration report)			
Reproducibility	0.5 %			
Resolution	0.003 l/min	0.006 l/min	0.012 l/min	0.03 l/min

1) At constant flow rate.

2) Reference condition: water, gas-free, fully-filled measuring tube, no cavitation, Medium temperature 20 ° C ambient temperature 20 ° C ... 25 ° C, compliance with the inlet zone and outlet zone, warm-up time electronic: 30 min

Mechanics

	NW 10	NW 15	NW 20	NW 25
Process connection	G 1/2 1/2" NPT Clamp 11864	G 3/4 3/4" NPT Clamp 11864	G 1 1" NPT Clamp 11864	G 1 1/4 1 1/4" NPT Clamp 11864
Wetted parts	PSU			
Housing material	PSU			
Enclosure rating	IP 67			
Weight	340 g	350 g	420 g	460 g

Electronics

Supply voltage ¹⁾	18 V DC ... 30 V DC
Ripple ²⁾	≤ 5 V _{pp}
Power consumption ³⁾	≤ 180 mA
Initialization time	≤ 5 s
Response time ⁴⁾	Filter off 100 ms, filter low 300 ms, filter medium 1 s, filter strong 4.2 s
Protection class	III
Electrical connection	M12x1, 5-pin M12x1, 8-pin (depending on type)
Electronics ¹⁾	1 analog output: 4 mA ... 20 mA, 0 mA ... 20 mA current flow and temperature, 1 pulse/status output: PNP-transistor output for flow rate meter, empty pipe detection, flow monitoring, dosing output, flow direction (depending on type)
Output load	< 500 Ohm
Lower signal level	3.8 mA ... 4 mA
Upper signal level	20 mA ... 20.5 mA
Impuls/frequency output	0 kHz ... 10 kHz
Puls width	≤ 1 s
Signal voltage HIGH	V _s - 2 V
Signal voltage LOW	≤ 2 V
Output current ⁵⁾	< 100 mA
Inductive load	1 H
Capacitive load	100 nF

1) All connections are polarity protected. All outputs are overload and short-circuit protected.

2) May not exceed or fall short of V_S tolerances.

3) Without load.

4) Analog output and display.

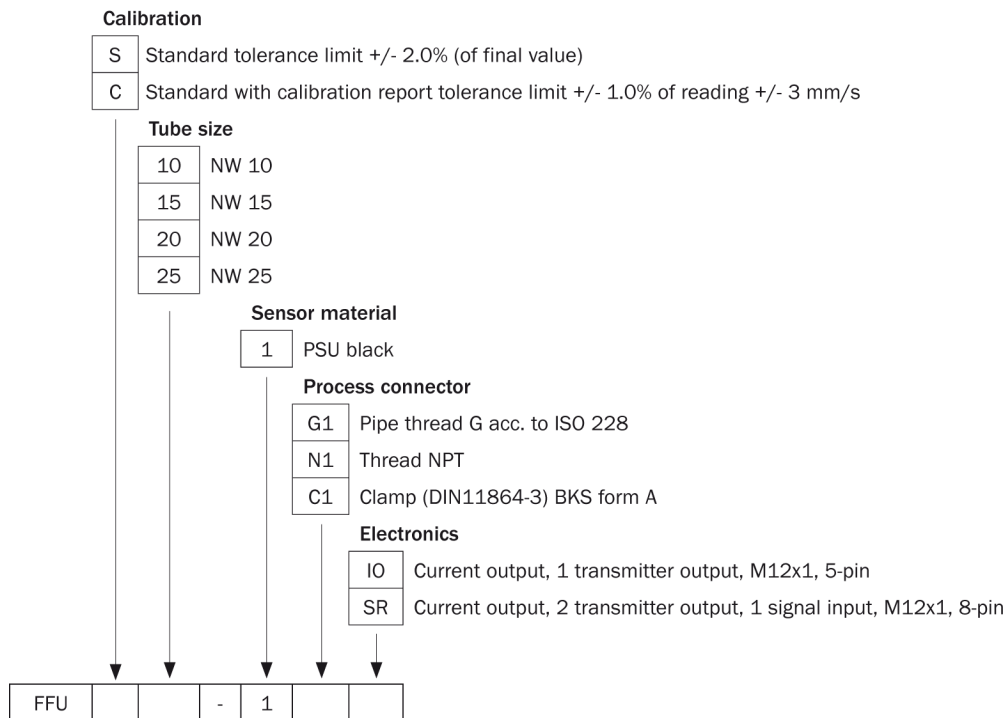
5) There are 100 mA for each output pnp and npn available.

Ambient data

Ambient temperature, operation	0 °C ... +60 °C
Ambient temperature, storage	-20 °C ... +70 °C

Ordering information

Type code



- Electronics: 1 analog output: 4 mA ... 20 mA, 0 mA ... 20 mA current flow and temperature, 1 pulse/status output: PNP-transistor output for flow rate meter; empty pipe detection, flow monitoring, dosing output, flow direction
- Electrical connection: M12x1, 5-pin

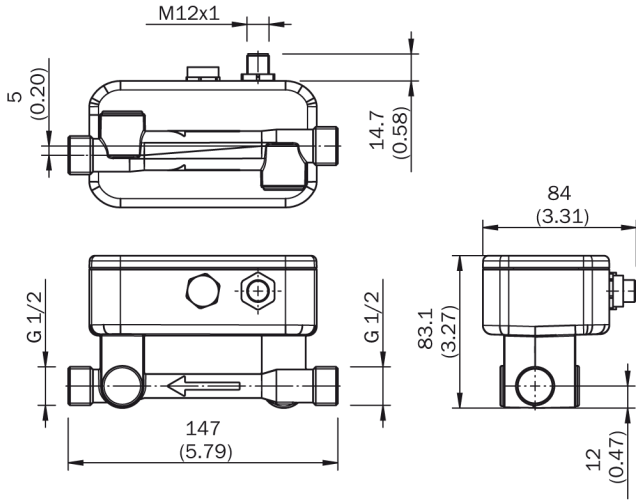
Process pressure	Process connection	Nominal width measuring tube	Maximum flow	Model name	Part No.
Max. 16 bar	G 1/2	NW 10	21 l/min	FFUS10-1G1IO	6041737
	G 3/4	NW 15	36 l/min	FFUS15-1G1IO	6041249
Max. 10 bar	G 1	NW 20	60 l/min	FFUS20-1G1IO	6041738
	G 1 1/4	NW 25	240 l/min	FFUS25-1G1IO	6041739
Max. 16 bar	1/2" NPT	NW 10	21 l/min	FFUS10-1N1IO	6047868
	3/4" NPT	NW 15	36 l/min	FFUS15-1N1IO	6047869
Max. 10 bar	1" NPT	NW 20	60 l/min	FFUS20-1N1IO	6047870
	1 1/4" NPT	NW 25	240 l/min	FFUS25-1N1IO	6044996
Max. 16 bar	Clamp 11864, Form A	NW 10	21 l/min	FFUS10-1C1IO	6049101
		NW 15	36 l/min	FFUS15-1C1IO	6045162

- Electronics: 1 analog output: 4 mA ... 20 mA, 0 mA ... 20 mA current flow and temperature, 2 pulse/status output: PNP-transistor output for flow rate meter; empty pipe detection, flow monitoring, dosing output, flow direction, 1 digital input for dosing and counter reset
- Electrical connection: M12x1, 8-pin

Process pressure	Process connection	Nominal width measuring tube	Maximum flow	Model name	Part No.
Max. 16 bar	G 1/2	NW 10	21 l/min	FFUS10-1G1SR	6043743
	G 3/4	NW 15	36 l/min	FFUS15-1G1SR	6043744
Max. 10 bar	G 1	NW 20	60 l/min	FFUS20-1G1SR	6043745
	G 1 1/4	NW 25	240 l/min	FFUS25-1G1SR	6043746

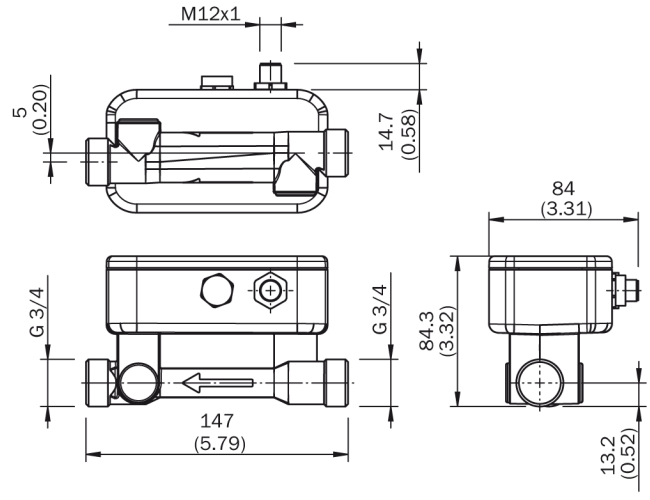
Dimensional drawings

NW 10, process connection G 1/2



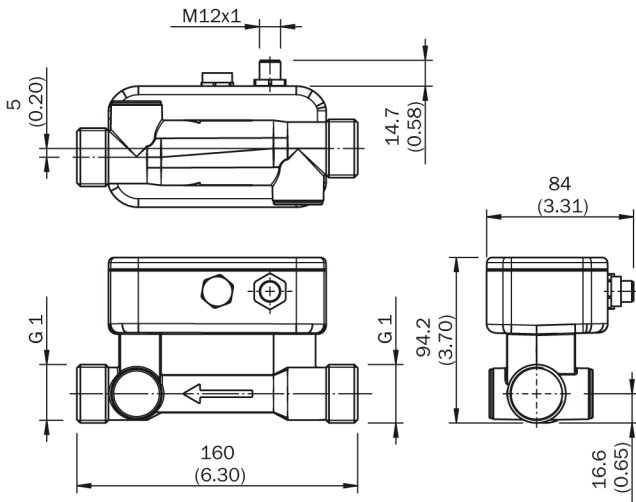
All dimensions in mm (inch)

NW 15, process connection G 3/4



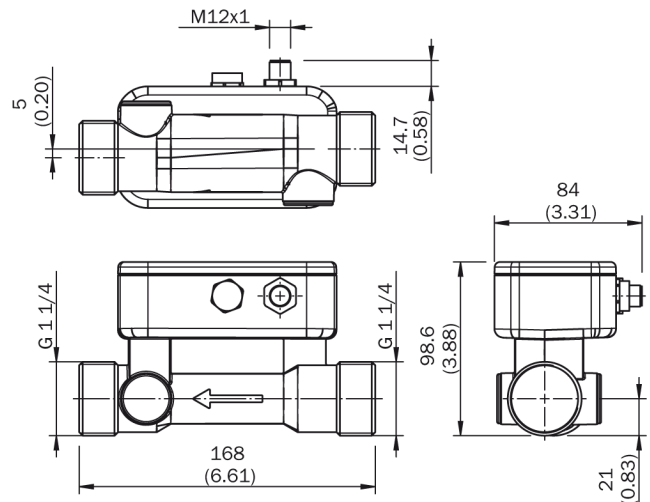
All dimensions in mm (inch)

NW 20, process connection G 1



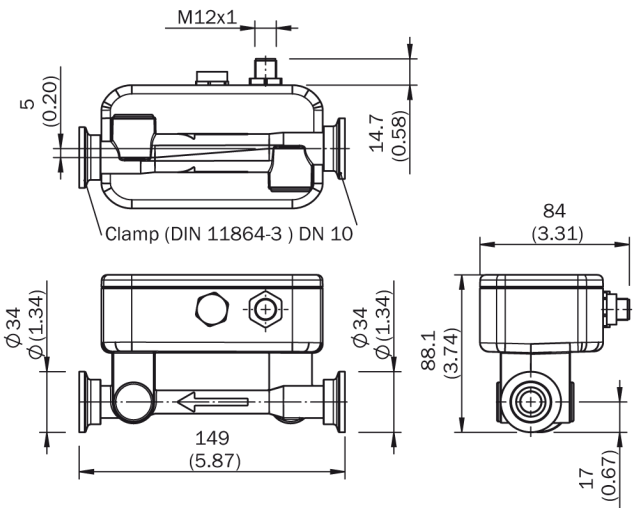
All dimensions in mm (inch)

NW 25, process connection G 1 1/4



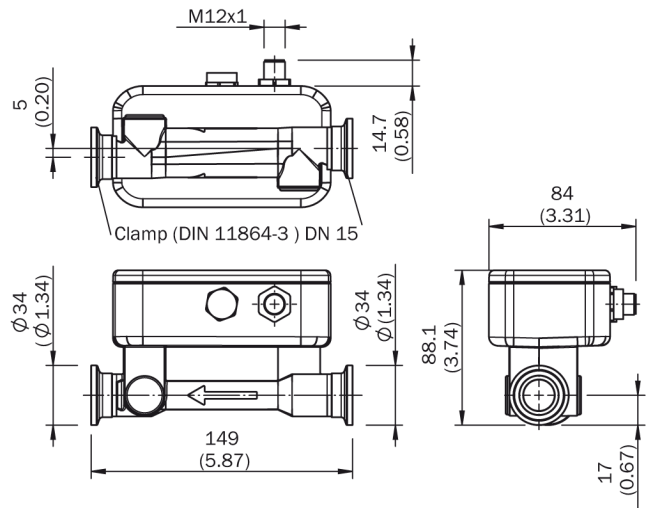
All dimensions in mm (inch)

NW 10, Clamp (DIN 11864-3)



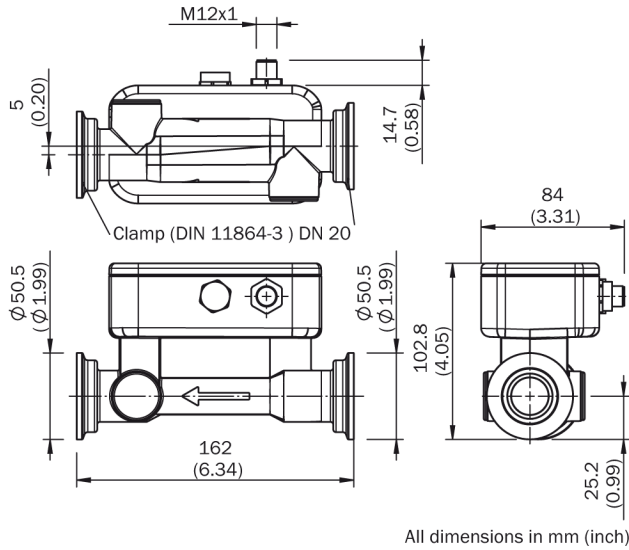
Dimensions in mm (inch)

NW 15, Clamp (DIN 11864-3)



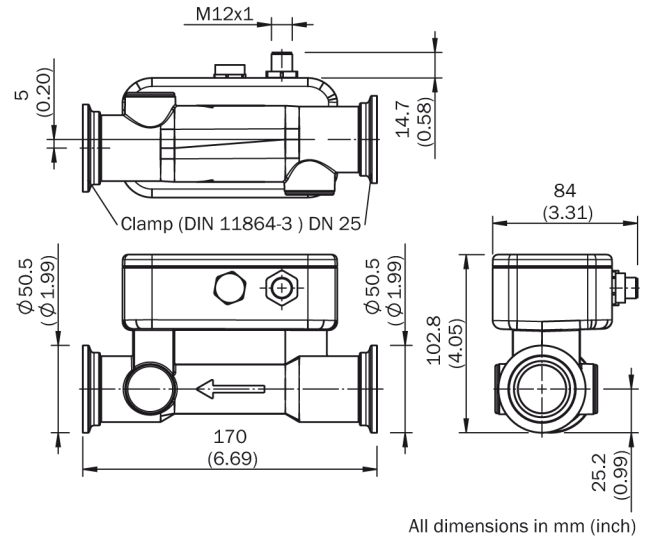
All dimensions in mm (inch)

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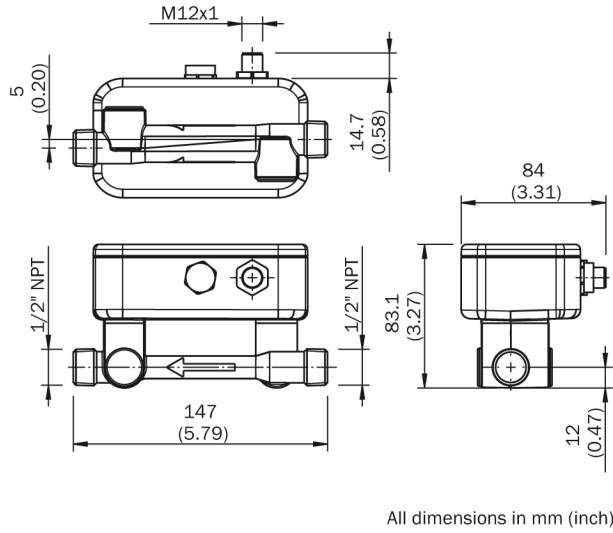
All dimensions in mm (inch)

NW 25, Clamp (DIN 11864-3)



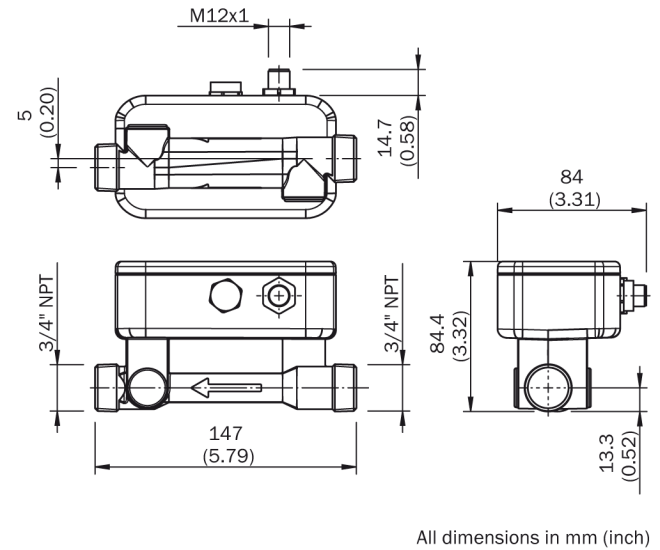
All dimensions in mm (inch)

NW 10, 1/2" NPT



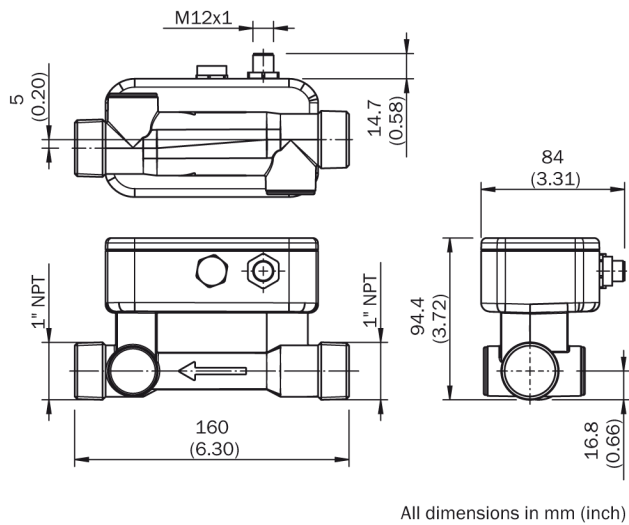
All dimensions in mm (inch)

NW 15, 3/4" NPT



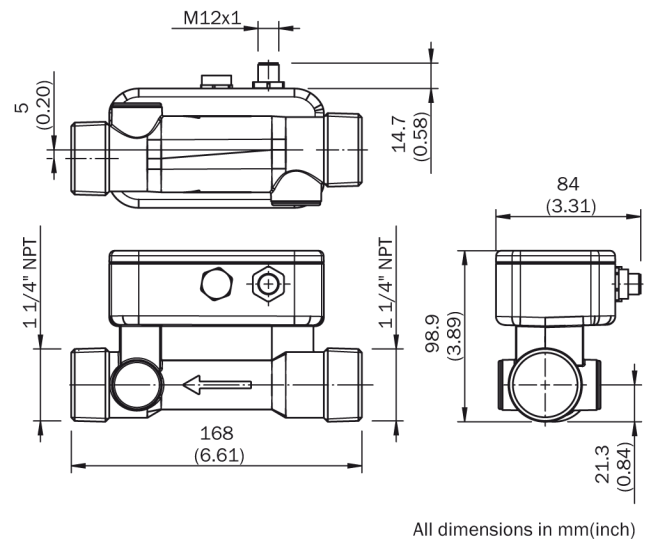
All dimensions in mm (inch)

NW 20, 1" NPT



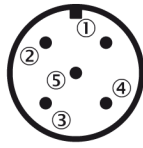
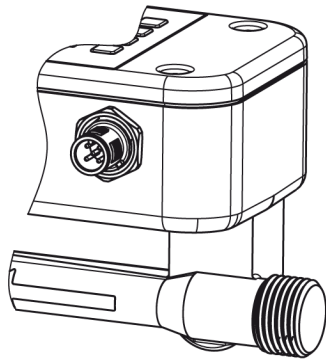
All dimensions in mm (inch)

NW 25, 1 1/4" NPT

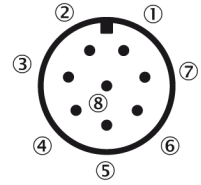
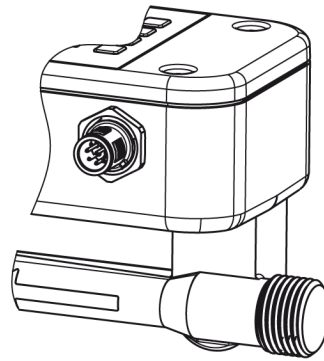


All dimensions in mm (inch)

Connection type and diagram



- 1) L⁺: Supply voltage
- 2) Q₁: Digital output PNP/NPN
- 3) M: Ground
- 4) C: Communication
- 5) Q_A: Analog current output

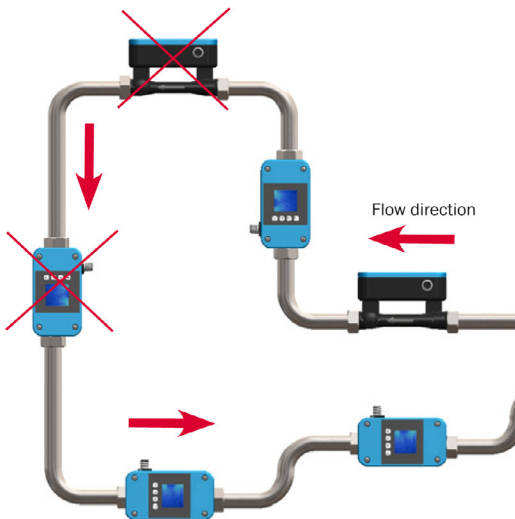


- 1) L⁺: Supply voltage
- 2) Q₁: Digital output PNP/NPN
- 3) M: Ground
- 4) Q₂: Digital output PNP/NPN
- 5) Q_A: Analog current output
- 6) C: Communication
- 7) IN₁: Digital input
- 8) No function

Recommended Accessories

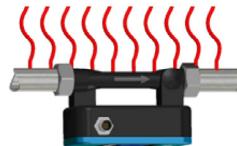
Brief description	Model name	Part No.
Cable, M12, 5-pin, straight connector female with molded cable, 2 m, PVC	DOL-1205-G02M	6008899
Cable, M12, 5-pin, straight connector female with molded cable, 2 m, PUR halogen free	DOL-1205-G02MC	6025906
Cable, M12, 5-pin, straight connector female with molded cable, 5 m, PVC	DOL-1205-G05M	6009868
Cable, M12, 5-pin, straight connector female with molded cable, 5 m, PUR halogen free	DOL-1205-G05MC	6025907
Cable, M12, 5-pin, straight connector female with molded cable, 10 m, PVC	DOL-1205-G10M	6010544
Cable, M12, 5-pin, straight connector female with molded cable, 10 m, PUR halogen free	DOL-1205-G10MC	6025908
Cable, M12, 5-pin, angled connector female with molded cable, 2 m, PVC	DOL-1205-W02M	6008900
Cable, M12, 5-pin, angled connector female with molded cable, 2 m, PUR halogen free	DOL-1205-W02MC	6025909
Cable, M12, 5-pin, angled connector female with molded cable, 5 m, PVC	DOL-1205-W05M	6009869
Cable, M12, 5-pin, angled connector female with molded cable, 5 m, PUR halogen free	DOL-1205-W05MC	6025910
Cable, M12, 5-pin, angled connector female with molded cable, 10 m, PUR halogen free	DOL-1205-W10MC	6025911
Cable, M12, 8-pin, straight connector female with molded cable, 2 m, PVC	DOL-1208-G02MA	6020633
Cable, M12, 8-pin, straight connector female with molded cable, 2 m, PUR halogen free	DOL-1208-G02MC	6035620
Cable, M12, 8-pin, straight connector female with molded cable, 5 m, PVC	DOL-1208-G05MA	6020993
Cable, M12, 8-pin, straight connector female with molded cable, 5 m, PUR halogen free	DOL-1208-G05MC	6035621
Cable, M12, 8-pin, straight connector female with molded cable, 10 m, PVC	DOL-1208-G10MA	6022152
Cable, M12, 8-pin, straight connector female with molded cable, 10 m, PUR halogen free	DOL-1208-G10MC	6035622
Cable, M12, 8-pin, angled connector female with molded cable, 2 m, PVC	DOL-1208-W02MA	6020992
Cable, M12, 8-pin, angled connector female with molded cable, 2 m, PUR halogen free	DOL-1208-W02MC	6035623
Cable, M12, 8-pin, angled connector female with molded cable, 5 m, PVC	DOL-1208-W05MA	6021033
Cable, M12, 8-pin, angled connector female with molded cable, 5 m, PUR halogen free	DOL-1208-W05MC	6035624
Cable, M12, 8-pin, angled connector female with molded cable, 10 m, PUR halogen free	DOL-1208-W10MC	6035625

Mounting instructions



Tube has to be fully filled

Correct positioning



False positioning



In applications where the flowmeter is exposed to high temperatures ($t \geq 60^\circ\text{C}$), the device should be mounted upside down:

Inlet and outlet paths

In order to receive an accurate volume measurement, it is necessary to observe inlet and outlet paths.

The diameter of the tube - as given by the process connector of the FFU - should not change directly in front of the device and directly after the device.

Minimum inlet and outlet paths are:

Device nominal width	1/2"	3/4"	1"	1 1/4"
Inlet path	20 cm	30 cm	50 cm	60 cm
Outlet path	0 cm	5 cm	10 cm	10 cm

Maximum torque

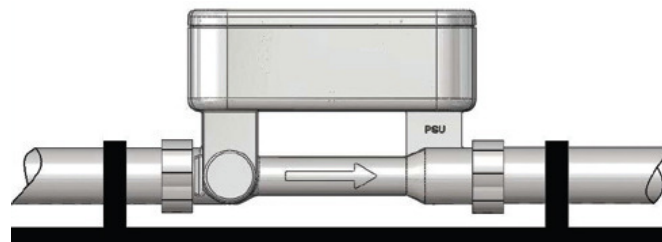
Always make sure that the maximum torque of the nuts for the hydraulic connections is not overstep. Please use the supplied seals. If you seal with teflon tape that can result in to excessive tightening torques.

We commend a maximum torque depending on the diameter of:

	DN10	DN15	DN20	DN25
Torque G	2 Nm	3 Nm	4 Nm	6 Nm

Attention: The process connections from the FFU are offset by 5 mm (see "dimensional drawing")

Mounted FFU must always be mechanically stress free. Strong tension in the pipe system can lead to damage to the device. Shocks or mechanical loads can affect the measurement accuracy of the measuring device. If the FFU must be additionally secured due to the presence of vibrations or mechanical motion, two mounting clamps can be mounted to the inlet and outlet of the measuring device.



FFU with mounting clamps