# Ultrasonic Flowmeter FFU

Non-contact flow measurement

**SICK**
Sensor Intelligence.

## Non-contact flow measurement

## Product description

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 non-conductive liquids
- No moving parts, compact design
- Process temperature up to 80 °C, process pressure up to 10 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 (EHEDG certification and conformance with FDA), CIP capable

## Your benefits

- Maintenance-free flow sensor; saves maintenance costs
- Adjustable measuring ranges, reduced number of variants
- Can be used for conductive and non-conductive 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

## Additional information

## 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. 10 bar | | Max. 6 bar | |
| EHEDG approval | ✔ | | | |

### Performance

|  | NW 10 | NW 15 | NW 20 | NW 25 |
|---|---|---|---|---|
| Minimum flow | 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 | 10 cm | 30 cm | 50 cm | 80 cm |
| Outlet zone | 0 cm | 5 cm | 10 cm | 20 cm |
| Conductivity | No limitation | | | |
| Accuracy | Ca. 2 % (of final value) | | | |
| Reproducibility | 0.5 % | | | |
| Resolution | 0.003 l/min | 0.006 l/min | 0.012 l/min | 0.03 l/min |

### Mechanics

|  | NW 10 | NW 15 | NW 20 | NW 25 |
|---|---|---|---|---|
| Process connection | G 1/2<br>1/2" NPT<br>Clamp 11864 | G 3/4<br>3/4" NPT<br>Clamp 11864 | G 1<br>1" NPT<br>Clamp 11864 | G 1 1/4<br>1 1/4" NPT<br>Clamp 11864 |
| Wetted parts | PSU | | | |
| Housing material | PSU | | | |
| 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 |
| **Protection class** | III |
| **Electrical connection** | M12x1, 5-pin<br>M12x1, 8-pin<br>(depending on type) |
| **Electronics** [1] | 1 analog output: 4 mA ... 20 mA, 0 mA ... 20 mA  current flow, 1 pulse/status output: PNP-transistor output for flow rate meter, empty pipe detection, flow monitoring /<br>1 analog output: 4 mA ... 20 mA, 0 mA ... 20 mA  current flow,  2 pulse/status outputs: PNP-transistor output for flow rate meter, empty pipe detection, flow monitoring, 1 digital input<br>(depending on type) |
| **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** | < 100 mA |
| **Inductive load** | 1 H |
| **Capacitive load** | 100 nF |
| **Response time** [4] | Filter off 100 ms, filter low 300 ms, filter medium 1 s, filter strong 4.2 s |
| **Enclosure rating** | IP 67 |
| **Output load** | < 500 Ohm |
| **Lower signal level** | 3.8 mA ... 4 mA |
| **Upper signal level** | 20 mA ... 20.5 mA |

[1] All connections are reverse polarity. All outputs are overload and short-circuit protected.

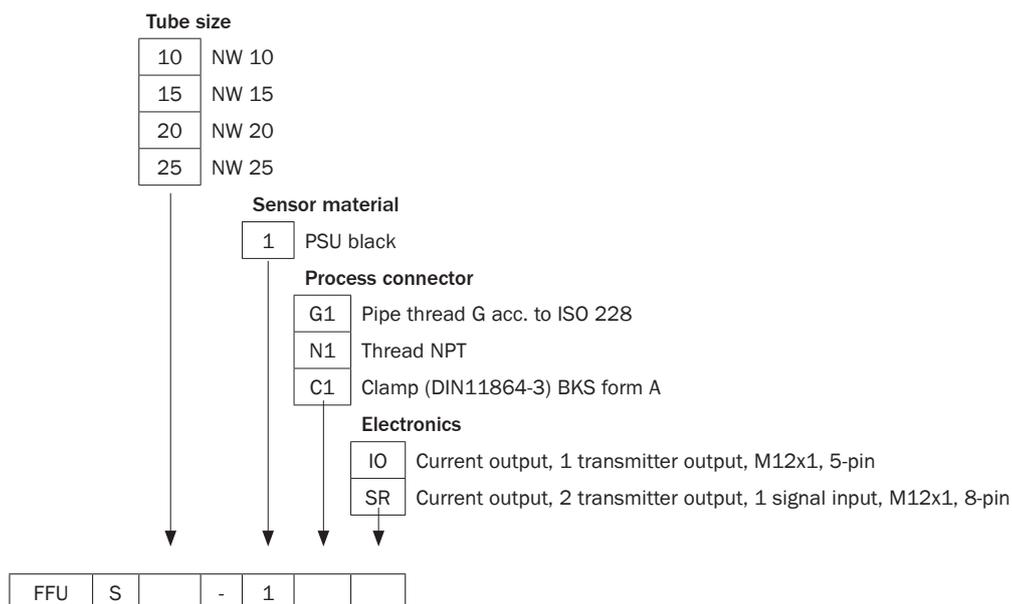[2] May not exceed or fall short of $V_s$ tolerances.

[3] Without load.

[4] Analog output.

## Ambient data

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

## Ordering information

**Type code**

**Tube size**

| | |
|---|---|
| 10 | NW 10 |
| 15 | NW 15 |
| 20 | NW 20 |
| 25 | NW 25 |

**Sensor material**

| | |
|---|---|
| 1 | PSU black |

**Process connector**

| | |
|---|---|
| G1 | Pipe thread G acc. to ISO 228 |
| N1 | Thread NPT |
| C1 | Clamp (DIN11864-3) BKS form A |

**Electronics**

| | |
|---|---|
| IO | Current output, 1 transmitter output, M12x1, 5-pin |
| SR | Current output, 2 transmitter output, 1 signal input, M12x1, 8-pin |

| | | | | |
|---|---|---|---|---|
| FFU | S | | - 1 | |

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

| Process pressure | Process connection | Nominal width measuring tube | Maximum flow | Model name | Part no. |
|---|---|---|---|---|---|
| Max. 10 bar | G 1/2 | NW 10 | 21 l/min | FFUS10-1G1IO | 6041737 |
| | G 3/4 | NW 15 | 36 l/min | FFUS15-1G1IO | 6041249 |
| Max. 6 bar | G 1 | NW 20 | 60 l/min | FFUS20-1G1IO | 6041738 |
| | G 1 1/4 | NW 25 | 240 l/min | FFUS25-1G1IO | 6041739 |

- **Electronics:** 1 analog output: 4 mA ... 20 mA, 0 mA ... 20 mA  current flow,  2 pulse/status outputs: PNP-transistor output for flow rate meter, empty pipe detection, flow monitoring, 1 digital input
- **Electrical connection:** M12x1, 8-pin

| Process pressure | Process connection | Nominal width measuring tube | Maximum flow | Model name | Part no. |
|---|---|---|---|---|---|
| Max. 10 bar | G 1/2 | NW 10 | 21 l/min | FFUS10-1G1IR | 6043743 |
| | G 3/4 | NW 15 | 36 l/min | FFUS15-1G1IR | 6043744 |
| Max. 6 bar | G 1 | NW 20 | 60 l/min | FFUS20-1G1IR | 6043745 |
| | G 1 1/4 | NW 25 | 240 l/min | FFUS25-1G1IR | 6043746 |

## Dimensional drawings
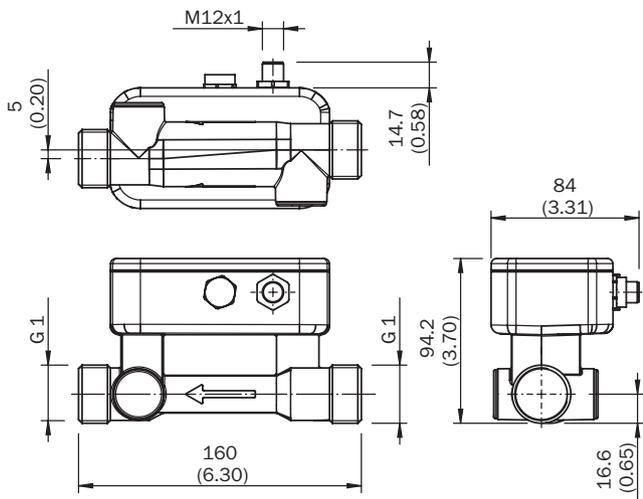
**NW 10, process connection G 1/2**
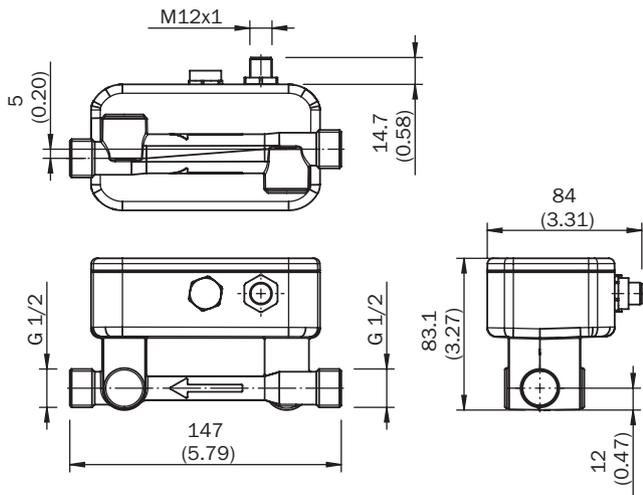


All dimensions in mm (inch)

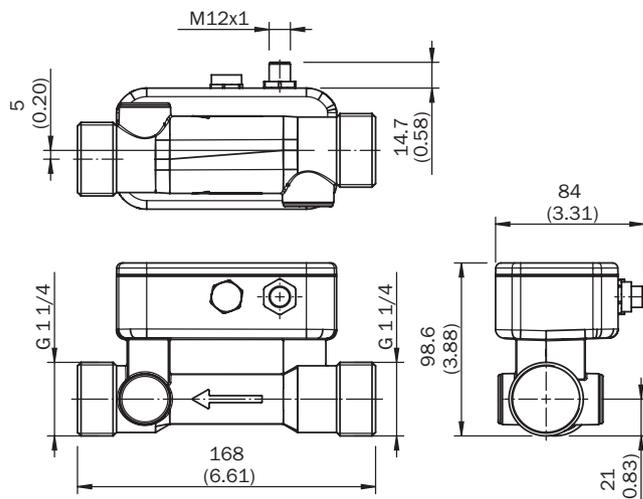**NW 15, process connection G 3/4**
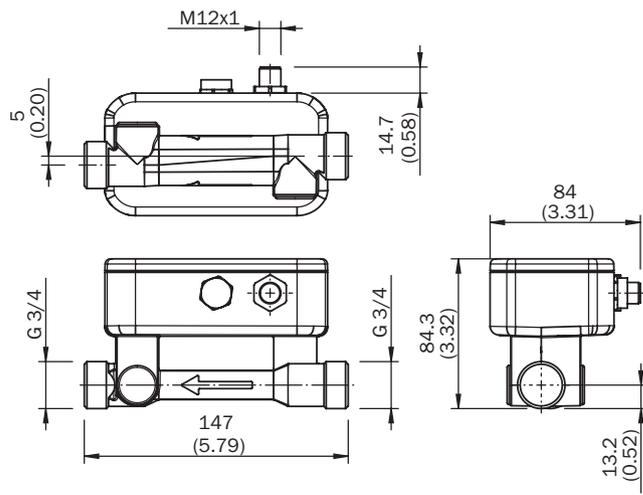


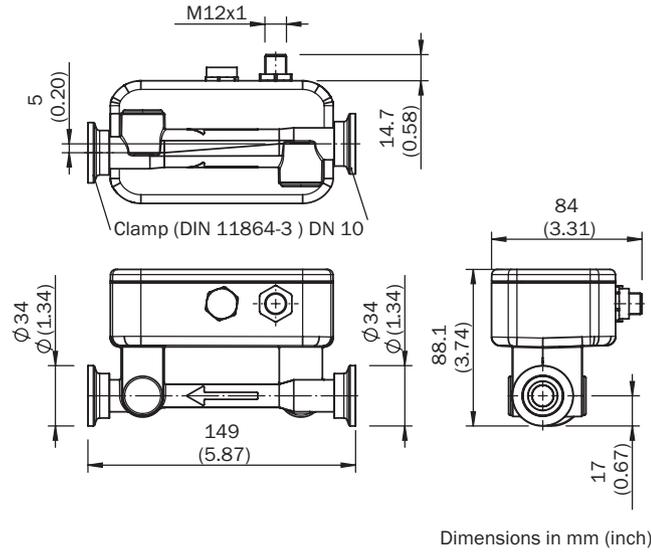All dimensions in mm (inch)

**NW 20, process connection G 1**


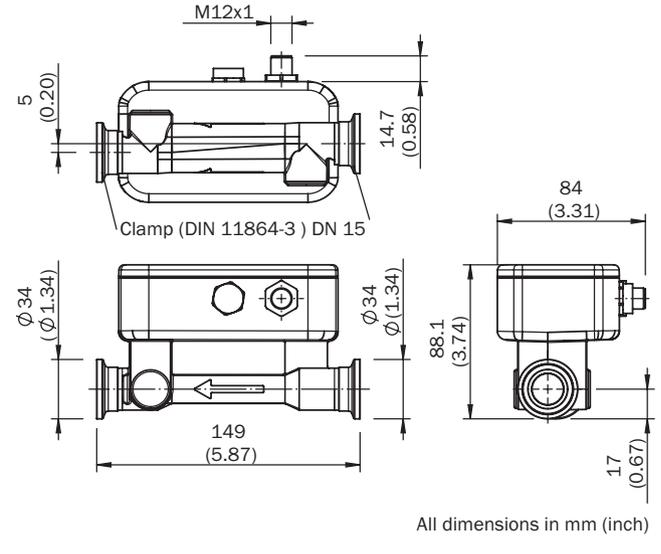
All dimensions in mm (inch)

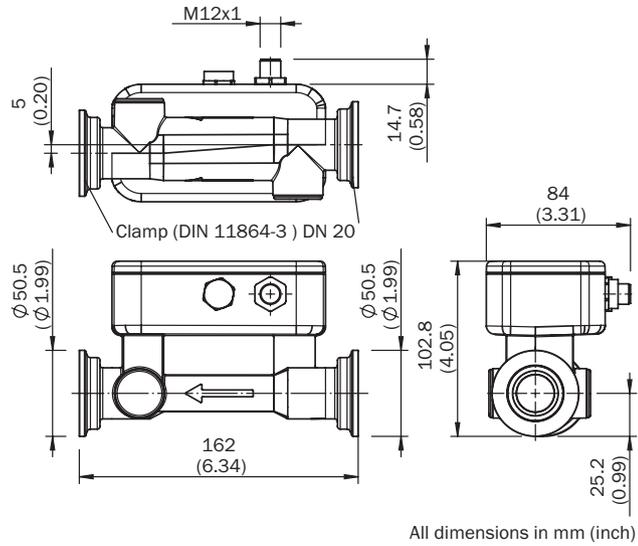**NW 25, process connection G 1 1/4**



All dimensions in mm (inch)

## NW 10, Clamp (DIN 11864-3)

M12x1

5 (0.20)
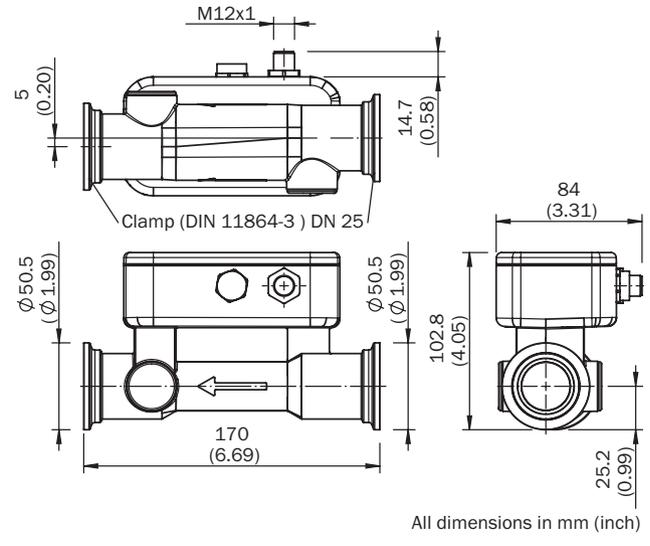
14.7 (0.58)

Clamp (DIN 11864-3 ) DN 10

Ø 34 (1.34)

Ø 34 (1.34)

149 (5.87)

84 (3.31)

88.1 (3.74)

17 (0.67)

Dimensions in mm (inch)

## NW 15, Clamp (DIN 11864-3)

M12x1

5 (0.20)

14.7 (0.58)

Clamp (DIN 11864-3 ) DN 15

Ø 34 (1.34)

Ø 34 (1.34)

149 (5.87)

84 (3.31)

88.1 (3.74)

17 (0.67)

All dimensions in mm (inch)

## NW 20, Clamp (DIN 11864-3)

M12x1

5 (0.20)

14.7 (0.58)

Clamp (DIN 11864-3 ) DN 20

Ø 50.5 (1.99)

Ø 50.5 (1.99)

162 (6.34)

84 (3.31)

102.8 (4.05)

25.2 (0.99)

All dimensions in mm (inch)

## NW 25, Clamp (DIN 11864-3)

M12x1

5 (0.20)

14.7 (0.58)

Clamp (DIN 11864-3 ) DN 25

Ø 50.5 (1.99)

Ø 50.5 (1.99)

170 (6.69)

84 (3.31)

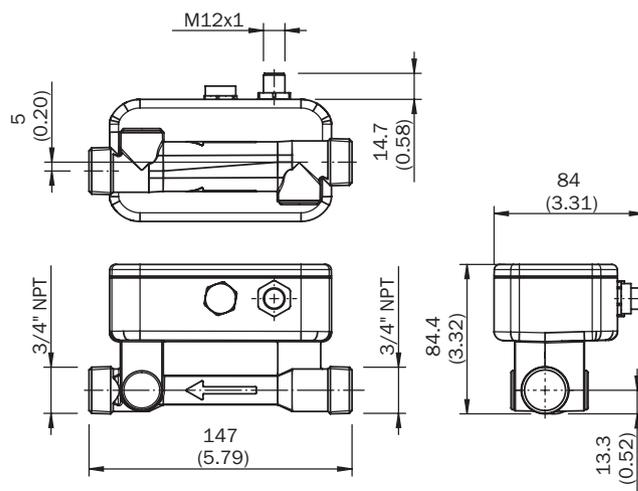102.8 (4.05)

25.2 (0.99)

All dimensions in mm (inch)
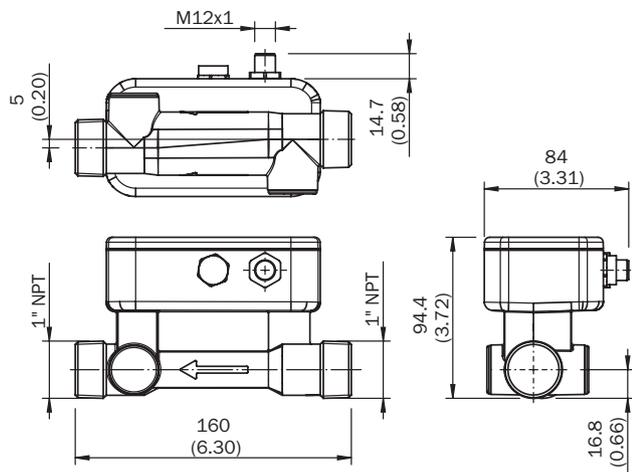
### NW 10, 1/2" NPT
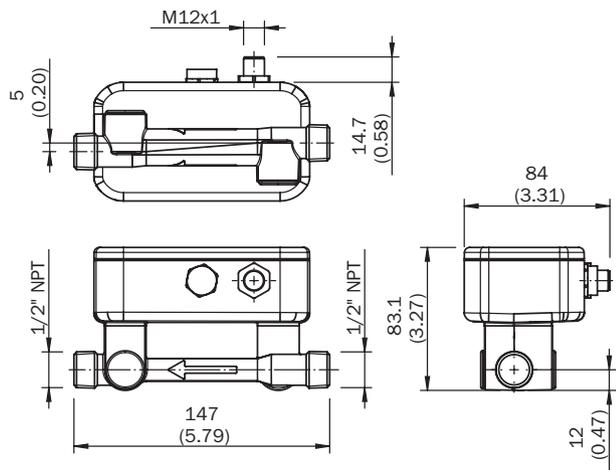


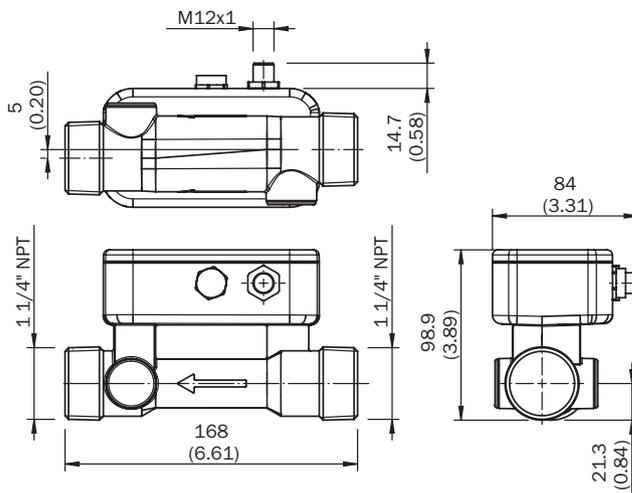All dimensions in mm (inch)

### NW 15, 3/4" NPT
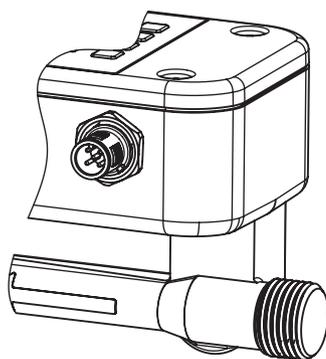


All dimensions in mm (inch)

### NW 20, 1" NPT
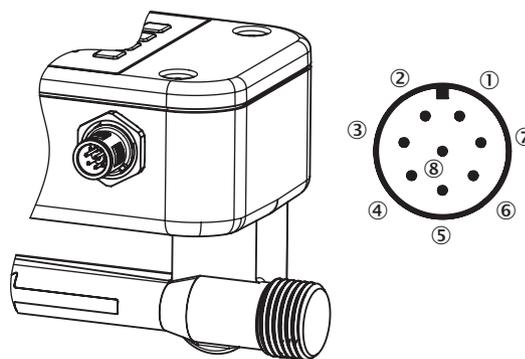


All dimensions in mm (inch)

### 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 QₐA: Analog current output

① L⁺: Supply voltage
② Q₁: Digital output PNP/NPN
③ M: Ground
④ Q₂: Digital output PNP/NPN
⑤ QₐA: Analog current output
⑥ C: Communication
⑦ I₁: Digital input
⑧ Shield

## Recommended accessories

### Plug connectors and cables

| 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 |

## Operation

| Select parameter or change values by using the arrow keys |
| --- |

Set: Save settings

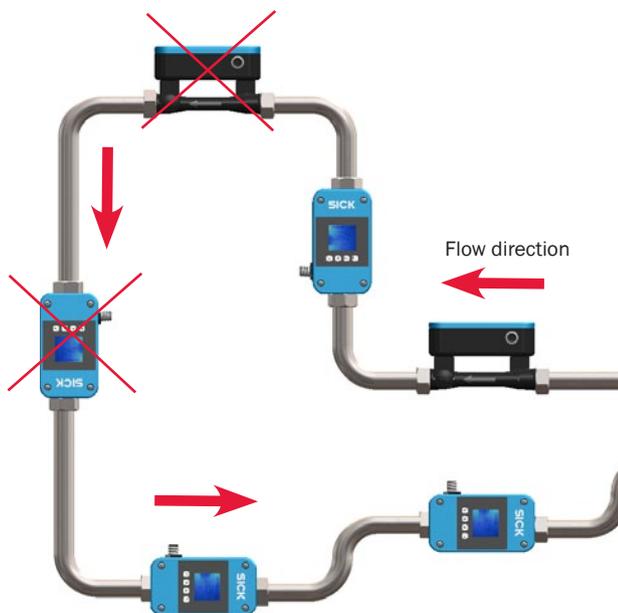Esc: Leaving current selection level / menu item

Display information:
- Current flow value in l/min
- Volume in l
- Bar graph with percentage value of current measurement range
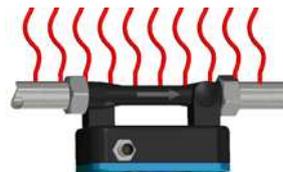
Setting of:
- Analog output
- Pulse output
- Status output
- Measurement unit
- Creeping flow
- Medium calibration

## Mounting instructions



Flow direction

Tube has to be fully filled

In applications where the flowmeter is exposed to high temperatures (t ≥ 60 °C), the device should be mounted upside down:

Correct positioning



False positioning



### 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 |

## Notes

Worldwide presence with
subsidiaries in the following
countries:

**Australia**
**Belgium/Luxembourg**
**Brasil**
**Ceská Republika**
**China**
**Danmark**
**Deutschland**
**España**
**France**
**Great Britain**
**India**
**Israel**
**Italia**
**Japan**
**Nederland**
**Norge**

**Österreich**
**Polska**
**Republic of Korea**
**Republika Slovenija**
**România**
**Russia**
**Schweiz**
**Singapore**
**Suomi**
**Sverige**
**Taiwan**
**Türkiye**
**United Arab Emirates**
**USA/Canada/México**

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additional representatives and agencies
in all major industrial nations at
**www.sick.com**

Handed over by:

## Our Business Segment Expertise

### Factory automation

With its intelligent sensors, safety systems, and automatic identification applications, SICK provides comprehensive solutions for factory automation.

- Non-contact detecting, counting, classifying, and positioning of any type of object
- Accident protection and personal safety using sensors, as well as safety software and services

### Logistics automation

Sensors made by SICK form the basis for automating material flows and the optimization of sorting and warehousing processes.

- Automated identification with barcode and RFID reading devices for the purpose of sorting and target control in industrial material flow
- Detecting volume, position, and contours of objects and surroundings with laser measurement systems

### Process automation

Optimized system solutions from SICK ensure efficient acquisition of environmental and process data in many industrial processes.

- Precise measurement of gases, liquids and dust concentrations for continuous monitoring of emissions and the acquisition of process data in production processes
- Gas flow measurements with maximum accuracy thanks to compact gas meters

**SICK**
Sensor Intelligence.

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