

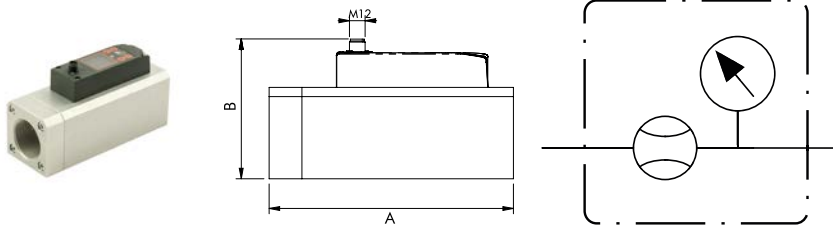
# Flowmeter

»FLUX« series

**MAX**

Art. No. 148213

Type No. 9000993610



Exemplary illustration

Thermal flowmeters of the »FLUX« series are the ideal solution for monitoring changes in flow and consumption, as well as for measuring leaks and energy efficiency. All flowmeters come with an M12 connection for power supply and signal management plus an analogue output that can be set to either voltage or current. For best results, use a straight pipe with a constant cross section and a minimum length according to the table (see data sheet). If straight piping is not installed, the accuracy may vary from what is stated.

They are available in two main versions: with or without built-in display.

The versions with display provide an intuitive user interface for several real-time information, including:

- flow rate, pressure and temperature
- graphs showing instant and cumulative quantities
- power consumption to generate the measured flow

The wireless versions can communicate, through the dedicated „Metal Work FluxUP“ app, both with Ethernet networks (via the MQTT protocol) and with mobile devices via Bluetooth®. In addition to displaying the measured values in real time, this app can be used to change all flowmeter settings and display the relevant data.

»FLUX« of sizes 1 and 2 can be mounted on »SYNTESI« maintenance units of sizes 1 and 2. If the device is fitted with a Syntesi® filter, the SYN filter parameter must be enabled in the system menu to guarantee the stated accuracy (function available only for the version with display). If the »SYNTESI« is fitted at the outlet of the »FLUX«, the straight pipe on the inlet side must still be guaranteed. »FLUX« of sizes 3 and 4 are installed directly in the pipes. Due to their size and weight, they are not intended for direct installation on maintenance units.

## Technical data

|                                                   |                                               |
|---------------------------------------------------|-----------------------------------------------|
| Series                                            | FLUX                                          |
| Size                                              | 3                                             |
| Version                                           | IO-Link                                       |
| Analogue output                                   | without                                       |
| Display                                           | with                                          |
| Thread                                            | G 1 1/2 IT                                    |
| Electrical connection                             | M12 male connector, 5-pin                     |
| Medium                                            | unlubricated compressed air and neutral gases |
| Required purity class in accordance w. ISO 8573-1 | 4.7.3                                         |
| Operating pressure                                | 0 - 10 bar                                    |

## Technical data

|                         |                                                            |
|-------------------------|------------------------------------------------------------|
| Flow measuring range    | 0 NI/min to 8000 NI/min                                    |
| Temperature range       | 0 to 50 °C                                                 |
| Digital output          | an allocated bit                                           |
| Hysteresis              | adjustable                                                 |
| Supply voltage range    | 15 to 27 V DC (with IO-Link Master)                        |
| Operating voltage       | 15 - 27 V DC                                               |
| Max. admissible voltage | 32 V DC*                                                   |
| Current consumption     | 80 mA at 24 V DC                                           |
| Pressure sensor         | with                                                       |
| Function                | flowmeter, flow switch, pressure gauge/switch, thermometer |
| Measured values output  | via cable and display                                      |
| WiFi                    | without                                                    |
| Compatible with app     | no                                                         |
| Housing                 | aluminium                                                  |
| Flow direction          | unidirectional                                             |
| Measuring system        | thermal                                                    |
| Protection IP           | IP 65                                                      |
| A                       | 187.0 mm                                                   |
| B                       | 107.0 mm                                                   |

Before appliance  $\geq 300$  mm straight section, after appliance  $\geq 100$ mm. A 5  $\mu$ m filter and a 0.01  $\mu$ m oil purifier are recommended.

\*IMPORTANT! Voltage greater than 32 V DC will damage the system irreparably.

## Commercial data

|                         |                            |
|-------------------------|----------------------------|
| Customs tariff number   | 90261021                   |
| Country of origin       | IT                         |
| eCl@ss 5.1.4            | 27200490                   |
| eCl@ss 9.0              | 27200490                   |
| UNSPSC_Code_v190501     | 20121904                   |
| UNSPSC_CodeDesc_v190501 | Flow measurement equipment |

## Material informations

|                            |                         |
|----------------------------|-------------------------|
| REACH SVHC1 substance name | lead                    |
| CAS no. SVHC 1             | 7439-92-1               |
| RoHS materials notice      | RoHS compliant          |
| REACH Info                 | contains SVHC substance |

## FLOWMETER SERIES FLUX

The flowmeters in the FLUX series are the ideal solution for measuring the flow rate of compressed air in pneumatic systems.

Made of an anodised aluminium body from 1/2" to 2" threaded ports, they can measure flow rates of up to 15,000 NI/min.

Available in two main versions: with or without built-in display.

The version with display provides an intuitive user interface for real-time several information, including:

- flow rate, pressure and temperature;
- graphs showing instant and cumulative quantities;
- power consumption to generate the measured flow.

This version also integrates a pressure/temperature transducer that uses an advanced software algorithm to minimise measurement error within the operating range.

All flowmeters come have an M12 connector for power supply and signal management plus an analogue output that can be set to either voltage or current; the models with display also feature a configurable digital output (on the flow rate, pressure or total consumption).

They can be powered with variable voltage ranging from 12VDC to 24VDC and act as either a flowmeter and flow switch; additionally,

the display versions can be used as either a pressure gauge or pressure switch. Internal air channels are designed to ensure an accurate flow rate reading at all times without creating any pressure drop between the instrument inlet and outlet.

The wireless versions can communicate with Ethernet networks (via MQTT protocol) and mobile devices (smartphones and tablets) via Bluetooth®, through the dedicated App "Metal Work FluxUP". In addition to displaying measured values in real time, through this App, you can change all flowmeter settings and view the relevant data.



UNITS

FLOWMETER SERIES FLUX

| TECHNICAL DATA                                     |        | FLUX 1                                                | FLUX 2    | FLUX 3    | FLUX 4     |
|----------------------------------------------------|--------|-------------------------------------------------------|-----------|-----------|------------|
| Measured flow range                                | Nl/min | 0 to 2000                                             | 0 to 4000 | 0 to 8000 | 0 to 15000 |
| Fluid                                              |        | Compressed air free of any lubricants and inert gases |           |           |            |
| Fluid temperature                                  | °C     | 0 to 50                                               |           |           |            |
| Direction of flow                                  |        | Unidirectional                                        |           |           |            |
| Measuring method                                   |        | Thermal                                               |           |           |            |
| Working pressure range                             | bar    | 0 to 10                                               |           |           |            |
|                                                    | MPa    | 0 to 1                                                |           |           |            |
|                                                    | psi    | 0 to 145                                              |           |           |            |
| Pressure drop                                      |        | None                                                  |           |           |            |
| Temperature range                                  | °C     | 0 to 50                                               |           |           |            |
| Threaded ports                                     |        | 1/2"                                                  | 1"        | 1 1/2"    | 2"         |
| Degree of protection                               |        | IP65                                                  |           |           |            |
| Weight                                             | g      | 585                                                   | 705       | 1975      | 4000       |
| IO-Link supply voltage range                       | VDC    | 15 - 27 (with IO-Link Master)                         |           |           |            |
| Current consumption                                | mA     | 80 mA (at 24VDC)                                      |           |           |            |
| Power supply voltage range in the analogue version | VDC    | 12 -10% 24 +30%                                       |           |           |            |
| Maximum admissible voltage                         | VDC    | 32 ▲                                                  |           |           |            |
| Current absorption                                 | mA     | min 50 - max 120                                      |           |           |            |
| DISPLAY                                            |        |                                                       |           |           |            |
| Instant flow rate                                  | Nl/min | 0 to 2300                                             | 0 to 4600 | 0 to 8800 | 0 to 16500 |
| Cumulative flow rate                               | Nl     | 999.999.999                                           |           |           |            |
|                                                    | Nm³    | 999.999                                               |           |           |            |
|                                                    | Nft³   | 35.320.000                                            |           |           |            |
| Pressure ■                                         | bar    | 0 to 10                                               |           |           |            |
| Resolution                                         | bar    | 0.01                                                  |           |           |            |

▲ IMPORTANT! Voltage greater than 32VDC will damage the system irreparably.

■ In versions with pressure transducer.

| TECHNICAL DATA                                          | FLUX 1 | FLUX 2                                                                                          | FLUX 3 | FLUX 4 |
|---------------------------------------------------------|--------|-------------------------------------------------------------------------------------------------|--------|--------|
| <b>PRECISION ●</b>                                      |        |                                                                                                 |        |        |
| Flow rate                                               |        |                                                                                                 |        |        |
| Measuring range                                         |        | 0 to 100% of the full scale                                                                     |        |        |
| Single unit display accuracy                            |        | from 0 to 20% of the FS - better than $\pm 1\%$ of the FS                                       |        |        |
|                                                         |        | from 20% to 100% of the FS - better than $\pm 3\%$ of the FS                                    |        |        |
| Display accuracy of unit installed in an SY unit *      |        | from 0 to 20% of the FS - better than $\pm 2\%$ of the FS                                       |        |        |
|                                                         |        | from 20% to 100% of the FS - better than $\pm 6\%$ of the FS                                    |        |        |
| Repeatability                                           |        | $\pm 1\%$ of the FS                                                                             |        |        |
| Temperature characteristic                              |        |                                                                                                 |        |        |
| Version with pressure transducer                        |        | Automatic compensation of fluid temperature from 0 to 50°                                       |        |        |
|                                                         |        | Between 0 and 15°C and between 35 and 50°C $\pm 0.6\%$ of the FS every °C                       |        |        |
| Version without pressure transducer                     |        | Without compensation, between 0 and 15°C and between 35 and 50°C $\pm 1.2\%$ of the FS every °C |        |        |
| Pressure                                                |        |                                                                                                 |        |        |
| Measuring range                                         | bar    | 0 to 10                                                                                         |        |        |
| Display accuracy                                        |        | $\pm 2\%$ of the FS                                                                             |        |        |
| <b>ANALOGUE OUTPUT</b>                                  |        |                                                                                                 |        |        |
| Output signal                                           |        |                                                                                                 |        |        |
| Analogue output powered                                 |        | 0 to 10 VDC or 0 to 5 VDC (I max 20 mA)                                                         |        |        |
|                                                         |        | Output impedance about 1 k $\Omega$                                                             |        |        |
| Analogue output current                                 |        | 4 to 20 mA                                                                                      |        |        |
|                                                         |        | Max. load impedance 500 $\Omega$                                                                |        |        |
| Analogue output accuracy                                |        | $\pm 0.1\%$ of the value read                                                                   |        |        |
| <b>DIGITAL OUTPUT †</b>                                 |        |                                                                                                 |        |        |
| Maximum current                                         | mA     | n° 1 open collector output NC / NO - PNP / NPN                                                  |        |        |
| Residual voltage                                        | VDC    | 100 mA                                                                                          |        |        |
| Operating mode, if set on flow rate                     |        | 20 mV (with load)                                                                               |        |        |
| Min. accumulated volume by pulse (pulse width 100 msec) | Nl     | Level switch, Band switch, Value switch, Cyclic pulse                                           |        |        |
|                                                         | Nm³    | 10 20 30 60                                                                                     |        |        |
|                                                         | Nl/h   | 1 1 1 1                                                                                         |        |        |
|                                                         | Nl/h   | 1 1 1 2                                                                                         |        |        |
| Response mode, with pressure mode setting               |        | Level switch, Band switch                                                                       |        |        |
| Hysteresis                                              |        | Adjustable                                                                                      |        |        |
| Short-circuit protection at output                      |        | Yes                                                                                             |        |        |
| <b>DIGITAL INPUT ♦</b>                                  |        |                                                                                                 |        |        |
| Type of input                                           |        | n° 1 input for the reset of the consumption counters NO - PNP/NPN                               |        |        |
| Activation time                                         |        | Voltage 12 -10% 24 +30%                                                                         |        |        |
|                                                         |        | min 1 sec                                                                                       |        |        |

● Accuracy referred to compressed air gas, at a pressure of 5 bar and a fluid temperature of 25°C  $\pm 10^\circ\text{C}$ .

\* In order to guarantee the stated measurement accuracy and to prevent lubricant residues from damaging the measurement sensor, a filter has to be mounted at the FLUX inlet.

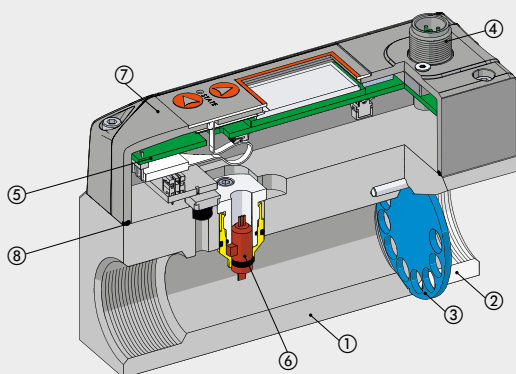
If the device is fitted with a Syntesi<sub>®</sub> filter, the SYN filter parameter must be enabled in the system menu to guarantee the stated accuracy (function available only for the version with display).

♦ Version without display: the digital input selects the type of analogue output from 0 to 10 V and 4 to 20 mA.

† Available only for version with display.

## COMPONENTS

- ① BODY: anodized aluminium
- ② INLET BUSHING: anodized aluminium
- ③ FLOW RECTIFIER DISC: passivated aluminium
- ④ CONNECTOR M12: technopolymer
- ⑤ ELECTRONIC BOARD
- ⑥ FLOW SENSOR
- ⑦ COVER: technopolymer
- ⑧ GASKETS: NBR



## WIRING DIAGRAMS

### Wiring diagram, analogue version

M12 male connector, A encoding



| Pin | Function description | Lead colour |
|-----|----------------------|-------------|
| 1   | +24VDC power supply  | Brown       |
| 2   | Digital output       | White       |
| 3   | 0VDC power supply    | Blue        |
| 4   | Digital input        | Black       |
| 5   | Analogue output      | Gray        |

### Wiring diagram, IO-Link version

M12 male connector, A encoding



Port Class A  
1 = L+  
2 = NC  
3 = L-  
4 = C/Q  
5 = NC

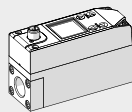
| Pin | Signal | Description of Port Class A | Lead colour |
|-----|--------|-----------------------------|-------------|
| 1   | L+     | +24VDC power supply         | Brown       |
| 2   | NC     | /                           | White       |
| 3   | L-     | 0VDC power supply           | Blue        |
| 4   | C/Q    | IO-Link communication       | Black       |
| 5   | NC     | /                           | Gray        |

## WIRELESS CONNECTION

With the Wireless versions, you can establish a connection to a Wi-Fi® network via an access point or gateway to monitor and collect all the measured gas values.

### Connection to a MQTT broker via an access point

MQTT

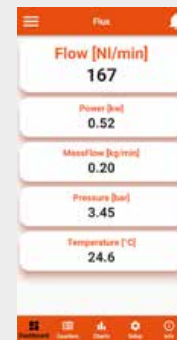


Broker MQTT



The "Metal Work FluxUp" App allows you to connect, via Bluetooth®, from Android® and iOS® smartphones, to the Metal Work flowmeters of the FLUX series, equipped with a wireless interface.

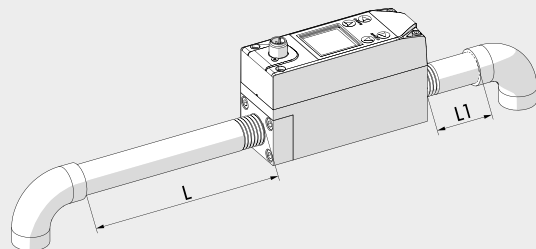
Through "Metal Work FluxUp" it is possible to view in real time all the data recorded by FLUX and set all the operating parameters.



## PNEUMATIC CONNECTION

To connect the inlet side, use a straight pipe\* with a minimum length as per the table. If straight piping is not installed, the accuracy may vary from what is stated.

\* **Straight pipe:** the pipe must be straight with a constant cross-section.



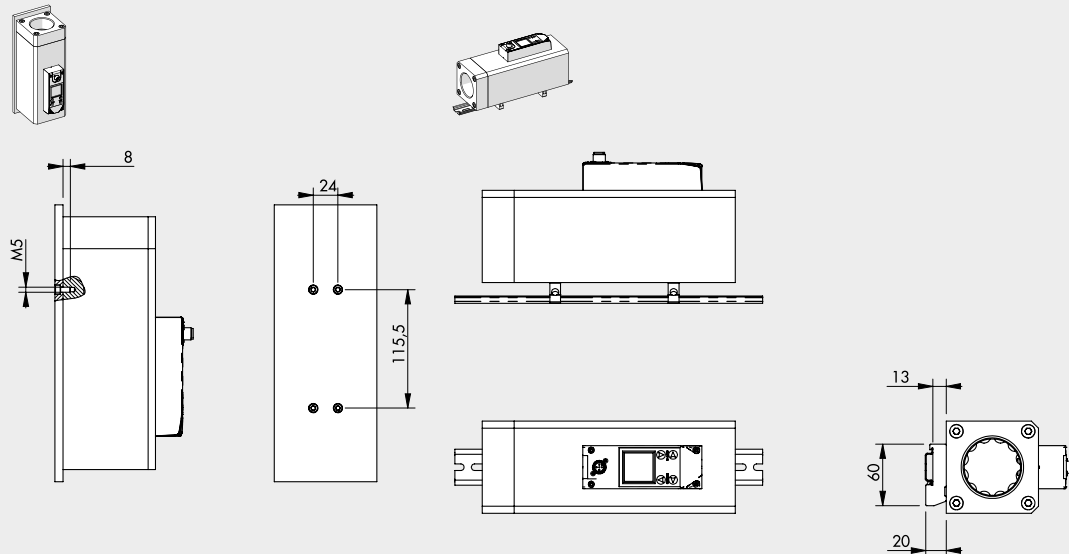
Pipe length

|        | L Inlet | L1 Outlet |
|--------|---------|-----------|
| FLUX 1 | ≥150 mm | ≥50 mm    |
| FLUX 2 | ≥200 mm | ≥50 mm    |
| FLUX 3 | ≥300 mm | ≥100 mm   |
| FLUX 4 | ≥300 mm | ≥100 mm   |

**FIXING OPTIONS**
**FLUX 1 - 2 - 3**


Wall mounting by means M5 screws.

DIN rail mounting with bracket code 900099A001, using the M5x14 screws provided.

**FLUX 4**


Wall mounting by means M5 screws.

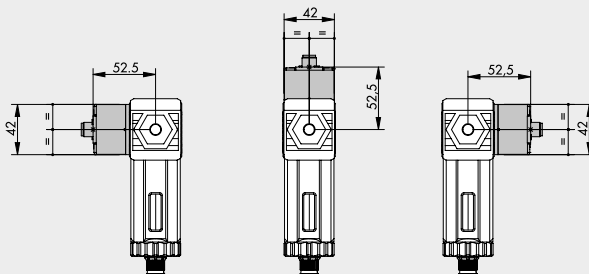
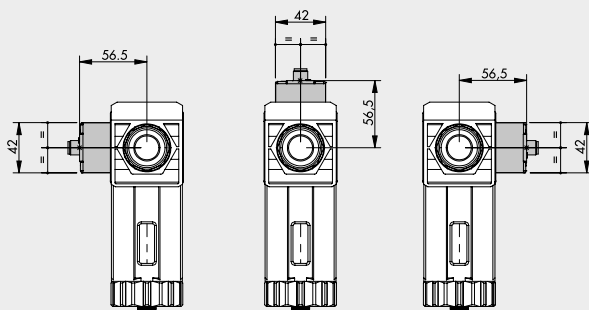
DIN rail mounting with bracket code 900099A001, using the M5x14 screws provided.

**N.B.:** For this type of fixing use n. 2 connection brackets.

**UNITS**
**FLOWMETER SERIES FLUX**

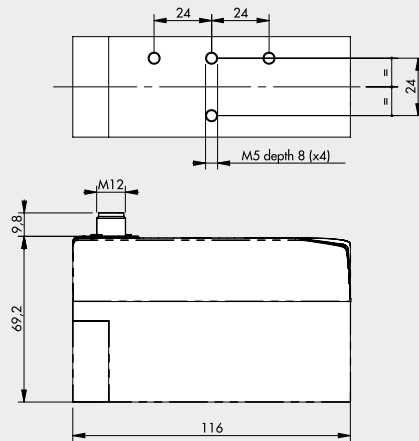
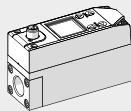
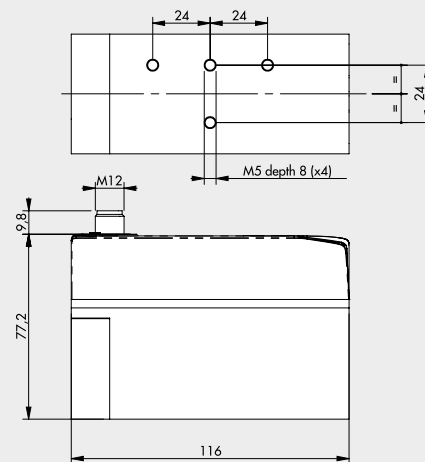
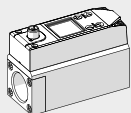
**ASSEMBLY DIAGRAM OF FLUX 1 - 2 WITH SYNTESI<sub>®</sub>**


- 1) Tighten the connection bushing on the flowmeter until it is flush (it is advisable to use sealant on the male thread of the bushing to ensure a perfect seal).
- 2) Unscrew the bushing slightly until two surfaces of the hexagon are parallel to the body of FLUX.
- 3) Insert the bushing into the Syntesi<sub>®</sub> unit.
- 4) Tighten the two self-tapping screws in the Syntesi<sub>®</sub> unit to a torque of 0.4 Nm for size 1 and torque 2.5 Nm for size 2.

**FLUX 1 + SYNTESI<sub>®</sub> 1**

**FLUX 2 + SYNTESI<sub>®</sub> 2**


**N.B.:** If the FLUX is used downstream a Syntesi<sub>®</sub> filter, fit it in one of the three positions shown in the figure.

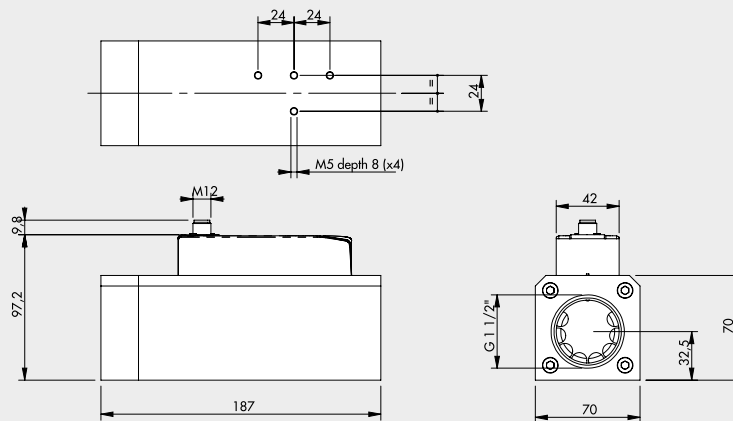
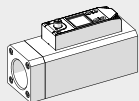
**UNITS**
**FLOWMETER SERIES FLUX**

**DIMENSIONS AND ORDERING CODES FLUX 1 - 2**
**FLUX 1**

**FLUX 2**

**UNITS**
**FLOWMETER SERIES FLUX**

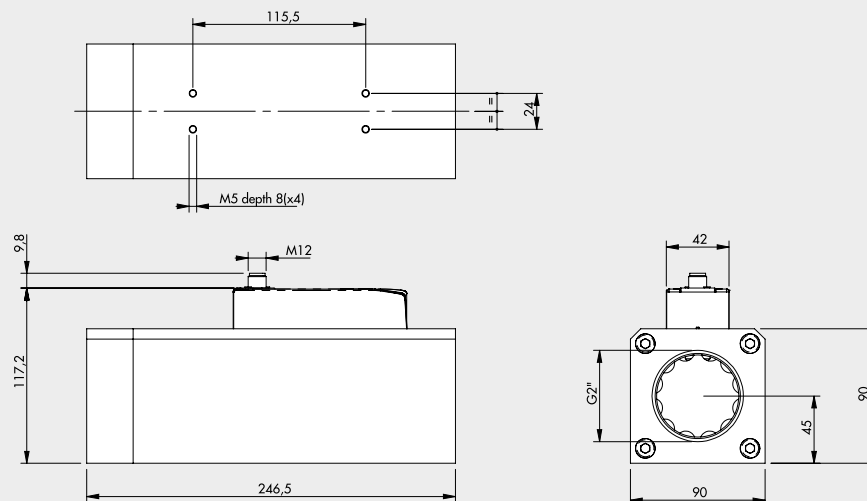
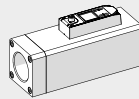
| Symbol                                                                              | Code       | Description                                                                                                 |
|-------------------------------------------------------------------------------------|------------|-------------------------------------------------------------------------------------------------------------|
|  | 9000991000 | Flowmeter FLUX 1, coupling 1/2", analog output 0-10V 4-20 mA                                                |
|                                                                                     | 9000991200 | Flowmeter FLUX 1, coupling 1/2", IO-Link                                                                    |
|                                                                                     | 9000992000 | Flowmeter FLUX 2, coupling 1", analog output 0-10V 4-20 mA                                                  |
|  | 9000992200 | Flowmeter FLUX 2, coupling 1", IO-Link                                                                      |
|                                                                                     | 9000991510 | Flowmeter FLUX 1, coupling 1/2", digital output PNP 0-10V 4-20 mA, with display and pressure sensor         |
|                                                                                     | 9000991511 | Flowmeter FLUX 1, coupling 1/2", digital output PNP 0-10V 4-20 mA, with display, pressure sensor and Wi-Fi® |
|                                                                                     | 9000991610 | Flowmeter FLUX 1, coupling 1/2", IO-Link with display and pressure sensor                                   |
|                                                                                     | 9000991611 | Flowmeter FLUX 1, coupling 1/2", IO-Link with display, pressure sensor and Wi-Fi®                           |
|                                                                                     | 9000992510 | Flowmeter FLUX 2, coupling 1", digital output PNP 0-10V 4-20 mA, with display and pressure sensor           |
|                                                                                     | 9000992511 | Flowmeter FLUX 2, coupling 1", digital output PNP 0-10V 4-20 mA, with display, pressure sensor and Wi-Fi®   |
|                                                                                     | 9000992610 | Flowmeter FLUX 2, coupling 1", IO-Link with display and pressure sensor                                     |
|                                                                                     | 9000992611 | Flowmeter FLUX 2, coupling 1", IO-Link with display, pressure sensor and Wi-Fi®                             |

# DIMENSIONS AND ORDERING CODES FLUX 3 - 4

## FLUX 3



## FLUX 4

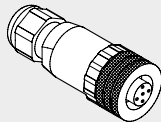


| Symbol                                                                              | Code       | Description                                                                                                   |
|-------------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------------------------------------------|
|  | 9000993000 | Flowmeter FLUX 3, coupling 1 1/2", analog output 0-10V 4-20 mA                                                |
|                                                                                     | 9000993200 | Flowmeter FLUX 3, coupling 1 1/2", IO-Link                                                                    |
|  | 9000994000 | Flowmeter FLUX 4, coupling 2", analog output 0-10V 4-20 mA                                                    |
|                                                                                     | 9000994200 | Flowmeter FLUX 4, coupling 2", IO-Link                                                                        |
|  | 9000993510 | Flowmeter FLUX 3, coupling 1 1/2", digital output PNP 0-10V 4-20 mA, with display and pressure sensor         |
|                                                                                     | 9000993511 | Flowmeter FLUX 3, coupling 1 1/2", digital output PNP 0-10V 4-20 mA, with display, pressure sensor and Wi-Fi® |
|  | 9000993610 | Flowmeter FLUX 3, coupling 1 1/2", IO-Link with display and pressure sensor                                   |
|                                                                                     | 9000993611 | Flowmeter FLUX 3, coupling 1 1/2", IO-Link with display, pressure sensor and Wi-Fi®                           |
|  | 9000994510 | Flowmeter FLUX 4, coupling 2", digital output PNP 0-10V 4-20 mA, with display and pressure sensor             |
|                                                                                     | 9000994511 | Flowmeter FLUX 4, coupling 2", digital output PNP 0-10V 4-20 mA, with display, pressure sensor and Wi-Fi®     |
|  | 9000994610 | Flowmeter FLUX 4, coupling 2", IO-Link with display and pressure sensor                                       |
|                                                                                     | 9000994611 | Flowmeter FLUX 4, coupling 2", IO-Link with display, pressure sensor and Wi-Fi®                               |



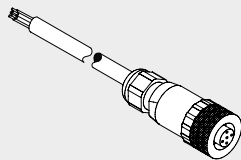
## ACCESSORIES

## STRAIGHT CONNECTOR



| Code        | Description                    |
|-------------|--------------------------------|
| W0970513001 | 5-PIN M12x1 straight connector |

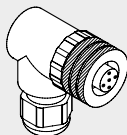
### STRAIGHT CONNECTOR WITH WIRE



| Pin | Cable color |
|-----|-------------|
| 1   | Brown       |
| 2   | White       |
| 3   | Blue        |
| 4   | Black       |
| 5   | Grey        |

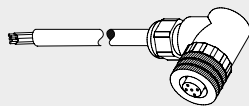
| Code        | Description                                      |
|-------------|--------------------------------------------------|
| W0970513002 | 5-PIN M12x1 straight connector with wire L = 5 m |

## 90° CONNECTOR



| Code        | Description               |
|-------------|---------------------------|
| W0970513003 | M12x1 5-PIN 90° connector |

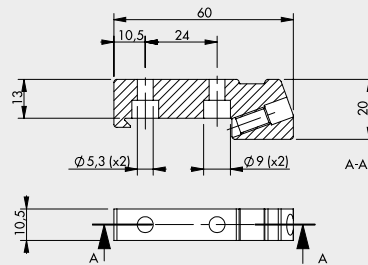
### 90° CONNECTOR WITH WIRE



| Pin | Cable color |
|-----|-------------|
| 1   | Brown       |
| 2   | White       |
| 3   | Blue        |
| 4   | Black       |
| 5   | Grey        |

| Code        | Description                                 |
|-------------|---------------------------------------------|
| W0970513004 | M12x1 5-PIN 90° connector with wire L = 5 m |

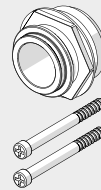
### CONNECTION BRACKETS ON THE BAR (DIN EN50022)



| Code       | Description                                |
|------------|--------------------------------------------|
| 900099A001 | Connection brackets on DIN bar, FLUX 1 - 4 |

Note: complete with 2 M5x14 screws and 1 M6 grub screw

### SY1 - SY2 KIT FOR CONNECTION



| Code       | Description          |
|------------|----------------------|
| 900099A002 | Adapter FLUX 1 - SY1 |
| 900099A003 | Adapter FLUX 2 - SY2 |

Max torque for screw, 0.4 Nm for SY1  
Max torque for screw, 2.5 Nm for SY2

## NOTES

## Accessories

|                                                                                                           | Art. No. | Type No.    |
|-----------------------------------------------------------------------------------------------------------|----------|-------------|
| Straight socket M12 x 1 mm, 5-pin, for electrical connection cable                                        | 148191   | W0970513001 |
| Electrical connection cable with straight socket and 5 m cable, 5-wire, for service unit »ONE«            | 101132   | 533.901     |
| 90° angle socket M12 x 1 mm, 5-pin, for electrical connection cable                                       | 148239   | W0970513003 |
| Electrical connection cable with 90° angle socket and 5 m cable, 5-wire, for service unit »ONE«           | 101133   | 533.902     |
| Adapter for DIN rail (EN 50022) incl. 2 M5 x 14 mm screws and 1 M6 grub screw, for series »FLUX« size 1-4 | 148236   | 900099A001  |