The sensors SEMIFLOW CO.65/xxxPI V2.0 – designed as clamp-on-sensors with flexible inlay – measure the flow rate of liquids in rigid tubes of different diameters within a few milliseconds. Industrial applications in the **semiconductor industry** are typical: use in wafer cleaning equipment, lithography equipment, mixing equipment, chemical supply systems or slurry lines. The sensors have no contact to the fluid and are suitable for all applications with strict hygienic requirements, e.g. **biotechnology, pharmaceutical industries or chemical industry.** Due to the switching output the sensors support industrial dosing applications. The RS-485 interface (SONOTEC protocol; Modbus via software settings) allows bus operation. The SEMIFLOW CO.65/xxxPI V2.0 sensors with complete built-in electronics can be installed in machines or apparatuses.

## Sensor overview and dimensions

| Type SEMIFLOW | Order number | Dimensions (L × W × H) | Fixing holes | Weight (approx.) |
|---|---|---|---|---|
| **CO.65/080PI V2.0** | 200 08 0122 | 44 × 44 × 34 mm | M4, depth 8 mm | 70 g |
| **CO.65/120PI V2.0** | 200 08 0123 | 44 × 44 × 38 mm | | 80 g |
| **CO.65/160PI V2.0** | 200 08 0124 | 44 × 56 × 41 mm | | 100 g |
| **CO.65/190PI V2.0** | 200 08 0125 | 50 × 76 × 54 mm | M6, depth 12 mm | 190 g |
| **CO.65/260PI V2.0** | 200 08 0126 | 50 × 76 × 60 mm | | 200 g |
| **CO.65/340PI V2.0** | 200 08 0127 | 58 × 84 × 62 mm | | 240 g |
| **CO.65/500PI V2.0** | 200 08 0128 | 70 × 116 × 75 mm | M10, depth 12 mm | 460 g |
| **CO.65/630PI V2.0** | 200 08 0129 | 80 × 130 × 90 mm | | 640 g |

For dimensions of the measuring channel and for suitable tubes, please refer to next section.

## Tubing properties and dimensions of the measuring channel

**Material:** Homogeneous rigid plastic tubing (e.g. PFA, PTFE, PA, PU)
For appropriate acoustic coupling, the sensor channels are equipped with flexible inlays.
The use of the inlay is mandatory.

**NOTE!** **Sensors are factory calibrated with inlay and the listed tubing** (see next page).

| Type SEMIFLOW | Measuring channel<br>Width \| Width with inlay<br>(see also 'Technical drawings') | Standard tubing<br>Outer Ø | <br>Inner Ø |
|---|---|---|---|
| **CO.65/080PI V2.0** | 8 mm \| 5 mm | 1/4″ | 3/16″ |
| **CO.65/120PI V2.0** | 12 mm \| 8.5 mm | 3/8″ | 1/4″ |
| **CO.65/160PI V2.0** | 16 mm \| 12 mm | 1/2″ | 3/8″ |
| **CO.65/190PI V2.0** | 19.5 mm \| 17.8 mm | 3/4″ | 5/8″ |
| **CO.65/260PI V2.0** | 26 mm \| 23.4 mm | 1″ | 7/8″ |
| **CO.65/340PI V2.0** | 34 mm \| 32 mm | 1 5/16″ | 1 1/16″ |
| **CO.65/500PI V2.0** | 50 mm \| 45.4 mm | 48.8 mm | 40.8 mm |
| **CO.65/630PI V2.0** | 63 mm \| 57.4 mm | 60.32 mm | 52.5 mm |

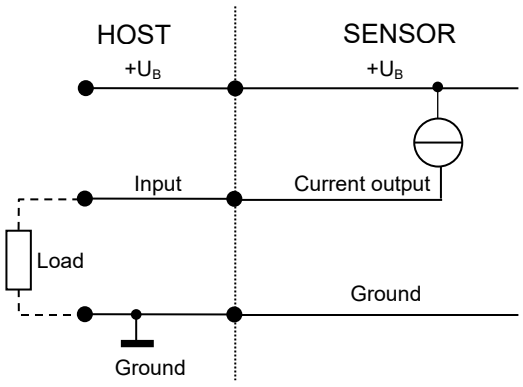
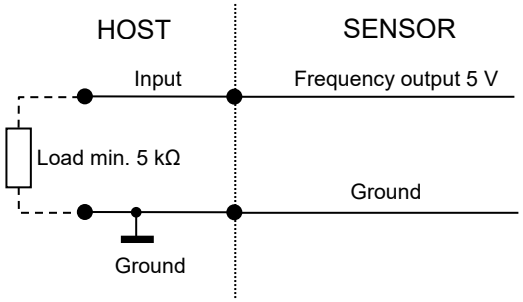
## Accuracy

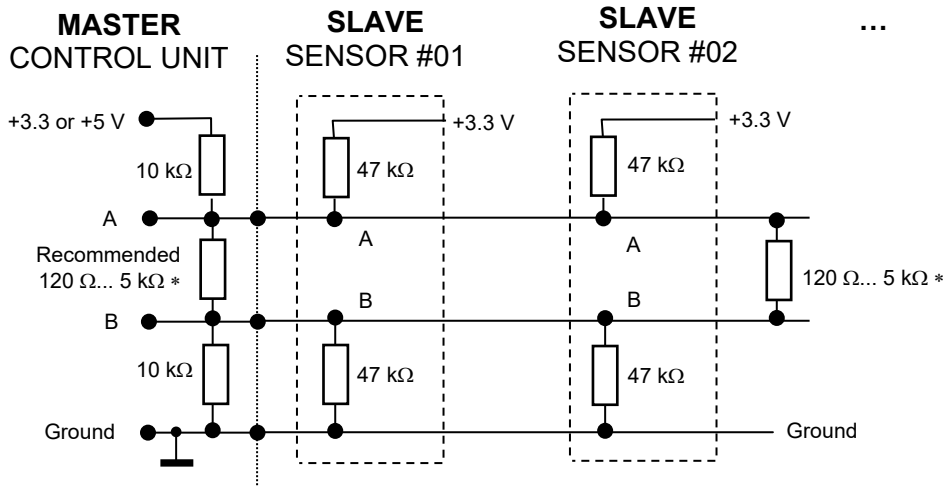
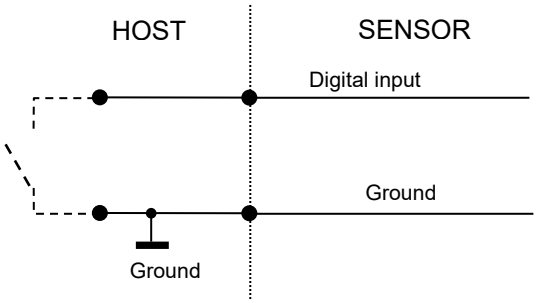
| Type SEMIFLOW | Accuracy for: water, standard flow rate, standard tubing, 23 °C ± 2 K, 0 bar | | Typical max. flow [2] | Calibrated max. flow |
|---|---|---|---|---|
| **CO.65/080PI V2.0** | < 800 ml/min:<br>± 16 ml/min | > 800 ml/min:<br>± 2 % [1] | 6 000 ml/min | 5 000 ml/min |
| **CO.65/120PI V2.0** | < 1 200 ml/min:<br>± 24 ml/min | > 1 200 ml/min:<br>± 2 % [1] | 20 000 ml/min | 10 000 ml/min |
| **CO.65/160PI V2.0** | < 1 600 ml/min:<br>± 36 ml/min | > 1 600 ml/min:<br>± 2 % [1] | 40 000 ml/min | 20 000 ml/min |
| **CO.65/190PI V2.0** | < 1 800 ml/min:<br>± 80 ml/min | > 1 800 ml/min:<br>± 2 % [1] | 60 000 ml/min | 40 000 ml/min |
| **CO.65/260PI V2.0** | < 4 000 ml/min:<br>± 140 ml/min | > 4 000 ml/min:<br>± 2 % [1] | 80 000 ml/min | 50 000 ml/min |
| **CO.65/340PI V2.0** | < 14 000 ml/min:<br>± 280 ml/min | > 14 000 ml/min:<br>± 2 % [1] | 150 000 ml/min | 150 000 ml/min |
| **CO.65/500PI V2.0** | < 16 000 ml/min:<br>± 480 ml/min | > 16 000 ml/min:<br>± 3 % [1] | 250 000 ml/min | 150 000 ml/min |
| **CO.65/630PI V2.0** | < 18 000 ml/min:<br>± 540 ml/min | > 18 000 ml/min:<br>± 3 % [1] | 290 000 ml/min | 180 000 ml/min |

Calibration of the sensors is documented in the calibration report.

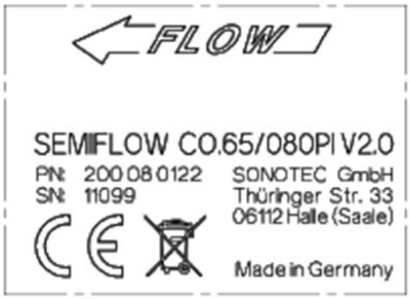
[1] [Percent] of measurement reading. | [2] Unless requested differently. Limited by tubing capacity only.

## Technical data

| Parameter | Specification |
|---|---|
| **Measuring method** | Ultrasound, two sections of measurements, dry coupling, built-in flexible inlay |
| **Calibration** | Sensors are factory calibrated for water at 23 °C ± 2 K,<br>tube end depressurized; other calibration on request |
| **Media** | Water or other acoustically transparent liquids |
| **Operating voltage** | 12 ... 30 VDC, maximum ripple 10 %, protection against reverse-polarity (external fuse, if required: min. 200 mA) |
| **Current consumption** | Maximum 50 mA (with open current, frequency and switching output depending on supply voltage) |
| **Electrical connection** | 8-pin connector, Binder 720 (m), see pin assignment, following |
| **Shielding** | ⚠ Required: Shield of cable must be connected on side of machine |
| **Interfaces** | • Current output for flow rate: 0/4 … 20 mA<br>• Frequency output for flow rate: 0 … 20 kHz, 5 V digital<br>• RS-485 interface: bus-capable (SONOTEC protocol, optional Modbus)<br>• Switching output: configurable as PNP / NPN / Push-Pull, 0 … 30 V<br>• Digital input |
| **Current output for flow rate** | ⚠ **NOTE:** Load to GND. The max. load depends on the operating voltage: 12 V → 250 Ω, 15 V → 500 Ω, 24 V → 1 kΩ, 30 V → 1.2 kΩ<br>  |
| **Frequency output for flow rate** |  |

| | |
|---|---|
| **RS-485 interface** | SONOTEC protocol: Half-duplex operation / 115.200 baud / 8 data bit / no parity / 1 stop bit / no handshaking (Modbus via software settings)<br>⚠ **NOTE:** Description of serial protocol upon request.<br>Recommended electrical connection of the RS-485 interface.<br>⚠ **CAUTION!** If the interface is not used, the pins A and B shall remain open.<br>  <br>* According to bus standard: depending on number of sensors and cable length |
| **RS-485 bus operation** | The sensor supports bus operation with max. 12 devices (SONOTEC protocol). The default address is #01.<br>⚠ **NOTE:** The address can be changed with the help of the SEMIFLOW Monitor. Permitted are addresses from #01 … #12. |
| **Switching output** | PNP / NPN / Push-Pull, 0 … 30 V, maximum 100 mA, configurable for applications such as<br>• Adapting batch process (dosing)<br>• Threshold switch of flow<br>• Slow pulses of volume (max. 20 Hz) |
| **Digital input** | Freely configurable. For applications such as:<br>• Zero point calibration of flow<br>• Start dosing processes<br>Voltage resistant up to 30 V<br>  |

| | | |
|---|---|---|
| **Media temperature**<br><br>(depending on ambient temperature) | **Sensors CO.65/080PI V2.0 … CO.65/340PI V2.0** | |
| | 0 ... 90 °C | @ 0 … 25 °C ambient temperature |
| | 0 ... 60 °C | @ 0 … 60 °C ambient temperature |
| | **Sensors CO.65/500PI V2.0 \| CO.65/630PI V2.0** | |
| | 0 ... 60 °C | |
| **Storage temperature** (all sensors) | -20 ... +70 °C | |
| **Degree of protection** | IP65 (in mated condition) | |
| **Sensor materials** | Channel: PMMA black \| Inlay: silicone rubber (others on request) \| Housing and cover: PP-H gray similar to RAL7032 (pebble gray) \| Potting: PU \| Cover screws: PA natural \| Connector: PA black \| Pins: brass | |
| **Labeling** | Sensor front: Flow direction, sensor type, product number (order number), serial number, DM code (product No.), CE marking, manufacturer \| Cover: Sensor type | |

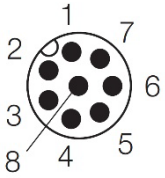


| | |
|---|---|
| **Directives and standards** | • EMC directive 2014/30/EU<br>• RoHS: 2011/65/EU, exception: III 7cl/ IV 15, RoHS (EU) 2015/863<br>• Acoustic emission: IEC 61157 |
| **Maintenance** | Maintenance-free |

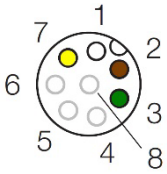
| | |
|---|---|
| **Scope of supply** | SEMIFLOW according to specification (including cover and screws), user documentation |
| **Optional accessories** | Software: Adjusting parameters, recording measurement data, updating the sensor software (2 variants) |
| | SEMIFLOW Monitor software set (all interfaces) consisting of<br>• USB data converter, type 013<br>• Connecting cable, 5 m, Binder 720 (f), 8-pole \| open end, 8 wires<br>• Switching power supply, 12 V, incl. international plug adapters<br>• USB cable, A – B, 2 m<br>• Flow Monitor software package (incl. driver for Windows)<br>• User documentation<br><br>SEMIFLOW Monitor software set portable (for serial communication and digital input) consisting of<br>• USB data converter, type 023<br>• Connecting cable, 5 m, Binder 720 (f), 8-pole \| M12 (m), 8-pin<br>• Flow Monitor software package (incl. driver for Windows)<br>• User documentation |
| | Remote Display RD.10 including connecting cable for<br>• Monitoring sensor performance (display e.g. current flow rate, volume or measuring state)<br>• Zero calibration<br>• Manual volume reset |
| | EtherNet/IP Gateway programmed for SONOTEC<br>• Serial communication with an EtherNet/IP-based system (e.g. PLC)<br>• Support of up to 12 sensors<br>• Pre-configured parameters and commands (library with Modbus registers for time-saving installation) |
| | Portable USB Data Converter Type 023 for<br>• Mobile operation of sensors via a standard USB power socket or power bank<br>• Triggering of functions stored for the digital sensor input (‘push button switch’) |
| | • Calibration report |

## Electrical connection

Sensor connector (8-pin) to cable connector (8 poles, cable with 4 wires):



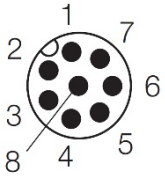

Male connector (at the sensor)



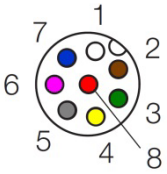

Female connector (at the cable)

| Connecting cable | Pin | Connection | Color* |
|---|---|---|---|
| **Assignment** | 1 | Ground | White |
| | 2 | Operating voltage +12 ... 30 VDC | Brown |
| | 3 | Current output (0/4 … 20 mA) | Green |
| | 4 | RS-485 B | |
| | 5 | RS-485 A | |
| | 6 | Frequency output 0 … 20 kHz | |
| | 7 | Switching output: PNP / NPN / Push-Pull | Yellow |
| | 8 | Digital input | |
| **Shield** | If available, must be connected on side of machine | | |

Sensor connector (8-pin) to cable connector (8 poles, cable with 8 wires):




Male connector (at the sensor)




Female connector (at the cable)

| Connecting cable | Pin | Connection | Color* |
|---|---|---|---|
| **Assignment** | 1 | Ground | White |
| | 2 | Operating voltage +12 ... 30 VDC | Brown |
| | 3 | Current output (0/4 … 20 mA) | Green |
| | 4 | RS-485 B | Yellow |
| | 5 | RS-485 A | Gray |
| | 6 | Frequency output 0 … 20 kHz | Pink |
| | 7 | Switching output: PNP / NPN / Push-Pull | Blue |
| | 8 | Digital input | Red |
| **Shield** | If available, must be connected on side of machine | | |

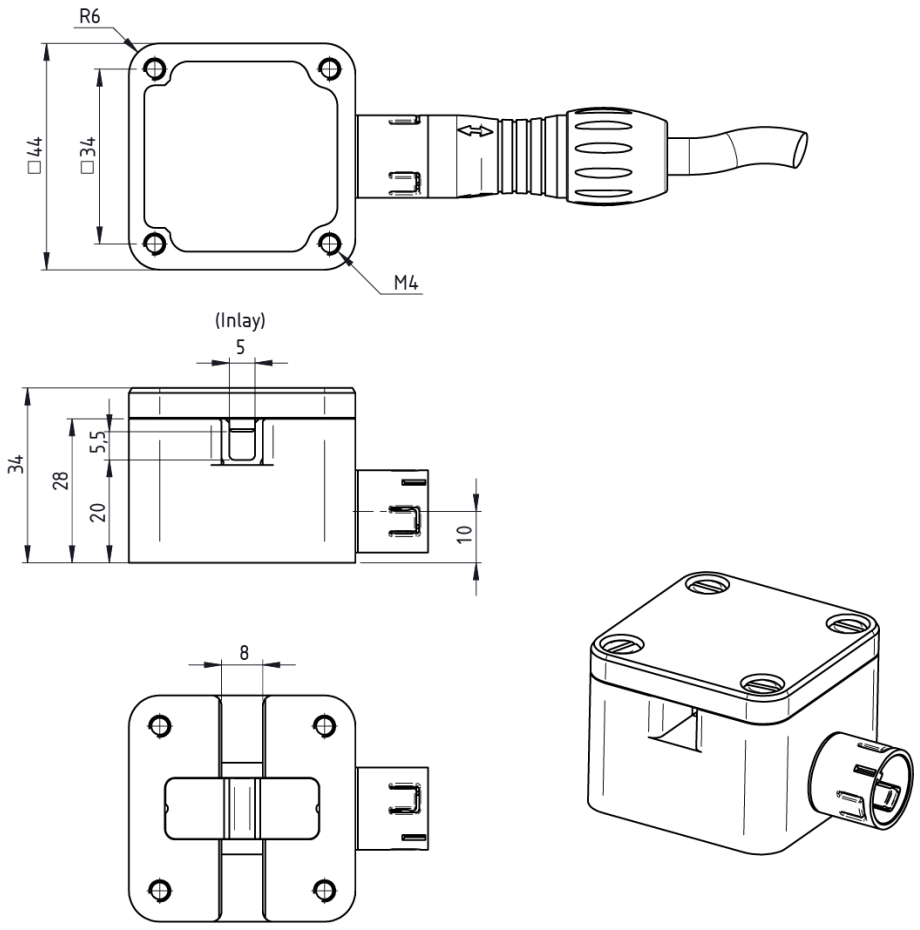
* of specified SONOTEC cable

## Technical drawings

Drawings are not to scale. Dimensions in mm, unless otherwise specified.
Projection method: ISO

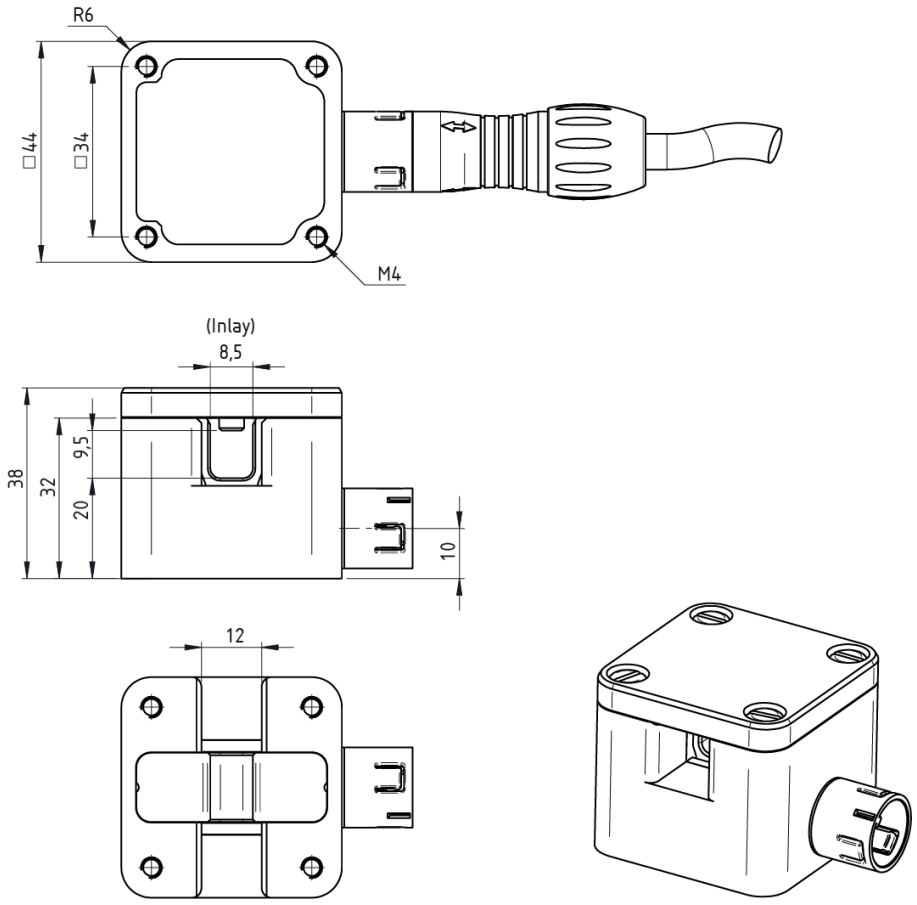
Design data (STEP files) for integration will be provided upon request. Please contact us.

### SEMIFLOW CO.65/080PI V2.0



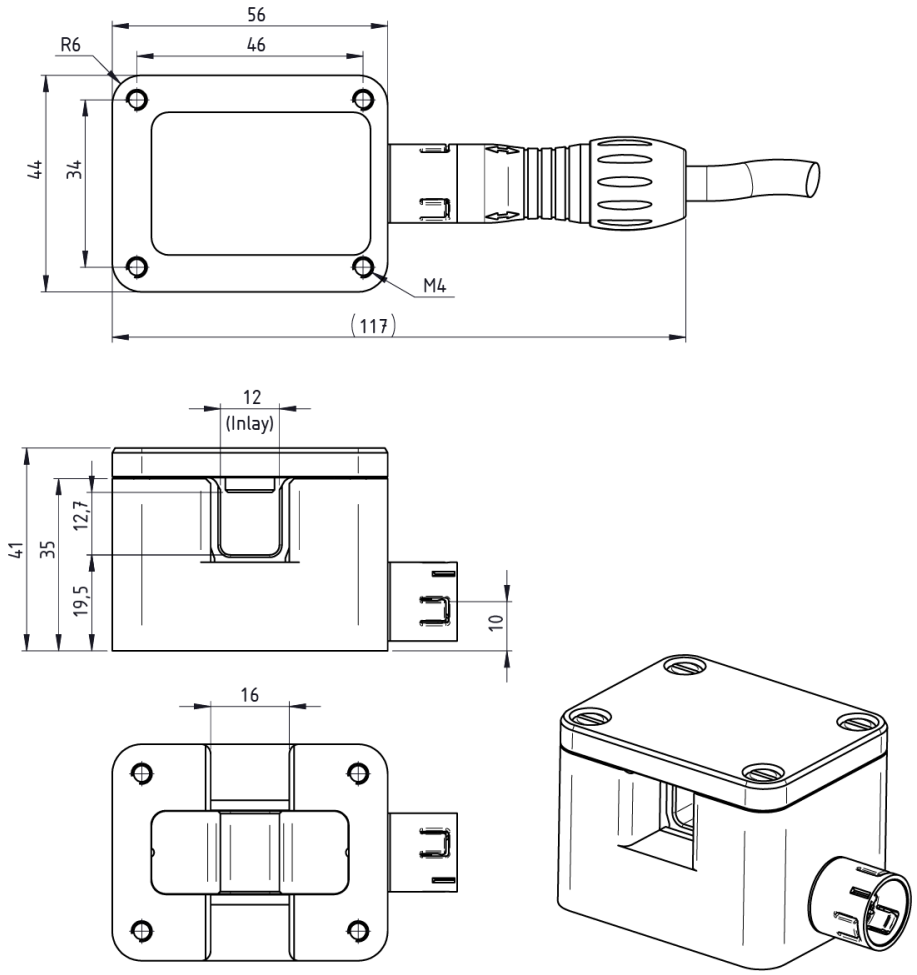

Top view without lid and screws

## SEMIFLOW CO.65/120PI V2.0



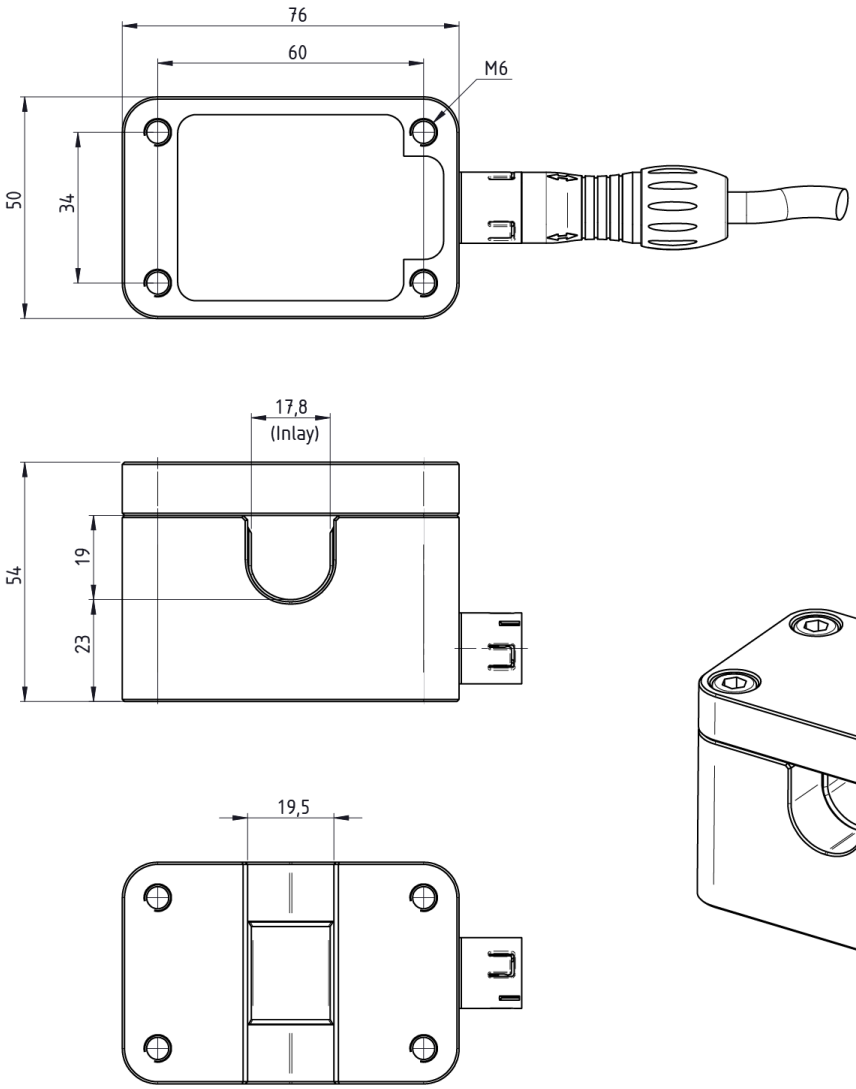

Top view without lid and screws

## SEMIFLOW CO.65/160PI V2.0



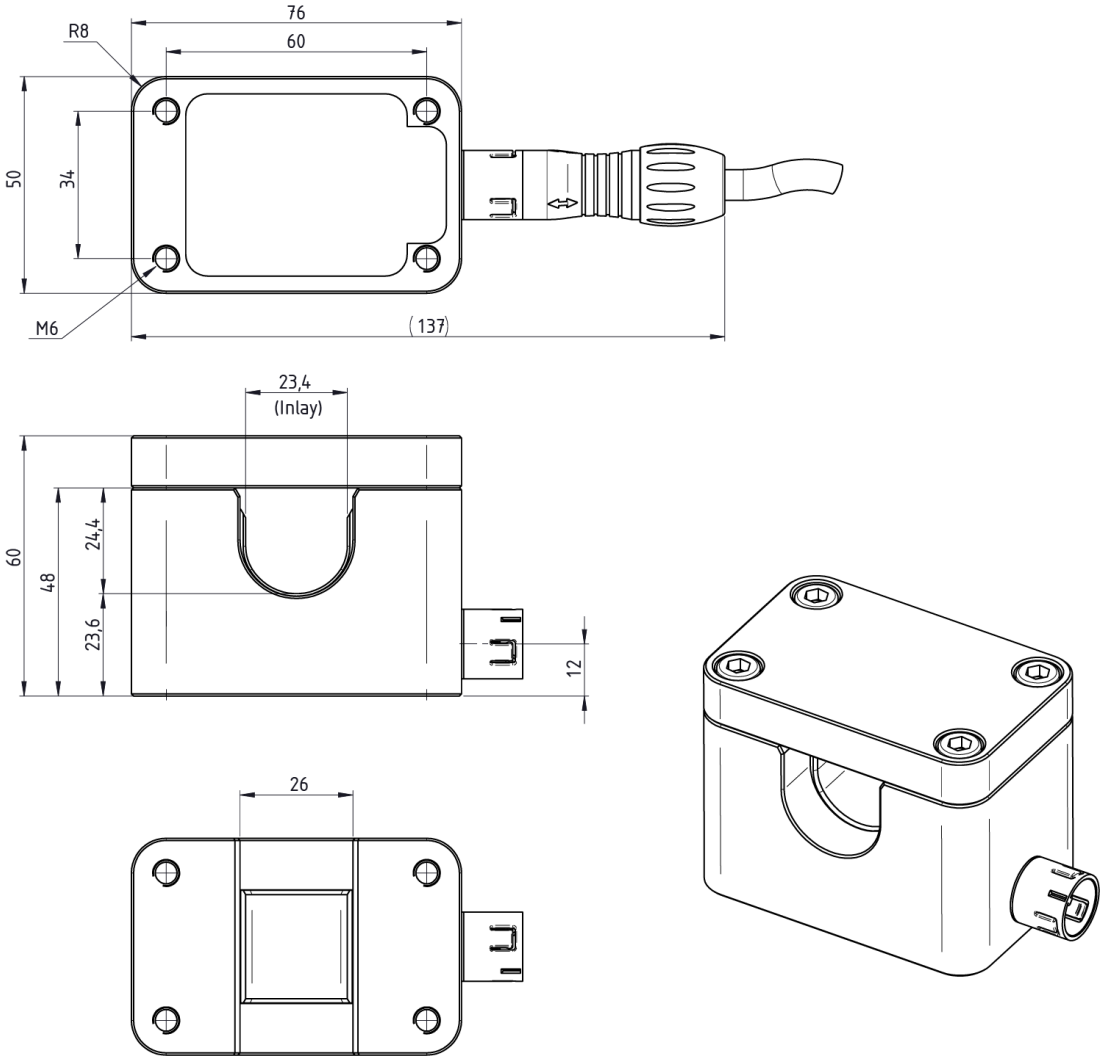

Top view without lid and screws

## SEMIFLOW CO.65/190PI V2.0



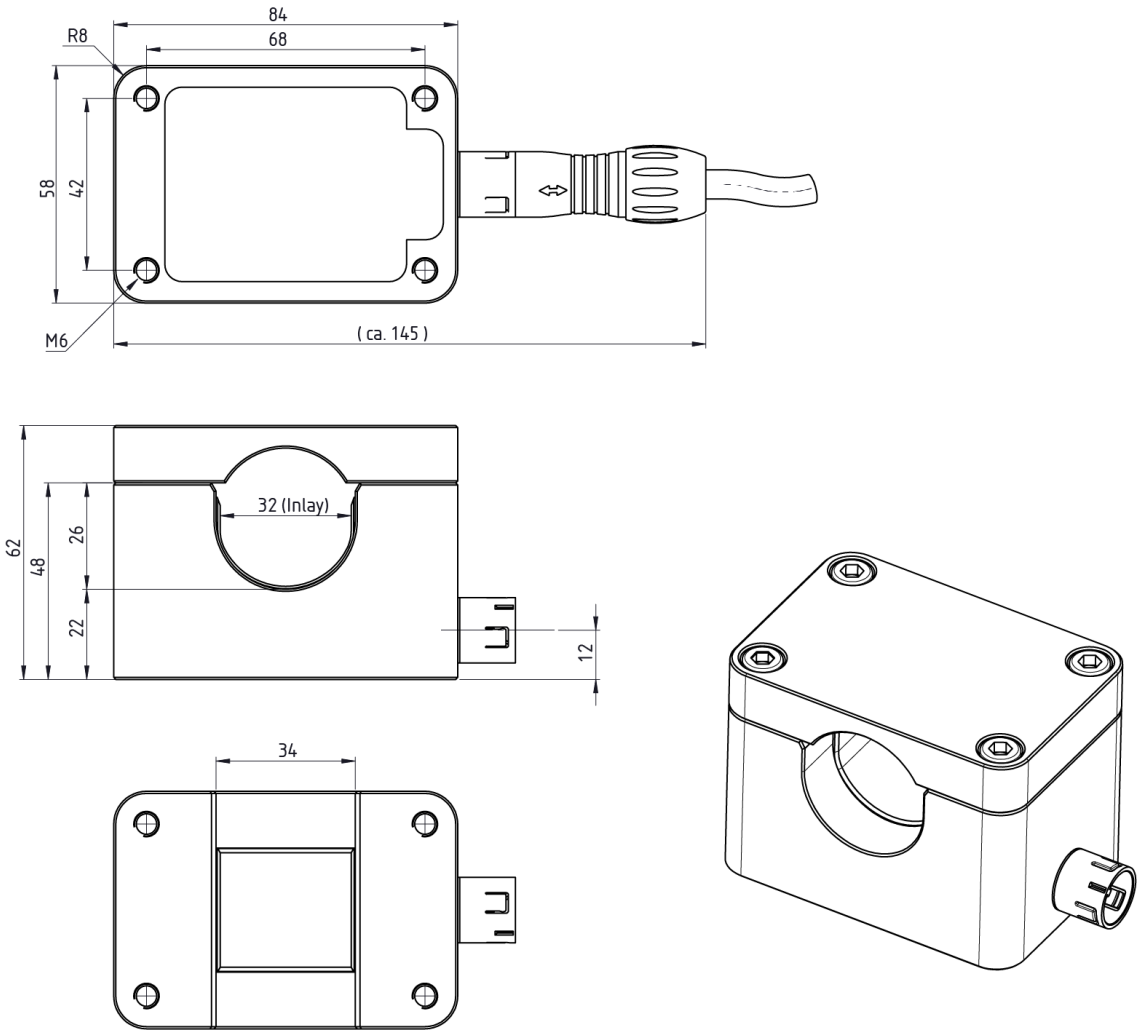

Top view without lid and screws

## SEMIFLOW CO.65/260PI V2.0



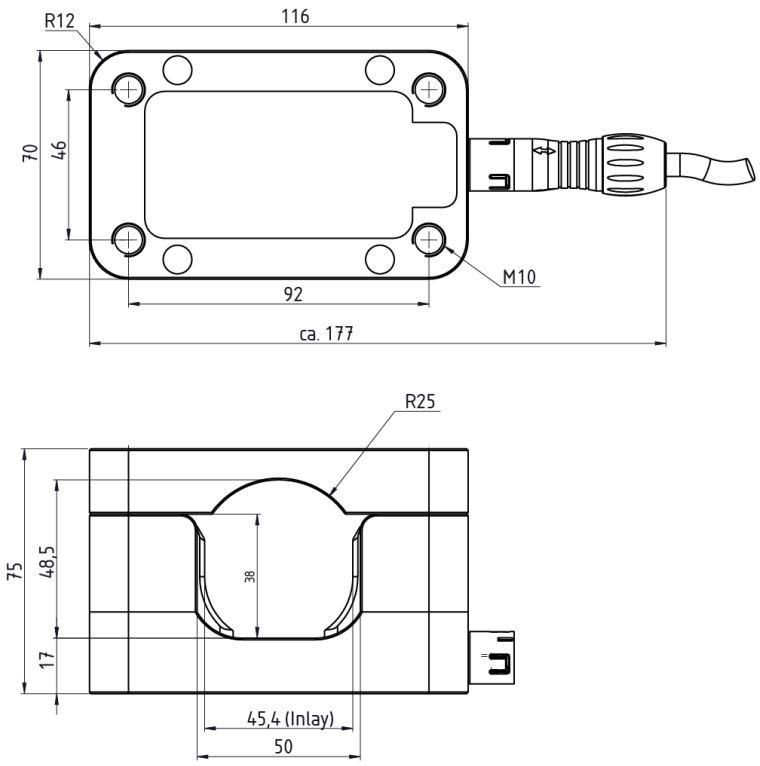

Top view without lid and screws

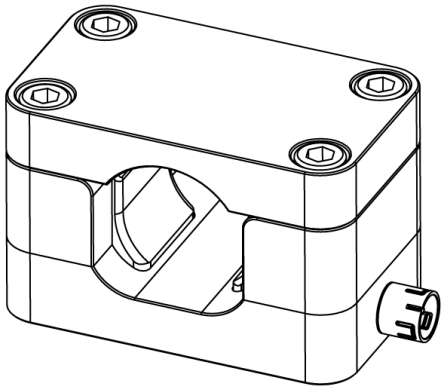
## SEMIFLOW CO.65/340PI V2.0



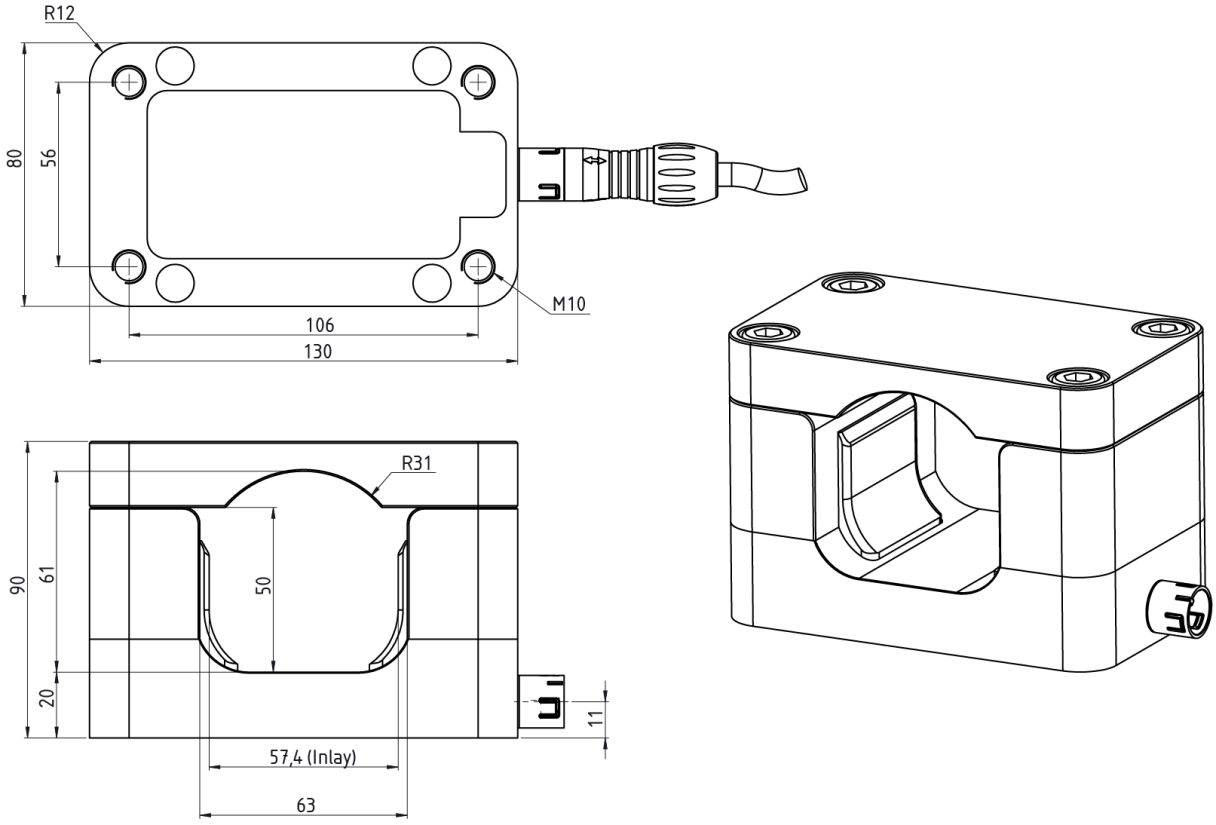

Top view without lid and screws

## SEMIFLOW CO.65/500PI V2.0



## SEMIFLOW CO.65/630PI V2.0

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