



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 Width Width with inlay (see also 'Technical drawings')	Standard tubing	
		Outer Ø	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
	< Range ± Accuracy	> Range ± Accuracy ⁽¹⁾		
CO.65/080PI V2.0	< 800 ml/min: ± 16 ml/min	> 800 ml/min: ± 2 % ⁽¹⁾	6 000 ml/min	5 000 ml/min
CO.65/120PI V2.0	< 1 200 ml/min: ± 24 ml/min	> 1 200 ml/min: ± 2 % ⁽¹⁾	20 000 ml/min	10 000 ml/min
CO.65/160PI V2.0	< 1 600 ml/min: ± 36 ml/min	> 1 600 ml/min: ± 2 % ⁽¹⁾	40 000 ml/min	20 000 ml/min
CO.65/190PI V2.0	< 1 800 ml/min: ± 80 ml/min	> 1 800 ml/min: ± 2 % ⁽¹⁾	60 000 ml/min	40 000 ml/min
CO.65/260PI V2.0	< 4 000 ml/min: ± 140 ml/min	> 4 000 ml/min: ± 2 % ⁽¹⁾	80 000 ml/min	50 000 ml/min
CO.65/340PI V2.0	< 14 000 ml/min: ± 280 ml/min	> 14 000 ml/min: ± 2 % ⁽¹⁾	150 000 ml/min	150 000 ml/min
CO.65/500PI V2.0	< 16 000 ml/min: ± 480 ml/min	> 16 000 ml/min: ± 3 % ⁽¹⁾	250 000 ml/min	150 000 ml/min
CO.65/630PI V2.0	< 18 000 ml/min: ± 540 ml/min	> 18 000 ml/min: ± 3 % ⁽¹⁾	290 000 ml/min	180 000 ml/min

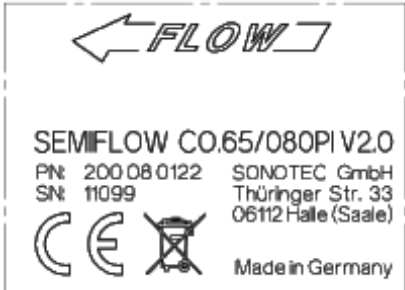

Calibration of the sensors is documented in the calibration report.

⁽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, 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	<ul style="list-style-type: none"> • Current output for flow rate: 0/4 ... 20 mA • Frequency output for flow rate: 0 ... 20 kHz, 5 V digital • RS-485 interface: bus-capable (SONOTEC protocol, optional Modbus) • Switching output: configurable as PNP / NPN / Push-Pull, 0 ... 30 V • Digital input
Current output for flow rate	<p>⚠ 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</p>
Frequency output for flow rate	

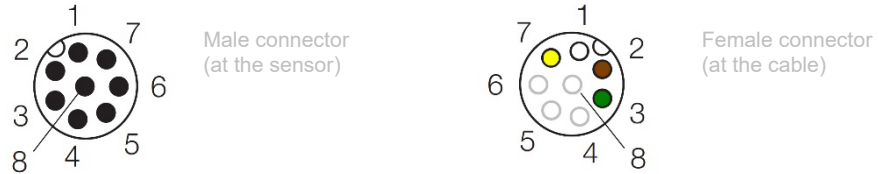
<p>RS-485 interface</p>	<p>SONOTEC protocol: Half-duplex operation / 115.200 baud / 8 data bit / no parity / 1 stop bit / no handshaking (Modbus via software settings)</p> <p>⚠ NOTE: Description of serial protocol upon request.</p> <p>Recommended electrical connection of the RS-485 interface.</p> <p>⚠ CAUTION! If the interface is not used, the pins A and B shall remain open.</p> <div style="text-align: center;"> <p>MASTER CONTROL UNIT SLAVE SENSOR #01 SLAVE SENSOR #02 ...</p> </div> <p>* According to bus standard: depending on number of sensors and cable length</p>
<p>RS-485 bus operation</p>	<p>The sensor supports bus operation with max. 12 devices (SONOTEC protocol). The default address is #01.</p> <p>⚠ NOTE: The address can be changed with the help of the SEMIFLOW Monitor. Permitted are addresses from #01 ... #12.</p>
<p>Switching output</p>	<p>PNP / NPN / Push-Pull, 0 ... 30 V, maximum 100 mA, configurable for applications such as</p> <ul style="list-style-type: none"> • Adapting batch process (dosing) • Threshold switch of flow • Slow pulses of volume (max. 20 Hz)
<p>Digital input</p>	<p>Freely configurable. For applications such as:</p> <ul style="list-style-type: none"> • Zero point calibration of flow • Start dosing processes <p>Voltage resistant up to 30 V</p> <div style="text-align: center;"> </div>

Media temperature (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	<p>Sensor front: Flow direction, sensor type, product number (order number), serial number, DM code (product No.), CE marking, manufacturer Cover: Sensor type</p>  	
Directives and standards	<ul style="list-style-type: none"> • EMC directive 2014/30/EU • RoHS: 2011/65/EU, exception: III 7cl/ IV 15, RoHS (EU) 2015/863 • 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 <ul style="list-style-type: none"> • USB data converter, type 013 • Connecting cable, 5 m, Binder 720 (f), 8-pole open end, 8 wires • Switching power supply, 12 V, incl. international plug adapters • USB cable, A – B, 2 m • Flow Monitor software package (incl. driver for Windows) • User documentation 	SEMIFLOW Monitor software set portable (for serial communication and digital input) consisting of <ul style="list-style-type: none"> • USB data converter, type 023 • Connecting cable, 5 m, Binder 720 (f), 8-pole M12 (m), 8-pin • Flow Monitor software package (incl. driver for Windows) • User documentation
	Remote Display RD.10 including connecting cable for <ul style="list-style-type: none"> • Monitoring sensor performance (display e.g. current flow rate, volume or measuring state) • Zero calibration • Manual volume reset 	
	EtherNet/IP Gateway programmed for SONOTEC <ul style="list-style-type: none"> • Serial communication with an EtherNet/IP-based system (e.g. PLC) • Support of up to 12 sensors • Pre-configured parameters and commands (library with Modbus registers for time-saving installation) 	
	Portable USB Data Converter Type 023 for <ul style="list-style-type: none"> • Mobile operation of sensors via a standard USB power socket or power bank • Triggering of functions stored for the digital sensor input ('push button switch') 	
<ul style="list-style-type: none"> • Calibration report 		

Electrical connection

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



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):



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

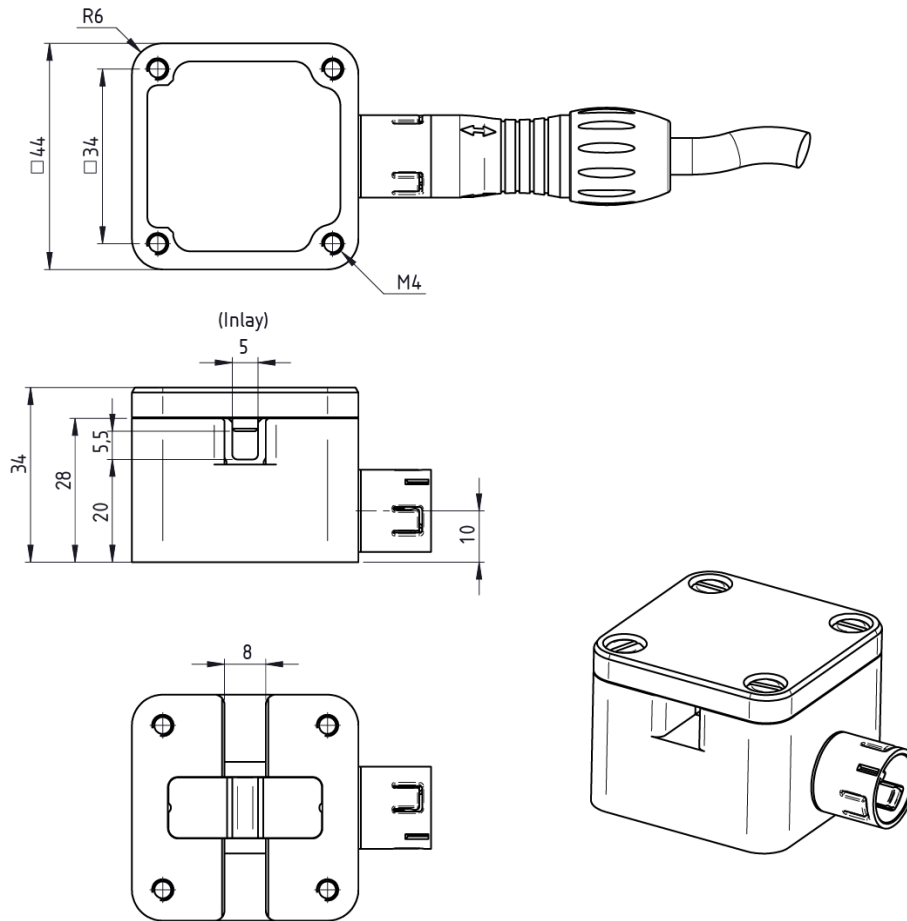
Technical drawings

Drawings are not to scale. Dimensions in mm, unless otherwise specified.

Projection method: ISO 

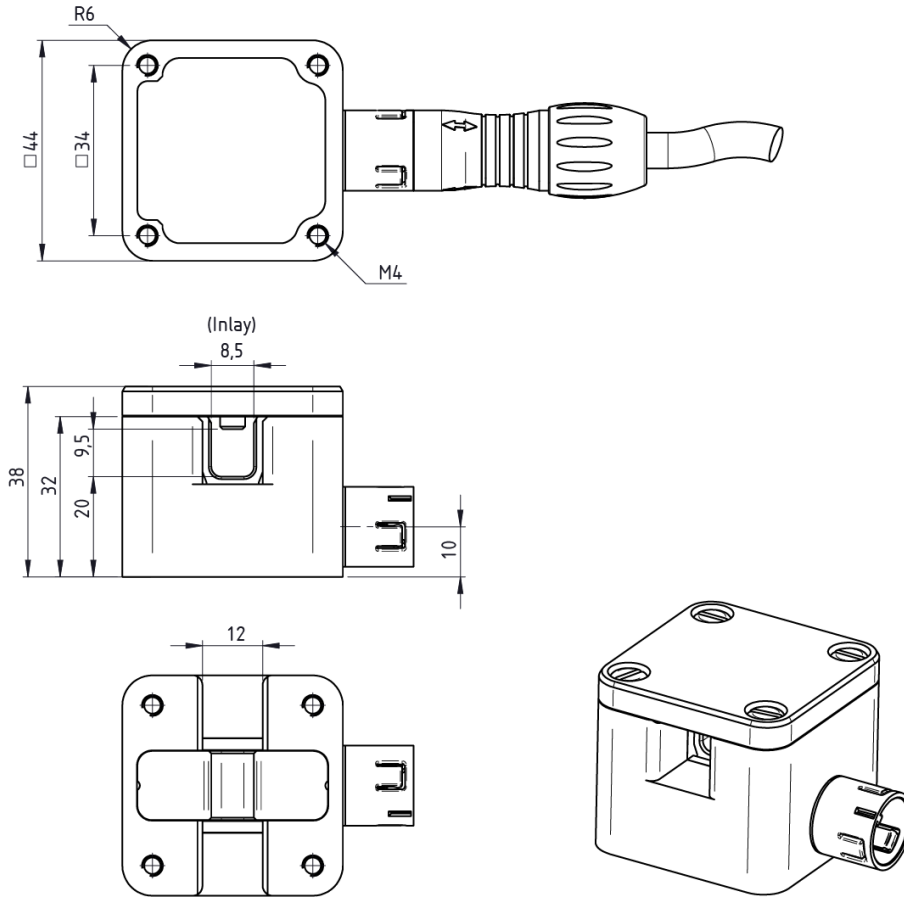
Design data (STEP files) for integration will be provided upon request. Please contact us.

SEMIFLOW CO.65/080PI V2.0



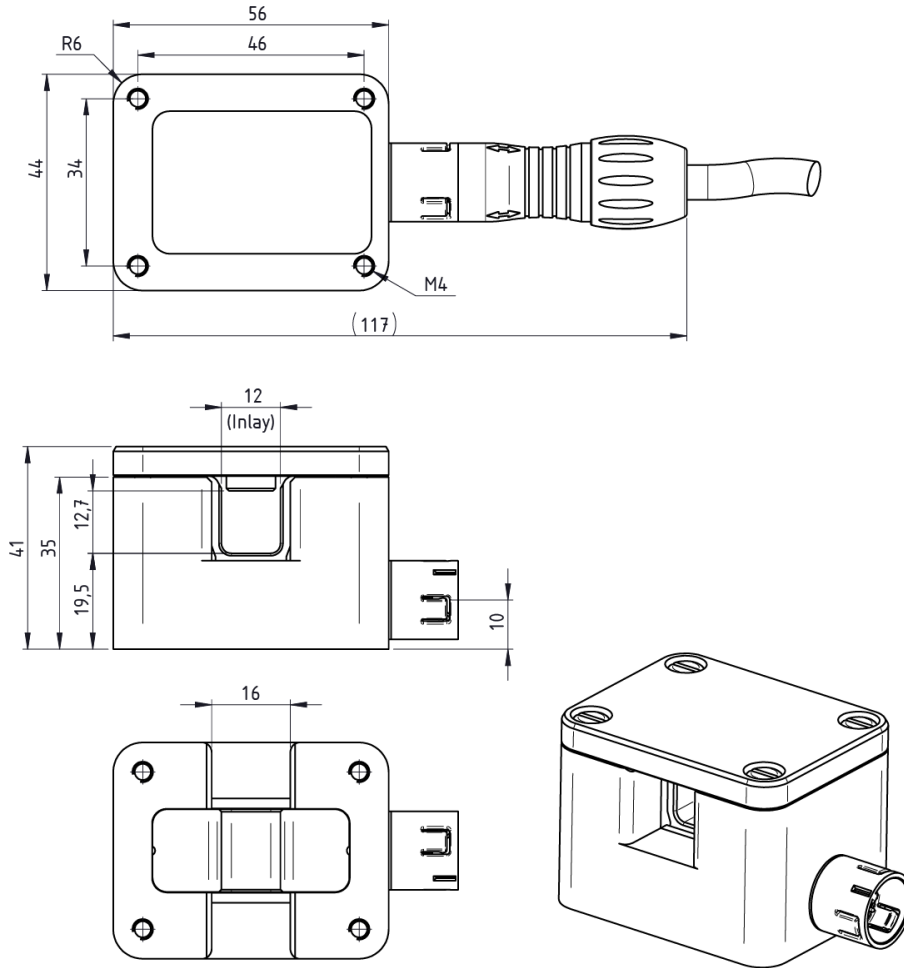
Top view without lid and screws

SEMIFLOW CO.65/120PI V2.0



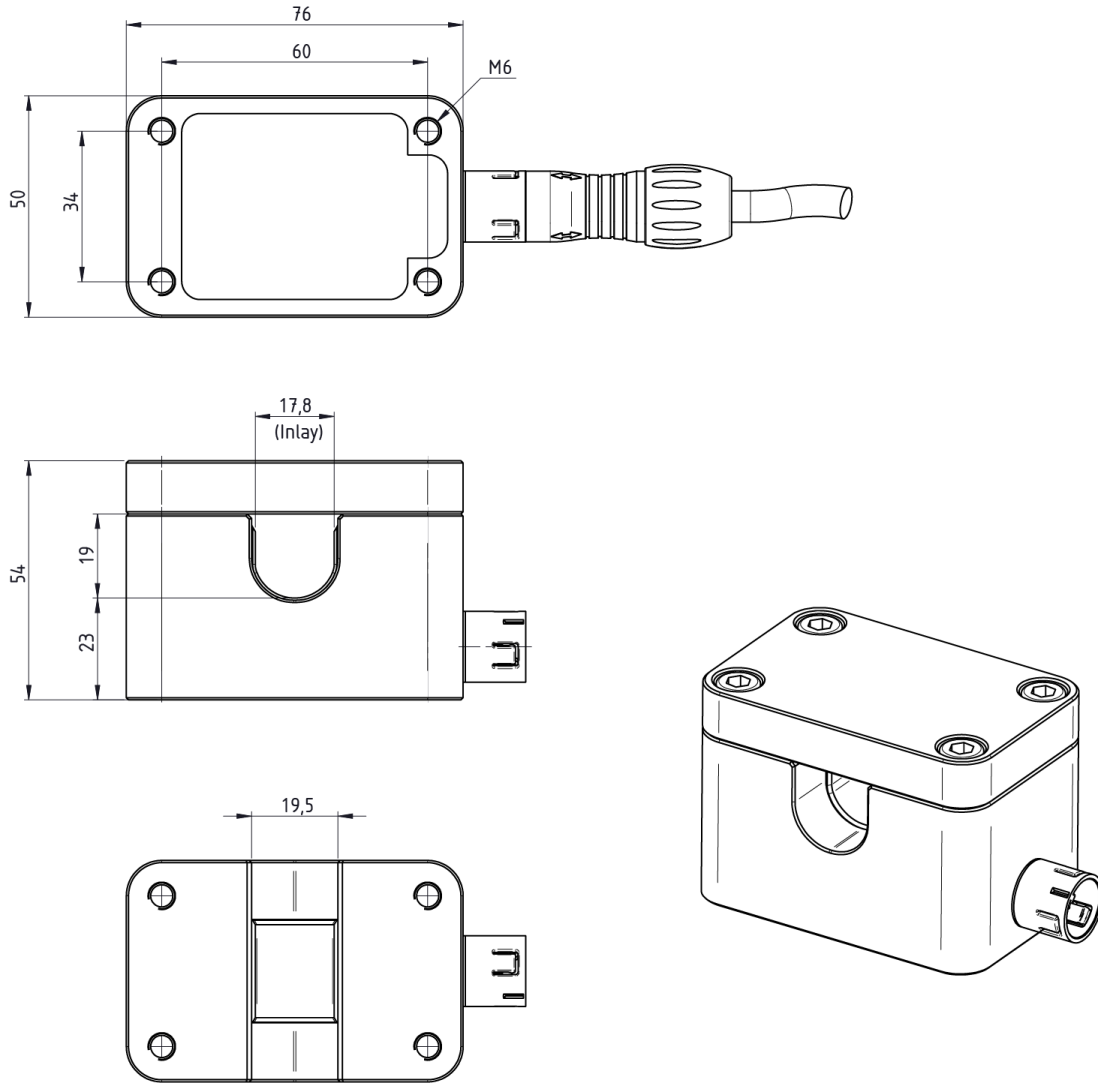
Top view without lid and screws

SEMIFLOW CO.65/160PI V2.0



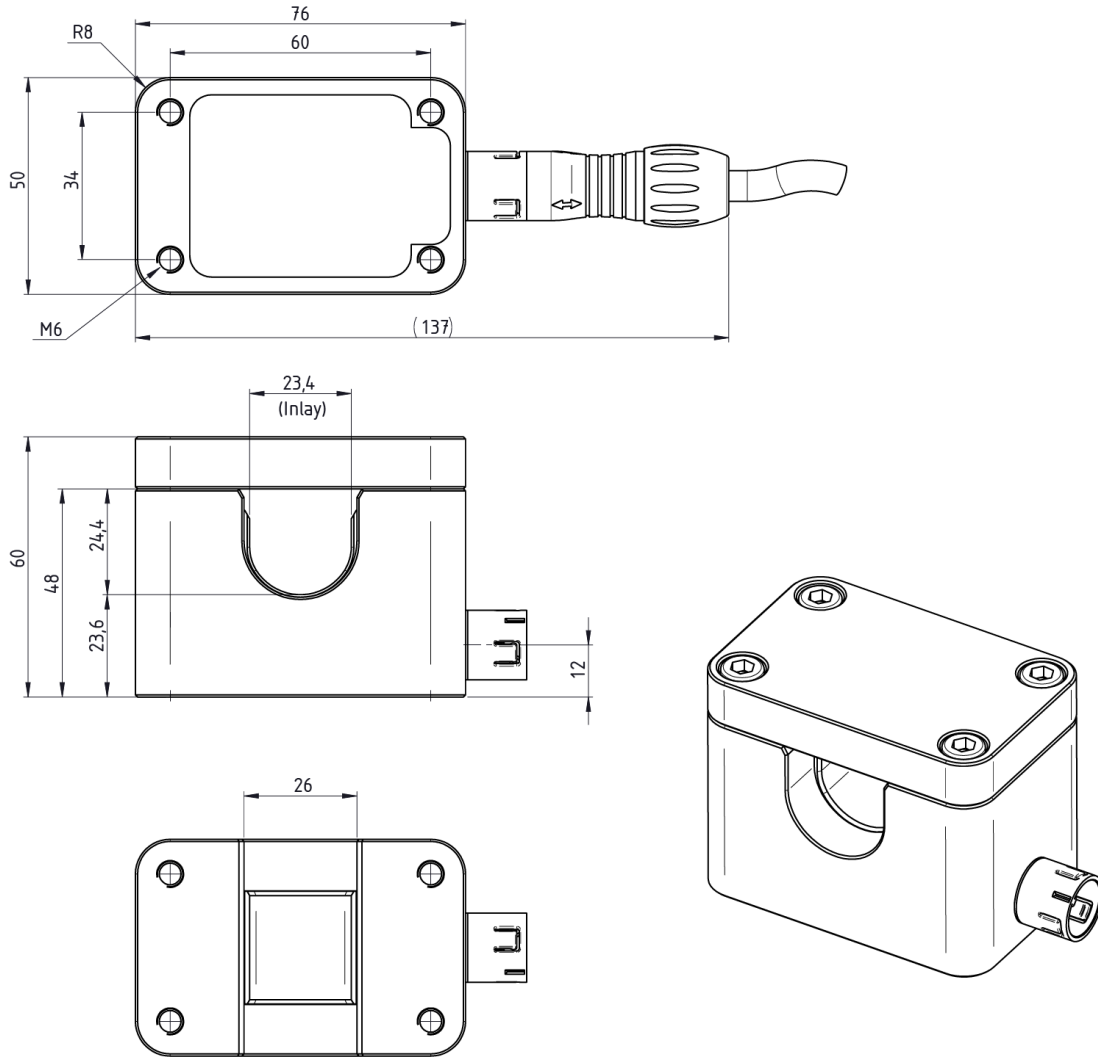
Top view without lid and screws

SEMIFLOW CO.65/190PI V2.0



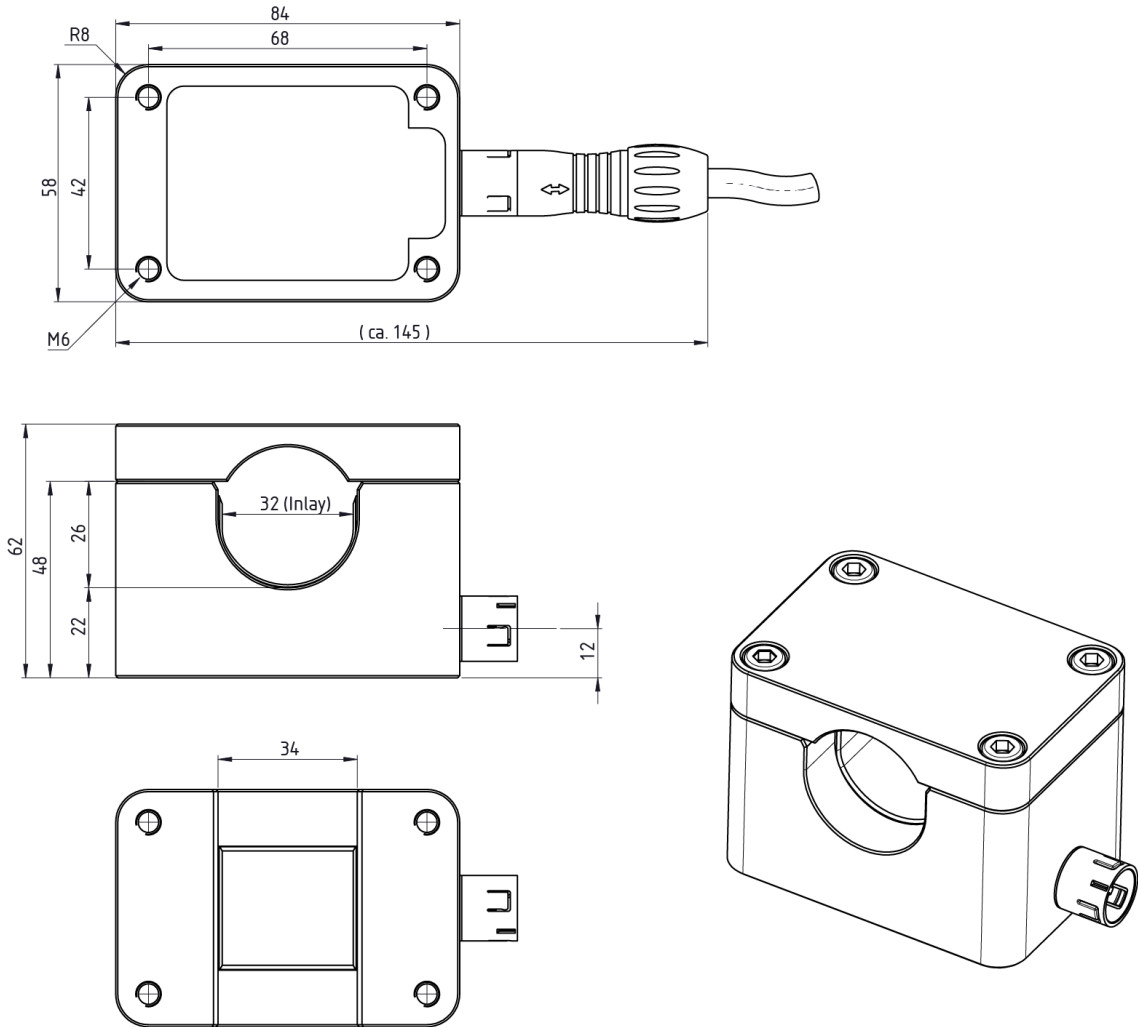
Top view without lid and screws

SEMIFLOW CO.65/260PI V2.0



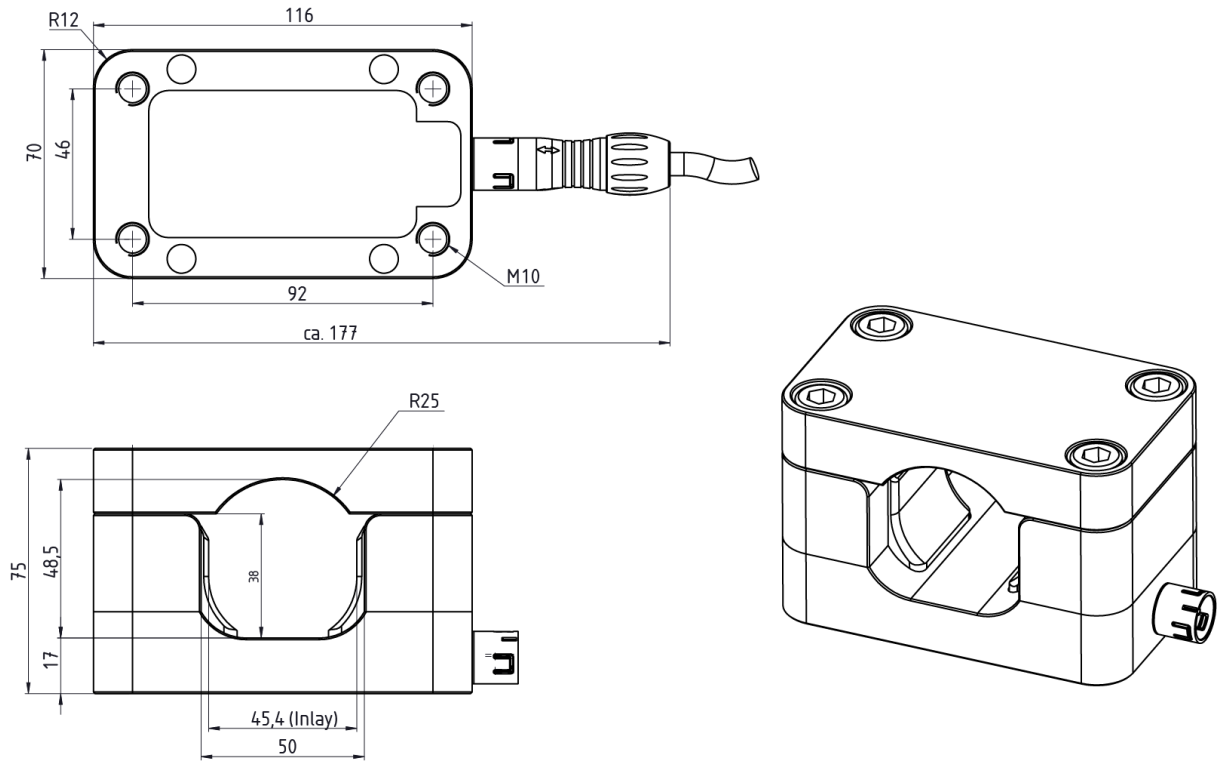
Top view without lid and screws

SEMIFLOW CO.65/340PI V2.0

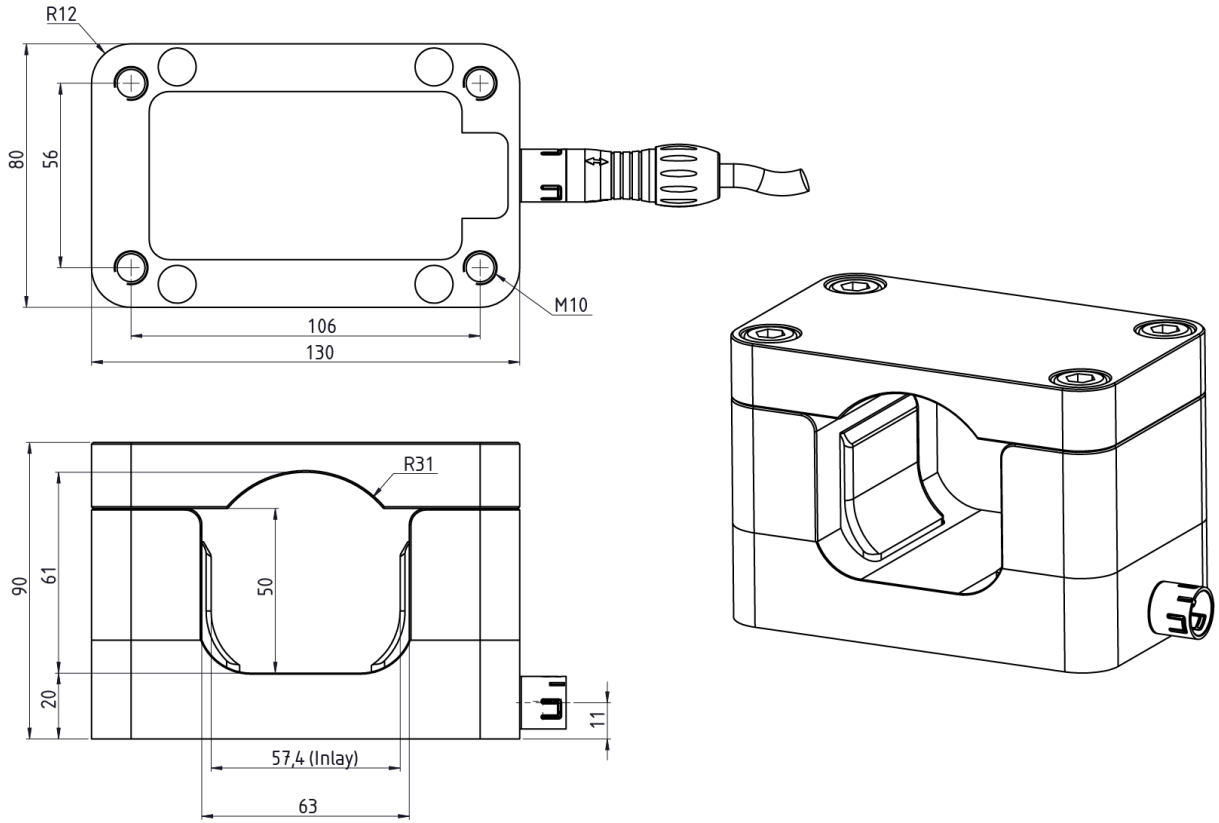


Top view without lid and screws

SEMIFLOW CO.65/500PI V2.0



SEMIFLOW CO.65/630PI V2.0



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SONOTEC is a registered trademark.

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