

The sensor series **SONOFLOW CO.56** – designed as clamp-on-sensors – detect the flow rate of liquids in plastic tubes of different diameters or materials within a few milliseconds.

With extended functionality the sensors are also applicable for the detection of air bubbles.

The sensors have no contact to the medium or product and are suitable for applications in fields with strict hygienic standards e.g. the medical technology, biotechnology and pharmaceutical industry as well as chemical and semiconductor industry. The **SONOFLOW CO.56** sensors with complete built-in electronics can be installed in machines or apparatuses.

In addition to our standard sensors, we also manufacture customer-specific solutions regarding housing materials, colors, mechanical dimensions, customized output specifications and parameter settings.

Overview sensors

Specification SONOFLOW	Order-No.	Measuring channel (□ CH = CW)	Dimensions (L x W x H)	Weight
CO.56/035	200 04 0009	3.5 mm	44 x 44 x 28 mm	120 g
CO.56/044	200 04 0010	4.4 mm	44 x 44 x 30 mm	125 g
CO.56/060	200 04 0011	6.0 mm	44 x 44 x 32 mm	130 g
CO.56/080	200 04 0012	8.0 mm	44 x 44 x 34 mm	135 g
CO.56/120	200 04 0013	12.0 mm	44 x 44 x 36 mm	140 g
CO.56/140	200 04 0014	14.0 mm	44 x 44 x 38 mm	145 g

Tubing properties

Material: PVC, Silicone, PTFE, PFA, FEP, TPE, Tygon, PE, etc.

Outer diameter: 4 mm ... 22 mm

The selection of the right sensor depends on tubing dimensions as well as on tubing properties. If possible, please provide us with a tubing sample. The sensors are also applicable for further tubing diameters, up to 2". Please note that the given OD and ID are guide values.

Sensor	Tubing OD		Tubing ID		Tubing material	Product ID of tube manufacturer
CO.56/035	4.0 mm		0.8 mm	1/32"	Silicone	PHI-031x156 *
	4.0 mm		3.0 mm		PVC ¹	3500304 ***
CO.56/044	4.8 mm	3/16"	1.6 mm	1/16"	Silicone, PVC	PHI-062x187 *
	5.0 mm		3.0 mm		PVC ¹	702101031099 **
CO.56/060	6.4 mm	1/4"	3.2 mm	1/8"	Silicone, PVC	PHI-1.6MMx6.4MM *
		1/4"		1/8"	Silicone, PVC	PHI-125x250 *
	7.0 mm		5.0 mm		PVC ¹	702101051099 **
CO.56/080	9.0 mm	3/8"	6.0 mm	3/16"	PVC ¹	702101061599 **
	9.6 mm		4.8 mm		Silicone, PVC, TPE	PHI-4.8MMx96.MM *
		3/8"		3/16"	Silicone, PVC, TPE	PHI-187x375 *
CO.56/120	14:0 mm		10:0 mm		PVC ¹	702101102050 **
CO.56/140	16.0 mm		9.6 mm		Silicone, PVC, TPE	PHI-9.6MMx16MM *
	16.0 mm		10.0 mm		PVC ¹	702101103050 **

¹ Sensors are factory calibrated with the highlighted tubing.

Calibration to all the listed tubing upon request, please inform our sales team.

Special calibration to customer specific tubing is available.

Manufacturer:

* TBL Performance Plastics, New Jersey 07871 (USA); ** ESSKA.de GmbH, 20537 Hamburg (Germany);

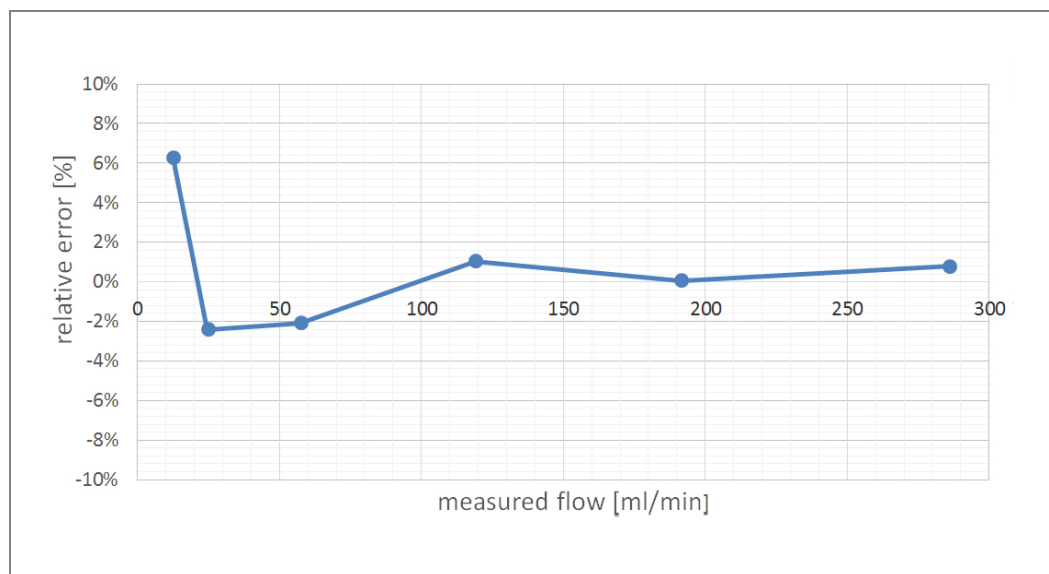
*** Deutsch & Neumann GmbH, 10585 Berlin (Germany)

Accuracy

Specification SONOFLOW	Upper range value	Accuracy for water: adjusted at 23 °C ± 2 K and 1 bar on specified tube	
CO.56/035	3 000 ml/min	0 ... 300 ml/min: ± 6 ml/min	300 ... 3 000 ml/min: ± 2 %
CO.56/044	5 000 ml/min	0 ... 500 ml/min: ± 10 ml/min	500 ... 5 000 ml/min: ± 2 %
CO.56/060	6 000 ml/min	0 ... 600 ml/min: ± 12 ml/min	600 ... 6 000 ml/min: ± 2 %
CO.56/080	8 000 ml/min	0 ... 800 ml/min: ± 16 ml/min	800 ... 8 000 ml/min: ± 2 %
CO.56/120	12 000 ml/min	0 ... 1 200 ml/min: ± 24 ml/min	1 200 ... 12 000 ml/min: ± 2 %
CO.56/140	14 000 ml/min	0 ... 1 400 ml/min: ± 28 ml/min	1 400 ... 14 000 ml/min: ± 2 %

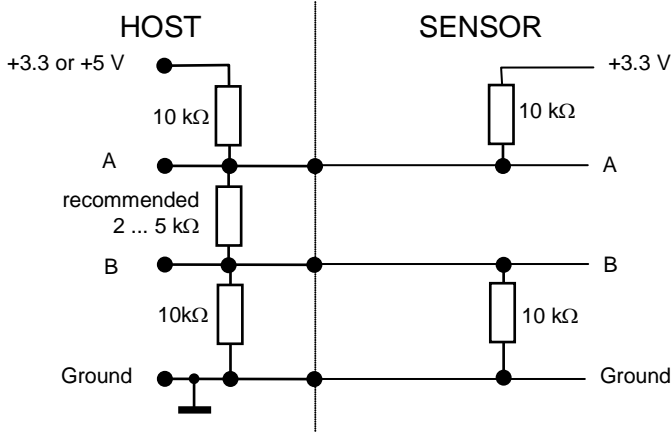
Accuracy and calibration

Example for accuracy of **SONOFLOW CO.55/035** in the lower flow range, achieved by calibration to customer specific conditions:



Accuracy depends on tubing, temperature, fluid properties and other conditions. Calibration to customer tubing, fluid, flow range, temperature, etc. on request.

Technical data

SONOFLOW CO.56 Flow Sensor for liquids	
Measuring method	Ultrasound, dry coupling, no couplant required
Calibration	Sensors are factory calibrated for water at 23 °C ± 2 K, tube end depressurized (0 bar); other calibration on request
Extended functionality	Bubble detection
Bubble sensitivity	Bubbles larger than 30 % ... 50 % of internal tube diameter are detected
Response time	< 10 ms; faster response time possible if needed
Mounting	Fixed installation: 4 fixing holes M4, 8 mm deep ⚠ NOTE: The metallic housing of sensor has to be connected to Ground of machine by means of mounting
Media	Water, human blood or other acoustically transparent liquids
Sensor materials	Measuring channel: PMMA black Housing: aluminium, anodized grey/red (optional: stainless steel, plastics)
Output (others on request)	RS485 interface, half-duplex mode, on demand mode Baud rate 115.2 kBaud, 8 data bit, 1 stop bit, no parity bit Query cycle: 20 ... 200 ms (typically)
RS485 interface	<p>Half-duplex operation / 115.200 baud / no parity / 1 stop bit / no handshaking</p> <p>⚠ NOTE: Please find the description of the serial protocol for details (upon request).</p>  <p>Recommended electrical connection of the RS 485 interface</p> <p>⚠ CAUTION! If the interface is not used, it does not necessarily has to be connected; the two pins A and B can remain open.</p>

RS485 Bus operation	<p>The sensor supports bus operation with max. 12 subscribers. The default address is #1.</p> <p>⚠ NOTE: The address can be changed with the help of the ABD Monitor. Permitted are addresses from #1 ... #12. → Menu: Identification RS485 address</p>
Operating voltage	5 VDC ±0.25 VDC
Current consumption	<p>< 150 mA</p> <p>⚠ ATTENTION: Current must be limited externally to max. 250 mA (e.g. fuse)</p>
Cable	Fixed cable, 4x open end wires, length 1 m ± 30 mm
Ambient- / Media temperature	0 ... +60 °C, other temperatures available on request
Storage temperature	-20 ... +70 °C
Protection class	IP67
Directives and standards	<ul style="list-style-type: none"> • EMC: IEC 60601-1-2:2007 • Medical safety: IEC 60601-1 3rd edition • Software developed acc. to IEC 62304:2006, class C • RoHS: 011/65/EU, exception: III 7cI/ IV 15 • Acoustic emission: IEC 61157
Maintenance	Maintenance-free
Scope of delivery	<ul style="list-style-type: none"> • SONOFLOW CO.56/xxx according to specification • User documentation
	<ul style="list-style-type: none"> • Calibration protocol <p>SONOFLOW Monitor for setting parameters, recording measurements, diagnostics and tuning consisting of</p> <ul style="list-style-type: none"> • USB Data Converter, type 012 for the connection to a computer • USB cable, type A-B, length 2 m • CD with Software SONOFLOW Monitor and driver for Windows

Electrical Connection

M12 connecting cable	Pin	Colour	Connection
Assignment	Blue		Ground
	White		RS485 / Line B
	Red		Power Supply +5 VDC
	Yellow		RS485 / Line A

Technical drawings

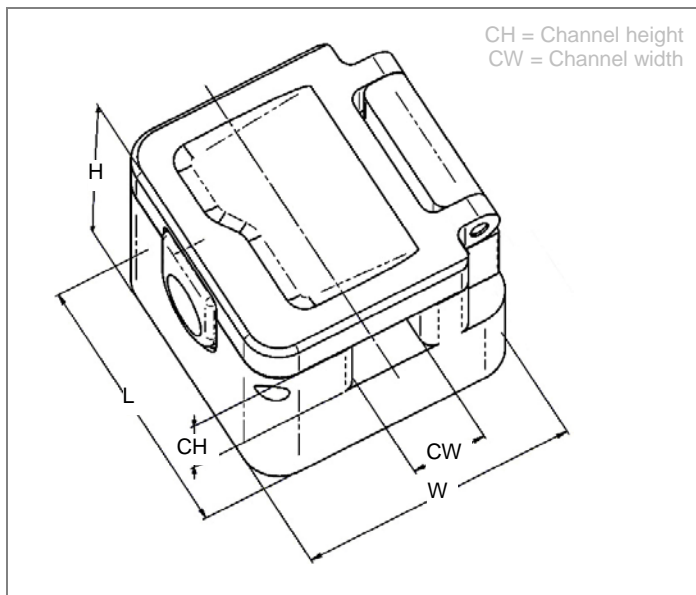


Figure 1: Dimensions SONOFLOW CO.56
(The drawings are not to scale)

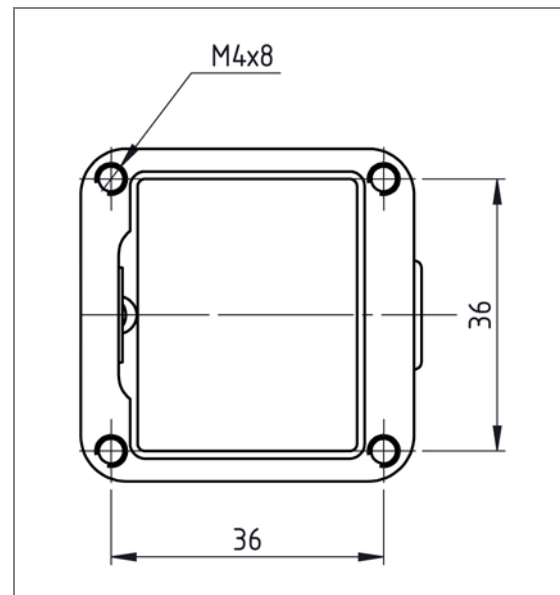


Figure 2: Rear side with drill holes for mounting

Information is subject to change without notice!

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