



The sensor series **SONOFLOW® CO.55/xxx(H) V2.0** – designed as clamp-on-sensors – detect the flow rate of liquids in plastic tubes of different diameters or materials within a few milliseconds.



For applications on tubes with large outer diameters the sensors **SONOFLOW® CO.55/xxx(H) V2.0** are equipped with a handle for an optimized handling for tube insertion.

The sensors have no contact to the medium or product and are suitable for applications in fields with strict hygienic standards. Due to the current, frequency and switching outputs industrial dosing applications can be supported. The RS485 interface (SONOTEC® protocol; MODBUS® via software settings) allows bus operation of up to 12 sensors in rough industrial environments.

The sensors **SONOFLOW® CO.55/xxx(H) V2.0** 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.	Max. flow range	Measuring channel (CH = CW)	Dimensions (L x W x H)	Weight
CO.55/035 V2.0	200 01 0292	3 000 ml/min	□ 3.5 mm	44 x 44 x 28 mm	120 g
CO.55/044 V2.0	200 08 0026	5 000 ml/min	□ 4.4 mm	44 x 44 x 30 mm	125 g
CO.55/060 V2.0	200 01 0293	6 000 ml/min	□ 6.0 mm	44 x 44 x 32 mm	130 g
CO.55/080 V2.0	200 01 0297	8 000 ml/min	□ 8.0 mm	44 x 44 x 34 mm	135 g
CO.55/100 V2.0	200 08 0006	10 000 ml/min	□ 10.0 mm	44 x 44 x 35 mm	138 g
CO.55/120 V2.0	200 08 0027	12 000 ml/min	□ 12.0 mm	44 x 44 x 36 mm	140 g
CO.55/140 V2.0	200 08 0004	14 000 ml/min	□ 14.0 mm	44 x 44 x 38 mm	145 g
CO.55/160 V2.0	200 08 0008	18 000 ml/min	□ 16.0 mm	44 x 44 x 40 mm	150 g
CO.55/190 V2.0	200 08 0007	40 000 ml/min	□ 19.0 mm	66 x 66 x 48 mm	380 g

Specification SONOFLOW® (with Handle)	Order-No.	Max. flow range	Measuring channel (CH x CW)	Dimensions L x W x H [Height without handle]	Weight
CO.55/230H V2.0	200 08 0047	50 000 ml/min	□ 23.0 mm	66 x 75 x 72 [51] mm	510 g
CO.55/260H V2.0	200 08 0049	70 000 ml/min	□ 26.0 mm	66 x 75 x 75 [54] mm	520 g
CO.55/300H V2.0	200 08 0076	100 000 ml/min	□ 30.0 mm	66 x 75 x 79 [58] mm	510 g
CO.55/340H V2.0	200 08 0050	140 000 ml/min	30.0 x 34.0 mm	66 x 75 x 79 [58] mm	510 g

Tubing properties

Material: PVC, Silicone, PTFE, PFA, FEP, TPE, Tygon, PE, etc.
Outer diameter: ≈ 4 mm ... 35 mm

	<p>Note</p> <p>The following listed tubes are examples for frequently used tubes and the given OD and ID are guiding values. The sensors are also applicable for further tubing diameters, up to 2". The selection of the right sensor depends on tubing dimensions as well as on tubing properties. If possible, provide us with a tubing sample (minimum length 50 cm).</p>
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Other materials and diameters upon request. Contact our service.

Specification SONOFLOW®	Tubing OD		Tubing ID		Wall thickness		Tubing
	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	
CO.55/035 V2.0	4.0 mm		3.0 mm		0.5 mm		PVC, Deutsch & Neumann 3500304
	3.96 mm	5/32" 0.1563"	0.79 mm	1/32" 0.031"	1.6 mm	1/16" 0.0625"	Platinum-Cured Silicone, Cole-Parmer® L/S 13, Masterflex®
CO.55/044 V2.0	5.0 mm		3.0 mm		1.0 mm		PVC, ESSKA, 702101031099
	4.76 mm	3/16" 0.1875"	1.6 mm	1/16" 0.0625"	1.6 mm	1/16" 0.0625"	Platinum-Cured Silicone, Cole-Parmer® L/S 14, Masterflex®
CO.55/060 V2.0	7.0 mm		5.0 mm		1.0 mm		PVC, ESSKA, 702101051099
	6.35 mm	1/4" 0.25"	3.18 mm	1/8" 0.125"	1.6 mm	1/16" 0.0625"	Platinum-Cured Silicone, Cole-Parmer® L/S 16, Masterflex®
CO.55/080 V2.0	9.0 mm		6.0 mm		1.5 mm		PVC, ESSKA, 702101061599
	9.53 mm	3/8" 0.375"	6.35 mm	1/4" 0.25"	1.6 mm	1/16" 0.0625"	Platinum-Cured Silicone, Cole-Parmer® L/S 17, Masterflex®
CO.55/100 V2.0	12.0 mm		9.0 mm		1.5 mm		PVC, ESSKA, 702101091550
	11.13 mm	7/16" 0.438"	6.35 mm	1/4" 0.25"	2.39 mm	3/32" 0.0938"	Platinum-Cured Silicone, Cole-Parmer® L/S 24, Masterflex®
CO.55/120 V2.0	14.0 mm		10.0 mm		2 mm		PVC, ESSKA, 702101102050
	14.29 mm	9/16" 0.563"	9.53 mm	3/8" 0.375"	2.39 mm	3/32" 0.0938"	Platinum-Cured Silicone, Cole-Parmer® L/S 36, Masterflex®
CO.55/140 V2.0	16.0 mm		12.0 mm		2 mm		PVC, ESSKA, 702101122050
	15.88 mm	5/8" 0.625"	9.53 mm	3/8" 0.375"	3.18 mm	1/8" 0.125"	Platinum-Cured Silicone, Cole-Parmer® I/P 73, Masterflex®
CO.55/160 V2.0	19.0 mm		14.0 mm		2.5 mm		PVC, ESSKA, 702101142550
	19.05 mm	3/4" 0.75"	12.7 mm	1/2" 0.5"	3.18 mm	1/8" 0.125"	Platinum-Cured Silicone, Cole-Parmer® I/P 82, Masterflex®
CO.55/190 V2.0	22.0 mm		16.0 mm		3 mm		PVC, ESSKA, 702101163050
	22.23 mm	7/8" 0.875"	15.88 mm	5/8" 0.625"	3.18 mm	1/8" 0.125"	Platinum-Cured Silicone, Saint-Gobain, Sani-Tech® STHT®-C-625-4
CO.55/230H V2.0	25.4 mm	1" 25.4 mm	15.88 mm	5/8" 0.625"	4.76 mm	3/16" 0.1875"	Platinum-Cured Silicone, Saint-Gobain, Sani-Tech® STHT®-C-625-5
CO.55/260H V2.0	28.56 mm	1 1/8" 1.125"	19.05 mm	3/4" 0.75"	4.76 mm	3/16" 0.1875"	Platinum-Cured Silicone, Saint-Gobain, Sani-Tech® STHT®-C-750-5
CO.55/300H V2.0	31.75 mm	1 1/4" 1.25"	19.05 mm	3/4" 0.75"	6.35 mm	1/4" 0.25"	Platinum-Cured Silicone, Cole-Parmer® I/P 91, Masterflex®
CO.55/340H V2.0	34.93 mm	1 3/8" 1.375"	25.4 mm	1" 25.4 mm	4.76 mm	3/16" 0.1875"	Platinum-Cured Silicone, Saint-Gobain, Sani-Tech® STHT®-C-1000-5

Manufacturers:

PVC Tubing: Deutsch & Neumann GmbH, 10585 Berlin (Germany); ESSKA.de GmbH, 20537 Hamburg (Germany)
 Silicone Tubing: Cole-Parmer®, Vernon Hills, IL 60061 United States; Saint-Gobain Performance Plastics, Solon, OH 44139

Calibration and conditions of use

Calibration	<p>Sensors are factory calibrated under the following conditions:</p> <ul style="list-style-type: none"> ▪ Tubing as listed and highlighted in table 'Tubing properties' ▪ Water at 23 °C ± 2 °C ▪ Warm up: at least 30 min (to compensate thermal effects) ▪ Zero calibration just before measurement procedure ▪ Normal pressure <p>Calibration to customer tubing, fluid, flow range, temperature, etc. on request.</p>
Media	<p>Water, human blood or other acoustically transparent liquids</p> <p>⚠ NOTE:</p> <p>SONOTEC® does not operate with human blood within the company premises.</p> <p>With respect to calibration, the difference between water and saline solution is negligible. For applications with blood (hemoglobin: Hb = 9 ± 2 g/dl) some special factors/settings can be modified after calibration</p>
Conditions of use	<p>⚠ CAUTION:</p> <p>The sensors need to be adjusted individually to special operating conditions</p> <ul style="list-style-type: none"> ▪ in case of operation with tubing not listed in the table 'Tubing properties', because the accuracy of flow measurement and bubble detection can be affected and ▪ if the sensor is intended to measure with human blood at normally 37 °C and hemoglobin between 6 g/dl to 12 g/dl. <p>Contact our service for details!</p> <hr/> <p>⚠ NOTE:</p> <p>Generally, the sensors are able to measure liquids in an extended operating temperature range of +1 to +50 °C and to measure blood within the ranges of Hb = 0 to 6 g/dl or Hb = 12 to 18.5 g/dl, but with limited accuracy only.</p>

Accuracy depends on tubing, temperature, fluid properties and other conditions. Absolute accuracy is influenced by zero stability, resolution and zero offset effects. For details see next chapter.

Accuracy

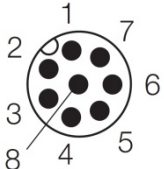
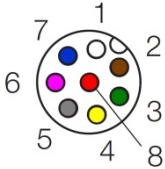
Specification SONOFLOW	Upper range value	Accuracy for water: adjusted at 23 °C ± 2 K and 1 bar on specified tube (listed)	
CO.55/035 V2.0	3 000 ml/min	0 ... 300 ml/min: ± 6 ml/min	300 ... 3 000 ml/min: ± 2 %*
CO.55/044 V2.0	5 000 ml/min	0 ... 500 ml/min: ± 10 ml/min	500 ... 5 000 ml/min: ± 2 %*
CO.55/060 V2.0	6 000 ml/min	0 ... 600 ml/min: ± 12 ml/min	600 ... 6 000 ml/min: ± 2 %*
CO.55/080 V2.0	8 000 ml/min	0 ... 800 ml/min: ± 16 ml/min	800 ... 8 000 ml/min: ± 2 %*
CO.55/100 V2.0	10 000 ml/min	0 ... 1 000 ml/min: ± 20 ml/min	1 000 ... 10 000 ml/min: ± 2 %*
CO.55/120 V2.0	12 000 ml/min	0 ... 1 200 ml/min: ± 24 ml/min	1 200 ... 12 000 ml/min: ± 2 %*
CO.55/140 V2.0	14 000 ml/min	0 ... 1 400 ml/min: ± 28 ml/min	1 400 ... 14 000 ml/min: ± 2 %*
CO.55/160 V2.0	18 000 ml/min	0 ... 1 800 ml/min: ± 36 ml/min	1 800 ... 18 000 ml/min: ± 2 %*
CO.55/190 V2.0	40 000 ml/min	0 ... 4 000 ml/min: ± 80 ml/min	4 000 ... 40 000 ml/min: ± 2 %*
CO.55/230H V2.0	50 000 ml/min	0 ... 5 000 ml/min: ± 100 ml/min	5 000 ... 50 000 ml/min: ± 2 %*
CO.55/260H V2.0	70 000 ml/min	0 ... 7 000 ml/min: ± 140 ml/min	7 000 ... 70 000 ml/min: ± 2 %*
CO.55/300H V2.0	100 000 ml/min	0 ... 10 000 ml/min: ± 200 ml/min	10 000 ... 100 000 ml/min: ± 2 %*
CO.55/340H V2.0	140 000 ml/min	0 ... 14 000 ml/min: ± 280 ml/min	14 000 ... 140 000 ml/min: ± 2 %*

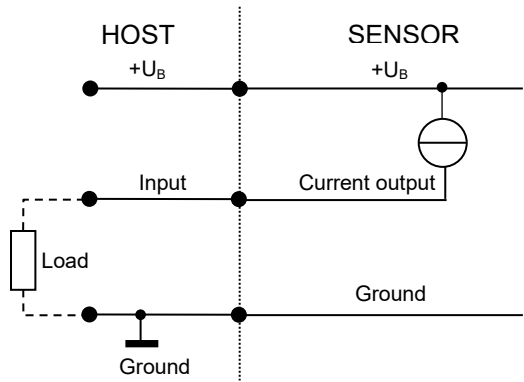
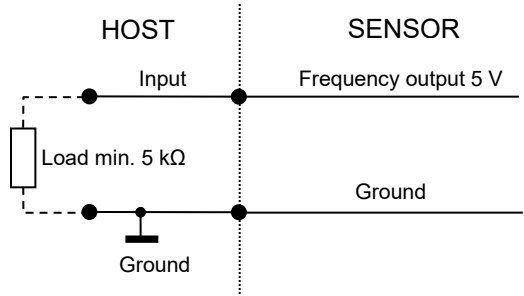
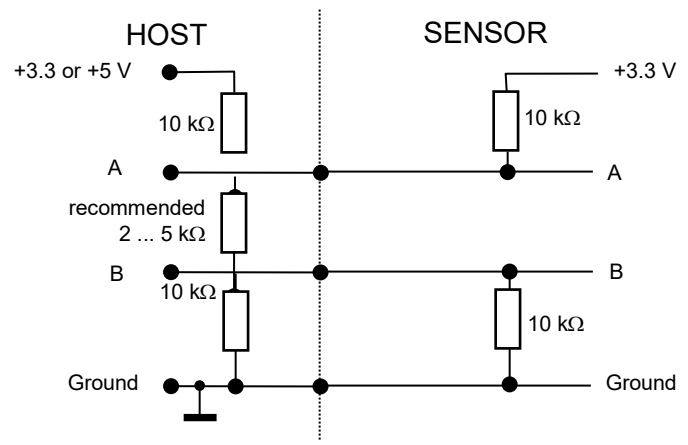
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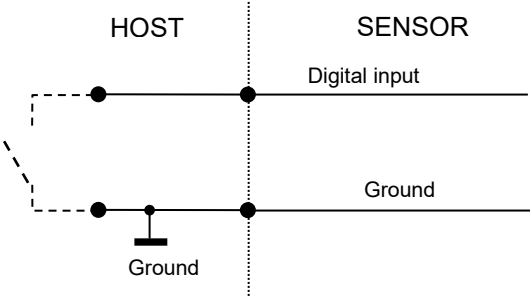
Technical data

SONOFLOW® CO.55/xxx(H) V2.0

Flow Sensor for liquids

Measuring method	Ultrasound, two sections of measurements, dry coupling, no couplant required		
Mounting	Fixed installation: 4 fixing holes	CO.55/xxx V2.0	M4, 8 mm deep
		CO.55/xxxH V2.0	M5, 10 mm deep
Sensor materials	Measuring channel: PMMA black Housing: aluminium, anodized grey/red (optional: stainless steel, plastics)		
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 M12 Connector, DIN EN 61076-2-101:2012		
Shielding	Required: via cable / housing (mounting screws)		
Electrical Connection	M12 connecting cable		
			
	Male connector (at the sensor)		Female connector (at the cable)
Assignment	Pin	Colour	Connection
	1	White	Ground
	2	Brown	Operating voltage +12 ... 30 VDC
	3	Green	Current output (0/4 ... 20 mA)
	4	Yellow	RS485 B
	5	Grey	RS485 A
	6	Pink	Frequency output 0 ... 20 kHz
	7	Blue	Switching output: PNP / NPN / Push-Pull
	8	Red	Digital input

<p>Interfaces</p>	<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 • RS485 interface: bus-capable (SONOTEC® protocol, optional MODBUS®) • Switching output: configurable as PNP / NPN / Push-Pull, 0 ... 30 V • Digital input
<p>Current output for flow rate</p>	<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> 
<p>Frequency output for flow rate</p>	
<p>RS485 interface</p>	<p>SONOTEC® protocol: Half-duplex operation / 115.200 baud / no parity / 1 stop bit / no handshaking (MODBUS® via software settings)</p> <p>⚠ NOTE: Please find the description of the serial protocol for details (upon request).</p>  <p>Recommended electrical connection of the RS485 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 #01.</p> <p>⚠ NOTE: The address can be changed by software settings (see opt. accessories). Permitted are addresses from #01 ... #12. → Menu: Identification RS485 address</p>
Switching output	<p>Freely configurable: e.g. adapting batch process or threshold switch of flow, Maximum 100 mA</p>
Digital input	<p>Freely configurable: for example for zero point calibration of flow or start dosing processes</p> <p>Voltage resistant up to 30 V</p> 
Ambient- / Media temperature	<p>0 ... 60 °C, other temperatures available on request</p>
Storage temperature	<p>-20 ... +70 °C</p>
Protection class	<p>IP65</p>
Directives and standards	<ul style="list-style-type: none"> • EMC directive 2004/108/EG • RoHS: 011/65/EU, exception: III 7cl/ IV 15 • Acoustic emission: IEC 61157
Maintenance	<p>Maintenance-free</p>
Scope of delivery	<ul style="list-style-type: none"> • SONOFLOW® CO.55/xxx(H) V2.0 according to specification • User documentation
Optional accessories	<ul style="list-style-type: none"> • 8-pin M12 sensor cable, length 2 m / 5 m • Calibration protocol <p>SONOFLOW® C³ Software for testing parameter settings, to adjust sensors for a specific application and for recording measurements consisting of</p> <ul style="list-style-type: none"> • USB Data Converter, type 013 for the connection to a computer • USB cable, type A-B, length 2 m • 8-pole M12 connecting cable, length 2 m • Switching power supply (12 VDC) • USB flash drive with SONOFLOW® C³ Software and driver for Windows

Technical drawings

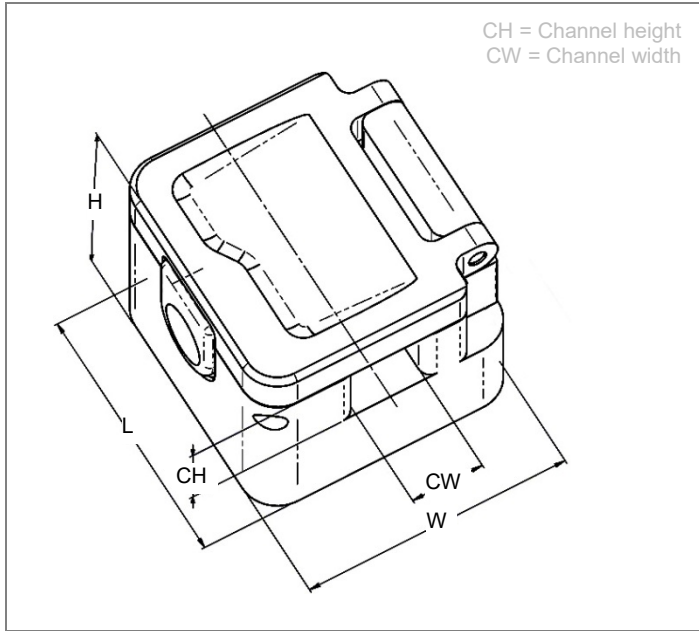


Figure 1: Dimensions SONOFLOW® CO.55/xxx V2.0

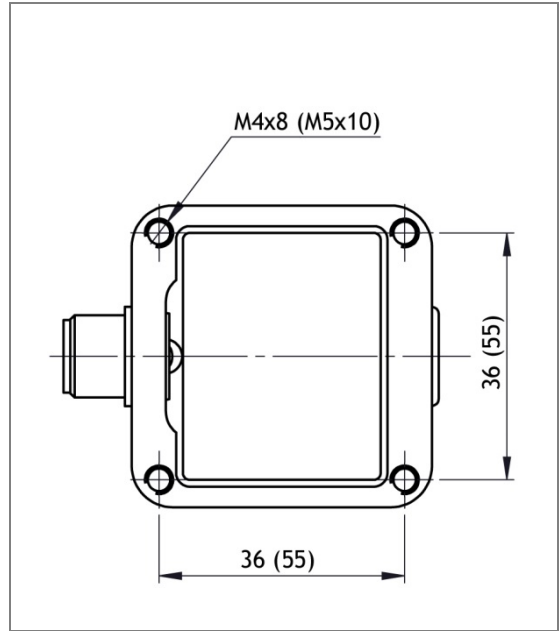
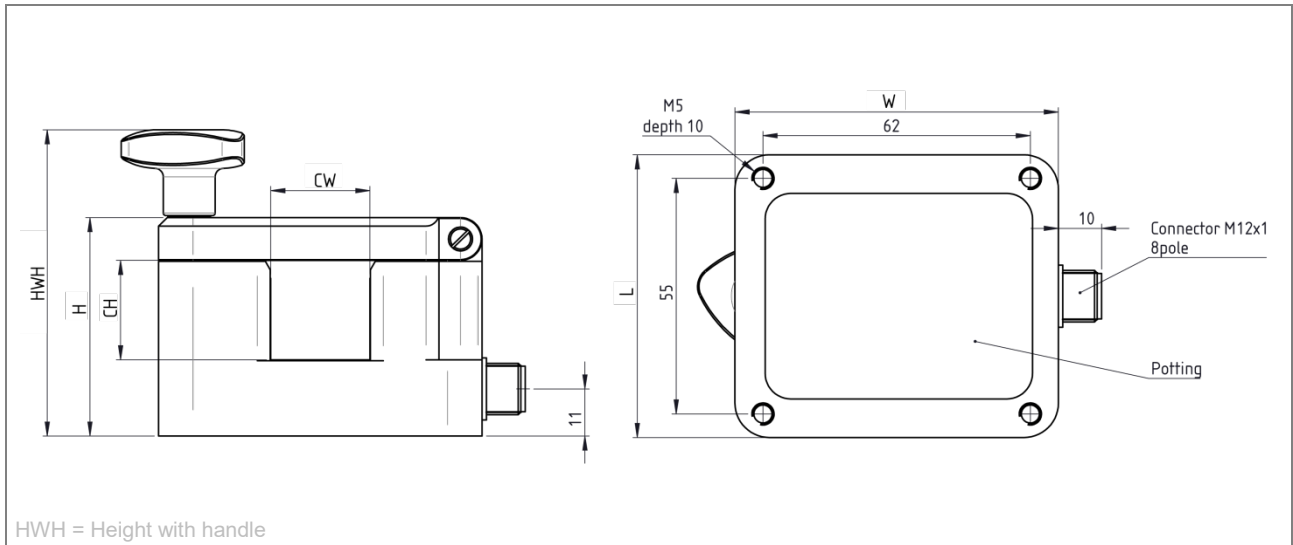


Figure 2: Rear side with drill holes for mounting (dimensional deviation SONOFLOW® CO.55/190 V2.0)



HWH = Height with handle

Figure 3: Dimensions SONOFLOW® CO.55/xxxH V2.0

Drawings are not to scale. Dimensions in mm, unless otherwise specified. Information is subject to change without notice!

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