NON-INVASIVE FLUID MONITORING

ULTRASONIC SENSORS

FOR BIOPROCESS & PHARMACEUTICAL APPLICATIONS

MADE IN GERMANY – DISTRIBUTED GLOBALLY

SONOTEC

ULTRASONIC FLOW SENSORS

Designed for upstream and downstream monitoring of bioprocesses, the innovative ultrasonic sensors from SONOTEC measure the liquid flow quickly and accurately. With their integrated electronics board, the SONOFLOW sensors offer the smallest equipment footprint solution on the market. By using our reliable and reusable sensors you can improve process stability, achieve easy data transfer and save costs associated with disposables. With the aim of a flexible production and minimizing the risk of contamination, there is a high demand for non-invasive and highly accurate flow sensors in the biotech industry.

NON-INVASIVE CLAMP-ON FLOW SENSORS

The **SONOFLOW CO Sensors** are designed for non-product contact fluid monitoring from the outside through the tubing. After being simply clamped onto the tubing, they measure the flow accurately and reliably. With their non-invasive measurement principle, they are designed for repeatable use, without having to be sterilized or gamma-irradiated. The flexible use for different tube sizes and materials as well as the option for different housing types (aluminum, stainless steel) or an integrated display are further benefits of the SONOFLOW CO.55 sensors series.

- Bi-directional flow as low as 20 ml / min
- High accuracy with no product contact
- Repeatability within 1.5 % of measurement
- No moving parts inducing shear stress on the cells
- Reduced risk of contamination
- Cost saving due to repeatable use
- Scale up easily with sizes for most standard tubing
- Seamless process integration with standard outputs and connectors

INLINE ULTRA LOW FLOW SENSORS

The **SONOFLOW IL Sensors** are designed for precise measurement of ultra low flow rates. Ideal for the use in R&D, benchtop and small scale process development applications, these reusable and cost saving sensors will surpass your expectations for accuracy in flow ranges below 10 ml / min.

- Flow as low as 0.4 ml / min
- Accuracy of +/- 1 %
- No moving parts inducing shear stress on the cells
- PEEK construction suitable for SIP, CIP or autoclave
- Seamless process integration with standard outputs and connectors

FEATURES OVERVIEW

Besides numerous sensors for bioprocess and pharmaceutical process applications, SONOTEC offer customized solutions, which integrate particular features requested by the customer. The modular design of the ultrasonic sensors allows for an easy and fast composition of individual solutions. The customer can choose between various options regarding housing design, safety concepts, power supply and output configurations.

| SENSORS		CO.55	IL.52	ABD06	ABD07	SC15
VALUES MAY VARY WITH TUBE SIZE	Recommended Flow Range	20 ml/min	0.4 ml/min			
	Recommended Maximum Flow Range	140 l/min	3 l/min			
	Operating Temperature Min. / Max.	0/60°C	0/145°C	5/60°C	5/60°C	-40/140°C
	Accuracy / Repeatability	2%/1.5%	1%			
	Minimum Tubing OD	0.125"		0.0625"	0.125"	0.375"
	Maximum Tubing OD	1.375"		1"	0.5"	2.5"
OUTPUTS / INPUTS	4-20 mA	✓	✓	✓		✓
	Serial Interface	RS485 Modbus	RS485 Modbus	RS485	UART	
	Frequency, 0 to 20 kHz, max. 5 V	✓	✓			
	Switching Output	✓	✓	✓	✓	✓
	Digital Input	✓	✓		✓	
OPERATION MODES	Real Time Flow	✓	✓			
	Volume Dosing /Totalizer	✓	✓			
	Flow Switch	✓	✓			
	Bubble Size			≥0.3 µl	≥0.3 µl	
	Full / Empty Detection			✓	✓	✓
CALIBRATION FEATURE	Customer Calibration Points	32	32			
	Temperature Compensation	2	2			
ELECTRICAL SPECIFICATIONS	Voltage Requirements	12-30 VDC	12-30 VDC	12-30 VDC	5-30 VDC	12-40 VDC
	Current Consumption Max.	30 mA	30 mA	50 mA	30 mA	50 mA
	Integrated Processing Electronics	✓	✓	✓	✓	✓

ABD = Air Bubble Detector, CO = Clamp-on, IL = Inline, OD = Outer diameter, SC = SONOCONTROL

SOFTWARE FOR EASY PARAMETERIZATION AND TESTING

SONOTEC has developed an advanced, but easy to operate software, the **SONOFLOW Monitor**, which allows for customer specific parameterization, testing and calibration. The software displays the measured data in real time, provides an infinite data logging ability and allows for a detailed analysis of the sensor performance. Optional USB connectivity to a Windows based PC or tablet are available for trouble shooting or full on-site calibration. This additional tool provides a unique flexibility to adapt the sensor to your specific requirements.

UNIQUE SOFTWARE BENEFITS

- Optional full on-site calibration
- Adjustable settings
- Parameter optimization
- Live monitoring and data logging
- Use with a Windows based PC or tablet

Flow sensor type connected to the software
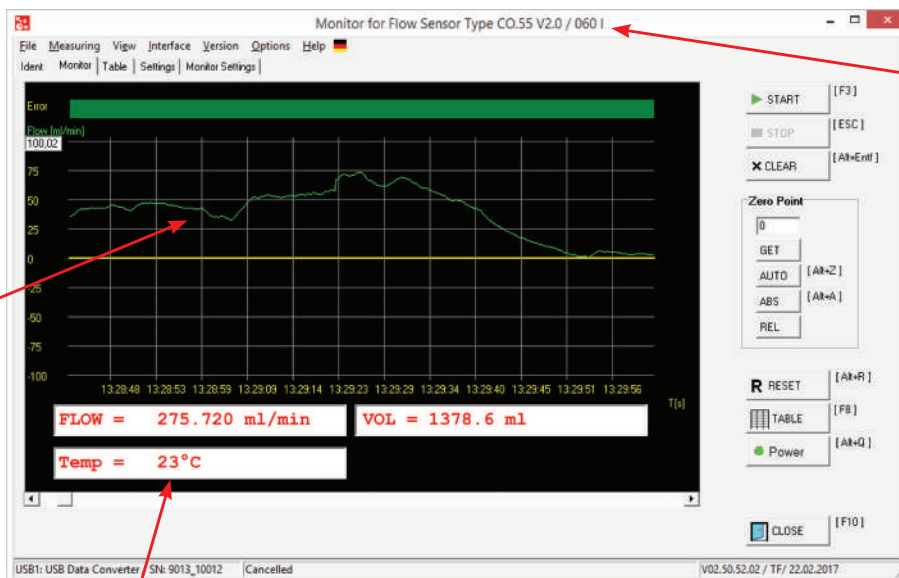
Display of the measured flow rate in ml / min

Standard calibration: Water at 23°C ±2 K and 1 bar on specified PVC tube

SEAMLESS PROCESS INTEGRATION

Besides the standard interfaces, such as current output, frequency output, switching output and digital input, SONOTEC has recently implemented the serial Modbus communication protocol for RS485 bus. This guarantees easy integration into existing data infrastructure and to process data easily within the data network. The Bus system can operate up to twelve SONOFLOW sensors in parallel and offers continuous data reporting wherever and whenever needed. Multiple outputs can be utilized simultaneously depending on integration needs.
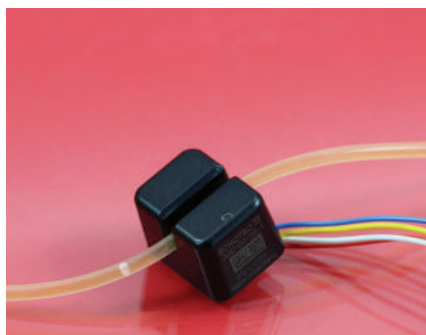
ABD07 • Plug & Play Air Bubble Sensor, Suitable for a Variety of Fluids

CO.55 • Clamp-on Flow Sensor for Large Tubing with Handle

ABD06 • CE Certified Air Bubble Sensor Including Various Lid Solutions

REMOTE DISPLAY

SONOFLOW CO Remote Display RD.10 extends SONOTECs portfolio for non-invasive fluid monitoring. The menu-operated display shows the flow, the total volume and the temperature of the measured media simultaneously. It can be applied to carry out zero-calibration and to reset the volume manually. The compact housing guarantees a flexible use and positioning.

- IP67
- Easy display set-up
- Reset functionality

MEASURING SCREEN

+60.4 $\frac{ml}{s}$ **Status: OK**	-0.6 $\frac{ml}{s}$ **Min. flow**
Flow	Minimum flow

+910.2 ^{ml} **Status: OK**	+9999 $\frac{ml}{s}$ **Max. flow**
Volume	Maximum flow

| +21 °C **Status: OK**	Link?
Temperature	Status messages

AIR IN-LINE / BUBBLE / LEVEL SENSORS

SONOCHECK Air Bubble Detectors are applied for the detection of smallest air bubbles or full/empty detection in various applications. The non-invasive ultrasonic sensors with integrated electronics can be connected to the process control unit or directly to the pump.

- IP67 and CE certified
- Bubbles as small as 0.3 µl
- For multiple tube sizes from 1/16" to 1 1/2" OD
- ATEX versions available for hazardous areas

SONOCONTROL 15 Level Sensors detect easily and reliably the filling level of a pipe. The non-invasive sensors, available in different sizes, are applied for full/empty detection in various applications.

- IP67 and CE certified
- Retrofit without process interruption
- Easy installation from outside the pipe
- ATEX versions available for hazardous areas
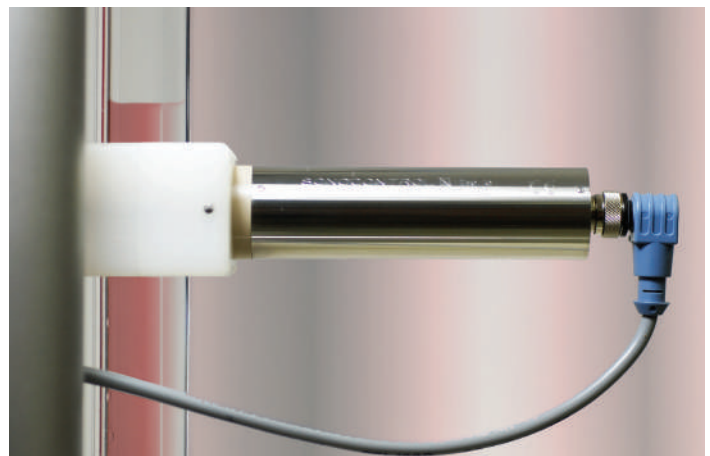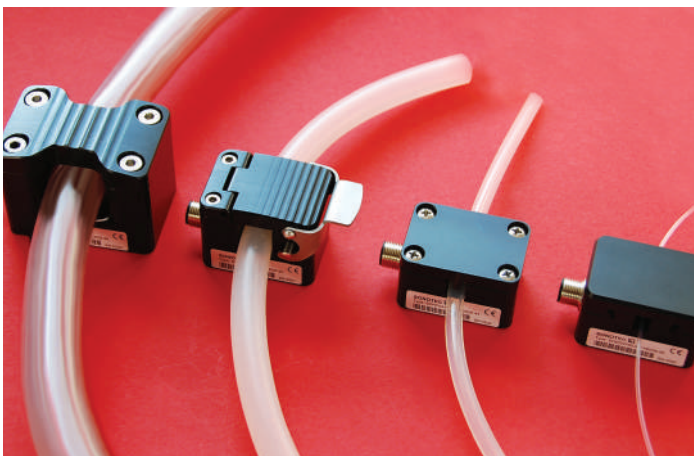
# SONOTEC – ULTRASOUND IS OUR STRENGTH

1991	1995	2000	2010	2013	2016
Founded by 2 physicists	ISO 9001 certified	1st air bubble sensor	1st clamp-on flow sensor	EN ISO 13485 certified	2nd generation flow sensors

Founded in 1991, SONOTEC is the leading specialist in ultrasonic measurement solutions. With more than 150 employees, the technology company based in Halle (Saale), in the heart of Germany, develops and manufactures ultrasonic transducers and sensors as well as testing and measurement devices for a wide variety of industries.

FIELDS OF APPLICATION
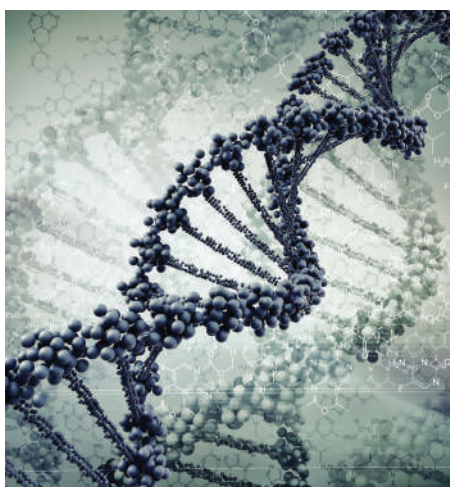
- Feed or volume dosing
- Media / buffer prep
- Tangential flow filtration (TFF)
- Chromatography
- Fill & finish
- Depth filtration

- Up or downstream processing
- Pump calibration and monitoring
- Pump feedback and control
- Perfusion systems
- Bioreactor inoculation
- Purification

SONOTEC preserves the right to change technical specifications without further notice. (Rev. 1.1 / 2018-06-08)

SALES & SUPPORT

SONOTEC

Certified according to ISO 9001 & EN ISO 13485