



Bioprocessing Industry

# ULTRASONIC SENSORS

MADE IN GERMANY

Non-Invasive Fluid Monitoring





## Ultrasonic Sensor Solutions for Bioprocessing Applications

The combination of single-use solutions (SUS) and continuous bioprocessing changes the biopharmaceutical industry and has a significant impact on plant engineering. It offers a smaller equipment footprint and substantially lower cleaning requirements, especially in GMP environments.

Implementing a continuous, non-contact, contamination-free and highly accurate upstream and downstream process monitoring guarantees process stability and raises overall efficiency. SONOFLOW flow meters and SONOCHECK air bubble detectors offer optimal support in complying with the regulatory goals of the Process Analytical Technology (PAT) framework.

### Innovative Sensors for Process Intelligence Ensuring

- Stable processes
- A higher degree of automation
- Continuous processing
- Quality assurance
- Traceability

## SONOFLOW® CO.55

### Non-Contact Clamp-On Flow Meter

The non-contact SONOFLOW CO.55 flow sensor measures liquid flow rates accurately and reliably in flexible plastic tubing. The clamp-on design and non-invasive measurement principle allows for repeatable use. The advantageous sensor series ensures scale-up from process development to commercial applications in GMP environments.



### Unique Product Benefits

#### Excellent Measurement Performance

- Highly accurate real-time flow measurement of up to 1 %\*
- Volume totalizing / volume dosing feature
- No moving parts

#### Non-Contact Design

- No risk of contamination
- Minimized equipment footprint
- Reusable, thereby sustainable and cost-saving

#### Plug & Play Sensor Fit

- Integrated electronics, no external transmitter required
- Multiple sensor sizes with aluminum or stainless steel housing
- For process development as well as GMP

#### Easy System Integration

- Easy integration into existing PLC or pump systems via RS-485 interface
- Operation of up to 12 sensors in parallel
- Optional C<sup>3</sup> Software for convenient sensor operation, configuration and calibration

## SONOFLOW® IL.52 | Ultra-Low Flow Inline Flow Meter

The inline flow sensor SONOFLOW IL.52 measures ultra-low flow rates. The highly accurate flow meter can be integrated into multi-product manufacturing or hybrid platforms around single-use technologies for quick dosing processes and measuring pulsating flows.



### Unique Product Benefits

- Highly accurate ultra-low flow measurement
- Instantaneous response time
- CIP, SIP and autoclave compatible
- Easy data evaluation and process integration

## SONOCHECK® ABD06 | Non-Contact Clamp-On Bubble Detector

The contact-free bubble detector SONOCHECK ABD06 is ideally suited for continuous bubble monitoring and full/empty detection. The highly accurate sensor is an effective instrument to increase process stability and quality.



### Unique Product Benefits

- Bubble detection down to 1/3 of tubing ID
- For bioprocess tubing, incl. reinforced ones
- No risk of contamination
- No moving parts
- ATEX certified (optional)

## SONOCONTROL 15 | Full/Empty Detector for Pipes

The compact level switch SONOCONTROL 15 measures through the wall of liquid filled pipes with small and medium sized diameters. The non-contact sensor is suited for applications within the pharmaceutical and fine chemical industries.



### Unique Product Benefits

- Retrofit to existing plants without process interruption
- For pump protection and to monitor filling applications
- No risk of contamination
- ATEX certified (optional)

# Technical Data

Sensors		SONOFLOW CO.55	SONOFLOW IL.52	SONOCHECK ABD06	SONOCONTROL 15
Application Parameters	Minimum Flow	20 ml/min	0.5 ml/min		
	Maximum Flow	200 L/min	3 L/min		
	Operating Temp. Min. / Max.	0 / 60 °C	0 / 145 °C	5 / 60 °C	-40 / 140 °C
	Accuracy	2% *	1%		
	Repeatability	1.5%			
	Tubing OD Min. / Max.	0.125" / 1.375"		0.0625" / 1.375"	0.375" / 2.5"
Outputs/Inputs	4...20 mA	☑	☑	☑	☑
	Serial Interface	RS-485 Modbus	RS-485 Modbus	RS-485 or UART	
	Frequency, 0...20 kHz, max. 5V	☑	☑		
	Switching Output	☑	☑	☑	
	Digital Input	☑	☑		
Operation Modes	Real-Time Flow	☑	☑		
	Volume Dosing / Totalizer	☑	☑		
	Flow Switch	☑	☑		
	Bubble Size			≥ 1 µl	
	Full / Empty Detection			☑	☑
Electrical Specifications	Voltage Requirements	12...30 VDC	12...30 VDC	5 +/- 0.2 VDC	12...40 VDC
	Current Consumption Max.	50 mA	50 mA	50 mA	50 mA
	Integr. Processing Electronics	☑	☑	☑	☑

\* Under ideal conditions accuracy up to 1%; ABD = Air Bubble Detector, CO = Clamp-On, IL = Inline, OD = Outer Diameter

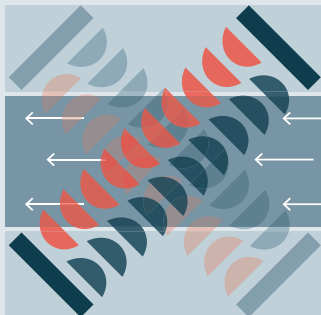
## Measurement Principle

### Flow Measurement | Ultrasonic Transit-Time

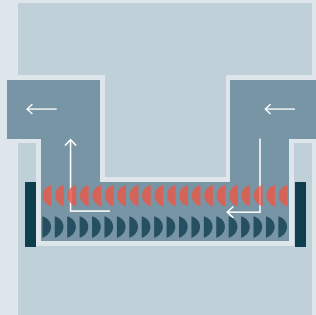
SONOFLOW sensors measure the time of flight of the ultrasonic wave with and against the liquid's flow direction by using the transit-time method. The time difference between both signals is a measure for the fluid velocity. The velocity together with the value of the cross-sectional area allows determining the specific flow volume. The volume results from the product of the flow velocity and the cross-sectional tubing area.

### Bubble Detection | Ultrasonic Transmission

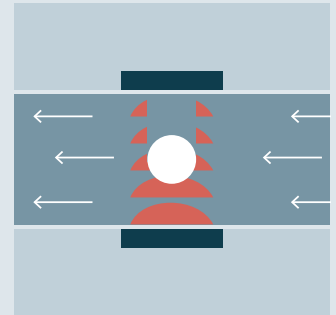
SONOCHECK ABD06 bubble sensors detect air bubbles and obstructions by means of dynamic amplitude monitoring. Depending on the sound impedance of the adjacent media, reflection and transmission take place at the interface. When an air bubble passes the sensor channel, the signal level of the transmitted sound wave drops. The higher the drop of the signal level, the larger the bubble size.



Transit-time principle for clamp-on flow measurement



Transit-time principle for inline flow measurement

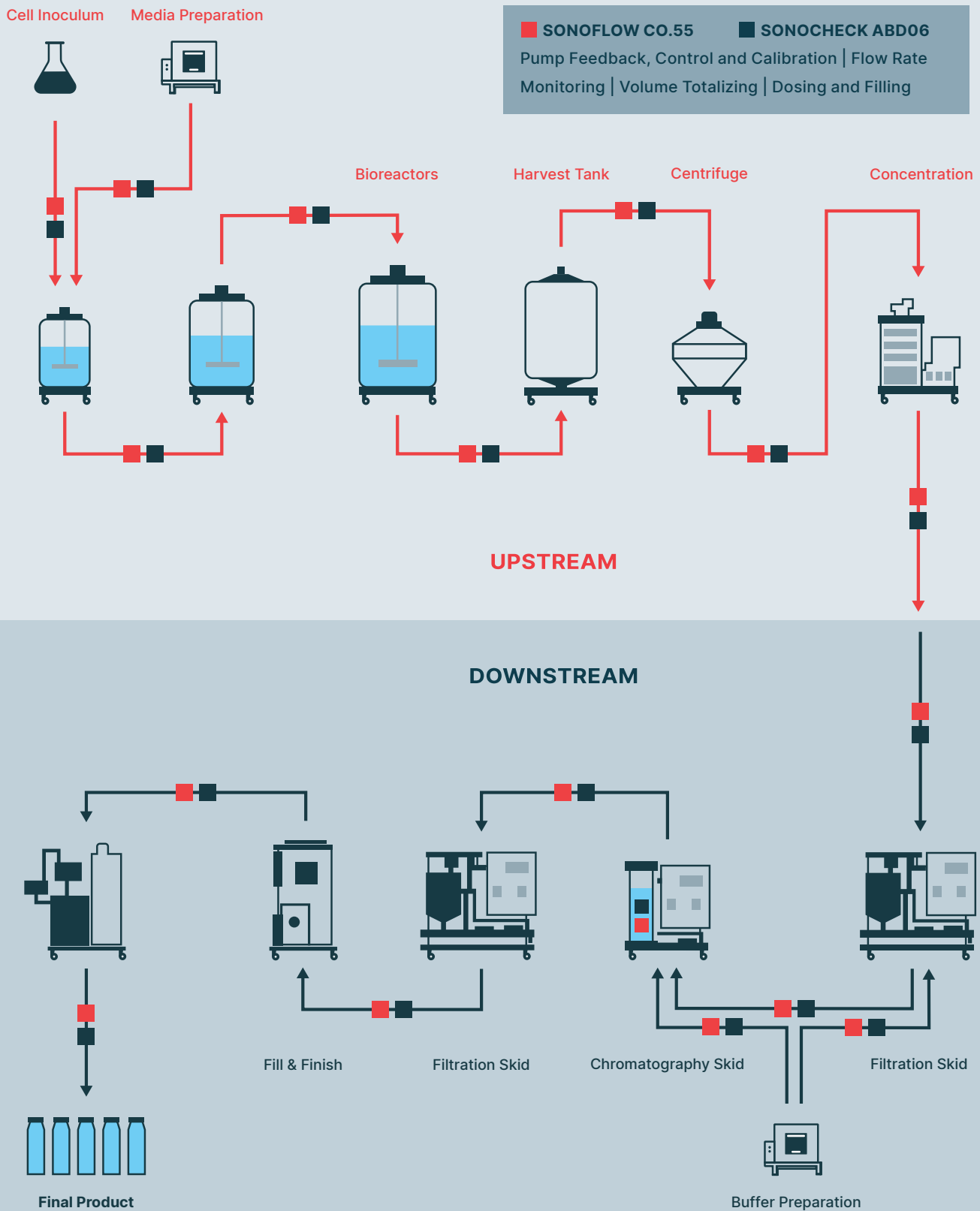


Amplitude monitoring for bubble detection



# Non-Invasive Fluid Monitoring

## Applications of SONOFLOW & SONOCHECK Sensors in Bioprocesses



## Accessories

### C<sup>3</sup> Software | Configure, Control, Collect

- Configure and control sensor performance, set outputs/inputs
- Collect measurement and sensor data
- Real-time flow monitoring and volume totalizing
- Convenient onsite sensor calibration



### Portable USB Data Converter

- Easy power supply of SONOFLOW sensors
- Monitor real-time flow on sensors with display for small-scale lab applications
- Direct transfer of measurement data
- Convenient connection of flow sensor via USB and PC with C<sup>3</sup> Software



### Remote Display

- Display for real-time flow data
- Zero calibration, volume reset, unit changes
- Compact PVC-C housing
- Protection class IP65



## SONOTEC Ultrasound is our Strength

SONOTEC is specialized in ultrasonic sensor technology in the field of non-contact and non-invasive liquid flow measurement and air bubble detection in flexible tubes and hard plastic pipes. As a global technology leader, we offer first-class measurement performance, excellent product quality and outstanding service to our customers in medical technology, biotechnology, and the semiconductor industry.

We are certified according to ISO 9001 as well as EN ISO 13485 and fulfill the directives for the manufacturing of products to be applied in potentially explosive atmospheres according to ATEX/IECEx. In addition to our off-the-shelf products, we offer customized sensor solutions responding to application-specific requirements.

### Sales & Support

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🛡 Certified according to  
ISO 9001 and EN ISO 13485

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