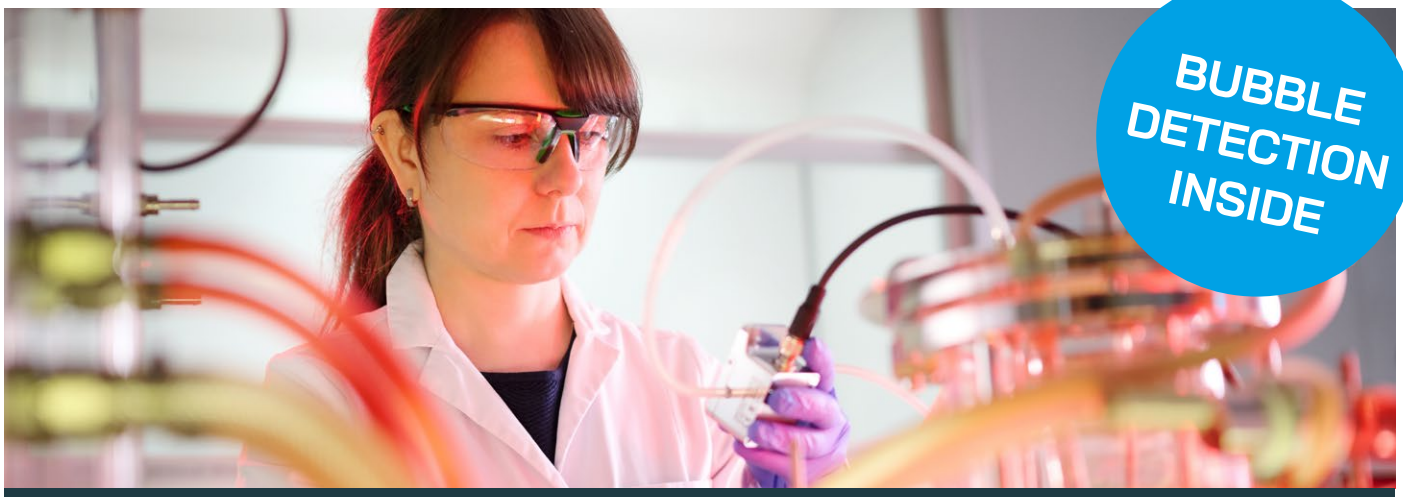
SONOTEC

Technical Note
Enhancing Flow Measurement with Air Bubble Detection

In bioprocessing, reliable flow measurement is essential to ensure product quality, process stability, and efficient production operations. Air bubbles can affect measurement accuracy and filling precision, as well as disrupt processes such as chromatography. Advanced air bubble detection plays a key role in protecting equipment, maintaining stable process conditions, and ensuring consistent process performance.



"With our high accuracy SONOFLOW CO.55 V3.0 flow meter series, air bubbles can now be detected quickly and reliably, ensuring that processes remain stable and free of interruptions." Nico Polley, SONOTEC GmbH

Benefits for Lab and GMP Bioprocessing

Upstream Bioprocessing

- **Media and buffer preparation**
  Batch reproducibility through airless and stable liquid flow, as well as precise mixing and dosing.
- **Single-use bioprocessing systems**
  Safe, automated operation without process interruptions due to incomplete priming and unintended air ingress.
- **Fermentation and cell culture transfer**
  Gentle product handling and stable transfer conditions as air bubbles may increase shear stress and affect cell viability.
- **Pump protection and monitoring**
  Rapid response to abnormal conditions or dry running to maintain an airfree liquid stream for stable flow rates.

Downstream Bioprocessing

- **Sampling and dosing systems**
  Airless dosing for higher precision in sampling and better process control.
- **Chromatography systems**
  Column protection and process stability for consistent purification results, as well as reduced downtime.
- **Filtration and Tangential Flow Filtration**
  Improved filtration efficiency and performance, as well as consistent and bubble-free operation conditions.
- **Filling and dosing applications**
  Higher accuracy through airless filling and dosing, as well as minimized product loss or rejected batches.

Working with the Bubble Detection Feature

SONOFLOW CO.55 V3.0 flow meters are preset with a fixed threshold value for bubble detection. Depending on mounting orientation and operating conditions, bubbles with a minimum size of approx. 1/3 of the inner diameter of the tubing can be detected.

Adjustments to the detection threshold and related parameters can be made in the advanced access mode of the SONOTEC Flow Monitor Software by the SONOTEC Customer Service or by particularly trained users.

Sensor Configuration

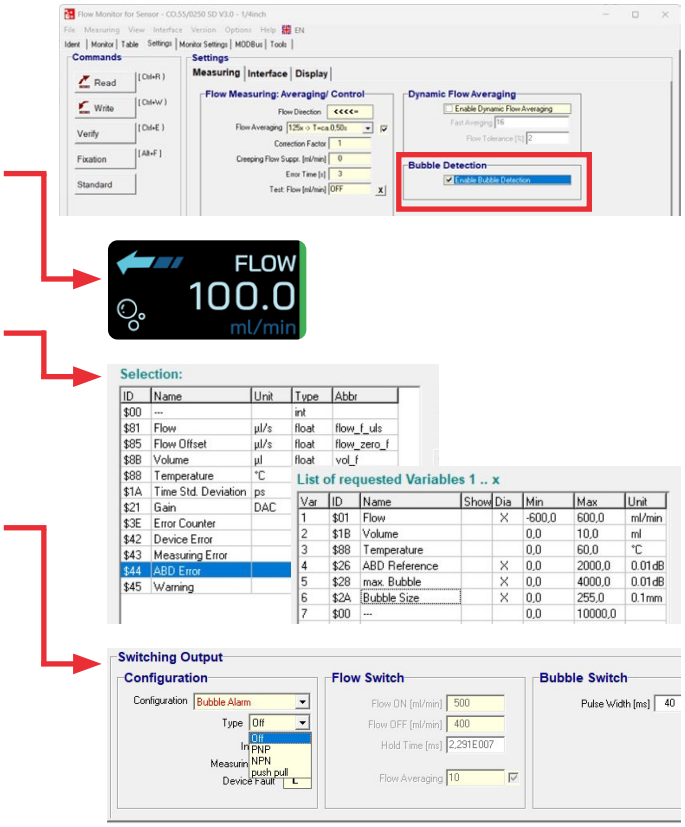
By default, the bubble detection feature is disabled. With only one click in the SONOTEC Flow Monitor Software, the bubble detection can be activated. Once activated, the sensor starts detecting bubbles acc. to the default threshold - also indicated on the **sensor's touch display**.

Bubble events are available digitally via the RS485 serial interface or analog via the switching output.

By using the **serial interface**, a number of variables are available for data retrieval. Thus, further data analysis about bubble events and their effects can be performed. Users can choose between the SONOTEC protocol and the Modbus protocol.

The **analog signal** via the switching output can be easily configured in the SONOTEC Flow Monitor Software. Select the Bubble Alarm from the available options and choose between the configuration type, e.g., PNP or NPN.

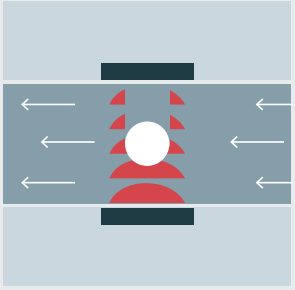
The sensor offers **additional configuration options**, particularly when using the serial interface. Contact our service team so that we can set up the optimal configuration for application-specific settings.



Measurement Principle

Bubble Detection | Ultrasonic Transmission

SONOFLOW CO.55 V3.0 flow meters 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.



Sales & Support

SONOTEC US Inc.
10 Newton Place
Hauppauge, New York 11788
USA

+1 631 415-4758
sales@sonotecusa.com
www.sonotecusa.com

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