



The SONOCHECK® **ABD05** air bubble detector is used to detect air or gas bubbles in plastic tubes filled with liquid and is intended to prevent air infusions. However, it can also be used as a wet/dry sensor.



The sensor has no contact with the liquid and is suitable for applications in medical technology. The sensor is designed as a component for fixed installation in machines.

Besides the standard sensors we offer customized versions for different applications.

Technical Data

SONOCHECK ABD05.xx	
Air Bubble Detector	
Measuring method	Ultrasound
Bubble sensitivity	Bubbles larger than 0.3 µl are detected (depending on tube properties, application and process characteristics)
Measuring cycle	200 µs
Response time; Holding time	Minimum < 0.2 ms, maximum 2 ms, typical 1 ms; On request: Delays or holding times for bubble events
Operating temperature	+5 °C to + 45 °C
Storage temperature	-20 °C to +70 °C
Humidity	During operation 10 ... 90 % relative humidity (not condensing)
	During storage & transport 10 ... 98 % relative humidity (not condensing)
Degree of protection	IP67 (electronics potted, see technical drawings page 5)
Materials	Housing: Plastic / POM black Measuring cell: PMMA transparent <i>(Exterior materials feature high resistance against disinfection solutions and other liquids.)</i> Potting: PUR, Wepuran VU 4452/61, blue <i>(Not accessible after mounting.)</i> i The chemical resistance must be tested by the manufacturer of the MDEV for the expected conditions of use.
Versions / Designs	The sensor version depends on the tube diameter, the hardness of the tube and its wall thickness. If possible, provide us with a sample of the tube so that we can select an optimum design.

Requirements for tube	Parameter	Property
	Wall thickness	Optimal 10 to 20 % of outer diameter
	Material	Plastics, e.g. PVC, PE, silicone, PUR Other materials on request or after test only
	Special features	Tube must be smooth on outside, no fabric tube
	Elasticity	Tube must be able to adjust flexibly
	⚠ Tube is inserted into sensor dry, no coupling medium allowed.	
Requirements for liquid	<p>Sensors can be applied to typical liquids in medicine, e.g. human blood, blood plasma, saline and water, with or without drugs. Low-viscosity fluids which contain no or only little filler are suitable.</p> <p>The intensity of ultrasound, which is transmitted into the liquid is below the limitation acc. appropriate standard EN 61157, $I_{spta} < 100 \text{ mW/cm}^2$. The intensity is so small, that no biological damage occurs.</p> <p>NOTE! Any solution which consists of foam will be detected as air.</p>	
Mounting	Rectangular design	2 x recessed M4 threaded holes on rear of sensor
	Circular design	Appropriate clamping fixture
Operating voltage	+5 \pm 0.2 VDC, maximum ripple 100 mV	
Current consumption	Max. 60 mA	
Connecting cable	Fixed connection to sensor, shielded line, 4 poles (specification see page 4), stranded wires, 1 m (deviating lengths and connectors on request)	
Outputs	TTL-Logic, serial interface or PWM	
Directives / Standards	<p>The sensors were developed to be tested with respect to the following standards:</p> <ul style="list-style-type: none"> • Safety Requirements: IEC 60601-1:2005 (3rd edition) • EMC: EN 60601-1-2:2007 (3rd edition) • Acoustic Output (Ultrasonic): IEC 61157:2007 • Directive 2011/65/EU, exemption EU-RoHS: III 7cl / IV 15; RoHS 2015/863 • Software developed acc. DIN EN 62304:2016-10, classified "C" (Module Main) • SONOTEC is certified according to ISO 9001 and EN ISO 13485 	
Flammability classification	The sensor has a power consumption of < 300 mW. Devices with power consumption less than 15 W do not need flammability classification acc. to UL94.	

<p>Adaptable parameters</p>	<p>With the help of software ABD Monitor (optional) for configuration of the sensors and assistance in diagnostics</p> <ul style="list-style-type: none"> • Bubble sensitivity (threshold air / liquid) • Response time / holding time for output conditions • Output specifications, e.g. of serial output, switching output, LED state or PWM value
<p>Safety in medical devices</p>	<ul style="list-style-type: none"> • TÜV approved safety concept • Single channel architecture / Fail-Safe (depending on the configuration, for details see the operating manual) • Initial test (after power on or restart) / cyclical self-test during measuring • Self-adjusting to surrounding conditions for constant sensitivity • Microbubble detection • Software developed according to standards (see directives / standards) • Tracing of relevant sensor parts during manufacturing
<p>Electrical safety</p>	<p>Classified as <i>Applied Part "CF"</i> in combination with the MDEV and tubing. Insulation between outside of housing and electrical components > 1000VAC</p>
<p>Label</p>	<p>Label glued on housing on socket or laser labelling on housing:</p> <p>Contains type and serial number (SN). The SN is coded in bar code (glued label) or 2D matrix code (laser labelling).</p> <div data-bbox="1091 894 1442 1045" style="border: 1px solid black; padding: 5px; margin: 10px 0;">  </div> <div data-bbox="526 1115 1430 1224" style="border: 1px solid black; padding: 10px; margin: 10px 0;">  </div>
<p>Packaging</p>	<p>Each sensor is packed in a plastic bag. All sensors of each lot are put together in cushioned cartons. ESD packaging is not needed.</p>
<p>Scope of delivery</p>	<p>Air bubble detector type SONOCHECK ABD05, channel width and design adapted to tube diameter; user documentation</p>
<p>Optional accessories</p>	<p>ABD Monitor for configuration and diagnostics, consisting of:</p> <ul style="list-style-type: none"> • USB data converter (type 007_V001) • USB cable, type A-B, length 1.5 m • CD with ABD Monitor software <p>Certificate of compliance</p>
<p>Customization</p>	<p>In addition to our standard sensors, we also manufacture customer-specific solutions with:</p> <ul style="list-style-type: none"> • special materials • individual colors • adapted mechanical dimensions • other cable specifications • different interfaces • customized output specifications • default parameters adapted to application

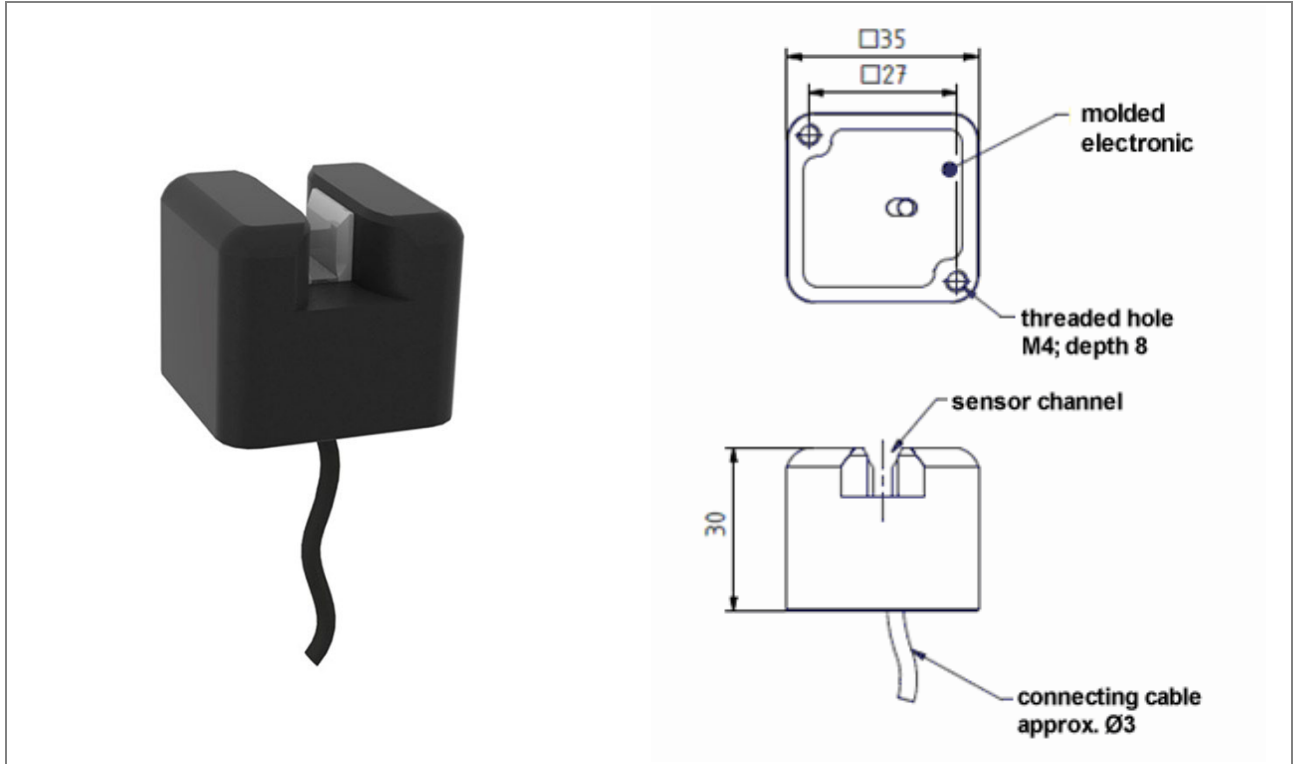
Electrical specification of input and output

Connection	Colour	Specification	Function
+5 VDC	Red	+5 ± 0.2 VDC	Operating voltage, provided by machine
GND	Blue		
ABD-IN	Yellow	5 V logic, TTL <i>Internal pull up 10 kΩ to +5 V</i> <i>Ratings: L = -0.2 ... 1.0 V H = 3.0 ... 5.5 V</i>	Control input for test or service <i>Configurable as</i> <ul style="list-style-type: none"> Digital input Serial input of UART
ABD-OUT	White	5 V logic, TTL, push-pull <i>Ratings: L = max. -5 mA H = max. +5 mA</i>	Output of sensor <i>Configurable as</i> <ul style="list-style-type: none"> Switching output Serial output of UART PWM output
Shield	The shield is not connected in sensor. It must be connected to GND (blue) on the side of MDEV.		
i NOTE	<ul style="list-style-type: none"> There is no protection against reverse polarity implemented. Respect the safety notes in the operating manual. Protect the lines of power supply against overvoltage! There is no fuse in the sensor. The maximum current must be rated to 200 mA! The power consumption must be limited in MDEV. 		

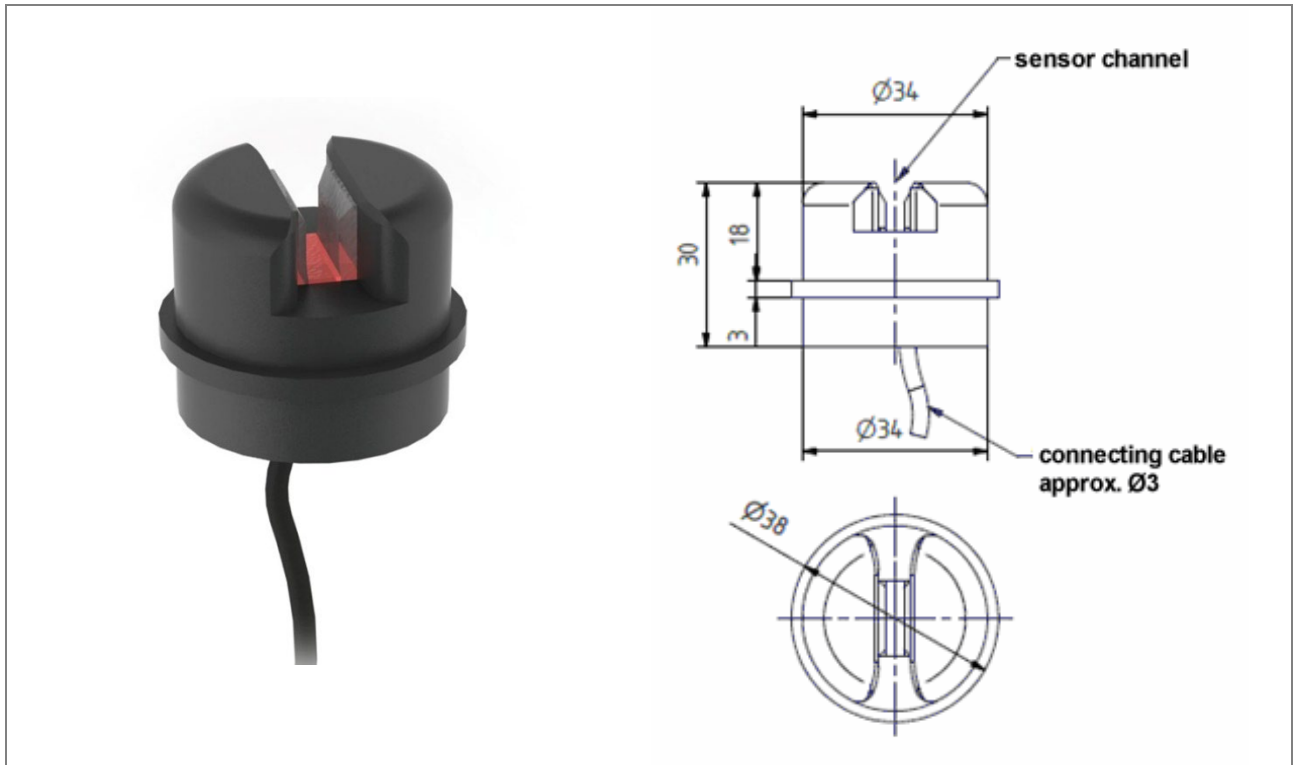
By default (Mode 0 → see 'Operating Manual' for Interface Modes) the output is configured as switching output, the input as serial input of UART.

Output specification (default)		
Condition	Signal at output (H/L: TTL output)	LED
Air / Bubble	H	Red
Liquid	L	Green
Internal error (self-test)	H	Blue

Technical drawings



Version with rectangular design



Version with circular design

Information for ordering

Sensor type	Design version	Channel width	Outer Ø tube (typical)	Order number
ABD05.50	Circular	3.4 mm	4.2 mm	200 02 0050
ABD05.51	Rectangular	3.4 mm	4.2 mm	200 02 0051
ABD05.52	Circular	5.2 mm	6.8 mm	200 02 0052
ABD05.53	Rectangular	5.2 mm	6.8 mm	200 02 0053
ABD05.54	Rectangular	2.2 mm	3.0 mm	200 02 0054
ABD05.55	Circular	2.2 mm	3.0 mm	200 02 0056
ABD05.56	Rectangular	1.8 mm	2.4 mm	200 02 0057
ABD05.57	Circular	4.4 mm	5.5 mm	200 02 0107

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

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