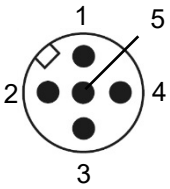
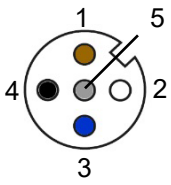
The air bubble detector SONOCHECK® ABD06.xxx with analogue output is used to detect air, gas bubbles and foam in liquid filled tubes made of synthetic materials. It also serves as wet/dry indicator. Typical applications are in **biotechnology** or industrial applications in the automation, **semiconductor or food and beverage industry** (e.g. filling processes of glue, paint and lubricants) are typical. The SONOCHECK® ABD06 with analog output is designed as a component for fixed installation in machines and equipment. The sensor has no contact with the liquid. The sensors have a configurable analogue output for the **distinction of bubble size** in a wide range and are suitable especially for the **use on hard plastic tubing** and under harsh process conditions (concerning pressure, flow rate, vibration).

Technical data

ABD06.xxx with Analogue Output **Air Bubble Detector**	
Measuring method	Ultrasound
Bubble sensitivity	Bubbles larger than approx. 1/3 of the inner tube diameter 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 (Furthermore, the holding time can be set in order to increase the duration of the output signal.)
Operating temperature	+5 °C … + 60 °C
Storage temperature	-20 °C … +70 °C
Materials	Housing: Plastic, PET black (ABD06.102: PVC grey) Cover: Plastic, POM black, (ABD06.116 / ABD06.123: PET black; ABD06.102: PVC grey) Potting: PUR | Cover clasp: stainless steel | Handle (screw clamp): Plastics, PA, steel

<table>
<tr><td rowspan="4">Requirements for tube
(provide us with a tube sample, if possible;
list of sensors and tubing properties behind)</td><td colspan="2">Parameter</td><td>Property</td></tr>
<tr><td colspan="2">Material</td><td>Hard or soft plastic tubes (e.g. PTFE, FEP, PFA, PVC, Silicone, PUR, PE, reinforced tubing;
other materials on request or after test only)</td></tr>
<tr><td colspan="2">Special features</td><td>Tube must be smooth on outside, no fabric tube</td></tr>
<tr><td colspan="2">Wall thickness</td><td>Depending on application, optimal 10 ... 20 % of outer diameter for typical usage</td></tr>
<tr><td colspan="4">Tube is inserted into sensor dry, no coupling medium required</td></tr>
<tr><td>Requirements for liquid</td><td colspan="4">Water, saline, other solutions, paint, glue or low-viscosity liquids containing no or few solids in general.

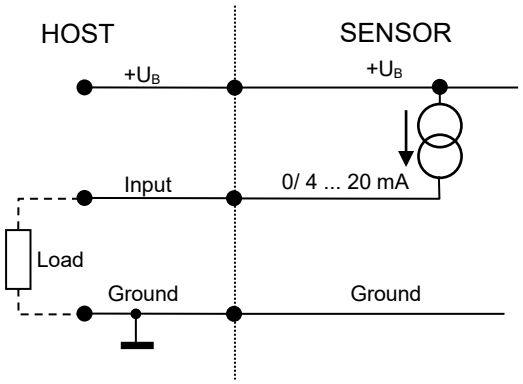
ⓘ NOTE! For applications with high-viscosity liquids
(e.g. fats/special paints) screening tests must be made.
Large amounts of foam in the liquid will be detected as air.</td></tr>
<tr><td>Protection</td><td colspan="4">IP67</td></tr>
<tr><td>Operating voltage</td><td colspan="4">+12 ... 30 VDC, ripple max. 10 %, protection against reverse polarity</td></tr>
<tr><td>Current consumption</td><td colspan="4">Max. 50 mA (without switching current)</td></tr>
<tr><td>Connecting cable</td><td colspan="4">M12 sensor cable, 5 pins</td></tr>
<tr><td rowspan="8">Pin assignment</td><td colspan="4">Male connector at the sensor
 

Female connector at the cable
 
</td></tr>
<tr><td>Pin</td><td>Colour</td><td>Connection</td></tr>
<tr><td>1</td><td>Brown</td><td>Power supply voltage +12 … 30 VDC</td></tr>
<tr><td>2</td><td>White</td><td>RS-485 A</td></tr>
<tr><td>3</td><td>Blue</td><td>Ground</td></tr>
<tr><td>4</td><td>Black</td><td>Output</td></tr>
<tr><td>5</td><td>Grey</td><td>RS-485 B</td></tr>
<tr><td colspan="2">Shielding</td><td>If available: must be grounded on the side of host.</td></tr>
<tr><td>Outputs (specification can be adopted with the Monitor software)</td><td colspan="4">Configurable as:
• Current output 0/4 … 20 mA (default factory setting)
• Switching output PNP /
PWM output (max. 25 mA): period 1 kHz, modulation 0 … 100 %
• Voltage output 0/2 … 10 V
• RS-485 service interface (default factory setting)</td></tr>
</table>

Configuration as:

Current output (factory setting)

The current output can be configured in the range of 0 … max. 25 mA



Example: Measuring range 4 ... 20 mA / error output 0 mA or 22 mA

⚠ **CAUTION!** Pay attention to the max. load depending on the operating voltage: 12 V: 0 ... 400 Ω | 24 V: 0 … 200 Ω | 30 V: 0 ... 100 Ω

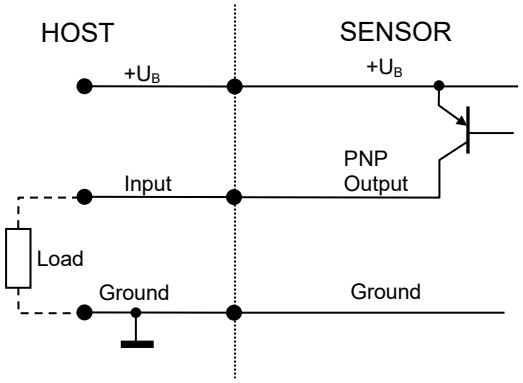
Output specification (default configuration)

State	**Current output**
Air / Bubble	20 mA
Fluid	4 mA
Internal error (self-test)	0 mA

Configuration as:

Switching output / PWM output

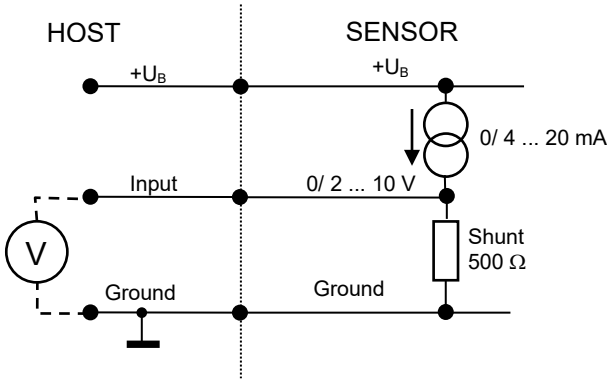
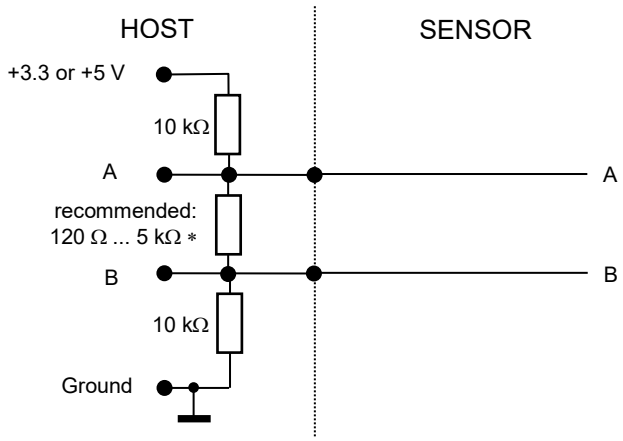
PNP und PWM, switching current max. 25 mA



ℹ **NOTE!** In the event of a short circuit the current is limited internally to approx. 33 mA

Output specification (default configuration

State	**Level of PNP-Output**
Air / Bubble	+24 V
Fluid	Ground
Internal error (self-test)	+24 V

Configuration as: **Voltage output**	The current output is used as voltage output. Internally a shunt (500 Ω) is connected to output. The voltage output can be configured in the range of 0 … max. 12.5 V. Example: Measuring range 2 … 10 V / error output 0 V or 11 V  ⚠ **CAUTION!** Pay attention to the internal resistance (shunt) at the connection of voltage output. Adhere to the maximum output voltage depending on the operating voltage: 12 V: 0 ... 9 V | 14 V: 0 ... 10 V | 18 V: 0 ... 12.5 V
RS-485 service interface	Half-duplex operation / 115.200 baud / no parity / 1 stop bit / no handshaking / Bus operation not possible Recommended electrical connection of the RS-485 interface  * According to bus standard: depending on number of sensors and cable length ⓘ **NOTE!** For details of the protocol please contact our service. If the interface is not used, the two pins A and B shall remain open.

Directives / Standards	Electromagnetic compatibility, tests in compliance with DIN EN 61326-1: 2013 EN 61000-4-3 EMC, radiated radio-frequency - electromagnetic field immunity, test result A, test with 10 V/m (0.15 ... 1000 MHz) EN 61000-4-4 EMC, electrical fast transient/burst immunity test, test result A (see restrictions below) EN 61000-4-6 EMC, immunity to conducted disturbances, induced by radio-frequency fields, test result A, test with 10 V/m EN 55011 Electromagnetic disturbance characteristics, limit 30 dBµV/m **NOTE!** For testing typical settings for bubble detection have been applied. The interference immunity depends on a reasonable configuration. Operating with very high bubble sensitivity combined with a very short response time can cause disturbances of the system, induced by electromagnetic disturbing, pressure changing, mechanical vibration, etc.
Scope of delivery	• Bubble detector type ABD06.xxx with analogue output, • Cover with screws / hinged cover / hinged cover and handle, dimensions adjusted to sensor and tube • User documentation
Accessories / Options	M12 sensor cable, 5 pins, length 2 m / 5 m / 10 m ABD Monitor, consisting of: • USB Data Converter Type 011 (for RS-485) • Power supply • USB cable, type A-B, length 2 m • Software ABD Monitor With the help of software ABD Monitor (optional) for configuration of the sensors and assistance in diagnostics: • Bubble sensitivity (threshold air / liquid) • Response time / holding time for output conditions • Output specifications, e.g. of serial output, switching output or PWM value Furthermore measurement values can be recorded for diagnosis.
Customization	Customized modifications for special applications upon request (e.g. adapted channel width, individual output specifications or settings)

Overview of sensor and tubing dimensions

The sensors series ABD06 are suitable for a variety of tubes.

The sensor version depends on the tube diameter, the hardness of the tube and its wall thickness. Please note, that because of diverse tubing dimensions and materials an aptitude test has to be made. Please provide us with a tube sample (minimum length 30 cm) and contact our service to find the appropriate sensor and cover.

Note, that the cover is necessary to fix the tubing in the measuring channel to ensure correct coupling. The cover sizes and the bridge as well depend on the tubing properties and the application. Contact our Service to determine the correct cover and order number.

Dimensions, listed in the following, are guiding values:

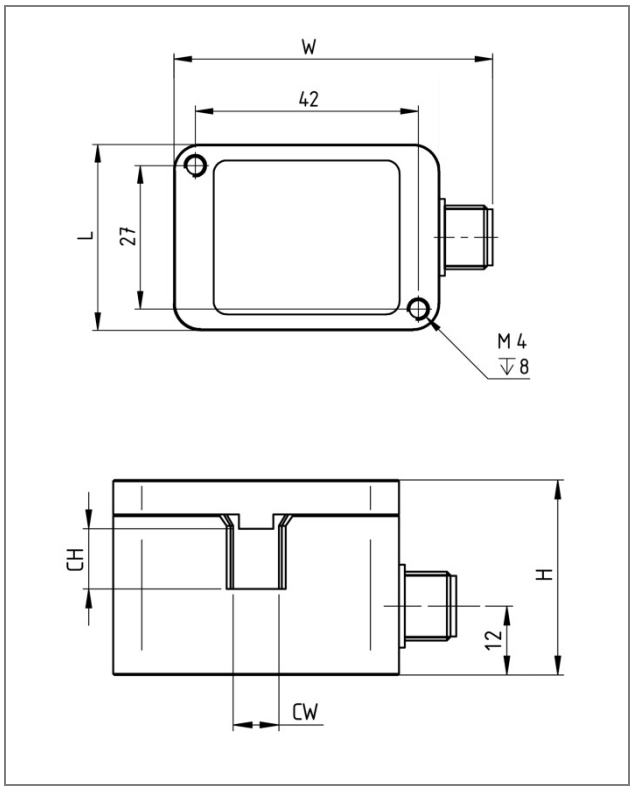
SONOCHECK® type	Sensor		Tube Dimensions [mm]		Tube Dimensions [inch]	
	CW	CH	OD	ID	OD	ID
Sensors with screw cover						
ABD06.115	5.6 mm	11.0 mm	6.0 ... 9.5 mm	2.5 ... 7.0 mm	0.235“ … 0.375“	0.1“ … 0.275“
ABD06.114	8.0 mm	13.0 mm	8.0 ... 11.5 mm	4.0 ... 9.0 mm	0.315“ … 0.455“	0.175“ … 0.355“
ABD06.119	11.0 mm	17.0 mm	12.0 ... 16.0 mm	6.0 ... 11.0 mm	0.470“ … 0.630“	0.235“ … 0.435“
Sensors with hinged cover						
ABD06.122	3.4 mm	6.5 mm	3.9 … 5.5 mm	1.6 … 4.5 mm	0.156" … 0.219"	0.063" … 0.172"
ABD06.125	5.2 mm	8.0 mm	5.9 … 7.9 mm	2.0 … 6.4 mm	0.234" … 0.313"	0.078" … 0.250"
ABD06.120	7.2 mm	11.5 mm	8.0 ... 11.0 mm	3.5 ... 8.0 mm	0.315“ … 0.435“	0.140“ … 0.315“
ABD06.117	12.0 mm	15.5 mm	13.0 ... 16.0 mm	6.5 ... 13.0 mm	0.500“ … 0.630“	0.255“ … 0.510“
ABD06.121	15.5 mm	20.0 mm	16.0 ... 22.0 mm	10.0 ... 17.0 mm	0.630“ … 0.865“	0.395“ … 0.670“
Sensors with handle (screw clamp)						
ABD06.102	24.5 mm	19.5 mm	25.4 ... 28.6 mm	15.9 ... 22.2 mm	1.000“ … 1.125“	0.625“ … 0.875“
ABD06.116	26.0 mm	28.0 mm	26.6 ... 34.5 mm	19.1 ... 25.4 mm	1.050“ … 1.360“	0.750“ … 1.000“
ABD06.123	32.0 mm	28.0 mm	34.5 ... 35.7 mm	25.4 ... 27.0 mm	1.360“ … 1.405“	1.000“ … 1.050“

Abbreviations: CW = channel width at the narrowest part of the channel; CH = channel height; OD = outer diameter; ID = inner diameter

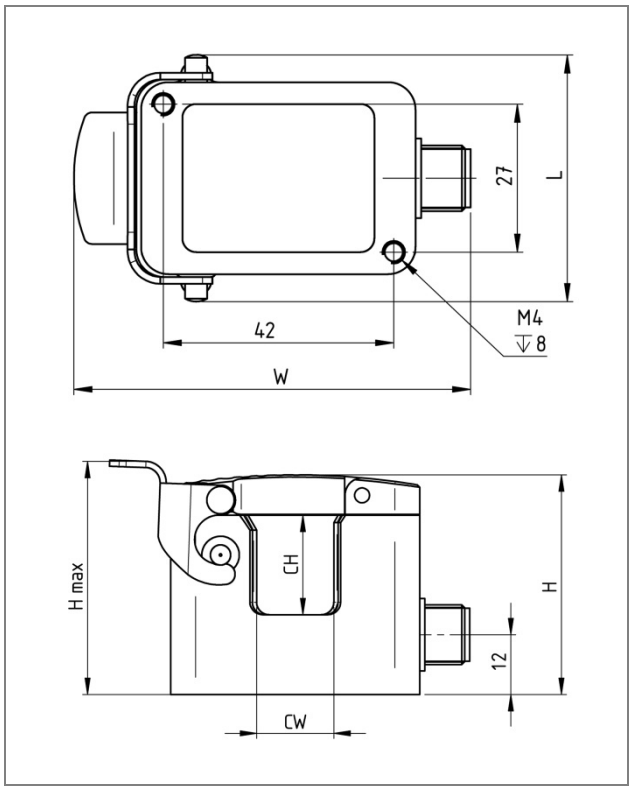
SONOCHECK® type	Product No.	Dimensions L x W x H [H max]	Mounting Sc W | Sc L (threaded holes on rear side, see technical drawings)
Sensors with screw cover			
ABD06.115	200 02 0116	35 x 50 x 32 mm	2 x M4, depth 8 mm 42 mm | 27 mm
ABD06.114	200 02 0114	35 x 50 x 34 mm	
ABD06.119	200 02 0125	35 x 50 x 38 mm	
Sensors with hinged cover			
ABD06.122	200 02 0048	45 x 73 x 32 mm	2 x M4, depth 8 mm 42 mm | 27 mm
ABD06.125	200 02 0154	45 x 73 x 34 mm	
ABD06.120	200 02 0024	45 x 73 x 34 mm	
ABD06.117	200 02 0137	45 x 73 x 39 mm	
ABD06.121	200 02 0126	45 x 73 x 44 mm	
Sensors with handle (screw clamp)			
ABD06.102	200 02 0081	40 x 100* x 55 [75] mm	2 x M6, depth 8 mm 54 mm | 30 mm
ABD06.116	200 02 0021	40 x 100* x 67.5 [85] mm	4 x M6, depth 10 mm 70 mm | 30 mm
ABD06.123	200 02 0148	40 x 100* x 67.5 [85] mm	4 x M6, depth 10 mm 70 mm | 30 mm

Abbreviations: L = sensor length; W = sensor width; H = sensor height; H max = height with handle; Sc W = screw distance in sensor width; Sc L = screw width in sensor length
** Value depending on handle position, approx. 10 mm*

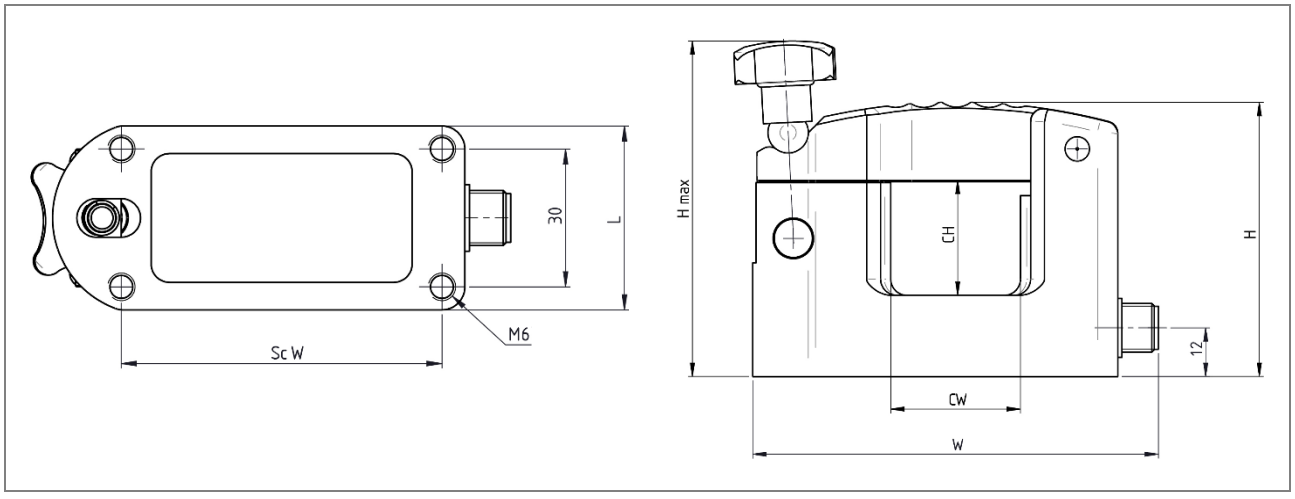
Technical drawings



Sensor design with screw cover



Sensor design with hinged cover



Sensor design with handle

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

SONOTEC Ultraschallsensorik Halle GmbH

U-F-M B.V.
Argon 24

4751XC Oud-Gastel
The Netherlands

T +31 (0) 165 855 655
E info@u-f-m.nl
www.u-f-m.nl

Official Sonotec dealer in The Netherlands:
UFM
Ultrasonic Flow Management