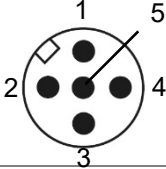
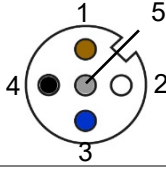


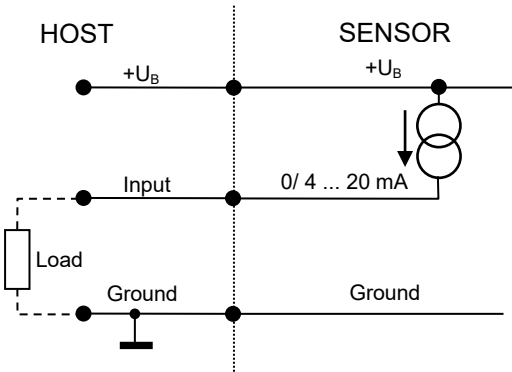
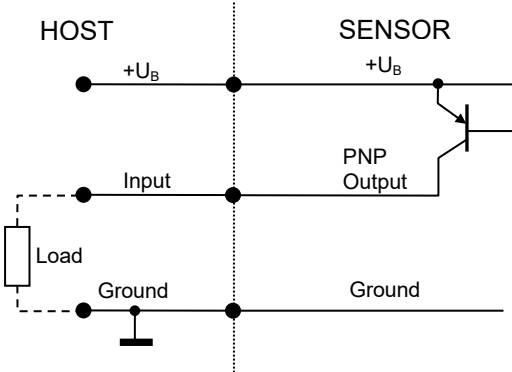


The air bubble detector SONOCHECK® ABD06.xxx with analogue output is used to detect air, gas bubbles and foam in liquid filled tubes made of synthetic materials. It also serves as wet/dry indicator. Typical applications are in **biotechnology** or industrial applications in the automation, **semiconductor 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

| SONOCHECK® 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 |

| Requirements for tube (provide us with a tube sample, if possible; list of sensors and tubing properties behind) | Parameter | Property | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--------|------------|---|-------|-------------------------------------|---|-------|-----------|---|------|--------|---|-------|--------|---|------|-----------|-----------|--|---|
| | Material | Hard or soft plastic tubes (e.g. PTFE, FEP, PFA, PVC, Silicone, PUR, PE, reinforced tubing; other materials on request or after test only) | | | | | | | | | | | | | | | | | | | | |
| | Special features | Tube must be smooth on outside, no fabric tube | | | | | | | | | | | | | | | | | | | | |
| | Wall thickness | Depending on application, optimal 10 ... 20 % of outer diameter for typical usage | | | | | | | | | | | | | | | | | | | | |
| Tube is inserted into sensor dry, no coupling medium required | | | | | | | | | | | | | | | | | | | | | | |
| Requirements for liquid | Water, saline, other solutions, paint, glue or low-viscosity liquids containing no or few solids in general. | | | | | | | | | | | | | | | | | | | | | |
| | i 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. | | | | | | | | | | | | | | | | | | | | | |
| Protection | IP67 | | | | | | | | | | | | | | | | | | | | | |
| Operating voltage | +12 ... 30 VDC, ripple max. 10 %, protection against reverse polarity | | | | | | | | | | | | | | | | | | | | | |
| Current consumption | Max. 50 mA (without switching current) | | | | | | | | | | | | | | | | | | | | | |
| Connecting cable | M12 sensor cable, 5 pins | | | | | | | | | | | | | | | | | | | | | |
| Pin assignment | <i>Male connector at the sensor</i>  | <i>Female connector at the cable</i>  | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Pin</th> <th>Colour</th> <th>Connection</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Brown</td> <td>Power supply voltage +12 ... 30 VDC</td> </tr> <tr> <td>2</td> <td>White</td> <td>RS485 - 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>RS485 - B</td> </tr> <tr> <td colspan="2">Shielding</td> <td>If available: should be grounded on the side of host.</td> </tr> </tbody> </table> | Pin | Colour | Connection | 1 | Brown | Power supply voltage +12 ... 30 VDC | 2 | White | RS485 - A | 3 | Blue | Ground | 4 | Black | Output | 5 | Grey | RS485 - B | Shielding | | If available: should be grounded on the side of host. |
| Pin | Colour | Connection | | | | | | | | | | | | | | | | | | | | |
| 1 | Brown | Power supply voltage +12 ... 30 VDC | | | | | | | | | | | | | | | | | | | | |
| 2 | White | RS485 - A | | | | | | | | | | | | | | | | | | | | |
| 3 | Blue | Ground | | | | | | | | | | | | | | | | | | | | |
| 4 | Black | Output | | | | | | | | | | | | | | | | | | | | |
| 5 | Grey | RS485 - B | | | | | | | | | | | | | | | | | | | | |
| Shielding | | If available: should be grounded on the side of host. | | | | | | | | | | | | | | | | | | | | |
| Outputs (specification can be adopted with the Monitor software) | Configurable as: <ul style="list-style-type: none"> 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 RS485 service interface (default factory setting) | | | | | | | | | | | | | | | | | | | | | |

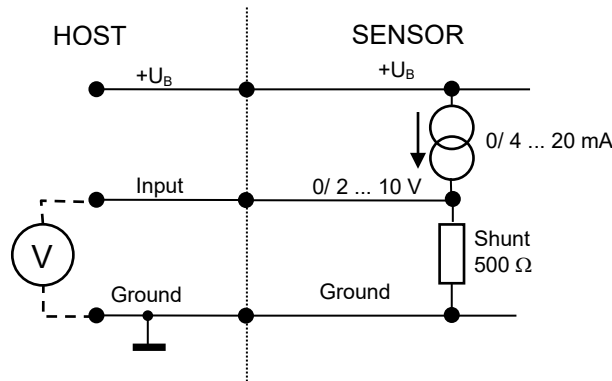
| <p>Configuration as: Current output (factory setting)</p> | <p>The current output can be configured in the range of 0 ... max. 25 mA</p>  <p>Example: Measuring range 4 ... 20 mA / error output 0 mA or 22 mA</p> <p>CAUTION! Pay attention to the max. load depending on the operating voltage: 12 V: 0 ... 400 Ω 24 V: 0 ... 200 Ω 30 V: 0 ... 100 Ω</p> | | | | | | | | |
|--|--|-------|---------------------|--------------|-------|-------|--------|----------------------------|-------|
| <p>Output specification (default configuration)</p> | <table border="1"> <thead> <tr> <th>State</th> <th>Current output</th> </tr> </thead> <tbody> <tr> <td>Air / Bubble</td> <td>20 mA</td> </tr> <tr> <td>Fluid</td> <td>4 mA</td> </tr> <tr> <td>Internal error (self-test)</td> <td>0 mA</td> </tr> </tbody> </table> | State | Current output | Air / Bubble | 20 mA | Fluid | 4 mA | Internal error (self-test) | 0 mA |
| State | Current output | | | | | | | | |
| Air / Bubble | 20 mA | | | | | | | | |
| Fluid | 4 mA | | | | | | | | |
| Internal error (self-test) | 0 mA | | | | | | | | |
| <p>Configuration as: Switching output / PWM output</p> | <p>PNP und PWM, switching current max. 25 mA</p>  <p>NOTE! In the event of a short circuit the current is limited internally to approx. 33 mA</p> | | | | | | | | |
| <p>Output specification (default configuration)</p> | <table border="1"> <thead> <tr> <th>State</th> <th>Level of PNP-Output</th> </tr> </thead> <tbody> <tr> <td>Air / Bubble</td> <td>+24 V</td> </tr> <tr> <td>Fluid</td> <td>Ground</td> </tr> <tr> <td>Internal error (self-test)</td> <td>+24 V</td> </tr> </tbody> </table> | State | Level of PNP-Output | Air / Bubble | +24 V | Fluid | Ground | Internal error (self-test) | +24 V |
| 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

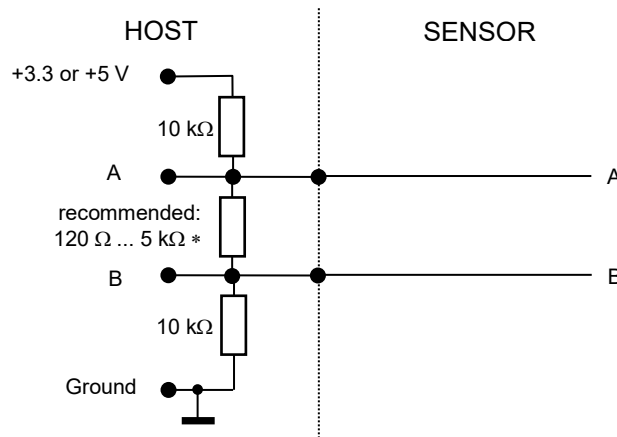


CAUTION! Pay attention to the internal resistance (shunt) at the connection of voltage output. Adhere to the maximum output voltage depending on the operating voltage: 12 V: 0 ... 9 V | 14 V: 0 ... 10 V | 18 V: 0 ... 12.5 V

RS485 Service interface

Half-duplex operation / 115.200 baud / no parity / 1 stop bit / no handshaking / Bus operation not possible

Recommended electrical connection of the RS485 interface



* According to bus standard: depending on number of sensors and cable length

i 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.

| | |
|--------------------------------------|---|
| <p>Directives / Standards</p> | <p>Electromagnetic compatibility, tests in compliance with DIN EN 61326-1: 2013</p> <p>EN 61000-4-3 EMC, radiated radio-frequency - electromagnetic field immunity, test result A, test with 10 V/m (0.15 ... 1000 MHz)</p> <p>EN 61000-4-4 EMC, electrical fast transient/burst immunity test, test result A (see restrictions below)</p> <p>EN 61000-4-6 EMC, immunity to conducted disturbances, induced by radio-frequency fields, test result A, test with 10 V/m</p> <p>EN 55011 Electromagnetic disturbance characteristics, limit 30 dBμV/m</p> <p>i 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.</p> |
| <p>Scope of delivery</p> | <ul style="list-style-type: none"> • 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 |
| <p>Accessories / Options</p> | <p>M12 sensor cable, 5 pins, length 2 m / 5 m / 10 m</p> <p>ABD Monitor, consisting of:</p> <ul style="list-style-type: none"> • USB Data Converter Type 011 (for RS 485) • Power supply • USB cable, type A-B, length 2 m • Software ABD Monitor <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 or PWM value <p>Furthermore measurement values can be recorded for diagnosis.</p> |
| <p>Customization</p> | <p>Customized modifications for special applications upon request (e.g. adapted channel width, individual output specifications or settings)</p> |

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:

| SPECIFICATION SONOCHECK® | 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 | | | | | | |
| ABD06.120 | 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" |

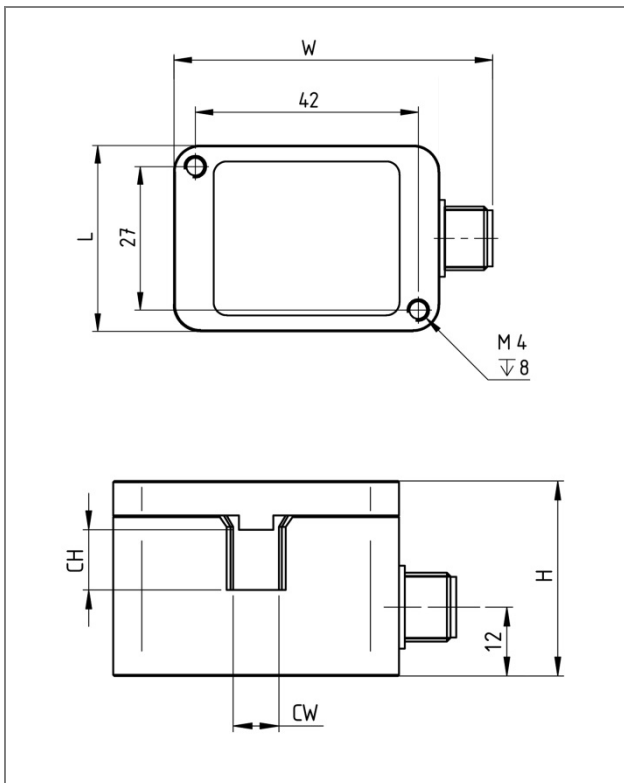
Abbreviations: CW = channel width at the narrowest part of the channel; CH = channel height; OD = outer diameter; ID = inner diameter

| SPECIFICATION SONOCHECK® | ART.-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 | |
| ABD06.114 | 200 02 0114 | 35 x 50 x 34 mm | 2 x M4, depth 8 mm 42 mm 27 mm |
| ABD06.119 | 200 02 0125 | 35 x 50 x 38 mm | |
| Sensors with hinged cover | | | |
| ABD06.120 | 200 02 0024 | 45 x 73 x 34 mm | |
| ABD06.117 | 200 02 0137 | 45 x 73 x 39 mm | 2 x M4, depth 8 mm 42 mm 27 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 |

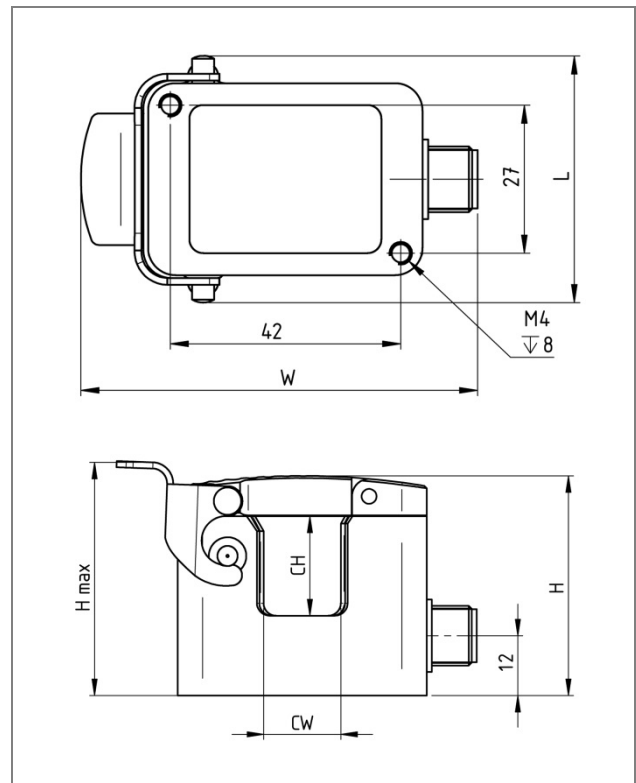
Abbreviations: L = sensor length; W = sensor width; H = sensor height; H max = height with handle;
Sc W = screw distance in sensor width; Sc L = screw width in sensor length

* Value depending on handle position, approx. 10 mm

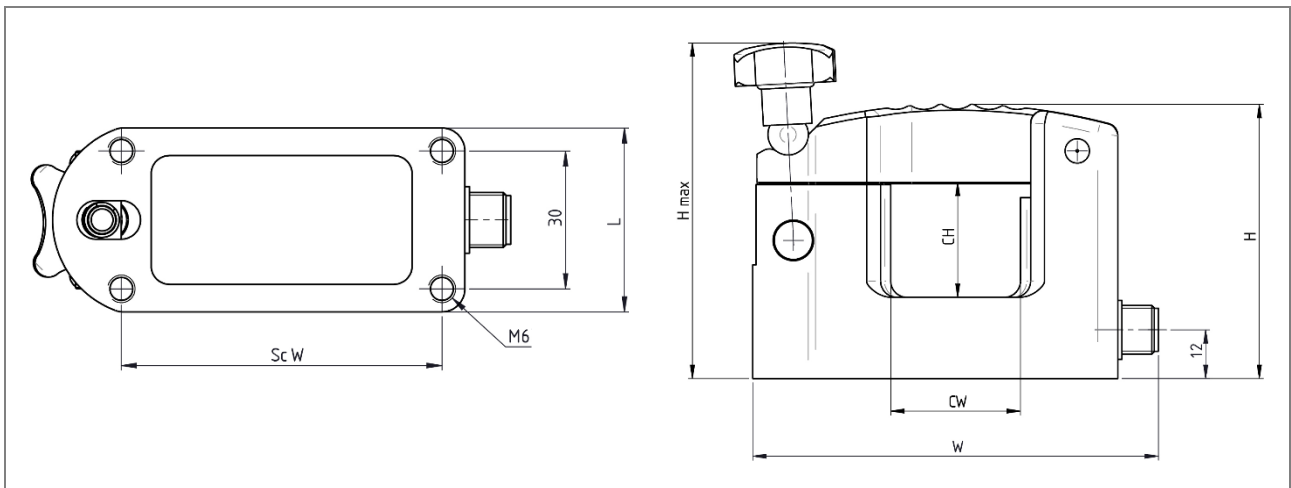
Technical drawings



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.

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