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. Industrial applications in the automation, semiconductor or food and beverage industry (e.g. filling processes of glue, paint and lubricants) are typical.
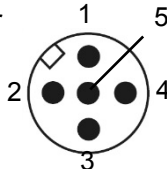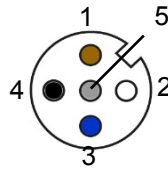
The SONOCHECK ABD06 with analog output is designed as a component for fixed installation in machines and equipment. The sensor has no contact with the liquid. The sensors have a configurable analogue output for the **distinction of bubble size in a wide range** and are suitable **especially for the use on hard plastic tubing** and under harsh process conditions (concerning pressure, flow rate, vibration).
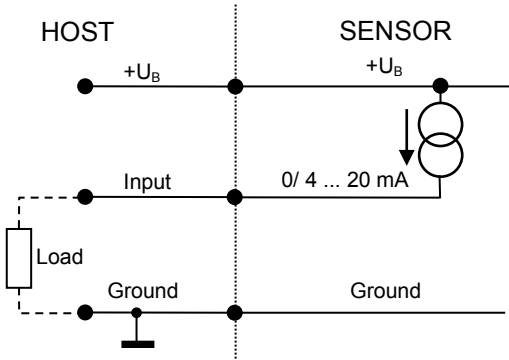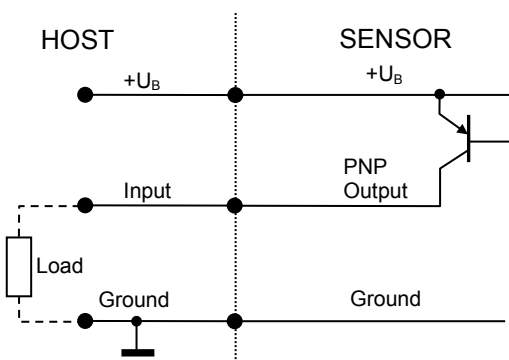
Technical data

SONOCHECK ABD06.xxx with Analogue Output 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 to + 60 °C
Storage temperature	-20 °C to +70 °C
Materials	Housing: Plastic PET black; Cover: Plastic POM black; Potting: PUR
Mounting	2 x recessed M4 threaded holes on rear of sensor

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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, 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. Foam 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

Male connector at the sensor

Female connector at the cable

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:

- 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
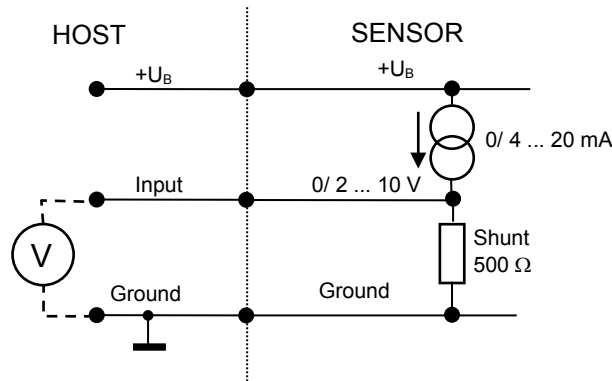- RS485 service interface (default factory setting)

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Configuration as: **Current output (factory setting)**	The current output can be configured in the range of 0 … max. 25 mA

HOST   SENSOR

$+U_B$ $+U_B$

Input   0/ 4 ... 20 mA

Load

Ground   Ground

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

HOST   SENSOR

$+U_B$ $+U_B$

Input   PNP Output

Load

Ground   Ground

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

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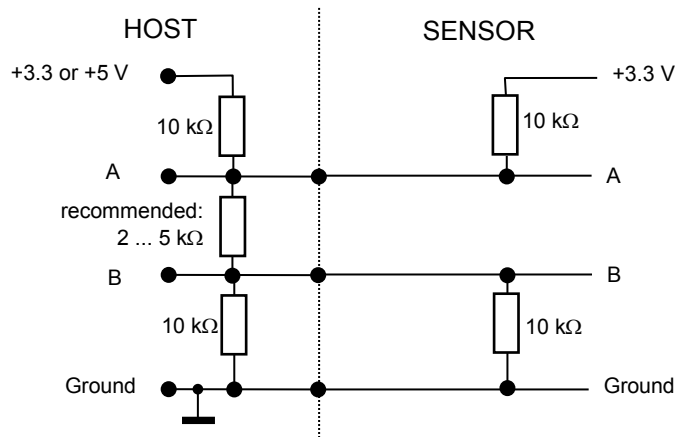|	
Configuration as: **Voltage output**	The current output is used as voltage output. Internally a shunt (500 Ω) is connected to output. The voltage output can be configured in the range of 0 … max. 12.5 V. Example: Measuring range 2 …10 V / error output 0 V or 11 V ⚠ **CAUTION!** Pay attention to the 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 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.

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
	ℹ️ **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, dimensions adjusted to sensor and tube • Data sheet
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 unit • 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)

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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:

Spec. SONOCHECK	Art.-No.	Sensor			Tube	
		Dimensions (L x W x H)	CW	CH	OD	ID
Cover with screws						
ABD06.115	200 02 0116	50 x 35 x 32 mm	5.6 mm	11.0 mm	6.0 ... 8.0 mm	2.5 ... 7.0 mm
ABD06.114	200 02 0114	50 x 35 x 34 mm	8.0 mm	13.0 mm	9.0 ... 11.5 mm	4.0 … 10.0 mm
ABD06.119	200 02 0125	50 x 35 x 38 mm	11.0 mm	17.0 mm	12.0 ... 15.5 mm	6.0 ... 13.5 mm
Hinged cover						
ABD06.120	200 02 0024	73 x 45 x 34 mm	7.2 mm	11.5 mm	8.0 … 10.0 mm	3.5 … 8.0 mm
ABD06.117	200 02 0137	73 x 45 x 39 mm	12.0 mm	15.5 mm	13.0 … 17.0 mm	6.5 … 15.0 mm
ABD06.121	200 02 0126	73 x 45 x 44 mm	15.5 mm	20.0 mm	17.0 ... 22.0 mm	10.0 ... 20.0 mm

Abbreviations: L = sensor length; W = sensor width; H = sensor height; CW = channel width at the narrowest part of the channel; CH = channel height (without cover); OD = outer tube diameter; ID = inner tube diameter

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Technical drawings
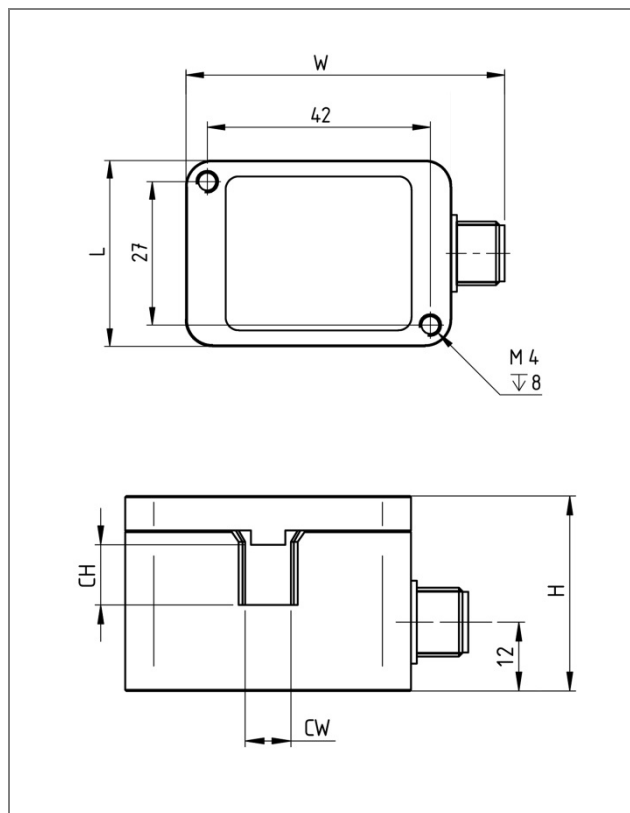
Design version: Cover with screws
(The drawings are not to scale)
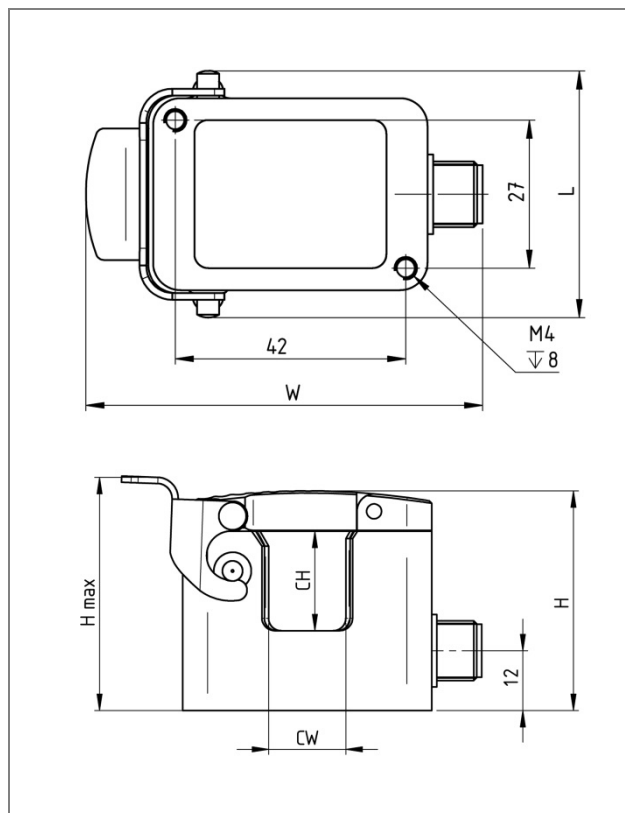
Design version: Hinged cover

Drawings are not to scale. Information is subject to change without notice!

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