

SONAPHONE

Ultrasonic Testing Device for Preventive Maintenance

User Documentation:
Structure-Borne Sound Sensor BS20



© SONOTEC Ultraschallsensorik Halle GmbH
All rights reserved.

Revision: 1.0; Date: 2017-11-06
Subject to technical modifications!

Content

1	Information on this document.....	5
1.1	General.....	5
1.2	Symbols used.....	6
2	Sensor description	7
2.1	Applications and designated use	7
2.2	Functioning.....	7
2.3	Connections, operating and display elements	8
2.4	Accessories for the structure-borne sound & temperature sensor BS20	10
2.5	Device identification/type label.....	11
3	Sensor operation	12
3.1	Connecting the sensor	12
3.2	Assembling and disassembling waveguides.....	13
3.3	Using the waveguides	14
3.4	Operation via the buttons on the sensor	14
3.5	Temperature measurements.....	15
3.6	Cleaning and maintenance	15
4	Disposal.....	16
5	Warranty	17

(This page has been deliberately left empty)

1 Information on this document

1.1 General

This document forms part of the structure-borne sound sensor BS20 and should therefore be stored in its immediate vicinity where it can be accessed by all operators at any time. It contains all the instructions to ensure safe operation of the structure-borne sound sensor with the SONAPHONE, as well as all the information needed to ensure proper and efficient use. It must therefore be read prior to first use and before carrying out any further steps.

**WARNING**

The structure-borne sound sensor BS20 must only be operated by users who have read (in full) and understood the safety information in the corresponding document and the provided user documentation.

This document has been created with all due care. SONOTEC does not assume any guarantee of the completeness, correctness and current validity of the provided data and is not liable for errors or omissions.

Please note that the user documentation for the SONAPHONE is made up of different sections due to the device's modular construction. The scope of supply will vary depending on the device and accessory options that have been ordered.

1.2 Symbols used

Hazards or special information are indicated in the following ways:



Warns of possible **imminent dangers** which, if ignored, may lead to **lasting adverse health effects and/or serious material damage**.



Warns of dangers which, if ignored, may lead to **injury and/or material damage** - including financial losses due to operational interruptions.



Warns of dangers which, if ignored, may lead to **material damage** – including financial losses due to operational interruptions.



Note

This section provides information or draws attention to special features.

2 Sensor description

2.1 Applications and designated use

The structure-borne sound sensor with exchangeable waveguides is used for applications including:

- Status monitoring of machines, systems and plant components
- Function checking of steam traps and valves
- Monitoring of wear and malfunctions in bearings
- Monitoring of lubrication conditions

2.2 Functioning

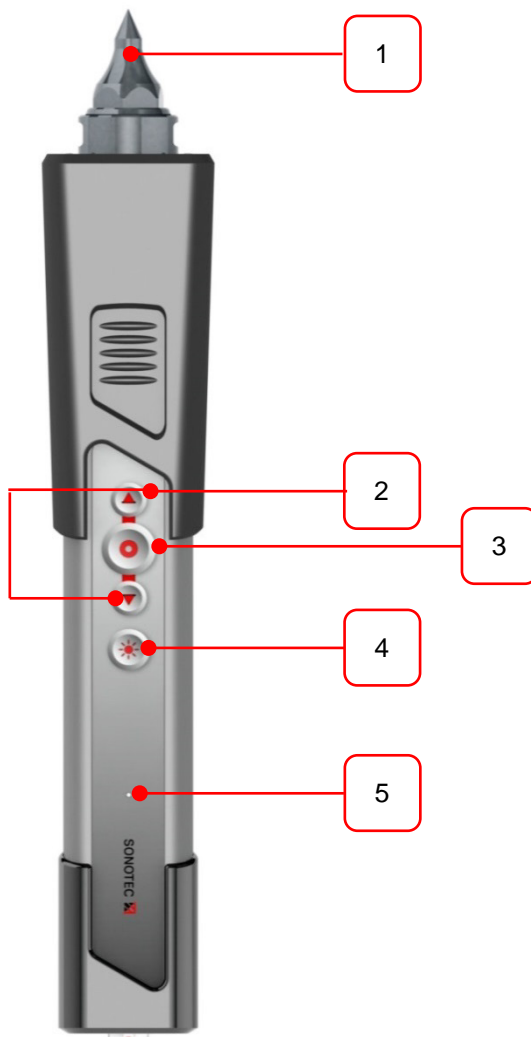
The **waveguide** conducts the ultrasonic waves from the test point to the ultrasonic transducer.

The **ultrasonic transducer** converts ultrasonic waves (vibrations) to an electrical signal over a wide frequency range. This electrical signal is amplified and digitalized within the sensor. Further data processing and output takes place in the testing device.

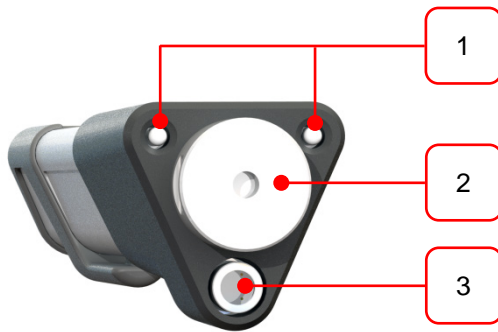
The integrated **infrared temperature sensor** allows for contactless and quick recording of the test object's surface temperature. The size of the visual recording field depends on the distance between the sensor and the test object.

The **LED lights** act as a torch, making it easier to connect the sensor to test points in poorly lit environments.

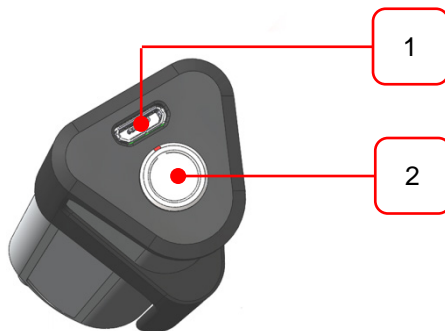
2.3 Connections, operating and display elements



No.	Operating and display elements
1	Sensor accessory: Short waveguide (standard)
2	Adjusting the volume
3	Starting/stopping the measurement recording
4	LED lights (torch) on/off
5	Status LED



No.	Sensor elements and connections
1	LED lights (torches)
2	Ultrasonic transducer – coupling surface (internal thread M5)
3	Infrared temperature sensor



No.	Connections
1	USB connection (for service work only)
2	Socket for sensor cable with marked plug-in position

2.4 Accessories for the structure-borne sound & temperature sensor BS20

The intensity and behavior of ultrasonic signals depend on factors such as the process during which they are generated. Options for verifying and recording the signals and for providing these to the user in high-quality format so that useful statements can be made with regard to system conditions are also dependent upon a number of different factors.

In order to record high-quality signals for processing in the structure-borne sound & temperature sensor BS20, waveguides are available for different testing tasks.

In order to ensure optimal results, please observe the fields of application for the accessories as well as the corresponding instructions.

Short waveguide BS20-1

Accessory for structure-borne sound and temperature sensor BS20 (standard)

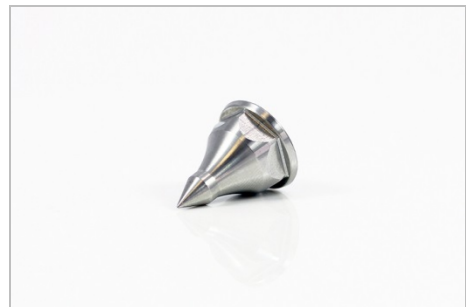


Fig. 1: Short waveguide BS20-1

The waveguide is used to record ultrasonic waves that spread in solid structures, and to pass these on for processing in the sensor. Sufficient contact pressure is required in order for this to work correctly.

Note: For comparable results, sound should always be recorded from the same position. It may be useful to attach a punch point at the required position.

Long waveguide BS20-2 (optional)

Accessory for structure-borne sound and temperature sensor BS20

Application:

Tests on hard-to-access points



Fig. 2: Long waveguide BS20-2

This waveguide, which is longer than the BS-20-1, makes it possible to reach test points that are harder to access. The long waveguide also makes it possible to carry out tests on hot surfaces.

The signals will be slightly modified as a result of the longer sound path, and this will need to be taken into account in the evaluation.

Magnetic waveguide BS20-3 (optional)

Accessory for structure-borne sound and temperature sensor BS20

Application:

For connection at the test point for long-term testing and for ensuring even contact pressure





Fig. 3: Magnetic waveguide BS20-3

In order to ensure usable test results with long-term testing or comparative tests, even contact pressure is required. This can be achieved using the magnetic waveguide. Following connection to the test point, the magnetic coupling ensures even recording of ultrasonic signals.

2.5 Device identification/type label

The type label is located on the back of the device, and should be to hand in the event of a service call. As well as the sensor designation, the following information can also be found on the housing:

Model-ID: Sensor 12345 | Serial-No.: 12345 | 
SONOTEC  Nauendorfer Str. 2 06112 Halle Germany

3 Sensor operation

⚠ WARNING**Danger of injury!**

- The sharp ends of the waveguides can cause injuries, and even serious injuries in the case of the long waveguide. Make sure never to injure anyone with the sharp ends of the waveguides. Never direct the tip at other people.
- The high magnetic force of the waveguide can lead to crushing injuries to the hands. Place the magnetic waveguide onto the test object at an incline and as slowly as possible.

3.1 Connecting the sensor

ATTENTION**Risk of damage to the connectors!**

Take note of the red dots indicating the plug-in position on the plug and socket.

- ⇒ Connect the sensor to the SONAPHONE in accordance with the red dots, making sure to use the designated cable.
- ⇒ The sensor is powered via the cable, and the test data is transferred to the SONAPHONE automatically.
- ⇒ The sensor is ready for operation when the operating display LED lights up green.

3.2 Assembling and disassembling waveguides

ACHTUNG**Risk of device damage and incorrect test values!**

- Risk of destruction of the waveguide holder as a result of incorrect assembly and disassembly. Always use the two elements of wrench set BS20 (see image below) to assemble and disassemble the waveguides.
- Make sure that the waveguides are securely screwed into the holder. The ultrasound is guided to the ultrasonic transducer by the waveguides. Loose waveguides may have an impact on the signals.

The screw thread in the waveguide holder is used to attach the sensor accessory parts onto the sensor shaft. The wrench set BS20 prevents damage when screwing the waveguides on and off.

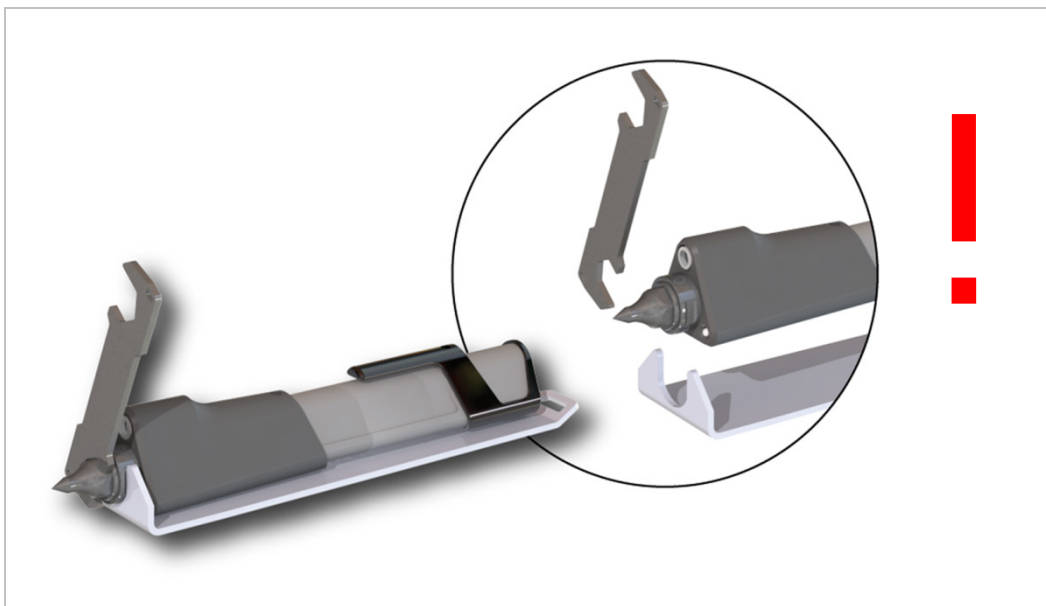


Fig. 4: Assembly and disassembly of the waveguides using the wrench set BS-20

**Note!**

The warranty will become invalid in the event of damage due to removing the waveguides without the wrench set BS20.

3.3 Using the waveguides

During testing, the sensor should be pressed against the object being tested in as vertical a position as possible and using gentle, even pressure.

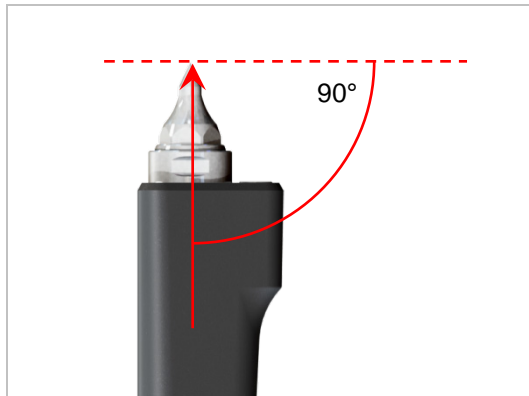


Fig. 5: Optimal contact angle for testing with waveguides

3.4 Operation via the buttons on the sensor

Measurements can be controlled via the touchscreen on the device or via the buttons on the sensor itself.

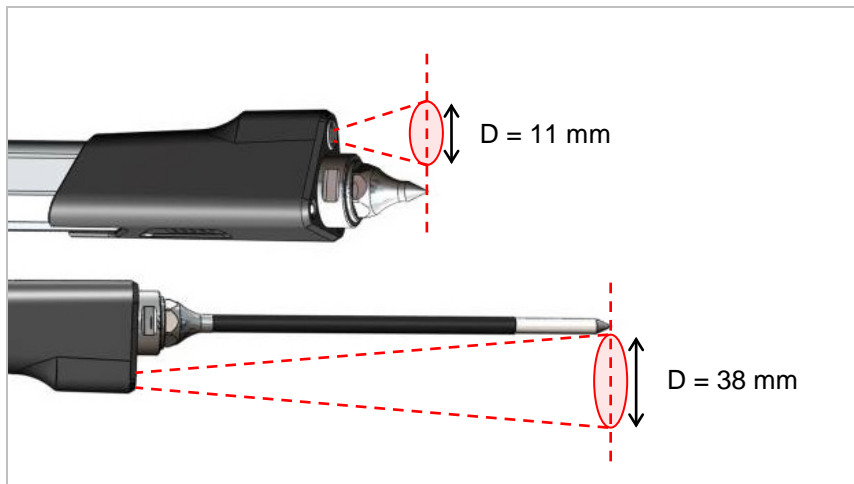
The acoustic playback volume can be adjusted using the function buttons. Testing can also be started and stopped. The LED lights (torches) also help with the precise location of damage areas.

The internal thread on the sensor and the magnetic waveguide BS20-3 make it possible to carry out quasi-stationary tests using the SONAPHONE.

3.5 Temperature measurements

**Note!**

For correct temperature measurements, make sure that the surface of the temperature sensor is free from contamination.



The infrared temperature sensor is calibrated on a black emitter that emits the maximum possible temperature (100 % emission → emissivity value $\varepsilon = 1$). As the emission characteristics of the surfaces of measurement objects will deviate from this value, this will need to be taken into account for the contactless temperature measurement.

Painted or oxidized surfaces usually have an emissivity value of 0.9. This setting is suitable for many measurement tasks. Additional values for frequently used materials can be found in emissivity value tables.

The emissivity value can be set at the SONAPHONE as follows:
In the LevelMeter app, under the

⇒  Settings ⇒ Temperature measurement

menu item, a material with a stored emissivity value can be selected, or an emissivity value specified manually.

3.6 Cleaning and maintenance

The sensor is maintenance-free. It can be cleaned externally using a damp cloth and a mild, non-abrasive cleaning agent.

4 Disposal

Electrical and electronic equipment can pose serious health and environmental risks if it is not properly disposed of. For this reason it must not be disposed of in domestic waste according to WEEE directive 2012/19/EU (Waste Electrical and Electronic Equipment Directive) but separately at designated collection points or has to be sent back to the manufacturer.

The following symbol on the device refers to the legal obligation in Germany to arrange a separate disposal for electronic equipment.



It has to be handled according to specific processes (e.g. concerning the batteries or circuit boards) to ensure a safe, environmentally-friendly recycling or the separate disposal of different device components.

The taking back of used equipment is regulated differently in the various countries and regions. Consult the local authorities and other competent public authorities to inform yourself about the taking back conditions of commercially used electrical equipment. The device and also the battery do not contain harmful substances that have to be labelled separately regarding the disposal as mercury (Hg), cadmium (Cd), lead (Pb) or hexavalent chromium (e.g. in galvanized parts or circuit boards).

5 Warranty

The ultrasonic testing device and its corresponding sensors comply with the current state of the art and the safety regulations. All devices and accessory parts are factory tested and are delivered in a safe condition for operation. We reserve the right to make modifications to the device as part of ongoing product development, and to make changes to the shape and color.

Within the warranty period, SONOTEC Ultraschallsensorik Halle GmbH will rectify, free of charge, all defects caused by material or manufacturing errors. At its own discretion, SONOTEC Ultraschallsensorik Halle GmbH will provide a guarantee in the form of either a repair or the replacement of the defective device or component. The warranty does not cover the internal batteries or damage caused by improper use, wear or interventions in the device or sensors. The warranty also does not cover any defects that have only a negligible impact on the value or usability of the device.

The recording of valid test results, the interpretation of these results and any measures that are derived as a result are exclusively the responsibility of the user. SONOTEC does not assume any guarantee for the correctness of the recorded test values or test results. SONOTEC accepts no liability for any errors or damages that arise as a result of the further use of the recorded test and measurement values.

MANUFACTURER

Headquarters

SONOTEC Ultraschallsensorik Halle GmbH
Nauendorfer Str. 2
06112 Halle (Saale)

Phone: +49 (0)345 133 17-0
Fax: +49 (0)345 133 17-99

Email: sonotec@sonotec.de
Internet: www.sonotec.de

USA contact details

SONOTEC US Inc.
190 Blydenburgh rd
Suite 8 2nd floor

Phone: +1 631/415 4758

Email: sales@sonotecusa.com
Internet: www.sonotecusa.com
