Operating instructions
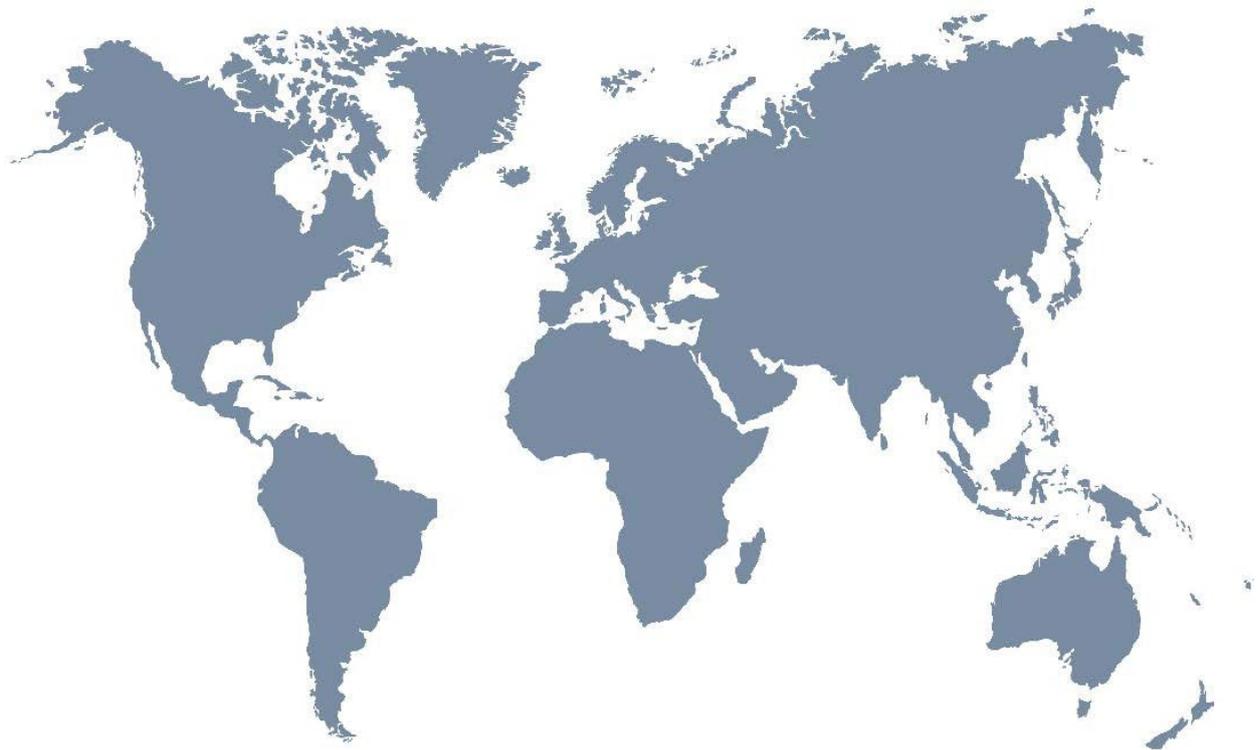
Sensor tester
IST 01

370-0501-en-Rev. 1.0 202509
Translation of the original operating instructions

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Keep the operating instructions for future reference!

Contents

1   General information

1.1 Manufacturer and designation

The operating instructions are an integral part of the scope of delivery and are also an important technical guide for the proper use of the system and for achieving its full functional benefits. At the same time, they represent an indispensable source of information for the user in terms of product liability, helping to protect both himself and the device from damage.

The IST 01 sensor tester was developed by:

Ibis GmbH
Werner-von-Siemens Straße 21
D-64319 Pfungstadt

and bears the full name:

Sensor tester IST 01

In the following pages, the full company name is replaced by the term "manufacturer."

1.2 Contact

Tel. ....+49.6157.949.370
Email ....sales.vg-ibis@hofmann-global.com
Website:...........www.hofmann-global.com

1.3 Property rights

The IST 01 sensor tester is the intellectual property of Hofmann Mess- und Auswuchttechnik GmbH & Co. KG.

All rights are reserved by the manufacturer and are subject to the German copyright law "Gesetz über Urheberrecht und verwandte Schutzrechte (UG)" of 9 September 1965, as amended.

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The above regulations also apply to the operating instructions.

All rights to drawings, software, and other documents, as well as any power of disposal, such as the right to copy and distribute, are held by Hofmann Mess- und Auswuchttechnik GmbH & Co. KG, even in the event of any application for property rights.

1.4 Notes on these operating instructions

1.4.1 Illustrations and drawings

Illustrations and drawings are for illustrative purposes only and do not always correspond in detail to the current version of the product.

1.4.2 Options

Individual features described may be options that are not included in every version delivered. Options are marked as such in the text.

1.4.3 Signal words in safety instructions and their meaning

NOTICE   Used when there is a risk of damage to property or the environment.

CAUTION   Indicates a potentially dangerous situation. Failure to observe the warning may result in minor injury.

WARNING   Indicates a potentially dangerous situation. Failure to observe this warning may result in death or serious injury.

DANGER   indicates an imminent danger. Failure to observe this warning may result in death or serious injury.

1.4.4 Information symbols

ℹ INFORMATION

Used for additional information

1. Requests you to take action.

1.4.5 Conventions in this manual

Softkeys

When softkeys are to be pressed, their names are shown in ***bold italics***.

Example: Press the ***Mode*** key.

1.5 Disposal

ℹ INFORMATION

Observe national laws and regulations for environmental protection.

ℹ INFORMATION

Do not dispose of the device or batteries with household waste. Use existing systems for the separate collection of devices and batteries, or send the device to be disposed of to:

Hofmann Mess- und Auswuchttechnik GmbH & Co. KG
Werner-von-Siemens Straße 21
D-64319 Pfungstadt

2 Safety information

ℹ️	**INFORMATION**
	The information contained in the operating instructions does not claim to be exhaustive!

2.1 Operation of the device on machines

The device is built according to the latest technology and generally accepted safety regulations and is safe to operate.

However, dangers may arise when using the device on machines if it is not operated by trained or at least instructed personnel and/or is used improperly or for purposes other than those intended. These dangers may include:

- Dangers to the life and limb of the user or third parties
- Damage to the device and other property of the user

⚡	**DANGER** **Danger of electric shock**
	Machines on which the device is to be used must be grounded. If this is not the case, life-threatening voltages may be present on the machine under certain circumstances.

⚠️	**DANGER** **General Hazard**
	The machine on which the device is to be used poses a hazard if it is operated improperly or is not in proper condition. The operating company is obliged to operate the machine only when it is in perfect condition. Hazardous areas between the device and customer-owned equipment must be secured by the operating company.

⚠️	**DANGER** **Danger of entangelement or entrapment**
	Arrange cables between the machine and the device in such a way that they cannot be pulled in or entangled. Otherwise, there is a considerable risk of injury.

2.1.1 Requirements for personnel

Personnel operating power-driven work equipment must ensure that they do not endanger themselves or others through dangerous movements. The operating company may only assign work on power-driven work equipment involving dangerous movements in which the device is used to personnel who are authorized to do so and

- can carry out the work independently and safely, or

- who have received prior instruction and are supervised by a person familiar with this work.

⚠ **DANGER**
General Hazard

Work on/with the device may only be carried out by personnel who are authorized to do so based on their training and qualifications. In addition, this personnel must be commissioned by the operating company.

2.2 Intended use

2.2.1 Intended use

The ST 01 sensor tester is designed exclusively for testing piezoelectric acceleration sensors with integrated charge amplifiers (so-called IEPE sensors, often also referred to as ICP® sensors or similar), which are supplied with constant current and are correctly connected to the device. The tests performed may vary depending on the sensor type. The test results are shown on the device display.

Experience has shown that measuring the bias voltage provides a high degree of information about the functionality of the sensor. If this is within the tolerance range, the charge amplifier built into the sensor is functional. In measurement mode, the device measures the vibration velocity in mm/s effective.

The sensor tester is not a stand-alone calibrator, as the sensor sensitivity must be calibrated by exposing the transducers to a defined vibration.

Specifically, the following tasks can be performed:

- Testing IEPE acceleration sensors for functionality
- Checking sensors with PT100 and PT1000 temperature elements

2.2.2 Permitted use

The device is intended exclusively for the use specified in the description and designation. Operation of the device is only permitted

- if these operating instructions have been read and understood in full,
- in accordance with the procedure described in these operating instructions

2.2.3 Prohibited use

Operation of the device is not permitted

- if the operating instructions have not been read and observed in full
- if it has been installed in a manner not described in the manual
- if the device is obviously damaged or inoperable

- if the environmental conditions are unsuitable for safe operation
- if a malfunction of the device could pose a danger to the life and limb of the user or third parties

2.3 Obligations of the operating company

ⓘ INFORMATION

The operating company is obliged by various protective laws to draw up instructions for employees and to ensure that the device is operated safely.

These protective laws are country-specific and differ in some respects. The operating company must consult the protective laws of their country; for Germany, for example, the following apply:

- Gewerbeordnung § 120a paragraphs 1 and 4
- U.V.-Vorschriften "Allgemeine Vorschriften" / "Kraftbetriebene Arbeitsmittel"

2.3.1 Obligation to inform

- Personnel assigned to work with the device must have read and understood the operating instructions, in particular the chapter "Safety measures," as well as the applicable regulations before starting work.
- Keep the operating instructions and applicable regulations in a place where they are accessible to operating and maintenance personnel.
- In addition to the operating instructions, observe and instruct on generally applicable legal and other binding regulations on accident prevention and environmental protection!

2.3.2 Obligations of the operator

- Read and observe the operating instructions before commissioning, operation, and repair!
- Observe occupational safety, trade association, and accident regulations, in particular wear protective equipment.

2.4 Warranty and liability

The warranty and liability are based on the contractually agreed terms and conditions.

ℹ INFORMATION

Damage caused by improper use or incorrect operation is not covered by the manufacturer's warranty obligations. The user bears the sole risk.

ℹ INFORMATION

Any modifications to the device without the manufacturer's knowledge and approval will void the liability and warranty claims.

2.4.1 Cleaning agents

Cleaning the device

- Only use special monitor cleaning agents and soft cloths or spectacle cleaning cloths!
- Wipe the surface with a slightly damp cloth.
- If necessary, rub dry with a soft cloth.

3 Sensor Tester IST 01

3.1 General description

The IST 01 sensor tester can be used to check IEPE acceleration sensors, including those with PT100/PT1000 temperature elements, for short circuits in the connections.
Interruptions in the circuit and correct bias voltage can also be checked. For temperature sensors, the measured resistance values are checked for plausibility.
As an additional test option, the vibration velocity can be output as an RMS value with the sensitivity and measuring range set accordingly.

3.2 Device overview

3.2.1 Connections and controls

Connection for plug-in power supply

Sensor connection adapter

BNC socket for sensor signal (input/output)

The sensor tester has 2 buttons, whose function is depending on the context and is indicated on the bottom line of the display.
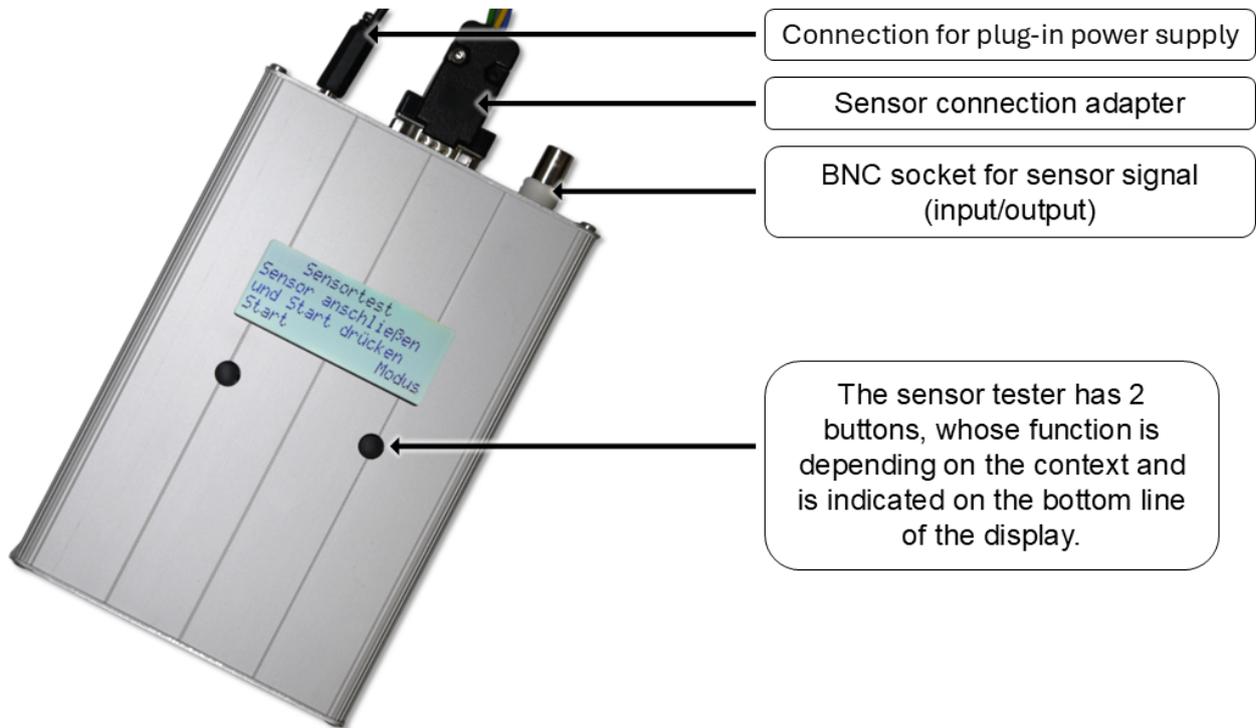
3.2.2 Assignment of the connector for the connection adapter

The Sub-D 9 socket is used to connect a connection adapter. Depending on the sensor type, different connection adapters can be used to establish the connection to the sensor.

The socket is assigned as follows:

Pin	Function	Description
1	Sensor signal	Signal connection for IEPE sensors
2	Sensor ground	Ground connection for IEPE sensors
3	Shield	Shield connection of the sensor cable
4	PT100 / PT 1000 signal	Signal connection for temperature sensor
5	PT100 / PT 1000 ground	Ground connection for temperature sensor
6	-	Currently not assigned
7	Housing	For connecting the sensor housing

3.2.3 Connecting a sensor

Use a connection adapter that is suitable for the respective sensor type.

The cables and terminals of the connection adapters are color-coded. As a rule, the color of the connection adapter cable corresponds to the wire color of the sensor cable.

Color of adapter cable	Color of terminal	Color of sensor cable	Function
White	White	White	Sensor signal
Brown	Black	Brown	Sensor ground
Gray	Gray (crocodile)	Shield	Sensor shield
Blue	Blue (crocodile)	Sensor housing	Sensor housing
Yellow	Yellow	Yellow	Signal temperature *1
Green	Green	Green	Ground temperature *1

*1 Only with sensor adapters 002 and A004 (see chapter 6)

When testing external sensors, please note that you must determine the assignment of the terminals to the sensor connection accordingly.
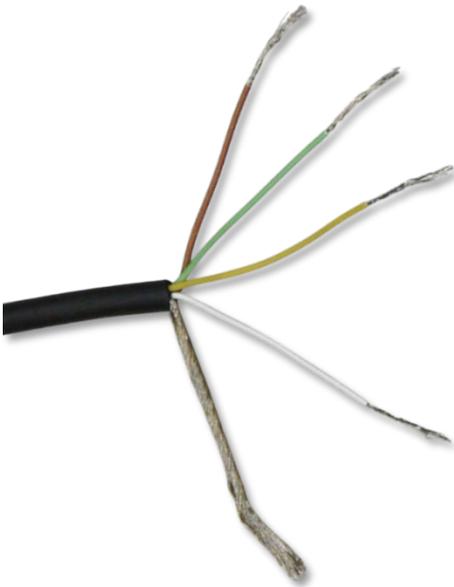
ⓘ INFORMATION

The connection terminals are short-circuit-proof. Nevertheless, make sure that no stripped wires come into contact with each other, as this will result in incorrect test results. Fan out the wires.

3.2.3.1 Connection of a single-wire sensor with metal housing

For example, Ibis types AI10.011.xxx, AI100.011.xxx
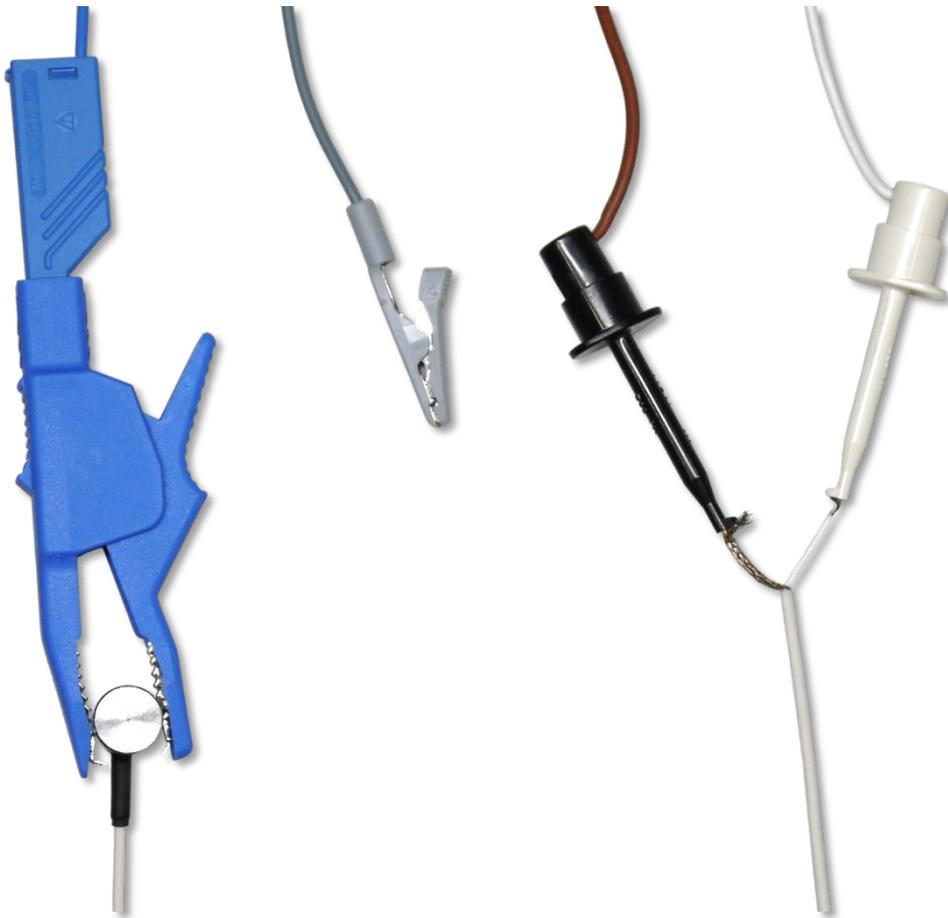
With this type of sensor, the cable shield is used as the ground wire. Therefore, the black terminal (brown cable) must be connected to the shield. The gray alligator clip remains unconnected.

3.2.3.2 Connection of a two-wire sensor with metal housing

For example, Ibis types AIxxx.021, AExxx.942, ARxxx.928
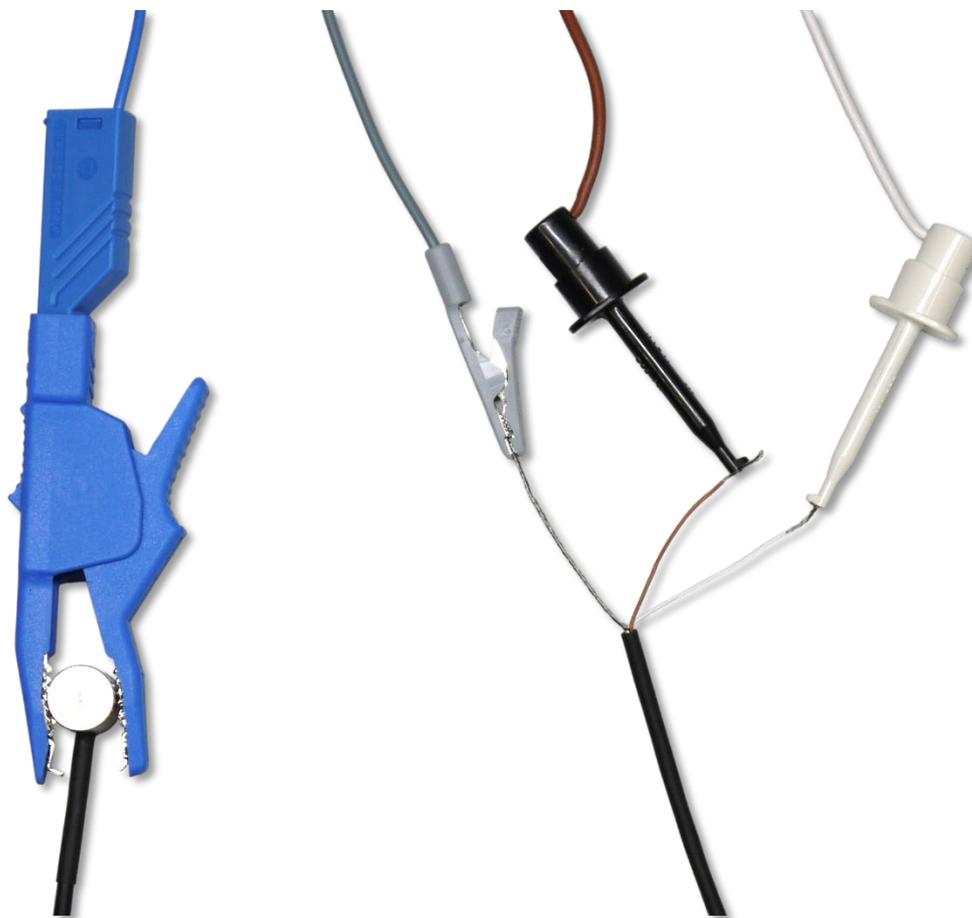
Simply connect the terminals to the respective wire color. The gray terminal is connected to the shield, while the blue alligator clip is connected to the housing.

3.2.3.3 Connection of a two-wire sensor with plastic housing

For example, Ibis types AIxxx.012.030, AIxxx.M16
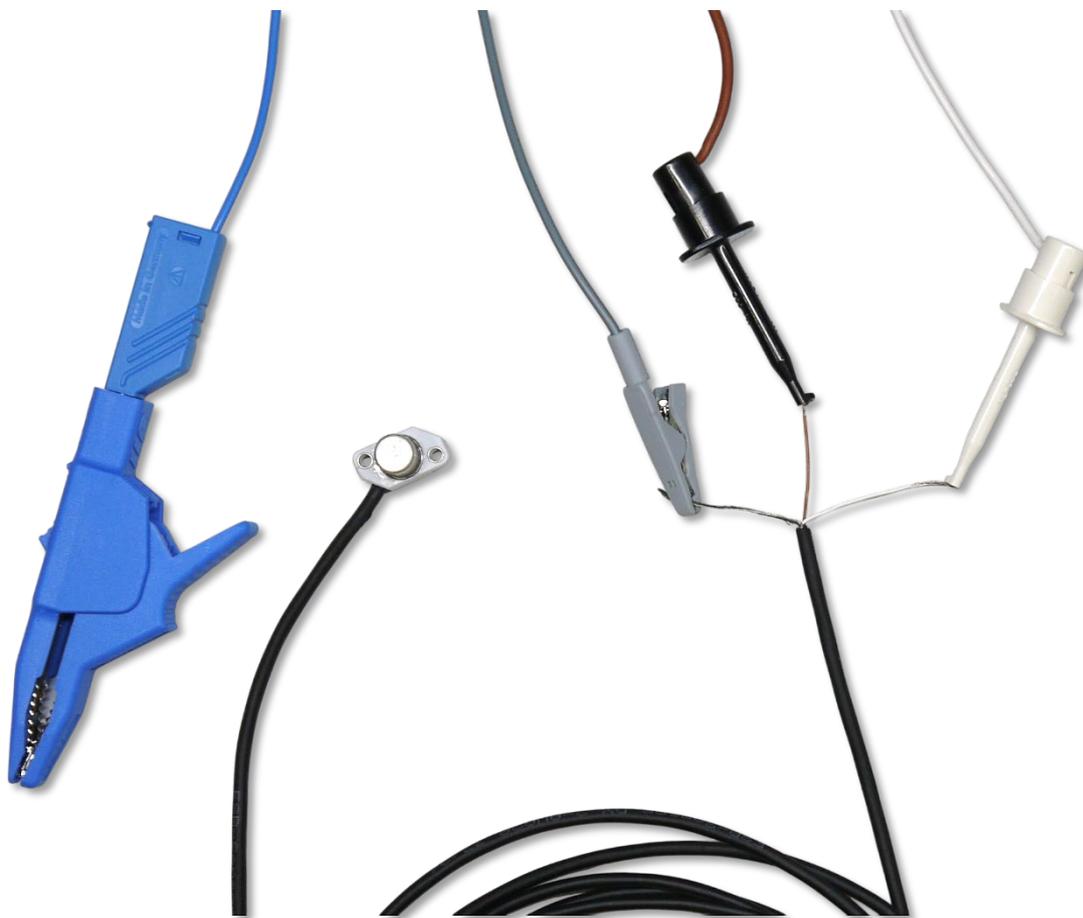
The blue crocodile clip is not connected for this sensor type. The metal part of the sensor is coated with a transparent protective lacquer that must not be damaged.

3.2.3.4 Connecting a sensor with a temperature element

For example, Ibis types ATIxxx.020.PT100x

The connection is made according to the wire colors. The gray alligator clip is connected to the cable shield. The blue alligator clip contacts the sensor housing.

3.2.3.5 Connecting a multi-axis sensor

For example, Ibis types AExxx.303
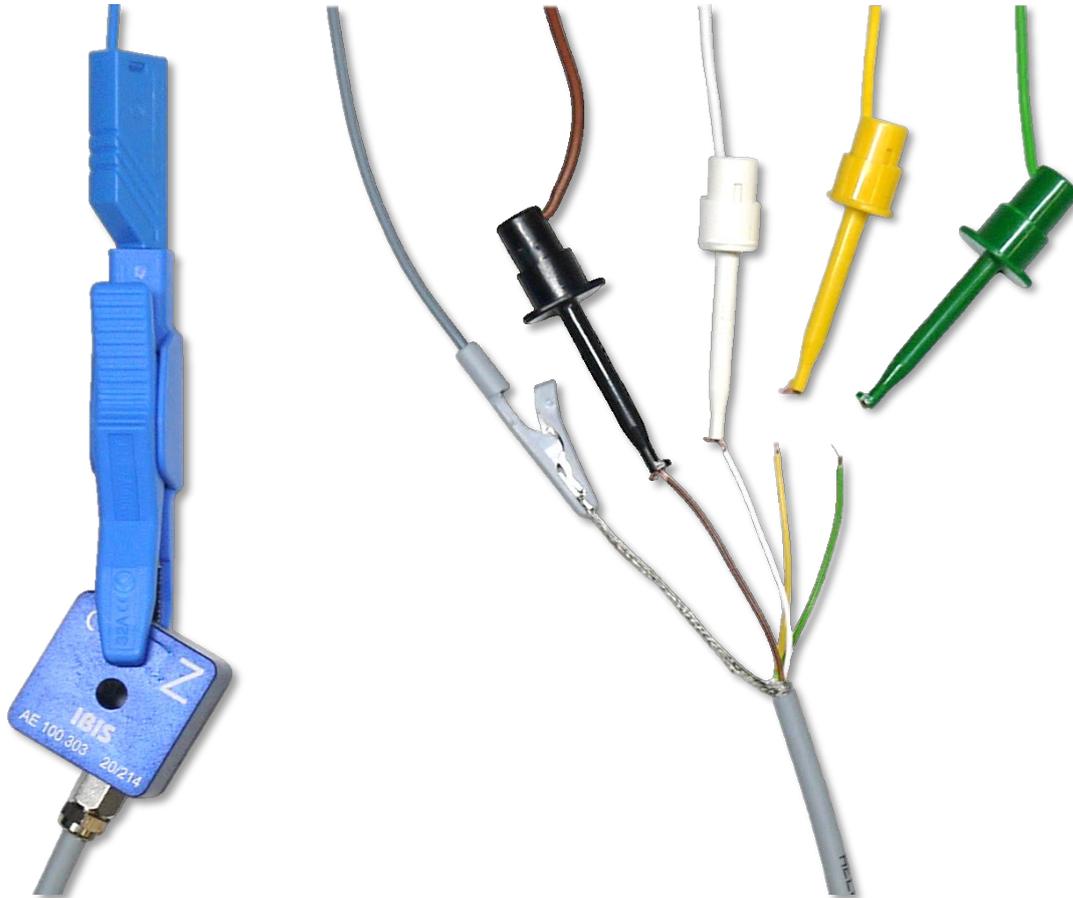
In this case, the yellow and green wires each correspond to a signal line for the additional measuring directions:

Color of adapter cable	Color of clamp	Color of sensor cable	Function
White	White	White	Sensor signal Z-axis
Yellow	Yellow	Yellow	Sensor signal Y-axis
Green	Green	Green	Sensor signal X-axis
Brown	Black	Brown	Sensor ground Z/Y/X
Gray	Gray (crocodile)	Shield	Sensor shield
Blue	Blue (crocodile)	Sensor housing	Sensor housing

Each individual measuring direction is tested according to the connection diagram for a two-wire sensor (see 3.2.3.2). All three signal wires must be connected to the white terminal one after the other and tested.

4   Test procedure

The sensor is connected to the tester using terminals on open sensor cable ends or a suitable connection cable. The sensor type is selected in the tester menu. Pressing the button starts the test sequence, which first tests for short circuits between the connections and also to the housing. The tester then supplies the sensor with a constant current of 4 mA and measures and displays the bias voltage (average DC voltage) across the sensor. Any errors are indicated by meaningful messages on the display.

4.1   Flowchart of test sequence

```
                                    ┌──────────────┐
                                    │   Turn on    │
                                    └──────┬───────┘
                                           │
                                           ▼
                        Menu              ╱◆╲
   ┌─────────────────┐ ◄────────────────╱     ╲
   │ Select language │                 ◆  Start  ◆
   └────────┬────────┘                  ╲ screen ╱
            │                            ╲◆╱
            │ OK                           │ Next
            └──────────────────────────────┤
                                           ▼
                        Mode              ╱◆╲
   ┌─────────────────┐ ◄────────────────╱     ╲
   │ Select sensor   │                 ◆ Sensor type ◆
   │ type with       │                  ╲(Standard sensor)╱
   │ PT 100 / PT     │                   ╲◆╱
   └────────┬────────┘                     │ Start
            │ Start                        ▼
            └──────────────────┐    ┌──────────────┐
                               └───►│Perform sensor│◄──────┐
                                    │    test      │       │
                                    └──────┬───────┘       │
                                           ▼               │
                        Mode              ╱◆╲              │
            ┌────────────────◄──────────╱     ╲            │
            │                          ◆ Display test ◆    │
            │                           ╲  result  ╱       │
            │                            ╲◆╱               │
            │                              │ Start         │
            └──────────────────────────────┴──────────────┘
```
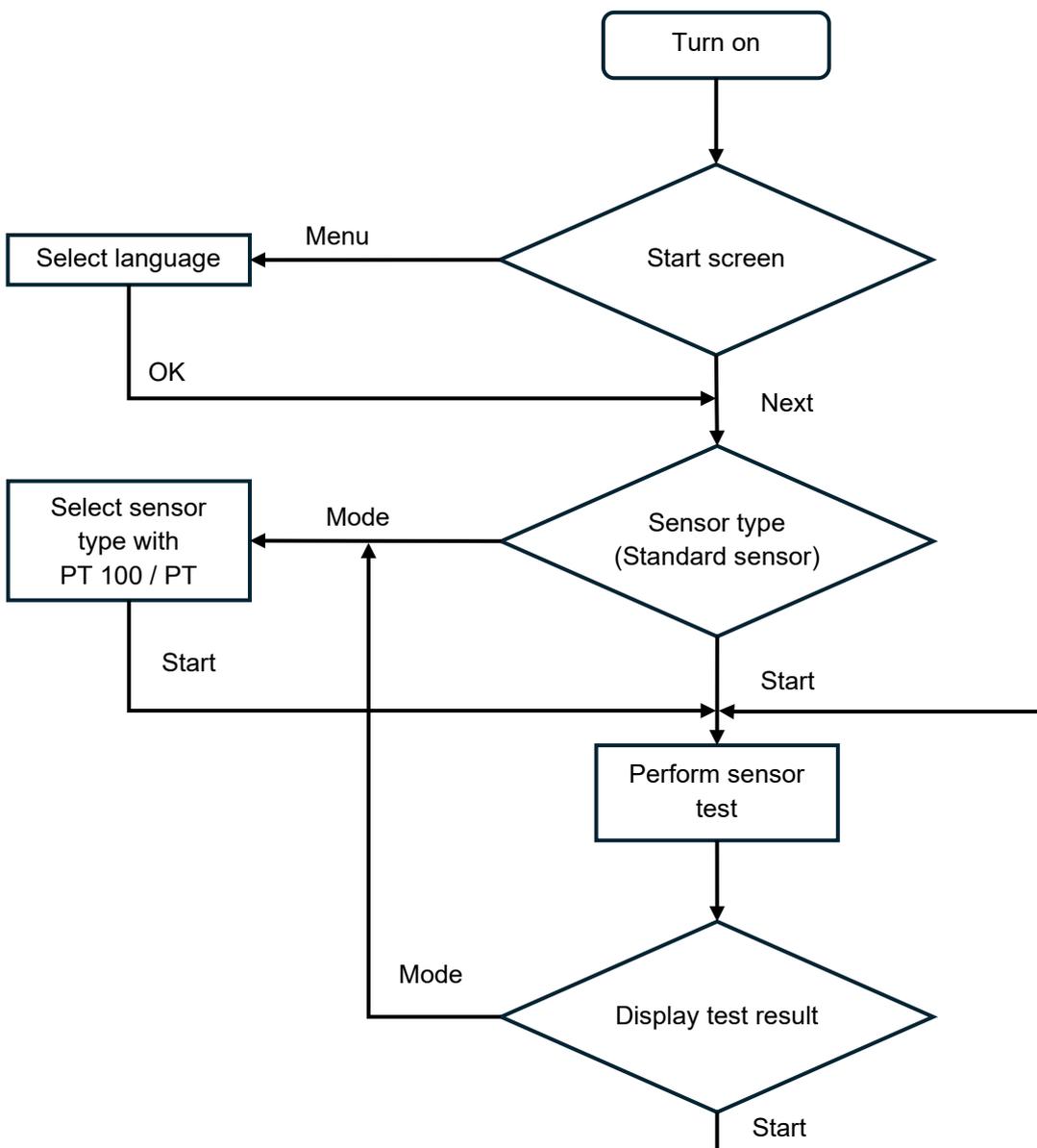
4.1.1 Switching on the device

Use the supplied plug-in power supply or another 24-volt DC source to power the device.

After switching on or connecting the power supply, the start screen appears:

```
       IBIS
 Sensortester IST01
     Version 1.0
Menue       [8]->next
```

- To change the display language, select *Menu*.
- To continue with the sensor test, select *Continue.*
- After approx. 10 seconds, the device automatically jumps to Next.

4.1.2 Select language

If you selected Menu on the start screen, you will be taken to the language selection screen:

```
 Gewählte Sprache:
     -Deutsch-

ändern          Ok
```

Press the *Change* button to select English or French.

```
 Current Language:
     -English-

Change          Ok
```

```
 Langue choisie:
    -Francais-

modif.          Ok
```

After selecting the desired language, press *OK*.

The selected language is saved and will also be available the next time the device is started.

4.2 Perform test

4.2.1 Preparation

Connect the tester to the power supply. After a short initialization period, the following message appears:

```
     Sensorcheck
Connect sensor
and press Start
Start          Mode
```

The tester is now ready to test sensors with a constant current supply of 4 mA. The sensitivity (mV/g) of the sensor is irrelevant here.

If you want to test a sensor without a temperature measuring element, you can start the automatic test immediately as described below.

If you want to test a sensor with a temperature measuring element, first press the **Mode** button to select the test mode with temperature sensor check.

4.2.2 Automatic test

1. Connect the sensor as described in section **3.2.3**
2. If necessary, select the temperature sensor type by pressing the **Mode** button.
   - Press once for type PT100

     ```
     Check AI100TR PT100
     Connect sensor
     and press Start
     Start          Mode
     ```

   - Press a second time for type PT1000

     ```
     Check AR100TR PT1000
     Connect sensor
     and press Start
     Start          Mode
     ```
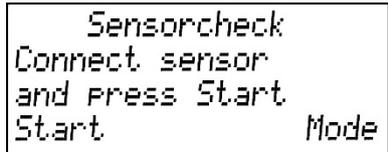
3. Press the **Start** button
4. The test result is displayed as follows:

```
 Result:  Bias:11,2V
Sensor OK

Start          Mode
```

5. After you have disconnected the sensor, the message reappears:

```
  Sensorcheck
Connect sensor
and press Start
Start          Mode
```

6. If you want to test additional sensors, you can connect the next one and continue with **_Start_**.

If error messages appear, please check that the sensor is connected correctly, has good contact, and that the stripped wire ends are not touching each other.

4.2.3 Detectable errors

The sensor tester detects the following errors during the automatic test sequence:

- Short circuit between signal and ground
- Short circuit between signal and shield
- Short circuit between signal and housing
- Short circuit between ground and shield
- Short circuit between ground and housing
- Short circuit between shield and housing *2
- Interruption of the sensor signal and sensor ground circuit
- Bias voltage outside the tolerance window (9 to 13 volts)
- Resistance of the temperature sensor (if present)

*2 In some third-party sensors, the shield is connected to the sensor housing. Please refer to the respective sensor instructions to avoid ground loops.

If there are multiple errors, the number of errors is displayed, as well as a description of each error in turn in line three of the display.

Example of error messages:

```
Result:  Bias:11,2V
1 Error:
Short shield -> V-
Start          Mode
```

```
Result:  Bias: 4,5V
2 Errors: Bias error
Short shield -> V+
Start          Mode
```

Abbreviations in the error messages

Display	Meaning
V+	Signal of the acceleration sensor
V-	Ground of the acceleration sensor
PT100	Signal of the temperature sensor
PT100-	Ground of the temperature sensor

4.2.4 Undetectable errors

The sensor tester cannot detect deviating sensor sensitivity on its own. To do so, it would be necessary to expose the sensor to a defined vibration and then evaluate the measurement result of the vibration.

However, it is possible to estimate the correct sensitivity of a sensor to be tested using a comparison method. To do this, attach the test object and a properly functioning sensor to a vibrating object. Use the measurement mode and compare the measured values with the test object connected with the display when using the comparison sensor. Please note that the sensors should be attached in the same place as far as possible.

For the ATIxxx.020.PT100 sensor type with built-in PT 100 temperature sensor, the ground connections of the vibration sensor and the temperature sensor are separate. An internal short circuit between the shield and one of the two ground wires cannot be distinguished. In both cases, the message "Short circuit shield – V-" is displayed.

If there is a short circuit between the signal of the acceleration sensor (V+) and the signal of the temperature sensor (PT100+), the error message "Short circuit V+ - V-" is displayed.

5 Measurement mode

In measurement mode, the vibration velocity [mm/s_eff] is measured and displayed using the connected acceleration sensor. If the sensor is exposed to a known, defined vibration, for example on a vibration calibrator, the sensor sensitivity can also be checked.

The vibration velocity values displayed in measurement mode are calibrated for sensors with a nominal sensitivity of 100 mV/g or 10 mV/g.

Press the **Mode** button to switch to measurement mode. Measurement mode appears after the selection option for PT100 and PT1000 temperature sensors:

```
Vibration 100 mV/g
 0,10 mm/sec RMS
Range: 10 mm/sec
Range          Mode
```

The specification 100 mV/g refers to the nominal sensitivity (target sensitivity) of the connected sensor. If necessary, you can switch to the nominal sensitivity of 10 mV/g by pressing the **Mode** button again:

```
Vibration 10 mV/g
 1,10 mm/sec RMS
Range: 10 mm/sec
Range          Mode
```

You can then select the measuring range to be used with the **Range** button.

5.1 Setting the measuring ranges

The measuring ranges are set by pressing the **Range** button.

Select the appropriate measuring range according to the expected maximum values, depending on the measuring task.

| Vibration velocity [mm/s_eff]			
0 - 10	```Vibration 100 mV/g 0,10 mm/sec RMS Range: 10 mm/sec Range Mode```	0 - 40	```Vibration 100 mV/g 0,09 mm/sec RMS Range: 40 mm/sec Range Mode```
0 - 20	```Vibration 100 mV/g 0,09 mm/sec RMS Range: 20 mm/sec Range Mode```	0 - 80	```Vibration 100 mV/g 0,1 mm/sec RMS Range: 80 mm/sec Range Mode```

6 Technical data

Measured variables:	- Short circuit or interruption of connections, depending on the selected sensor type. - Bias voltage - Vibration velocity mm/s$_{eff}$ Resistance value of the PT 100 / PT 1000 measuring element
Design:	Aluminum housing IP20 Dimensions approx. 175 x 115 x 35 mm (WxHxD), plus connections Display 4 x 20 characters, backlit
Sensor connections:	Sensor signal Sensor ground Shield Housing Temperature sensor signal Temperature sensor ground
Testable sensor types xxx = Sensitivity in mV/g e.g. 10, 100	Ibis AExxx.303 / .942 Ibis ATExxx.942 Ibis AIxxx.011 / .012 / .021 / .201 / .M16 Ibis ATIxxx.011 / .020 / .021 Ibis AMxxx.012 / .016 Ibis ARxxx.928 Other piezoelectric acceleration sensors with constant current power supply (ICP® ; IEPE)
Power supply:	24 VDC or 230 VAC via supplied plug-in power supply
Measuring ranges:	Bias voltage 0–24 volts For sensors with 100 mV/g: Vibration: 0.1 - 10 / 20 / 40 / 80 v$_{eff}$ [mm/s]
Scope of delivery:	Sensor tester, plug-in power supply, instructions (Please order the required adapter cable separately, depending on the application)

Versions and ordering information:

Model	Description	Order number
Sensor tester IST-01	Sensor tester for acceleration sensors 100 mV/g or 10 mV/g, temperature sensors PT100 and PT1000	960-000220
Sensor tester adapter 001	For sensor types AE, AI, AR without temperature sensor	960-000221
Sensor tester adapter 002	For sensor types ATE, ATI with temperature sensor	960-000222
Sensor tester adapter 003	For sensor types AM with M12 connector	960-000223
Sensor tester adapter 004	With open end on sensor side	960-000224

For your notes:
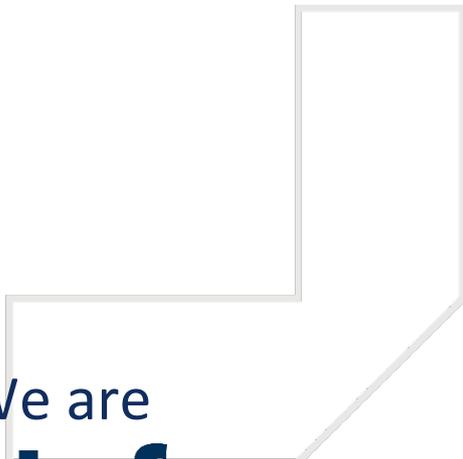
We are
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Hofmann Mess- und Auswuchttechnik GmbH & Co. KG

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Hofmann Precision Balancing Ltd.

Ibis GmbH

deineMaschine GmbH

Intelligent Balancing Solutions

Advanced Vibration Monitoring

Overspeed Testing Systems