

# EN

**OPERATING MANUAL**  
MULTIFUNCTION MEASURING  
METER



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**Notes regarding the operating manual**


**Symbols**


 **Warning of electrical voltage**  
 This symbol indicates dangers to the life and health of persons due to electrical voltage.

 **Warning**  
 This signal word indicates a hazard with an average risk level which, if not avoided, can result in serious injury or death.

 **Caution**  
 This signal word indicates a hazard with a low risk level which, if not avoided, can result in minor or moderate injury.

**Note**  
 This signal word indicates important information (e.g. material damage), but does not indicate hazards.

 **Info**  
 Information marked with this symbol helps you to carry out your tasks quickly and safely.

 **Follow the manual**  
 Information marked with this symbol indicates that the operating manual must be observed.

You can download the current version of the operating manual and the EU declaration of conformity via the following link:



T3000



<https://hub.trotec.com/?id=44146>

**Safety**

**Read this manual carefully before starting or using the device. Always store the manual in the immediate vicinity of the device or its site of use!**



**Warning**

**Read all safety warnings and all instructions.** Failure to follow the warnings and instructions may result in electric shock, fire and / or serious injury. **Save all warnings and instructions for future reference.**

This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

- Do not use the device in potentially explosive rooms.
- Do not use the device in aggressive atmosphere.
- Protect the device from permanent direct sunlight.
- Do not remove any safety signs, stickers or labels from the device. Keep all safety signs, stickers and labels in legible condition.
- Do not open the device.

## Intended use

Only use the multifunction measuring meter for preventive maintenance and risk analysis in the fields of material, construction and climate diagnostics. Observe and comply with the storage and operating conditions according to the Technical data chapter.

Intended use comprises:

- the analysis of:
  - supply and exhaust air flows
  - fluctuations in relative humidity
  - condensate formation
  - poor machine cooling
  - porous seals
  - heat build-up and temperature fluctuations
  - excessively dry or damp materials
- leak detection with trace gas

To use the device for its intended use, only use accessories and spare parts which have been approved by Trotec.

## Improper use

Do not use the device in potentially explosive atmospheres, when wet or for measurements in liquids.

Any unauthorised changes, modifications or alterations to the device are forbidden.

## Personnel qualifications

People who use this device must:

- take measures to protect themselves from direct contact with live parts.
- have read and understood the operating manual, especially the Safety chapter.

## Residual risks



### Warning of electrical voltage

There is a risk of a short-circuit due to liquids penetrating the housing!  
Do not immerse the device and the accessories in water. Make sure that no water or other liquids can enter the housing.



### Warning of electrical voltage

Work on the electrical components must only be carried out by an authorised specialist company!



### Warning

Risk of suffocation!  
Do not leave the packaging lying around. Children may use it as a dangerous toy.



### Warning

The device is not a toy and does not belong in the hands of children.



### Warning

Dangers can occur at the device when it is used by untrained people in an unprofessional or improper way! Observe the personnel qualifications!



### Caution

Keep a sufficient distance from heat sources.

### Note

To prevent damages to the device, do not expose it to extreme temperatures, extreme humidity or moisture.

### Note

Do not use abrasive cleaners or solvents to clean the device.

**Information about the device**

**Device description**

The T3000 multifunction measuring meter is used for carrying out detailed analysis in the fields of material and construction diagnostics. To do so, the device has a 24 bit analogue / digital converter which delivers precise results and is permanently stable compared with analogue measuring instruments.

The operating elements are found on the front and sides of the robust housing. A scratch proof colour display with touch function (1) allows entering and selecting values and functions and also displaying detected results. You can also navigate the device software for selecting measuring functions by using the cross control (3) and the "OK" key (5).

Pressing the "Back" key (2) returns you to the previous screen of the device software. Pressing the "Main menu" key (6) opens the main menu which is also shown when you start the device.

Pressing the "Illumination on/off" key (4) switches the background illumination for the colour display and the keys on and off and also serves for dimming.

The sensor connections (one SDI connection (7) and one BNC connection (8)) can be found above the colour display (1). At the SDI connection (7), connect the appropriate digital SDI sensor for the corresponding situation. The universal interface of the SDI sensors allows the multifunction measuring meter to automatically detect the sensor construction and/or indicates when the wrong type of sensor is connected. Depending on the sensor construction, it is calibrated to the prevailing surrounding conditions after connection. Any sensor settings are saved directly to the corresponding SDI sensor. The various measured values, such as relative humidity, dew point or flow rate, are automatically calculated by the SDI sensors and transmitted to the multifunction measuring meter.

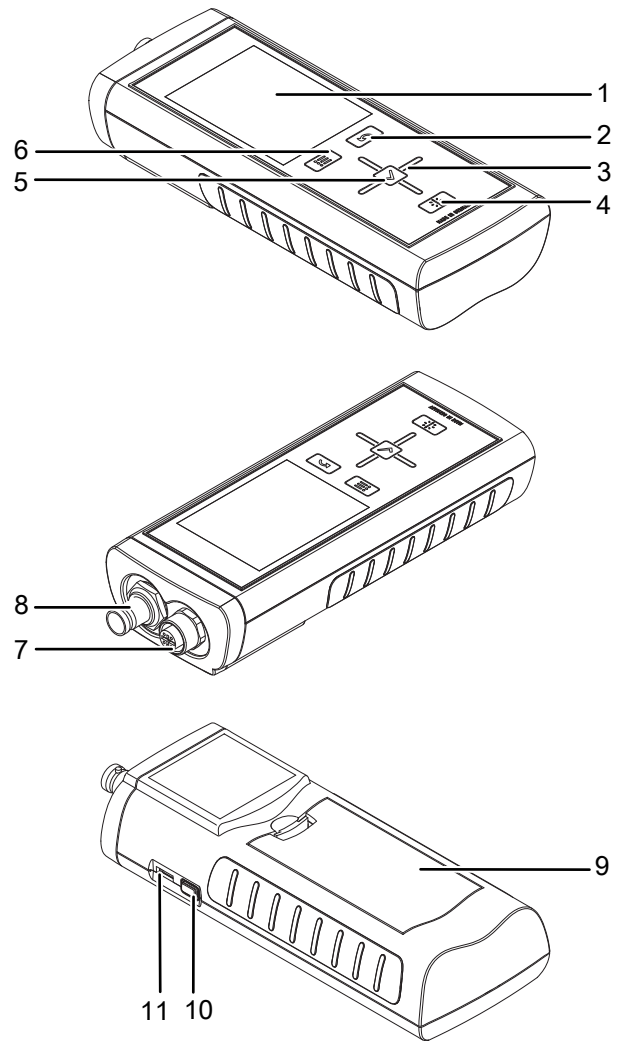
At the BNC connection (8), you connect passive wood or building moisture sensors.

The measured results of the sensor which is connected to the SDI or BNC connection are shown in the device's colour display (1).

The "Power" button (10) and a USB connection (11) can be found on the sides of the device.

You can connect the device to a computer by using the supplied USB connection cable. Then you can extract and analyse your measured results with the optional MultiMeasure Studio Standard or MultiMeasure Studio Professional software. Contact your Trotec customer service.

**Device depiction**



No.	Operating element
1	Scratch proof colour display with touch function
2	"Back" key
3	Cross control with "Up", "Down", "Left", "Right" keys
4	"Illumination on/off" key
5	"OK" key
6	"Main menu" key
7	SDI connection (5-pin)
8	BNC connection
9	Battery compartment with cover
10	"Power" button
11	USB port

## Technical data

Parameter	Value	
Model	T3000	
Dimensions (length x width x height)	approx. 170 x 62 x 34 mm	
<b>Operating range</b>		
Operating temperature	0 °C to +50 °C	
Relative humidity	< 90 % or < 20 g/m <sup>3</sup> (non-condensing)	
Height above sea level (SL)	max. 3000 m	
<b>Storage</b>		
Relative humidity	< 95 % (non-condensing)	
Ambient temperature	-20 °C to +60 °C	
<b>Energy</b>		
Battery	4 x Alkaline LR6 AA, 1.5 V batteries	
Optional power supply	5 V USB	
Power input, active	Approx. 400 mW	
Battery lifespan, passive	approx. 1 year	
Battery lifespan, active	at least 24 h	
Sensor supply	5.5 V ±10 % DC, 200 mA max.	
<b>Compatibility</b>		
Sensors*	SDI sensors (digital)	Air temperature and humidity Material temperature Material moisture Air current H <sub>2</sub> trace gas detection
	BNC electrodes	Material moisture (construction materials and wood) according to the resistance measuring method
Measured value memory	for approx. 200 measuring projects consisting of up to 3 x 3,600 (=10,800) measured values, that is a total of 200 x 10,800 = 2,160,000 measured values	
Amount of tiles in the grid	max. 50 x 40 (max. amount of grid fields in one measurement)	
Real time clock with calendar	programmed to 2099	
<b>Trace gas sensor (optional)</b>	<b>TS 800 SDI</b>	<b>TS 810 SDI</b>
Response sensitivity	1 ppm H <sub>2</sub>	1 ppm H <sub>2</sub>
Measuring range	0 to 1000 ppm H <sub>2</sub>	10 to 1000 ppm H <sub>2</sub>
Response time	< 1 s	< 1 s
Pore size at stainless steel sinter filter	> 50 µm	> 50 µm
Power supply	11 – 14 V	5 – 5.5 V
Battery ("BatteryPack")	12 V / 2 Ah lead battery	-
Current consumption		
active	approx. 400 mA	-
passive	approx. 20 mA (sensor inactive)	-
Ambient temperature		
Operation	0 °C to +50 °C	10 °C to +60 °C
Storage	-20 °C to +50 °C	-20 °C to +50 °C
Relative humidity	< 95 % (non-condensing)	< 95 % (non-condensing)

\* Data changes reserved.

**Scope of delivery**

- 1 x Multifunction measuring meter T3000
- 1 x USB connection cable
- 4 x Alkaline LR6 AA, 1.5 V batteries
- 1 x Display protection film
- 1 x Factory test certificate
- MultiMeasure Studio Standard PC software (to be downloaded from [www.trotec.de](http://www.trotec.de) under the "Downloads" menu)
- 1 x Manual

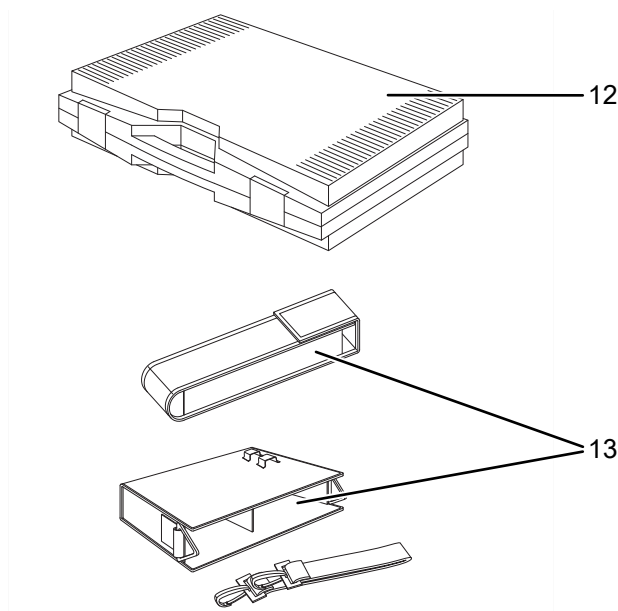
**Transport and storage**

**Note**

If you store or transport the device improperly, the device may be damaged.  
 Note the information regarding transport and storage of the device.

**Transport**

To safely transport the multifunction measuring meter and accessories, use the optional MultiMeasure transport case (12) recommended by Trotec. Otherwise, protect the device during use and transport with an optional device bag (13). Contact your Trotec customer service.



**Storage**

When the device is not being used, observe the following storage conditions:

- dry and protected from frost and heat
- protected from dust and direct sunlight
- The storage temperature is the same as the range given in the Technical data chapter.
- Remove the batteries from the device.

- To store the device, use the optional transport case (see chapter "Transport and storage") wherever possible.

**Operation**

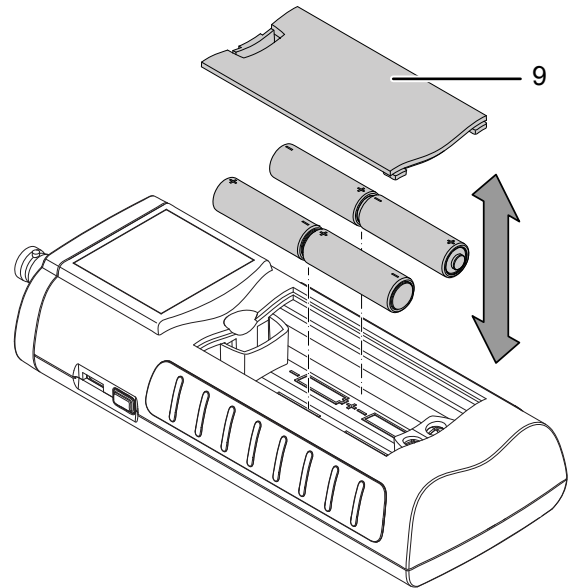
**Inserting the batteries**

Insert the supplied batteries before first use.



**Caution**

Make sure that the surface of the device is dry and the device is switched off.



1. Remove the cover of the battery compartment (9).
2. Insert the batteries with correct polarity.
3. Insert the cover of the battery compartment (9).  
 ⇨ The device can now be switched on.

**Switching the device on**

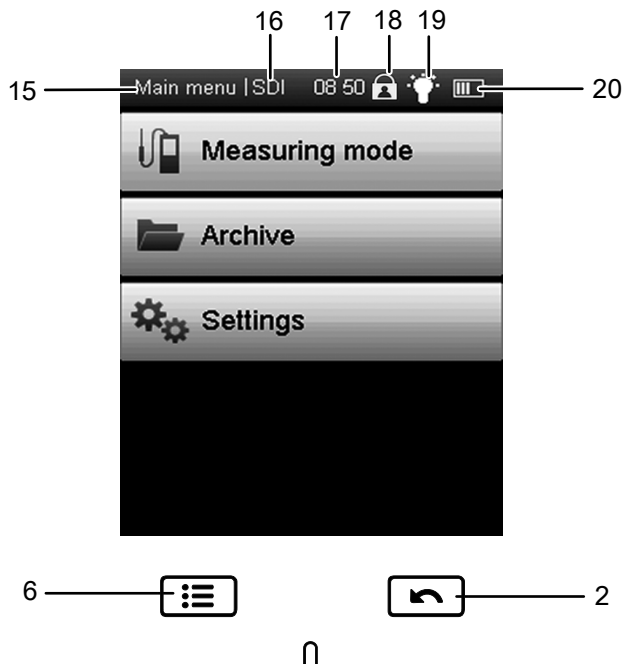
1. Press and hold the Power button (10).  
 ⇨ An acoustic signal is emitted.
2. Hold the button until a second beep is emitted. Then, release the "Power" button (10).  
 ⇨ After approx. 3 seconds, the colour display will be switched on. The device is ready to go as soon as the main menu is shown.

### Switching the device off

1. Press and hold the Power button (10).  
⇒ An acoustic signal is emitted.
2. Hold the button until a second beep is emitted. Then, release the "Power" button (10).  
⇒ The device is switched off.

### Overview and navigation

When using the device, take special note of the following important operating elements and displays:



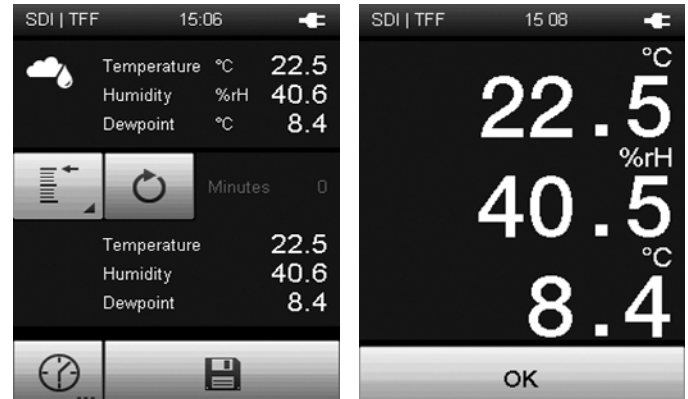
Item	Function
2	opens the previous menu
6	opens the main menu
15	name of current screen
16	indicates the connected sensor type (SDI/BNC/NTC)
17	display of current time
18	locking/unlocking the touch function: press the Power button (10) for 1 s
19	background illumination indication: press the Illumination on/off key (4)
20	battery loading status indicator/plug symbol when charged via USB

All options which can be selected via touch function can also be selected by using the cross control (3) and the "OK" key (5). For safety reasons, some options can only be selected and configured by using the cross control and the "OK" key (5) (e.g. date and time in the *Settings* screen).

### Activating large print

The current measured values shown in the upper half of the display can also be displayed in large print.

1. Briefly press the "On/Off" key (10) in any measuring mode screen.



2. To exit the large print display, press the "OK" button.



#### Info

When the key lock is enabled, large print cannot be activated or deactivated.

### Setting the language

1. Press the *Settings* key in the main menu.
2. Press the language selection key (21) in the "Settings" screen.



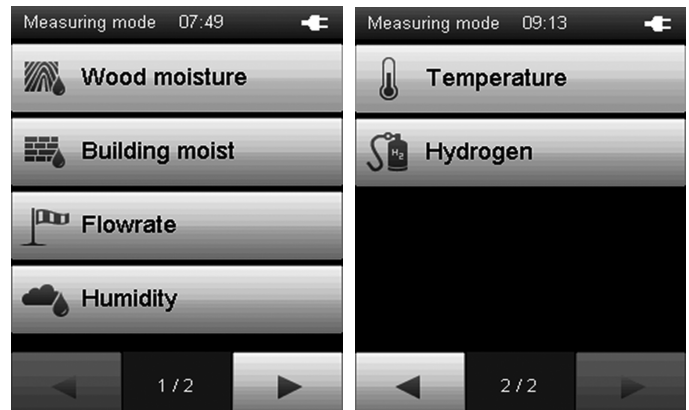


- Press the key with the desired language from the following screen.  
 ⇒ The selected screen language is activated immediately.



**submenu measuring mode**

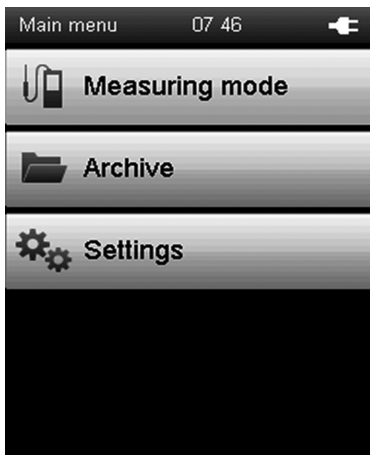
The following measuring methods are available in the Measuring mode submenu:



- Press the "Main menu" key (6) to open the main menu.

**Main menu**

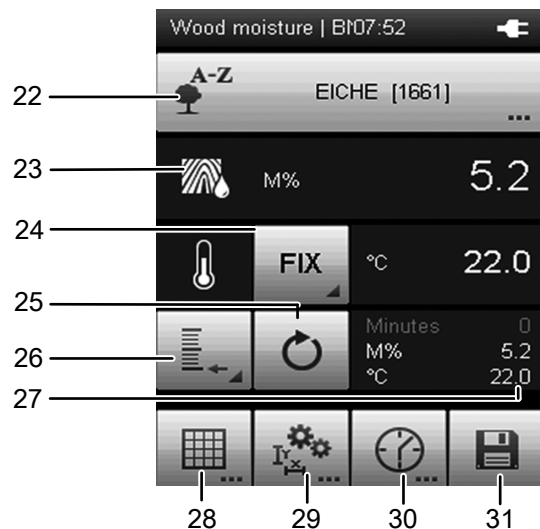
You can open the following submenus from the main menu:



Measuring method	Function
<i>Wood moisture</i>	measure moisture in wood (with BNC electrode)
<i>Building moisture</i>	measure moisture in walls and floors (with SDI or BNC electrodes)
<i>Flowrate</i>	measure air/gas flows (with SDI sensor)
<i>Humidity</i>	measure humidity (with SDI sensor)
<i>Temperature</i>	measure temperature (with SDI sensor)
<i>Hydrogen</i>	measure hydrogen content (trace gas; with SDI sensor)

Submenu	Function
<i>Measuring mode</i>	Carrying out measurements
<i>Archive</i>	open archived measured values
<i>Settings</i>	make any device settings

**"Measuring mode – Wood moisture" screen**

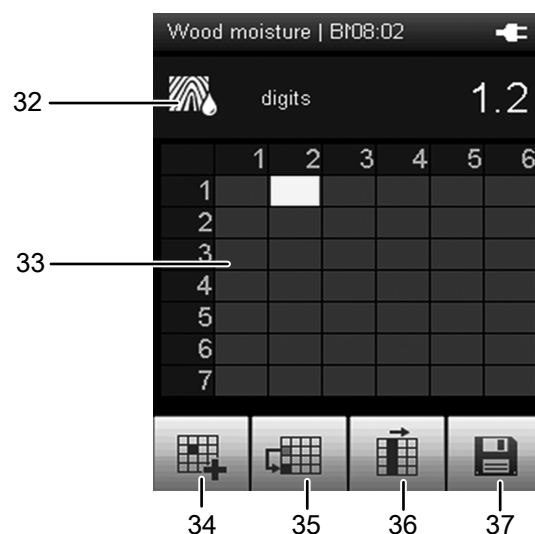




Item	Function
22	<p>Opens the menu for selecting the wood type. To change the wood type, please proceed as follows:</p> <ol style="list-style-type: none"> <li>1. Tap the displayed type of wood (22).</li> <li>2. Press the "OK" button (5) to activate the "wood type" input box.</li> <li>3. Press the "Up" and "Down" keys on the cross control (3) to select the initial letter of the desired type of wood.</li> <li>4. Press the "Right" key to select any other letters of the desired type of wood.</li> <li>5. confirm the setting by pressing the OK button (5)</li> <li>6. Use the "Down" key to navigate to the search result list of "wood types" or use the "Left" and "Right" keys to scan forwards or backwards through the "wood type" list page by page.</li> <li>7. Confirm the selected wood type by pressing the "OK" button.</li> </ol>
23	<p>M%: Shows the wood moisture as a mass percentage (relative mass proportion of the humidity to the total mass).</p>
24	<p>Opens the menu for selecting the internal temperature sensor (INT) or for entering a fixed temperature value (FIX). The measured or manually specified temperature value is shown on the right.</p>
25	<p>Resets the measured values shown in item 27 to zero.</p>
26	<p>Opens the menu for selecting the indication of measured values. Minimum: Indicates the smallest detected measured value from a measuring period. Maximum: Indicates the largest detected measured value from a measuring period. Average: Shows the average value of all detected measured values from a measuring period. Hold: Pauses the current detected measured value and shows it continually (when this option is selected). Off: Switches off the measured values in item 27.</p>
27	<p>Measurement value display according to selection in item 26: Minute: Duration of the measured interval M%: Shows the measured value (e.g. as average value) as a mass percentage. °C: Shows the measured (INT) or manually specified temperature values (FIX).</p>
28	<p>Opens the menu for carrying out a grid measurement (see section <i>Measuring method wood moisture – Grid measurement</i>).</p>

Item	Function
29	<p>Opens the menu for setting the measuring range in height x width (edge lengths) and their activation/deactivation as well as the specified temperature value (FIX) (see section <i>Measuring method wood moisture – Measuring range</i>).</p>
30	<p>Opens the menu for setting a fixed recording duration for an automatic measurement (see section <i>Measuring mode wood moisture – Automatic measurement</i>).</p>
31	<p>Saves the measured values in the archive.</p>

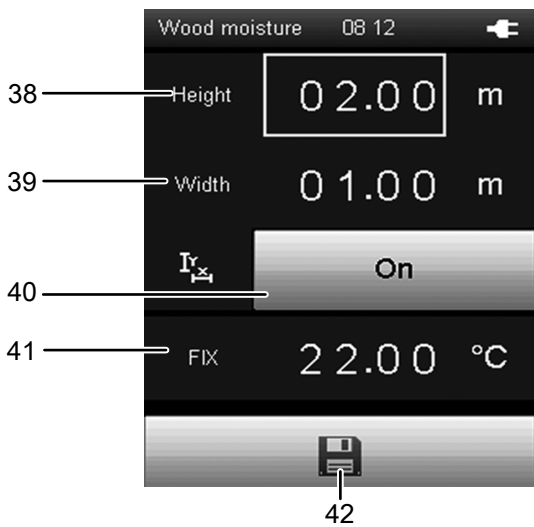
### "Measuring mode – Wood moisture – Grid measurement" screen



Item	Function
32	<p>digits: dimensionless display of the measured value; the lower the measured electric resistance, the higher the moisture in the wood and therefore, the higher the digit value</p>
33	<p>Measuring grid: Use the grid measurement function to carry out a grid measurement (e.g. of a wall). The grid measurement can be carried out either with or without height and length details, but the grid is always used. Please proceed as follows:</p> <ol style="list-style-type: none"> <li>1. Press the "OK" button (5) to select the grid.</li> <li>2. Use the keys on the cross control to select the grid measuring spot.</li> <li>3. Press the "OK" button (5) or the button (34) to confirm the selected grid measuring spot. =&gt; The dimensionless measured value is recorded.</li> <li>4. Use the keys of the cross control to select the next grid measuring spot and repeat the process.</li> </ol>

Item	Function
34	Enters the current measured value to the marked grid measuring spot. Afterwards, the grid measuring spot below will be selected.
35	Skips the grid measuring spot below the currently selected grid measuring spot and selects the grid measuring spot that follows afterwards. Use this function if no measurement can be made at this position because of a power cabinet or a window etc.
36	Skips to the start of the next column.
37	Saves the measured values in the archive.

**"Measuring mode – Wood moisture – Measuring range" screen**



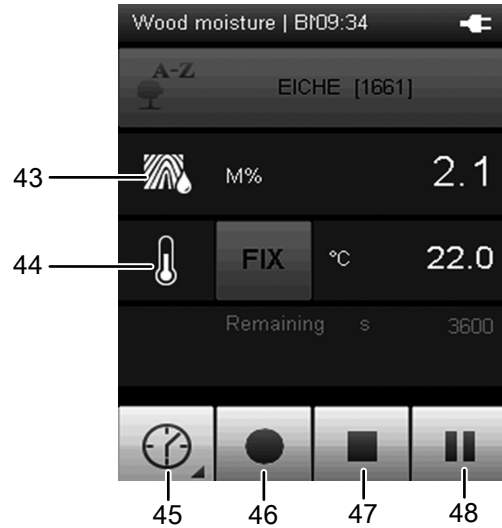
Item	Function
38	Specifies the total height of the grid area to be measured. The value is used during grid measurement. Use the "OK" button (5) to go to the settings. Afterwards, you can adjust the values with the control keys and move on to the next field.
39	Specifies the total width of the grid area to be measured. The value is used during grid measurement. Use the "OK" button (5) to go to the settings. Afterwards, you can adjust the values with the control keys and move on to the next field.
40	Activates ("On") or deactivates ("Off") the use of specified edge lengths (38, 39) during grid measurement. For deactivation, you must specify the corresponding edge lengths of the grid area in the PC software after grid measurement.
41	Specifies the temperature value (FIX) for the temperature compensation which is necessary for accurate wood moisture calculation if the integrated sensor is not being used.
42	Saves the settings.



**Info**

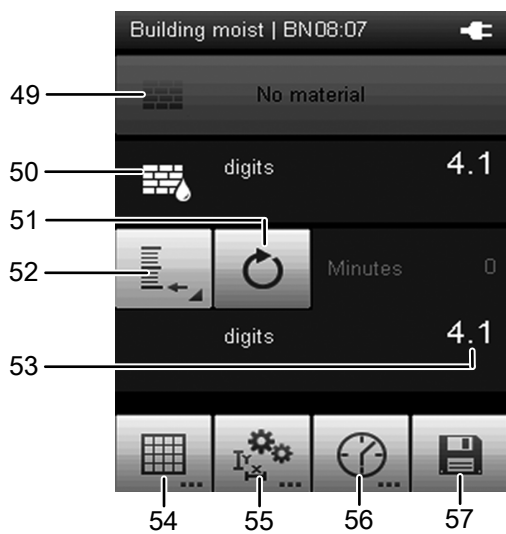
The settings saved here are also used for all following measurements, unless they are deactivated (in the corresponding menu item)!

**"Measuring mode – Wood moisture – Automatic measurement" screen**



Item	Function
43	M%: Shows the measured value as a mass percentage (relative mass proportion of the humidity to the total mass).
44	Selection for temperature compensation: - internal sensor (INT) - specified, fixed temperature value (FIX)
45	Opens a screen for selecting the recording duration for measuring over a long period.
46	Starts recording. The key turns red once recording has started.
47	Stops the current recording. The detected values are automatically saved to the current measuring project.
48	Pauses the current recording. Key 46 flashes. Press this key or key 46 again to continue recording.

## "Measuring mode – Building moist" screen



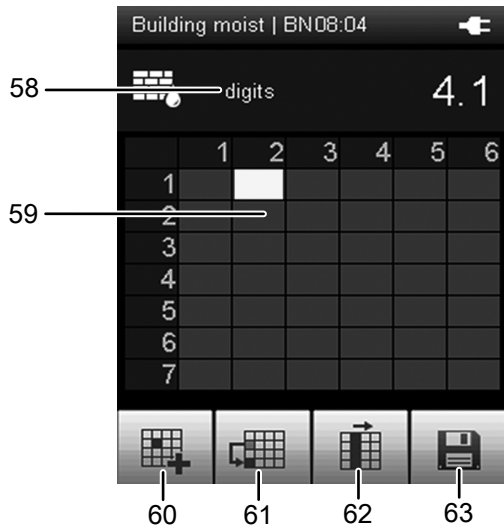
### Note

When using BNC electrodes, the measured value is shown as the dimensionless unit *digits*.  
When using dielectric measuring SDI sensors, the measured value is shown as *digits*, *M%* or *CM%*.

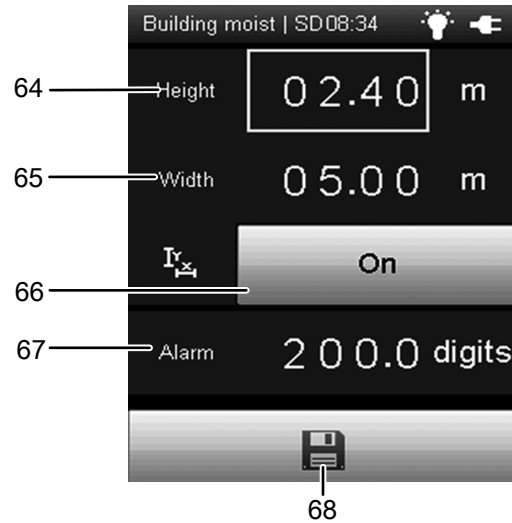
Item	Function
49	Opens the menu for selecting the construction material: No material: a non-destructive, indicative ( <i>digit</i> ) measurement is carried out Anhydrite floor: A building moisture measurement for anhydrite screed is carried out (with SDI sensor TS 660 SDI only). The measurement results (indicative) in <i>M%</i> and <i>CM%</i> are calculated with an equation which is suitable for this material. Cement floor: building moisture measurement for cementitious screed (with SDI sensor TS 660 SDI only). the measurement results (indicative) in <i>M%</i> and <i>CM%</i> are calculated with an equation which is suitable for this material
50	Indicates the building moisture: <i>digits</i> : dimensionless display of the measured value (with BNC electrode): <i>M%</i> : indicates the measured value as a mass percentage (with SDI sensor TS 660 SDI only) <i>CM%</i> : indicates the measured value according to the calcium carbide method
51	Resets the measured values shown in item 53 to zero.

Item	Function
52	Opens the menu for selecting the indication of measured values. Minimum: Indicates the smallest detected measured value from a measuring period. Maximum: Indicates the largest detected measured value from a measuring period. Average: Shows the average value of all detected measured values from a measuring period. Hold: Pauses the current detected measured value and shows it continually (when this option is selected). Off: Switches off the measured values in item 53.
53	Measurement value display according to selection in item 52: Minute: Duration of the measured interval <i>M%</i> : Shows the measured value (e.g. as average value) as a mass percentage. <i>CM%</i> : Shows the measured value (e.g. as average value) according to the calcium carbide method.
54	Opens the menu for carrying out a grid measurement (see section <i>Building moisture – Grid measurement</i> ).
55	Opens the menu for setting the measuring range in height x width (edge lengths) and their activation/deactivation as well as the specified alarm value (see section <i>Building moisture – Measuring range/alarm value</i> ).
56	Opens the menu for setting a fixed recording duration for an automatic measurement. (see section <i>Measuring mode building moisture – Automatic measurement</i> ).
57	Saves the measured values in the archive.

**"Measuring mode – Building moisture – Grid measurement" screen**



**"Measuring mode – Building moisture – Measuring range/ alarm value" screen**



Item	Function
58	digits: dimensionless display of the measured value; the lower the measured electric resistance, the higher the moisture in the material and therefore, the higher the digit value
59	Measuring grid: 1. Press the "OK" button (5) to select the grid. 2. Use the keys on the cross control to select the grid measuring spot. 3. Press the "OK" button (5) or the button (34) to confirm the selected grid measuring spot. ⇒ The dimensionless measured value is recorded. 4. Use the keys of the cross control to select the next grid measuring spot and repeat the process.
60	Enters the current measured value to the marked grid measuring spot. Afterwards, the grid measuring spot below will be selected.
61	Skips the grid measuring spot below the currently selected grid measuring spot and selects the grid measuring spot that follows afterwards. Use this function if no measurement can be made at this position because of a power cabinet or a window etc.
62	Skips to the start of the next column.
63	Saves the measured values in the archive.

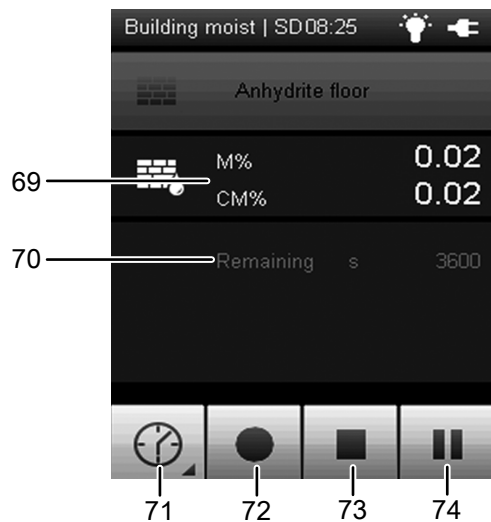
Item	Function
64	Specifies the total height of the grid area to be measured. The value is used during grid measurement. Use the "OK" button (5) to go to the settings. Afterwards, you can adjust the values with the control keys and move on to the next field.
65	Specifies the total width of the grid area to be measured. The value is used during grid measurement. Use the "OK" button (5) to go to the settings. Afterwards, you can adjust the values with the control keys and move on to the next field.
66	Activates ("On") or deactivates ("Off") the use of specified edge lengths (64, 65) during grid measurement. For deactivation, you must specify the corresponding edge lengths of the grid area in the PC software after grid measurement.
67	Only when using an SDI sensor: Specifies the limit value for the alarm signal of the dimensionless measuring unit "digits". Once the limit value is reached, an alarm signal is emitted. If no SDI sensor is used, the field's background colour will be grey and the field cannot be selected.
68	Saves the settings.



**Info**

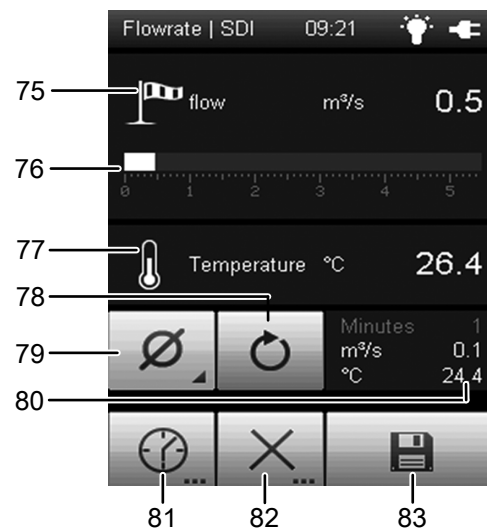
The settings saved here are also used for all following measurements, unless they are deactivated (in the corresponding menu item)!

### "Measuring mode – Building moisture – Automatic measurement" screen



Item	Function
69	Building moisture indication according to the selected material. No material: digits Anhydrite screed or cement screed: M%, CM%
70	Shows the remaining time until the automatic measurement finishes.
71	Opens a screen for selecting the recording duration for measuring over a long period. Once you confirmed your selection, the selected remaining time will be adopted in the display (item 70).
72	Starts recording. The key turns red once recording has started.
73	Stops the current recording. The detected values are automatically saved to the current measuring project.
74	Pauses the current recording. Key 72 flashes. Press this key or key 72 again to continue recording.

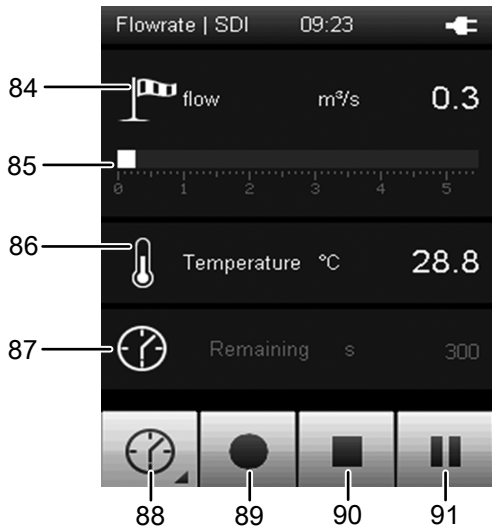
### "Measuring mode – Flowrate" screen



Item	Function
75	Shows the measured flow rate as a numerical value in the selected unit (e.g. m/s). Select the unit in the "Settings" screen which you can access from the main menu.
76	Shows the measured flow rate as visual bars.
77	Shows the measured temperature value.
78	Resets the measured values shown in item 80 to zero.
79	Opens the menu for selecting the indication of measured values. Minimum: Indicates the smallest detected measured value from a measuring period. Maximum: Indicates the largest detected measured value from a measuring period. Average: Shows the average value of all detected measured values from a measuring period. Hold: Pauses the current detected measured value and shows it continually (when this option is selected). Off: Switches off the measured values in item 80.
80	Measurement value display according to selection in item 79: Minutes: Duration of the measured interval m/s: Shows the measured flow rate as a numerical value in the selected unit (e.g. m/s). Select the unit in the "Settings" screen which you can access from the main menu. °C: Shows the measured temperature value.
81	Opens the menu for setting a fixed recording duration for an automatic measurement (see section <i>Measuring mode flowrate – Automatic measurement</i> ).
82	Opens the menu for setting the measuring range in height x width (edge lengths) as well as the form of the object to be measured (e.g. pipe or shaft) for the volumetric flow measurement (see section <i>Measuring mode flowrate – Measuring range</i> ).
83	Saves the measured values in the archive.

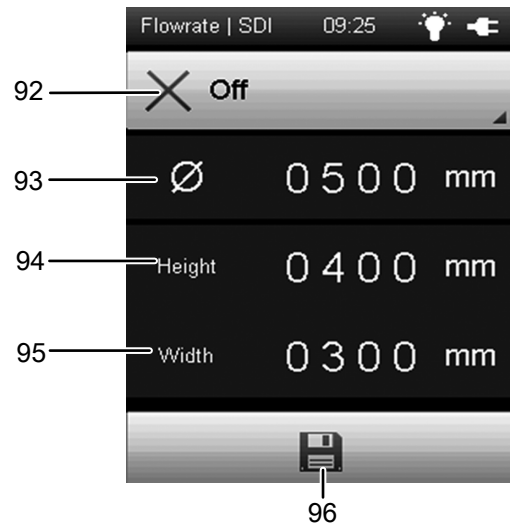


**"Measuring mode – Flowrate – Automatic measurement" screen**



Item	Function
84	Shows the measured flow rate as a numerical value in the selected unit (e.g. m/s). Select the unit in the "Settings" screen which you can access from the main menu.
85	Shows the measured flow rate as visual bars.
86	Shows the measured temperature value.
87	Shows the remaining time until the automatic measurement finishes.
88	Opens a screen for selecting the recording duration for measuring over a long period.
89	Starts recording. The key turns red once recording has started.
90	Stops the current recording. The detected values are automatically saved to the current measuring project.
91	Pauses the current recording. Key 89 flashes. Press this key or key 89 again to continue recording.

**"Measuring mode – Flowrate – Measuring range" screen**



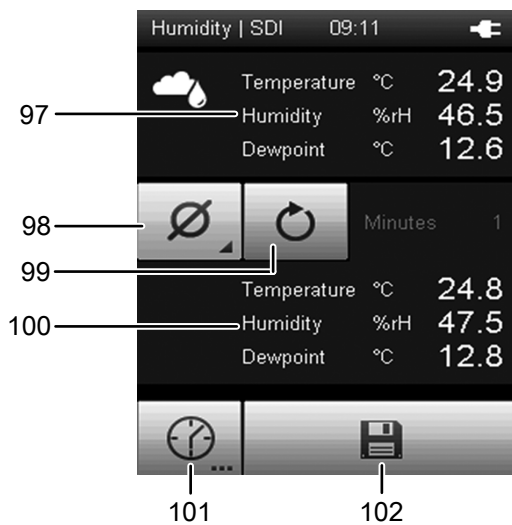
Item	Function
92	Selects the form of the object to be measured. The following options are available: 1. rectangular 2. round 3. off Depending on the selected form, a different equation is used to calculate the measured values.
93	Specifies the diameter of the object to be measured. Use the "OK" button (5) to go to the settings. Afterwards, you can adjust the values with the control keys and move on to the next field.
94	Specifies the height of the object to be measured. Use the "OK" button (5) to go to the settings. Afterwards, you can adjust the values with the control keys and move on to the next field.
95	Specifies the width of the object to be measured. Use the "OK" button (5) to go to the settings. Afterwards, you can adjust the values with the control keys and move on to the next field.
96	Saves the settings.



**Info**

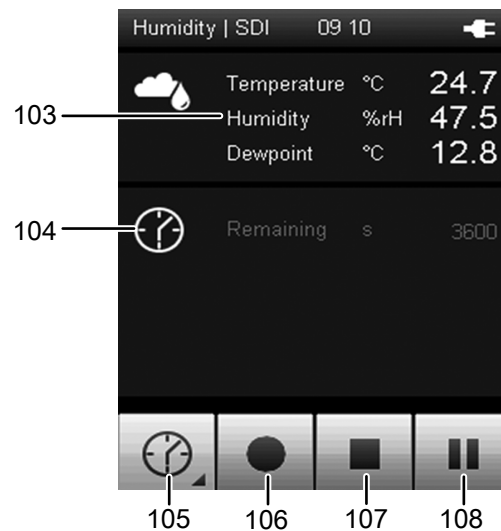
The settings saved here are also used for all following measurements, unless they are deactivated (in the corresponding menu item)!

### "Measuring mode – Humidity" screen



Item	Function
97	Shows the following measured values: Temperature: Temperature value in °C Humidity: Humidity in %RH (relative humidity) Dew point: Dew point in °C Critical dew point: Critical dew point in °C at 70 %, 75 % or 80 % RH (user setting)
98	Specifies how measured values are displayed in item 100: Minimum: Always shows the smallest detected measured value from a measuring period. Maximum: Always shows the largest detected measured value from a measuring period. Average: Shows the average value of all measured values which have been detected so far from a measuring period. Hold: Pauses the current detected measured value and shows it continually (when this option is selected). Off: switches off the display in item 100
99	Resets the measured values shown in item 100 to zero.
100	Shows the measured values according to the specifications in item 98.
101	Opens the menu for setting a fixed recording duration for an automatic measurement (see section <i>Measuring mode humidity – Automatic measurement</i> ).
102	Saves the measured values in the archive.

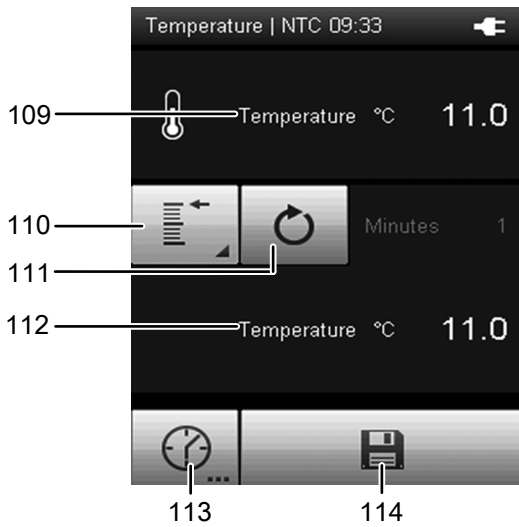
### "Measuring mode – Humidity – Automatic measurement" screen



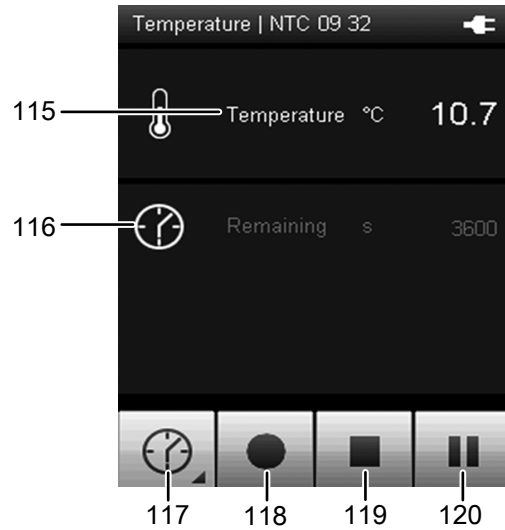
Item	Function
103	Shows the following measured values: Temperature: Temperature value in °C Humidity: Humidity in %RH (relative humidity) Dew point: Dew point in °C Critical dew point: Critical dew point in °C at 70%, 75% or 80% RH (user setting)
104	Shows the remaining time until the automatic measurement finishes.
105	Opens a screen for selecting the recording duration for measuring over a long period.
106	Starts recording. The key turns red once recording has started.
107	Stops the current recording. The detected values are automatically saved to the current measuring project.
108	Pauses the current recording. Key 106 flashes. Press this key or key 106 again to continue recording.



**"Measuring mode – Temperature" screen**



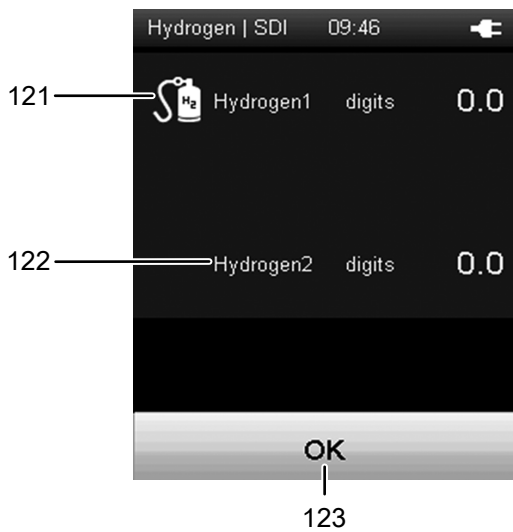
**"Measuring mode – Temperature – Automatic measurement" screen**



Item	Function
109	Shows the measured temperature in °C.
110	Specifies how measured values are displayed in item 112: Minimum: Always shows the smallest detected measured value from a measuring period. Maximum: Always shows the largest detected measured value from a measuring period. Average: Shows the average value of all measured values which have been detected so far from a measuring period. Hold: Pauses the current detected measured value and shows it continually (when this option is selected). Off: switches off the display in item 112
111	Resets the measured values shown in item 112 to zero.
112	Shows the measured values according to the specifications in item 110.
113	Opens the menu for setting a fixed recording duration for an automatic measurement (see section <i>Measuring mode temperature – Automatic measurement</i> ).
114	Saves the measured values in the archive.

Item	Function
115	Shows the measured temperature in °C.
116	Shows the remaining time until the automatic measurement finishes.
117	Opens a screen for selecting the recording duration for measuring over a long period.
118	Starts recording. The key turns red once recording has started.
119	Stops the current recording. The detected values are automatically saved to the current measuring project.
120	Pauses the current recording. Key 118 flashes. Press this key or key 118 again to continue recording.

### "Measuring mode – Hydrogen" screen

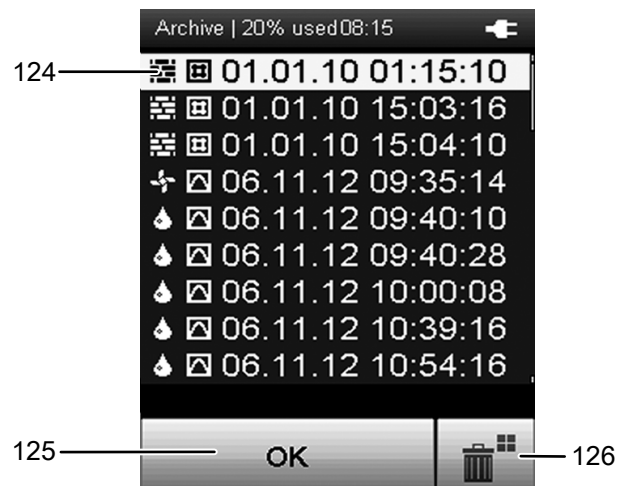


Item	Function
121	Shows the measured hydrogen concentration in digits (dimensionless measured value). This measured value is shown relative to the set base value (see chapter "Preparing for measurement with trace gas sensor (heating phase)"). Negative measured values cannot be shown.
122	Shows the measured hydrogen concentration in digits (dimensionless measured value). This measured value is shown relative to the set reference value (see chapter "Differentiated indication measurement"). Negative measured values can also be shown.
123	Exits the screen.

#### Note!

When using the differentiated indication measurement, new H<sub>2</sub> base concentrations always occur which the displayed measured values are based on. An evaluation and comparison of the dimensionless measured values is then not worthwhile, because the measurements may relate to constantly changing H<sub>2</sub> concentrations. Thus, the measured values are not saved. So, only use the Measuring mode – Hydrogen for locating leaks.









### "Archive" screen



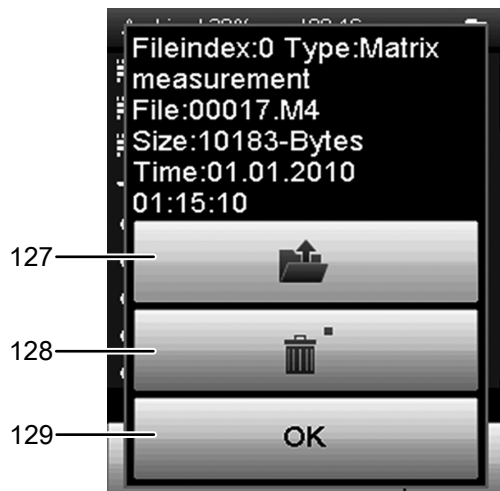
In the "Archive" screen, you can view archived measuring projects or open them for further processing. You can access this screen from the main menu.

Item	Function
124	Shows a list of the measuring projects which are saved in the archive. The currently selected archive entry is highlighted. Navigate in the archive as follows: <ol style="list-style-type: none"> <li>1. Press the "Down" key on the cross control until the desired archive entry is selected.</li> <li>2. You may need to turn the page by pressing the "Left" or "Right" keys on the cross control.</li> <li>3. Press the "OK" key on the cross control to confirm the selected archive entry. You can also press "OK" (124) on the screen key. <ul style="list-style-type: none"> <li>⇒ The basic data of the archive entry are displayed on the screen (see section "Archive – Basic data menu").</li> </ul> </li> </ol>
125	Selects the currently selected archive entry. Afterwards, the basic data of the archive entry are displayed (see section "Archive – Basic data menu").
126	Deletes all entries from the archive. Then, a safety prompt opens. Confirm it by pressing the "OK" key if you want to delete all entries. Otherwise, touch the "Cancel" key.

The icons next to the saved measuring projects show each measuring mode. The meaning is as follows:

	Building moisture measurement
	Wood moisture measurement
	Flowrate measurement
	Temperature measurement
	Relative humidity measurement
	Grid measurement
	Spot measurement
	Time measurement

**"Archive – Basic data menu" screen**



Item	Function
127	Opens the selected archive entry. Depending on the measuring mode, the logged values of the archive entry will be displayed. Use the "OK button (5) to return to the list view of the archive entries. If the archive entry represents a grid measurement, a grid symbol button will appear. After pressing this button, you will be able to edit the grid measurement. Single measurements or measurements over a long period cannot be edited in the device.
128	Deletes the selected archive entry. Then, a safety prompt opens. Confirm it by pressing the "OK" key (5) if you want to delete the entry. Otherwise, touch the "Cancel" key.
129	Closes this screen and returns to the list view of the archive entries.

**"Settings" screen**

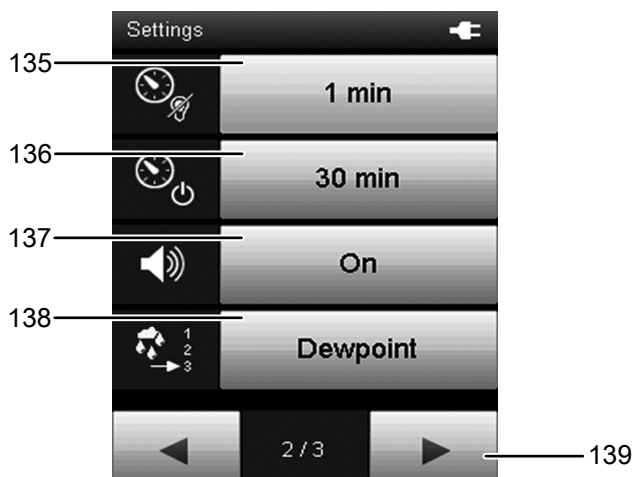
You can configure the device as follows in the "Settings" screen:

**"Settings" screen – screen 1**



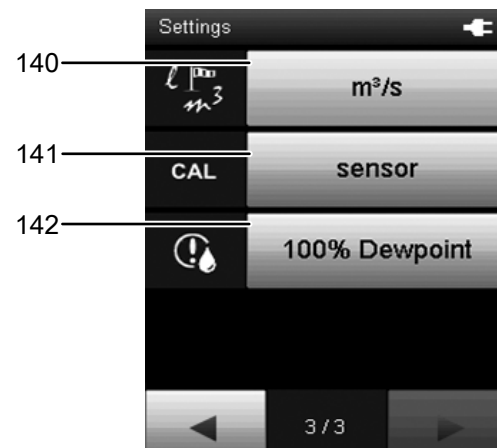
Item	Function
130	Opens the submenu for selecting the screen language.
131	Opens the submenu for selecting the unit system. Metric: Activates the metric unit system (e.g. for use in continental Europe). Imperial: Activates the imperial unit system (e.g. for use in the USA).
132	Sets the screen brightness. This option can only be selected by using the cross control below the colour display. <ol style="list-style-type: none"> <li>1. Press the "Down" key on the cross control until the scale is selected.</li> <li>2. Press the "Left" and "Right" keys on the cross control to increase or reduce the display brightness.</li> </ol>
133	Sets the date and time. This option can only be selected by using the cross control below the colour display. <ol style="list-style-type: none"> <li>1. Press the "Down" key on the cross control until the date is selected.</li> <li>2. Press the "OK" key (5) on the cross control. ⇒ The entire row is selected.</li> <li>3. Press the "Left" or "Right" keys on the cross control to select the value to be configured.</li> <li>4. Press the "Up" or "Down" keys on the cross control to increase or reduce the value to be configured.</li> <li>5. Press the "OK" key (5) on the cross control. ⇒ The row is deselected.</li> </ol>
134	Opens the next screen.

### "Settings" screen – screen 2



Item	Function
135	Either specifies the period for automatic dimming of the colour display or deactivates the function: 30 sec, 1 min, 5 min, off
136	Either specifies the period for automatic switch-off of the colour display or deactivates the function: 10 min, 30 min, 1 hour, off
137	Switches signal tones/key tones on or off.
138	Selects the base value to be shown in measuring mode: Dewpoint: Displays the value as dew point. Absolute humidity: Displays the value as absolute humidity in g/m <sup>3</sup> . Mixing Ratio: Displays the value as mixing ratio (g/kg) of the mass of steam to the mass of the dry gas.
139	Opens the next screen.

### "Settings" screen – screen 3



Item	Function
140	Specifies the unit for volumetric flow: m <sup>3</sup> /s, m <sup>3</sup> /min, m <sup>3</sup> /h, l/min
141	Calibrates the connected sensor. For more detailed information please refer to the "Calibrate sensor" section.
142	Opens the submenu for the temperature indication of the critical dew point. You can choose from the following options: <ul style="list-style-type: none"> <li>• 100 %: The temperature of the calculated dew point will be displayed (100 % relative humidity).</li> <li>• 80 %: The temperature at 80 % relative humidity will be displayed as critical dew point.</li> <li>• 75 %: The temperature at 75% relative humidity will be displayed as critical dew point.</li> <li>• 70 %: The temperature at 70 % relative humidity will be displayed as critical dew point.</li> </ul>



#### Info

The term "critical dew point" specifies the temperature that is already critical for mould formation with regard to an associated relative humidity of approx. 70 %, 75 % or 80 %. Within these ranges, mould formation is already possible.

Therefore, the critical dew point is often several °C higher than the actual dew point temperature with 100 % RH, where condensation actually occurs! Knowing the critical dew point is particularly important when carrying out measurements e.g. behind picture frames, closets or wardrobes in environments with otherwise inconspicuous room climate values.

**Calibrating the sensor**

The calibration process for the sensor will be carried out in the submenu "Settings" after pressing the "Sensor" button (Settings menu, screen 3). From this menu, a single-point calibration (zero offset) can be carried out for the selected sensor indications. All sensors are already factory-calibrated and have a corresponding characteristic calibration curve. By stating a calibration value (offset) a global shift of the calibration curve, which has an effect on the entire measuring range, is performed for the single-point calibration! The offset value to be entered is that value by which the calibration curve will be shifted.

**Example:**

The displayed value is always 5 increments too high.  
=> Change the offset value for this measurement channel by -5.

The default setting of most sensor types' offset value is 0.0. Changing the offset value brings about an automatic reset of the measured values.

The offset value range depends on the respective sensor type and the unit to be measured. When entering values outside of the respective value range, a fault message stating the setting limits will be emitted. The offset will be saved by most SDI sensors and therefore also be considered for future measurements.

Please observe that in case of flow sensors the adjustment is effected by means of a factor. The default setting of the CAL value here is 1.0, which corresponds to 100 %.

**Example:**

A setting of 0.9 would mean an adjustment to 90 % and therefore a reduction by 10 %. (measured value before: 10 m/s<sup>2</sup>, after: 9 m/s).

A setting of 1.2 would mean an adjustment to 120 % and therefore an increase by 20 %. (measured value before: 10 m/s<sup>2</sup>, after: 12 m/s)

An exception constitutes the contact temperature measurement using an NTC-based surface probe (e.g. TS131SDI). Here the offset value is set via the settings menu of the sensor. In this settings menu, you can enter the offset value for the NTC sensor. **The set offset value will be accordingly saved in the device, not in the sensor. This means that all connected sensors of the same type also work with this adjusted offset!**

**Carrying out a measurement**

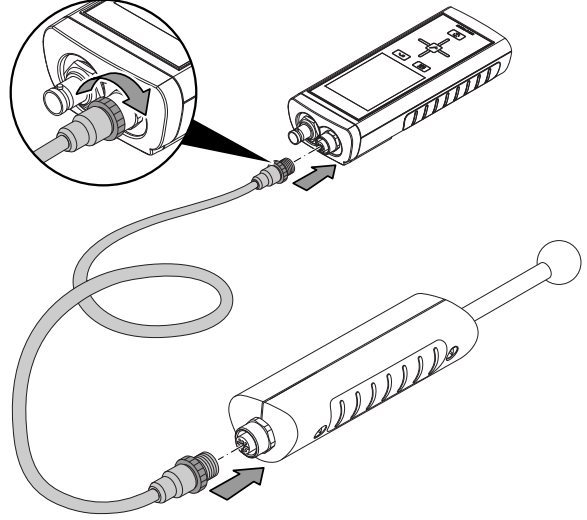
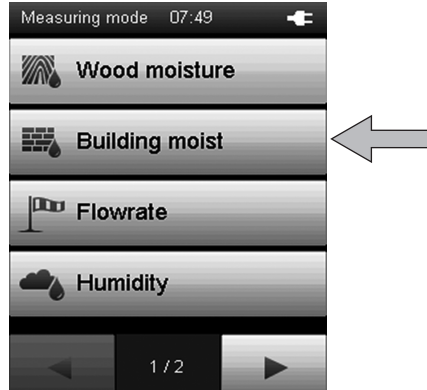
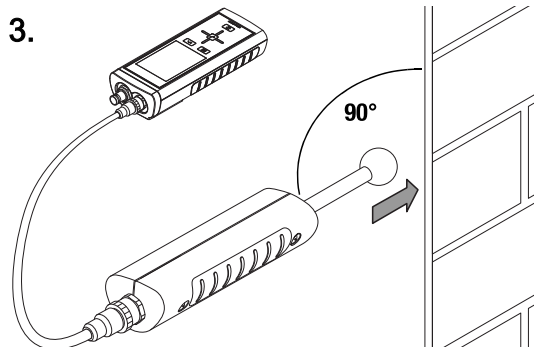


**Info**

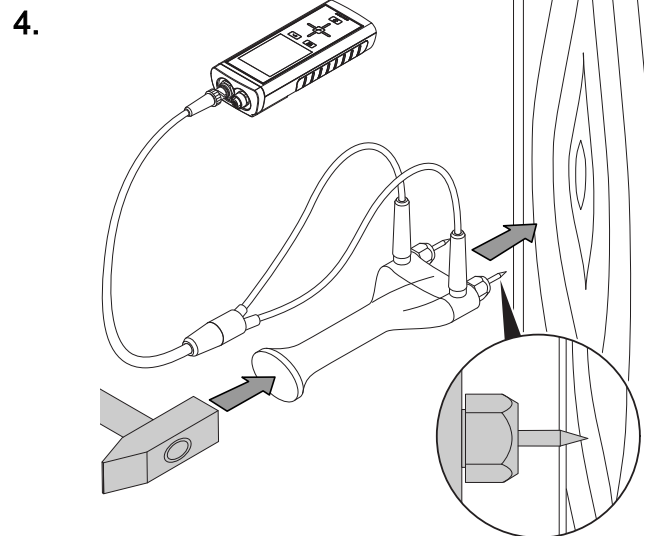
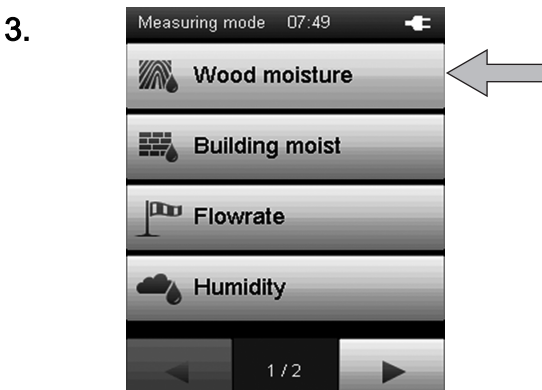
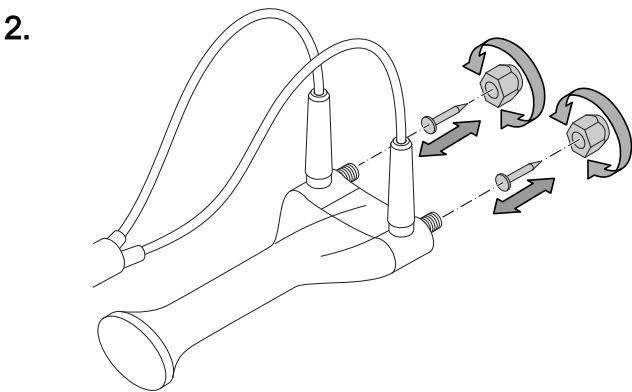
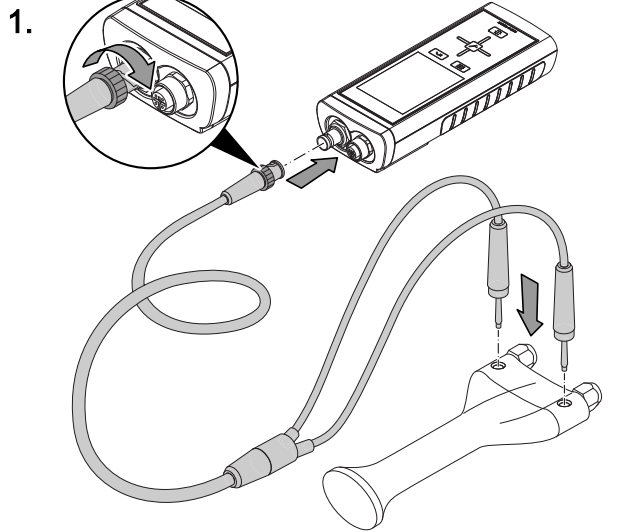
Please note that moving from a cold area to a warm area can lead to condensation forming on the device's circuit board. This physical and unavoidable effect can falsify the measurement. In this case, the display shows either no measured values or they are incorrect. Wait a few minutes until the device has become adjusted to the changed conditions before carrying out a measurement.

After connecting a sensor and selecting the measuring mode, the measurement starts automatically.

**Carrying out a measurement with SDI sensor (e.g. with TS 660 SDI humidity sensor)**

1. 
2. 
3. 

**Carrying out a measurement with BNC electrode (e.g. with TS 60 hand electrode)**



**Shutdown**

1. Switch off the device by pressing the "Power" button (see section "Switching the device off").
2. Detach connecting cables and sensors.
3. Clean the device according to the "Maintenance" chapter.
4. Store the device according to the "Storage" chapter.



## PC software

Use the MultiMeasure Studio Standard PC software (free standard version) or MultiMeasure Studio Professional (paid professional version, dongle required) to carry out a detailed analysis and visualisation of your measured results. You can only use all configuration, visualisation and functional options of the device when using this PC software and a TROTEC® USB dongle (professional).

### Installation requirements

Ensure that the following minimum requirements for installing the MultiMeasure Studio Standard or MultiMeasure Studio Professional PC software are fulfilled:

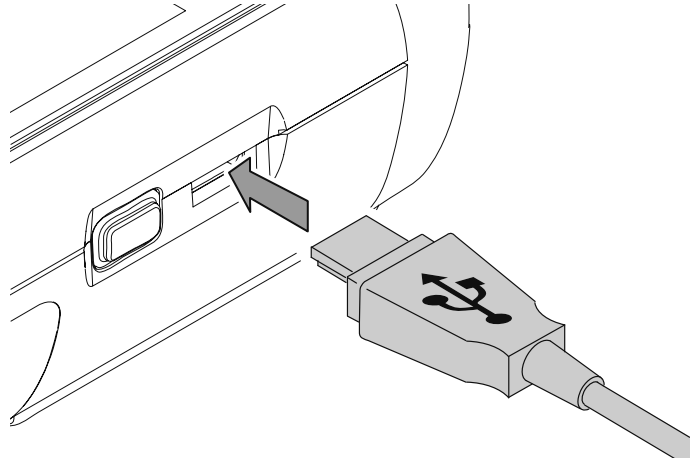
- Supported operating systems (32 or 64 bit version):
  - Windows XP from service pack 3
  - Windows Vista
  - Windows 7
  - Windows 8
  - Windows 10
- Software requirements:
  - Microsoft Excel (to display stored Excel files)
  - Microsoft .NET Framework 3.5 SP1 (is automatically installed during software installation, where applicable)
- Hardware requirements:
  - Processor speed: 1.0 GHz, minimum
  - USB connection
  - Internet connection
  - 512 MB RAM, minimum
  - 1 GB hard disk space, minimum
  - optional: TROTEC® USB dongle (Professional) for using the professional version of the PC software

### Installing the PC software

1. Download the current PC software from the Internet. To do so, visit the website [www.trotec.de](http://www.trotec.de). First click on Service, followed by Downloads and then Software. Select the MultiMeasure Studio Standard software from the list. If you want to use the optionally available professional version of the PC software "MultiMeasure Studio Professional" (dongle), then get in touch with your TROTEC® customer service.
2. Double-click on the downloaded file to start the installation.
3. Follow the instructions of the installation wizard.

### Starting the PC software

1. Connect the device to your PC via the USB connection cable provided in the scope of delivery.



#### Note

Step 2 only needs to be performed, when using the Professional software functions.

If you only use the Standard software functions, please proceed to step 3.

2. In order to enable the Professional functions, connect the TROTEC® USB dongle to a free USB port on your PC. The TROTEC® USB dongle (Professional) is automatically detected by the operating system. If you only connect the TROTEC® USB dongle (Professional) to your PC after starting the PC software, click the "Parameters" menu item in the PC software. Afterwards, click the USB symbol (dongle check) to read the connected TROTEC® USB dongle (Professional).
3. Switch the device on (see chapter *Switch-on and measurements*).
4. Start the MultiMeasure Studio software. Depending on the activation process you will be asked to insert the access code that has been previously assigned to you. Only then the dongle for releasing the according Professional tools of the software will be activated.



#### Note

Information regarding the use of the MultiMeasure Studio software is provided in the help text of the software.



## Maintenance and repair

### Battery change

Change the batteries when the message *Batt lo* is displayed upon switch-on or the device can no longer be switched on.

See chapter Operation *Inserting the batteries*.

### Activities required before starting maintenance

1. Switch off the device (see chapter "Operation" – "Switching the device off").
2. Detach connecting cables and sensors.



#### Danger



**For maintenance or repair work which requires the housing to be opened, contact the Trotec customer service. Devices which have been opened unlawfully are void of any warranty and warranty claims.**

### Visual inspection of the device

1. Check the device for dirt and damages.
2. Check the SDI, the BNC and the USB connection for dirt and damages.
3. Check the colour display for dirt and damages.
4. Check that the batteries and battery compartment cover sit properly.

Damaged connections can falsify measurements and measurement results. A damaged colour display can influence how measured results are shown. In this case, contact your Trotec customer service or replace the device.

### Cleaning

Clean the device with a soft, damp and lint-free cloth. Make sure that no moisture enters the housing. Do not use any sprays, solvents, alcohol-based cleaning agents or abrasive cleaners, but only clean water to moisten the cloth.

Clear dirt from the housing, the connections and the colour display.

### Repair

Do not modify the device or install any spare parts. For repairs or device testing, contact the manufacturer.

## Errors and faults

The device has been checked for proper functioning several times during production. If malfunctions occur nonetheless, check the device according to the following list.

### The device does not switch on:

- Check the charging status of the batteries. Change the batteries when the message *Batt lo* is displayed upon switch-on.
- Check that the batteries are properly positioned. Check the polarity is correct.
- Never carry out an electrical check yourself; instead, contact your TROTEC® customer service.

### The device runs but no measured values are shown:

- Check whether the multifunction measuring meter is in the correct sensor mode.
- Check the connection cable to the SDI or BNC sockets is connected properly.
- Check the used connection cable and its connections as well as the connections to the multifunction measuring meter for damages (e.g. broken cable, damaged pins etc.). Use a different connection cable of the same type to rule out possible faults.
- Ensure that the appropriate sensor for the measurement is being used. Here, also observe the Practice Handbook or the product catalogue for measuring devices.
- Ensure that the colour display is switched on. Possibly use the "Illumination on/off" key (see chapter "Device depiction").
- Check the room temperature and the relative humidity. Observe the device's permissible operating range according to the technical data.
- Check whether the multifunction measuring meter responds to touching the colour display. If it shows no reaction despite an enabled colour display and sufficient battery power, then the device firmware may have crashed. Restart the multifunction measuring meter. To do so, remove a battery and reinsert it.

### Your device still does not operate correctly after these checks?

Contact your Trotec customer service.

**Using the trace gas sensor TS 800 SDI (optional)**



**Warning of hot surface**

The silver sensor protection cap (sinter filter) of the trace gas sensor heats up during operation to a temperature approximately 40 °C above ambient temperature.  
Do not touch the sensor protection cap.



**Warning of explosive substances**

Do not use pure hydrogen as a trace gas. There is a risk of explosion! Only use the gas mixture recommended in chapter "Trace gas and calibration gas".

**Note**

To prevent damages to the trace gas sensor, never hold it in stagnant water, other liquids, mud or fine powdered or powdery substances.

**Trace gas and calibration gas**

Use a mixture of 95 % nitrogen and 5 % hydrogen as trace gas. This gas mixture is not flammable, not explosive, not poisonous and not corrosive.

Do not use this trace gas to calibrate the trace gas sensor. The calibration gas must contain oxygen. Trotec recommends 50 ppm of hydrogen in synthetic air as calibration gas.

**Functioning principle**

When using this trace gas sensor, it is possible to detect and locate leakages in systems purged with trace gas without causing any damage. To do so, an indicative measurement of the hydrogen concentration is carried out. The measurement of easily volatile and flammable gases is also possible to an extent.

Hydrogen is known for its small molecule size and high rate of diffusion. After being filled into the system to be checked, this allows the hydrogen contained in the trace gas to exit through small openings (e.g. tears in the sleeves of pressure tanks, pipes, tanks) and back into the surrounding air. Hydrogen can also diffuse through surrounding and covering materials (e.g. flooring, plaster, mineral joining material). Thus, covered leakages in the home technology can be limited by detection of the hydrogen or even precisely located. The surrounding material does not need to be damaged to do so.

Due to its high resolution accuracy, the trace gas sensor TS 800 SDI already detects low concentrations of hydrogen from 1 ppm. Here, the detection is carried out at a heated sensor, which permanently detects the hydrogen concentration in the surroundings within the measuring range from 0 ppm to 1000 ppm.

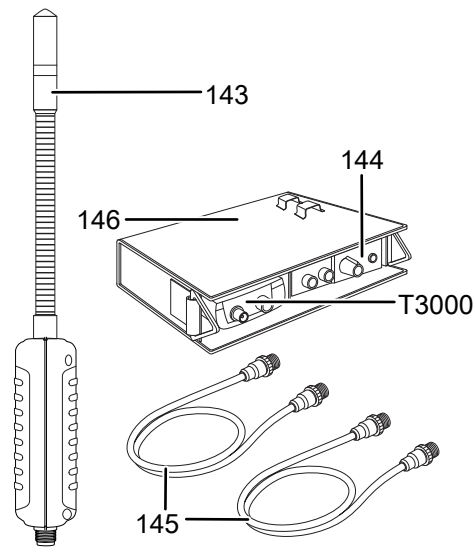
During measurement, rising and falling hydrogen concentrations are signalled acoustically at the carry handle or the trace gas sensor as well as displayed numerically in the colour display of the measuring meter.

The trace gas sensor is not designed for absolutely determining the hydrogen content in surrounding air!

**Scope of delivery**

The scope of delivery of the TS 800 SDI trace gas sensor set contains:

- 1 x trace gas sensor TS 800 SDI (143)
- 1 x battery pack (144)
- 2 x TC 30 SDI connecting cable (145)
- 1 x device bag (146)
- 1 x charger (not shown)



**Information about the battery pack**

The battery pack contains a special lead battery which allows continuous operation for approx. 4 hours.

Always use the charger provided to load the battery pack completely and without interruption. Then use the battery pack until it is nearly completely empty.

A 'memory effect' does not occur if the lead battery is only occasionally not completely discharged and loaded. But try to avoid interim charging wherever possible, as this can influence the lead battery lifetime.

For a battery voltage between 11.5 V and 11 V, the lead battery is run in the reserve range. Two short note signals are sounded. The trace gas sensor can still remain in operation.

If the lead battery is discharged, a three-beep signal sounds every 10 seconds. The colour display of the T3000 multifunction measuring meter displays the flashing value "-1000.0" (battery voltage < 11 V).

If the lead battery capacity is lower, then the operation is automatically interrupted to prevent damages to the lead battery.

Switch off the trace gas sensor (see chapter "Switching the trace gas sensor on and off") and use the charger provided to load the battery pack.

If the lead battery is not completely discharged and another minimum voltage is available, you can also run the trace gas sensor directly via the charger (connected to the battery pack). In this case, the lead battery is loaded simultaneously.

**However, first ensure that the lead battery is definitely not completely discharged!**

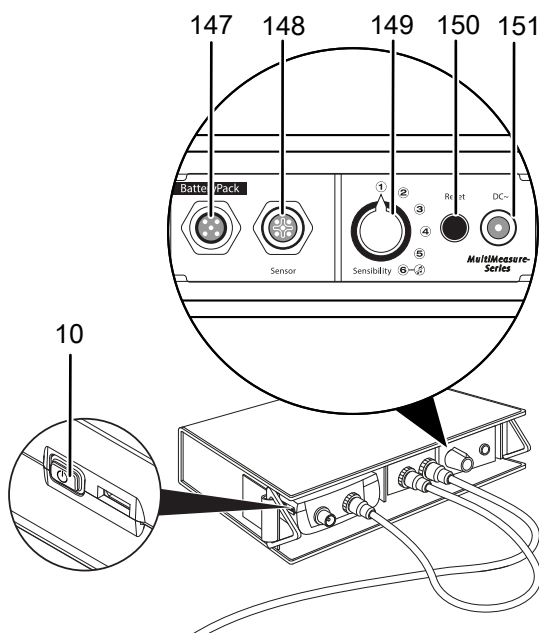
**Note**

Always store and charge the lead battery at temperatures between 15 °C and 35 °C. Otherwise, there is a risk of decreased capacity and long-term damages to the lead battery!

**Connecting the trace gas sensor to the T3000 multifunction measuring meter**

**Switching the trace gas sensor on and off**

The trace gas sensor is also switched on and off when you actuate the Power button (10) on the T3000 multifunction measuring meter.



**Note**

Ensure that the trace gas sensor is correctly connected to the T3000 multifunction measuring meter. The trace gas sensor remains connected if it is only connected to the battery pack.

**Operating elements of the trace gas sensor**

Use the operating elements at the battery pack for operating the trace gas sensor.

Item	Function
147	Connection cable socket for the T3000 multifunction measuring meter
148	Connection cable socket for the trace gas sensor
149	"Sensitivity" selector switch: Position 1: Maximum interval for measured value difference 500 (device only reacts to larger amounts of hydrogen.) Position 2: Maximum interval for measured value difference 200 Position 3: Maximum interval for measured value difference 100 Position 4: Maximum interval for measured value difference 50 Position 5: Maximum interval for measured value difference 10 (device even reacts to small amounts of hydrogen.) Position 6: Beep deactivated
150	"Reset" key: Defines the current measured value as the new reference value.
151	Connection for charger

**Preparing for measurement with trace gas sensor (heating phase)**

1. Ensure that the trace gas sensor and the T3000 multifunction measuring meter are properly connected to each other.
2. Ensure that the T3000 multifunction measuring meter is switched on.



**Warning of hot surface**

The silver sensor protection cap (sinter filter) of the trace gas sensor heats up during operation to a temperature approximately 40 °C above ambient temperature.

Do not touch the sensor protection cap.

After being switched on, the trace gas sensor is heated for approx. 1 minute at approx. 600 °C – regardless on the position of the "Sensitivity" selector switch.

During the heating phase, the trace gas sensor carries out a self-calibration to detect the base value for hydrogen concentration in the surroundings.



**Info**

During the heating phase, ensure that the trace gas sensor is not near a relevant source of hydrogen. Otherwise, an increased hydrogen concentration can influence the self-calibration.

During heating, the "Hydrogen 2" value on the colour display or the T3000 multifunction measuring meter drops from 50 to 0. Upon reaching zero, the trace gas sensor is ready for operation.

If you have disabled the trace gas sensor beep ("Sensitivity" selector switch at position 6), then the end of the heating phase is indicated with a short beep. The trace gas sensor is ready for operation.

If you have enabled the trace gas sensor beep ("Sensitivity" selector switch at position 1–5), then this beep is not emitted at the end of the heating phase. The readiness to operate is automatically indicated at least once per second with a beep.

**Measuring with the trace gas sensor**

1. Start by setting the "Sensitivity" selector switch to position 5.
  - ⇒ The leakage rate of the exiting hydrogen is not yet known at the start of a measurement. If the "Sensitivity" selector switch is at position 5, then even minimal amounts of hydrogen are detected.
2. Inspect the surrounding area for raised hydrogen concentration.
  - ⇒ The colour display of the T3000 multifunction measuring meter shows an increasing measured value when you approach an area with raised hydrogen concentration. In addition, the trace gas sensor emits a beep at higher frequency and shorter intervals when the measured values increase.
  - ⇒ The colour display of the T3000 multifunction measuring meter shows a decreasing measured value when you leave an area with increased hydrogen concentration. The beep of the trace gas sensor is emitted at longer intervals and lower frequency.
3. Adjust the position of the "Sensitivity" selector switch during the measurement according to conditions on site.



**Info**

It is not possible to display measured values below the base values (negative measured values) in standard operation.

To inspect surrounding areas in which the hydrogen concentration is below the base value, use the differentiated indication measurement by pressing the "Reset" key (see chapter "Differentiated indication measurement").

**Differentiated indication measurement**

1. Press the "Reset" key on the battery pack to specify the current measured value as the new reference value.
  - ⇒ A short beep confirms the selection of the new reference value.
  - ⇒ The T3000 multifunction measuring meter's colour display shows two different measured values in the "Measuring mode – hydrogen" screen at the same time.

For the differentiated indication measurement, the trace gas sensor also reacts to minimal changes in the hydrogen concentration when the nearby hydrogen concentration is raised.

If you reach areas with higher or lower hydrogen concentration, the indicated measured value on the lower measured value display in the "Measuring mode – hydrogen" screen changes in relation to the reference value. For increasing hydrogen concentration, it rises. For decreasing hydrogen concentration, even negative measured values are shown in relation to the reference value.

The base value for the beep intervals is no longer the benchmark, but instead the selected reference value is.

From a combination of the basis value and reference value, as well as a systematic procedure, you can also locate hydrogen leaks in poor conditions.

**Schematic example of measured value displays**

In the following example, three bordering, fictional measuring environments are assumed:

- In environment 1, a base hydrogen concentration of 200 digits applies.
- In environment 2, a base hydrogen concentration of 300 digits applies.
- In environment 3, a base hydrogen concentration of 100 digits applies.

The base hydrogen concentrations are not known to the example user, but the reader does know them for understandability.

The trace gas sensor is commissioned in environment 1. After the start up phase and automatic calibration, the base value 0 for the prevailing base hydrogen concentration (200 digits) is specified.

### The measurements start in standard operation.

In environment 1, the relative measured value 0 is shown in the upper and lower measured value display.

The user proceeds to environment 2. Both measured value displays show a relative measured value of 100, relating to the base value. Finally, the user proceeds to environment 3. Here, both displays show 0 again, but the base hydrogen concentration is 100 digits lower than the concentration below the base value. This is due to the fact that no measured values below the base value (negative measured values) can be shown in standard operation.

Now the user returns to environment 3. The upper display shows the measured value 0 here relating to the base value; while the lower displays shows the measured value -100 relating to the reference value.

While still in environment 3, the user carries out a differentiated indication measurement. The measured value display of the reference value now changes from -100 to 0 because this environment was specified as the new reference value. Afterwards, the user proceeds to environment 2. Here, the upper display shows the measured value 100 as at the start because the base value was not changed. Due to the renewed differentiated indication measurement in environment 3 and thus a renewed reference value specification, the lower measured value display now shows a measured value of 200 in environment 2.



#### Info

The correlation of measured value display and H<sub>2</sub> concentration is not linear, but logarithmic. The displayed digit value does not automatically equal the ppm value!

#### Practical example

The measuring position is located in the basement of a house. Earlier pressure testing determined that a pressure water line was to be checked. This pressure water line proceeds through three basement rooms without windows.

After purging the line with air from a compressor and then feeding the trace gas, the gas is emitted from the leakage point. This point should now be found. Because no damp areas on the floor are visible, every room must be individually checked.

The first measurement occurs in basement room 1 – unsuccessful. After approx. 5 minutes, the next unsuccessful measurement occurs in basement room 2. Thus, the leakage must be located in basement room 3. After 10 minutes, the user enters the third basement room with the enriched trace gas. The device shows a high base level and emits beeps at a high frequency.

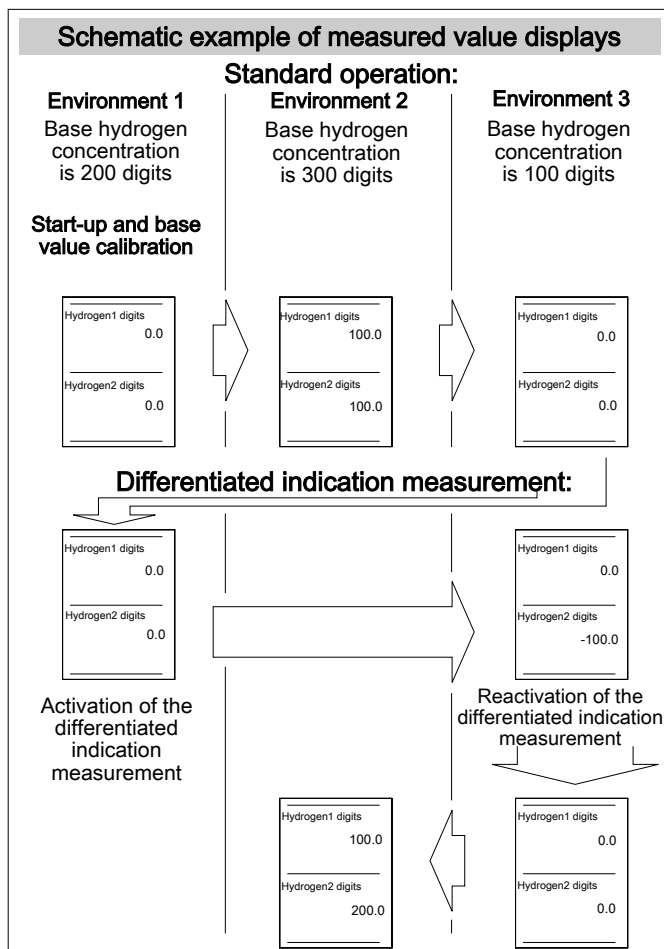
Because the room cannot be aired, the leakage must be located with the prevailing, high H<sub>2</sub> concentration. To do so, a reference value is enabled with the differentiated indication measurement (see chapter "Differentiated indication measurement").

Thus, the user carries out an active compensation relating to the H<sub>2</sub> surrounding concentration. This is now adopted as reference value 0.

The device emits the corresponding tone and/or shows the according value for rising, deviating concentrations, e.g. directly above or near the leakage.

The sensitivity control with its six settings also remains functional.

It is thus possible to locate very high H<sub>2</sub> concentrations in surroundings already enriched with trace gas.



### The user then returns to environment 1 to use the differentiated indication measurement by pressing the "Reset" key (see chapter "Differentiated indication measurement").

In environment 1, the user activates the differentiated indication measurement and defines an additional reference value for the current environmental concentration.

The upper display now shows the measured value relating to the base value. The lower display shows the measured value relating to the reference value.

Because both the base value and the reference value were specified in this environment, both measured value displays show the value 0 in this environment.



**Errors and faults at the trace gas sensor**

The accurate functionality of the trace gas sensor was tested during production a number of times. However, if functionality faults do occur, then check the trace gas sensor according to the following list.

**Fault at basic calibration:**

- Never heat the trace gas sensor near a source of hydrogen.

**The displayed measured value rises over a long period continually by approx. 20 to 30 digits:**

- This so-called basic noise occurs when the "Sensitivity" selector switch is set to position 5 or 6. This effect is normal and negligible over the entire measuring range of 1000 digits.

**The trace gas sensor reacts sensitively to sources of interference such as flammable gases:**

- Due to the physical principle of the detection process, the trace gas sensor does not only react to hydrogen, but also to other flammable gases (e.g. alcohol-air mixtures, methane or hydrocarbons).
- Use the differentiated indication measurement to bypass existing, permanent sources of interference on a case by case basis (see chapter "Differentiated indication measurement"). This lowers the sensitivity to sources of interference and raises the sensitivity for detecting hydrogen.

**Cleaning the trace gas sensor**

**Note**

The silver sensor protection cap is sealed with a special sticker. Do not remove the silver sensor protection cap. Otherwise, the sensor may be damaged.

**Note**

Never use water or harsh cleaners for cleaning. These can damage the sensor head if they come into contact with it.

1. After measuring with the trace gas sensor, wait approx. 5 minutes before cleaning it. After approx. 5 minutes, the silver sensor protection cap has cooled down sufficiently.
2. Only clean the silver sensor protection cap externally by using a short bristled brush (e.g. file brush) while applying only slight pressure.
3. Ensure that the silver sensor protection cap is screwed on tightly. Particulate must not enter below the silver sensor protection cap or directly onto the sensor element.
4. Remove any loose dust with compressed air. Ensure that the compressed air flow is only used near the silver sensor protection cap.

**Using the trace gas sensor TS 810 SDI (optional)**



**Warning of explosive substances**

Do not use pure hydrogen as a trace gas. There is a risk of explosion! Only use the gas mixture recommended in chapter "Trace gas and calibration gas".

**Note**

To prevent damages to the trace gas sensor, never hold it in stagnant water, other liquids, mud or fine powdered or powdery substances.

**Trace gas and calibration gas**

Use a mixture of 95 % nitrogen and 5 % hydrogen as trace gas. This gas mixture is not flammable, not explosive, not poisonous and not corrosive.

Do not use this trace gas to calibrate the trace gas sensor. The calibration gas must contain oxygen. Trotec recommends 50 ppm of hydrogen in synthetic air as calibration gas.

**Functioning principle**

When using this trace gas sensor, it is possible to detect and locate leakages in systems purged with trace gas without causing any damage. To do so, an indicative measurement of the hydrogen concentration is carried out. The measurement of easily volatile and flammable gases is also possible to an extent.

Hydrogen is known for its small molecule size and high rate of diffusion. After being filled into the system to be checked, this allows the hydrogen contained in the trace gas to exit through small openings (e.g. tears in the sleeves of pressure tanks, pipes, tanks) and back into the surrounding air. Hydrogen can also diffuse through surrounding and covering materials (e.g. flooring, plaster, mineral joining material). Thus, covered leakages in the home technology can be limited by detection of the hydrogen or even precisely located. The surrounding material does not need to be damaged to do so.

Due to its high resolution accuracy, the trace gas sensor TS 800 SDI already detects low concentrations of hydrogen from 1 ppm. Here, the detection is carried out at a heated sensor, which permanently detects the hydrogen concentration in the surroundings within the measuring range from 0 ppm to 1000 ppm.

During measurement, rising and falling hydrogen concentrations are signalled acoustically at the carry handle or the trace gas sensor as well as displayed numerically in the colour display of the measuring meter.

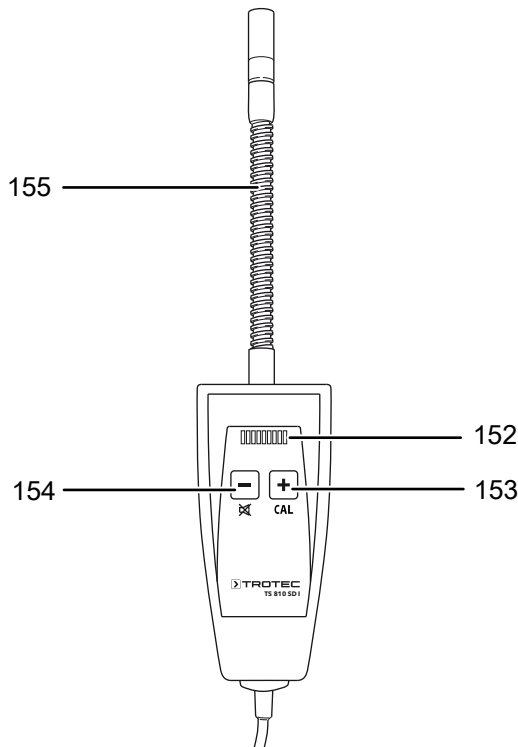
The trace gas sensor is not designed for absolutely determining the hydrogen content in surrounding air!

## Scope of delivery

The scope of delivery of the TS 810 SDI trace gas sensor set contains:

- 1 x Trace gas sensor TS 810 SDI with integrated connection cable (2 m)

## Operating elements of the trace gas sensor



Item	Operating element
152	Indication (LEDs, from left to right): LED 1: illuminated red when the acoustic signal is activated LED 2: no function LED 3 to 7: sensitivity level 1 to 5 LED 8: no function LED 9: illuminated red when zero reset was carried out and the function remains enabled
153	CAL button (plus)
154	Speaker button (minus)
155	Gooseneck probe

## Switching the acoustic signal on or off

1. Press the speaker button for approx. 2 s to switch the acoustic signal on or off.
  - ⇒ If LED 1 is illuminated, the acoustic signal is switched on.

## Adjusting the sensitivity

The sensor has 5 sensitivity levels.

1. Press the plus or minus button to adjust the sensitivity level.
  - ⇒ The selected level is indicated by LEDs 3 to 7. LED 3 corresponds to level 1 (lowest sensitivity) and LED 7 corresponds to level 5 (highest sensitivity).

## Zero reset

A zero reset means that the sensor is synchronized with the current H<sub>2</sub> concentration in the environment, which is then adopted as the zero concentration. The display value "Hydrogen 2" is reset to 0.0. The display value "Hydrogen 1" continues to show the value of the actual H<sub>2</sub> concentration in the environment from the beginning of the measurement.

1. Press the CAL button for 2 s.
  - ⇒ An acoustic signal is emitted and LED 9 lights up.
  - ⇒ Pressing the button for 2 s again triggers another zero reset and is confirmed by a single acoustic signal.
2. Press the CAL button for 4 s to exit zero reset.
  - ⇒ A first acoustic signal signal is emitted after 2 s and another after 4 s in total.
  - ⇒ The sensor is no longer in CAL mode and LED 9 goes out.

## Preparing for measurement with trace gas sensor (heating phase)

1. Ensure that the trace gas sensor and the T3000 multifunction measuring meter are properly connected to each other.
2. Ensure that the T3000 multifunction measuring meter is switched on.



### Warning of hot surface

The silver sensor protection cap (sinter filter) of the trace gas sensor heats up during operation to a temperature approximately 40 °C above ambient temperature.

Do not touch the sensor protection cap.

After switch-on, the trace gas sensor is heated to operating temperature for up to 1 minute.

During the heating phase, the trace gas sensor carries out a self-calibration to detect the base value for hydrogen concentration in the surroundings.



### Info

During the heating phase, ensure that the trace gas sensor is not near a relevant source of hydrogen. Otherwise, an increased hydrogen concentration can influence the self-calibration.



During heating, the "Hydrogen 2" value on the colour display of the T3000 multifunction measuring meter drops from approx. -50 to 0 (countdown). The duration of the heating phase depends on the ambient temperature and the current sensor temperature. If, for example, the sensor was used shortly before and was switched off temporarily, its basic temperature is already increased, which reduces the time required for heating up. Upon reaching zero, the trace gas sensor is ready for operation.

If the acoustic signal of the trace gas sensor is activated (LED 1 illuminated), the operational readiness is indicated automatically by an acoustic signal at least once a second.

### Measuring with the trace gas sensor

1. When starting a measurement, set the sensitivity level (LED 3 to 7 illuminated).
  - ⇒ The leakage rate of the exiting hydrogen is not yet known at the start of a measurement. If the "Sensitivity" selector switch is at position 5, then even minimal amounts of hydrogen are detected.
2. Inspect the surrounding area for raised hydrogen concentration.
  - ⇒ The colour display of the T3000 multifunction measuring meter shows an increasing measured value when you approach an area with raised hydrogen concentration. In addition, the trace gas sensor emits a beep at higher frequency and shorter intervals when the measured values increase.
  - ⇒ The colour display of the T3000 multifunction measuring meter shows a decreasing measured value when you leave an area with increased hydrogen concentration. The beep of the trace gas sensor is emitted at longer intervals and lower frequency.
3. Adjust the sensitivity during the measurement according to the conditions on site.

### Differentiated indication measurement

1. Press the CAL button (157) on the sensor for two seconds to use the current H<sub>2</sub> concentration in the environment as the new reference value. Immediately after zero reset was carried out, the value 0.0 is displayed in the "Hydrogen 2" field.
  - ⇒ A short beep confirms the selection of the new reference value.
  - ⇒ The T3000 multifunction measuring meter's colour display shows two different measured values in the "Measuring mode – hydrogen" screen at the same time: "Hydrogen 1" shows the value from the beginning of the measurement. "Hydrogen 2" shows the updated value based on the ambient concentration during the last zero reset.

For the differentiated indication measurement, the trace gas sensor also reacts to minimal changes in the hydrogen concentration when the nearby hydrogen concentration is raised.

If you reach areas with higher or lower hydrogen concentration, the indicated measured value on the lower measured value display in the "Measuring mode – hydrogen" screen changes in relation to the reference value. For increasing hydrogen concentration, it rises. For decreasing hydrogen concentration, the value drops to a minimum of 0.0.

The base value for the beep intervals is no longer the benchmark, but instead the selected reference value is.

From a combination of the basis value and reference value, as well as a systematic procedure, you can also locate hydrogen leaks in poor conditions.

### Example of measured value displays

In the following example, three bordering, fictional measuring environments are assumed:

- In environment 1, a base hydrogen concentration of 200 digits applies.
- In environment 2, a base hydrogen concentration of 300 digits applies.
- In environment 3, a base hydrogen concentration of 700 digits applies.

The base hydrogen concentrations are not known to the example user, but the reader does know them for understandability.

The trace gas sensor is commissioned in a preferably neutral environment, e.g. in the open air. After the start-up phase and automatic calibration, the base value 0 for the prevailing base hydrogen concentration (approx. 0.0 digits) is specified.

### The measurements start in standard operation.

In environment 1, the relative measured value 200 is shown in the upper and lower measured value display.

The user proceeds to environment 2. Both measured value displays show a relative measured value of 300, relating to the base value.

Finally, the user proceeds to environment 3. Here, both displays show 700. This suggests that larger amounts of trace gas must have already escaped during the measurements in environments 1 and 2, which is a clear indication of an existing leakage in environment 3. Due to the overall high concentration, however, a differentiation is not easy and an exact localization of the leakage is thus very difficult. By carrying out a zero reset, the markedly increased H<sub>2</sub> concentration in the environment is adopted as the base concentration and the value in the "Hydrogen 2" field is reset to 0.0.

The reference value for the beep intervals is now no longer the base value, but the selected reference value of the H<sub>2</sub> base concentration from environment 3. This value is shown in the "Hydrogen 2" field.

Due to this adjustment, the trace gas sensor also reacts to minimal changes in the hydrogen concentration when the nearby hydrogen concentration is raised. This makes it easier to detect the continuously rising H<sub>2</sub> concentration near the actual leakage and thus to locate the leakage.

The device emits the corresponding tone and/or shows the according value for rising, deviating concentrations, e.g. directly above or near the leakage.

The sensitivity control with its five settings also remains functional.

It is thus possible to locate very high H<sub>2</sub> concentrations in surroundings already enriched with trace gas.

### **Errors and faults at the trace gas sensor**

The accurate functionality of the trace gas sensor was tested during production a number of times. However, if functionality faults do occur, then check the trace gas sensor according to the following list.

#### **Fault at basic calibration:**

- Never start up the trace gas sensor in close proximity to a source of hydrogen.

#### **The displayed measured value rises over a long period continually by approx. 20 to 30 digits:**

- This so-called basic noise occurs when the Sensitivity is set to position 5 (LED 7 is illuminated). This effect is normal and negligible over the entire measuring range of 1000 digits.

#### **The trace gas sensor reacts sensitively to sources of interference such as flammable gases:**

- Due to the physical principle of the detection process, the trace gas sensor does not only react to hydrogen, but also to other flammable gases (e.g. alcohol-air mixtures, methane or hydrocarbons).
- Use the differentiated indication measurement to bypass existing, permanent sources of interference on a case by case basis (see chapter "Differentiated indication measurement"). This lowers the sensitivity to sources of interference and raises the sensitivity for detecting hydrogen.

### **Cleaning the trace gas sensor**

#### **Note**

The silver sensor protection cap is sealed with a special sticker. Do not remove the silver sensor protection cap. Otherwise, the sensor may be damaged.

#### **Note**

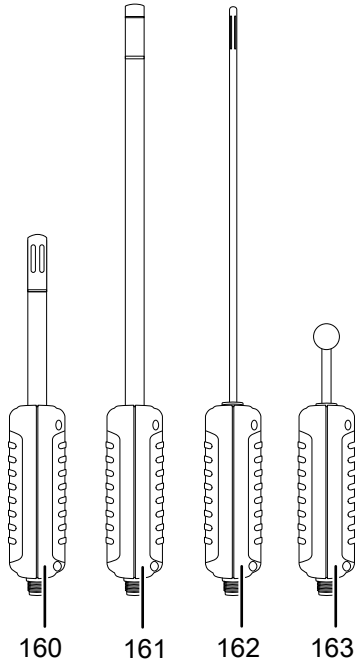
Never use water or harsh cleaners for cleaning. These can damage the sensor head if they come into contact with it.

1. After measuring with the trace gas sensor, wait approx. 5 minutes before cleaning it. After approx. 5 minutes, the silver sensor protection cap has cooled down sufficiently.
2. Only clean the silver sensor protection cap externally by using a short bristled brush (e.g. file brush) while applying only slight pressure.
3. Ensure that the silver sensor protection cap is screwed on tightly. Particulate must not enter below the silver sensor protection cap or directly onto the sensor element.
4. Remove any loose dust with compressed air. Ensure that the compressed air flow is only used near the silver sensor protection cap.

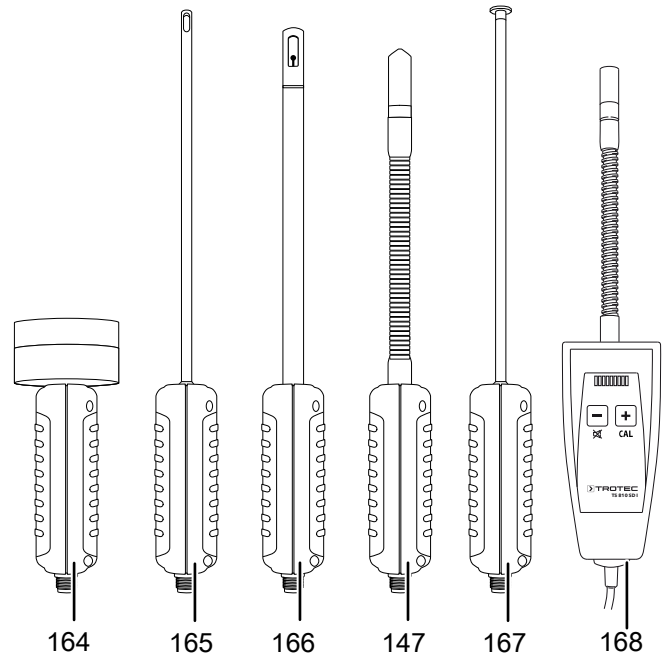
**Available SDI sensors**

An overview of the currently available SDI sensors is provided below.

Further details about SDI sensors and their use is provided in the separate Practice Handbook.



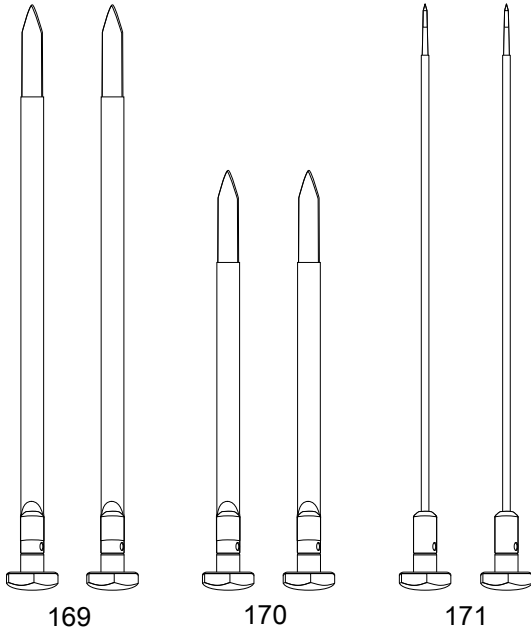
No.	SDI sensor
160	TS 210 SDI climate sensor
161	TS 230 SDI climate sensor
162	TS 250 SDI climate sensor
163	TS 660 SDI dielectric humidity sensor



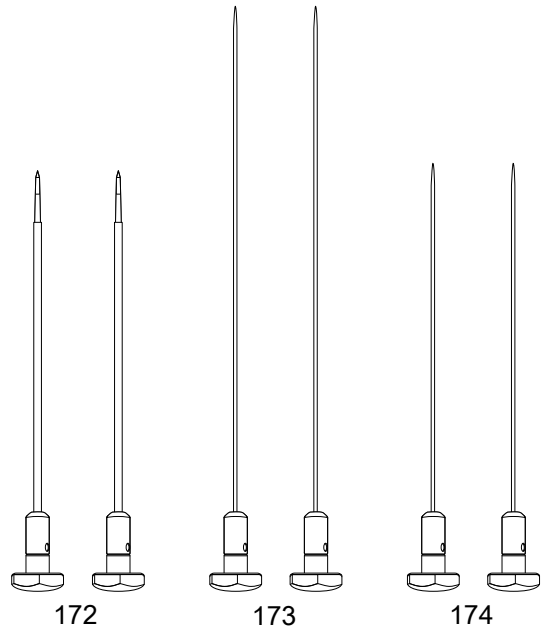
No.	SDI sensor
164	TS 610 SDI microwave humidity sensor
165	TS 410 SDI anemometer sensor
166	TS 470 SDI anemometer sensor
147	TS 800 SDI trace gas sensor system (also see chapter "Using the trace gas sensor TS 800 SDI (optional)")
167	TS 131/150 SDI surface temperature sensor, 5 mm
168	TS 810 SDI trace gas sensor system (also see chapter "Using the trace gas sensor TS 810 SDI (optional)")

## Available BNC electrodes

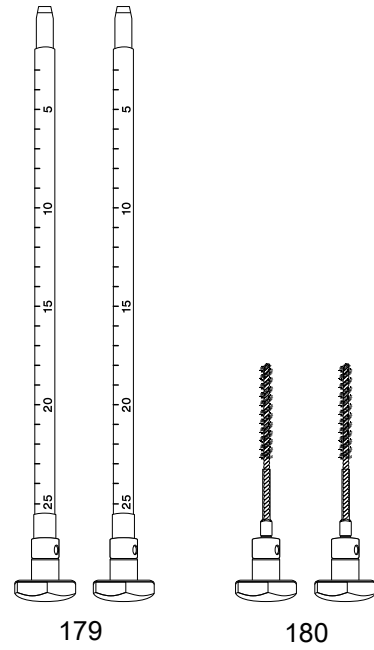
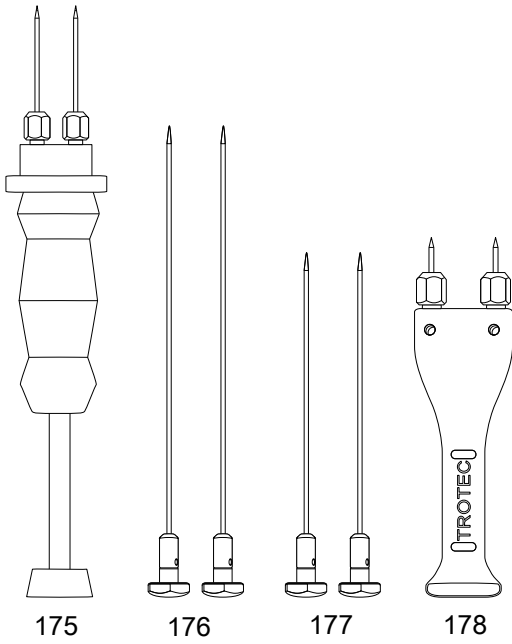
An overview of the currently available BNC electrodes is provided below. Further details about BNC electrodes and their use is provided in the separately available Practice Handbook.



No.	BNC electrode
169	TS 16/300 flat electrodes, 1 mm, insulated
170	TS 16/200 flat electrodes, 1 mm, insulated
171	TS 12/300 round electrodes, 4 mm, insulated



No.	BNC electrode
172	TS 12/200 round electrodes, 4 mm, insulated
173	TS 4/300 round electrodes, 2 mm
174	TS 4/200 round electrodes, 2 mm



No.	BNC electrode
175	TS 70 ram electrode
176	TS 8/300 round electrodes, 4 mm
177	TS 8/200 round electrodes, 4 mm
178	TS 60 hand electrode

No.	BNC electrode
179	TS 24/250 layer depth electrodes, 8 mm
180	TS 20/110 brush electrodes, 7 mm, insulated

## Further accessories (optional)

The following accessories are optionally available. Contact your Trotec customer service:

Accessories	Article number
Transport case II MultiMeasure series T3000	3.510.200.920
Holster 3 MultiMeasure series	3.510.200.228
Extension rod for T3000 sensors	3.510.200.221
Extension rod for T2000 sensors	3.510.200.218
Measuring probe holder T3000	7.330.000.002
Measuring probe holder TS 810 SDI H2 sensor	3.510.200.230
Display protection film for T3000 / T210 / T260 / T510 / T610 / T660	3.510.200.220
Protective grid sinter T210/T260/TS 210 SDI	3.510.200.211
Electrode tips TS 070/ 45 mm, Teflon-coated	3.510.200.212
Electrode tips TS 070/ 60 mm, Teflon-coated	3.510.200.213
Replacement electrode tips can	3.510.200.214
TC 20 connection cable BNC	3.510.200.024
TC 30 connection cable SDI sensors	3.510.200.027
Adapter TS 060 for round and flat electrodes	7.200.001.280
Calibration block	3.510.200.216
Calibration ampoules	3.510.200.215
Silicone protective case for T3000 / T660 / T610 / T510 / T260 / T210	7.330.000.065
Test block for T510 / T3000	3.510.200.226
Contact mass for TS004/ TS024	3.510.200.217
Measuring point stickers (100 pcs.)	9.110.000.100
MultiMeasure Studio Professional PC software module 1+2 for analysing the measured results	3.510.204.013

## Disposal



The icon with the crossed-out waste bin on waste electrical or electronic equipment stipulates that this equipment must not be disposed of with the household waste at the end of its life. You will find collection points for free return of waste electrical and electronic equipment in your vicinity. The addresses can be obtained from your municipality or local administration. For further return options provided by us please refer to our website <https://de.trotec.com/shop/>.

The separate collection of waste electrical and electronic equipment aims to enable the re-use, recycling and other forms of recovery of waste equipment as well as to prevent negative effects for the environment and human health caused by the disposal of hazardous substances potentially contained in the equipment.



In the European Union, batteries and accumulators must not be treated as domestic waste, but must be disposed of professionally in accordance with Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators. Please dispose of batteries and accumulators according to the relevant legal requirements.

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