

TC100

EN

OPERATING MANUAL
THERMOHYGROMETER



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





TC100

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.

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 with a tool.
 - Observe the storage and operating conditions as given in the Technical data chapter.

Intended use

Only use the device for indoor temperature and humidity measurements within the measuring range specified in the technical data. Observe and comply with the technical data.

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, for measurements in liquids or at live parts. Trotec accepts no liability for damages resulting from improper use. In such a case, any warranty claims will be voided. Any unauthorised modifications, alterations or structural changes to the device are forbidden.

Personnel qualifications

People who use this device must:

- have read and understood the operating manual, especially the Safety chapter.

Residual risks



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 thermohygrometer TC100 can be used to determine the air, dew point and wet-bulb temperature as well as the humidity level and air pressure of indoor areas.

For assessing the measurements, a Max/Min function (maximum and minimum value), an average value and a Hold function for freezing the currently measured value are also available. In addition, up to 99 measurements can be saved on the device.

Moreover, the heat index (HI), the apparent temperature (WBGT index) and the globe temperature (GT) can be determined. A configurable alarm function issues a warning as soon as a certain value is exceeded.

When not in use, an automatic switch-off saves the battery.

Heat index

The heat index, also referred to as humidex, is an indicator developed in the 1970s by the American Steadman. It describes the combined effect of temperature and (high) humidity levels on the human body.

The higher the relative humidity, the worse or slower does the moisture (perspiration) emitted by the human body evaporate as the ambient air can only absorb little additional moisture.

This evaporation, however, is necessary for the human organism to be able to regulate itself in case of strong heat or physical exertion and to keep the core body temperature on a healthy level. If this natural cooling mechanism is slowed down, the body can no longer discharge the generated heat properly, which results in so-called heat stress. Overheating or heat strokes can be among the health consequences.

Even without any physical effort, high temperatures combined with high humidity levels (muggy heat) are therefore generally considered as unpleasant, while high temperatures and low humidity values are more tolerable.

Sweating and the associated cooling effect are thus vitally important for both humans and many mammals, and are indispensable for the physical well-being.

wet-bulb globe temperature index (WBGT index)

The wet-bulb globe temperature index is a climate index developed by the US army as early as in the 1950s. It serves to specify the effects of the current climate on the human body.

Unlike the heat index, the WBGT does not only incorporate the air temperature (dry-bulb temperature) and humidity level, but also the wind speed, the wet-bulb and radiation temperature (globe temperature) for assessing the outdoor thermal stress.

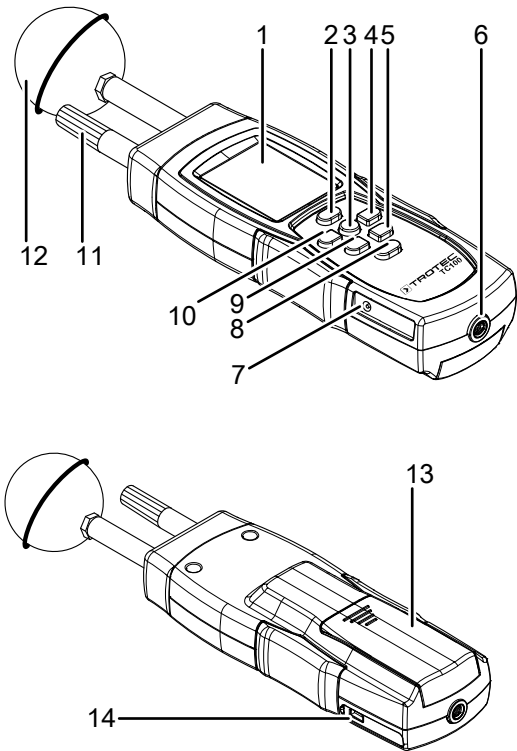
The wet-bulb temperature (or theoretical limit of cooling) is the lowest temperature that can be reached through direct evaporative cooling only. It is determined by wrapping a cotton cloth soaked with distilled water around the measuring tip or mercury bulb of a thermometer and then exposing it to the environment. The cooling effect achieved by the evaporated water can thus be measured and simulated for the perspiring human body under these conditions.

The radiation temperature, which is also taken into consideration, is measured inside a thin-walled matt black globe reacting to the infrared heat radiation emitted by the sun.

When calculating the WBGT in indoor areas or outdoor areas exposed to negligible amounts of sunlight, it can be assumed that the radiation temperature has practically no influence. In this case, the globe temperature is assumed to be identical with the ambient temperature.

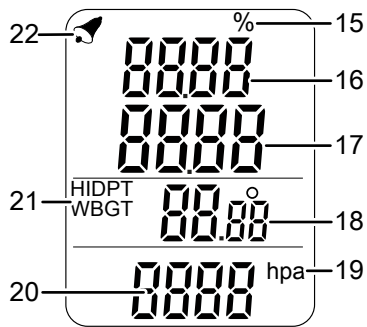
Therefore, the WBGT index is another indicator for determining the climate effects on the human organism. It is, however, even more informative than the heat index since additional parameters are included in the calculation. Established as an international standard, it is described in ISO 7243 and DIN EN 27243.

Device depiction



No.	Designation
1	Display
2	<i>HOLD</i> button
3	Power button
4	<i>MAX/MIN</i> button
5	<i>UNIT</i> button
6	Tripod thread
7	Connector for the power adapter
8	Lamp / pressure unit button
9	<i>SET</i> button
10	<i>MODE</i> button
11	Measuring sensor for humidity
12	Black globe measuring head
13	Battery compartment with cover
14	Mini USB port

Display



No.	Designation
15	Percentage indication
16	Measurement value display for relative humidity
17	Measurement value display for air temperature
18	Measurement value display for: <ul style="list-style-type: none"> • heat index • dew point temperature • wet-bulb temperature • globe temperature • WBGT index
19	Indication of the air pressure unit: <ul style="list-style-type: none"> • hpa • inHg • mmHg
20	Measurement value display for air pressure
21	Measuring mode indication
22	Activated alarm indication

Technical data

Parameter	Value
Model	TC100
Article number	3.510.007.010
Weight incl. batteries	215 g
Dimensions (length x width x height)	162 mm x 58 mm x 32 mm
Temperature	
Measuring range	0 °C to +50 °C or 32 °F to 122 °F
Accuracy	±0.6 °C (0 °C to +50 °C)
Measuring range resolution	0.1 °C or 0.1 °F

Parameter	Value
Relative humidity	
Measuring range	0.0 % RH to 99.9 % RH
Accuracy	±3 % RH (10 % to 70 %) ±5 % RH (0 % to 10 % and 70 % to 99.9 %)
Measuring range resolution	0.1 % RH
Reaction time	<15 s
Type of protection	IP54
Operating conditions	0 °C to 50 °C, <80 % RH (non-condensing)
Storage conditions	-20 °C to 50 °C, <90 % RH (non-condensing)
Air pressure	
Measuring range	300 to 1100 hPa
Accuracy	±1.5 hPa
Measuring range resolution	0.1:300.0 to 999.9 hPa; 1:1000 to 1100 hPa
Globe temperature	
Measuring range	0 to 80 °C (32 to 176 °F)
Accuracy	±0.6 °C (20 to 50 °C), otherwise ±1 °C
WBGT	
Indoor measuring range	+15 °C to +59 °C
Accuracy	±1 °C
Outdoor measuring range	+15 °C to +56 °C
Accuracy	± 1.5 °C
Automatic switch-off	after approx. 15 minutes
Power supply	4 AAA batteries

Scope of delivery

- 1 x device TC100
- 4 x AAA battery
- 1 x Quick guide
- 1 x Calibration certificate

WBGT index

In the course of sports events, for instance, both the WBGT and the HI index are increasingly used as an indication for a potential physical strain and associated hazards.

Colour of warning flag	Risk	Effect	WBGT °C	WBGT °F
Black	Extreme	Overheating	above 28 °C	above 82 °F
Red	High		23 °C to 28 °C	73 °F to 82 °F
Yellow	Moderate		18 °C to 22 °C	65 °F to 72 °F
Green	Low		below 18 °C	below 65 °F
White	Increasing	Supercooling	below 10 °C	below 50 °F

Source: American College of Sports Medicine



Info

The index is only intended to provide a basis of information. Personal perceptions and heat-related effects may differ.

HI index

	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%	100%
42°	48	50	52	55	57	59	62	64	66	68	71	73	75	77	80	82
41°	46	48	51	53	55	57	59	61	64	66	68	70	72	74	76	79
40°	45	47	49	51	53	55	57	59	61	63	65	67	69	71	73	75
39°	43	45	47	49	51	53	55	57	59	61	63	65	66	68	70	72
38°	42	44	45	47	49	51	53	55	56	58	60	62	64	66	67	69
37°	40	42	44	45	47	49	51	52	54	56	58	59	61	63	65	66
36°	39	40	42	44	45	47	49	50	52	54	55	57	59	60	62	63
35°	37	39	40	42	44	45	47	48	50	51	53	54	56	58	59	61
34°	36	37	39	40	42	43	45	46	48	49	51	52	54	55	57	58
33°	34	36	37	39	40	41	43	44	46	47	48	50	51	53	54	55
32°	33	34	36	37	38	40	41	42	44	45	46	48	49	50	52	53
31°	32	33	34	35	37	38	39	40	42	43	44	45	47	48	49	50
30°	30	32	33	34	35	36	37	39	40	41	42	43	45	46	47	48
29°	29	30	31	32	33	35	36	37	38	39	40	41	42	43	45	46
28°	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
27°	27	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
26°	26	26	27	28	29	30	31	32	33	34	34	35	36	37	38	39
25°	25	25	26	27	27	28	29	30	31	32	33	34	34	35	36	37
24°	24	24	24	25	26	27	28	28	29	30	31	32	33	33	34	35
23°	23	23	23	24	25	25	26	27	28	28	29	30	31	32	32	33
22°	22	22	22	22	23	24	25	25	26	27	27	28	29	30	30	31

up to 29 °C	No discomfort
30 °C to 34 °C	Slight discomfort
35 °C to 39 °C	Caution: Limit intensive physical activity
40 °C to 45 °C	Warning: Avoid physical activity
46 °C to 53 °C	Danger: Overheating, stop all activities
above 54 °C	Danger: Potentially fatal heat stroke
Source: www.eurometeo.com	



Info

The index is only intended to provide a basis of information. Personal perceptions and heat-related effects may differ.

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

The manufacturer packed the device to the best of his abilities to protect it against transport damages.

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.

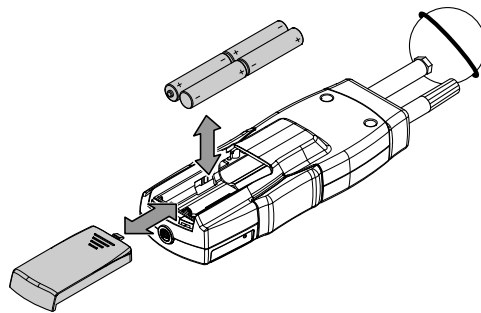
Operation

Inserting the batteries

Note

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

1. Open the battery compartment by sliding open the cover (13) with your fingers.
2. Remove the battery compartment cover.
3. Insert the batteries (4 batteries of type AAA) into the battery compartment with correct polarity.
4. Slide the cover back onto the battery compartment.



Switch-on and measurements

Note:

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.

1. Briefly press the Power button (3).
 - ⇒ The display will be activated and depending on the previously used settings either "Indoor" or "Outdoor" will be displayed for the *WBGT* measuring mode.
 - ⇒ An acoustic signal will be emitted, then the device is ready for operation.
 - ⇒ The *GT* indication (21) and the currently measured globe temperature value (18) will be displayed.
2. Point the device at the area to be measured.
 - ⇒ Wait for a moment to achieve a stable measured value.

Selecting the measuring mode

After switch-on, the device will display the globe temperature (GT, 21). Then also indicated are the air pressure (20), the ambient temperature (17) and the relative humidity (16). The following measuring modes are available:



Info

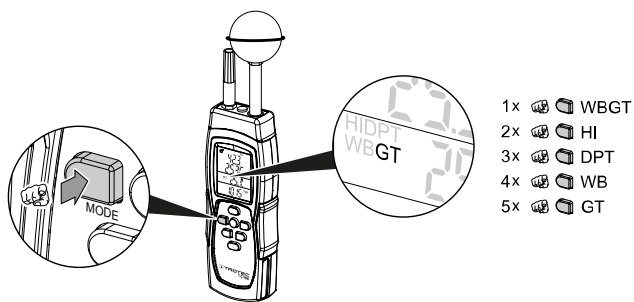
With activated MAX/MIN/AVG functions you cannot change the measuring mode. You can deactivate these functions by pressing the *MAX/MIN* button (4) repeatedly until the MAX/MIN/AVG indication is no longer displayed (1), then you can change the measuring mode.

Measuring mode	Description
WBGT	Wet-bulb globe temperature index (WBGT index)
HI	Heat index
DPT	Dew point temperature
WB	Wet-bulb temperature
GT	Globe temperature

Regardless of the selected measuring mode the device always additionally displays the relative humidity level and the ambient temperature.

Please proceed as follows to set the measuring mode:

1. Repeatedly press the *MODE* button (10) until the desired measuring mode is displayed (1).



Setting the HOLD function

1. Press the *HOLD* button (2).
 ⇒ The current value will be held.
2. Press the *HOLD* button (2) again.
 ⇒ The display again indicates the current measured value.

Setting the MAX/MIN/AVG functions



Info

These functions can only be used in the GT measuring mode.

You can view the highest, lowest or average value for ambient temperature, relative humidity and globe temperature from the current measuring interval.

To do so, please proceed as follows:

1. Briefly press the *MAX/MIN* button (4).
 ⇒ The indication MAX appears on the display.
 ⇒ The display now indicates the highest value for ambient temperature, relative humidity and globe temperature measured in the selected measuring mode since the device was switched on.
2. Press the *MAX/MIN* button (4) again.
 ⇒ The indication MIN appears on the display.
 ⇒ The display now indicates the lowest value for ambient temperature, relative humidity and globe temperature measured in the selected measuring mode since the device was switched on.
3. Press the *MAX/MIN* button (4) again.
 ⇒ The indication AVG appears on the display.
 ⇒ The display now indicates the mean value for ambient temperature, relative humidity and globe temperature measured in the selected measuring mode since the device was switched on.
4. Press the *MAX/MIN* button (4) again.
 ⇒ The display again indicates the current measured value.



Info

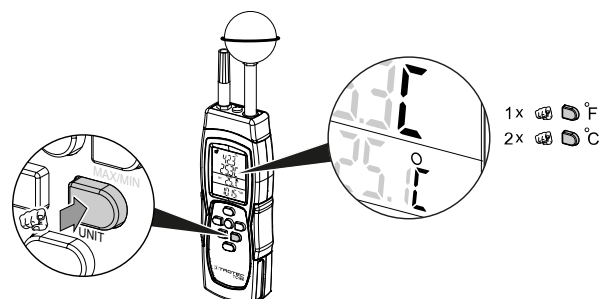
Press and hold the *MAX/MIN* button (for approx. 3 s) to delete the most recent measuring interval's MAX/MIN/AVG values from the cache. Use "CLR" to confirm the delete operation. Afterwards the device will return to the normal measuring mode.

Changing the unit °C / °F

The default setting for the temperature unit is °C.

Please proceed as follows to change the temperature unit:

1. Press the *UNIT* button (5) to change the unit.
 ⇒ The currently selected unit °C or °F is displayed.



Switching on the background illumination

1. Press and hold the Lamp / pressure unit button (8) for approx. 3 seconds.
⇒ The background illumination is activated.
2. Press the Lamp / pressure unit button (8) again for approx. 3 seconds to deactivate the background illumination.

Setting the indoor / outdoor function

In the *WBGT* measuring mode you can improve the accuracy of your measuring results by selecting Indoor or Outdoor with respect to the measuring location. To do so, please proceed as follows:

1. Press and hold the *UNIT* button (5) for approx. 3 seconds whilst in the *WBGT* measuring mode.
⇒ The current setting "*Indoor*" or "*Outdoor*" will briefly be visible on the display (1).

Changing the unit hPa / inHg / mmHg

Three measuring units are available to display the determined air pressure values: hPa / inHg / mmHg. Please proceed as follows to switch between these units:

1. Briefly press the Lamp / pressure unit button (8).
⇒ The currently selected measuring unit for air pressure will be displayed in the indication of the air pressure unit.

Setting the air pressure threshold

The air pressure threshold value can be manually adjusted at the device. In case you detect a regular inaccuracy / deviation of the indicated pressure values, the indication can be adjusted within a range of ± 3 hPa around the zero point. To adjust the value, please proceed as follows:

1. Press and hold the *SET* button (9) for approx. 3 seconds.
⇒ The currently set air pressure threshold value flashes on the display (1).
2. Now you can adjust the value as desired by use of the *HOLD* button (2) and the Lamp / pressure unit button (8).
3. Press the *HOLD* button (2) to increase the value in steps of 0.1.
4. Press the Lamp / pressure unit button (8) to reduce the value in steps of 0.1.
5. Press and hold the Power button (3) for approx. 3 seconds to save the selected value.
⇒ The message "Save" will briefly appear on the display (1) to confirm that the selected air pressure threshold value has been set.

Setting the threshold values for globe temperature, relative humidity and ambient temperature

The thresholds for the globe temperature, relative humidity and ambient temperature measurements can be manually adjusted at the device. In case you detect a regular inaccuracy / deviation of the thresholds, these values can be adjusted within a range of ± 9.9 °C, ± 9.9 °F and ± 9.9 % around the zero point. To adjust the values, please proceed as follows:

Globe temperature:

1. Switch the device off.
2. Simultaneously press and hold the *MODE* button (10) and the Lamp / pressure unit button (8), then briefly actuate the Power button (3) as well.
⇒ The value "0.0" will appear on the display (1).
3. Let go of the *MODE* (10) and the Lamp / pressure unit button (8).
4. Now you can increase the globe temperature threshold by holding down the *UNIT* button (5) and briefly actuating the *HOLD* button (2) as well.
⇒ The threshold value will increase in steps of 0.1.
5. You can reduce the globe temperature threshold by holding down the *UNIT* button (5) and briefly actuating the Lamp / pressure unit button (8) in addition.
⇒ The threshold value will decrease in steps of 0.1.
6. Simultaneously press the *MODE* (10) and the Power button (3) to save the adjusted threshold value.
⇒ The message "Save" will briefly appear on the display (1) to confirm that the selected threshold value has been set.
7. Now switch the device off and back on to proceed with the changed settings.

Ambient temperature:

1. Switch the device off.
2. Simultaneously press and hold the *MODE* button (10) and the Lamp / pressure unit button (8), then briefly actuate the Power button (3) as well.
⇒ The value "0.0" will appear on the display (1).
3. Let go of the *MODE* (10) and the Lamp / pressure unit button (8).
4. Now you can increase the ambient temperature threshold by holding down the *SET* button (9) and briefly actuating the *HOLD* button (2) as well.
⇒ The threshold value will increase in steps of 0.1.
5. You can reduce the ambient temperature threshold by holding down the *SET* button (9) and briefly actuating the Lamp / pressure unit button (8) in addition.
⇒ The threshold value will decrease in steps of 0.1.
6. Simultaneously press the *MODE* (10) and the Power button (3) to save the adjusted threshold value.
⇒ The message "Save" will briefly appear on the display (1) to confirm that the selected threshold value has been set.

- Now switch the device off and back on to proceed with the changed settings.

Relative humidity:

- Switch the device off.
- Simultaneously press and hold the *MODE* button (10) and the Lamp / pressure unit button (8), then briefly actuate the Power button (3) as well.
 - ⇒ The value "0.0" will appear on the display (1).
- Let go of the *MODE* (10) and the Lamp / pressure unit button (8).
- Now you can increase the relative humidity threshold by holding down the *MAX/MIN* button (4) and briefly actuating the *HOLD* button (2) as well.
 - ⇒ The threshold value will increase in steps of 0.1.
- You can reduce the relative humidity threshold by holding down the *MAX/MIN* button (4) and briefly actuating the Lamp / pressure unit button (8) in addition.
 - ⇒ The threshold value will decrease in steps of 0.1.
- Simultaneously press the *MODE* (10) and the Power button (3) to save the adjusted threshold value.
 - ⇒ The message "Save" will briefly appear on the display (1) to confirm that the selected threshold value has been set.
- Now switch the device off and back on to proceed with the changed settings.

Saving and calling up measuring results

The device memory permits you to save up to 99 measuring results. Please proceed as follows to save a measured value:

- Briefly press the *SET* button (9).
 - ⇒ "Rec" will briefly appear on the display (1) beside the measurement value display for air temperature (16).
 - ⇒ The slot, i.e. memory location, for the just saved measured value will be indicated for approx. 2 seconds on the display in place of the air pressure value (20).

Please proceed as follows to call up a saved measuring result:

- Press and hold the *MODE* button (10) for approx. 3 seconds.
 - ⇒ The measuring result most recently saved in slot "01" will be displayed.
- You can use the *HOLD* button (2) and the Lamp / pressure unit button (8) to browse the list of saved measuring results.

Deleting saved measuring results

All saved measuring results can be deleted at any time. This means, however, that all saved measuring results will be deleted at once, not just individual ones.

Proceed as follows to delete the saved measuring results on the device:

- Press and hold the *MODE* button (10) for approx. 3 seconds.
 - ⇒ The measuring result most recently saved in slot "01" will be displayed.
- Press and hold the *SET* button (9) for approx. 2 seconds.
 - ⇒ All saved measuring results will be deleted.
 - ⇒ "- - -" will be indicated for the measuring results on the display (1) and the value for the selected memory space is "00".
- Press and hold the *MODE* button (10) twice for about 3 seconds to switch back into normal measuring operation.
 - ⇒ You can now resume the current measurement.

Configuring the alarm for the WBGT index

You can define values for the WBGT index upon the exceedance of which an acoustic alarm will be triggered. In default setting, the alarm function is deactivated. For indoor measurements the value can be set within a range of 15.0 °C to 59.0 °C, out of doors you should set it between 15.0 °C and 56.0 °C.

Please proceed as follows to configure the alarm function:

- Press and hold the *MODE* button (10) for approx. 3 seconds.
 - ⇒ The measuring result most recently saved in slot "01" will be displayed.
- Press and hold the *MODE* button (10) again for approx. 3 seconds.
 - ⇒ The currently set alarm threshold for the WBGT index will be indicated on the display (1).
- You can use the *HOLD* button (2) and the Lamp / pressure unit button (8) to adjust the set value.
- You can switch between the individual positions of the segment display by briefly actuating the *UNIT* button (5).
- Press and hold the *MODE* button (10) again for about 3 seconds to switch back into normal measuring operation.
 - ⇒ The set value will be saved and you can proceed with the current measurement.

De-/activating the alarm for the WBGT index

Once the alarm for the WBGT index has been configured, it needs to be activated at the device.

Please proceed as follows to configure the alarm function at the device:

1. Press the Power button (3) for approx. 1 s.
 ⇒ The activated alarm indication (22) will be displayed and the alarm function is activated.
2. Press the Power button (3) again for approx. 1 s to deactivate the alarm function.
 ⇒ The activated alarm indication (22) will no longer be displayed and the alarm function is deactivated.

Maintenance and repair

Battery change

A battery change is required, when the message "bAt" appears on the display (1) or the device can no longer be switched on. See chapter Operation.

Cleaning

Clean the device with a soft, damp and lint-free cloth. Ensure 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.

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 following error messages can be displayed in the measurement value display for relative humidity (16):

Error no.	Cause	Remedy
Er1	Defective sensor	Please contact the customer service.
Er2	Measured values outside the measuring range	

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 www.trotec24.com.

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.



Li-Ion

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.

