

EN

OPERATING MANUAL
MOISTURE MEASURING
DEVICE



Table of contents

Notes regarding the operating manual.....	1
Safety	2
Information about the device.....	3
Transport and storage.....	4
Operation	5
Measuring principle	7
Maintenance and repair	8
Disposal	8

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.

The current version of the operating manual can be found at:



BM22



<http://hub.trotec.com/?id=36730>

Legal notice

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Changes to construction in the interests of constant improvements to the product, as well as changes to the shape and colour are reserved.

The scope of delivery may vary from product images. This document was created with all due care. Trotec GmbH & Co. KG accepts no liability whatsoever for possible mistakes or omissions.

The only party responsible for determining valid measured results, drawing conclusions and deriving actions is the user! Trotec GmbH & Co. KG accepts no claims of warranty for the correctness of the determined measured values or measured results. Further, Trotec GmbH & Co. KG accepts no liability whatsoever for possible mistakes or damage which have been caused by utilising the determined measured results.

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Warranty and liability

The device complies with the fundamental health and safety requirements of the applicable EU regulations and was tested at the factory for perfect functionality multiple times.

If malfunctions occur nonetheless, please contact your dealer or distributor.

When manufacturer's instructions or legal regulations have not been followed, or after unauthorised changes to the device are made, the manufacturer is not responsible for the resulting damages. Changes to the device or unauthorised replacement of individual parts can drastically impact the electrical safety of this product and will result in the loss of the warranty. Liability does not extend to damages to people or property caused by the device being used other than as described in the instructions in this operating manual. Subject to changes to technical design and model changes as part of constant development and product improvement without prior notice.

No liability is accepted for damages resulting from improper use. In such a case, any warranty claims will be voided also.

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!

- 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 (see chapter Technical data).

Intended use

Only use the device for moisture measurements of wood and building materials 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 changes, modifications or alterations 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!**
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!**
When handling the device there is a risk of injury due to the exposed measuring tips.
Always put on the protective cap when not in use.

Note
Exclusively use the original measuring tips included in the scope of delivery. Other measuring tips might bend or damage the holder at the measuring device.

Note
Never force the measuring device into the material to be measured or yank it out. Applying force can lead to bending or breaking of the measuring tips or to the destruction of the housing.

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.

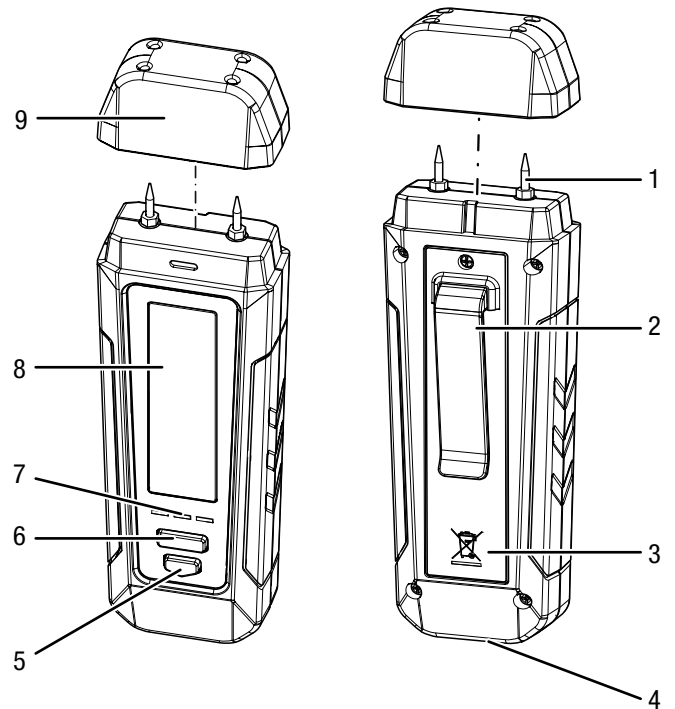
Information about the device

Device description

By use of the moisture measuring device BM22 the humidity level of wood and building material can be determined. Additionally, the ambient temperature can be measured in °C or °F.

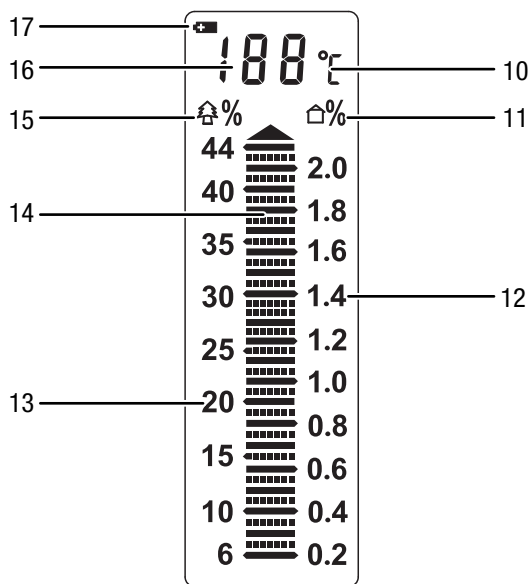
Three-colour LED display for a quick assessment of the humidity level.

Device depiction



No.	Designation
1	Measuring tips
2	Transport clip
3	Battery compartment with cover
4	LED illumination
5	Lamp button
6	SET/ON button
7	LED display (green / yellow / red)
8	Display
9	Protective cap

Display



No.	Designation
10	°C / °F indication
11	Indication of the building moisture measuring mode
12	Numeric values for building moisture measurement
13	Numeric values for wood moisture measurement
14	Measured value scale (1 bar corresponds to 1 % of wood moisture or 0.05 % of building moisture)
15	Indication of the wood moisture measuring mode
16	Measurement value indication
17	Battery indication

Technical data

Measuring principle:	Resistance measuring method
Dimensions:	145 x 44 x 34 mm
Weight:	132 g (incl. batteries)
Measuring range:	Wood moisture: 6 to 44 % Building moisture: 0.2 to 2.0 % Temperature: 0 to 40 °C (32 to 104 °F)
Measuring range resolution:	Wood moisture: 1 % Building moisture: 0.05 % Temperature: 1 °C (2 °F)
Accuracy:	Wood moisture measured value until 30 %: ±2 % Wood moisture measured value from 30 %: ±4 % Building moisture measured value until 1.4 %: ±0.1 % Building moisture measured value from 1.4 %: ±0.2 % Temperature: not specified
Ambient temperature:	0 to 50 °C with 0 to 85 % RH
Power supply:	4 x 1.5 V batteries AAA
Automatic switch-off:	after approx. 30 seconds

Scope of delivery

- 1 x Moisture measuring device BM22
- 4 x AAA batteries
- 1 x Quick guide

Transport and storage

Transport

For transporting the device use a suitable bag to protect it from external influences.

Storage

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

- dry and protected from frost and heat
- in an upright position where it is protected from dust and direct sunlight
- with a cover to protect it from invasive dust if necessary
- The storage temperature is the same as the range given in the Technical data chapter.
- When storing the device for a long time, remove the batteries.

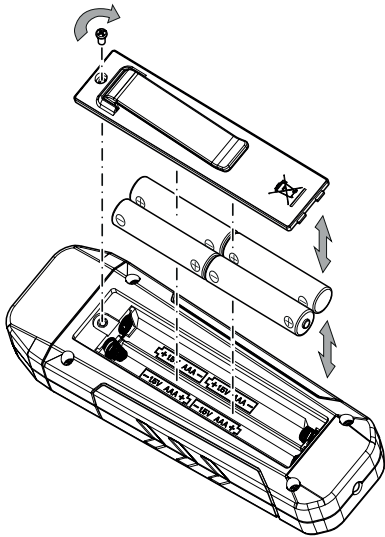
Operation

Inserting the batteries

- Insert the supplied batteries before first use.

Note

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



1. Unscrew the screw from the battery compartment.
2. Remove the cover from the device.
3. Insert the new batteries in the compartment with correct polarity.
4. Fit the cover back on the device.
5. Tighten the screw.

Switching the device on



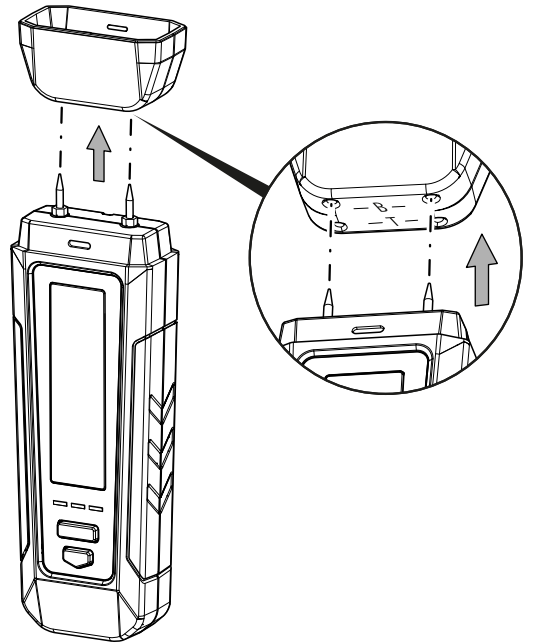
Info

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. Press the SET/ON button (6).
 - ⇒ The display switches on.
 - ⇒ The device is ready for operation.

Performing a function test

1. Hold the measuring tips to the contacts lettered -T- at the top of the protective cap (device test).
 - ⇒ The scale ought to indicate the value $19\% \pm 1$.
 2. Hold the measuring tips to the contacts lettered -B- at the top of the protective cap (battery test).
 - ⇒ All scale bars (14) should be flashing.
- ⇒ If the device reacts as described, the general function test is completed with a positive result.



If the device does not react as described, please check the battery voltage or replace the batteries with new ones of high quality. If this does not solve the problem, please contact the Trotec customer service.

Temperature measurement

The ambient temperature determined by the device is indicated on the display (16) in real time.

Moisture measurement

1. Remove the protective cap.
2. If possible, carefully prick the measuring tips a few millimetres into the material.
 - ⇒ When measuring wood moisture, read the measured value off the left-hand side of the scale (13).
 - ⇒ When measuring building moisture, read the measured value off the right-hand side of the scale (12).
3. Carefully pull the device out of the material by gently moving it in turns to the left and to the right.
4. Upon conclusion of the measurement put the protective cap back on the device.

Reading the LED display

In the *wood moisture* measuring mode the LEDs are to be read as follows:

- At a measured wood moisture of less than 6 % none of the LEDs is illuminated.
- At a measured wood moisture between 6 % and 16 % the green LED is illuminated.
- At a measured wood moisture between 16 % and 20 % the yellow LED is illuminated.
- At a measured wood moisture of more than 20 % the red LED is illuminated.

In the *building moisture* measuring mode the LEDs are to be read as follows:

- At a measured building moisture of less than 0.2 % none of the LEDs is illuminated.
- At a measured building moisture between 0.2 % and 0.7 % the green LED is illuminated.
- At a measured building moisture between 0.7 % and 0.9 % the yellow LED is illuminated.
- At a measured building moisture of more than 0.9 % the red LED is illuminated.

Changing the unit °C / °F

1. Press the SET/ON button (6) for approx. 3 seconds.
 - ⇒ The display (10) changes to either °C or °F.
 - ⇒ The measured value adapts to the selected unit.

Switching on the LED illumination

1. Press the Lamp button (5) for approx. 3 seconds to switch on the LED illumination (4).
2. Press the Lamp button (5) for approx. 1 second to switch the LED illumination (4) back off.

Switching the device off

The device switches off after approx. 30 seconds without being used.



Info

Please bear in mind that with activated LED illumination the device will NOT switch off automatically. Switch off the LED illumination as formerly described.

Measuring principle

The measuring device at hand serves for the rough determination of the material or wood moisture content according to the resistance measuring method. Fields of application are wood moisture measurements of sawn timber and firewood. Moreover, the measuring device can be used to detect the moisture in soft building materials such as gypsum or plaster.

The resistance measuring method is an indirect measurement method, since the moisture content of the measured material is deduced from the its conductivity.

Influencing variables suitable to change the conductivity, e.g. electrically conducting materials or dissolved salts, hence also have a direct influence on the determined measured values. Therefore, the displayed measured values can only be considered as indicator of the moisture content.

Notes on use regarding the wood moisture measurement:

For wood moisture measurement a calibration curve is stored in the device, which corresponds to the average of the relevant kinds of wood in Europe based on a wood temperature of 20 °C. Therefore, no further settings are required for a quick rough determination of the wood moisture content. If precise wood moisture values are required for other wood temperatures or with due regard of the type and bulk density of a certain timber, an additional control measurement applying the Darr procedure or else using a wood moisture measuring device with temperature comparison function and selection option for the specific wood type calibration is recommended.

- Always insert the measuring tips transverse to the wood fibre direction. The conductivity transverse to the wood fibre direction is lower than that in line with it.
- When selecting the measuring positions observe the following:
 - Always measure the material moisture at three different positions in order to achieve a sufficient accuracy by means of the arithmetic average.
 - Do not measure the face, because there are mainly dry areas.
 - Preferably do not measure at cracks, branches or resin pockets either.
- Oily and/or aqueous timber preservatives affect the measurement result.
- If possible, do not measure wood with a temperature below -5 °C. Too low wood temperatures distort the result of the measurement.
- Avoid static charge of the material to be measured due to friction. Static charge distorts the measurement result.

- With a wood moisture of less than 10 % RH, electrostatic forces may occur at the good to be measured. This can falsify the result of the measurement. Experience has shown that this occurs at the outlet of veneer drying plants. Remove the static charge by use of suitable grounding measures.
- The measurement's accuracy depends on the contact pressure of the measuring tips. The measuring tips must be connected to the wood in a way that the contact resistance is small as compared to the measuring resistance.

Notes on use regarding the material moisture measurement:

No further settings are required for the quick determination of the material moisture at the device. Nevertheless, when assessing the measurement results one has to bear in mind that increased occurrences of soluble salts in the measured material can distort the result of the measurement. The more salts present, the higher the conductivity of the material and the higher will be the displayed measurement value.

Further observe disruptive influences due to electrically conducting substances:

If a construction material contains electrically conducting substances, it also has a lower resistance value, which then simulates high moisture values. Which means that a too high measured value is displayed.

From visual inspection it is not always apparent, whether there are any electrically conducting substances inside the construction material.

Some of the main error sources here are in particular reinforcements, metal laminations and conducting insulation such as slag in timber beam ceiling constructions. Especially in case of insulation materials with metal lamination, measured values are often misinterpreted during the resistance measurement. Quantitative conclusions about the moisture content of the mineral material to be measured can only be drawn by applying the Darr procedure or the CM method.

Maintenance and repair

Battery change

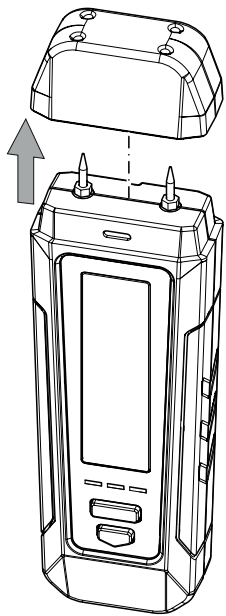
A battery change is required when the Battery indication (17) lights up or the device can no longer be switched on (see chapter Inserting the battery).

Exchanging measuring tips

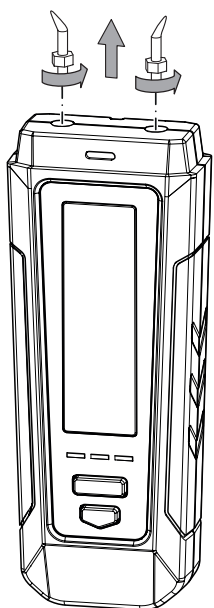
Exchange the measuring tips when these exhibit signs of wear (e.g. oxidation, deformation, heavy, irremovable contamination).

✓ Ensure that the device is switched off.

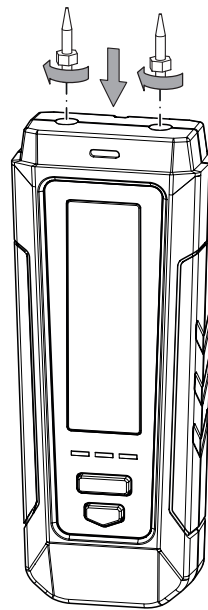
1. Remove the protective cap from the device.



2. Detach the screwed-on measuring tips from the device.



3. Screw the new measuring tips into the device.



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.

Disposal



■ In the European Union, electronic equipment must not be treated as domestic waste, but must be disposed of professionally in accordance with Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE). At the end of its life, please dispose of this device according to the valid legal requirements.

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