

EN

OPERATING MANUAL
MOISTURE MEASURING
DEVICE

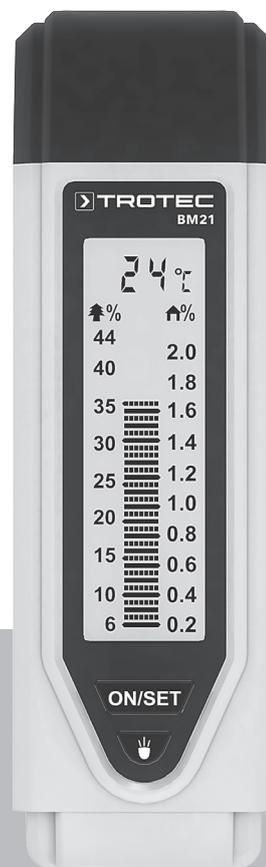


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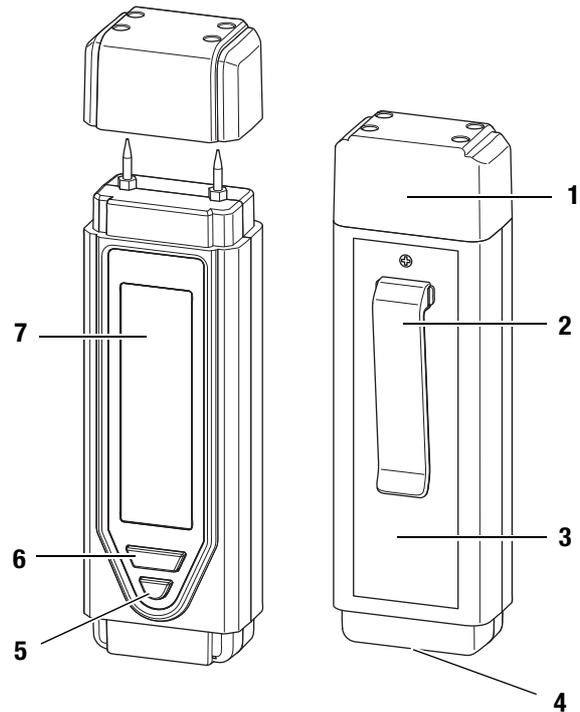
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Information about the device

Description of the device

By use of the moisture measuring device BM21 the humidity level of wood and building material can be determined. Additionally, the ambient temperature can be measured in °C or °F.

Device depiction



Notes regarding the operating manual

Symbols



Danger!

Warns of a hazard which can lead to injuries.



Caution!

Warns of a hazard which can lead to damage to property.

The current version of the operating manual can be found at: www.trotec.de

Legal notice

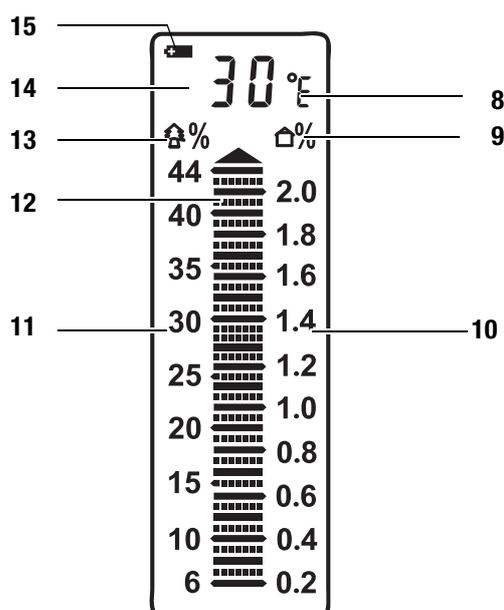
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The scope of delivery may vary from product images. This document was created with all due care. TROTEC® accepts no liability whatsoever for possible mistakes or omissions.

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

No.	Operating element
1	Measuring tips with protective cap
2	Transport clip
3	Battery compartment with cover
4	LED
5	Lamp button
6	ON/SET button
7	Display

Display



No.	Display element
8	Indication of the temperature unit
9	Indication of the building moisture measuring mode
10	Numeric values for building moisture measurement
11	Numeric values for wood moisture measurement
12	Measured value scale (1 bar corresponds to 1% of wood moisture or 0.05 % of building moisture)
13	Indication of the wood moisture measuring mode
14	Measurement value display
15	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 BM21
- 4 x AAA batteries
- 1 x Getting started guide

Safety

Carefully read the operating manual before using the device and keep it within reach!

- Do not use the device in atmospheres containing oil, sulphur, chlorine or salt.
- 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.
- Observe the storage and operating conditions (see chapter Technical data).

Intended use

Only use the device to measure the moisture level of wood and building materials. Here, read and observe 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, entitlements to a warranty are forfeited. 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**Danger!**

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.

**Danger!**

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

**Danger!**

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

**Danger!**

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

**Caution!**

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

**Caution!**

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

**Caution!**

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.

**Caution!**

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.

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:

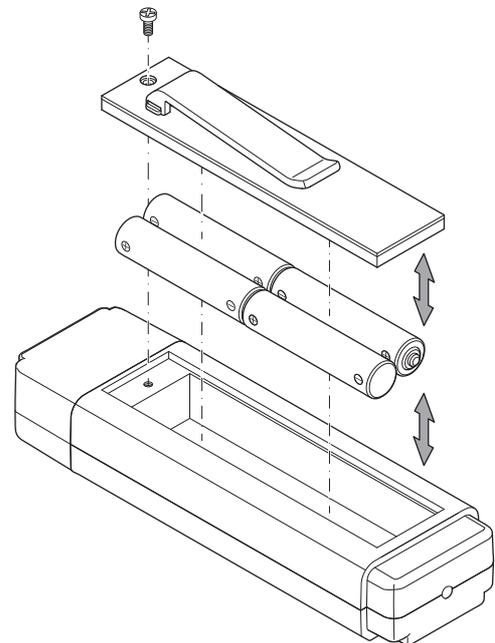
- Dry.
- Protected from dust and direct sunlight.
- with a plastic cover to protect it from invasive dust, if necessary.
- The storage temperature is the same as the range given in the chapter Technical data.
- When storing the device for a long time, remove the batteries.

Operation**Inserting the batteries**

- Insert the supplied batteries before first use.

**Caution!**

Make certain 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.

Switch-on

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

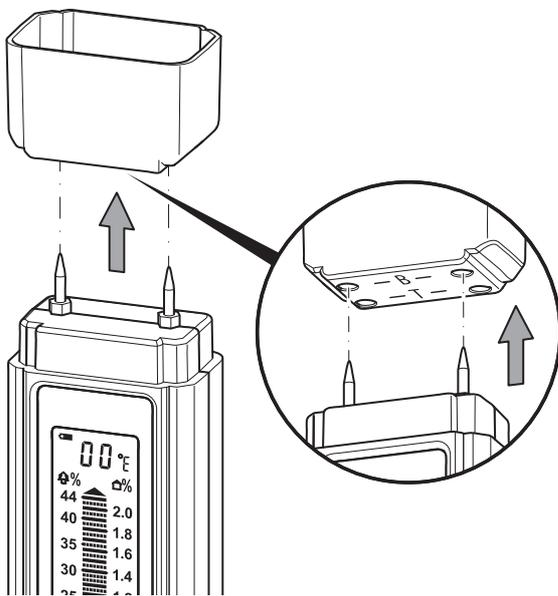
Note:

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.

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 (12) should be flashing.
3. 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 (14) 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 (11).
 - When measuring building moisture, read the measured value off the right-hand side of the scale (10).
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.

Changing the unit °C / °F

- Press the ON/SET button (6) for approx. 3 seconds.
 - The display (8) changes to either °C or °F.
 - The measured value adapts to the selected unit.

Switching on the illumination

- Press the Lamp button (5) for approx. 3 seconds to switch on the LED (4).
- Briefly press the Lamp button (5) to switch the LED (4) off.

Switch-off

- The device switches off after approx. 30 seconds without being used.
- Please mind that with activated illumination the device will NOT switch off automatically. Switch off the 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 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 %, electrostatic forces can appear 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

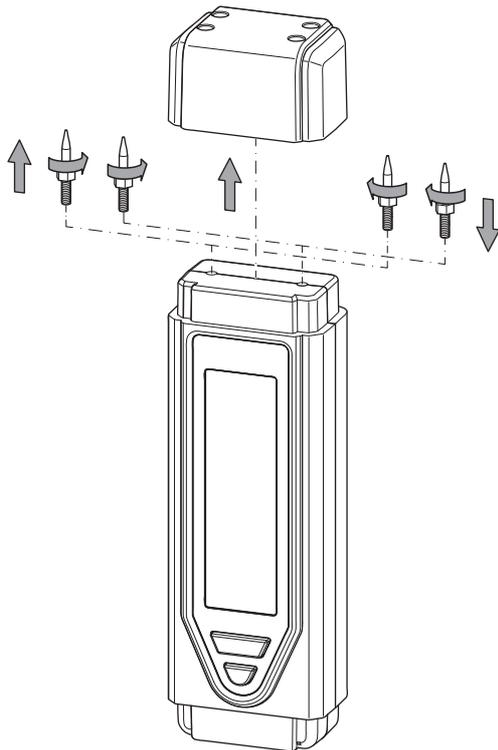
Battery change

A battery change is required, when the Battery indication (15) lights up or the device can no longer be switched on. See Inserting the batteries on page 3.

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. Only use clean water to moisten the cloth.

Repair

Do not modify the device. Never open the device housing 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 2002/96/EC of the European Parliament and Council of 27th January 2003 concerning old electrical and electronic equipment. At the end of its life, please dispose of this instrument in a manner appropriate to the relevant legal requirements.

Declaration of conformity

in accordance with the EC Low Voltage Directive 2006/95/EC and the EC Directive 2004/108/EC about electromagnetic compatibility.

Herewith, we declare that the moisture measuring device BM21 was developed, constructed and produced in compliance with the named EC directives.

The CE marking is found on the rear of the device.

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