

EN

INSTRUCTIONS
MOISTURE MEASURING
DEVICE



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Information on the use of these instructions


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.

Notice
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 instructions must be observed.

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




BM40



<https://hub.trotec.com/?id=41251>

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.
- Do not use the device in potentially explosive rooms or areas and do not install it there.
 - Do not use the device in an aggressive atmosphere.
 - Do not immerse the device in water. Do not allow liquids to penetrate into the device.
 - The device may only be used in dry surroundings and must not be used in the rain or at a relative humidity exceeding the operating conditions.
 - Protect the device from permanent direct sunlight.
 - Do not expose the device to strong vibrations.
 - Do not open the device.
 - Do not remove any safety signs, stickers or labels from the device. Keep all safety signs, stickers and labels in legible condition.
 - Use batteries of type 6LR61 (9 V battery).
 - Never charge batteries that cannot be recharged.
 - Different types of batteries and new and used batteries must not be used together.
 - Insert the batteries into the battery compartment according to the correct polarity.
 - Remove discharged batteries. Batteries contain materials hazardous to the environment. Dispose of the batteries according to the national regulations.
 - Remove the batteries from the device if you will not be using the device for a longer period of time.
 - Never short-circuit the supply terminal in the battery compartment!

- Do not swallow batteries! If a battery is swallowed, it can cause severe internal burns within 2 hours! These burns can lead to death!
- If you think batteries might have been swallowed or otherwise entered the body, seek medical attention immediately!
- Keep new and used batteries and an open battery compartment away from children.
- Observe the storage and operating conditions (see 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.

Any use other than the intended use is regarded as misuse.

Reasonably foreseeable misuse

Do not use the device in potentially explosive atmospheres, for measurements in liquids or at live parts.

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

Personnel qualification

People who use this device must:

- have read and understood the instructions, 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.

Notice

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

Notice

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

Information about the device

Device description

The device BM40 is suited for the non-destructive material moisture measurement in mineral building materials and wood.

The measuring probe is pressed against the material to be tested. The moisture level is then measured by capacitive sensors using the dielectric measurement method, which is absolutely non-destructive since no electrodes or probes have to be inserted into the material.

For an increased accuracy of the measured values, which are directly indicated in % by weight, there are 10 selectable material curves available for the most important types of wood and building materials.

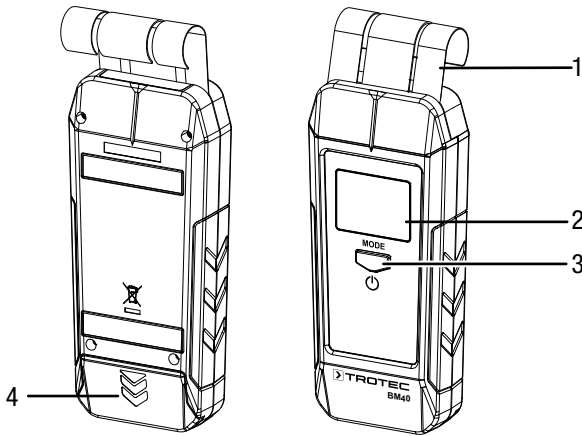
The device further features the following functions:

- Real-time measurement value display
- Temperature measurement
- Automatic switch-off

Scope of delivery

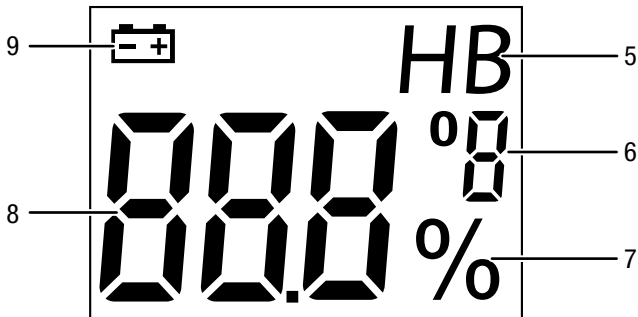
- 1 x Moisture measuring device
- 1 x Quick guide

Device depiction



No.	Designation
1	Measuring probe
2	Display
3	Power/MODE button
4	Battery compartment with cover

Display



No.	Designation	Function
5	Measuring mode indication	Currently set measuring mode
6	°C / °F indication	Unit of the displayed temperature
7	% indication	Unit of the displayed humidity
8	Measurement value display	Current measured value
9	Battery indication	Displayed when the battery voltage is low

Technical data

Parameter	Value	
Model	BM40	
Measuring principle	Dielectric/capacitive	
Electrode length	approx. 40 mm	
Penetration depth, non-destructive	0 mm to 50 mm	
Measuring range	Solid brick	0% to 20%
	Anhydrite screed	0% to 20%
	Cement screed	0% to 20%
	Sand-lime brick	0% to 20%
	Gas concrete	0% to 20%
	High-insulating brick	0% to 20%
	Concrete	0% to 20%
	Hardwood	0% to 50%
	Softwood	0% to 50%
	Chipboard	0% to 50%
Resolution	Temperature	-10 °C to 55 °C
	Wood	0.1 %
	Mineral building materials	0.1 %
Ambient temperature	-5 to 50 °C with 0 to 85 % RH	
Power supply	1 x 9 V battery	
Automatic switch-off	after approx. 10 min	
Dimensions (length x width x height)	168 x 35 x 75 mm	
Weight	220 g	

Transport and storage

Notice

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

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
- protected from dust and direct sunlight
- at the temperature specified in the technical data
- battery is removed from the device

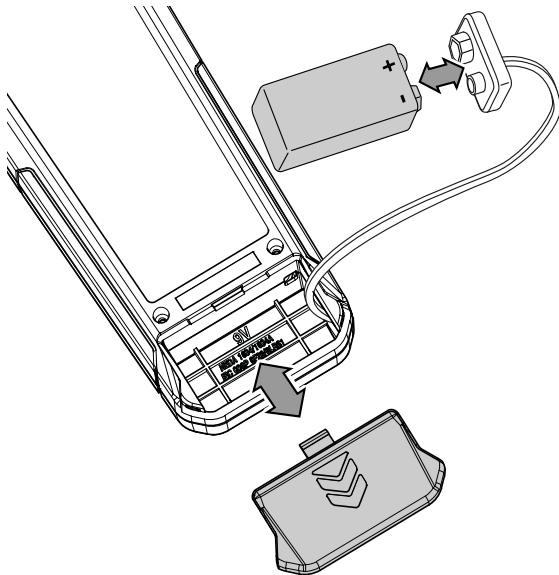
Operation

Inserting the battery

Insert the battery into the device before first use.

Notice

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



1. Open the battery compartment at the rear of the device by sliding down the cover.
2. Use the battery clip to connect the 9 V battery with correct polarity.
3. Place the battery with the battery clip into the battery compartment.
4. Slide the cover back onto the battery compartment until it locks in place.

Switching the device on



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.

1. Press the *Power/MODE* button (3) for approx. 1 second.
 - ⇒ The device starts in the measuring mode °C.
 - ⇒ The measured value is displayed in real time on the measurement value display (8).

Selecting the measuring mode

For an increased accuracy of the measured values, which are directly indicated in % by weight, 10 selectable material curves are available for the following types of wood and building materials:

Measuring mode	Designation	Measuring range
B1	Solid brick	0% to 20%
B2	Anhydrite screed	0% to 20%
B3	Cement screed	0% to 20%
B4	Sand-lime brick	0% to 20%
B5	Gas concrete	0% to 20%
B6	High-insulating brick	0% to 20%
B7	Concrete	0% to 20%
H1	Hardwood (e.g. maple, birch, beech, Douglas fir, oak, ash, walnut)	0% to 50%
H2	Softwood (e.g. spruce, pine, cherry, larch, Meranti, poplar)	0% to 50%
H3	Chipboard	0% to 50%
°C	Temperature	-10 °C to 55 °C

1. Repeatedly press the *Power/MODE* button (3) until the desired measuring mode is set.

Moisture measurement



Info

When pressing the contact surface of the measuring probe against the object, apply a steady contact pressure (approx. 10 N which corresponds to approx. 1 kg of weight force) but do not bend it to the point of overlapping.

In order to become a better judge of what the right level of contact pressure might be, we recommend pressing the device a few times against a pair of scales.

1. Select the desired measuring mode.
2. Hold the device against the object at an angle of 90° and make sure that the entire width of the measuring probe rests on the contact surface.
 - ⇒ The measured value is displayed in real time on the measurement value display (8).

Switching the device off

The device switches off after approx. 10 minutes of non-use.

1. Press the *Power/MODE* button (3) for approx. 3 seconds.
 - ⇒ The device switches off.

Measuring principle

The measuring device at hand serves for the rough determination of the material or wood moisture content according to the dielectric measuring principle. Fields of application include the non-destructive moisture measurement of sawn timber, lumber and firewood as well as of mineral building materials.

The dielectric measuring method is an indirect measurement method, since the moisture content of the measured material is deduced from the changed dielectric permittivity.

Influencing variables suitable to change this parameter, e.g. electrically conducting materials or dissolved salts, hence also have a direct influence on the determined measured values. Since the exact composition of building materials is generally unknown before a moisture measurement, the displayed measured values can only be regarded as an indicator of the moisture content.

General notes on use

Calibration curves for measuring the moisture level in different mineral building materials, hardwood, softwood and chipboard are stored in the device. If precise material moisture values are required, an additional control measurement applying the Darr procedure is recommended. Especially for precise wood moisture measurements for other wood temperatures or with due regard to the type and bulk density of a certain timber it is recommended to use a wood moisture measuring device with temperature comparison function and selection option for the specific wood type calibration.

- 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.
- The measurement results are only to be used as reference for a rough orientation.
- The height of the measured value can be calculated from the determined dielectric constant of the measured material. Dry air has a constant of 1, water 80. Hence, the more humidity is contained in the material, the higher will be the displayed measured value.
- Another important variable influencing the measured value is the bulk density of the good to be measured. The higher the bulk density, the higher the measured value.

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 the results can be influenced by various factors.

- Performing the measurement
 - The measurement's accuracy depends on the contact pressure of the measuring electrodes. Ideally, they should be applied with a steady contact pressure of approx. 10 N (this corresponds to approx. 1 kg of weight force), however not bent to the point of overlapping.
- Measuring depth
 - Depending on the material's bulk density and degree of moisture penetration, the device's penetration depth ranges up to 40 mm. Conclusions regarding zones located at a lower level cannot be drawn.
- Material characteristics
 - 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.
 - If possible, do not measure wood with a temperature below -5 °C. Too low wood temperatures distort the result of the measurement.
 - Material aggregates and their concentration, e.g. in screed or concrete, can also considerably influence the height of the measured value.
 - The material should be preferably homogenous and not have any air pockets.

- Electrically conducting materials or electrical fields
 - If a construction material contains electrically conducting substances, the dielectric constant is also increased, which then simulates high moisture values. Consequently, a too high measured value will be displayed.
 - If the material to be measured contains metal (e.g. nails, screws, lines, pipes, etc.) and is situated within the sensor's measuring field, the measured value skyrockets due to intense reflections.
 - 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.
 - 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.
 - For optimum conditions neither electrical fields nor conducting materials should be present.
- Surface condition
 - Before measuring, the measuring point is to be cleared of any impurities (e.g. paint residues, dust).
 - Oily and/or aqueous timber preservatives affect the measurement result.
 - Rough surfaces will always result in a too low measured value.
 - The surface of the material to be measured should be as level as possible to permit thorough contact of the measuring probe.
- Moisture distribution
 - With material thicknesses of less than 2 cm there is a danger of humidity values from adjacent material layers affecting the measured value.
 - Ideally, the moisture should be evenly distributed within the material to be measured.

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 (9) is displayed or the device can no longer be switched on (see chapter Operation, section Inserting the battery).

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.

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.

Display segments are only faintly visible or flicker:

- The battery voltage is too low. Exchange the battery immediately.

The device displays implausible measured values:

- The battery voltage is too low. Exchange the battery immediately.

Disposal

Always dispose of packing materials in an environmentally friendly manner and in accordance with the applicable local disposal regulations.



The icon with the crossed-out waste bin on waste electrical or electronic equipment is taken from Directive 2012/19/EU. It states that this device 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. You can also find out about other return options that apply for many EU countries on the website <https://hub.trotec.com/?id=45090>. Otherwise, please contact an official recycling centre for electronic and electrical equipment authorised for your country.

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.

Only for United Kingdom

According to Waste Electrical and Electronic Equipment Regulations 2013 (SI 2013/3113) (as amended) and the Waste Batteries and Accumulators Regulations 2009 (SI 2009/890) (as amended), devices that are no longer usable must be collected separately and disposed of in an environmentally friendly manner.

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