BM31



EN

INSTRUCTIONS
MOISTURE INDICATOR

TROTEC

TRT-BA-BM31-TC220926TTRT02-004-EN

Table of contents

Information on the use of these instructions 2
Safety 2
Information about the device 4
Transport and storage 5
Operation 5
Dielectric measurements 6
Maintenance and repair 8
Errors and faults 8
Disposal 9

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 these instructions via the following link:



BM31

https://hub.trotec.com/?id=43574

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.
- Do not operate the device near medical equipment (e.g. pacemakers).
- Do not operate the device near open electrical wiring.
- Use batteries of type 6LR61 (9 V battery).
- Never charge a battery that cannot be recharged.
- Insert the battery into the battery compartment according to the correct polarity.
- Remove the discharged battery. Batteries contain materials hazardous to the environment. Dispose of the battery according to the national regulations.
- Remove the battery from the device if you will not be using the device for a longer period of time.
- Never short-circuit the terminal of the battery!

- 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

There is a danger of suffocation for children due to packaging material! Keep packaging films and parts away from children. There is a risk of death due to suffocation.

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

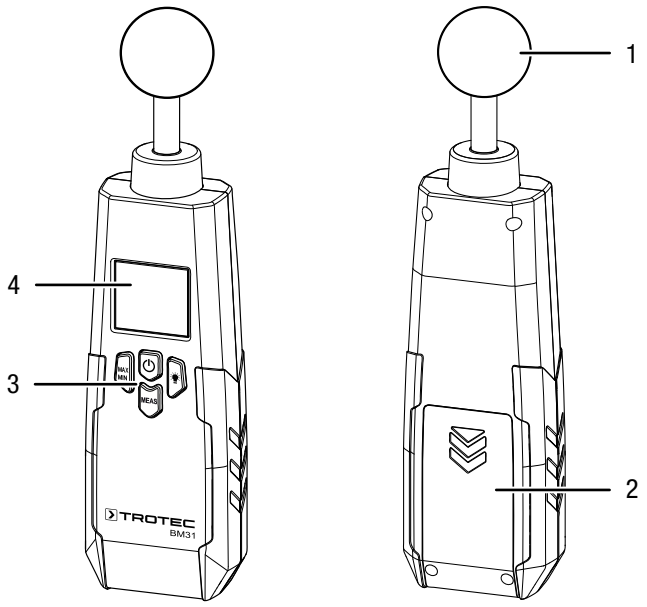
The dielectric humidity sensor serves the purpose of a quick, indicative and non-destructive localization of humidity or moisture distributions.
The measuring device is suited for the preliminary check of the building materials' readiness for covering for subsequent CM measurements. The moisture indication allows the localization of the most significant measuring spots to extract material for the CM measurement.

A max/min function is available for the assessment of the measurements.

The measuring device comes equipped with a selectable display illumination.

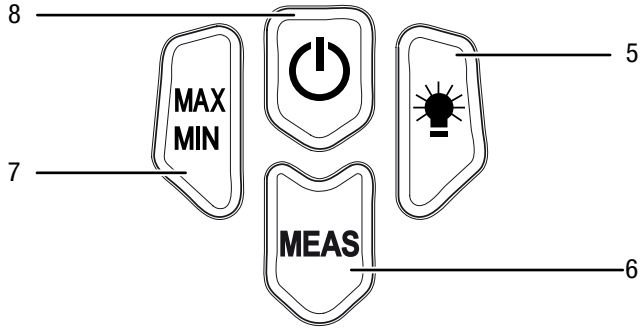
When not in use, an automatic switch-off saves the battery.

Device depiction



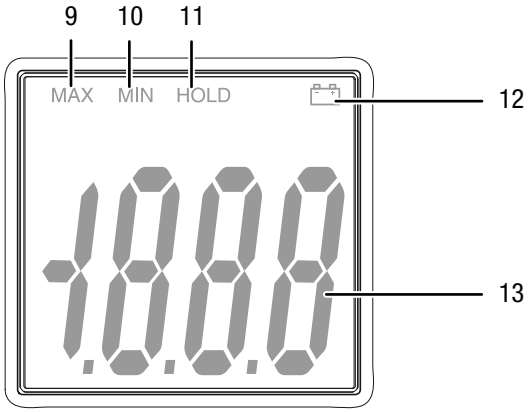
No.	Designation
1	Sensor
2	Battery compartment with cover
3	Operating elements
4	Display

Operating elements



No.	Designation
5	*Light* button
6	*MEAS* button
7	*MAX/MIN* button
8	*Power* button

Display



No.	Designation
9	*MAX* indication
10	*MIN* indication
11	*HOLD* indication
12	*Battery* indication
13	*Measured value* indication

Technical data

Parameter	Value
Model	BM31
Measurement principle:	Dielectric
Measuring range:	0 to 100 digits
Measuring range resolution:	1 digit
Penetration depth	5 to 40 mm
Operating temperature:	0 to 40 °C
Storage temperature:	-20 to 70 °C
Power supply:	1 x 9 V battery
Automatic switch-off:	after approx. 30 seconds of non-use
Weight:	190 g
Dimensions (height x width x depth)	190 x 55 x 32 mm

Scope of delivery

- 1 x Device BM31 (without battery)
- 1 x Quick guide

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
- Batteries are removed from the device

Operation

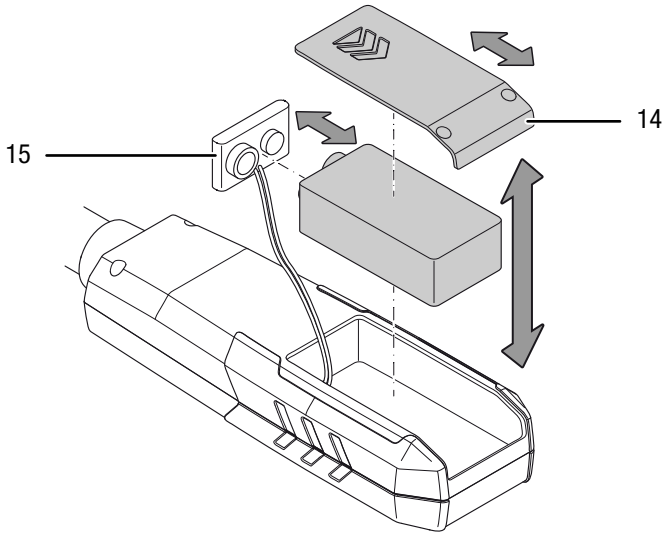
Inserting the battery

- Insert the battery before first use. Observe the specifications in the technical data.

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 (14).
2. Use the battery clip (15) 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 (14) back onto the battery compartment.



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* button (8).
   ⇨ The display (4) switches on.

Calibrating the measuring device

Info
The first measurement after switch-on is carried out automatically and serves for the purpose of calibration.

1. Hold the measuring device preferably somewhere near the bottom and in one hand (corrugated rubber coating).
2. Point the measuring device away from the body and any objects into clear space.
3. Press and hold the *MEAS* button (6).
   ⇨ *CAL* flashes in the *measured value indication* (13) for approx. 5 seconds.
   ⇨ The calibration is complete once the *CAL* indication stops flashing.
4. Release the *MEAS* button (6).
   ⇨ The device is ready for operation.

Carrying out a measurement

1. Place the measuring device in a vertical position on the component.
2. Press and hold the *MEAS* button (6) until the desired measurement interval is completed.
3. Release the *MEAS* button (6).
   ⇨ The *HOLD* indication (10) appears on the display.
   ⇨ The last measured value is displayed in the *measured value indication* (13).

Performing a humidity scan

1. Place the measuring device in a vertical position on the component.
2. Run the device over the surface to be measured without a break. In doing so, press and hold the *MEAS* button (6).
3. Observe the indicated measured value for changes.
4. Release the *MEAS* button (6).
   ⇨ The *HOLD* indication (10) appears on the display.
   ⇨ The last measured value is displayed in the *measured value indication* (13).

MAX/MIN function

1. Press the *MAX/MIN* button (7) **before** performing the measurement.
   ⇨ The *MAX* indication (9) appears on the display.
   ⇨ The highest measured value during a measurement will be displayed.
2. Press the *MAX/MIN* button (7) again **before** performing the measurement.
   ⇨ The *MIN* indication (10) appears on the display.
   ⇨ The lowest measured value during a measurement will be displayed.
3. Carry out the measurement with the desired setting.

Switching on the display illumination

1. Press the *Light* button (5).
   ⇨ The background illumination is activated.
2. Press the *Light* button (5) again.
   ⇨ The background illumination is deactivated.

Switching the device off

Info
The device automatically switches off after approx. 30 seconds of non-use.

Please proceed as follows for manual switch-off:

1. Press the *Power* button (8).
   ⇨ The device is switched off.

Dielectric measurements

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.

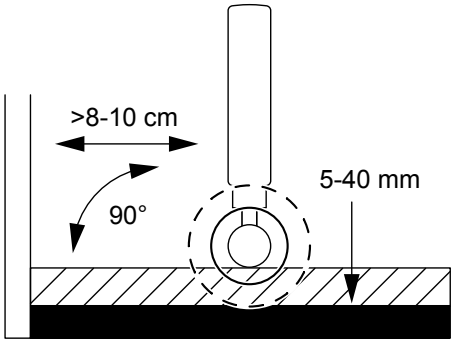
The dielectric measuring method is an indirect measurement method, since the moisture content of the measured material is deduced from the changed dielectric permittivity.

General notes on use

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.

- The measurement results are only to be used as reference for a rough orientation.
- The displayed measured values are so-called unitless digit values in the range of 0-100. These do not resemble moisture data in mass % or volume %.
- 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

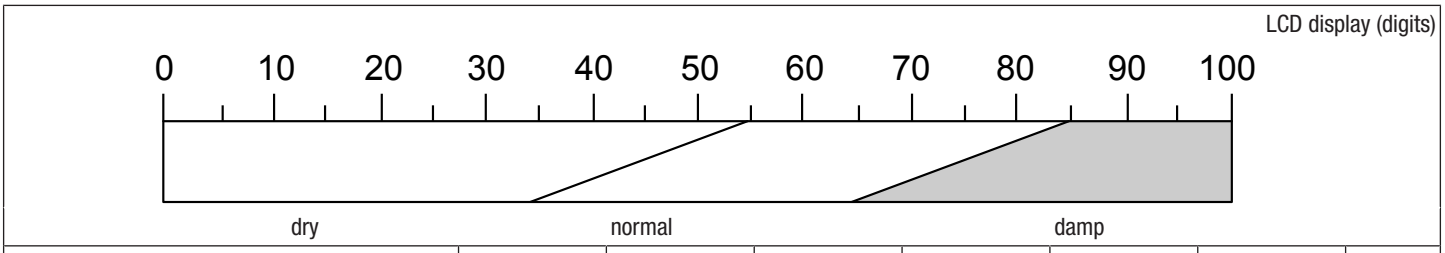


No further settings are required for the quick determination of the material moisture at the device. Nevertheless, when assessing the measurement results one has to bear in mind that the results can be influenced by various factors:

- Performing the measurement
  - When the ball head is held to corners (e.g. window frames), the measured value is generally higher, because there is more matter in the measuring head's stray field. Toward a corner a distance of more than 8 to 10 cm has to be observed.
  - When performing the measurement, always hold the ball head perpendicular to the material to be measured. Press the ball head firmly against the surface to be measured and make sure not to tilt it.
- Measuring depth
  - Depending on the material's bulk density and degree of moisture penetration, the device's penetration depth amounts to 5 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.

Comparison chart material moisture



plaster and anhydrite in M/CM% (M% = CM%)	0.3	0.5	1.4	2.0	2.5	2.7	%
cement-based materials in CM%	1.5		2.1	3.0	3.5	4.0	CM%
cement-based materials in mass %	2.7		3.6	4.5	5.5	6.0	M%

CM% = percentage due to calcium carbide method

M% = mass %

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:

- Check the charging status of the battery. Change the battery, if required (see chapter Inserting the battery).
- Make sure that the battery is properly positioned. Check the polarity is correct.

The device displays implausible measured values:

- Check the charging status of the battery. Change the battery, if required (see chapter Inserting the battery).
- Make sure that the battery is properly positioned. Check the polarity is correct.
- The sensor is defective or soiled. Clean the device as described in the Cleaning chapter.

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 wheeled bin indicates that this device and any associated components (e.g. remote controls) must not be disposed of with household waste at the end of their life, in accordance with the Waste Electrical and Electronic Equipment Directive (2012/19/EU) and national laws.

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.



This icon with the crossed-out wheeled bin indicates that batteries or accumulators must not be disposed of with household waste at the end of their life. If the device contains batteries or accumulators that contain mercury, cadmium or lead, the respective chemical symbol (Hg, Cd or Pb) is shown below the icon of the crossed-out wheeled bin. To prevent environmental pollution, do not carelessly leave batteries or electrical and electronic equipment containing batteries in public areas. In the European Union, batteries and accumulators must be returned to a designated collection point in accordance with REGULATION (EU) 2023/1542 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 July 2023 concerning batteries and waste batteries. Remove batteries/accumulators and dispose of them separately 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.

Trotec GmbH

Grebbener Str. 7
52525 Heinsberg
Germany
+49 2452 962-0
+49 2452 962-200

online@trotec.com
www.trotec.com