

EN

ORIGINAL INSTRUCTIONS  
MOISTURE INDICATOR



**Table of contents**

**Notes regarding the 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** ..... 8

**Notes regarding the 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.

**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 instructions 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.**

- The device is supplied with warning signs. Prior to initial start-up, make sure to paste the corresponding warning signs in your local language over the ones present at the rear of the device as described in chapter Operation.
- Do not use the device in potentially explosive rooms or areas and do not install it there.
- Do not use the device in 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 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 open the device.
- Do not operate the device near open electrical wiring.
- 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 from the device. 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.

To use the device for its intended use, only use accessories and spare parts which have been approved by Trotec.

### 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 qualifications

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.

#### 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 dielectric humidity sensor serves the purpose of a quick, indicative and non-destructive localization of humidity or moisture distributions.

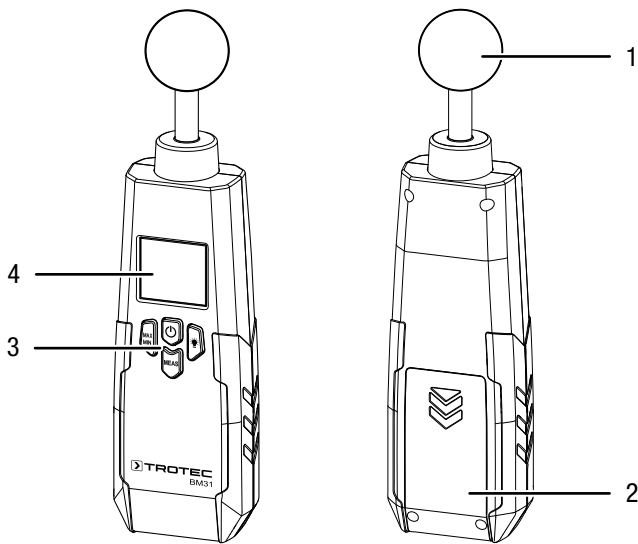
The measuring device is suited for the preliminary check of the building materials' readiness for covering for subsequent CM measurements. The moisture indication allows the localization of the most significant measuring spots to extract material for the CM measurement.

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

The measuring device comes equipped with a selectable display illumination.

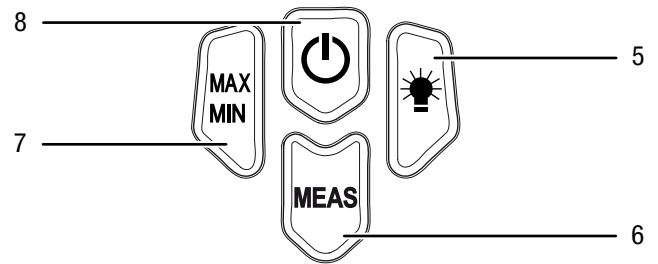
When not in use, an automatic switch-off saves the battery.

**Device depiction**



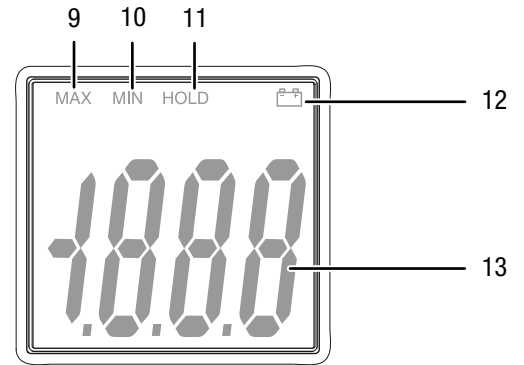
No.	Designation
1	Sensor
2	Battery compartment with cover
3	Operating elements
4	Display

**Operating elements**



No.	Designation
5	Lamp button
6	MEAS button
7	MAX/MIN button
8	On/off button

**Display**



No.	Designation
9	MAX indication
10	MIN indication
11	HOLD indication
12	Battery indication
13	Measurement 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
- 1 x 9 V battery
- 1 x Quick guide

## 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

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
- the storage temperature complies with the values specified in the Technical data
- Remove the batteries from the device.

## Operation

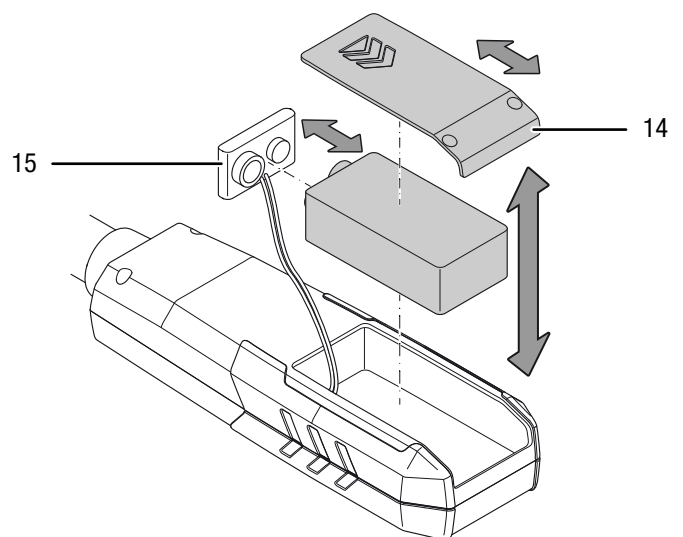
### Inserting the batteries

- Insert the supplied battery before first use.

### Note

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 on/off switch (8).
  - ⇒ The display switches on.
  - ⇒ The device starts the calibration.

## 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.
  - ⇒ CAL flashes on the display for approx. 5 seconds.
  - ⇒ The calibration is complete once the CAL indication stops flashing.
  - ⇒ 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 indication HOLD (10) appears on the display.
  - ⇒ The last measured value is displayed in the measurement 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 indication HOLD (10) appears on the display.
  - ⇒ The last measured value is displayed in the measurement 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 Lamp button (5).
  - ⇒ The background illumination is activated.
2. Press the Lamp 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 on/off switch (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.

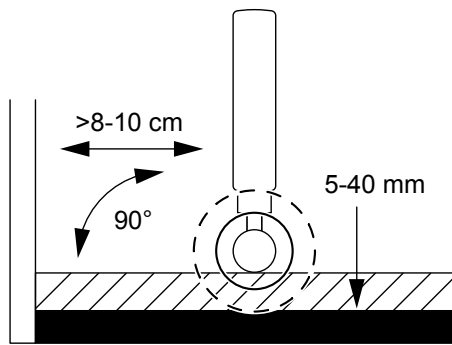
The dielectric measuring method is an indirect measurement method, since the moisture content of the measured material is deduced from the changed dielectric permittivity.

### 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  $-5\text{ }^{\circ}\text{C}$ . 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**

LCD display (digits)							
dry		normal			damp		
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 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.

**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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