

# EN

**OPERATING MANUAL**  
LASER DISTANCE  
MEASURING DEVICE



## Table of contents

Notes regarding the operating manual .....	1
Information about the device .....	2
Technical data .....	3
Safety .....	4
Transport and storage .....	5
Operation .....	5
Fault indications .....	9
Maintenance and repair .....	9
Disposal .....	10
Declaration of conformity .....	10

## Notes regarding the operating manual

### Symbols

**Danger!**

Warns of a hazard which can lead to injuries.

**Risk from laser radiation!**

Warns of injury risk from laser radiation.

**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](http://www.trotec.de)

## Legal notice

This release replaces all previous versions. No part of this publication may be reproduced without written permission from TROTEC®. The same applies for electronically processing, duplicating or spreading the publication. Subject to technical changes. All rights reserved. Trademarks are used without guarantee that they may be used freely and primarily following the spelling of the manufacturer. Product names are registered. 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® 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®

## Information about the device

### Description of the device

The laser distance measuring device is used to determine distances, areas and volumes in interior spaces. Indirect measurements are carried out employing the Pythagoras function.

The device is equipped with separate operating elements (2) for the different measuring functions. The multi-line and optionally also illuminated display (3) indicates the determined values.

Owing to the dust- and splash-proof housing (IP54), the device is also suited for use on construction sites.

### Measuring distance

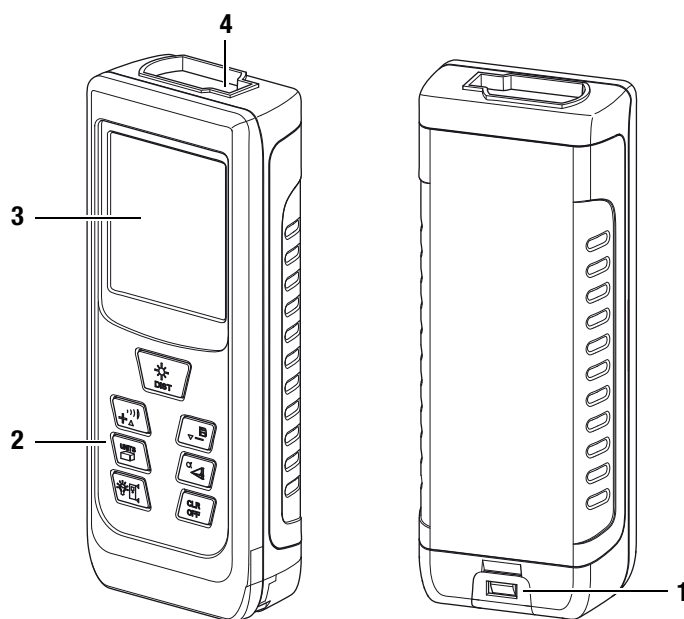
The range of the device can be gathered from the Technical data chapter.

Under certain conditions – e.g. at night, in twilight or when the target is hidden in the shade – greater distances are possible even without target plate. During the day use a target plate to increase the distance for poorly reflecting targets.

### Target surfaces

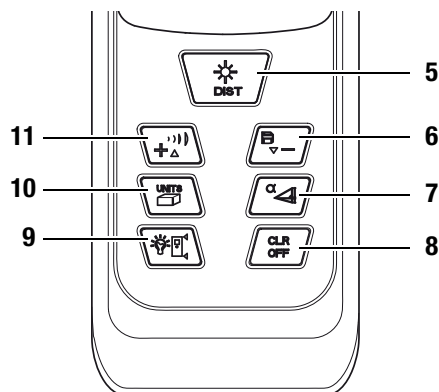
There might be measurement errors, when the laser encounters colourless liquids (e.g. water), dust-free glass, styrofoam or other semi-permeable materials. The measurement results could also be falsified, if the laser encounters a high-gloss surface and is deflected by it. Non-glossy, non-reflective or dark surfaces can extend the measurement duration.

## Device depiction



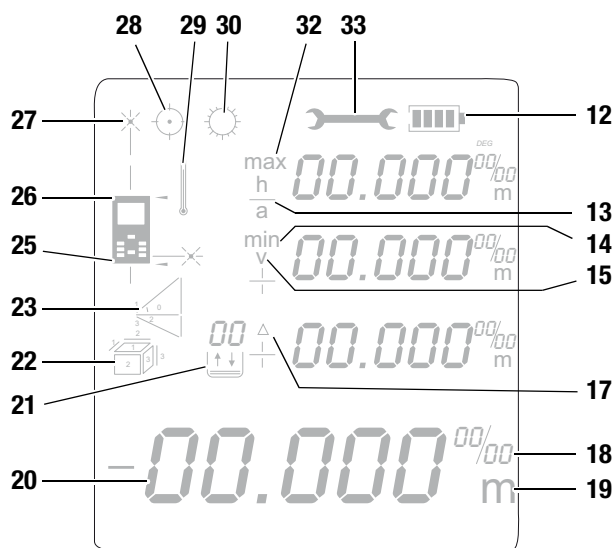
No.	Operating element
1	Battery compartment opening
2	Operating elements
3	Display
4	Laser

## Operating elements



No.	Operating element	
5	Press briefly:	Switch-on/measurement button
	Press for a long time:	Button for permanent distance measurements
6	Press briefly:	Minus key
	Press for a long time:	Save button (history)
7	Press briefly:	Button for indirect measurements
	Press for a long time:	Inclination key (on/off)
8	Press briefly:	Delete button
	Press for a long time:	Switch-off button
9	Press briefly:	Illumination key (on/off)
	Press for a long time:	Reference key
10	Press briefly:	Area/room volume key
	Press for a long time:	Unit key (ft, in., m)
11	Press briefly:	Plus key
	Press for a long time:	Signal tone key (on/off)

## Display



No.	Display element
12	Battery status
13	Horizontal measuring distance
14	Measured minimum value
15	Vertical measuring distance
16	Spare
17	Delta = maximum minus minimum
18	Complementary display when using imperial units
19	Display of the selected unit. Possible units are: ft, in., m – for the three measurement value displays above ft, ft <sup>3</sup> , ft <sup>2</sup> , in., m, m <sup>3</sup> , m <sup>2</sup> – for the lower measurement value display
20	Measurement value display: The lower measurement value display indicates the last measured value or the result of a calculation. The three upper measurement value displays contain the past three measured values, the minimum and maximum value or the measured values to be added or subtracted.
21	Display inclination and history
22	Area measurement Volume measurement
23	Indirect measurement (two auxiliary measurements) Indirect measurement (three auxiliary measurements)
24	Spare
25	Reference value rear
26	Reference value front
27	Laser active
28	Error: calculation error
29	Error: temperature too high/low
30	Error: ambient light too intense
31	Spare
32	Measured maximum value
33	Device error warning

## Technical data

Model:	BD20
Weight:	85 g
Dimensions (H x W x D):	113 x 45 x 25 mm
Measuring range:	0.05 to 60 m
Accuracy:	±2 mm*
Measuring range resolution:	1 mm
Number of recordings logged in the history:	10
Type of protection:	IP54
Operating temperature:	0 to 40 °C
Storage temperature:	-20 to 70 °C
Laser output:	< 1 mW (620-690 nm)
Laser class:	II
Power supply:	2 x Alkaline LR6 AAA batteries, 1.5 V or NiMH 1.2 V to 1.5 V (rechargeable batteries) Battery life approx. 5000 to 8000 measurements

Automatic switch-off of the device: After approx. 75 seconds of non-use

Automatic switch-off of the laser: After approx. 30 seconds of non-use

\*under favourable conditions (good target surface, room temperature) up to 10 m

## Scope of delivery

- 1 x Laser distance measuring device BD20
- 2 x Alkaline LR6 AAA, 1.5 V batteries
- 1 x Device bag
- 1 x Wrist strap
- 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.
- Do not open the device with a tool.
- Avoid looking directly into the laser beam.
- Never point the laser beam at people or animals.
- Only use the device, if sufficient safety precautions were taken at the surveyed location (e.g. when performing measurements along public roads, on building sites etc.). Otherwise do not use the device.
- Observe the storage and operating conditions (see chapter Technical data).

## Intended use

Only use the device for measuring distances, areas and volumes by means of the integrated laser and within the measuring range specified in the technical data. 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, or for measurements in liquids. Never point it at people or animals. 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:

- be aware of the dangers that occur when working with laser measuring devices.
- have read and understood the operating manual, especially the Safety chapter.

## Residual risks



### Risk from laser radiation!

Class 2 laser radiation.

Lasers of class 2 only radiate in the visible range and during continuous wave operation (lasting beam) no more than 1 milliwatt (mW) of output will be emitted. Looking directly into the laser beam for a longer period of time (more than 0.25 seconds) can cause damage to the retina.

Avoid looking directly into the laser beam. Never look into the laser beam using optical aides. Do not suppress the winking reflex when looking into the laser beam unintentionally. Never point the laser beam at people or animals.



### Danger!

Keep a sufficient distance away from sources of heat.



### 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.



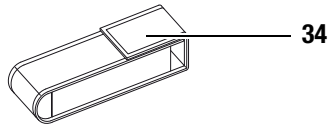
### Caution!

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

## Transport and storage

### Transport

Use the supplied device bag (34) to transport the device.



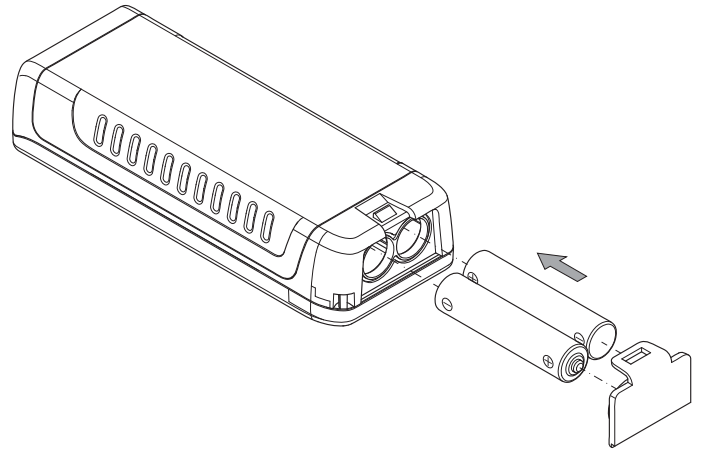
### Storage

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

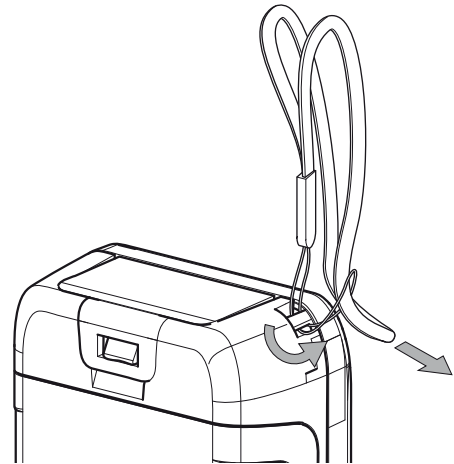
- Dry.
- Protected from dust and direct sunlight.
- With a plastic cover to protect it from invasive dust, if necessary.
- The storage temperature is the same as the range given in the chapter Technical data.
- When storing the device for a long time, remove the batteries.
- Preferably use the supplied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

## Operation

### Inserting the batteries



### Attaching the wrist strap



### Switch-on

- Briefly press the Switch-on/measurement button (5).
  - The display is switched on and the device is ready for operation.

### Switch-off

- Press the Switch-off button (8) for a long time.
  - The display is switched off.

## Basic settings

### Switching the display illumination on/off

Briefly press the Illumination key (9) to switch the display illumination on/off.

### Switching the acoustic signal on/off

Press the Signal tone on/off key for a long time to switch the acoustic signal on/off.

### Aborting the measurement and deleting the display

Briefly press the Delete button (8) to abort the current measurement or to delete the displayed measured values.

### Setting the reference value

The device always measures the total distance beginning with the reference point. This means that if the rear end of the device is set as reference point, the length of the device will be part of the measurement. By default the reference point is set to the rear of the device. You can, however, also relocate the reference point to the front part of the device. Proceed as follows:

- Press the Reference key (9) for a long time to relocate the reference point to the front end of the device.  
=> An acoustic signal can be perceived, whenever the reference point is relocated. Additionally, the indication Reference value front (26) appears.

When switching the device off and then on again, the reference value will automatically be relocated to the rear end of the device.

### Changing the units

- Press the Unit key (10) for a long time to switch between the units for the measured values. Available units are **ft**, **in**, and **m**.
- Briefly press the Unit key (10) to switch between the area units (**ft<sup>2</sup>**, **m<sup>2</sup>**) and the volume units (**ft<sup>3</sup>**, **m<sup>3</sup>**).

### Displaying the inclination

- Press the Inclination key (7) for a long time.  
– The inclination of the device will be indicated in the Inclination display (21).

### Calling up a measured value in the device history

The device automatically saves the last 10 measured values. The saved measured values can be called up as follows:

1. Press the Save button (6) for a long time to call up the history.
2. Briefly press the Minus key (6) or the Plus key (11) to navigate through the history and call up the saved measured values.
3. You can return to the normal measuring menu by briefly pressing the Delete button (8) or the Measurement button (5).

## Carrying out measurements



### Risk from laser radiation!

Class 2 laser radiation.

Lasers of class 2 only radiate in the visible range and during continuous wave operation (lasting beam) no more than 1 milliwatt (mW) of output will be emitted. Looking directly into the laser beam for a longer period of time (more than 0.25 seconds) can cause damage to the retina.

Avoid looking directly into the laser beam. Never look into the laser beam using optical aides. Do not suppress the winking reflex when looking into the laser beam unintentionally. Never point the laser beam at people or animals.


### Carrying out single distance measurement

1. Briefly press the Switch-on/measurement button (5) to activate the laser.
2. Point the laser at the target area.
3. Briefly press the Switch-on/measurement button (5) again to perform a distance measurement. => The measured value is immediately indicated on the display.


### Adding / subtracting measured values

1. Carry out a single distance measurement.
2. Press the Plus key (11) to add the next measured value to the previous one.  
Press the Minus key (6) to subtract the next measured value from the previous one.
3. Press the Switch-on/measurement button (5) to determine the next measured value.  
=> The overall result will be indicated in the lower measurement value display. The individual measured values will be indicated in the upper measurement value displays.

### Performing an area measurement

1. Briefly press the Area/room volume key (10) one time.  
– The symbol  for area measurement appears on the display.
  2. Briefly press the Switch-on/measurement button (5) to carry out the first measurement (e.g. length).
  3. Briefly press the Switch-on/measurement button (5) again to carry out the second measurement (e.g. width).
- => Upon pressing the Switch-on/measurement button (5) for the second time the device independently calculates the area and displays this value in the lower measurement value display. The most recently measured value will be indicated in one of the upper measurement value displays.

### Performing a volume measurement

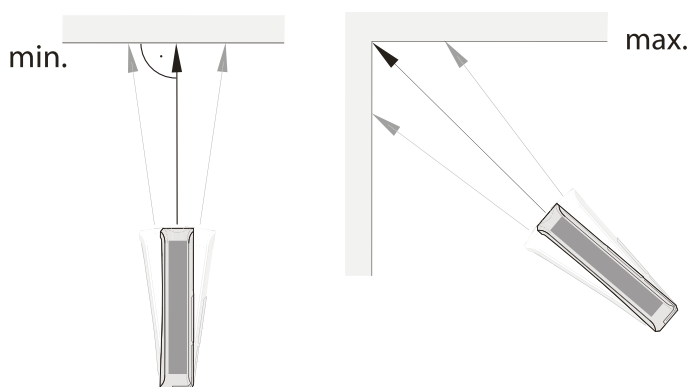
- Briefly press the Area/room volume key (10) twice.
  - The symbol  for volume measurement appears on the display.
  - The side to be measured in each case is indicated on the display by flashing.
- Briefly press the Switch-on/measurement button (5) to carry out the first measurement (e.g. length).
- Briefly press the Switch-on/measurement button (5) again to carry out the second measurement (e.g. width).
- Briefly press the Switch-on/measurement button (5) again to carry out the third measurement (e.g. height).

=> Upon pressing the Switch-on/measurement button (5) for the third time the device independently calculates the volume and displays this value in the lower measurement value display.

### Performing a non-stop /min and max measurement

Use the non-stop measuring function to correlate measurements e.g. with construction drawings. With this measurement method the device can be moved closer toward the target with the measured value being recalculated roughly every 0.5 seconds. The corresponding maximum and minimum measurements are displayed in the first and second line respectively.

For instance, you can direct the laser beam at a wall and then retreat from it step by step. Keep reading the measured values until the desired distance is achieved.

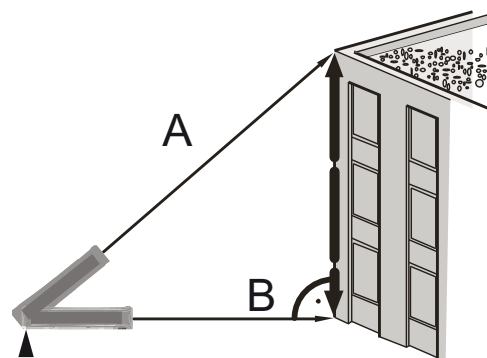


- Press the Switch-on/measurement button (5) for a long time until an acoustic signal can be heard.
- With reference to the aim point, move the device slowly back and forth as well as up and down (e.g. in a corner).
- Briefly press the Switch-on/measurement button (5) to terminate the non-stop measurement.
 

=> The maximum and minimum measured values and the difference ( $\Delta$ ) between these two are indicated on the display. Additionally the last measured value will be displayed in the bottommost line.

### Indirect height measurement (Pythagoras)


Using this method the length of an unknown straight-line segment can be determined via Pythagoras' theorem. This method is suitable for e.g. height measurements.

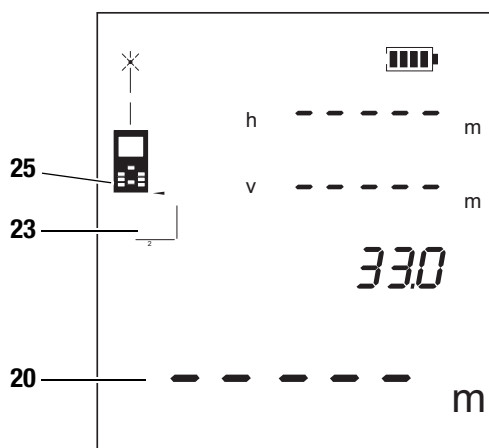


Measurement requirements:

- The device is aligned horizontally to the lowest point (B) of the line segment to be determined.
- The reference point is currently located at the rear of the device. See Setting the reference value on page 6.

The following method applies to inclination angles of **less than 45°** in relation to the horizontal:

- Briefly press the Button for indirect measurements (7) one time.
  - The symbol  for indirect measurements appears on the display.
  - The inclination angle is displayed in the third line of the upper measurement value display on the right-hand side (see example 33.0°).
  - The reference point is indicated at the rear end of the device (25).
  - The bar with number 1 (hypotenuse) flashes.




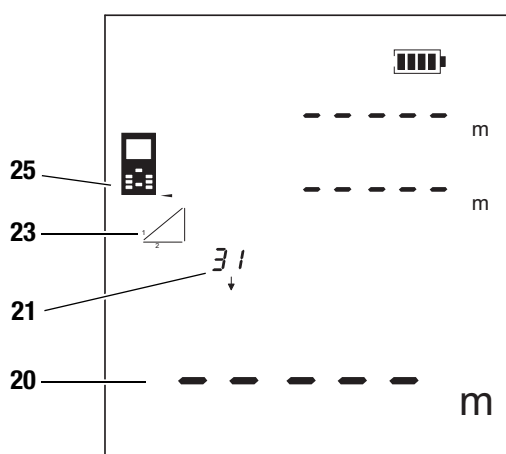


2. Aim the device at the highest point (A) and briefly press the Switch-on/measurement button (5) once again. Make sure to hold the device as steady as possible and place it level on the ground with the two rear edges. **The position at the two rear edges must not be changed during the measurements!**

- Both measurement and calculation are effected.
- The horizontal (1st line) and vertical (2nd line) distance values are indicated in the upper measurement value display.
- The line segment to be determined is displayed as result in the lower measurement value display (20).

If the inclination angle amounts to **more than 45°** and is not indicated in the upper measurement value display, please proceed as follows:

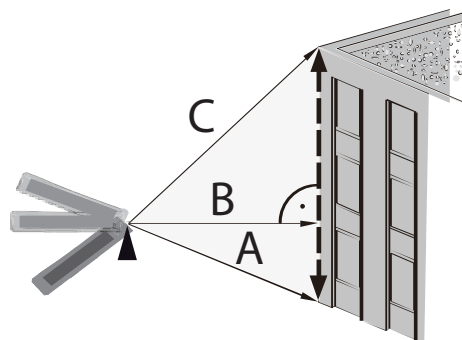
1. Indirect height measurement is active and the inclination angle lies outside the measuring range, i.e. ----- will be indicated in the upper measurement value display instead of a number.
  - The symbol  for indirect measurements is displayed.
  - The hypotenuse flashes.
2. Activate the inclination display by pressing button 7 for a long time.
  - The inclination angle will be indicated on the display (21).




3. First, aim the device at the highest point (A) and briefly press the Switch-on/measurement button (5) once. Make sure to hold the device as steady as possible and place it level on the ground with the two rear edges. **The position at the two rear edges must not be changed during the measurements!**
  - The length of the line segment will be indicated in the 1st line of the upper measurement value display.
4. Align the device horizontally (point B) and briefly press the Switch-on/measurement button (5) one time to measure the horizontal distance.
  - The second measured value will be indicated in the second line of the upper measurement value display.
  - The line segment to be determined is displayed as result in the lower measurement value display (20).

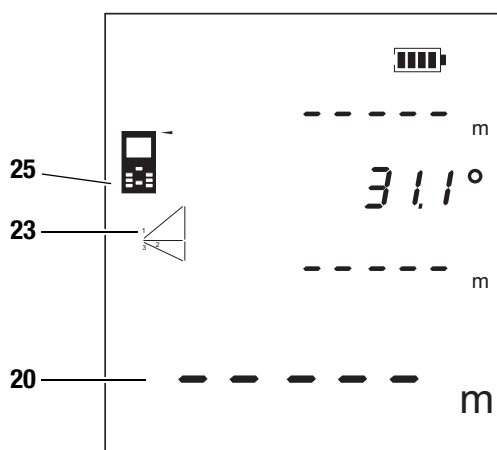
## Twofold indirect height measurement

This method is suitable for e.g. height measurements.




The following method applies to inclination angles of **less than 45°** in relation to the horizontal:

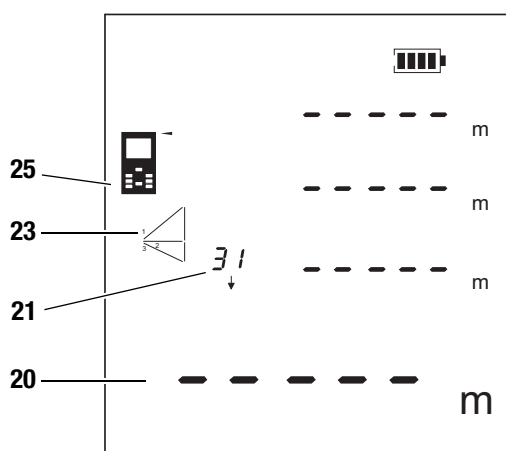
1. Briefly press the Button for indirect measurements (7) twice.
  - The symbol  for indirect measurements appears on the display.
  - The inclination angle is displayed in the second line of the upper measurement value display on the right-hand side (see example 31.1°).
  - The bar with number 1 (hypotenuse) flashes.



2. First, aim the device at the highest point (C) and briefly press the Switch-on/measurement button (5) once to perform a measurement. In doing so, hold the device as steady as possible. **The alignment of the device in relation to the reference point must not be changed during the measurements!**
  - The first measured value will be displayed in the upper measurement value display.
3. Aim the device at the lowest point (A) and briefly press the Switch-on/measurement button (5) once to perform a measurement.
  - The second measured value will be indicated in the third line of the upper measurement value display.
  - The angle will be indicated in the second line of the upper measurement value display.
  - The line segment to be determined is displayed as result in the lower measurement value display (20).

If the inclination angle in relation to the horizontal amounts to **more than 45°** and is not indicated in the upper measurement value display, please proceed as follows:




1. Indirect height measurement is active and the inclination angle lies outside the measuring range, i.e. ----- will be indicated in the upper measurement value display instead of a number.
  - The symbol  for indirect measurements appears on the display.
2. Activate the inclination display by pressing button 7 for a long time.
  - The inclination angle will be indicated on the display (21).



3. First, aim the device at the highest point (C) and briefly press the Switch-on/measurement button (5) once to perform a measurement. In doing so, hold the device as steady as possible. **The alignment of the device in relation to the reference point must not be changed during the measurements!**
  - The first measured value will be displayed in the upper measurement value display.
4. Align the device horizontally (point B) and briefly press the Switch-on/measurement button (5) one time to measure the horizontal distance.
  - The second measured value will be indicated in the second line of the upper measurement value display.
5. Aim the device at the lowest point (A) and briefly press the Switch-on/measurement button (5) once to perform a measurement.
  - The third measured value will be indicated in the third line of the upper measurement value display.
  - The line segment to be determined is displayed as result in the lower measurement value display (20).

## Fault indications

The following fault indications could appear on the display:

Display	Cause	Remedy
	Calculation error; reception of the reflecting light is too poor or too intense The measurement time is too long.	Repeat measurement on another surface with better reflective properties or use a target plate.
	The ambient light is too intense.	Change the ambient light conditions for the measurement.
	The temperature is too high.	Allow the device to cool down. Observe the permissible operating temperature according to the Technical data chapter.
	The temperature is too low.	Allow the device to warm up. Observe the permissible operating temperature according to the Technical data chapter.
<b>2800</b>	Hardware fault	Repeatedly switch the device on and off. If the symbol does not disappear, please contact your retailer.

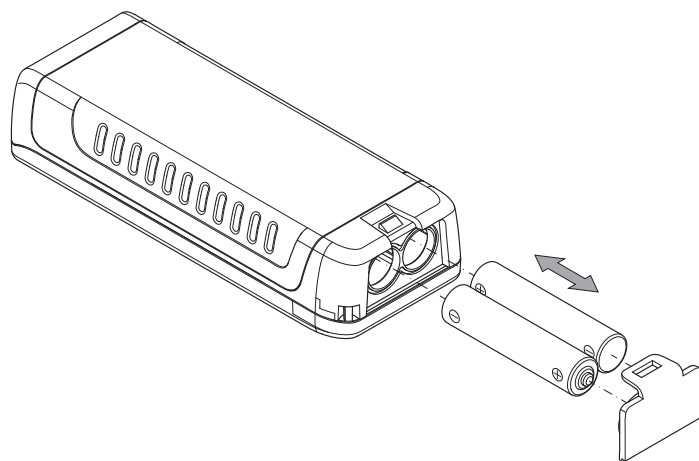
## Maintenance and repair

### Battery change



#### Caution!

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



### 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 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 laser distance measuring device BD20 was developed, constructed and produced in compliance with the named EC directives.

The  $\zeta$   $\epsilon$  marking is found on the rear of the device.

Manufacturer:  
Trotec GmbH & Co. KG  
Grebbeener Straße 7  
D-52525 Heinsberg

Phone: +49 2452 962-400  
Fax: +49 2452 962-200  
E-mail: [info@trotec.com](mailto:info@trotec.com)

Heinsberg, 31/03/2014



Managing Director: Detlef von der Lieck