BOSCH

GLM 50-27 CG Professional

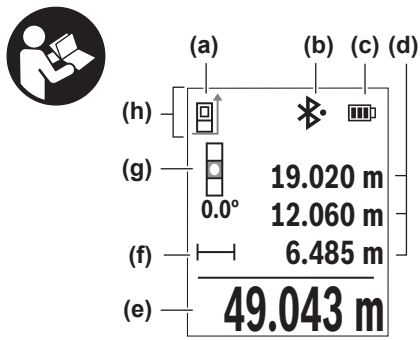
Robert Bosch Power Tools GmbH
70538 Stuttgart
GERMANY

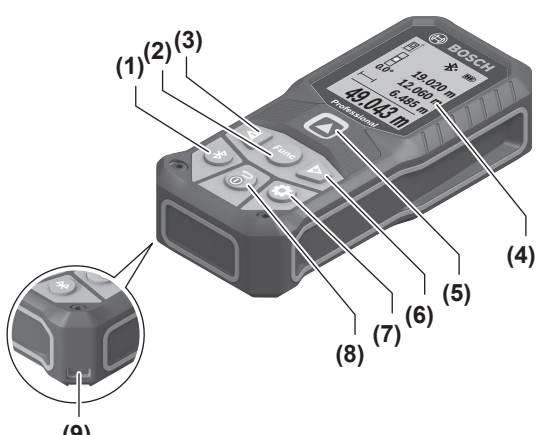
www.bosch-pt.com

1 609 92A 5YM (2021.01) O / 126

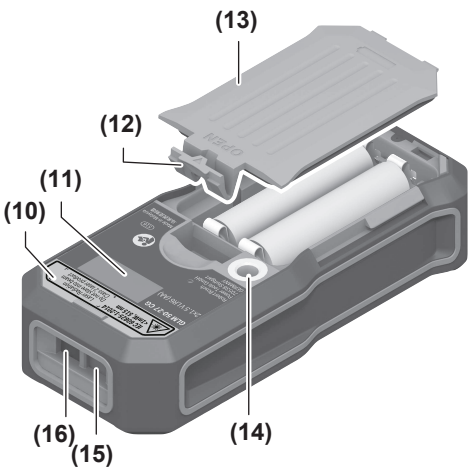
1 609 92A 5YM

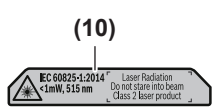
en Original instructions
zh 原始使用說明書
ko 사용 설명서 원본
th หนังสือคู่มือการใช้งานฉบับต้นแบบ
id Petunjuk-Petunjuk untuk Penggunaan Orisinal
vi Bản gốc hướng dẫn sử dụng

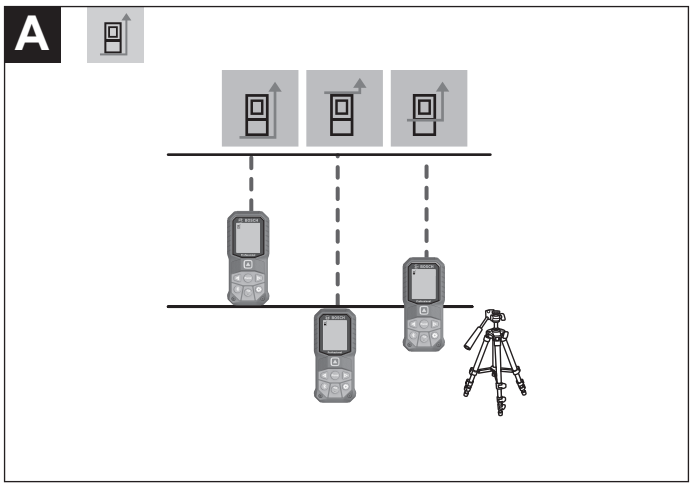

(a)
(b)
(c)
(d)
(h)
(g)
(f)
(e)
0.0°
19.020 m
12.060 m
6.485 m
49.043 m

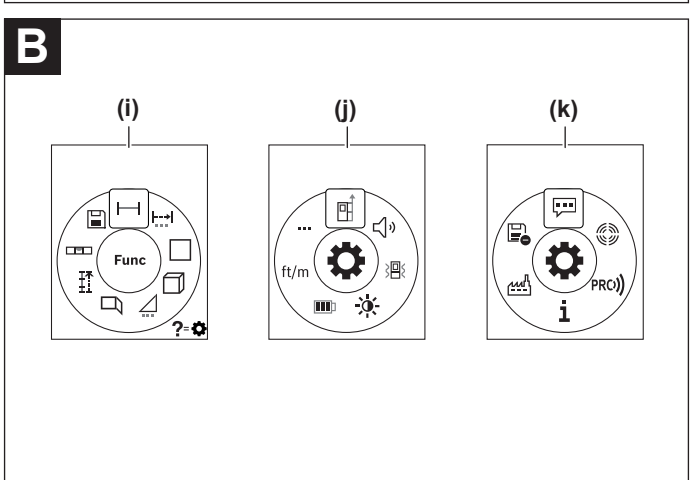

(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)
(9)
BOSCH
Professional

GLM 50-27 CG

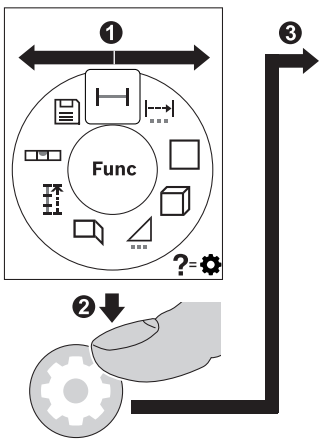

(13)
(12)
(11)
(10)
(16)
(15)
(14)


(10)
IEC 60825-1:2014
<1mW, 515 nm
Laser Radiation
Do not stare into beam
Class 2 laser product

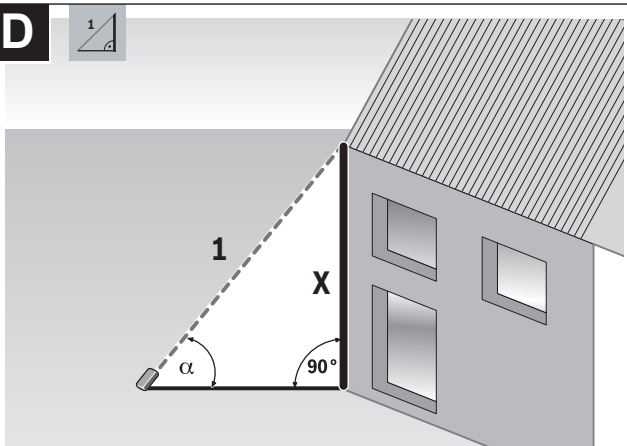

A

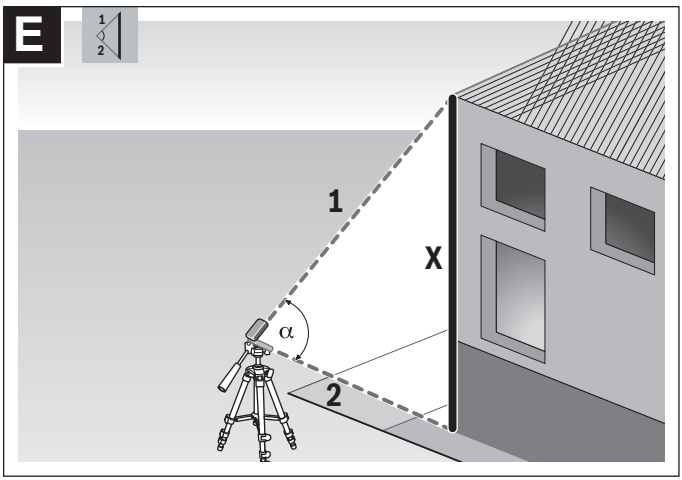

B
(i)
(j)
(k)
Func
ft/m
PRO

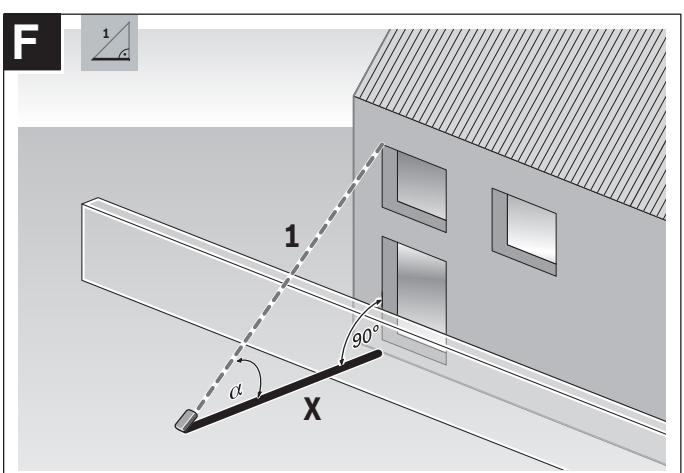
C

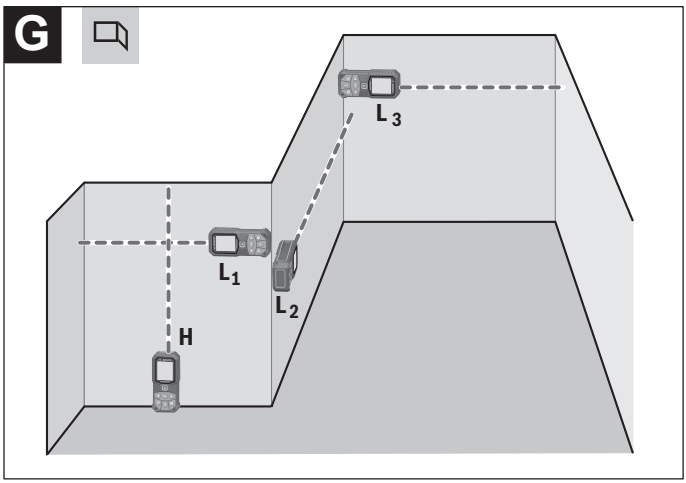


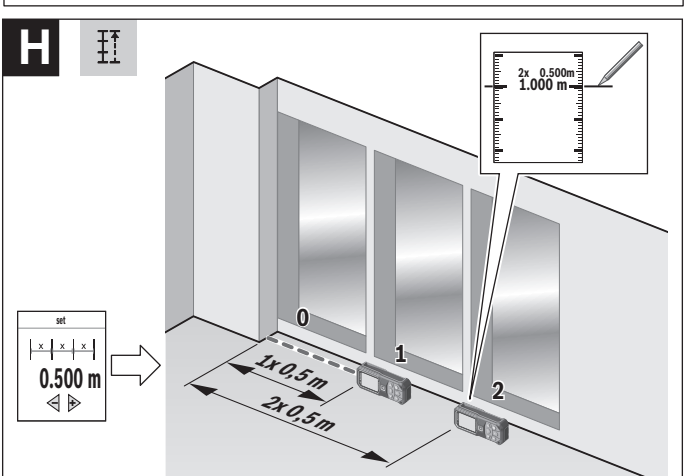
D



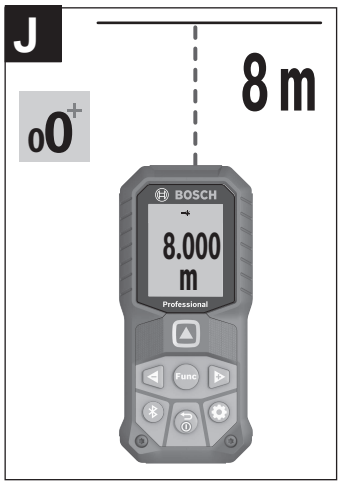

E
1
2
1
X
α
2

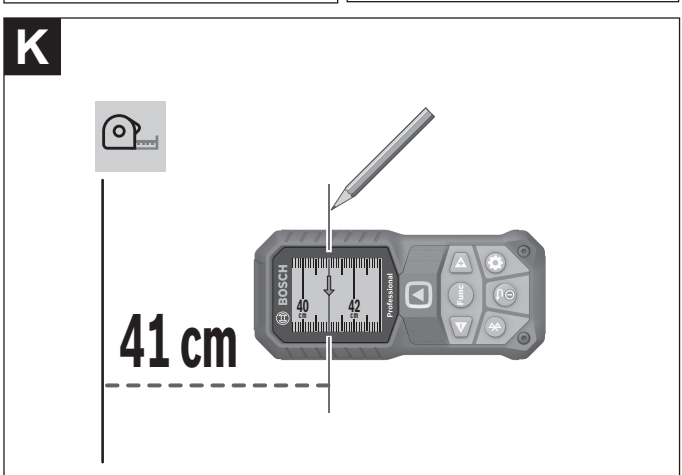

F
1
1
90°
α
X


G
L 3
L 1
L 2
H

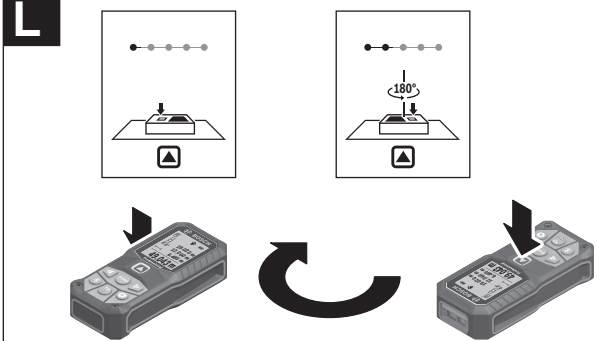

H
2x 0.500m
1.000 m
set
0.500 m
0
1
2
1x 0,5 m
2x 0,5 m

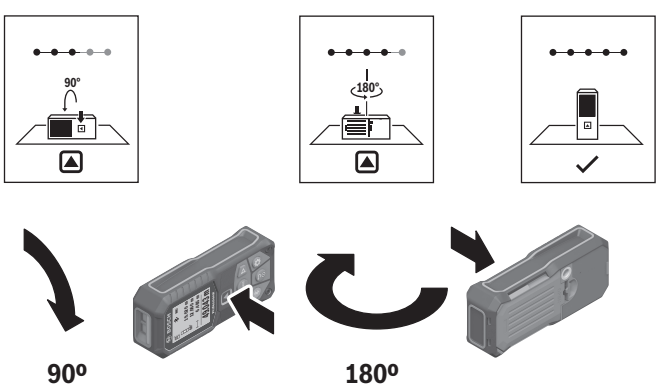

I
8 m
min
max
BOSCH
min
6.000 m
max
10.000 m
8.000 m
Professional
Func

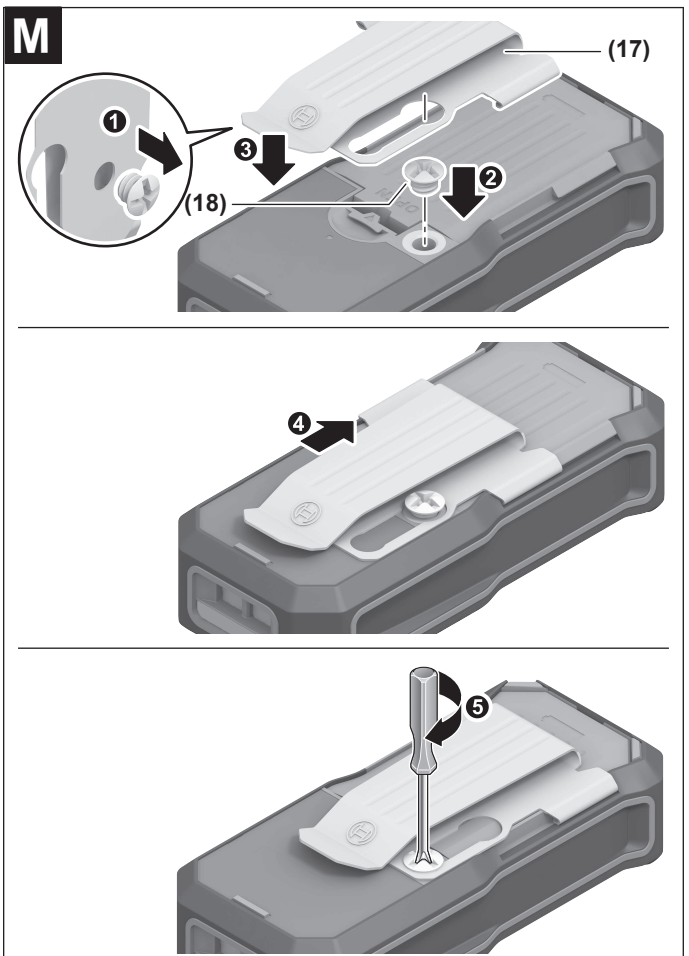

J
8 m
BOSCH
8.000
m
Professional
Func


K
41 cm
BOSCH
40
42
Professional
Func

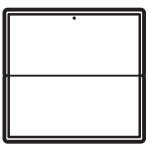
L






M
(17)
1
3
2
(18)
4
5

N



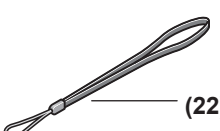
(19)
2 607 001 391

(17)

(18)

(20)
1 608 M00 05J (GLM 50-27 CG)

(21)
BT 150
0 601 096 B00



(22)

(23)

English

Safety Instructions

All instructions must be read and observed in order for the measuring tool to function safely. The safeguards integrated into the measuring tool may be compromised if the measuring tool is not used in accordance with these instructions. Never make warning signs on the measuring tool unrecognisable. SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE AND INCLUDE THEM WITH THE MEASURING TOOL WHEN TRANSFERRING IT TO A THIRD PARTY.

- ▶ **Warning! If operating or adjustment devices other than those specified here are used or other procedures are carried out, this can lead to dangerous exposure to radiation.**
- ▶ **The measuring tool is delivered with a laser warning sign (marked in the illustration of the measuring tool on the graphics page).**
- ▶ **If the text of the laser warning label is not in your national language, stick the provided warning label in your national language over it before operating for the first time.**

Do not direct the laser beam at persons or animals and do not stare into the direct or reflected laser beam yourself. You could blind somebody, cause accidents or damage your eyes.

- ▶ **If laser radiation hits your eye, you must close your eyes and immediately turn your head away from the beam.**
- ▶ **Do not make any modifications to the laser equipment.**
- ▶ **Do not use the laser goggles (accessory) as protective goggles.** The laser goggles make the laser beam easier to see; they do not protect you against laser radiation.
- ▶ **Do not use the laser goggles (accessory) as sunglasses or while driving.** The laser goggles do not provide full UV protection and impair your ability to see colours.
- ▶ **Have the measuring tool serviced only by a qualified specialist using only original replacement parts.** This will ensure that the safety of the measuring tool is maintained.
- ▶ **Do not let children use the laser measuring tool unsupervised.** They could unintentionally blind themselves or other persons.

- ▶ **Do not use the measuring tool in explosive atmospheres which contain flammable liquids, gases or dust.** Sparks may be produced inside the measuring tool, which can ignite dust or fumes.
- ▶ **Caution! Using the measuring tool with *Bluetooth*® can cause faults to occur in other devices and systems, aeroplanes and medical devices (e.g. pacemakers, hearing aids). Also, damage to people and animals in the immediate vicinity cannot be completely excluded. Do not use the measuring tool with *Bluetooth*® in the vicinity of medical devices, petrol stations, chemical plants, areas with a potentially explosive atmosphere and in blasting areas. Do not use the measuring tool with *Bluetooth*® on aeroplanes. Avoid using the product near your body for extended periods.**

The *Bluetooth*® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Robert Bosch Power Tools GmbH is under license.

Product Description and Specifications

Intended Use

The measuring tool is intended for measuring distances, lengths, heights, clearances and inclines, and for calculating areas and volumes.

The measuring tool is suitable for indoor use.

The measuring results can be transferred to other devices via *Bluetooth*®.

Product features

The numbering of the product features shown refers to the illustration of the measuring tool on the graphic page.

(1) *Bluetooth*® button

(2) Function button [**Func**]

(3) Minus/left [**–**] button

(4) Display

(5) Measuring button [▲]

(6) Plus/right [**+**] button

(7) Basic settings [⚙] button

(8) On/off/back button [⏻]

(9) Eyelet for carrying strap[a)]

(10) Laser warning label
(11) Serial number
(12) Battery compartment cover locking mechanism
(13) Battery compartment cover
(14) 1/4" tripod thread
(15) Reception lens
(16) Laser beam output
(17) Belt clip[a)]
(18) Screw[a)] for belt clip[a)]
(19) Laser target plate[a)]
(20) Laser viewing glasses[a)]
(21) Tripod[a)]
(22) Carrying strap[a)]
(23) Protective bag

a) **Accessories shown or described are not included with the product as standard. You can find the complete selection of accessories in our accessories range.**

Display elements (selection)

(a) Reference level of measurement
(b) Connection status

 Bluetooth® activated, connection not established

 *Bluetooth*® activated, connection established

(c) Battery indicator
(d) Measured value lines
(e) Result line
(f) Measuring function
(g) Slope angle display
(h) Status bar
(i) Measuring function display indicator
(j) Basic settings display indicator
(k) More settings display indicator

Technical data

Digital laser measure	GLM 50-27 CG
Article number	**3 601 K72 U..**
Distance measurement	
Measuring range	0.05–50 m[A)]
Measuring range (unfavourable conditions)	0.05–20 m[B)]
Measuring accuracy	±1.5 mm[A)]
Measuring accuracy (unfavourable conditions)	±3.0 mm[B)]
Smallest display unit	0.5 mm
Indirect distance measurement and level	
Measuring range	0°–360° (4 x 90°)
Grade measurement	
Measuring range	0°–360° (4 x 90°)
Measuring accuracy (typical)	±0.2° [C)D)]
Smallest display unit	0.1°
General	
Operating temperature	–10 °C to +45 °C[E)]
Storage temperature	–20 °C to +70 °C
Relative air humidity max.	90 %
Max. altitude	2000 m
Pollution degree according to IEC 61010-1	2[F)]
Laser class	2
Laser type	515 nm, < 1 mW
Divergence of the laser beam	< 1.5 mrad (full angle)
Automatic switch-off after approx.	
– Laser	20 s
– Measuring tool (without measurement)	5 mins[G)]
Weight according to EPTA-Procedure 01:2014	0.17 kg
Dimensions	119 x 53 x 29 mm

Digital laser measure	**GLM 50-27 CG**
Protection rating	IP 65 (protection against dust ingress and water jets)
Batteries	2 x 1.5 V LR6 (AA)
Unit of measurement setting	m, ft, in
Data transfer	
Bluetooth®	*Bluetooth*® (4.2 low-energy)[H)]
Operating frequency band	2402–2480 MHz
Max. transmission power	8 mW

A) For measurements from the front edge of the measuring tool, this applies for high reflectivity of the target (e.g. a white-painted wall), weak backlighting and 25 °C operating temperature. In addition, a deviation of ±0.05 mm/m must be taken into account, depending on the distance.

B) For measurements from the front edge of the measuring tool, this applies for high reflectivity of the target (e.g. a white-painted wall), strong backlighting and 25 °C operating temperature. In addition, a deviation of ±0.15 mm/m must be taken into account, depending on the distance.

C) After user calibration at 0 ° and 90 °; An additional grade error of ±0.01 °/degree to 45 ° (max.) has to be taken into account. The left-hand side of the measuring tool serves as the reference level for grade measurement.

D) At an operating temperature of 25 °C

E) In continuous measurement mode, the max. operating temperature is +40 °C.

F) Only non-conductive deposits occur, whereby occasional temporary conductivity caused by condensation is expected.

G) *Bluetooth*® deactivated

H) When using *Bluetooth*® Low Energy devices, it may not be possible to establish a connection depending on the model and operating system. *Bluetooth*® tools must support the GATT profile.

The serial number **(11)** on the type plate is used to clearly identify your measuring tool.

Bluetooth® interface

Transmitting data to other devices

The measuring tool is fitted with a *Bluetooth*® module which enables wireless data transfer to certain mobile devices with a *Bluetooth*® interface (e.g. smartphone, tablet).

Information about the system requirements for a *Bluetooth*® connection can be found on the Bosch website at www.bosch-pt.com

▶ **Further information can be found on the Bosch product page.**

When transmitting data by means of *Bluetooth*®, time lags may occur between the mobile device and the measuring tool. This can be due to the distance between the two devices or the measurement object itself.

Activating the *Bluetooth*® interface for transmitting data to a mobile device

Ensure that the *Bluetooth*® interface is activated on your mobile device.

Press the **(1)** button to bring up the *Bluetooth*® menu and press the **(1)** button again (or the **(6) [+]** button), to activate the *Bluetooth*® interface. If multiple active measuring tools are found, select the appropriate measuring tool using the serial number. You can find the serial number **(11)** on your measuring tool's type plate. The connection status and the active connection **(b)** are displayed in the status bar **(h)** of the measuring tool.

Bosch applications are available to expand the range of functions. Depending on the device, you can download these applications from the corresponding app stores.

Deactivating the *Bluetooth*® interface

Press the **(1)** button to bring up the *Bluetooth*® menu and press the **(1)** button again (or the **(3) [–]** button), to deactivate the *Bluetooth*® interface.

Assembly

Inserting/changing the batteries

Using alkali-manganese or nickel metal hydride rechargeable batteries (especially at low operating temperatures) is recommended for operation of the measuring tool.

With 1.2 V batteries, more measurements may be possible than with 1.5 V batteries, depending on the capacity.

Press the locking mechanism **(12)** to open the battery compartment cover **(13)** and remove the battery compartment cover. Insert the batteries. When inserting, pay attention to the correct polarity according to the representation on the inside of the battery compartment.

When the state of charge of the batteries or reusable batteries is low, a request to activate the battery saver mode will appear on the display. When the battery saver mode is activated, the battery runtime will be extended and the battery symbol on the display will have a yellow outline(see ""Settings" menu (see figure **B**)", page 20).

When the empty battery symbol first appears on the display, only a limited number of measurements is still possible. When the battery symbol is empty and flashes red, no further measurements are possible. Replace the batteries or reusable batteries.

Always replace all the batteries at the same time. Only use batteries from the same manufacturer and which have the same capacity.

- ▶ **Take the batteries out of the measuring tool when you are not using it for a prolonged period of time**. The batteries can corrode and self-discharge during prolonged storage.

Operation

Start-Up

- ▶ **Never leave the measuring tool unattended when switched on, and ensure the measuring tool is switched off after use.** Others may be dazzled by the laser beam.
- ▶ **Protect the measuring tool from moisture and direct sunlight.**
- ▶ **Do not expose the measuring tool to any extreme temperatures or variations in temperature.** For example, do not leave it in a car for extended periods of time. In case of large variations in temperature, allow the measuring tool to adjust to the ambient temperature before putting it into operation. The precision of the measuring tool may be compromised if exposed to extreme temperatures or variations in temperature.
- ▶ **Avoid substantial knocks to the measuring tool and avoid dropping it.** Always carry out an accuracy check before continuing work if the measuring tool has been subjected to severe external influences (see "Checking accuracy and calibrating the grade measurement (see figure **L**)", page 28) and (see "checking accuracy of the distance measurement", page 29).
- ▶ **The measuring tool is equipped with a wireless interface. Local operating restrictions, e.g. in aeroplanes or hospitals, must be observed.**

Switching on/off

– To **switch on** the measuring tool and the laser, briefly press the measuring button **(5)** [▲].

– To **switch on** the measuring tool without the laser, briefly press the on/off/back button **(8)** [⏻].

- ▶ **Do not direct the laser beam at persons or animals and do not stare into the laser beam yourself (even from a distance).**

When switching on the measuring tool for the first time, you will be prompted to set your preferred language for the display text.

To **switch off** the measuring tool, press and hold the on/off/back button **(8)** [⏻].

The measured values and device settings in the memory are retained when you switch off the measuring tool.

Measuring process

When switching on for the first time, the measuring tool will be in the length measurement function. When switching on every subsequent time, the measuring tool will be in the measuring function that was last used. For a different measuring function, press the **(2)** [**Func**] button. Use the **(6)** [**+**] button or the **(3)** [**–**] button to select the required measuring function Measuring Functions. Activate the measuring function with the **(2)** [**Func**] button or with the measuring button **(5)** [▲].

There are three settings available for the reference level for measurement (see "Selecting the reference level (see figure **A**)", page 20).

Apply the measuring tool to the point at which you want to start the measurement (e.g. wall).

Note: If the measuring tool has been switched on using the on/off/back button **(8)** [⏻], briefly press the measuring button **(5)** [▲] to switch the laser on.

To initiate the measurement, briefly press the measuring button **(5)** [▲]. The laser beam will then switch off. For a further measurement, repeat this process.

▶ **Do not direct the laser beam at persons or animals and do not stare into the laser beam yourself (even from a distance).**

Note: The measured value typically appears within half a second, and no later than approximately four seconds. The duration of the measurement depends on the distance, the lighting conditions and the reflective properties of the target surface. Upon completion of the measurement, the laser beam will automatically switch off.

Selecting the reference level (see figure A)

You can choose between three different reference levels for the measurement:

– The rear edge of the measuring tool (e.g. when placing against walls)
– The front edge of the measuring tool (e.g. when measuring from a table edge)
– The centre of the thread **(14)** (e.g. for tripod measurements)

To select the reference level, press the **(7)** [☼] button. Then select the “Reference level” setting with the measuring button **(5)** [▲] or the **(2)** [**Func**] button. Then use the **(6)** [**+**] button or the **(3)** [**–**] button to select the required reference level. Every time the measuring tool is switched on, the last selected reference level is preset.

“Settings” menu (see figure B)

Press the **(7)** [☼] button to access the “Settings” menu **(j)**.

Use the **(6)** [**+**] button or the **(3)** [**–**] button to select the required setting and confirm this by pressing the measuring button **(5)** [▲] or the **(2)** [**Func**] button.

Use the **(6)** [**+**] button or the **(3)** [**–**] button to select the required setting and confirm this by pressing the measuring button **(5)** [▲] or the **(2)** [**Func**] button.

To exit the “Settings” menu, press the on/off/back button **(8)** [ ].

Switching sound on and off

The sound is switched on by default.

Switching vibration on and off

The vibration function is switched on by default.

The vibration function of the measuring tool can be a useful aid, for example in noisy environments. Two short vibrations indicate a successful measurement; one long vibration indicates a measurement error.

Display illumination

The display illumination is continuously switched on. When no button is pressed, the display illumination is dimmed after approx. 20 seconds to preserve the batteries.

Battery saver mode

Battery saver mode is switched off by default. When battery saver mode is switched on, sound and vibration are deactivated and the display brightness is reduced. This extends the battery runtime.

Changing the unit of measurement ft/m

The default unit of measurement is "m" (metres). There are six different units of measurement available. Set the appropriate unit of measurement for your purposes.

Setting the language

When switching on the measuring tool for the first time, you will be prompted to set your preferred language for the display text.

You can change the selected language at any time.

PRO360

Initial activation is required. Data can only be transferred using a suitable app or computer program. After changing the battery, the measuring tool must be switched on once to restart PRO360. PRO360 can be deactivated again at any time. You can find additional information about PRO360 at www.pro360.com.

Device information

Here you will find information about the measuring tool, such as the serial number and software version.

Factory Reset

This function is used to reset the measuring tool to factory settings. After carrying out a reset, you will be prompted to set your preferred language for the display.

Measuring functions

Help function (see figure C)

To select a measuring function, press the button **(2)** [**Func**]. Select the desired measuring function with the button **(6)** [**+**] or the button **(3)** [**–**].

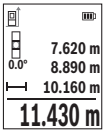
To start the help function, press the **(7)** [☼] button. The help function shows the detailed procedure for the selected measuring function.

Measuring length

Select the length measurement mode.

To switch on the laser beam, briefly press the measuring button **(5)** [▲].

To measure, briefly press the measuring button **(5)** [▲]. The measured value will be shown at the bottom of the display.



Repeat the above steps for each subsequent measurement. The last measured value is at the bottom of the display, the penultimate measured value is above it, and so on.

Continuous measurement

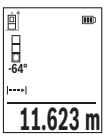
In continuous measurement mode, the measuring tool can be moved relative to the target, during which the measured value will be updated approx. every half a second. You can, for example, move a desired distance away from a wall while reading off the current distance at all times.

Select continuous measurement. Select one of the following functions:

- Min/max: The smallest and largest measured value are permanently shown on the display (see figure **I**).
- Large numbers: The measured value is displayed in an enlarged format for better legibility (see figure **J**).
- Tape measure: The distance will be displayed visually, as with a tape measure (see figure **K**). **Note**: The distance from the marking is shown in the display in the tape measure function. The reference is **not** the edge of the measuring tool.

To switch on the laser beam, briefly press the measuring button **(5)** [▲].

Move the measuring tool until the required distance is shown at the bottom of the display.



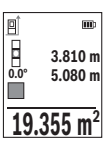
Briefly pressing the measuring button **(5)** [▲] will interrupt the continuous measurement. The current measured value will be shown at the bottom of the display. Pressing the measuring button **(5)** [▲] once more will start the continuous measurement again.

Continuous measurement automatically switches off after four minutes.

Area measurement

Select the area measurement mode □.

Then measure the width and length one after the other as with a length measurement. The laser beam remains switched on between the two measurements. The distance to be measured flashes in the indicator for area measurement □.



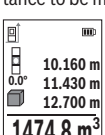
The first measured value is shown at the top of the display.

After the second measurement has been completed, the area will be automatically calculated and displayed. The end result is shown at the bottom of the display, while the individual measured values are shown above it.

Volume measurement

Select the volume measurement mode ⧈.

Then measure the width, length and depth one after the other as with a length measurement. The laser beam remains switched on between the three measurements. The distance to be measured flashes in the indicator for volume measurement ⧈.



The first measured value is shown at the top of the display.

After the third measurement has been completed, the volume will be automatically calculated and displayed. The end result is shown at the bottom of the display, while the individual measured values are shown above it.

Indirect distance measurement

For indirect length measurements, three measuring modes are available. Each measuring function can be used for determining different distances.

The indirect distance measurement is used to determine distances that cannot be measured directly, due to an obstacle that would impede the path beam or the absence of a

target surface that could serve as a reflector. This measuring procedure can only be employed vertically. Any horizontal deviation will lead to measurement errors.

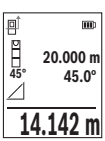
Note: Indirect distance measurement is always less accurate than direct distance measurement. For application-related reasons, measuring errors can be greater than with direct distance measurement. To improve the accuracy of measurement, we recommend the use of a tripod (accessory).

The laser beam remains switched on between the individual measurements.

a) Indirect height measurement (see figure D)

Select the indirect height measurement mode ◿.

Ensure that the measuring tool is at the same height as the lower measuring point. Then tilt the measuring tool around the reference level and measure distance **1** as for a length measurement (displayed as a red line).



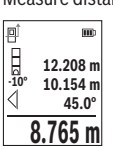
Once the measurement is complete, the result for the required distance **X** is displayed in the result line **(e)**. The measured values for distance **1** and angle **α** can be found in the measured value rows **(d)**.

b) Double indirect height measurement (see figure E)

The measuring tool can indirectly measure all distances that lie in the vertical level of the measuring tool.

Select the double indirect height measurement mode ◺.

Measure distances **1** and **2** in succession as for a length measurement.



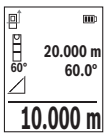
Once the measurement is complete, the result for the required distance **X** is displayed in the result row **(e)**. The measured values for distances **1** and **2** and angle **α** can be found in the measured value rows **(d)**.

Ensure that the reference level for the measurement (e.g. the rear edge of the measuring tool) remains in exactly the same place for all the individual measurements in a single measuring process.

c) Indirect length measurement (see figure F)

Select the indirect length measurement mode ◿.

Ensure that the measuring tool is at the same height as the required measuring point. Then tilt the measuring tool around the reference level and measure distance **1** as for a length measurement.



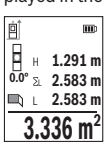
Once the measurement is complete, the result for the required distance **X** is displayed in the result row **(e)**. The measured values for distance **1** and angle **α** can be found in the measured value row **(d)**.

Wall area measurement (see figure G)

The wall area measurement is used to determine the sum of multiple individual areas with a common height. In the illustrated example, the total area of several walls that have the same ceiling height **H** but different lengths **L** is to be determined.

Select the wall area measurement mode.

Measure the ceiling height **H** as for a length measurement. The measured value is displayed in the top measured-value line. The laser remains switched on.



Then measure the length $\mathbf{L}_1$ of the first wall. The area is automatically calculated and displayed in the result line **(e)**. The last measured value for length can be found in the bottom measured value line **(d)**. The laser remains switched on.

Now measure the length $\mathbf{L}_2$ of the second wall. The individual measured value displayed in the measured value line **(d)** is added to the length $\mathbf{L}_1$. The sum of the two lengths (displayed in the middle measured value line **(d)**) is multiplied by the saved height **H**. The total area value is displayed in the result line **(e)**.

You can measure any number of lengths $\mathbf{L}_x$, which will be automatically added and multiplied by the height **H**. The requirement for a correct area calculation is that the first measured length (for example the ceiling height **H**) is identical for all sub-areas.

Stake out function (see figure H)

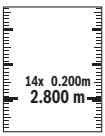
The stake out function repeatedly measures a defined length (distance). These lengths can be transferred to a surface, for example to enable material to be cut into pieces of equal lengths or to install stud walls in a drywall construction. The minimum adjustable length is 0.1 m and the maximum length is 50 m.

Note: The distance from the marking is shown in the display in the stake out function. The reference is **not** the edge of the measuring tool.

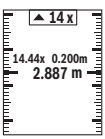
Select the stake out function.

Use the button **(6)** [**+**] or the button **(3)** [**–**] to set the required length.

Begin the stake out function by pressing the measuring button **(5)** [▲] and slowly move away from the starting point.



The measuring tool continuously measures the distance to the starting point. The defined length and the current measured value are thereby displayed. The lower or upper arrow displays the shortest distance to the next or last marking.



The left factor specifies how many times the defined length has already been reached. A green measured value indicates that a length has been reached for marking purposes.

A blue measured value indicates the actual value when the reference value is outside the display.

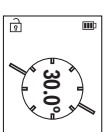
Grade measurement/digital spirit level

Select the inclination measurement/digital spirit level .

The measuring tool automatically switches between two states.

The digital spirit level is used to check the horizontal or vertical alignment of an object (e.g. washing machine, refrigerator, etc.).

When the inclination exceeds 3°, the ball in the display lights up red.



Grade measurement is used to measure a slope or incline (e.g. of stairs, railings, when fitting furniture, laying pipes, etc.).

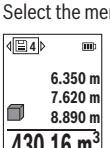
The left-hand side of the measuring tool serves as the reference level for grade measurement.

Memory value display

The value or end result of each completed measurement is automatically saved.

Maximum 30 values (measured values or end results) can be retrieved.

Select the memory function [].



The number of the memory value is shown at the top of the display, the corresponding memory value is shown at the bottom and the corresponding measuring function is shown on the left.

Press the [**+**] button **(6)** to browse forwards through the saved values.

Press the [**–**] button **(3)** to browse backwards through the saved values.

The oldest value is located in position 1 in the memory, while the newest value is in position 30 (when 30 memory values are available). If a further value is saved, the oldest value in the memory is always deleted.

Deleting the memory

To delete an individual memory value, select this value(see "Memory value display", page 26). To delete, first press the on/off/back button **(8)** [ ] and confirm this by pressing the **(2)** [**Func**] button.

To delete all the contents of the memory, press the **(7)** [ ] button and select the function. Then press the **(6)** [**+**] button and confirm this by pressing the **(2)** [**Func**] button.

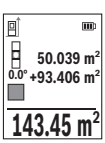
Adding/subtracting values

Measured values or end results can be added or subtracted.

Adding values

The following example describes the addition of areas:

Measure an area as described in the "Area measurement" section Area measurement.



Press the [**+**] button **(6)**. The calculated area and the **+** symbol will be displayed.

Press the measuring button **(5)** [▲] to start another area measurement. Measure the area as described in the "Area measurement" section Area measurement. Once the second measurement is completed, the result of the second area measurement is displayed below. To show the end result, press the measuring button **(5)** [▲] once more.

Note: In the case of a length measurement, the end result is displayed immediately.

To exit addition, press the [**Func**] button **(2)**.

Subtracting values

To subtract values, press the button **(3)** [**–**]. The subsequent steps are the same as for the section on adding values.

Deleting measured values

Briefly pressing the on/off/back button **(8)** [ ] will delete the last measured value in all measuring functions. Repeatedly pressing the on/off/back button **(8)** [ ] briefly will delete the measured values in reverse order.

Practical advice

► **The measuring tool is equipped with a wireless interface. Local operating restrictions, e.g. in aeroplanes or hospitals, must be observed.**

General advice

The reception lens **(15)** and the laser beam output **(16)** must not be covered during the measuring process.

The measuring tool must not be moved during a measurement (with the exception of the continuous measurement and grade measurement functions). For this reason, place the measuring tool against or on a firm surface whenever possible.

Influences on the measuring range

The measuring range depends on the lighting conditions and the reflective properties of the target surface. For better visibility of the laser beam in bright extraneous light, use the laser viewing glasses **(20)** (accessory) and the laser target plate **(19)** (accessory) or shade the target area.

Influences on the measurement result

Due to physical effects, the possibility of inaccurate measurements when measuring various surfaces cannot be excluded. These include:

– Transparent surfaces (e.g. glass, water)
– Reflective surfaces (e.g. polished metal, glass)
– Porous surfaces (e.g. insulating materials)
– Structured surfaces (e.g. roughcast, natural stone).

If necessary, use the laser target plate **(19)** (accessory) on these surfaces.

Inaccurate measurements are also possible where the laser is pointed at target surfaces diagonally.

Layers of air at different temperatures and indirectly received reflections can also influence the measured value.

Checking accuracy and calibrating the grade measurement (see figure L)

Regularly check the accuracy of the grade measurement. This is accomplished by means of a reverse measurement. To do this, lay the measuring tool on a table and measure the inclination. Turn the measuring tool by 180° and measure the inclination again. The difference between the displayed values must not exceed 0.3°.

In the event of larger deviations, you have to recalibrate the measuring tool. To do so, select ⚙ in the settings. Follow the instructions on the display.

We recommend that you perform an accuracy check and if necessary a calibration of the measuring tool after extreme temperature variations and after impact to the tool. After a

temperature variation, the measuring tool must adjust to the ambient temperature for a while before calibration is performed.

Accuracy Check of the Distance Measurement

You can check the accuracy of the measuring tool as follows:

– Choose a measuring section of approx. 3–10 m in length that is permanently unchanged, the exact length of which is known to you (e.g. room width, door opening). The measurement should be taken under favourable conditions, i.e. the measuring section should be indoors and the target surface for the measurement should be smooth and reflect well.
– Measure the section ten times in succession.

The deviation of the individual measurements from the mean value must not exceed ±4 mm over the entire measuring section in favourable conditions. Record the measurements in order to be able to compare the accuracy at a later date.

Working with the tripod (accessory)

The use of a tripod is particularly necessary for larger distances. Place the measuring tool with the 1/4" thread **(14)** on the quick-release plate of the tripod **(21)** or of a commercially available camera tripod. Tighten it using the locking screw of the quick-release plate.

Set the reference level for measurements with a tripod in the settings (see "Selecting the reference level (see figure **A**)", page 20).

Belt clip (accessory) (see figure M)

With the belt clip **(17)**, the measuring tool can be conveniently secured to your belt.

Error message

If a measurement cannot be performed correctly, the “Error” message will appear in the display. Start the measurement again.

The measuring tool monitors correct functioning in every measurement. If a defect is detected, the display will indicate only the symbol shown opposite and the measuring tool switches itself off. In this case, have the measuring tool checked by an after-sales service agent for Bosch power tools.

Maintenance and Service

Maintenance and Cleaning

Store and transport the measuring tool only in the supplied protective bag **(23)**.

Keep the measuring tool clean at all times.

Never immerse the measuring tool in water or other liquids.

Wipe off any dirt using a damp, soft cloth. Do not use any detergents or solvents.

Take particular care of the reception lens **(15)**, which must be handled with the same level of care you would give to a pair of glasses or a camera lens.

If the measuring tool needs to be repaired, send it off in the protective bag **(23)**.

After-Sales Service and Application Service

Our after-sales service responds to your questions concerning maintenance and repair of your product as well as spare parts. You can find explosion drawings and information on spare parts at: **www.bosch-pt.com**

The Bosch product use advice team will be happy to help you with any questions about our products and their accessories.

In all correspondence and spare parts orders, please always include the 10-digit article number given on the nameplate of the product.

Malaysia
Robert Bosch Sdn. Bhd.(220975-V) PT/SMY
No. 8A, Jalan 13/6
46200 Petaling Jaya
Selangor
Tel.: (03) 79663194
Toll-Free: 1800 880188
Fax: (03) 79583838
E-Mail: kiathoe.chong@my.bosch.com
www.bosch-pt.com.my

You can find further service addresses at:
www.bosch-pt.com/serviceaddresses

繁體中文

安全注意事項

為確保能夠安全地使用本測量工具，您必須完整詳讀本說明書並確實遵照其內容。若未依照現有之說明內容使用測量工具，測量工具內部所設置的防護措施可能無法發揮應有功效。謹慎對待測量工具上的警告標示，絕對不可讓它模糊不清而無法辨識。請妥善保存說明書，將測量工具轉交給他人時應一併附上本說明書。

- ▶ **小心 - 若是使用非此處指明的操作設備或校正設備，或是未遵照說明的操作方式，可能使您暴露於危險的雷射光照射環境之下。**
- ▶ **本測量工具出貨時皆有附掛雷射警示牌（即測量工具詳解圖中的標示處）。**
- ▶ **雷射警示牌上的內容若不是以貴國語言書寫，則請於第一次使用前將隨附的當地語言說明貼紙貼覆於其上。**

請勿將雷射光束對準人員或動物，您本人亦不可直視雷射光束或使雷射光束反射。 因為這樣做可能會對他人眼睛產生眩光，進而引發意外事故或使眼睛受到傷害。

- ▶ **萬一雷射光不小心掃向眼睛，應立刻閉上眼睛並立刻將頭轉離光束範圍。**
- ▶ **請勿對本雷射裝備進行任何改造。**
- ▶ **請勿將雷射眼鏡當作護目鏡（配件）使用。**雷射眼鏡是用來讓您看清楚雷射光束；但它對於雷射光照射並沒有保護作用。
- ▶ **請勿將雷射眼鏡當作護目鏡（配件）使用，或在道路上行進間使用。**雷射眼鏡無法完全阻隔紫外線，而且還會降低您對於色差的感知能力。
- ▶ **本測量工具僅可交由合格的專業技師以原廠替換零件進行維修。**如此才能夠確保本測量工具的安全性能。
- ▶ **不可放任兒童在無人監督之下使用本雷射測量工具。** 他們可能會不小心對他人或自己的眼睛造生眩光。
- ▶ **請不要在存有易燃液體、氣體或粉塵等易爆環境下操作本測量工具。**測量工具內部產生的火花會點燃粉塵或氣體。
- ▶ **小心！使用測量工具時若開啟 *Bluetooth*®（藍牙）功能，將可能對其他裝置或設備、飛機以及醫療器材（例如心律調節器、助聽器等）產生干擾。同樣亦無法完全排除對鄰近之人員或動物造成身體危害的可能性。請**

勿在醫療器材、加油站、化學設備、爆炸危險場所以及易爆環境等處附近，使用測量工具的 *Bluetooth*® 功能。請勿在飛機上使用測量工具的 *Bluetooth*® 功能。應避免直接貼靠在身體部位旁的長時間持續操作。

產品和功率描述

依規定使用機器

該測量工具是用來測量距離、長度、高度、間距、傾角，並具有計算面積及體積之功能。

本測量工具適合在室內使用。

測量結果可透過 *藍牙*®功能傳送至其他裝置。

插圖上的機件

機件的編號和儀器詳解圖上的編號一致。

(1) *藍牙*® 按鈕
(2) 功能按鈕 [**Func**]
(3) 減號／向左按鈕 [**–**]
(4) 顯示器
(5) 測量按鈕 [▲]
(6) 加號／向右按鈕 [**+**]
(7) 基本設定按鈕 [⚙]
(8) 電源／返回按鈕 [⏻]
(9) 腕帶吊環[a)]
(10) 雷射警示牌
(11) 序號
(12) 電池盒蓋鎖扣
(13) 電池盒蓋
(14) 供三腳架使用的 1/4" 螺紋孔
(15) 接收點
(16) 雷射光束出口
(17) 腰帶夾[a)]

(18) 腰帶夾螺栓[a)a)]

(19) 雷射標靶[a)]

(20) 雷射辨識鏡[a)]

(21) 三腳架[a)]

(22) 腕帶[a)]

(23) 保護套袋

a) **圖表或說明上提到的配件，並不包含在基本的供貨範圍中。本公司的配件清單中有完整的配件供應項目。**

顯示元件（樣版）

(a) 測量基準點

(b) 連線狀態

 藍牙® 功能已啟用，未建立連線

 *藍牙®* 功能已啟用，已成功連線

(c) 電池電量指示器

(d) 測量值顯示列

(e) 測量結果顯示列

(f) 測量功能

(g) 傾角指示器

(h) 狀態列

(i) 測量功能螢幕指示器

(j) 基本設定螢幕指示器

(k) 更多設定螢幕指示器

技術性數據

數位雷射測距儀	**GLM 50-27 CG**
產品機號	**3 601 K72 U..**
距離測量	
測量範圍	0.05–50 m[A)]
測量範圍（在不利條件下）	0.05–20 m[B)]
測量精度	± 1.5 mm[A)]
測量準確度（在不利條件下）	± 3.0 mm[B)]

數位雷射測距儀	GLM 50-27 CG
最小顯示單位	0.5 mm
間接距離測量和水平儀	
測量範圍	0°–360° (4x90°)
傾角測量	
測量範圍	0°–360° (4x90°)
測量準確度（標準值）	± 0.2° [C)D)]
最小顯示單位	0.1°
一般資訊	
操作溫度	−10 °C ... +45 °C [E)]
儲藏溫度	−20 °C ... +70 °C
空氣相對濕度最大值	90 %
從基準點高度算起的最大可測量高度	2000 m
依照 IEC 61010-1，污染等級為	2 [F)]
雷射等級	2
雷射種類	515 nm, < 1 mW
雷射光束發散角	< 1.5 mrad（全角度）
自動關機的執行時間點	
– 雷射	20 秒
– 測量工具（未進行測量）	5 分鐘 [G)]
重量符合 EPTA-Procedure 01:2014	0.17 kg
尺寸	119 x 53 x 29 mm
防護等級	IP 65（防塵、防潑水設計）
電池	2 x 1.5 V LR6 (AA)
設定計量單位	m，ft，in，尺
資料傳輸	
藍牙®	*藍牙*®（4.2 low-energy） [H)]
工作頻率範圍	2402–2480 MHz

數位雷射測距儀	GLM 50-27 CG
最大發射功率	8 mW

A) 以測量工具前緣為測量起點、目標物反射率高（例如白漆牆）、背景照明微弱、操作溫度為 25 °C。應額外再依距離誤差 ± 0.05 mm/m 列入計算。

B) 以測量工具前緣為測量起點、目標物反射率高（例如白漆牆）、背景照明強烈、操作溫度為 25 °C。應額外再依距離誤差 ± 0.15 mm/m 列入計算。

C) 使用者在進行 0° 與 90° 校正後，45°（最大值）以下必須另外加上每度 ±0.01° 的螺距誤差。測量工具的左側為傾角測量的基準點。

D) 在操作溫度 25 °C 下

E) 使用連續測量功能時的操作溫度最高為 +40 °C。

F) 只產生非傳導性污染，但應預期偶爾因水氣凝結而導致暫時性導電。

G) *藍牙®* 為停用狀態

H) 具有 *Bluetooth®* 低功耗功能之工具裝置，視其機型和作業系統，可能會有無法建立連線之情形。*Bluetooth®* 裝置必須支援 GATT 模式。

從產品銘牌的序號 (11) 即可確定您的測量工具機型。

藍牙® 介面

將資料傳輸至其他裝置

本測量工具配備 *藍牙®* 模組，透過此一無線技術即可與具有 *藍牙®* 介面的特定行動終端裝置進行資料傳輸（例如智慧型手機、平板電腦）。

如需 *藍牙®* 連線的最低系統需求相關資訊，請至博世網站：www.bosch-pt.com。

▶ **如需其他資訊，請參考博世產品說明頁。**

透過 *藍牙®* 進行資料傳輸時，行動終端裝置與測量工具之間可能會有時間遲滯的現象。問題可能是出在兩個裝置之間的距離或是出在測量目標物本身。

啟用行動終端裝置的 *藍牙®* 介面，以便進行資料傳輸

請確認：行動終端裝置上的 *藍牙®* 介面已啟用。

若要開啟 *藍牙®* 功能表，請按一下按鈕 **(1)**；若要啟用 *藍牙®* 介面，請再按一下按鈕 **(1)**（或按鈕 **(6) [+]**）。萬一同時找到多個啟用的測量工具，請您根據序號選擇相符的那一個測量工具。序號 **(11)** 位於測量工具的產品銘牌上。連線狀態以及啟用之連線 **(b)** 將顯示於測量工具的狀態列 **(h)** 中。

本公司提供博世應用程式，可為您擴充本電動工具的功能。您可到相關 App 商店按照所使用的終端裝置下載該程式。

停用 *藍牙®* 介面

若要開啟 *藍牙®* 功能表，請按一下按鈕 **(1)**；若要停用 *藍牙®* 介面，請再按一下按鈕 **(1)**（或按鈕 **(3) [–]**）。

安裝

裝入／更換電池

建議使用鹼性錳電池或鎳氫充電電池做為測量工具的電源（尤其是操作溫度偏低時）。

視電池容量而定，使用 1.2 伏特充電電池時的可測量次數可能會比使用 1.5 伏特電池來得少。

若要打開電池盒蓋 **(13)**，請按壓鎖扣 **(12)** 並取下電池盒蓋。裝入拋棄式電池或充電電池。此時請您注意是否有依照電池盒內側上的電極標示正確放入。

拋棄式電池或充電電池進入低電量狀態時，將在顯示器上詢問您是否要啟用省電模式。使用省電模式可延長電池供電時間，螢幕上的電池符號將加註黃框(參見 「「設定」功能表（請參考圖 **B**）」, 頁 38)。

螢幕中的電池符號一變成無格數後，您還可以進行少數幾次測量。當電池符號處於無格數並呈紅色閃爍狀態時，則無法再進行測量。請您更換拋棄式電池或充電電池。

務必同時更換所有的拋棄式電池或充電電池。請使用同一製造廠商、容量相同的拋棄式電池或充電電池。

▶ **長時間不使用時，請將測量工具裡的拋棄式電池或充電電池取出。**經過長期存放，電池會腐蝕或自行放電。

操作

操作機器

▶ **不可放任啟動的測量工具無人看管，使用完畢後請關閉測量工具電源。**雷射可能會對旁人的眼睛產生眩光。

▶ **不可以讓濕氣滲入儀器中，也不可以讓陽光直接照射在儀器上。**

▶ **勿讓測量工具暴露於極端溫度或溫度劇烈變化的環境。**例如請勿將它長時間放在車內。測量工具歷經較大溫度起伏時，請先讓它回溫後再使用。如果儀器曝露在極端溫度下或溫差較大的環境中，會影響儀器的測量準確度。

▶ **測量工具須避免猛力碰撞或翻倒。** 測量工具遭受外力衝擊後，一律必須先檢查其準確度，確認後才能繼續使用 (參見 「檢查傾角測量準確度及進行相關校正（請參考圖 **L**）」, 頁 45)以及(參見 「檢查距離測量準確度」, 頁 45)。

▶ **本測量工具配備無線介面。請您務必遵守不同場所的使用限制條件，例如在飛機或醫院內。**

啟動／關閉

– 若要**啟動**測量工具並同時開啟雷射功能，請按一下測量按鈕 **(5)** [▲]。
– 若要**啟動**測量工具但不需要開啟雷射功能，則請按一下電源／返回按鈕 **(8)** [ ]。

▶ **雷射光束不可以對準人或動物，操作人本身也不要直視光束，即使和光束相距甚遠也不可以做上述動作。**

測量工具初次開機時，系統將要求您設定螢幕文字的偏好使用語言。

若要**關閉**測量工具，請按住電源開關電源／返回按鈕 **(8)** [ ]。

即使測量工具已關機，記憶體中的測量值及裝置設定將繼續留存。

探測程序

測量工具初次開機後的模式為長度測量功能。之後每一次開機時，測量工具將直接進入上一次使用的測量功能。如欲使用其他測量功能，按一下按鈕 **(2)** [**Func**]。請利用按鈕 **(6)** [**+**] 或按鈕 **(3)** [**–**] 選擇所需的測量功能測量功能。若要啟用測量功能，請按一下按鈕 **(2)** [**Func**] 或測量按鈕 **(5)** [▲]。

測量基準點共有三種不同設定(參見 「選擇基準點（請參考圖 **A**）」，頁 37)。

將測量工具置於所需的測量起點上（例如：牆壁）。

提示：利用電源／返回按鈕 **(8)**[ ] 啟動測量工具後，按一下測量按鈕 **(5)** [▲] 即可開啟雷射功能。

短按一下測量按鈕 **(5)** [▲] 即可開始測量。隨後，雷射光束即自動關閉。若要進行另一次測量，請重複此程序。

▶ **雷射光束不可以對準人或動物，操作人本身也不要直視光束，即使和光束相距甚遠也不可以做上述動作。**

提示：原則上 0.5 秒鐘內就會出現測量值，最遲為 4 秒鐘左右。測量時間取決於距離、光線情況和目標物表面的反射特性。結束測量後，雷射光束會自動關閉。

選擇基準點（請參考圖 A）

測量時共有三個不同基準點供您選擇：

– 測量工具後緣（例如貼靠在牆面上時）、
– 測量工具前緣（例如：以桌緣做為測量起點）、
– 螺紋孔中心點 **(14)**（例如：使用三腳架進行測量）

若要選擇基準點，請按一下按鈕 **(7)** [✲]。接著請利用測量按鈕 **(5)** [▲] 或按鈕 **(2)** [**Func**] 選取「基準點」設定。然後再利用按鈕 **(6)** [**+**] 或按鈕 **(3)** [**–**] 選擇所需基準點。測量工具每次啟動之後，將預設為上一次選取的基準點。

「設定」功能表（請參考圖 B）

若要進入「設定」功能表 **(j)**，請按一下按鈕 **(7)** [✲]。

利用按鈕 **(6)** [**+**] 或按鈕 **(3)** [**–**] 選擇所需設定，然後再按一下測量按鈕 **(5)** [▲] 或按鈕 **(2)** [**Func**] 以確認您的設定。

利用按鈕 **(6)** [**+**] 或按鈕 **(3)** [**–**] 選擇所需設定，然後再按一下測量按鈕 **(5)** [▲] 或按鈕 **(2)** [**Func**] 以確認您的設定。

若要離開「設定」功能表，請按一下電源／返回按鈕 **(8)** [↺]。

啟動／關閉音效

您可在基本設定中開啟音效。

啟動／關閉振動訊號

您可在基本設定中開啟振動訊號。

舉列來說，測量工具的振動訊號在吵雜環境中可以發揮很大的幫助。連續兩次短暫振動代表測量成功；單次較長時間振動則是代表測量發生錯誤。

螢幕照明

螢幕照明的設定為持續亮起。若未操作按鈕，螢幕照明會在約 20 秒鐘後變暗，以維護電池/充電電池的壽命。

省電模式

您可在基本設定中關閉省電模式。省電模式開啟時，將停用音效和振動訊號，並且降低螢幕亮度。藉此延長電池供電時間。

切換計量單位 ft／m

基本設定中的計量單位為「m」（公尺）。本機共有六種不同計量單位供您選用。請依據您的需要設定適合的計量單位。

設定語言

測量工具初次開機時，系統將要求您設定螢幕文字的偏好使用語言。

您隨時可以變更介面使用的語言。

PRO360 PRO)

必須進行初次啟用。僅能透過 App 或電腦程式進行資料傳輸。測量工具更換電池後一定會開機，這是為了啟動 PRO360。PRO360 可隨時重新停用。如需 PRO360 的其他相關資訊，請至：www.pro360.com。

裝置資訊

此處將為您提供測量工具的序號和軟體版本等相關資訊。

恢復出廠預設值

本項功能是用來將測量工具重設回原廠設定／重設基本設定。重設後，系統將要求您設定螢幕的偏好使用語言。

測量功能

輔助功能（請參考圖 C）

請按一下按鈕 **(2)** [**Func**]，以便選擇測量功能。請利用按鈕 **(6)** [**+**] 或按鈕 **(3)** [**–**] 選擇所需的測量功能。

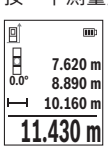
請按一下按鈕 **(7)** [✲]，以便啟動輔助功能。輔助功能將為您顯示所選用之測量功能的詳細操作方式。

長度測量

請選擇長度測量 ⊢⊣。

若要啟動雷射光束，請按一下測量按鈕 **(5)** [▲]。

按一下測量按鈕 **(5)** [▲] 即可開始測量。測量結果會出現在螢幕下方。



每一次想要重新進行測量時，請重複上述步驟。最新測量值將出現在螢幕下方，而前一次的測量值則位於其上，依此類推。

連續測量

進行連續測量時，可針對目標物讓測量工具進行相對移動，期間系統將每 0.5 秒左右更新一次測量值。舉例來說，您可從某一個牆面離開，走到相隔所需距離的位置，期間可隨時看到當下的實際距離。

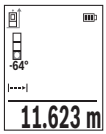
請選擇連續測量 ⊢⊣。請選擇下列其中一項功能：

– 最小值／最大值：將持續在螢幕上為您顯示最小測量值及最大測量值（請參考圖 **I**）。
– 數字加大：為了方便您讀取測量值，以較大字體顯示數字（請參考圖 **J**）。

– 捲尺：畫面上以捲尺顯示距離（請參考圖 **K**）。**提示**：使用捲尺功能時，所顯示的是到螢幕中標記處的距離。基準點**不是**測量工具的邊緣。

若要啟動雷射光束，請按一下測量按鈕 **(5)** [▲]。

移動測量工具，直至所需距離出現在螢幕下方為止。



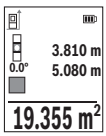
再按一下測量按鈕 **(5)** [▲] 即可中斷連續測量功能。目前的測量值將顯示於螢幕下方。若是再按一次測量按鈕 **(5)** [▲]，則將重頭開始連續測量。

連續測量功能將於 4 分鐘後自動關閉。

面積測量

請選擇面積測量 ▭。

接著按照進行長度測量之方式，測量寬度、長度即可。進行這兩次測量之間，雷射光束將保持開啟。面積測量指示器 ▭ 中即將進行測量的長度以閃爍方式顯示。



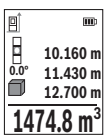
第一個測量值顯示於螢幕上方。

完成第二次測量後，將自動計算出面積並於畫面中顯示該值。最後的計算結果位於螢幕下方，而個別測量值則位於其上方。

體積測量

請選擇體積測量 ⧈。

接著按照進行長度測量之方式，測量寬度、長度及深度即可。進行這三次測量之間，雷射光束將保持開啟。體積測量指示器 ⧈ 中即將進行測量的長度以閃爍方式顯示。



第一個測量值顯示於螢幕上方。

完成第三次測量後，測量工具將自動計算出體積並於畫面中顯示該值。最後的計算結果位於螢幕下方，而個別測量值則位於其上方。

間接長度測量

間接距離測量共分為三種測量功能供您選用，它們分別可用來量測不同類型的距離。

無法進行直接測量時（例如有障礙物會阻擋雷射，或者沒有目標物可充當反射體時），則必須以間接的方式測量。此一測量方式僅適用於垂直方向。任何水平方向的偏差都會導致測量誤差。

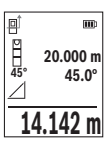
提示：間接距離測量的精準度永遠不如直接距離測量。視運用方式而定，其測量誤差可能大於直接距離測量。為改善測量準確度，建議您使用三腳架（配件）。

雷射將在各次單一測量之間的空檔保持開啟。

a）間接高度測量（請參考圖 D）

請選擇間接高度測量 ◿。

請注意：測量工具應位於與下方測量點一致的高度上。接著將測量工具沿基準點側傾，依照進行長度測量之方式來測量**「1」**線段（即螢幕上以紅線顯示者）。



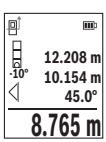
完成測量後，測量結果顯示列 **(e)** 中顯示的測量結果即為您想要確認的**「X」**線段。**「1」**線段及**「α」**角的測量值則是位於測量值顯示列 **(d)** 中。

b）雙重間接高度測量（請參考圖 E）

本測量工具可以間接測量位於測量工具垂直平面上的任何長度。

請選擇雙重間接高度測量 ◺。

依照進行長度測量之方式依序測量線段**「1」**和**「2」**。



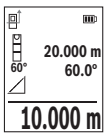
完成測量後，測量結果顯示列 **(e)** 中顯示的測量結果即為您想要確認的**「X」**線段。線段**「1」**、線段**「2」**及**「α」**角的測量值則是位於測量值顯示列 **(d)** 中。

請注意：在同一個測量流程中進行每一次測量時，測量基準點（例如：測量工具後緣）都必須精準地保持在同一位置上。

c）間接長度測量（請參考圖 F）

請選擇間接長度測量 ◿。

請注意：測量工具必須與您想要確認的測量點位在同一高度上。接著將測量工具沿基準點側傾，依照進行長度測量之方式來測量**「1」**線段。



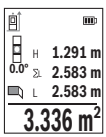
完成測量後，測量結果顯示列 **(e)** 中顯示的測量結果即為您想要確認的「**X**」線段。「**1**」線段及「**α**」角的測量值則是位於測量值顯示列 **(d)** 中。

牆壁面積測量（請參考圖 G）

牆壁面積測量是用來計算相同高度之數個單一牆面的總面積。插圖範例中所測量的是：空間高度 **H** 相同但長度不同 **L** 之多個牆面加總起來的總面積。

請選擇牆面測量 。

依照進行長度測量之方式來測量空間高度 **H**。測量值將顯示於上方測量值列。雷射功能將保持開啟。



隨後請測量第一面牆的長度 L_1。將自動計算出面積並於測量結果顯示列 **(e)** 中顯示該值。最新得出的長度測量值位於下方測量值列 **(d)**。雷射功能將保持開啟。

現在請您測量第二面牆的長度 L_2。測量值列 **(d)** 中所顯示的單次測量值將累加於長度 L_1 中。兩個長度（顯示於中間測量值列 **(d)**）加總後再乘以之前儲存的高度 **H**。所得的總面積值將顯示於測量結果顯示列 **(e)** 中。

您可以繼續測量任意多個長度 L_X，系統會自動相加這些值後再乘以高度 **H**。為求正確計算面積，其前提是：所有區塊面積的第一個測量長度要一致（在本範例中即為空間高度 **H**）。

放樣功能（請參考圖 H）

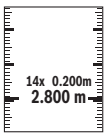
放樣功能可重複測量一個自訂長度（距離）。您可將此長度移植到任一表面上，以便將材料切成相同長度或建構石膏隔間牆等等。可設定的最小長度為 0.1 m，可設定的最大長度為 50 m。

提示：使用放樣功能時，所顯示的是到螢幕中標記處的距離。基準點**不是**測量工具的邊緣。

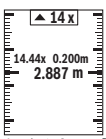
請選擇放樣功能 。

請利用按鈕 **(6)** [**+**] 或按鈕 **(3)** [**–**] 設定所需長度。

按一下測量按鈕 **(5)** [▲] 即可啟動放樣功能，接下來請您慢慢從起點往前走。



測量工具將持續測量目前與起點之間的間距。此時將同時顯示您的自訂長度以及目前測量值。向下或向上箭頭表示：到下一個或最後一個記號的最短距離。



位於左邊的系數代表目前可換算成幾個完整自訂長度。綠色測量值代表還有多長距離就應標設下一個記號。

當參照值不在螢幕範圍上時，藍色測量值用來代表目前的實際值。

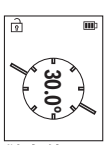
傾角測量／數位水平儀

請選擇傾角測量／數位水平儀 。

測量工具將於這兩種顯示之間自動切換。

數位水平儀是用來檢查某一物體的水平或垂直定位（例如洗衣機、冰箱等等）。

傾斜度若超過 3°，螢幕上的圓球將以紅色顯示。



傾角測量則是用來測量坡度或傾斜度（例如用於樓梯、欄杆、家具榫接、管路鋪設等等）。

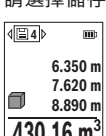
測量工具的左側為傾角測量的基準點。

儲存值顯示器

每次完成測量後，將自動儲存測量值或最後的計算結果。

最多可叫出 30 個數值（測量值或最後的計算結果）。

請選擇儲存功能 [ ]。



螢幕上方所顯示的是所儲存之數值的編號，下方是所屬之儲存值，而左方是所屬之測量功能。

請按一下按鈕 **(6)** **[+]**，即可往前翻頁至其他儲存值。

請按一下按鈕 **(3)** **[–]**，即可往後翻頁至其他儲存值。

最舊數值位於記憶體中的第 1 筆資料；最新數值則是位於第 30 筆資料（儲存值達 30 筆時）。如果還要儲存其他筆數值資料，則將一律刪除記憶體中的最舊數值。

刪除所有記憶

若要刪除單一儲存值，請您直接選取該值(參見 「儲存值顯示器」, 頁 43)。若要刪除，請先按一下電源／返回按鈕 **(8)** [ ] 再按一下按鈕 **(2)** [**Func**] 予以確認。

若要刪除所有儲存內容，請按一下按鈕 **(7)** [ ]，並選擇 功能。然後再按一下按鈕 **(6)** [**+**] 並透過按鈕 **(2)** [**Func**] 予以確認。

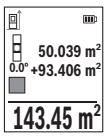
數值相加／相減

測量值或最後的計算結果可進行加減。

數值相加

以下範例將說明如何累加面積：

請依照「面積測量」小節進行「面積測量」。面積測量。



請按一下按鈕 **(6)** [**+**]。隨即出現計算後得出的面積並加註**「+」**符號。

按一下測量按鈕 **(5)** [▲]，即可開始其他面積測量。請依照「面積測量」小節進行「面積測量」。面積測量第二次測量完成後，螢幕下方會立即顯示第二次面積測量的結果。若要顯示最後的計算結果，請再按一下測量按鈕 **(5)** [▲]。

提示：進行長度測量時，將立即顯示最後的計算結果。

若要離開相加功能，請按一下按鈕 **(2)** [**Func**]。

數值相減

若要將數值相減，請按一下按鈕 **(3)** [**–**]。後續步驟請比照「數值相加」。

刪除測量值

在所有測量功能中，只要按一下電源／返回按鈕 **(8)** [ ]，即可刪除您所測得的最後一項測量值。重複按壓電源／返回按鈕 **(8)** [ ]，即可反序刪除測量值。

作業注意事項

▶ **本測量工具配備無線介面。請您務必遵守不同場所的使用限制條件，例如在飛機或醫院內。**

一般注意事項

測量時，接收點 **(15)**、雷射光束出口 **(16)** 上不得有遮蓋物。

進行測量時不可移動測量儀器（使用連續測量功能和傾角測量功能時例外）。因此，請將測量工具儘可能放置在固定的擋塊或托架平面上。

影響測量範圍的因素

測量範圍取決於光線情況和目標物表面的反射特性。有強烈外來燈光影響時，使用雷射眼鏡 **(20)**（配件）和雷射標靶 **(19)**（配件）可提高雷射光束的能見度，或遮住目標物表面的光線。

影響測量結果的因素

由於物理作用之故，無法排除在不同種型表面上進行測量時出現誤測的狀況。表面的類型可分為：

– 透明表面（例如玻璃、水）
– 反射表面（例如拋光金屬、玻璃）
– 多孔狀表面（例如具有阻隔特性的材料）
– 結構性表面（例如毛胚、天然石材）。

必要時請將雷射標靶 **(19)**（配件）放到表面上。

如果未正確地瞄準好目標物表面，也可能會出現誤測。

此外有溫差的空氣層和間接的反射都可能影響測量值。

檢查傾角測量準確度及進行相關校正（請參考圖 L）

請定期檢查傾角測量準確度。其做法是執行一次反轉測量。請將測量工具放到桌上，然後進行傾角測量。將測量工具旋轉 180°，然後再測量一次傾角。顯示值最多可相差 0.3°。

如果差距超出規定則必須重新校正測量工具。若要這麼做，請至設定中選擇 。並遵照螢幕上的指示。

本測試工具經歷溫度劇烈變化或碰撞之後，建議您進行準確度測試，並視需要執行校正。本測試工具經歷溫度劇烈變化或碰撞之後，必須先回溫一段時間然後才進行校正。

檢查測距精準度

可如下檢查測量工具的準確度：

– 選擇一個您本人非常熟悉且長度不會改變的測量線段，線段長度大概在 3 到 10 公尺之間（例如房間的寬度，門孔等）。該測量應在有利條件下進行，亦即該測量位置位於室內，待測量的目標物表面光滑，且具有良好的反射性。
– 連續測量該長度 10 次。

在有利的測量條件下，每一次的測量結果與平均值的不得相差超過 ±4 mm。記錄測量結果，以便後續可比較其準確度

使用三腳架（配件）進行測量

當測量目標位於遠處時，必須使用三腳架。請利用 1/4" 螺紋孔 **(14)** 將測量工具安裝到三腳架 **(21)** 或一般市售相機三腳架的快拆座上。請使用快拆座的止付螺絲來固定測量工具。

請至設定中，選好使用三腳架時的測量基準點。(參見 「選擇基準點（請參考圖 **A**）」, 頁 37)。

腰帶夾（配件）（請參考圖 M）

利用腰帶夾 **(17)** 即可很方便地將測量工具掛在你的腰帶上。

故障訊息

如果無法正確執行測量程序，螢幕上將出現故障訊息「Error」。重新啟動測量。

測量工具在進行每次測量時會監控功能是否正常。若確認出現故障，螢幕上僅會出現左側符號，隨後測量工具將自動關機。發生這種情況時，請將該測量工具交由您的經銷商轉送至博世顧客服務處。

維修和服務

保養與清潔

儲放和搬運測量工具時，一定要將它放置在隨附的保護套袋 **(23)** 內。

測量儀器必須隨時保持清潔。

不可以把儀器放入水或其它的液體中。

使用柔軟濕布擦除儀器上的污垢。切勿使用清潔劑或溶液。

進行保養時需格外小心接收點 **(15)**，務必請您比照眼鏡或攝影鏡頭的處置方式。

如需送修，請將測量工具放入保護套袋 **(23)** 內後，再轉交給相關單位。

顧客服務處和顧客咨詢中心

本公司顧客服務處負責回答有關本公司產品的維修、維護和備用零件的問題。以下的網頁中有分解圖和備用零件相關資料：**www.bosch-pt.com**

如果對本公司產品及其配件有任何疑問，博世應用諮詢小組很樂意為您提供協助。

當您需要諮詢或訂購備用零件時，請務必提供本產品型號銘牌上 10 位數的產品機號。

台灣
台灣羅伯特博世股份有限公司
建國北路一段90 號6 樓
台北市10491
電話: (02) 7734 2588
傳真: (02) 2516 1176
www.bosch-pt.com.tw

制造商地址:
Robert Bosch Power Tools GmbH
羅伯特· 博世電動工具有限公司
70538 Stuttgart / GERMANY
70538 斯圖加特/ 德國

以下更多客戶服務處地址：
www.bosch-pt.com/serviceaddresses

有關台灣的更多資訊

NCC 警語

低功率射頻器材管理辦法:

取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

한국어

안전 수칙

측정공구의 안전한 사용을 위해 모든 수칙들을 숙지하고 이에 유의하여 작업하시기 바랍니다. 측정공구를 해당 지침에 따라 사용하지 않으면, 측정공구에 내장되어 있는 안전장치에 안 좋은 영향을 미칠 수 있습니다. 측정공구의 경고판을 절대로 가려서는 안 됩니다. 안전 수칙을 잘 보관하고 공구 양도 시 측정공구와 함께 전달하십시오.

- ▶ **주의 – 여기에 제시된 조작 장치 또는 조정 장치 외의 용도로 사용하거나 다른 방식으로 작업을 진행하는 경우, 광선으로 인해 폭발될 위험이 있습니다.**
- ▶ **본 측정공구는 레이저 경고 스티커가 함께 공급됩니다(그림에 측정공구의 주요 명칭 표시).**
- ▶ **처음 사용하기 전에 함께 공급되는 한국어로 된 레이저 경고 스티커를 독문 경고판 위에 붙이십시오.**

사람이나 동물에게 레이저 광선을 비추거나, 광선을 직접 또는 반사시켜 보지 마십시오. 이로 인해 눈이 부시게 만들어 사고를 유발하거나 눈에 손상을 입을 수 있습니다.

- ▶ **눈으로 레이저 광선을 쳐다본 경우, 의식적으로 눈을 감고 곧바로 고개를 돌려 광선을 피하십시오.**
- ▶ **레이저 장치를 개조하지 마십시오.**
- ▶ **레이저 보안경(액세서리)을 일반 보안경으로 사용하지 마십시오.** 레이저 보안경은 레이저 광선을 보다 잘 감지하지만, 그렇다고 해서 레이저 광선으로부터 보호해주는 것은 아닙니다.
- ▶ **레이저 보안경(액세서리)을 선글라스 용도 또는 도로에서 사용하지 마십시오.** 레이저 보안경은 자외선을 완벽하게 차단하지 못하며, 색상 분별력을 떨어뜨립니다.
- ▶ **측정공구의 수리는 해당 자격을 갖춘 전문 인력에게 맡기고, 수리 정비 시 순정 부품만 사용하십시오.** 이 경우에만 측정공구의 안전성을 오래 유지할 수 있습니다.
- ▶ **어린이가 무감독 상태로 레이저 측정공구를 사용하는 일이 없도록 하십시오.** 의도치 않게 타인 또는 자신의 눈이 부시게 할 수 있습니다.

- ▶ **가연성 유체나 가스 혹은 분진 등 폭발 위험이 있는 곳에서 측정공구를 사용하지 마십시오.** 측정공구에 분진이나 증기를 점화하는 스파크가 생길 수 있습니다.
- ▶ **주의! 측정공구의 *Bluetooth*® 사용은 다른 기기나 설비, 비행기 및 의료 기기(예: 심박 조정기,보청기) 등에 장애를 가져올 수 있습니다. 마찬가지로 근처에 있는 동물이나 사람에게도 좋지 않은 영향을 미칠 수 있습니다. 측정공구의 *Bluetooth*® 사용은 의료 기기, 주유소, 화학설비 및 폭발 위험이 있는 주변에서는 삼가하십시오. 비행기에서 측정공구의 *Bluetooth*® 사용은 삼가하십시오. 오랜 시간 신체에 직접 접촉하여 작동하는 것을 삼가하십시오.**
- ▶ 해당 무선설비는 전파혼신 가능성이 있으므로 인명안전 과 관련된 서비스는 할 수 없습니다 .

***블루투스*® 워드마크와 그림(로고)은 Bluetooth SIG, Inc.의 등록상표입니다. Robert Bosch Power Tools GmbH는 허가를 받아 이를 사용하고 있습니다.**

제품 및 성능 설명

규정에 따른 사용

본 측정공구는 거리, 길이, 높이, 간격, 경사도를 측정하고 면적 및 체적을 계산하는 데 사용됩니다.

측정공구는 실내용입니다.

측정 결과는 *블루투스*®를 통해 다른 장치로 전송할 수 있습니다.

제품의 주요 명칭

제품의 주요 명칭에 표기되어 있는 번호는 측정공구의 그림이 나와있는 면을 참고하십시오.

(1) *블루투스*® 버튼
(2) 기능 버튼 [**Func**]
(3) 마이너스/좌측 버튼 [**–**]
(4) 디스플레이
(5) 측정 버튼 [**▲**]
(6) 플러스/우측 버튼 [**+**]
(7) 기본 설정 버튼 [**⚙**]
(8) 전원/뒤로 가기 버튼 [**⏻**]

(9) 운반 고리[a)]
(10) 레이저 경고판
(11) 일련 번호
(12) 배터리 케이스 덮개 잠금쇠
(13) 배터리 케이스 덮개
(14) 1/4" 삼각대 소켓
(15) 수신 렌즈
(16) 레이저빔 발사구
(17) 벨트 클립[a)]
(18) 벨트 클립[a)] 용 나사[a)]
(19) 레이저 표적판[a)]
(20) 레이저 보안경[a)]
(21) 삼각대[a)]
(22) 운반 고리[a)]
(23) 안전 케이스

a) **도면이나 설명서에 나와있는 액세서리는 표준 공급부품에 속하지 않습니다. 전체 액세서리는 저희 액세서리 프로그램을 참고하십시오.**

디스플레이 요소(옵션)

(a) 측정 기준 레벨
(b) 연결 상태

 블루투스® 작동, 연결되지 않음

 *블루투스® 작동, 연결됨*

(c) 배터리 표시기
(d) 측정값 표시열
(e) 결과 표시열
(f) 측정 기능
(g) 경사각도 표시
(h) 상태 바
(i) 측정 기능 디스플레이 표시
(j) 기본 설정 디스플레이 표시
(k) 기타 설정 디스플레이 표시

제품 사양

디지털 레이저 거리 측정기	GLM 50-27 CG
품번	**3 601 K72 U..**
거리 측정	
측정 영역	0.05–50 m[A)]
측정 영역(부적절한 조건)	0.05–20 m[B)]
측정 정확도	± 1.5 mm[A)]
측정 정확도(부적절한 조건)	± 3.0 mm[B)]
최소 표시 단위	0.5 mm
간접 거리 측정 및 수준기	
측정 영역	0°–360° (4x90°)
경사 측정	
측정 영역	0°–360° (4x90°)
측정 정확도(평균)	± 0.2° [C)D)]
최소 표시 단위	0.1°
일반 사항	
작동 온도	−10 °C ... +45 °C[E)]
보관 온도	−20 °C ... +70 °C
상대 습도 최대	90 %
기준 높이를 초과한 최대 사용 높이	2000 m
IEC 61010-1에 따른 오염도	2[F)]
레이저 등급	2
레이저 유형	515 nm, < 1 mW
레이저빔의 편차	< 1.5 mrad(전체 각도)
자동 꺼짐 기능이 활성화되는 대략적인 시간	
– 레이저	20초
– 측정공구(측정 미포함)	5분[G)]
EPTA-Procedure 01:2014에 따른 중량	0.17 kg
치수	119 x 53 x 29 mm

디지털 레이저 거리 측정기	GLM 50-27 CG
보호 등급	IP 65(먼지 및 분무수 침투 방지)
배터리	2 × 1.5 V LR6 (AA)
측정 단위 설정	m, ft, in
데이터 전송	
블루투스®	*블루투스*® (4.2 low-energy)[H]
작동 주파수 대역	2402–2480 MHz
최대 송신 출력	8 mW

A) 측정공구의 앞 모서리부터 측정할 경우, 표적물(예: 흰색으로 칠한 벽)의 반사율을 높게, 배경 조명을 약하게 조성해야 합니다. 작동 온도는 25 °C입니다. 그 외에도 거리에 따라 ± 0.05 mm/m 정도 차이가 있을 수 있음을 고려해야 합니다.

B) 측정공구의 앞 모서리부터 측정할 경우, 표적물(예: 흰색으로 칠한 벽)의 반사율을 높게, 배경 조명을 강하게 조성해야 합니다. 작동 온도는 25 °C입니다. 그 외에도 거리에 따라 ± 0.15 mm/m 정도 차이가 있을 수 있음을 고려해야 합니다.

C) 0° 및 90°에서 사용자가 캘리브레이션한 후 ±0.01°/도 ~ 45°(최대) 정도의 경사 오류가 추가로 있을 수 있음을 고려해야 합니다. 측정공구의 좌측은 경사 측정을 위한 기준점 역할을 합니다.

D) 작동 온도 25 ℃

E) 연속 측정 기능의 경우 최고 작동 온도는 +40 °C입니다.

F) 비전도성 오염만 발생하지만, 가끔씩 이슬이 맺히면 임시로 전도성이 생기기도 합니다.

G) *블루투스*® 비활성화됨

H) *Bluetooth*® 저 에너지 기기의 경우, 모델과 작동 시스템에 따라 연결 구성이 불가능할 수 있습니다. *Bluetooth*® 기기가 GATT 프로필을 지원해야 합니다.

측정공구를 확실하게 구분할 수 있도록 타입 표시판에 일련 번호 (11) 가 적혀 있습니다.

블루투스® 인터페이스

다른 기기로의 데이터 전송

본 측정공구에는 *블루투스*® 모듈이 장착되어 있으며, 이 모듈은 무선 기술을 이용하여 *블루투스*® 인터페이스가 있는 특정한 모바일 단말기에 데이터를 전송합니다(예: 스마트폰, 태블릿).

블루투스® 연결에 필요한 시스템 전제조건에 관한 정보는 보쉬 인터넷 사이트 www.bosch-pt.com에서 확인할 수 있습니다.

▶ **보다 상세한 정보는 보쉬 제품 사이트에서 확인할 수 있습니다.**

블루투스® 를 이용하여 데이터를 전송할 경우 모바일 단말기와 측정공구 간에 시간 지연이 있을 수 있습니다. 이는 두 기기 간의 거리 때문일 수도 있고, 측정 대상 자체에 원인이 있을 수도 있습니다.

모바일 단말기로 데이터를 전송하기 위해 *블루투스®* 인터페이스 활성화

모바일 단말기에 있는 *블루투스®* 인터페이스가 활성화되었는지 확인하십시오.

버튼 **(1)** 을 눌러 *블루투스®* 메뉴를 불러온 후, 다시 버튼 **(1)** (또는 버튼 **(6) [+]**)을 눌러 *블루투스®* 인터페이스를 활성화시키십시오. 활성화된 여러 개의 측정공구 중에 일련 번호에 따라 적합한 것을 고르십시오. 일련 번호 **(11)** 는 측정공구의 타입 표시판에 적혀 있습니다. 연결 상태 및 활성화된 연결 **(b)** 은 측정공구의 상태 바 **(h)** 에 표시됩니다.

기능을 추가할 수 있도록 보쉬 앱이 제공됩니다. 단말기에 따라 해당 앱 스토어에서 다운받으실 수 있습니다.

***블루투스®* 인터페이스 비활성화**

버튼 **(1)** 을 눌러 *블루투스®* 메뉴를 불러온 후, 다시 버튼 **(1)** (또는 버튼 **(3) [–]**)을 눌러 *블루투스®* 인터페이스를 비활성화시키십시오.

조립

배터리 삽입하기/교환하기

측정공구 작동에는 알칼리 망간 배터리 또는 니켈 수소 배터리(특히 낮은 작동 온도에서)를 사용할 것을 권장합니다.

1.2 V 충전용 배터리를 사용할 경우 1.5 V 배터리를 사용할 때보다 용량에 따라 측정 가능 횟수가 줄어들 수 있습니다.

배터리 케이스 덮개 **(13)** 를 열려면 잠금쇠 **(12)** 를 누른 뒤 배터리 케이스 덮개를 빼냅니다. 배터리 또는 충전용 배터리를 끼웁니다. 이때 배터리 케이스 안쪽 면에 나온 표시대로 제대로 전극을 맞추어 끼우십시오.

배터리 또는 충전용 배터리의 충전상태가 낮은 경우 디스플레이에 배터리 절약 모드를 활성화할 것인지 묻는 메시지가 나타납니다. 배터리 절약 모드가 활성화되면 배터리 작동 시간이 늘어나고, 디스플레이에서 배터리 기호에 황색 테두리가 표시됩니다 (참조 „ “설정” 메뉴(그림 **B** 참조) “, 페이지 55).

비어 있는 배터리 기호가 처음 디스플레이에 나타난 경우, 적은 횟수의 측정만 가능합니다. 비어 있는 배터리 기호가 적색으로 깜박이는 경우, 더 이상 측정할 수 없습니다. 배터리나 재충전 배터리 팩을 교환하십시오.

항상 배터리나 충전용 배터리는 모두 동시에 교환해 주십시오. 한 제조사의 동일한 용량의 배터리나 충전용 배터리만을 사용하십시오.

▶ **측정공구를 장기간 사용하지 않을 경우에는 배터리 또는 충전용 배터리를 측정공구에서 분리하십시오**. 장기간 보관할 경우 배터리나 충전용 배터리가 부식되거나 저절로 방전될 수 있습니다.

작동

기계 시동

▶ **측정공구가 켜져 있는 상태에서 자리를 비우지 말고, 사용 후에는 측정공구의 스위치를 끄십시오.** 레이저빔으로 인해 다른 사람의 눈을 일시적으로 안 보이게 할 수 있습니다.

▶ **측정공구가 물에 젖거나 직사광선에 노출되지 않도록 하십시오.**

▶ **극한의 온도 또는 온도 변화가 심한 환경에 측정공구를 노출시키지 마십시오.** 예를 들어 장시간 차량 안에 측정공구를 두지 마십시오. 온도 변화가 심한 경우 측정공구를 작동시키기 전에 먼저 온도에 적응할 수 있게 하십시오. 극심한 온도에서나 온도 변화가 심한 환경에서 사용하면 측정공구의 정확도가 떨어질 수 있습니다.

▶ **측정공구가 외부와 세게 부딪히거나 떨어지지 않도록 주의하십시오.** 측정공구에 외부 영향이 심하게 가해진 후에는 계속 작업하기 전에 항상 정확도를 점검해야 합니다 (참조 „정확도 점검 및 경사 측정 보정(그림 **L** 참조) “, 페이지 63) 및 (참조 „거리 측정 정확도 점검 “, 페이지 63).

▶ **측정공구에는 무선 인터페이스가 장착되어 있습니다. 비행기나 병원 등 장소에 따른 제약에 주의하십시오.**

전원 스위치 작동

– 측정공구와 레이저의 **스위치를 켜려면** 측정 버튼 **(5)** [▲]을 짧게 누릅니다.

– 레이저 없는 측정공구의 **스위치를 켜려면** 전원/뒤로 가기 버튼 **(8)** [⏻]을 짧게 누릅니다.

▶ **레이저빔이 사람이나 동물에 향하지 않도록 하고, 먼 거리에서라도 레이저빔 안을 들여다 보지 마십시오.**

측정공구의 전원을 처음 켜면 디스플레이 사용 시 선호하는 언어를 설정하도록 요구합니다.

측정공구의 **전원을 끄려면** 전원/뒤로 가기 버튼 **(8)** [⏻]을 누르고 계십시오.

측정공구의 전원을 끄면 메모리에 저장된 값들과 장치 설정은 그대로 유지됩니다.

측정 과정

전원을 처음 켜면 측정공구는 길이 측정 기능에 위치합니다. 다시 전원을 켤 때마다 측정공구는 마지막으로 사용한 측정 기능에 있습니다. 다른 측정 기능을 사용하려면 버튼 **(2)** [**Func**]을 누르십시오. 버튼 **(6)** [**+**] 또는 버튼 **(3)** [**–**]을 눌러 원하는 측정 기능을 선택하십시오 측정 기능. 버튼 **(2)** [**Func**] 또는 측정 버튼 **(5)** [▲]을 눌러 측정 기능을 활성화시키십시오.

측정 기준 레벨의 경우 세 가지 설정이 제공됩니다 (참조 „기준 레벨 선택하기(그림 **A** 참조) “, 페이지 55).

측정공구를 원하는 측정 시작점(예: 벽)에 두십시오.

지침: 전원/뒤로 가기 버튼 **(8)** [⏻]을 눌러 측정공구를 켰으면 측정 버튼 **(5)** [▲]을 짧게 눌러 레이저를 켭니다.

측정을 위해 측정 버튼 **(5)** [▲]을 짧게 누릅니다. 그러면 레이저빔이 꺼집니다. 다시 측정하려면 상기 과정을 반복하십시오.

▶ **레이저빔이 사람이나 동물에 향하지 않도록 하고, 먼 거리에서라도 레이저빔 안을 들여다 보지 마십시오.**

지침: 측정값은 타입별로 0.5 초 내에, 늦어도 대략 4 초 후에 디스플레이됩니다. 측정 시간은 거리, 조명 상태 그리고 표적면의 반사 정도에 따라 좌우됩니다. 측정을 끝낸 뒤 레이저빔은 자동으로 꺼집니다.

기준 레벨 선택하기(그림 A 참조)

측정할 경우 세 가지의 다양한 기준 레벨 중에 선택할 수 있습니다:

– 측정공구의 뒷 모서리(예: 벽면에 설치할 경우),

– 측정공구의 앞 모서리(예: 책상 가장자리에서부터 측정할 경우),

– 나사부 **(14)** 의 중간(예: 삼각대를 이용하여 측정할 경우)

기준 레벨을 선택하려면 버튼 **(7)** [✲] 을 누르십시오. 그리고 나서 측정 버튼 **(5)** [▲] 또는 버튼 **(2)** [**Func**]을 눌러 “기준 레벨” 설정을 선택하십시오. 이후 버튼 **(6)** [**+**] 또는 버튼 **(3)** [**–**]을 눌러 원하는 기준 레벨을 선택하십시오. 측정공구의 전원을 켜면 항상 마지막으로 선택한 기준 레벨로 사전 설정되어 있습니다.

“설정” 메뉴(그림 B 참조)

“설정” **(j)** 메뉴로 가려면 셋업 버튼 **(7)** [✲]을 누르십시오.

버튼 **(6)** [**+**] 또는 버튼 **(3)** [**–**]을 눌러 원하는 설정 내역을 선택한 후 측정 버튼 **(5)** [▲] 또는 버튼 **(2)** [**Func**]을 눌러 승인하십시오.

버튼 **(6)** [**+**] 또는 버튼 **(3)** [**–**]을 눌러 원하는 설정 내역을 선택한 후 측정 버튼 **(5)** [▲] 또는 버튼 **(2)** [**Func**]을 눌러 승인하십시오.

메뉴 “설정” 에서 벗어나려면, 전원/뒤로 가기 버튼 **(8)** [ ]을 짧게 누르십시오.

음향 켜기/끄기

기본 설정에는 음향이 켜져 있습니다.

진동 켜기/끄기

기본 설정에는 진동이 켜져 있습니다.

측정공구의 진동은 시끄러운 환경 등에서 유용하게 사용할 수 있습니다. 짧게 두 번 진동하면 측정이 성공적으로 완료되었음을 알리고, 한 번 길게 진동하면 측정에 오류가 있음을 알립니다.

디스플레이 조명

디스플레이 조명은 계속 켜져 있습니다. 버튼을 누르지 않으면, 디스플레이 조명은 약 20 초 후 배터리/충전용 배터리 절약을 위해 어두워집니다.

배터리 절약 모드

기본 설정에는 배터리 절약 모드가 꺼져 있습니다. 배터리 절약 모드가 켜진 경우 음향과 진동이 비활성화되고, 디스플레이의 밝기가 어두워집니다. 이로 인해 배터리 작동 시간이 늘어납니다.

단위 변경하기 ft/m

기본 설정의 측정 단위는 "m" (미터)입니다. 6개의 다양한 단위가 제공됩니다. 목적에 맞는 단위를 설정하십시오.

언어 설정

측정공구의 전원을 처음 켜면 디스플레이 사용 시 선호하는 언어를 설정하도록 요구합니다.

설정한 언어는 언제든지 변경할 수 있습니다.

PRO360

첫 사용 시에는 활성화해야 합니다. 데이터는 해당 앱 또는 PC 프로그램을 통해서만 전송할 수 있습니다. 배터리 교체 후 PRO360을 다시 시작하려면 측정공구의 전원을 켜야 합니다. PRO360은 언제든지 다시 비활성화할 수 있습니다. PRO360에 대한 세부 정보는 www.pro360.com에서 확인할 수 있습니다.

장치 정보

여기에서는 일련 번호 및 소프트웨어 버전과 같은 측정공구 관련 정보를 확인할 수 있습니다.

초기 설정

이 기능은 측정공구를 초기 설정/기본 설정으로 리셋하는 역할을 합니다. 리셋하면 디스플레이 사용 시 선호하는 언어를 설정하도록 요구합니다.

측정 기능

도움말 기능(그림 C 참조)

측정 기능을 선택하려면 버튼 **(2)** [**Func**]을 누르십시오. 버튼 **(6)** [**+**] 또는 버튼 **(3)** [**–**]을 눌러 원하는 측정 기능을 선택하십시오.

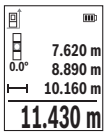
버튼 **(7)** [✲]을 눌러 도움말 기능을 시작하십시오. 도움말 기능은 선택한 측정 기능에 대한 세부적인 작업 절차를 알려줍니다.

길이 측정

길이 측정 ⊢ 을 선택하십시오.

레이저빔을 켜려면 측정 버튼 **(5)** [▲]을 짧게 누르십시오.

측정을 위해 측정 버튼 **(5)** [▲]을 짧게 누릅니다. 측정치가 디스플레이 하단에 나타납니다.



다시 측정할 때마다 상기 제시된 과정을 반복하십시오. 마지막 측정값이 디스플레이 하단에, 마지막에서 두 번째 측정값이 그 위에 차례로 표시됩니다.

연속 측정

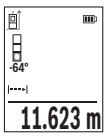
연속 측정 시 측정공구가 상대적으로 대상물을 향해 움직일 수 있으며, 측정값은 0.5초마다 업데이트됩니다. 예를 들어 벽면에서 원하는 간격까지 움직일 수 있으며, 현재 거리는 항상 판독 가능합니다.

연속 측정 ⊢⊢ 을 선택하십시오. 다음 기능 중 하나를 선택하십시오:

- min/max: 디스플레이에 최소 측정값 및 최대 측정값이 표시됩니다(그림 **I** 참조).
- 큰 숫자: 측정값이 더 잘 보이도록 확대하여 표시합니다(그림 **J** 참조).
- 줄자: 줄자의 경우 눈에 보이는 거리가 표시됩니다(그림 **K** 참조). **지침:** 줄자 기능에서 표시된 부분까지의 간격이 디스플레이에 표시됩니다. 측정공구의 모서리는 기준점이 **아닙니다**.

레이저빔을 켜려면 측정 버튼 **(5)** [▲]을 짧게 누르십시오.

디스플레이 하단에 원하는 거리값이 보일 때까지 측정공구를 계속 움직입니다.

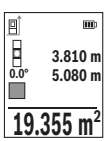


측정 버튼 **(5)** [▲]을 짧게 누르면 연속 측정이 중단됩니다. 디스플레이 하단에 현재 측정값이 표시됩니다. 측정 버튼 **(5)** [▲]을 다시 누르면 연속 측정이 새로 시작됩니다. 4분이 지나면 자동으로 연속 측정이 꺼집니다.

면적 측정

면적 측정 ▭ 을 선택하십시오.

이어서 길이 측정 시와 같이 폭 및 길이를 연속으로 측정하십시오. 두 측정을 하는 동안 레이저빔이 계속 켜져 있습니다. 측정해야 할 구간이 면적 측정용 표시기 ▭ 에서 깜박입니다.



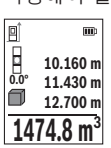
첫 번째 측정값이 디스플레이 상단에 표시됩니다.

두 번째 측정을 하고나면 면적이 자동으로 계산되어 나타납니다. 최종 결과가 디스플레이 하단에, 개별 측정값이 그 위에 표시됩니다.

체적 측정

체적 측정 ⬚ 을 선택하십시오.

이어서 길이 측정 시와 같이 폭, 길이 그리고 깊이를 연속으로 측정하십시오. 세 가지 측정이 이루어지는 사이에 레이저빔은 켜진 상태로 유지됩니다. 측정해야 할 구간이 체적 측정용 표시기 ⬚ 에서 깜박입니다.



첫 번째 측정값이 디스플레이 상단에 표시됩니다.

세번째 측정을 하고나면 체적이 자동으로 계산되어 나타납니다. 최종 결과가 디스플레이 하단에, 개별 측정값이 그 위에 표시됩니다.

간접 거리 측정

간접 거리 측정의 경우 각각 다양한 구간을 측정할 수 있는 세가지 측정 기능이 있습니다.

간접 거리 측정 기능은 장애물이 있어 레이저빔 측정이 불가능하거나 표적면을 반사체로 이용할 수 없어 거리를 직접 측정할 수 없을 경우 사용할 수 있습니다. 이 측정방법은 수직 방향으로만 사용할 수 있습니다. 수평 방향으로 사용하면 측정 오류가 발생할 수 있습니다.

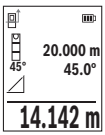
지침: 간접적인 거리 측정은 항상 직접적인 거리 측정보다 정확도가 떨어집니다. 측정 오류는 사용에 따라 직접적인 거리 측정 시보다 점점 더 커집니다. 측정 정확도를 높이기 위해 삼각대(부속품)를 사용하면 좋습니다.

개별 측정을 하는 동안 레이저빔은 켜져 있습니다.

a) 간접 높이 측정(그림 D 참조)

간접 높이 측정 ◿ 을 선택하십시오.

이때 측정공구가 아래 측정점과 동일한 위치에 있도록 해야 합니다. 그리고 나서 측정공구를 기준면 둘레에 기울이고 거리 측정할 때와 같이 구간 **"1"** (디스플레이에 붉은색 라인으로 표시됨)을 측정하십시오.



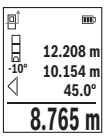
측정을 마치고 나면 구하려는 구간 **"X"**가 결과 표시열 **(e)** 에 표시됩니다. 구간 **"1"**에 대한 측정치 및 각도 **"α"**는 측정치 표시열 **(d)** 에 표시됩니다.

b) 이중 간접 높이 측정(그림 E 참조)

측정공구를 통해 측정공구의 수직면에 놓인 모든 구간을 간접적으로 측정할 수 있습니다.

이중 간접 높이 측정 ◺ 을 선택하십시오.

길이 측정할 때와 같이 구간 **"1"** 및 **"2"**를 순서대로 측정하십시오.



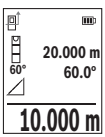
측정을 마치고 나면 구하려는 구간 **"X"**가 결과 표시열 **(e)** 에 표시됩니다. 구간 **"1"**, **"2"**에 대한 측정치 및 각도 **"α"**는 측정치 표시열 **(d)** 에 표시됩니다.

이때 측정 기준점(측정공구의 뒷 모서리 등)이 측정 과정 중 모든 개별 측정 시에 정확히 동일한 위치에 있어야 합니다.

c) 간접 길이 측정(그림 F 참조)

간접 길이 측정 ◿ 을 선택하십시오.

이때 측정공구가 구하려는 측정점과 동일한 높이에 있도록 해야 합니다. 그리고 나서 측정공구를 기준면 둘레에 기울이고 길이 측정할 때와 같이 구간 **"1"** 을 측정하십시오.



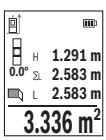
측정을 마치고 나면 구하려는 구간 **"X"**가 결과 표시열 **(e)** 에 표시됩니다. 구간 **"1"**에 대한 측정치 및 각도 **"α"**는 측정치 표시열 **(d)** 에 표시됩니다.

벽 면적 측정(그림 G 참조)

벽 면적 측정은 높이가 동일한 여러 단면적의 합한 값을 구하는데 사용할 수 있습니다. 제시된 예시에서는 공간의 높이 **H**는 같지만, 길이 **L**이 서로 다른 여러 벽의 전체 면적을 산출해야 합니다.

벽 면적 측정 을 선택하십시오.

길이 측정할 때와 같이 공간 높이 **H**를 측정하십시오. 상단 측정값행에 해당 측정값이 표시됩니다. 레이저는 켜진 상태입니다.



그리고 나서 첫 번째 벽의 길이 L_1을 측정하십시오. 면적이 자동으로 계산되어 결과 표시열 **(e)** 에 표시됩니다. 마지막 길이 측정값은 하단 측정치 표시열 **(d)** 에 표시됩니다. 레이저는 켜진 상태입니다.

이제 두 번째 벽의 길이 L_2를 측정하십시오. 측정치 표시열 **(d)** 에 표시된 개별 측정값은 길이 L_1 에 합산됩니다. 두 길이를 합한 값(중간 측정치 표시열 **(d)** 에 표시)에 저장된 높이 **H**가 곱해집니다. 결과 표시열 **(e)** 에 전체 면적 측정값이 표시됩니다.

임의로 여러 개의 다른 길이 L_X를 측정할 수 있으며, 측정된 값은 자동으로 합산되고 높이 **H**와 곱하여 계산됩니다. 정확하게 면적을 산출하려면 첫 번째로 측정한 길이(예시에서는 공간 높이 **H**)가 모든 측정 부분에서 동일해야 합니다.

분리 기능(그림 H 참조)

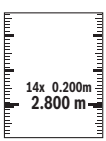
분리 기능을 통해 반복하여 정해진 길이(구간)를 측정합니다. 한 표면에서 정해진 길이 전송이 가능하며, 작업 소재를 동일한 길이로 절단하거나 건식 벽에 스터드 월을 설치할 때 등에 활용할 수 있습니다. 설정 가능한 최소 길이는 0.1 m이며, 최대 길이는 50 m입니다.

지침: 분리 기능에서 표시된 부분까지의 간격이 디스플레이에 표시됩니다. 측정공구의 모서리는 기준점이 **아닙니다**.

분리 기능 을 선택하십시오.

버튼 **(6)** [**+**] 또는 버튼 **(3)** [**–**] 을 눌러 원하는 길이를 설정하십시오.

측정 버튼 **(5)** [▲]을 눌러 시작한 후, 시작 지점에서 서서히 벗어나십시오.



측정공구는 계속해서 시작 지점과의 간격을 측정합니다. 이때 정의된 길이 및 현재 측정값이 표시됩니다. 하단 또는 상단의 화살표는 다음 표시 또는 마지막 표시와의 최소 거리 간격을 표시합니다.

좌측의 계수는 정의된 길이에 얼마나 도달했는지 알려줍니다. 녹색 측정값은 길이에 도달했음을 표시하기 위한 목적으로 나타납니다.

기준값이 디스플레이 영역을 벗어난 경우, 청색 측정값은 실제값을 나타냅니다.

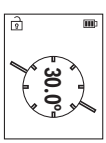
경사 측정/디지털 수준기

경사 측정/디지털 수준기 를 선택하십시오.

측정공구는 두 가지 상태 사이에서 자동으로 전환됩니다.

디지털 수준기는 (예를 들어 세탁기, 냉장고 등) 물체의 수평 또는 수직 방향을 점검하는 데 사용됩니다.

경사가 3°를 초과하면, 디스플레이의 구가 적색으로 점등됩니다.



경사 측정은 (예를 들어 계단, 난간, 가구를 들여올 때, 파이프를 배선할 때 등) 경사 또는 기울기를 측정하는 데 사용됩니다.

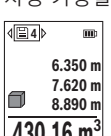
측정공구의 좌측은 경사 측정을 위한 기준점 역할을 합니다.

메모리값 표시기

측정이 종료될 때마다 해당 값 또는 최종 결과는 자동으로 저장됩니다.

최대 30개의 값(측정값 또는 최종 결과)을 불러올 수 있습니다.

저장 기능을 선택하십시오 [].



디스플레이 상단에 메모리 값의 번호가 표시되고, 하단에는 해당 메모리 값이 그리고 좌측에는 해당 측정 기능이 표시됩니다.

저장된 값들을 앞으로 넘기려면 버튼 **(6)** [**+**]을 누릅니다.

저장된 값들을 뒤로 넘기려면 버튼 **(3)** [**–**]을 누릅니다.

(제공되는 30개의 메모리 값 중에서) 가장 오래된 값은 메모리의 위치 1에, 마지막 값은 위치 30에 위치합니다. 다른 값을 저장하면 항상 메모리에서 가장 오래된 값이 삭제됩니다.

모든 이미지 삭제

개별 메모리값을 삭제하려면 이 값을 선택하십시오 (참조 „메모리값 표시기 “, 페이지 61). 삭제하려면 먼저 전원/뒤로 가기 버튼**(8)** [ ]을 누른 후 버튼 **(2)** [**Func**]을 눌러 승인하십시오.

전체 메모리 내용을 삭제하려면 버튼 **(7)** [✲]을 누른 후 기능 [🗎]을 선택하십시오. 이후 버튼 **(6)** [**+**] 을 누르고, 버튼 **(2)** [**Func**]을 눌러 승인하십시오.

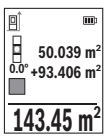
값 더하기/빼기

측정값 또는 최종 결과는 더하거나 뺄 수 있습니다.

값 더하기

다음과 같은 예시는 면적 더하는 방식을 설명합니다:

"면적 측정" 단락에 따라 면적을 산출하십시오 면적 측정.



버튼 **(6)** [**+**]을 누르십시오. 산출된 면적 및 기호 **"+"**가 표시됩니다.

다른 면적 측정을 시작하려면 다시 측정 버튼 **(5)** [▲]을 누르십시오. “면적 측정” 단락에 따라 면적을 산출하십시오 면적 측정. 두 번째 측정이 완료되면, 두 번째 면적 측정의 결과가 디스플레이 하단에 표시됩니다. 최종 결과를 나타내려면 다시 측정 버튼 **(5)** [▲]을 누르십시오.

지침: 길이 측정 시에는 결과가 즉시 표시됩니다.

합산에서 벗어나려면 버튼 **(2)** [**Func**]을 누르십시오.

값 빼기

값을 빼려면 버튼 **(3)** [**–**]을 누르십시오. 다른 작업 절차는 "값 더하기"와 동일하게 진행됩니다.

측정치 삭제하기

모든 측정 기능에서 전원/뒤로 가기 버튼 **(8)** [⟲]을 짧게 눌러서 마지막으로 측정된 값을 삭제할 수 있습니다. 전원/뒤로 가기 버튼 **(8)** [⟲]을 여러 차례 짧게 누르면 측정값들이 역순으로 삭제됩니다.

사용 방법

▶ **측정공구에는 무선 인터페이스가 장착되어 있습니다. 비행기나 병원 등 장소에 따른 제약에 주의하십시오.**

일반 사항

측정 시 수신 렌즈 **(15)**, 레이저빔 발사구 **(16)** 가 가려지지 않도록 하십시오.

연속 측정과 경사 측정 기능 시를 제외하고는 측정 중에 측정공구를 움직이면 안됩니다. 최대한 접촉면에 단단히 고정되도록 하십시오.

측정 범위에 미치는 영향

측정 범위는 조명 조건 및 표적면의 반사 정도에 따라 달라질 수 있습니다. 외부 광선이 강한 경우 레이저빔을 더 잘 알아볼 수 있도록 레이저 보안경 **(20)** (액세서리) 및 레이저 표적판 **(19)** (액세서리)을 사용하거나, 대상면을 어둡게 하십시오.

측정 결과에 미치는 영향

다양한 표면에 측정할 경우 물리적인 이유로 인해 측정 오류가 생길 수 있습니다. 예:

– 투명한 표면(예: 유리, 물)
– 반사 표면(예: 광택 처리된 금속, 유리)
– 기공 표면(예: 단열재)
– 구조화된 표면(예: 초벽칠, 천연 석재)

이러한 표면에는 필요에 따라 레이저 표적판 **(19)** (액세서리)을 사용하십시오.

표적면에 비스듬히 조준한 경우 측정 오류가 생길 수 있습니다.

또한 공기층의 온도가 상이하거나 혹은 간접적인 반사가 이루어진 경우에도 측정 결과에 지장이 있을 수 있습니다.

정확도 점검 및 경사 측정 보정(그림 L 참조)

경사 측정의 정확도를 정기적으로 검사하십시오. 이는 역측정으로 이루어집니다. 우선 측정공구를 책상 위에 놓고 그 경사를 측정합니다. 측정공구를 180° 돌린 후 다시 경사를 측정합니다. 표시된 숫자의 편차가 최대 0.3° 이하여야 합니다.

편차가 클 경우 측정공구를 새로 재보정해야 합니다. 이를 위해 설정에서 을 선택하십시오. 디스플레이에 나온 지시대로 따르십시오.

심한 온도 변화를 겪었거나 충격을 받은 경우, 측정공구의 정확도를 점검해 본 후 필요에 따라 보정하기를 권장합니다. 온도 변화 후 측정공구를 보정하기 전에, 일정 시간동안 측정공구가 온도에 적응할 수 있도록 해야 합니다.

거리 측정 정확도 점검

측정공구의 정확도는 다음과 같이 점검할 수 있습니다.

– 길이가 정확히 알려져 있는 약 3 m에서 10 m 사이의 장기간 변화하지 않는 측정 구간을 선택하십시오(예: 공간 폭이나 문 크기 등). 측정은 적절한 조건 하에서 이루어져야 합니다. 즉, 측정 구간이 실내 공간에 위치해야 하며 측정 대상면은 매끄럽고 잘 반사되어야 합니다.
– 해당 구간을 10회 연속으로 측정하십시오.

적절한 조건 하의 전체 측정 구간에서 평균값과 개별 측정에서 나타나는 편차는 최대 ±4 mm 정도 되어야 합니다. 측정한 내용을 기록하여 차후에 정확도를 비교해볼 수 있습니다.

삼각대(액세서리)를 이용해 작업하기

특히 먼거리를 측정할 때 삼각대를 사용하는 것이 필요합니다. 1/4" 나사부 **(14)** 와 함께 측정공구를 삼각대 **(21)** 의 순간 교환 플레이트 혹은 일반 카메라 삼각대 위에 놓습니다. 그리고 나서 이를 순간 교환 플레이트의 고정 나사를 사용하여 고정하십시오.

설정에서 측정을 위한 기준 레벨을 설정하십시오 (참조 „기준 레벨 선택하기(그림 **A** 참조) “, 페이지 55).

벨트 클립(액세서리)(그림 M 참조)

벨트 클립 **(17)** 을 이용해 측정공구를 벨트에 걸어 편리하게 사용할 수 있습니다.

오류 메시지

측정을 정확하게 실행할 수 없는 경우, 디스플레이에 오류 메시지 “Error” 가 표시됩니다. 측정을 다시 시작하십시오.

본 측정공구는 측정할 때마다 제대로 작동하는지 감시합니다. 결함이 확인되면, 디스플레이에는 옆에 있는 기호만 표시되고, 측정공구가 꺼집니다. 이 경우 딜러를 통해 보쉬 서비스 센터에 측정공구를 보내십시오.

보수 정비 및 서비스

보수 정비 및 유지

반드시 측정공구를 함께 공급된 안전 케이스 **(23)** 에 넣어 보관하고 운반하십시오.

항상 측정공구를 깨끗이 유지하십시오.

측정공구를 물이나 다른 액체에 넣지 마십시오.

물기있는 부드러운 천으로 오염된 부위를 깨끗이 닦으십시오. 세척제 또는 용제를 사용하지 마십시오.

특히 수신 렌즈 **(15)** 는 안경이나 카메라 렌즈를 다루듯이 조심스럽게 관리하십시오.

수리하는 경우 측정공구를 안전 케이스 **(23)** 에 넣어 보내주십시오.

AS 센터 및 사용 문의

AS 센터에서는 귀하 제품의 수리 및 보수정비, 그리고 부품에 관한 문의를 받고 있습니다. 대체 부품에 관한 분해 조립도 및 정보는 인터넷에서도 찾아 볼 수 있습니다 - **www.bosch-pt.com**
보쉬 사용 문의 팀에서는 보쉬의 제품 및 해당 액세서리에 관한 질문에 기꺼이 답변 드릴 것입니다.
문의나 대체 부품 주문 시에는 반드시 제품 네임 플레이트에 있는 10자리의 부품번호를 알려 주십시오.
콜센터
080-955-0909

다른 AS 센터 주소는 아래 사이트에서 확인할 수 있습니다:
www.bosch-pt.com/serviceaddresses

ไทย

กฎระเบียบเพื่อความปลอดภัย

ส่งเครื่องมือวัดให้ช่างผู้เชี่ยวชาญตรวจซ่อมและใช้อะไหล่เปลี่ยนของแท้เท่านั้น หากไม่ใช้เครื่องมือวัดตามคำแนะนำเหล่านี้ ระบบป้องกันเบ็ดเสร็จในเครื่องมือวัดอาจได้รับผลกระทบ อย่าทำให้ป้ายเตือนที่อยู่บนเครื่องมือวัดนี้ลบเลือน เก็บรักษาคำแนะนำเหล่านี้ไว้ให้ดี และหากเครื่องมือวัดนี้ถูกส่งต่อไปยังผู้อื่น ให้ส่งมอบคำแนะนำเหล่านี้ไปด้วย

- ▶ **ข้อควรระวัง - การใช้อุปกรณ์ทำงานหรืออุปกรณ์ปรับเปลี่ยนอื่นๆ นอกเหนือไปจากที่ระบุไว้ในที่นี้ หรือการใช้วิธีการอื่นๆ อาจนำไปสู่การสัมผัสกับรังสีอันตรายได้**
- ▶ **เครื่องมือวัดนี้จัดส่งมาพร้อมป้ายเตือนแสงเลเซอร์ (แสดงในหน้าภาพประกอบของเครื่องมือวัด)**
- ▶ **หากข้อความของป้ายเตือนแสงเลเซอร์ไม่ได้เป็นภาษาของท่าน ให้ติดสติกเกอร์ที่จัดส่งมาที่พิมพ์เป็นภาษาของท่านทับลงบนข้อความก่อนใช้งานครั้งแรก**

อย่าเล็งลำแสงเลเซอร์ไปยังคนหรือสัตว์ และตัวท่านเองอย่าจ้องมองเข้าในลำแสงเลเซอร์โดยตรงหรือลำแสงเลเซอร์สะท้อน การกระทำดังกล่าวอาจทำให้คนตาพร่า ทำให้เกิดอุบัติเหตุ หรือทำให้ดวงตาเสียหายได้

- ▶ **ถ้าแสงเลเซอร์เข้าตา ต้องปิดตาและหันศีรษะออกจากลำแสงในทันที**
- ▶ **อย่าทำการเปลี่ยนแปลงใดๆ ที่อุปกรณ์เลเซอร์**
- ▶ **อย่าใช้แว่นสำหรับมองแสงเลเซอร์ (อุปกรณ์เสริม) เป็นแว่นนิรภัย** แว่นสำหรับมองแสงเลเซอร์ใช้สำหรับมองลำแสงเลเซอร์ให้เห็นชัดเจนยิ่งขึ้น แต่ไม่ได้ช่วยป้องกันรังสีเลเซอร์
- ▶ **อย่าใช้แว่นสำหรับมองแสงเลเซอร์ (อุปกรณ์เสริม) เป็นแว่นกันแดดหรือใส่ขับรถยนต์** แว่นสำหรับมองแสงเลเซอร์ไม่สามารถป้องกันรังสีอัลตราไวโอเลต (UV) ได้อย่างสมบูรณ์ และยังลดความสามารถในการมองเห็นสี
- ▶ **ส่งเครื่องมือวัดให้ช่างผู้เชี่ยวชาญตรวจซ่อมและใช้อะไหล่เปลี่ยนของแท้เท่านั้น** ทั้งนี้เพื่อให้มั่นใจได้ว่าจะสามารถใช้งานเครื่องมือวัดได้อย่างปลอดภัยเสมอ
- ▶ **อย่าให้เด็กใช้เครื่องมือวัดด้วยเลเซอร์โดยไม่ควบคุมดูแล** เด็กๆ อาจทำให้บุคคลอื่นหรือตนเองตาพร่าโดยไม่ตั้งใจ
- ▶ **อย่าใช้เครื่องมือวัดในสภาพแวดล้อมที่เสี่ยงต่อการระเบิด ซึ่งเป็นที่ที่มีของเหลวแก๊ซ หรือฝุ่นที่ติดไฟได้** ในเครื่องมือวัดสามารถเกิดประกายไฟซึ่งอาจจุดฝุ่นละอองหรือไอระเหยให้ติดไฟได้
- ▶ **ระวัง! การใช้เครื่องมือวัดกับ *Bluetooth*® อาจรบกวนอุปกรณ์และระบบอื่นๆ เครื่องบิน และอุปกรณ์ทางการแพทย์ (ต. ย. เช่น เครื่องกระตุ้นหัวใจ เครื่องช่วยฟัง) นอกจากนี้ยังอาจเกิดความเสียหายต่อคนและสัตว์ในบริเวณใกล้เคียงด้วย อย่าใช้เครื่องมือวัดกับ *Bluetooth*® ใกล้ๆ อุปกรณ์ทางการแพทย์ สถานีบริการน้ำมัน โรงงานเคมี พื้นที่ที่เสี่ยงต่อการระเบิด และในพื้นที่ทำการระเบิด อย่าใช้เครื่องมือวัดกับ *Bluetooth*® ในเครื่องบิน หลีกเลี่ยงการทำงานเป็นระยะเวลานานตรงบริเวณใกล้ร่างกายโดยตรง**

เครื่องหมายข้อความ *Bluetooth*® และยี่ห้อเป็นเครื่องหมายการค้าจดทะเบียนและเป็นกรรมสิทธิ์ของ Bluetooth SIG, Inc. บริษัท Robert Bosch Power Tools GmbH ได้รับใบอนุญาตใช้งานเครื่องหมายข้อความ/โลโก้ดังกล่าว

รายละเอียดผลิตภัณฑ์และข้อมูลจำเพาะ

ประโยชน์การใช้งาน

เครื่องมือวัดนี้ใช้สำหรับวัดระยะทาง ความยาว ความสูง ช่องว่าง ความลาดชัน และสำหรับคำนวณพื้นที่และปริมาตร

เครื่องมือวัดนี้เหมาะสำหรับใช้ภายในอาคาร

ผลจากการวัดสามารถถ่ายโอนไปยังอุปกรณ์อื่นๆ ผ่าน *Bluetooth®*

ส่วนประกอบผลิตภัณฑ์

ลำดับเลขของส่วนประกอบอ้างถึงส่วนประกอบของเครื่องมือวัดที่แสดงในหน้าภาพประกอบ

(1) ปุ่ม *Bluetooth®*

(2) ปุ่มฟังก์ชั่น [**Func**]

(3) ปุ่มลบ/ซ้าย [**–**]

(4) จอแสดงผล

(5) ปุ่มวัด [**▲**]

(6) ปุ่มบวก/ขวา [**+**]

(7) ปุ่มการตั้งค่าพื้นฐาน [**⚙**]

(8) ปุ่มเปิด/ปิด/ย้อนกลับ [⏻]

(9) ห่วงสำหรับสายคล้อ[a)]

(10) ป้ายเตือนแสงเลเซอร์

(11) หมายเลขเครื่อง

(12) ตัวล็อคฝาช่องใส่แบตเตอรี่

(13) ฝาช่องใส่แบตเตอรี่

(14) เกลียวขาตั้งแบบสามขา 1/4"

(15) เลนส์รับแสง

(16) ทางออกลำแสงเลเซอร์

(17) คลิปหนีบเข็มขัด[a)]

(18) สกรู[a)] สำหรับคลิปหนีบเข็มขัด[a)]

(19) แผ่นเป้าหมายเลเซอร์[a)]

(20) แว่นตาสำหรับมองแสงเลเซอร์[a)]

(21) ขาตั้งแบบสามขา[a)]

(22) สายหิ้ว[a)]

(23) กระเป๋าใส่เครื่องมือวัด

a) **อุปกรณ์ประกอบที่แสดงภาพหรืออธิบายไม่รวมอยู่ในการจัดส่งมาตรฐาน กรุณาดูอุปกรณ์ประกอบทั้งหมดในรายการแสดงอุปกรณ์ประกอบของเรา**

ส่วนประกอบการแสดงผล (เลือก)

(a) ระนาบอ้างอิงของการวัด

(b) สถานะการเชื่อมต่อ

 Bluetooth® ถูกเรียกใช้งาน ไม่มีการเชื่อมต่อ

 Bluetooth® ถูกเรียกใช้งาน มีการเชื่อมต่อ

(c) ไฟแสดงสถานะแบตเตอรี่

(d) บรรทัดแสดงค่าจากการวัด

(e) บรรทัดผลลัพธ์

(f) ฟังก์ชั่นการวัด

(g) สัญลักษณ์ มุมเอียง

(h) แถบสถานะ

(i) หน้าจอแสดงผลฟังก์ชั่นการวัด

(j) หน้าจอแสดงผลการตั้งค่าพื้นฐาน

(k) หน้าจอแสดงผลการตั้งค่าพื้นฐาน

ข้อมูลทางเทคนิค

เครื่องวัดระยะด้วยเลเซอร์แบบดิจิตอล	GLM 50-27 CG
หมายเลขสินค้า	**3 601 K72 U..**
การวัดระยะ	
ขอบเขตการวัด	0.05–50 ม.[A)]
ช่วงการวัด (สภาวะที่ไม่เหมาะสม)	0.05–20 ม.[B)]
ความแม่นยำการวัด	± 1.5 มม.[A)]
ความแม่นยำการวัด (สภาวะที่ไม่เหมาะสม)	± 3.0 มม.[B)]
หน่วยแสดงการวัดต่ำสุด	0.5 มม.
การวัดระยะทางอ้อมและระดับน้ำ	
ขอบเขตการวัด	0°–360° (4 x 90°)
การวัดความลาดชัน	
ขอบเขตการวัด	0°–360° (4 x 90°)
ความแม่นยำการวัด (ปกติ)	± 0.2°[C)D)]
หน่วยแสดงการวัดต่ำสุด	0.1°
ทั่วไป	
อุณหภูมิใช้งาน	−10 °C ... +45 °C[E)]
อุณหภูมิเก็บรักษา	−20 °C ... +70 °C
ความชื้นสัมพัทธ์ สูงสุด	90 %
ความสูงใช้งานเหนือระดับอ้างอิง สูงสุด	2000 ม.
ระดับมลพิษตาม IEC 61010-1	2[F)]
ระดับเลเซอร์	2
ชนิดเลเซอร์	515 นาโนเมตร, < 1 มิลลิวัตต์

เครื่องวัดระยะด้วยเลเซอร์แบบดิจิตอล	GLM 50-27 CG
ความแตกต่างของลำแสงเลเซอร์	< 1.5 mrad (มุมเต็ม)
ระบบปิดสวิทช์อัตโนมัติ ภายในประมาณ	
– เลเซอร์	20 วินาที
– เครื่องมือวัด (เมื่อไม่มีการวัด)	5 นาที[G)]
น้ำหนักตามระเบียบการ EPTA-Procedure 01:2014	0.17 กก.
ขนาด	119 x 53 x 29 มม.
ระดับการคุ้มกัน	IP 65 (ป้องกันฝุ่นและน้ำกระเซ็น)
แบตเตอรี่	2 x 1.5 V LR6 (AA)
การตั้งค่าหน่วยของการวัด	เมตร, ฟุต, นิ้ว
การถ่ายโอนข้อมูล	
Bluetooth®	*Bluetooth*® (4.2 low-energy)[H)]
ย่านความถี่ใช้งาน	2402–2480 เมกะเฮิรตซ์

เครื่องวัดระยะด้วยเลเซอร์แบบดิจิตอล	GLM 50-27 CG
กำลังส่ง สูงสุด	8 มิลลิวัตต์

A) สำหรับการวัดจากขอบหน้าของเครื่องมือวัด ใช้ได้กับเป้าหมายที่มีการสะท้อนแสงมาก (ต. ย. เช่น ผนังทาสีขาว) แสงไฟพื้นหลังอ่อน และอุณหภูมิใช้งาน 25 °C นอกจากนี้ต้องนำส่วนเบี่ยงเบน ± 0.05 มม./ม. โดยขึ้นอยู่กับระยะห่างมาพิจารณาด้วย

B) สำหรับการวัดจากขอบหน้าของเครื่องมือวัด ใช้ได้กับเป้าหมายที่มีการสะท้อนแสงมาก (ต. ย. เช่น ผนังทาสีขาว) แสงไฟพื้นหลังเข้ม และอุณหภูมิใช้งาน 25 °C นอกจากนี้ต้องนำส่วนเบี่ยงเบน ± 0.15 มม./ม. โดยขึ้นอยู่กับระยะห่างมาพิจารณาด้วย

C) หลังการสอบเทียบของผู้ใช้งานที่ 0° และ 90° ต้องนำข้อผิดพลาดความชั่นเพิ่มเติมจาก ±0.01°/องศาถึง 45° (สูงสุด) มาพิจารณา สำหรับการวัดความลาดชัน ให้ใช้ด้านซ้ายของเครื่องมือวัดเป็นระนาบอ้างอิง

D) ที่อุณหภูมิใช้งาน 25 °C

E) ในฟังก์ชันการวัดต่อเนื่องอุณหภูมิใช้งานสูงสุดคือ +40 °C

F) เกิดขึ้นเฉพาะมลพิษที่ไม่นำไฟฟ้า ยกเว้นบางครั้งนำไฟฟ้าได้ชั่วคราวที่มีสาเหตุจากการกลั่นตัวที่ได้คาดว่าจะเกิดขึ้น

G) *Bluetooth*® ปิดใช้งานอยู่

H) สำหรับอุปกรณ์ *Bluetooth*® Low Energy อาจไม่มีการเชื่อมต่อ ทั้งนี้ขึ้นอยู่กับรุ่นและระบบปฏิบัติการ อุปกรณ์ *Bluetooth*® ต้องสนับสนุน GATT-Profile

หมายเลขเครื่อง **(11)** บนแผ่นป้ายรุ่นสามารถระบุเครื่องมือวัดของท่านได้อย่างชัดเจน

Bluetooth®-อินเตอร์เฟส

การถ่ายทอดข้อมูลไปยังอุปกรณ์อื่นๆ

เครื่องมือวัดนี้ติดตั้งโมดูล *Bluetooth*® ที่ช่วยถ่ายทอดข้อมูลด้วยเทคโนโลยีคลื่นวิทยุสำหรับเชื่อมโยงสื่อสารแบบไร้สายไปยังอุปกรณ์เคลื่อนที่ปลายทางบางอย่างที่มี *Bluetooth*® (เช่น สมาร์ทโฟน แท็บเล็ต)

กรุณาค้นหาข้อมูลเกี่ยวกับความต้องการของระบบที่จำเป็นสำหรับการเชื่อมต่อ *Bluetooth*® ได้ที่เว็บไซต์ของ บ๊อช www.bosch-pt.com

▶ **สำหรับข้อมูลเพิ่มเติม กรุณาดูหน้าผลิตภัณฑ์ของ บ๊อช**

ในระหว่างการถ่ายทอดข้อมูลผ่านทาง *Bluetooth*® อาจเกิดความล่าช้าในการแพร่สัญญาณระหว่างอุปกรณ์เคลื่อนที่ปลายทางและเครื่องมือวัด ทั้งนี้ขึ้นอยู่กับระยะห่างระหว่างอุปกรณ์ที่สื่อสารข้อมูลหรือวัตถุที่จะวัด

การเรียกใช้งาน *Bluetooth*®-อินเตอร์เฟสเพื่อถ่ายทอดข้อมูลไปยังอุปกรณ์เคลื่อนที่ปลายทาง

ตรวจสอบให้แน่ใจว่า อินเตอร์เฟส *Bluetooth*® เฟสที่อุปกรณ์เคลื่อนที่ปลายทางของท่านถูกเรียกใช้งาน

กดปุ่ม **(1)** เพื่อเรียกเมนู *Bluetooth*® และกดปุ่ม **(1)** (หรือปุ่ม **(6) [+]**) ใหม่อีกครั้งเพื่อเปิดใช้งานอินเตอร์เฟส *Bluetooth*® ถ้าพบเครื่องมือวัดที่ทำงานอยู่หลายเครื่อง ให้เลือกเครื่องมือวัดที่เหมาะสมโดยดูจากหมายเลขเครื่อง ท่านสามารถค้นหาหมายเลขเครื่อง **(11)** จากแผ่นป้ายรุ่นของเครื่องมือวัดของท่าน สถานะการเชื่อมต่อและการเชื่อมต่อที่ใช้งานอยู่ **(b)** จะปรากฏบนจอแสดงผล **(h)** ของเครื่องมือวัด

Bosch-Apps พร้อมใช้งานเพื่อขยายขอบเขตการทำงาน คุณสามารถดาวน์โหลดได้จาก App Stores ทั้งนี้ขึ้นอยู่กับอุปกรณ์

การปิดการเรียกใช้งาน *Bluetooth*®-อินเตอร์เฟส

กดปุ่ม **(1)** เพื่อเรียกเมนู *Bluetooth*® และกดปุ่ม **(1)** (หรือปุ่ม **(3) [–]**) ใหม่อีกครั้งเพื่อเปิดใช้งานอินเตอร์เฟส *Bluetooth*®

การติดตั้ง

การใส่/การเปลี่ยนแบตเตอรี่

ขอแนะนำให้ใช้แบตเตอรี่อัลคาไลน์-แมงกานีสหรือแบตเตอรี่ที่ไม่ใช่อัลคาไลน์-แมงกานีสสำหรับการทำงานของเครื่องมือวัด (โดยเฉพาะอย่างยิ่งในอุณหภูมิการทำงานต่ำ)

แบตเตอรี่แพ็ค 1.2 โวลท์ จะวัดได้น้อยกว่าแบตเตอรี่ 1.5 โวลท์ ทั้งนี้ขึ้นอยู่กับความจุของแบตเตอรี่

เมื่อต้องการเปิดฝาช่องใส่แบตเตอรี่ **(13)** ให้กดตัวล็อค **(12)** และถอดฝาช่องใส่แบตเตอรี่ออก ใส่แบตเตอรี่หรือแบตเตอรี่แพ็คเข้าไป ขณะใส่แบตเตอรี่ต้องดูให้ขั้วแบตเตอรี่อยู่ในตำแหน่งที่ถูกต้องตามที่กำหนดไว้ที่ด้านในช่องใส่แบตเตอรี่

หากแบตเตอรี่หรือแบตเตอรี่แพ็คมีประจุคงเหลือน้อยข้อความถามเพื่อเปิดใช้งานโหมดประหยัดแบตเตอรี่จะปรากฏบนหน้าจอ ในโหมดประหยัดแบตเตอรี่ อายุการใช้งานแบตเตอรี่จะขยายออกไปและสัญลักษณ์แบตเตอรี่ในจอแสดงผลจะเป็นสีเหลือง (ดู "เมนู "การตั้งค่า" (ดูภาพประกอบ **B**)", หน้า 75)

หากสัญลักษณ์แบตเตอรี่ที่ว่างเปล่าปรากฏบนจอแสดงผลเป็นครั้งแรก ยังสามารถวัดได้อีกประมาณไม่กี่ครั้งเท่านั้น หากสัญลักษณ์แบตเตอรี่ว่างเปล่าและกะพริบสีแดง ท่านไม่สามารถทำการวัดได้อีกต่อไป ให้เปลี่ยนแบตเตอรี่หรือแบตเตอรี่แพ็ค

เปลี่ยนแบตเตอรี่หรือแบตเตอรี่แพ็คทุกก้อนพร้อมกันเสมอ ใช้เฉพาะแบตเตอรี่หรือแบตเตอรี่แพ็คของผู้ผลิตเดียวกันและมีความจุเท่ากัน

- ▶ **เมื่อไม่ใช้งานเป็นเวลานาน ให้ถอดแบตเตอรี่หรือแบตเตอรี่แพ็คออกจากเครื่องมือวัด**เมื่อเก็บเป็นเวลานาน แบตเตอรี่หรือแบตเตอรี่แพ็คจะเกิดการกัดกร่อนและคายประจุไฟออกมาเอง

การปฏิบัติงาน

การเริ่มต้นปฏิบัติงาน

- ▶ **อย่าวางเครื่องมือวัดที่เปิดสวิทช์ทิ้งไว้โดยไม่มีผู้ดูแลและปิดสวิทช์เครื่องมือวัดเมื่อเลิกใช้งาน** คนอื่นอาจตาพร่าจากแสงเลเซอร์ได้
- ▶ **ป้องกันไม่ให้เครื่องมือวัดได้รับความชื้นและโดนแสงแดดส่องโดยตรง**
- ▶ **อย่าให้เครื่องมือวัดได้รับอุณหภูมิที่สูงมาก หรือรับอุณหภูมิที่เปลี่ยนแปลงมาก** ต. ย. เช่น อย่าปล่อยเครื่องไว้ในรถยนต์เป็นเวลานาน ในกรณีที่อุณหภูมิมีการเปลี่ยนแปลงมาก ต้องปล่อยให้เครื่องมือวัดปรับตัวเข้ากับอุณหภูมิรอบด้านก่อนใช้งาน ในกรณีที่ได้รับอุณหภูมิที่สูงมากหรือรับอุณหภูมิที่เปลี่ยนแปลงมาก เครื่องมือวัดอาจมีความแม่นยำน้อยลง
- ▶ **หลีกเลี่ยงอย่าให้เครื่องมือวัดตกหล่นหรือถูกกระทบอย่างรุนแรง** เมื่อเครื่องมือวัดถูกกระทบจากภายนอกอย่างแรง ท่านควรตรวจสอบความแม่นยำทุกครั้งก่อนนำไปใช้งานต่อ (ดู "การตรวจสอบความแม่นยำและการสอบเทียบของการวัดความลาดชัน (ดูภาพประกอบ **L**)", หน้า 84) และ (ดู "การตรวจสอบความแม่นยำของการวัดระยะทาง", หน้า 85)ที่อยู่ด้านหน้าหรือด้านข้างสั้นๆ

▶ **เครื่องมือวัดมีอินเตอร์เฟสคลื่นวิทยุสำหรับเชื่อมโยงสื่อสารแบบไร้สาย ต้องปฏิบัติตามข้อจำกัดการทำงานในพื้นที่ ต. ย. เช่น ในเครื่องบิน หรือโรงพยาบาล**

การเปิด-ปิดเครื่อง

– เมื่อต้องการ**เปิดสวิทช์**เครื่องมือวัดและเลเซอร์ให้กดปุ่มวัด **(5)** [▲] สั้นๆ

– เมื่อต้องการ**เปิดสวิทช์** เครื่องมือวัดโดยไม่เปิดเลเซอร์ให้กดปุ่มเปิด-ปิด**(8)** [⏻] สั้นๆ

▶ **อย่าส่องลำแสงเลเซอร์ไปยังคนหรือสัตว์ และอย่าจ้องมองลำแสงเลเซอร์แม้จะอยู่ในระยะไกล**

เมื่อคุณเปิดเครื่องมือวัดเป็นครั้งแรก คุณจะได้รับแจ้งให้ตั้งค่าภาษาที่คุณต้องการสำหรับข้อความบนหน้าจอแสดงผล

เมื่อต้องการ**ปิดสวิทช์** เครื่องมือวัดให้กดปุ่มเปิด-ปิด **(8)** [⏻] ค้างไว้

เมื่อปิดสวิทช์เครื่องมือวัด ค่าที่เก็บไว้ในหน่วยความจำและค่าที่ตั้งไว้ในเครื่องจะยังคงอยู่

วิธีดำเนินการวัด

เมื่อเปิดสวิทช์ครั้งเดียว เครื่องมือวัดจะอยู่ในฟังก์ชั่นการวัดความยาว ทุกครั้งเมื่อเปิดสวิทช์เครื่องมือวัดจะอยู่ในโหมดล่าสุดที่ใช้งาน สำหรับฟังก์ชั่นการวัดอื่นๆ ให้กดปุ่ม **(2)** [**Func**] เลือกฟังก์ชั่นการวัดที่ต้องการด้วยปุ่ม **(6)** [**+**] หรือปุ่ม **(3)** [**–**] ฟังก์ชั่นการวัดเรียกใช้งานฟังก์ชั่นการวัดด้วยปุ่ม **(2)** [**Func**] หรือด้วยปุ่มวัด **(5)** [▲]

มีการตั้งค่าสามรูปแบบสำหรับระนาบอ้างอิงของการวัด (ดู "การเลือกระนาบอ้างอิง (ดูภาพประกอบ **A**)", หน้า 75)ที่อยู่ด้านหน้าหรือด้านข้างสั้นๆ

วางเครื่องมือวัดที่จุดเริ่มต้นที่ต้องการวัด (ต. ย. เช่น ผนังห้อง)

หมายเหตุ: หากเปิดสวิทช์เครื่องมือวัดด้วยปุ่มเปิด/ปิด/ย้อนกลับ **(8)** [⏻] ให้กดปุ่มวัด **(5)** [▲] สั้นๆ เพื่อเปิดแสงเลเซอร์

กดปุ่มวัด **(5)** [▲] สั้นๆ เพื่อเริ่มต้นการวัด จากนั้นลำแสงเลเซอร์จะปิดลง สำหรับการวัดต่อไปให้ทำซ้ำขั้นตอนนี้

▶ **อย่าส่องลำแสงเลเซอร์ไปยังคนหรือสัตว์ และอย่าจ้องมองลำแสงเลเซอร์แม้จะอยู่ในระยะไกล**

หมายเหตุ: โดยทั่วไปค่าจากการวัดจะปรากฏภายใน 0.5 วินาที และ 4 วินาทีเป็นอย่างช้าที่สุด ระยะเวลาที่ใช้ในการวัดขึ้นอยู่กับระยะทาง สภาพแสง และคุณสมบัติการสะท้อนของพื้นผิวเป้าหมาย เมื่อเสร็จสิ้นการวัดลำแสงเลเซอร์จะปิดโดยอัตโนมัติ

การเลือกระนาบอ้างอิง (ดูภาพประกอบ A)

สำหรับการวัดท่านสามารถเลือกระดับอ้างอิงได้ 3 ลักษณะ:

– ขอบหลังของเครื่องมือวัด (ต. ย. เช่น เมื่อวางบนผนังห้อง)

– ขอบหน้าของเครื่องมือวัด (ต. ย. เช่น เมื่อวัดจากขอบโต๊ะเป็นต้นไป)

– จุดศูนย์กลางเกลียว **(14)** (ต. ย. เช่น สำหรับการวัดด้วยขาตั้งแบบสามขา)

เมื่อต้องการเลือกระนาบอ้างอิง ให้กดปุ่ม **(7)** [☼] จากนั้นให้เลือกการตั้งค่า "ระนาบอ้างอิง" ด้วยปุ่ม **(5)** [▲] หรือปุ่ม **(2)** [**Func**] เลือกระนาบอ้างอิงที่ต้องการด้วยปุ่ม **(6)** [**+**] หรือปุ่ม **(3)** [**–**] ทุกครั้งที่เปิดสวิทช์เครื่องมือวัดระดับอ้างอิงจะปรับไปอยู่ที่ระนาบอ้างอิงที่เลือกล่าสุด

เมนู "การตั้งค่า" (ดูภาพประกอบ B)

เข้าสู่เมนู "การตั้งค่า" **(j)** โดยกดปุ่ม **(7)** [☼]

เลือกการตั้งค่าที่ต้องการด้วยปุ่ม **(6)** [**+**] หรือปุ่ม **(3)** [**–**] และยืนยันด้วยปุ่มวัด **(5)** [▲] หรือปุ่ม **(2)** [**Func**]

ลือกการตั้งค่าที่ต้องการด้วยปุ่ม **(6)** [**+**] หรือปุ่ม **(3)** [**–**] และยืนยันด้วยปุ่มวัด **(5)** [▲] หรือปุ่ม **(2)** [**Func**]

เมื่อต้องการออกจากเมนู "การตั้งค่า" ให้กดปุ่มเปิด/ปิด/ย้อนกลับ **(8)** [⏻]

การเปิด-ปิดเสียง 🔊

ในการตั้งค่าพื้นฐาน เสียงจะถูกเปิดใช้งานอยู่แล้ว

การสั่นเปิด/ปิด

ในการตั้งค่าพื้นฐาน การสั่นจะถูกเปิดใช้งานอยู่แล้ว

การสั่นของเครื่องมือวัดอาจเป็นประโยชน์ เช่น ในสภาพแวดล้อมที่มีเสียงดัง การสั่นสั้น ๆ สองครั้งส่งสัญญาณว่าการวัดสำเร็จ การสั่นเป็นเวลานานบ่งบอกถึงการวัดที่ไม่ถูกต้อง

การส่องสว่างหน้าจอแสดงผล ☼

แสงสว่างหน้าจอแสดงผลจะติดขึ้นอย่างต่อเนื่อง ถ้าไม่มีการกดปุ่มใดๆ แสงสว่างหน้าจอแสดงผลจะหรี่ลงภายใน 20 วินาที ทั้งนี้เพื่อประหยัดแบตเตอรี่/แบตเตอรี่แพ็ค

โหมดประหยัดแบตเตอรี่

ในการตั้งค่าพื้นฐาน โหมดประหยัดแบตเตอรี่จะปิดใช้งานอยู่ เมื่อเปิดใช้งานโหมดประหยัดแบตเตอรี่ เสียงและการสั่นจะปิดใช้งานและความสว่างของจอแสดงผลจะลดลง ซึ่งช่วยขยายอายุการใช้งานแบตเตอรี่

การเปลี่ยนหน่วยของการวัด ft/m (ฟุต, เมตร)

การตั้งค่าพื้นฐานคือหน่วยของการวัด "m" (เมตร) มีหน่วยวัดที่แตกต่างกันหกหน่วย ปรับหน่วยวัดให้เหมาะสมกับวัตถุประสงค์ของคุณ

การกำหนดภาษา

เมื่อคุณเปิดเครื่องมือวัดเป็นครั้งแรก คุณจะได้รับแจ้งให้ตั้งค่าภาษาที่คุณต้องการสำหรับข้อความบนหน้าจอแสดงผล

คุณสามารถเปลี่ยนภาษาที่ตั้งไว้ได้ทุกเมื่อ

PRO360 PRO))

จำเป็นต้องทำการเรียกใช้งานครั้งแรก การถ่ายโอนข้อมูลทำได้เฉพาะเมื่อใช้ App ที่เกี่ยวข้องหรือโปรแกรมคอมพิวเตอร์เท่านั้น หลังจากเปลี่ยนแบตเตอรี่แล้ว ต้องเปิดเครื่องมือวัดหนึ่งครั้งเพื่อรีสตาร์ท PRO360 PRO360 สามารถปิดการใช้งานอีกครั้งได้ทุกเมื่อ สามารถดูข้อมูลเพิ่มเติมเกี่ยวกับ PRO360 ได้ที่ www.pro360.com

ข้อมูลอุปกรณ์ i

ที่นี่คุณจะทราบข้อมูลเกี่ยวกับเครื่องมือวัด เช่น หมายเลขซีเรียลและเวอร์ชันซอฟต์แวร์

การตั้งค่าจากโรงงานผลิต

ฟังก์ชันนี้ใช้เพื่อรีเซ็ตเครื่องมือวัดกลับเป็นการตั้งค่าจากโรงงานผลิต/การตั้งค่าพื้นฐาน หลังจากรีเซ็ตคุณจะได้รับแจ้งให้ตั้งค่าภาษาที่คุณต้องการสำหรับข้อความบนหน้าจอแสดงผล

ฟังก์ชั่นการวัด

ฟังก์ชั่นอธิบายวิธีใช้ (ดูภาพประกอบ C)

เมื่อต้องการเลือกฟังก์ชั่นวัด ให้กดปุ่ม **(2)** [**Func**] เลือกฟังก์ชั่นการวัดที่ต้องการด้วยปุ่ม **(6)** [**+**] หรือปุ่ม **(3)** [**–**]

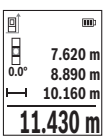
กดปุ่ม **(7)** [✲] เพื่อเริ่มฟังก์ชั่นวัด ฟังก์ชั่นอธิบายวิธีใช้จะแสดงขั้นตอนโดยละเอียดสำหรับฟังก์ชั่นวัดที่เลือก

การวัดความยาว

เลือกการวัดความยาว ⊢

เมื่อต้องการเปิดลำแสงเลเซอร์ให้กดปุ่มวัด **(5)** [▲]

กดปุ่มวัด **(5)** [▲] เพื่อทำการวัด ค่าจากการวัดแสดงอยู่ที่ด้านล่างของจอแสดงผล



สำหรับการวัดเพิ่มเติมแต่ละครั้ง ให้ทำซ้ำขั้นตอนข้างต้น ค่าจากการวัดครั้งล่าสุดแสดงที่ด้านล่างของจอแสดงผล ค่าจากการวัดก่อนครั้งล่าสุดแสดงที่ด้านบน ฯลฯ

การวัดต่อเนื่อง

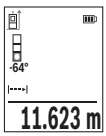
สำหรับการวัดต่อเนื่อง ท่านสามารถเคลื่อนย้ายเครื่องมือวัดเทียบกับเป้าหมายโดยที่ค่าจากการวัดจะได้รับการปรับปรุงทุกๆ 0.5 วินาที ต. ย. เช่น ท่านสามารถเดินออกจากผนังไปยังระยะห่างที่ต้องการในขณะที่สามารถอ่านระยะทางจริงได้เสมอ

เลือกการวัดต่อเนื่อง ⊢⋯⊣ เลือกฟังก์ชั่นใดฟังก์ชั่นหนึ่งต่อไปนี้:

- min/max: ค่าที่วัดได้น้อยที่สุดและมากที่สุดจะแสดงอย่างถาวรบนจอแสดงผล (ดูภาพประกอบ **I**)
- ตัวเลขที่เพิ่มขึ้น: ค่าที่วัดได้จะแสดงขยายใหญ่ขึ้นเพื่อให้อ่านง่ายขึ้น (ดูภาพประกอบ **J**)
- ตลับเมตร: จะแสดงระยะให้เห็นเป็นรูปตลับเมตร (ดูภาพประกอบ **K**) **หมายเหตุ**: ในฟังก์ชั่นคลับเมตร ระยะห่างจากเครื่องหมายจะแสดงในจอแสดงผล จุดอ้างอิง**ไม่ใช่**ขอบของเครื่องมือวัด

เมื่อต้องการเปิดลำแสงเลเซอร์ให้กดปุ่มวัด **(5)** [▲] สั้นๆ

เลื่อนเครื่องมือวัดจนค่าระยะที่ต้องการแสดงที่ด้านล่างของจอแสดงผล



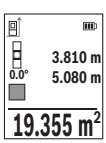
กดปุ่มวัด **(5)** [▲] สั้นๆ เพื่อหยุดการวัดต่อเนื่อง ค่าจากการวัดปัจจุบันแสดงที่ด้านล่างของจอแสดงผล กดปุ่มวัด **(5)** [▲] อีกครั้งเพื่อเริ่มต้นการวัดต่อเนื่องใหม่

การวัดต่อเนื่องจะปิดสวิทช์โดยอัตโนมัติหลังจากผ่านไป 4 นาที

การวัดพื้นที่

เลือกการวัดพื้นที่ ⬜

หลังจากนั้นให้วัดความยาวและความกว้างตามลำดับในลักษณะเดียวกับการวัดความยาว ลำแสงเลเซอร์ยังคงเปิดอยู่ระหว่างการวัดทั้งสองครั้ง ระยะทางที่จะวัดจะกะพริบในจอแสดงผลสำหรับการวัดพื้นที่ ⬜



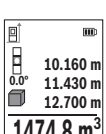
ค่าจากการวัดค่าแรกแสดงที่ด้านบนของจอแสดงผล

เมื่อการวัดค่าที่สองเสร็จสมบูรณ์ พื้นที่ผิวจะถูกคำนวณโดยอัตโนมัติและแสดงผล ผลลัพธ์สุดท้ายแสดงที่ด้านล่างของจอแสดงผล ค่าจากการวัดแต่ละค่าแสดงที่ด้านบน

การวัดปริมาตร

เลือกการวัดปริมาตร ⬜

หลังจากนั้นให้วัดความกว้าง ความยาว และความลึกตามลำดับในลักษณะเดียวกับการวัดความยาว ลำแสงเลเซอร์ยังคงเปิดอยู่ระหว่างการวัดทั้งสามครั้ง ระยะทางที่จะวัดจะกะพริบในจอแสดงผลสำหรับการวัดปริมาตร ⬜



ค่าจากการวัดค่าแรกแสดงที่ด้านบนของจอแสดงผล

เมื่อการวัดค่าที่สามเสร็จสมบูรณ์ ปริมาตรจะถูกคำนวณโดยอัตโนมัติและแสดงผล ผลลัพธ์สุดท้ายแสดงที่ด้านล่างของจอแสดงผล ค่าจากการวัดแต่ละค่าแสดงที่ด้านบน

การวัดระยะทางทางอ้อม

สำหรับการวัดความยาวทางอ้อม มีฟังก์ชันการวัดสามแบบ แต่ละฟังก์ชันการวัดสามารถใช้หาระยะทางที่แตกต่างกัน

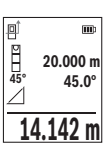
การวัดระยะทางทางอ้อมใช้วัดระยะทางที่ไม่สามารถวัดได้โดยตรง เพราะมีสิ่งกีดขวางที่อาจขวางลำแสงเลเซอร์หรือไม่มีผิวเป้าหมายที่เป็นตัวสะท้อนแสง กระบวนการวัดนี้สามารถใช้ได้เฉพาะในทิศทางแนวตั้งเท่านั้น การเบี่ยงเบนใดๆ ในแนวนอนนำไปสู่ความผิดพลาดในการวัด

หมายเหตุ: การวัดระยะทางทางอ้อมจะแม่นยำน้อยกว่าการวัดระยะทางทางตรงเสมอ ข้อผิดพลาดในการวัดอาจมีมากกว่าการวัดระยะทางทางตรงทั้งนี้ขึ้นอยู่กับการใช้งาน เพื่อปรับปรุงความแม่นยำการวัด เราขอแนะนำให้ใช้ขาตั้งแบบสามขา (อุปกรณ์ประกอบ) ระหว่างการวัดแต่ละครั้งลำแสงเลเซอร์ยังคงเปิดอยู่

ก) การวัดความสูงทางอ้อม (ดูภาพประกอบ D)

เลือกการวัดความสูงทางอ้อม ◿

ตรวจสอบให้แน่ใจว่าเครื่องมือวัดวางอยู่ระนาบเดียวกับจุดวัดด้านล่าง จากนั้นให้เอียงเครื่องมือวัดรอบระนาบอ้างอิงและวัดระยะทาง **"1"** ในลักษณะเดียวกับการวัดความยาว (บนจอแสดงผลปรากฏเป็นเส้นสีแดง)



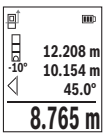
เมื่อการวัดเสร็จสมบูรณ์ ผลลัพธ์สำหรับระยะทางที่ต้องการหา **"X"** จะแสดงในบรรทัดผลลัพธ์ **(e)** ค่าจากการวัดสำหรับระยะทาง **"1"** และมุม **"α"** จะแสดงในบรรทัดแสดงค่าจากการวัด **(d)**

ข) การวัดความสูงทางอ้อมแบบสองครั้ง (ดูภาพประกอบ E)

เครื่องมือวัดสามารถวัดระยะทางที่อยู่ในระนาบแนวตั้งของเครื่องมือวัดโดยทางอ้อมได้ทั้งหมด

เลือกการวัดความสูงทางอ้อมแบบสองครั้ง ◺

วัดระยะทาง **"1"** และ **"2"** ตามลำดับในลักษณะเดียวกับการวัดความยาว



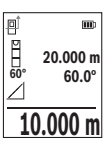
เมื่อการวัดเสร็จสมบูรณ์ ผลลัพธ์สำหรับระยะทางที่ต้องการหา **"X"** จะแสดงในบรรทัดผลลัพธ์ **(e)** ค่าจากการวัดสำหรับระยะทาง **"1"**, **"2"** และมุม **"α"** จะแสดงในบรรทัดแสดงจากค่าวัด **(d)**

ตรวจสอบให้แน่ใจว่าระนาบอ้างอิงของการวัด (ต. ย. เช่น ขอบหลังของเครื่องมือวัด) ยังคงอยู่ที่ตำแหน่งเดียวกันอย่างพอดิบพอดีสำหรับการวัดแต่ละครั้งทั้งหมดในกระบวนการวัด

ค) การวัดความยาวทางอ้อม (ดูภาพประกอบ F)

การวัดความยาวทางอ้อม ⦟

ตรวจสอบให้แน่ใจว่าเครื่องมือวัดวางอยู่ที่ความสูงเดียวกับจุดวัดที่ต้องการหา จากนั้นให้เอียงเครื่องมือวัดรอบระนาบอ้างอิงและวัดระยะทาง "1" ในลักษณะเดียวกับการวัดความยาว **"1"**



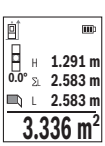
เมื่อการวัดเสร็จสมบูรณ์ ผลลัพธ์สำหรับระยะทางที่ต้องการหา **"X"** จะแสดงในบรรทัดผลลัพธ์ **(e)** ค่าจากการวัดสำหรับระยะทาง **"1"** และมุม **"α"** จะแสดงในบรรทัดแสดงค่าจากการวัด **(d)**.

การวัดพื้นผิวผนัง (ดูภาพประกอบ G)

การวัดพื้นผิวผนังใช้สำหรับคำนวณผลรวมของพื้นผิวแต่ละด้านหลายๆ พื้นผิวที่มีความสูงเท่ากัน ในตัวอย่างที่แสดงเราต้องการหาพื้นผิวทั้งหมดของผนังหลายด้านที่มีความสูงห้อง **H** เท่ากัน แต่ความยาว **L** ต่างกัน

เลือกการวัดพื้นผิวผนัง ⌼

วัดความสูงห้อง **H** ในลักษณะเดียวกับการวัดความยาว ค่าจากการวัดแสดงในบรรทัดบนของบรรทัดแสดงค่าจากการวัด เลเซอร์ยังคงเปิดอยู่



จากนั้นให้วัดความยาว L_1 ของผนังแรก พื้นที่ผิวจะถูกคำนวณโดยอัตโนมัติและแสดงในบรรทัดผลลัพธ์ **(e)** ค่าความยาวจากการวัดครั้งล่าสุดแสดงในบรรทัดล่างของบรรทัดแสดงค่าจากการวัด **(d)** เลเซอร์ยังคงเปิดอยู่

ต่อไปให้วัดความยาว L_2 ของผนังที่สอง ค่าการวัดแต่ละครั้งที่แสดงในบรรทัดแสดงค่าจากการวัด **(d)** จะรวมกับความยาว L_1 ผลรวมของความยาวทั้งสอง (แสดงในบรรทัดกลางของบรรทัดแสดงค่าจากการวัด **(d)**) จะคูณกับความสูงที่เก็บไว้ **H** ค่าพื้นผิวทั้งหมดจะแสดงในบรรทัดผลลัพธ์ **(e)**

ท่านสามารถวัดความยาว L_X อื่นๆ อีกมากมาย ซึ่งความยาวจะถูกนำมารวมกันโดยอัตโนมัติ แล้วนำมาคูณกับความสูง **H** เงื่อนไขเบื้องต้นสำหรับการคำนวณพื้นที่อย่างถูกต้องคือความยาวที่วัดครั้งแรก (ในตัวอย่างคือความสูงห้อง **H**) ต้องเท่ากันในทุกๆ ด้าน

ฟังก์ชั่นการกำหนดเขต (ดูภาพประกอบ H)

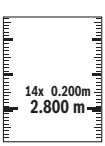
ฟังก์ชั่นการกำหนดเขตจะวัดซ้ำความยาวที่กำหนดไว้แล้ว (ระยะทาง) ความยาวนี้สามารถถ่ายทอดลงบนพื้นผิว ต. ย. เช่น เพื่อจะได้ตัดวัสดุให้มีความยาวเท่าๆ กัน หรือติดตั้งผนังระบบโครงคร่าวในดรายวอลล์ ความยาวต่ำสุดที่สามารถปรับได้คือ 0.1 ม. ความยาวสูงสุดคือ 50 ม.

หมายเหตุ: ในฟังก์ชั่นการกำหนดเขต ระยะห่างจากเครื่องหมายจะแสดงในจอแสดงผล จุดอ้างอิง**ไม่ใช่**ขอบของเครื่องมือวัด

เลือกฟังก์ชั่นการกำหนดเขต

กำหนดความยาวที่ต้องการด้วยปุ่ม **(6)** [+] หรือปุ่ม **(3)** [–]

เริ่มต้นฟังก์ชั่นการกำหนดเขตโดยกดปุ่ม **(5)** [▲] แล้วถอยออกจากจุดเริ่มต้นอย่างช้าๆ



เครื่องมือวัดจะวัดระยะทางจากจุดเริ่มต้นอย่างต่อเนื่อง ความยาวที่กำหนดไว้รวมทั้งค่าจากการวัดปัจจุบันจะปรากฏขึ้น ลูกศรบนและล่างแสดงให้เห็นระยะทางที่สั้นที่สุดไปยังเครื่องหมายถัดไปหรือก่อนหน้านี้

ตัวคูณทางด้านซ้ายระบุจำนวนครั้งที่ถึงความยาวกำหนดแล้ว ค่าวัดสีเขียวระบุให้ทราบว่าถึงความยาวเพื่อให้คุณทำเครื่องหมาย ค่าที่วัดได้สีน้ำเงินจะแสดงค่าจริงหากค่าอ้างอิงอยู่นอกเหนือจากค่าที่แสดง

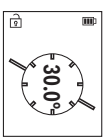
การวัดความลาดชัน/ระดับน้ำดิจิตอล

เลือกการวัดความลาดชัน/ระดับน้ำดิจิตอล

เครื่องมือวัดสลับไปมาระหว่างสองสถานะโดยอัตโนมัติ

ระดับน้ำดิจิตอลใช้สำหรับตรวจสอบการปรับระนาบแนวนอนหรือแนวตั้งของสิ่งของ (ต. ย. เช่น เครื่องซักผ้า ตู้เย็น ฯลฯ)

ถ้ามีความลาดชันเกินกว่า 3° ลูกกลมบนจอแสดงผลจะส่องสว่างสีแดง



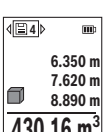
การวัดความลาดชันใช้สำหรับวัดความเอียงหรือความชัน (ต. ย. เช่น ของบันได ราวบันได สำหรับปรับเฟอร์นิเจอร์ให้เหมาะสม สำหรับติดตั้งท่อ ฯลฯ)

สำหรับการวัดความลาดชัน ให้ใช้ด้านซ้ายของเครื่องมือวัดเป็นระนาบอ้างอิง

การแสดงค่าในหน่วยความจำ

ค่าและผลลัพธ์สุดท้ายของการวัดแต่ละครั้งที่เสร็จสมบูรณ์จะถูกบันทึกไว้โดยอัตโนมัติ สามารถเรียกดูได้สูงสุด 30 ค่า (ค่าจากการวัดหรือผลลัพธ์สุดท้าย)

เลือกฟังก์ชั่นหน่วยความจำ [🖹]



หมายเลขของค่าที่เก็บไว้แสดงที่ด้านบนของจอแสดงผล ค่าที่เก็บไว้ที่สอดคล้องกันแสดงที่ด้านล่าง และฟังก์ชั่นการวัดที่สอดคล้องกันแสดงที่ด้านซ้าย

กดปุ่ม **(6)** [**+**] เพื่อเลื่อนดูค่าที่เก็บไว้ไปข้างหน้า

กดปุ่ม **(3)** [**–**] เพื่อเลื่อนดูค่าที่เก็บไว้ย้อนหลัง

ค่าเก่าที่สุดจะอยู่ที่ตำแหน่งที่ 1 ในหน่วยความจำ ค่าล่าสุดอยู่ในตำแหน่งที่ 30 (สำหรับค่าในหน่วยความจำ 30 ค่าที่มีอยู่) เมื่อมีการเก็บค่าต่อไป ค่าเก่าที่สุดจะถูกลบออกจากหน่วยความจำเสมอ

การลบหน่วยความจำ

เมื่อต้องการลบค่าหน่วยความจำเดียว ให้เลือกค่านี้(ดู "การแสดงค่าในหน่วยความจำ", หน้า 82) เมื่อต้องการลบ ก่อนอื่นให้ปุ่มเปิด/ปิด/ย้อนกลับ **(8)** [ ] และจากนั้นยืนยันด้วยปุ่ม **(2)** [**Func**]

เมื่อต้องการลบเนื้อหาหน่วยความจำทั้งหมด ให้กดปุ่ม **(7)** [☼] แล้วเลือกฟังก์ชั่น จากนั้นให้กดปุ่ม **(6)** [**+**] และยืนยันด้วยปุ่ม **(2)** [**Func**]

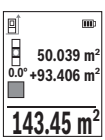
การเพิ่ม/การลดค่า

ท่านสามารถเพิ่มหรือลดค่าจากการวัดหรือผลลัพธ์สุดท้ายได้

การเพิ่มค่า

ตัวอย่างต่อไปนี้อธิบายการเพิ่มค่าของพื้นที่:

วัดพื้นที่ตามที่อธิบายไว้ในบท "การวัดพื้นที่" การวัดพื้นที่ที่อยู่ด้านหน้าหรือด้านข้างสั้นๆ



กดปุ่ม **(6)** [**+**] พื้นที่ที่คำนวณได้และสัญลักษณ์ **"+"** จะปรากฏขึ้น กดปุ่มวัด **(5)** [▲] เพื่อเริ่มต้นวัดพื้นที่อื่นๆ ต่อไป วัดพื้นที่ตามที่อธิบายไว้ในบท "การวัดพื้นที่" การวัดพื้นที่ทันทีที่การวัดที่สองเสร็จสมบูรณ์ ผลลัพธ์ของการวัดพื้นที่ที่สองแสดงที่ด้านล่างของจอแสดงผล เมื่อต้องการดูผลลัพธ์สุดท้ายให้กดปุ่มวัด **(5)** [▲] อีกครั้ง

หมายเหตุ: สำหรับการวัดความยาวผลลัพธ์สุดท้ายจะปรากฏทันที

เมื่อต้องการออกจากการเพิ่มค่าให้กดปุ่ม **(2)** [**Func**]

การลดค่า

เมื่อต้องการลดค่าให้กดปุ่ม **(3)** [**–**] ขั้นตอนต่อไปจะเหมือนกับ "การเพิ่มค่า"

การลบทิ้งค่าจากการวัด

กดปุ่มปุ่มเปิด/ปิด/ย้อนกลับ **(8)** [⌫] สั้นๆ เพื่อลบทิ้งค่าจากการวัดครั้งล่าสุดแต่ละค่าที่กำหนดไว้ในฟังก์ชั่นการวัดทั้งหมด กดปุ่มเปิด/ปิด/ย้อนกลับ **(8)** [⌫] สั้นๆ ซ้ำๆ กันจะลบทิ้งค่าจากการวัดในลำดับย้อนกลับ

ข้อแนะนำในการทำงาน

▶ **เครื่องมือวัดมีอินเตอร์เฟสคลื่นวิทยุสำหรับเชื่อมโยงสื่อสารแบบไร้สาย ต้องปฏิบัติตามข้อจำกัดการทำงานในพื้นที่ ต. ย. เช่น ในเครื่องบิน หรือโรงพยาบาล**

ข้อแนะนำทั่วไป

เลนส์รับแสง **(15)** ช่องทางออกลำแสงเลเซอร์ **(16)** ต้องไม่ถูกปิดคลุมขณะทำการวัด เครื่องมือวัดต้องไม่เคลื่อนไหวขณะทำการวัด (ยกเว้นฟังก์ชันการวัดต่อเนื่องและการวัดความลาดชัน) ดังนั้นให้วางเครื่องมือวัดลงบนพื้นผิวรองรับหรือทาบกับผนังหยุดที่แข็งแรงเท่าที่เป็นไปได้

ปัจจัยที่ส่งผลกระทบต่อช่วงการวัด

ช่วงการวัดขึ้นอยู่กับสภาพแสงและคุณสมบัติการสะท้อนของพื้นผิวเป้าหมาย ใช้แว่นตาสำหรับมองแสงเลเซอร์ **(20)** (อุปกรณ์ประกอบ) และแผ่นเป้าหมายเลเซอร์ **(19)** (อุปกรณ์ประกอบ) หรือให้ร่มเงาพื้นผิวเป้าหมายเพื่อจะได้มองเห็นลำแสงเลเซอร์ได้ดียิ่งขึ้นเมื่อแสงล้อมรอบจ้ามาก

ปัจจัยที่ส่งผลกระทบต่อผลลัพธ์การวัด

เนื่องจากผลทางกายภาพ การวัดอาจมีความผิดพลาดได้เมื่อวัดบนพื้นผิวที่แตกต่างกัน สิ่งเหล่านี้รวมถึง:

– พื้นผิวที่โปร่งแสง (ต. ย. เช่น แก้ว น้ำ)
– พื้นผิวที่สะท้อนแสง (ต. ย. เช่น โลหะขัดมัน กระจก)
– พื้นผิวที่มีรูพรุน (ต. ย. เช่น วัสดุฉนวน)
– พื้นผิวโครงสร้าง (ต. ย. เช่น ปูนฉาบ หินธรรมชาติ)

ให้ใช้แผ่นเป้าหมายเลเซอร์ **(19)** (อุปกรณ์ประกอบ) บนพื้นผิวเหล่านี้ หากจำเป็น

นอกจากนี้ความผิดพลาดจากการวัดอาจเกิดขึ้นได้เมื่อส่องพื้นผิวเป้าหมายที่อยู่ในตำแหน่งเอียง

ชั้นของอากาศที่มีอุณหภูมิแตกต่างกัน หรือแสงสะท้อนที่ได้รับทางอ้อม อาจส่งผลต่อค่าจากการวัดด้วยเช่นกัน

การตรวจสอบความแม่นยำและการสอบเทียบของการวัดความลาดชัน (ดูภาพประกอบ L)

ตรวจสอบความแม่นยำของการวัดความลาดชันเป็นประจำ ซึ่งจะกระทำได้โดยการวัดกลับด้าน สำหรับการตรวจสอบ ให้วางเครื่องมือวัดบนโต๊ะและวัดความลาดชัน หมุนเครื่องมือวัดไป 180° และวัดความลาดชันอีกครั้งหนึ่ง ความแตกต่างของจำนวนเลขที่แสดงต้องไม่มากกว่า 0.3° (สูงสุด)

ในกรณีที่มีส่วนเบี่ยงเบนมากกว่า จะต้องสอบเทียบเครื่องมือวัดใหม่ เลือก ⚙ ในการตั้งค่า ทำตามคำแนะนำบนจอแสดงผล

เมื่ออุณหภูมิมีการเปลี่ยนแปลงมากและเครื่องมือวัดถูกกระแทก เราขอแนะนำให้ตรวจสอบความแม่นยำ และหากจำเป็นให้สอบเทียบเครื่องมือวัด เมื่ออุณหภูมิมีการเปลี่ยนแปลงมาก ต้องปล่อยให้เครื่องมือวัดปรับเข้ากับอุณหภูมิรอบด้านสักชั่วครู่ก่อนสอบเทียบ

การตรวจสอบความแม่นยำของการวัดระยะทาง

ความแม่นยำของเครื่องมือวัดสามารถตรวจสอบได้ดังนี้:

– เลือกระยะวัดถาวรที่ไม่สามารถเปลี่ยนแปลงที่มีความยาวประมาณ 3 ถึง 10 เมตร โดยที่ท่านทราบความยาวนี้แล้วอย่างแม่นยำ (ต. ย. เช่น ความกว้างห้อง หรือ ช่องประตู) ควรทำการวัดภายใต้เงื่อนไขที่ดี นั่นคือ ระยะทางที่วัดควรอยู่ในอาคารและพื้นผิวเป้าหมายของการวัดควรราบเรียบและสะท้อนแสงได้ดี

– วัดระยะทาง 10 ครั้งต่อเนื่องกัน

ในระยะการวัดทั้งหมดและภายใต้เงื่อนไขที่ดี ส่วนเบี่ยงเบนสูงสุดของการวัดแต่ละครั้งจากค่าเฉลี่ยต้องไม่เกิน ±4 มม. บันทึกข้อมูลจากการวัดไว้เพื่อให้สามารถเปรียบเทียบความแม่นยำได้ในภายหลัง

การทำงานกับขาตั้งแบบสามขา (อุปกรณ์ประกอบ)

การใช้ขาตั้งแบบสามขาจำเป็นอย่างยิ่งสำหรับการวัดระยะทางไกลๆ วางเครื่องมือวัดที่มีเกลียวขนาด 1/4 นิ้ว **(14)** เข้าบนเพลตยึดแบบเปลี่ยนเร็วของขาตั้งแบบสามขา **(21)** หรือขาตั้งกล้องแบบสามขาทั่วไป ยึดเครื่องมือวัดโดยขันสกรูล็อคของเพลตยึดแบบเปลี่ยนเร็วเข้าให้แน่น

ตั้งระนาบอ้างอิงสำหรับการวัดด้วยขาตั้งแบบสามขาในการตั้งค่า (ดู "การเลือกระนาบอ้างอิง (ดูภาพประกอบ **A**)", หน้า 75)ที่อยู่ด้านหน้าหรือด้านข้างสั้นๆ

คลิปหนีบเข็มขัด (อุปกรณ์เสริม) (ดูภาพประกอบ M)

คลิปหนีบเข็มขัด **(17)** ช่วยให้คุณสามารถห้อยเครื่องมือวัดบนเข็มขัดสายพานได้อย่างง่ายดาย

ข้อความแสดงความผิดพลาด

หากไม่สามารถทำการวัดทำได้อย่างถูกต้องจะปรากฏข้อความแสดงข้อผิดพลาด "Error" ในจอแสดงผล เริ่มการวัดอีกครั้ง

เครื่องมือวัดจะตรวจสอบการทำงานที่ถูกต้องของแต่ละการวัด หากตรวจพบข้อบกพร่องบนจอแสดงผลจะแสดงเฉพาะสัญลักษณ์ด้านข้างนี้และเครื่องมือวัดจะปิดสวิทช์ ในกรณีเช่นนี้ให้ส่งเครื่องมือวัดเข้ารับการตรวจสอบที่ศูนย์บริการหลังการขาย บ๊อช ผ่านตัวแทนจำหน่ายของท่าน

การบำรุงรักษาและการบริการ

การบำรุงรักษาและการทำความสะอาด

เก็บรักษาและขนย้ายเครื่องมือวัดเฉพาะเมื่อบรรจุอยู่ภายในกระเป๋าใส่เครื่องมือวัดที่จัดมาให้เท่านั้น **(23)**

รักษาเครื่องมือวัดให้สะอาดตลอดเวลา

อย่าจุ่มเครื่องมือวัดลงในน้ำหรือของเหลวอื่นๆ

เช็ดสิ่งสกปรกออกด้วยผ้านุ่มที่เปียกหมาดๆอย่าใช้สารซักฟอกหรือตัวทำละลาย

ดูแลรักษาเลนส์รับแสง **(15)** เป็นพิเศษเหมือนกับการดูแลรักษาแว่นตาหรือเลนส์กล้องถ่ายภาพ

ในกรณีซ่อมแซม ให้ส่งเครื่องมือวัดโดยบรรจุลงในกระเป๋าใส่เครื่องมือวัด **(23)**

การบริการหลังการขายและการให้คำปรึกษาการใช้งาน

ศูนย์บริการหลังการขายของเรายินดีตอบคำถามของท่านที่เกี่ยวกับการบำรุงรักษาและการซ่อมแซมผลิตภัณฑ์รวมทั้งเรื่องอะไหล่ ภาพเขียนแบบการประกอบและข้อมูลเกี่ยวกับอะไหล่ กรุณาดูใน: **www.bosch-pt.com**

ทีมงานที่ปรึกษาของ บ๊อช ยินดีให้ข้อมูลเกี่ยวกับผลิตภัณฑ์ของเราและอุปกรณ์ประกอบต่างๆ

เมื่อต้องการสอบถามและสั่งซื้ออะไหล่ กรุณาแจ้งหมายเลขสินค้า 10 หลักบนแผ่นป้ายรุ่นของผลิตภัณฑ์ทุกครั้ง

ไทย

ไทย บริษัท โรเบิร์ต บ๊อช จำกัด
เอฟวายไอ เซ็นเตอร์ อาคาร 1 ชั้น 5
เลขที่ 2525 ถนนพระราม 4
แขวงคลองเตย เขตคลองเตย กรุงเทพฯ 10110
โทร: +66 2012 8888
แฟกซ์: +66 2064 5800
www.bosch.co.th

ศูนย์บริการซ่อมและฝึกอบรม บ๊อช
อาคาร ลาซาลทาวเวอร์ ชั้น G ห้องเลขที่ 2
บ้านเลขที่ 10/11 หมู่ 16
ถนนศรีนครินทร์ ตำบลบางแก้ว อำเภอบางพลี
จังหวัดสมุทรปราการ 10540
ประเทศไทย
โทรศัพท์ 02 7587555
โทรสาร 02 7587525

สามารถดูที่อยู่ศูนย์บริการอื่นๆ ได้ที่:

www.bosch-pt.com/serviceaddresses

Bahasa Indonesia

Petunjuk Keselamatan

Petunjuk lengkap ini harus dibaca dan diperhatikan agar tidak terjadi bahaya dan Anda dapat bekerja dengan aman saat menggunakan alat ukur ini. Apabila alat ukur tidak digunakan sesuai dengan petunjuk yang disertakan, keamanan alat ukur dapat terganggu. Janganlah sekali-kali menutupi atau melepas label keselamatan kerja yang ada pada alat ukur ini. SIMPAN PETUNJUK INI DENGAN BAIK DAN BERIKAN KEPADA PEMILIK ALAT UKUR BERIKUTNYA.

- **Perhatian – jika perangkat pengoperasian atau perangkat pengaturan atau prosedur lain selain yang dituliskan di sini digunakan, hal ini dapat menyebabkan terjadinya paparan radiasi yang berbahaya.**
- **Alat pengukur dikirim dengan tanda peringatan laser (ditandai dengan ilustrasi alat pengukur di halaman grafis).**
- **Jika teks pada tanda peringatan laser tidak tertulis dalam bahasa negara Anda, tempelkan label yang tersedia dalam bahasa negara Anda di atas label berbahasa Inggris sebelum Anda menggunakan alat untuk pertama kalinya.**

Jangan melihat sinar laser ataupun mengarahkannya kepada orang lain atau hewan baik secara langsung maupun dari pantulan. Sinar laser dapat membutakan seseorang, menyebabkan kecelakaan atau merusak mata.

- ▶ **Jika radiasi laser mengenai mata, tutup mata Anda dan segera gerakkan kepala agar tidak terkena sorotan laser.**
- ▶ **Jangan mengubah peralatan laser.**
- ▶ **Jangan gunakan kacamata pelihat laser (aksesori) sebagai kacamata pelindung.** Kacamata pelihat laser digunakan untuk mendeteksi sinar laser dengan lebih baik, namun tidak melindungi dari sinar laser.
- ▶ **Jangan gunakan kacamata pelihat laser (aksesori) sebagai kacamata hitam atau di jalan raya.** Kacamata pelihat laser tidak menawarkan perlindungan penuh terhadap sinar UV dan mengurangi persepsi warna.
- ▶ **Perbaiki alat ukur hanya di teknisi ahli resmi dan gunakan hanya suku cadang asli.** Dengan demikian, keselamatan kerja dengan alat ukur ini selalu terjamin.
- ▶ **Jangan biarkan anak-anak menggunakan alat ukur laser tanpa pengawasan.** Hal ini dapat menyilaukan orang lain atau diri sendiri secara tidak sengaja.
- ▶ **Jangan mengoperasikan alat ukur di area yang berpotensi meledak yang di dalamnya terdapat cairan, gas, atau serbuk yang dapat terbakar.** Di dalam alat pengukur dapat terjadi bunga api, yang lalu menyulut debu atau uap.
- ▶ **Waspada! Ketika menggunakan alat pengukur dengan *Bluetooth*® dapat terjadi gangguan pada perangkat dan instalasi lain, pesawat terbang, dan perangkat medis (misalnya alat pacu jantung, alat bantu dengar). Selain itu, cedera pada manusia dan binatang di area sekitar tidak dapat seluruhnya dihindari. Jangan menggunakan alat pengukur dengan *Bluetooth*® di dekat perangkat medis, pusat pengisian bahan bakar, instalasi kimia, dan area dengan bahaya ledakan. Jangan menggunakan alat pengukur dengan *Bluetooth*® dalam pesawat terbang. Hindari pengoperasian di dekat kepala secara langsung dalam waktu yang lama.**

Istilah merek *Bluetooth*® serta gambar simbol (logo) merupakan merek dagang terdaftar dan kepemilikan dari Bluetooth SIG, Inc. Setiap penggunaan istilah merek/gambar simbol ini berada di bawah lisensi Robert Bosch Power Tools GmbH.

Spesifikasi produk dan performa

Tujuan penggunaan

Alat pengukur merupakan instrumen untuk mengukur jarak, panjang, tinggi, celah, dan untuk menghitung luas bidang dan volume.

Alat pengukur ini cocok untuk penggunaan di dalam gedung.

Hasil ukur dapat dikirim melalui *Bluetooth*® ke perangkat lainnya.

Ilustrasi komponen

Nomor-nomor pada ilustrasi komponen sesuai dengan gambar alat pengukur pada halaman gambar.

(1) Tombol *Bluetooth*®
(2) Tombol fungsi [**Func**]
(3) Tombol minus/kiri [**–**]
(4) Display
(5) Tombol pengukuran [▲]
(6) Tombol plus/kanan [**+**]
(7) Tombol pengaturan dasar [⚙]
(8) Tombol on/off/kembali [⏻]
(9) Eyelet untuk tali pengangkat[a)]
(10) Label peringatan laser
(11) Nomor seri
(12) Pengunci tutup kompartemen baterai
(13) Tutup kompartemen baterai
(14) Ulir tripod 1/4"
(15) Lensa penerima
(16) Outlet sinar laser
(17) Klip sabuk[a)]
(18) Sekrup[a)] untuk klip sabuk[a)]
(19) Reflektor sinar laser[a)]
(20) Kacamata laser[a)]
(21) Tripod[a)]

(22) Tali pengangkat[a)]

(23) Tas pelindung

a) **Aksesori yang ada pada gambar atau yang dijelaskan tidak termasuk dalam lingkup pengiriman standar. Semua aksesori yang ada dapat Anda lihat dalam program aksesori kami.**

Simbol pada display (pilihan)

(a) Bidang acuan pengukuran

(b) Status koneksi

 *Bluetooth*® aktif, koneksi tidak dibuat

 *Bluetooth*® aktif, koneksi dibuat

(c) Indikator baterai

(d) Baris nilai pengukuran

(e) Baris hasil pengukuran

(f) Fungsi pengukuran

(g) Tampilan sudut kemiringan

(h) Bar status

(i) Indikator display fungsi pengukuran

(j) Indikator display pengaturan dasar

(k) Indikator display pengaturan lainnya

Data teknis

Laser pengukur jarak digital	**GLM 50-27 CG**
Nomor seri	**3 601 K72 U..**
Pengukuran jarak	
Jangkauan pengukuran	0,05–50 m[A)]
Jangkauan pengukuran (kondisi tidak menguntungkan)	0,05–20 m[B)]
Akurasi pengukuran	± 1,5 mm[A)]
Akurasi pengukuran (kondisi tidak menguntungkan)	± 3,0 mm[B)]
Unit display terkecil	0,5 mm
Pengukuran jarak tidak langsung dan waterpas	
Jangkauan pengukuran	0°–360° (4x90°)

Laser pengukur jarak digital	**GLM 50-27 CG**
Pengukuran kemiringan	
Jangkauan pengukuran	0°–360° (4x90°)
Akurasi pengukuran (khusus)	± 0,2° [C)D)]
Unit display terkecil	0,1°
Umum	
Suhu pengoperasian	–10°C...+45°C[E)]
Suhu penyimpanan	–20°C...+70°C
Kelembapan relatif maks.	90%
Ketinggian maks. di atas tinggi acuan	2000 m
Tingkat polusi sesuai dengan IEC 61010-1	2[F)]
Kelas laser	2
Jenis laser	515 nm, < 1 mW
Divergensi sinar laser	< 1,5 mrad (sudut penuh)
Penonaktifan otomatis setelah sekitar	
– Laser	20 detik
– Alat pengukur (tanpa pengukuran)	5 menit[G)]
Berat sesuai dengan EPTA-Procedure 01:2014	0,17 kg
Ukuran	119 x 53 x 29 mm
Tingkat perlindungan	IP 65 (terlindung dari debu dan percikan air)
Baterai	2 x 1,5 V LR6 (AA)
Pengaturan satuan ukur	m, ft, in
Pengiriman data	
Bluetooth®	*Bluetooth*® (4.2 Low Energy)[H)]
Pita frekuensi pengoperasian	2402–2480 MHz

Laser pengukur jarak digital	GLM 50-27 CG
Daya transmisi maks.	8 mW

A) Saat mengukur dari tepi depan alat pengukur, berlaku untuk daya pantul objek yang tinggi (misalnya dinding yang dicat putih), pencahayaan latar belakang yang lemah dan suhu pengoperasian sebesar 25°C. Selain itu, penyimpangan bergantung jarak sebesar ± 0,05 mm/m juga harus diperhitungkan.

B) Saat mengukur dari tepi depan alat pengukur, berlaku untuk daya pantul objek yang tinggi (misalnya dinding yang dicat putih), pencahayaan latar belakang yang kuat dan suhu pengoperasian sebesar 25°C. Selain itu, penyimpangan bergantung jarak sebesar ± 0,15 mm/m juga harus diperhitungkan.

C) Setelah kalibrasi pengguna pada suhu 0° dan 90°; tingkat kesalahan gradien tambahan sebesar ±0,01°/derajat hingga 45° (maks.) perlu diperhatikan. Sisi kiri alat pengukur digunakan sebagai bidang acuan untuk mengukur kemiringan.

D) Pada suhu pengoperasian 25°C

E) Suhu pengoperasian maksimal pada fungsi pengukuran kontinu yakni +40 °C.

F) Hanya polusi nonkonduktif yang terjadi, namun terkadang muncul konduktivitas sementara yang disebabkan oleh kondensasi.

G) *Bluetooth*® dinonaktifkan

H) Sambungan mungkin tidak dapat dibuat pada perangkat *Bluetooth*® Low Energy tergantung pada model dan sistem pengoperasian. Perangkat *Bluetooth*® harus mendukung profil GATT.

Untuk mengidentifikasi alat pengukur secara jelas terdapat nomor seri **(11)** pada label tipe.

Antarmuka *Bluetooth*®

Pengiriman data ke perangkat lain

Alat pengukur dilengkapi dengan modul *Bluetooth*® yang memungkinkan pengiriman data ke perangkat seluler tertentu dengan antarmuka *Bluetooth*® (misalnya smartphone, tablet) melalui teknologi radio.

Informasi mengenai persyaratan sistem yang diperlukan untuk koneksi *Bluetooth*® dapat dilihat pada situs internet Bosch di www.bosch-pt.com.

► **Informasi lebih lanjut dapat ditemukan di halaman produk Bosch.**

Ketika mengirim data melalui *Bluetooth*®, dapat terjadi penundaan waktu antara perangkat seluler dan alat pengukur. Hal ini dapat disebabkan oleh jarak antara kedua perangkat atau oleh objek pengukuran itu sendiri.

Pengaktifan antarmuka *Bluetooth*® untuk pengiriman data pada perangkat seluler

Pastikan antarmuka *Bluetooth*® telah diaktifkan pada perangkat seluler.

Tekan tombol **(1)** untuk mengakses menu *Bluetooth*® dan tekan lagi tombol **(1)** (atau tombol **(6) [+]**) untuk mengaktifkan antarmuka *Bluetooth*®. Pilih alat pengukur yang tepat sesuai dengan nomor seri jika ditemukan beberapa alat pengukur yang aktif.

Nomor seri **(11)** dapat ditemukan di label tipe alat pengukur. Status koneksi serta koneksi yang aktif **(b)** ditampilkan pada bar status **(h)** dari alat pengukur.

Aplikasi Bosch tersedia untuk memperluas cakupan fungsi. Aplikasi ini dapat diunduh di App Stores terkait bergantung pada perangkat.

Penonaktifan antarmuka *Bluetooth*®

Tekan tombol **(1)** untuk mengakses menu *Bluetooth*® dan tekan lagi tombol **(1)** (atau tombol **(3)[–]**) untuk menonaktifkan antarmuka *Bluetooth*®.

Pemasangan

Memasukkan/mengganti baterai

Direkomendasikan untuk menggunakan baterai mangan alkali atau baterai NiMH untuk pengoperasian alat pengukur (terutama ketika suhu pengoperasian rendah).

Lebih banyak pengukuran dapat dilakukan dengan baterai 1,2 V daripada menggunakan baterai 1,5 V bergantung pada kapasitas baterai.

Untuk membuka tutup kompartemen baterai **(13)**, tekan pengunci **(12)** dan lepaskan tutup kompartemen baterai. Masukkan baterai atau baterai isi ulang. Pastikan baterai terpasang pada posisi kutub yang benar sesuai gambar di dalam kompartemen baterai.

Ketika level pengisian daya baterai rendah, pada display akan muncul pertanyaan untuk mengaktifkan mode hemat baterai. Ketika mode hemat baterai telah diaktifkan, masa pengoperasian baterai akan menjadi lebih lama dan simbol baterai pada display akan dikelilingi warna kuning (lihat „Menu "Pengaturan" (lihat gambar **B**)“, Halaman 95).

Hanya sedikit pengukuran yang dapat dilakukan apabila simbol baterai kosong muncul pada display untuk pertama kali. Jika simbol baterai telah kosong dan berkedip merah, pengukuran tidak dapat lagi dilakukan. Ganti baterai.

Selalu ganti semua baterai atau baterai isi ulang secara bersamaan. Hanya gunakan baterai atau baterai isi ulang dari produsen dan dengan kapasitas yang sama.

- ▶ **Lepaskan baterai atau baterai isi ulang dari alat pengukur jika alat pengukur tidak digunakan dalam waktu yang lama**. Jika baterai dan baterai isi ulang disimpan untuk waktu yang lama, baterai dan baterai isi ulang dapat berkarat dan dayanya akan habis dengan sendirinya.

Penggunaan

Cara penggunaan

- ▶ **Jangan biarkan alat ukur yang aktif berada di luar pengawasan dan matikan alat ukur setelah digunakan.** Sinar laser dapat menyilaukan mata orang lain.
- ▶ **Lindungilah alat ukur dari cairan dan sinar matahari langsung.**
- ▶ **Jauhkan alat ukur dari suhu atau perubahan suhu yang ekstrem.** Jangan biarkan alat ukur berada terlalu lama di dalam kendaraan. Biarkan alat ukur menyesuaikan suhu lingkungan sebelum dioperasikan saat terjadi perubahan suhu yang drastis. Pada suhu yang ekstrem atau terjadi perubahan suhu yang drastis, ketepatan alat ukur dapat terganggu.
- ▶ **Hindari guncangan atau benturan yang keras pada alat pengukur.** Apabila terjadi guncangan atau benturan yang keras pada alat pengukur, disarankan untuk memeriksa akurasi alat pengukur sebelum digunakan kembali (lihat „Pemeriksaan akurasi dan kalibrasi pengukuran kemiringan (lihat gambar **L**)“, Halaman 103) dan (lihat „Pemeriksaan akurasi pada pengukuran jarak“, Halaman 104).
- ▶ **Alat pengukur dilengkapi dengan antarmuka nirkabel. Perhatikan batasan pengoperasian lokal, misalnya dalam pesawat terbang atau di rumah sakit.**

Mengaktifkan/menonaktifkan

- – Untuk **menghidupkan** alat pengukur dan laser, tekan singkat tombol pengukuran **(5)** [▲].
- – Untuk **menghidupkan** alat pengukur tanpa laser, tekan singkat tombol on/off/kembali **(8)** [⏻].

- ▶ **Jangan mengarahkan sinar laser pada orang lain atau binatang dan jangan melihat ke sinar laser, juga tidak dari jarak jauh.**

Saat menghidupkan alat pengukur untuk pertama kali, pengguna diminta untuk mengatur bahasa favorit untuk teks display.

Untuk **mematikan** alat pengukur, tekan dan tahan tombol on/off/kembali **(8)**[⏻].

Saat mematikan alat pengukur, nilai yang disimpan pada memori dan pengaturan perangkat akan tetap tersimpan.

Prosedur pengukuran

Setelah dihidupkan untuk pertama kali, alat pengukur akan berada dalam fungsi pengukuran panjang. Setiap penghidupan berikutnya, alat pengukur berada dalam fungsi pengukuran yang digunakan terakhir kali. Tekan tombol **(2)** [**Func**] untuk fungsi pengukuran lainnya. Pilih fungsi pengukuran yang diinginkan dengan tombol **(6)**[**+**] atau

tombol **(3)** [**–**] Fungsi pengukuran. Aktifkan fungsi pengukuran dengan tombol **(2)** [**Func**] atau dengan tombol pengukuran **(5)** [▲].

Tiga pengaturan tersedia untuk bidang acuan pengukuran (lihat „Memilih bidang acuan (lihat gambar **A**)“, Halaman 95).

Letakkan alat pengukur pada titik awal pengukuran yang diinginkan (misalnya dinding).

Catatan: Jika alat pengukur telah dihidupkan dengan tombol on/off/kembali **(8)**[⏻], tekan singkat tombol pengukuran **(5)** [▲] untuk mengaktifkan laser.

Untuk memulai pengukuran, tekan singkat tombol pengukuran **(5)** [▲]. Lalu sinar laser akan dinonaktifkan. Ulangi prosedur ini untuk pengukuran selanjutnya.

▶ **Jangan mengarahkan sinar laser pada orang lain atau binatang dan jangan melihat ke sinar laser, juga tidak dari jarak jauh.**

Catatan: Nilai pengukuran biasanya muncul dalam waktu 0,5 detik dan paling lambat setelah sekitar 4 detik. Durasi pengukuran bergantung pada jarak, kondisi cahaya dan karakter pantulan permukaan target. Setelah pengukuran selesai, sinar laser akan dinonaktifkan secara otomatis.

Memilih bidang acuan (lihat gambar A)

Untuk pengukuran, Anda dapat memilih antara tiga bidang acuan yang berbeda:

– tepi belakang alat pengukur (misalnya saat mengukur dari dinding),
– tepi depan alat pengukur (misalnya saat mengukur dari tepi meja),
– bagian tengah ulir **(14)** (misalnya untuk mengukur dengan tripod)

Tekan tombol **(7)**[☼] untuk memilih bidang acuan. Selanjutnya pilih pengaturan "Bidang acuan" dengan tombol pengukuran **(5)** [▲] atau dengan tombol **(2)** [**Func**]. Lalu pilih bidang acuan yang diinginkan dengan tombol **(6)**[**+**] atau tombol **(3)** [**–**]. Bidang acuan yang dipilih terakhir kali akan diatur sebelumnya begitu alat pengukur dihidupkan.

Menu "Pengaturan" (lihat gambar B)

Untuk mengakses menu "Pengaturan" **(j)**, tekan tombol **(7)** [☼].

Pilih pengaturan yang diinginkan dengan tombol **(6)**[**+**] atau tombol **(3)** [**–**] dan konfirmasi dengan tombol pengukuran **(5)** [▲] atau dengan tombol **(2)** [**Func**].
Pilih pengaturan yang diinginkan dengan tombol **(6)**[**+**] atau tombol **(3)** [**–**] dan konfirmasi dengan tombol pengukuran **(5)** [▲] atau tombol **(2)**[**Func**].

Untuk keluar dari menu "Pengaturan", tekan singkat tombol on/off/kembali **(8)** [⏻].

Mengaktifkan/menonaktifkan bunyi 🔊

Bunyi diaktifkan pada pengaturan dasar.

Mengaktifkan/menonaktifkan getaran

Getaran diaktifkan pada pengaturan dasar.

Getaran pada alat pengukur dapat berguna misalnya dalam situasi yang bising. Dua getaran singkat menandakan bahwa pengukuran berhasil, getaran yang panjang menandakan bahwa pengukuran tidak tepat.

Pencahayaan display

Pencahayaan display diaktifkan secara permanen. Apabila tidak ada tombol yang ditekan, pencahayaan display akan meredup setelah sekitar 20 detik untuk menghemat daya baterai.

Mode hemat baterai

Mode hemat baterai dinonaktifkan pada pengaturan dasar. Ketika mode hemat baterai diaktifkan, bunyi dan getaran akan dinonaktifkan dan kecerahan display akan dikurangi. Dengan begitu, masa pengoperasian baterai menjadi lebih panjang.

Mengubah satuan ukur ft/m

Satuan ukur dalam pengaturan dasar adalah "m" (meter). Terdapat enam satuan ukur yang berbeda. Atur satuan ukur yang tepat sesuai tujuan.

Mengatur bahasa

Saat menghidupkan alat pengukur untuk pertama kali, pengguna diminta untuk mengatur bahasa favorit untuk teks display.

Bahasa yang diatur dapat diubah setiap saat.

PRO360 PRO

Aktivasi pertama kali harus dilakukan. Pengiriman data hanya dapat dilakukan dengan program PC atau aplikasi yang sesuai. Setelah baterai diganti, alat pengukur harus dihidupkan untuk memulai kembali PRO360. PRO360 dapat dinonaktifkan kembali setiap saat. Temukan informasi lebih lanjut mengenai PRO360 di www.pro360.com.

Informasi perangkat i

Temukan informasi mengenai alat pengukur seperti misalnya nomor seri dan versi perangkat lunak di sini.

Pengaturan pabrik

Fungsi ini digunakan untuk mengatur ulang alat pengukur ke pengaturan pabrik/ pengaturan dasar. Setelah diatur ulang, pengguna diminta untuk mengatur bahasa favorit untuk display.

Fungsi pengukuran

Fungsi bantuan (lihat gambar C)

Untuk memilih fungsi pengukuran, tekan tombol **(2)** [**Func**]. Pilih fungsi pengukuran yang diinginkan dengan tombol **(6)**[**+**] atau tombol **(3)** [**–**].

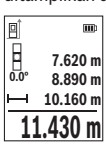
Tekan tombol **(7)** [☼] untuk memulai fungsi bantuan. Fungsi bantuan menampilkan prosedur rinci untuk fungsi pengukuran yang dipilih.

Pengukuran panjang

Pilih pengukuran panjang ⊢⊣.

Untuk mengaktifkan sinar laser, tekan singkat tombol pengukuran **(5)**[▲].

Untuk mengukur, tekan singkat tombol pengukuran **(5)**[▲]. Hasil pengukuran ditampilkan di display bagian bawah.



Ulangi langkah di atas saat setiap kali mengukur. Nilai ukur terakhir terletak pada display bagian bawah, nilai kedua terakhir berada di atasnya dan seterusnya.

Pengukuran kontinu

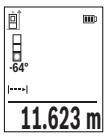
Saat melakukan pengukuran kontinu, alat pengukur dapat digerakkan bergantung target dengan nilai pengukuran yang diperbarui sekitar setiap 0,5 detik. Pengguna dapat menjauh misalnya dari dinding hingga ke suatu jarak yang diinginkan selama jarak saat ini selalu dapat terbaca.

Pilih pengukuran kontinu ⊢···⊣. Pilih salah satu fungsi berikut:

- min/maks: Nilai pengukuran terkecil dan terbesar ditampilkan secara permanen pada display (lihat gambar **I**).
- Angka tinggi: Nilai pengukuran ditampilkan dengan diperbesar agar lebih mudah terbaca (lihat gambar **J**).
- Pita pengukur: Jarak ditampilkan secara visual seperti pada pita pengukur (lihat gambar **K**). **Catatan**: Pada fungsi pita pengukur, jarak ke penanda akan ditampilkan pada display. Ujung alat pengukur **bukan** acuan.

Untuk mengaktifkan sinar laser, tekan singkat tombol pengukuran **(5)** [▲].

Gerakkan alat pengukur beberapa saat hingga jarak yang diinginkan muncul pada display di bagian bawah.



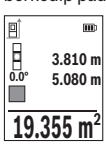
Dengan menekan singkat tombol pengukuran **(5)** [▲], pengukuran kontinu akan dibatalkan. Nilai pengukuran saat ini akan ditampilkan pada display bagian bawah. Menekan kembali tombol pengukuran **(5)** [▲] akan memulai ulang pengukuran kontinu.

Pengukuran kontinu akan berhenti secara otomatis setelah 4 menit.

Pengukuran luas

Pilih pengukuran luas □.

Kemudian ukur lebar dan panjang secara bergantian seperti dalam pengukuran panjang. Di antara dua pengukuran tersebut, sinar laser tetap menyala. Jarak yang diukur akan berkedip pada display untuk pengukuran luas □.



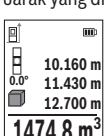
Nilai pengukuran pertama ditampilkan pada display bagian atas.

Setelah pengukuran kedua selesai, luas permukaan secara otomatis dihitung dan ditampilkan. Hasil akhir pengukuran terletak di display bagian bawah, nilai pengukuran tunggal terletak di atasnya.

Pengukuran volume

Pilih pengukuran volume ⬚.

Kemudian ukur lebar, panjang dan kedalaman secara bergantian seperti dalam pengukuran panjang. Di antara tiga pengukuran tersebut, sinar laser tetap menyala. Jarak yang diukur akan berkedip pada display untuk pengukuran volume ⬚.



Nilai pengukuran pertama ditampilkan pada display bagian atas.

Setelah pengukuran ketiga selesai, volume secara otomatis dihitung dan ditampilkan. Hasil akhir pengukuran terletak di display bagian bawah, nilai pengukuran tunggal terletak di atasnya.

Pengukuran jarak tidak langsung

Pada pengukuran jarak tidak langsung, terdapat tiga fungsi pengukuran, masing-masing fungsi dapat digunakan untuk menentukan setiap jarak yang berbeda.

Pengukuran jarak tidak langsung digunakan untuk menentukan jarak yang tidak dapat diukur secara langsung karena ada sesuatu yang menghalangi jalannya sinar atau tidak ada permukaan target yang tersedia sebagai reflektor. Cara pengukuran ini hanya dapat dilakukan dalam arah vertikal. Segala selisih dalam arah horizontal akan menyebabkan kesalahan dalam pengukuran.

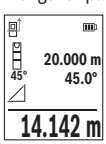
Catatan: Pengukuran jarak tidak langsung selalu tidak akurat dibandingkan dengan pengukuran jarak langsung. Kesalahan pengukuran dapat lebih besar daripada pengukuran langsung tergantung pada penggunanya. Untuk akurasi pengukuran yang lebih baik, kami menyarankan untuk menggunakan sebuah tripod (aksesori).

Sinar laser akan tetap menyala di antara pengukuran tunggal.

a) Pengukuran tinggi tidak langsung (lihat gambar D)

Pilih pengukuran tinggi tidak langsung ◿.

Pastikan alat pengukur berada pada ketinggian yang sama dengan titik pengukuran bawah. Lalu miringkan alat pengukur pada bidang acuan dan ukur jarak **"1"** seperti saat mengukur panjang (pada display ditampilkan dengan garis merah).



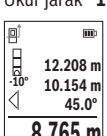
Setelah pengukuran selesai dilakukan, hasil untuk jarak **"X"** yang dicari akan ditampilkan pada baris hasil pengukuran **(e)**. Nilai pengukuran untuk jarak **"1"** dan sudut **"α"** terletak pada baris nilai pengukuran **(d)**.

b) Pengukuran tinggi ganda tidak langsung (lihat gambar E)

Alat pengukur dapat mengukur secara tidak langsung semua jarak yang terletak pada bidang vertikal alat pengukur.

Pilih pengukuran tinggi ganda tidak langsung ◺.

Ukur jarak **"1"** dan **"2"** dalam urutan ini seperti saat mengukur panjang.



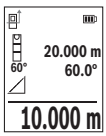
Setelah pengukuran selesai dilakukan, hasil untuk jarak **"X"** yang dicari akan ditampilkan pada baris hasil pengukuran **(e)**. Nilai pengukuran untuk jarak **"1"**, **"2"** dan sudut **"α"** terletak pada baris nilai pengukuran **(d)**.

Pastikan bidang acuan pengukuran (misalnya tepi belakang alat pengukur) tetap berada pada posisi yang sama pada semua pengukuran tunggal dalam prosedur pengukuran.

c) Pengukuran panjang tidak langsung (lihat gambar F)

Pilih pengukuran panjang tidak langsung ◿.

Pastikan alat pengukur berada pada ketinggian yang sama dengan titik ukur yang dicari. Lalu miringkan alat pengukur pada bidang acuan dan ukur jarak **"1"** seperti saat mengukur panjang.



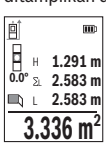
Setelah pengukuran selesai dilakukan, hasil untuk jarak **"X"** yang dicari akan ditampilkan pada baris hasil pengukuran **(e)**. Nilai pengukuran untuk jarak **"1"** dan sudut **"α"** terletak pada baris nilai pengukuran **(d)**.

Pengukuran luas dinding (lihat gambar G)

Pengukuran luas dinding digunakan untuk menentukan jumlah dari beberapa bidang tunggal dengan ketinggian yang sama. Pada contoh yang digambarkan, luas keseluruhan beberapa dinding perlu ditentukan yang memiliki ketinggian ruang yang sama **H** namun panjang **L** yang berbeda.

Pilih pengukuran luas dinding.

Ukur ketinggian ruang **H** seperti saat mengukur panjang. Nilai pengukuran akan ditampilkan di baris nilai pengukuran bagian atas. Sinar laser tetap menyala.



Kemudian ukur panjang $\mathbf{L}_1$ dinding pertama. Luas akan secara otomatis dihitung dan ditampilkan pada baris hasil pengukuran **(e)**. Nilai pengukuran panjang terakhir terletak di baris nilai pengukuran **(d)** bagian bawah. Sinar laser tetap menyala.

Selanjutnya, ukur panjang $\mathbf{L}_2$ dinding kedua. Nilai pengukuran tunggal yang ditampilkan pada baris nilai pengukuran **(d)** akan ditambahkan ke panjang $\mathbf{L}_1$. Jumlah kedua panjang (ditampilkan di baris nilai pengukuran **(d)** bagian tengah) akan dikalikan dengan tinggi **H** yang telah tersimpan. Nilai luas keseluruhan akan ditampilkan pada baris hasil pengukuran **(e)**.

Panjang $\mathbf{L}_X$ lainnya yang ditambahkan secara otomatis dan dikalikan dengan tinggi **H** dapat diukur secara opsional. Syarat penghitungan luas permukaan yang benar yakni panjang yang telah diukur pertama (sebagai contoh, tinggi ruang **H**) identik untuk semua luas permukaan parsial.

Fungsi peninjau (lihat gambar H)

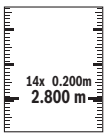
Fungsi peninjau akan mengukur panjang yang ditentukan (jarak) secara berulang. Panjang ini dapat dikirimkan ke permukaan untuk memungkinkan pemotongan material dengan panjang potongan yang sama atau untuk mengatur dinding partisi pada konstruksi drywall. Panjang minimal yang dapat diatur sebesar 0,1 m, panjang maksimal sebesar 50 m.

Catatan: Pada fungsi peninjau, jarak ke penanda akan ditampilkan pada display. Ujung alat pengukur **bukan** acuan.

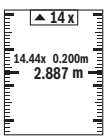
Pilih fungsi peninjau.

Atur panjang yang diinginkan dengan tombol **(6)**[**+**] atau tombol **(3)** [**–**].

Mulai fungsi peninjau dengan menekan tombol pengukuran **(5)**[▲] dan jauhkan diri Anda secara perlahan dari titik awal.



Alat pengukur terus mengukur jarak ke titik awal. Saat pengukuran, panjang yang telah ditentukan serta nilai pengukuran saat ini akan ditampilkan. Panah atas atau bawah menunjukkan jarak terkecil untuk penandaan terakhir atau berikutnya.



Koefisien kiri menunjukkan seberapa sering panjang yang ditentukan yang telah tercapai. Nilai pengukuran hijau menunjukkan suatu panjang telah tercapai untuk tujuan penandaan.

Nilai pengukuran biru menunjukkan nilai sebenarnya ketika nilai referensi berada di luar display.

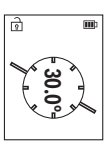
Pengukuran kemiringan/waterpas digital

Pilih pengukuran kemiringan/waterpas digital .

Alat pengukur beralih secara otomatis di antara dua kondisi.

Waterpas digital digunakan untuk menguji arah vertikal atau horizontal suatu objek (misalnya mesin cuci, kulkas, dll).

Jika sudut kemiringan 3° terlampaui, bola pada display akan menyala merah.



Pengukuran kemiringan digunakan untuk mengukur tanjakan atau kemiringan (misalnya pada tangga, selusur pagar, saat mengukur mebel, saat mengatur posisi pipa, dll.).

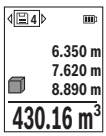
Sisi kiri alat pengukur digunakan sebagai bidang acuan untuk mengukur kemiringan.

Tampilan nilai yang disimpan

Nilai atau hasil akhir dari tiap pengukuran yang telah selesai akan tersimpan secara otomatis.

Maksimal 30 nilai (nilai pengukuran atau hasil akhir pengukuran) yang dapat diakses.

Pilih fungsi memori [].



Pada display bagian atas, di nilai memori terkait bagian bawah dan fungsi pengukuran terkait sebelah kiri akan ditampilkan angka nilai memori.

Tekan tombol **(6)** [**+**] untuk menggulir ke depan pada nilai yang tersimpan.

Tekan tombol **(3)** [**–**] untuk menggulir ke belakang pada nilai yang tersimpan.

Nilai terlama berada pada posisi 1 di memori, nilai terbaru berada pada posisi 30 (jika terdapat 30 nilai memori yang tersedia). Saat menyimpan nilai selanjutnya, nilai terlama di memori akan selalu terhapus.

Menghapus memori

Untuk menghapus satu nilai memori, pilih nilai berikut (lihat „Tampilan nilai yang disimpan“, Halaman 101). Untuk menghapus, tekan tombol on/off/kembali **(8)** [ ] terlebih dulu lalu konfirmasi dengan tombol **(2)** [**Func**].

Untuk menghapus keseluruhan isi memori, tekan tombol **(7)**[ ] dan pilih fungsi . Lalu tekan tombol **(6)** [**+**] dan konfirmasi dengan tombol **(2)** [**Func**].

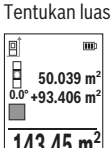
Menambah/mengurangi nilai

Nilai pengukuran atau hasil akhir pengukuran dapat ditambah atau dikurangi.

Menambah nilai

Contoh berikut ini menggambarkan penambahan luas:

Tentukan luas sesuai dengan bagian "Pengukuran luas" Pengukuran luas.



Tekan tombol **(6)**[**+**]. Simbol **"+"** dan permukaan yang dihitung akan ditampilkan.

Tekan tombol pengukuran **(5)** [▲] untuk memulai pengukuran luas selanjutnya. Tentukan luas sesuai dengan bagian "Pengukuran luas" Pengukuran luas. Begitu pengukuran kedua selesai, hasil pengukuran luas kedua akan ditampilkan pada display bagian bawah. Untuk menampilkan hasil akhir pengukuran, tekan ulang tombol pengukuran **(5)**[▲].

Catatan: Saat mengukur panjang, hasil akhir pengukuran akan segera ditampilkan.

Untuk keluar dari penambahan, tekan tombol **(2)** [**Func**].

Mengurangi nilai

Untuk mengurangi nilai, tekan tombol **(3)** [**–**]. Prosedur selanjutnya sama dengan "Menambahkan nilai".

Menghapus nilai pengukuran

Dengan menekan singkat tombol on/off/kembali **(8)**[⌀], nilai pengukuran yang ditetapkan terakhir kali dapat dihapus pada semua fungsi pengukuran. Dengan menekan singkat tombol on/off/kembali **(8)**[⌀] beberapa kali, nilai pengukuran akan dihapus dalam urutan sebaliknya.

Petunjuk pengoperasian

▶ **Alat pengukur dilengkapi dengan antarmuka nirkabel. Perhatikan batasan pengoperasian lokal, misalnya dalam pesawat terbang atau di rumah sakit.**

Petunjuk umum

Lensa penerima **(15)**, output sinar laser **(16)** tidak boleh tertutupi saat melakukan pengukuran.

Selama pengukuran dilakukan, alat pengukur tidak boleh digerakkan (kecuali pada fungsi pengukuran kontinu dan pengukuran kemiringan). Untuk itu, sebisa mungkin letakkan alat pengukur pada permukaan yang kokoh dan dapat menopang dengan baik.

Pengaruh terhadap rentang pengukuran

Jangkauan pengukuran bergantung pada kondisi pencahayaan dan karakter pemantulan permukaan target. Untuk meningkatkan visibilitas sinar laser pada cahaya sekitar yang kuat, gunakan kacamata laser **(20)** (aksesori) dan panel sasaran laser **(19)** (aksesori), atau bayangi permukaan target.

Efek dan pengaruh pada hasil pengukuran

Karena efek fisik, kesalahan pengukuran yang terjadi saat mengukur pada permukaan yang berbeda tidak dapat dihindari. Termasuk:

- permukaan transparan (misalnya kaca, air),
- permukaan yang memantulkan bayangan (misalnya logam yang mengilap, kaca),
- permukaan berpori (misalnya bahan insulasi)
- permukaan berstruktur (misalnya permukaan plester kasar, batu alam).

Jika perlu, gunakan reflektor (alat pemantulan) sinar laser **(19)** (aksesori) pada permukaan tersebut.

Kesalahan pengukuran juga dapat terjadi jika melihat permukaan target yang miring.

Selain itu, lapisan udara dengan suhu yang berbeda atau pantulan yang diterima secara tidak langsung dapat memengaruhi nilai pengukuran.

Pemeriksaan akurasi dan kalibrasi pengukuran kemiringan (lihat gambar L)

Periksa akurasi pengukuran kemiringan secara berkala. Lakukan dengan melakukan pengukuran pembalikan. Untuk melakukannya, letakkan alat pengukur pada meja dan

ukur kemiringannya. Putar alat pengukur sebesar 180° dan ukur kembali kemiringannya. Selisih nilai yang ditampilkan tidak boleh melebihi 0,3°.

Apabila terdapat selisih yang lebih besar, alat pengukur harus dikalibrasi ulang. Untuk melakukannya, pilih dalam pengaturan. Ikuti petunjuk pada display.

Jika alat mengalami benturan atau perubahan suhu yang besar, direkomendasikan agar dilakukan pemeriksaan akurasi dan bila perlu kalibrasi alat pengukur. Setelah mengalami perubahan suhu, suhu alat pengukur harus disesuaikan beberapa saat sebelum dilakukan kalibrasi.

Pemeriksaan akurasi pengukuran jarak

Anda dapat memeriksa ketepatan alat pengukur sebagai berikut:

– Pilih satu jarak pengukuran yang tidak berubah-ubah sebesar kira-kira 3 sampai 10 m yang panjangnya diketahui dengan pasti (misalnya lebar ruangan, ukuran pintu). Pengukuran harus dijalankan dalam kondisi yang baik, misalnya bagian yang diukur harus berada dalam ruangan dan permukaan target harus licin dan mengkilap.
– Ukur jarak 10 kali secara berurutan.

Penyimpangan pengukuran tunggal dari nilai rata-rata tidak boleh lebih dari ±4 mm terhadap total bagian yang diukur pada kondisi yang baik. Catat pengukuran untuk membandingkan ketepatan pengukuran dengan waktu berikutnya

Bekerja dengan tripod (aksesori)

Tripod sangat diperlukan saat melakukan pengukuran jarak yang lebih besar. Letakkan alat pengukur dengan ulir 1/4" **(14)** pada pelat penggantian cepat tripod **(21)** atau tripod foto pada umumnya. Kencangkan alat pengukur dengan baut pengunci pada pelat penggantian cepat.

Atur bidang acuan untuk pengukuran dengan tripod pada pengaturan (lihat „Memilih bidang acuan (lihat gambar **A**)“, Halaman 95).

Klip sabuk (aksesori) (lihat gambar M)

Dengan klip sabuk **(17)**, alat pengukur dapat dikaitkan ke sabuk dengan mudah.

Laporan kesalahan

Jika pengukuran tidak dapat dilakukan dengan benar, laporan kesalahan "Error" akan muncul pada display. Mulai ulang pengukuran.

Alat pengukur menjaga fungsi yang benar untuk setiap pengukuran. Jika ditemukan kerusakan, display hanya akan menunjukkan simbol yang berdekatan dan alat pengukur mati dengan sendirinya. Pada situasi tersebut, bawa alat pengukur ke dealer layanan pelanggan Bosch.

Perawatan dan servis

Perawatan dan pembersihan

Simpan dan bawalah alat pengukur hanya di dalam tas pelindung **(23)** yang disertakan.

Jaga kebersihan alat.

Jangan memasukkan alat pengukur ke dalam air atau cairan lainnya.

Jika alat kotor, bersihkan dengan lap yang lembut dan lembap. Jangan gunakan bahan pembersih atau zat pelarut.

Rawat lensa penerima **(15)** secara khusus, sama halnya seperti merawat kacamata atau lensa kamera.

Jika alat akan dibawa untuk diperbaiki, simpan alat pengukur ke dalam kantong pengamannya **(23)** lalu serahkan bersama dengan kantongnya untuk diperbaiki.

Layanan pelanggan dan konsultasi penggunaan

Layanan pelanggan Bosch menjawab semua pertanyaan Anda tentang reparasi dan perawatan serta tentang suku cadang produk ini. Gambaran teknis (exploded view) dan informasi mengenai suku cadang dapat ditemukan di: **www.bosch-pt.com**
Tim konsultasi penggunaan Bosch akan membantu Anda menjawab pertanyaan seputar produk kami beserta aksesorinya.

Jika Anda hendak menanyakan sesuatu atau memesan suku cadang, selalu sebutkan nomor model yang terdiri dari 10 angka dan tercantum pada label tipe produk.

Indonesia
PT Robert Bosch
Palma Tower 10th Floor
Jalan RA Kartini II-S Kaveling 6
Pondok Pinang, Kebayoran Lama
Jakarta Selatan 12310
Tel.: (021) 3005 5800
Fax: (021) 3005 5801
E-Mail: boschpowertools@id.bosch.com
www.bosch-pt.co.id

Alamat layanan lainnya dapat ditemukan di:
www.bosch-pt.com/serviceaddresses

Tiếng Việt

Hướng dẫn an toàn

Phải đọc và chú ý mọi hướng dẫn để đảm bảo an toàn và không bị nguy hiểm khi làm việc với dụng cụ đo. Khi sử dụng dụng cụ đo không phù hợp với các hướng dẫn ở trên, các thiết bị bảo vệ được tích hợp trong dụng cụ đo có thể bị suy giảm. Không bao giờ được làm cho các dấu hiệu cảnh báo trên dụng cụ đo không thể đọc được. HÃY BẢO QUẢN CẨN THẬN CÁC HƯỚNG DẪN NÀY VÀ ĐƯA KÈM THEO KHI BẠN CHUYỂN GIAO DỤNG CỤ ĐO.

- **Thận trọng - nếu những thiết bị khác ngoài thiết bị hiệu chỉnh hoặc thiết bị điều khiển được nêu ở đây được sử dụng hoặc các phương pháp khác được tiến hành, có thể dẫn đến phơi nhiễm phóng xạ nguy hiểm.**
- **Máy đo được dán nhãn cảnh báo laser (được đánh dấu trong mô tả máy đo ở trang đồ thị).**
- **Nếu văn bản của nhãn cảnh báo laser không theo ngôn ngữ của bạn, hãy dán chồng nhãn dính được cung cấp kèm theo bằng ngôn ngữ của nước bạn lên trên trước khi sử dụng lần đầu tiên.**

Không được hướng tia laze vào người hoặc động vật và không được nhìn vào tia laze trực tiếp hoặc phản xạ. Bởi vì bạn có thể chiếu lóa mắt người, gây tai nạn hoặc gây hỏng mắt.

- **Nếu tia laze hướng vào mắt, bạn phải nhắm mắt lại và ngay lập tức xoay đầu để tránh tia laze.**
- **Không thực hiện bất kỳ thay` đổi nào ở thiết bị laser.**
- **Không sử dụng kính nhìn tia laser (Phụ kiện) làm kính bảo vệ.** Kính nhìn tia laser dùng để nhận biết tốt hơn tia laser; tuy nhiên kính không giúp bảo vệ mắt khỏi tia laser.
- **Không sử dụng kính nhìn tia laser (Phụ kiện) làm kính mát hoặc trong giao thông đường bộ.** Kính nhìn tia laser không chống UV hoàn toàn và giảm thiểu thụ cảm màu sắc.

- **Chỉ để người có chuyên môn được đào tạo sửa dụng cụ đo và chỉ dùng các phụ tùng gốc để sửa chữa.** Điều này đảm bảo cho sự an toàn của dụng cụ đo được giữ nguyên.
- **Không để trẻ em sử dụng dụng cụ đo laser khi không có người lớn giám sát.** Có thể vô tình làm lóa mắt người khác hoặc làm lóa mắt chính bản thân.
- **Không làm việc với dụng cụ đo trong môi trường dễ nổ, mà trông đó có chất lỏng, khí ga hoặc bụi dễ cháy.** Các tia lửa có thể hình thành trong dụng cụ đo và có khả năng làm rác cháy hay ngún khói.
- **Cẩn thận! Nếu sử dụng máy đo với cổng *Bluetooth*® có thể gây nhiễu các dụng cụ, thiết bị khác cũng như máy bay và dụng cụ y tế (ví dụ: máy tạo nhịp tim, máy trợ thính). Và cũng không thể loại trừ hoàn toàn những tổn hại cho người và động vật ở môi trường trực diện xung quanh. Không sử dụng máy đo có kết nối *Bluetooth*® ở gần những thiết bị y tế, trạm xăng, cơ sở hóa học, các khu vực có nguy cơ gây nổ và các khu vực cháy nổ. Không sử dụng máy đo có kết nối *Bluetooth*® trên máy bay. Tránh để máy hoạt động gần cơ thể trong thời gian dài.**

Biểu tượng chữ *Bluetooth*® cũng như biểu tượng ảnh (các logo) do công ty cổ phần Bluetooth SIG đăng ký nhãn hiệu và sở hữu. Công ty trách nhiệm hữu hạn Robert Bosch Power Tools GmbH đã được cấp phép để sử dụng những biểu tượng chữ/biểu tượng ảnh này với sản phẩm của mình.

Mô Tả Sản Phẩm và Đặc Tính Kỹ Thuật

Sử dụng đúng cách

Dụng cụ đo lường được thiết kế để đo độ xa, độ dài, chiều cao, khoảng cách, độ nghiêng và để tính toán diện tích và thể tích.

Dụng cụ đo thích hợp để sử dụng trong nhà.

Kết quả đo có thể được gửi qua *Bluetooth*® đến các thiết bị khác.

Các bộ phận được minh họa

Sự đánh số các biểu trưng của sản phẩm là để tham khảo hình minh họa dụng cụ đo trên trang hình ảnh.

(1) Nút *Bluetooth*®

(2) Nút chức năng [**Func**]

(3) Nút trừ/bên trái **[–]**
(4) Hiển thị
(5) Nút đo [▲]
(6) Nút cộng/bên phải **[+]**
(7) Nút Các thiết lập ban đầu [⚙]
(8) Nút Bật/Tắt/Quay lại [⏻]
(9) Lỗ móc của vòng treo[a)]
(10) Nhãn cảnh báo laser
(11) Mã seri sản xuất
(12) Lấy cài nắp đậy pin
(13) Nắp đậy pin
(14) 1/4"-Lỗ cắm giá ba chân
(15) Thấu kính
(16) Lỗ chiếu luồng laser
(17) Kẹp đai[a)]
(18) Vít[a)] của kẹp đai[a)]
(19) Bảng đích tia laser[a)]
(20) Kính nhìn tia laser[a)]
(21) Giá đỡ ba chân[a)]
(22) Vòng treo[a)]
(23) Túi xách bảo vệ

a) **Phụ tùng được trình bày hay mô tả không phải là một phần của tiêu chuẩn hàng hóa được giao kèm theo sản phẩm. Bạn có thể tham khảo tổng thể các loại phụ tùng, phụ kiện trong chương trình phụ tùng của chúng tôi.**

Phần tử chỉ thị (Chọn)

(a) Điểm xuất phát đo chuẩn
(b) Trạng thái kết nối

ᛒ	*Bluetooth®* được kích hoạt, kết nối không được tạo
ᛒ•	Kích hoạt, tạo kết nối *Bluetooth®*

(c) Hiển thị pin
(d) Các hàng giá trị đo được

(e) Hàng kết quả
(f) Chức năng đo
(g) Hiển thị góc nghiêng
(h) Thanh trạng thái
(i) Hiển thị màn hình các chức năng đo
(j) Hiển thị màn hình các cài đặt ban đầu
(k) Hiển thị màn hình các cài đặt khác

Thông số kỹ thuật

Máy đo khoảng cách laser	GLM 50-27 CG
Mã hàng	**3 601 K72 U..**
Đo khoảng cách	
Phạm vi đo	0,05–50 m[A)]
Biên độ đo (trong điều kiện đo khó)	0,05–20 m[B)]
Sai số	± 1,5 mm[A)]
Sai số (trong điều kiện đo khó)	± 3,0 mm[B)]
Đơn vị biểu thị thấp nhất	0,5 mm
Đo gián tiếp khoảng cách và bọt thủy	
Phạm vi đo	0°–360° (4 x 90°)
Đo độ dốc	
Phạm vi đo	0°–360° (4 x 90°)
Sai số (tiêu biểu)	± 0,2° [C)D)]
Đơn vị biểu thị thấp nhất	0,1°
Giới thiệu chung	
Nhiệt độ hoạt động	–10 °C ...+45 °C[E)]
Nhiệt độ lưu kho	–20 °C ...+70 °C
Độ ẩm không khí tương đối tối đa	90%
Chiều cao ứng dụng tối đa qua chiều cao tham chiếu	2000 m
Mức độ bẩn theo IEC 61010-1	2[F)]
Cấp độ laser	2

Máy đo khoảng cách laser	**GLM 50-27 CG**
Loại laser	515 nm, < 1 mW
Phân kỳ tia laser	< 1,5 mrad (Góc đầy)
Tắt tự động sau khoảng	
– Điểm laser	20 s
– Dụng cụ đo (khi không đo)	5 phút[G)]
Trọng lượng theo Qui trình EPTA-Procedure 01:2014	0,17 kg
Kích thước	119 x 53 x 29 mm
Mức độ bảo vệ	IP 65 (được bảo vệ chống bụi và tia nước)
Bộ nguồn	2 x 1,5 V LR6 (AA)
Điều chỉnh đơn vị đo	m, ft, in
Truyền dữ liệu	
Bluetooth®	*Bluetooth*® (4.2 năng lượng thấp)[H)]
Dải tần số hoạt động	2402–2480 MHz

Máy đo khoảng cách laser	**GLM 50-27 CG**
Công suất phát tối đa	8 mW

A) Đo từ mép phía trước của dụng cụ đo, áp dụng cho mục tiêu có khả năng phản xạ cao (ví dụ như một bức tường sơn trắng), ánh sáng nền yếu và nhiệt độ làm việc là 25 °C. Thêm vào đó cần tính tới một mức sai lệch phụ thuộc khoảng cách khoảng ± 0,05 mm/m.

B) Đo từ mép phía trước của dụng cụ đo, áp dụng cho mục tiêu có khả năng phản xạ cao (ví dụ như một bức tường sơn trắng), ánh sáng nền mạnh và nhiệt độ làm việc là 25 °C. Thêm vào đó cần tính tới một mức sai lệch phụ thuộc khoảng cách khoảng ± 0,15 mm/m.

C) Sau khi hiệu chỉnh người dùng ở 0° và 90°; lỗi độ nghiêng bổ sung ±0,01°/độ đến 45° (tối đa) cần được lưu ý. Cạnh trái của dụng cụ đo được dùng làm mặt phẳng tham chiếu để đo độ nghiêng.

D) Ở nhiệt độ hoạt động 25 °C

E) Trong chức năng Đo liên tục, nhiệt độ hoạt động tối đa là +40 °C.

F) Chỉ có chất bẩn không dẫn xuất hiện, nhưng đôi khi độ dẫn điện tạm thời gây ra do ngưng tụ.

G) *Bluetooth*® bị bỏ kích hoạt

H) Với các thiết bị *Bluetooth®* tiêu thụ năng lượng thấp, tùy thuộc vào model và hệ điều hành, có thể không cần các thiết lập kết nối. Các thiết bị *Bluetooth®* phải có tính năng hỗ trợ GATT profile.

Số xêri **(11)** đều được ghi trên nhãn mác, để dễ dàng nhận dạng loại máy đo.

Giao diện *Bluetooth*®

Truyền dữ liệu sang các thiết bị khác

Máy đo được trang bị một mô-đun *Bluetooth®* bằng kỹ thuật sóng vô tuyến cho phép truyền dữ liệu tới các thiết bị di động đầu cuối với giao diện *Bluetooth®* (ví dụ điện thoại thông minh, máy tính bảng).

Các thông tin về điều kiện hệ thống cần thiết cho việc kết nối *Bluetooth*® có thể tìm thấy trên trang Web của Bosch theo địa chỉ www.bosch-pt.com.

▶ **Thông tin tiếp theo xin vui lòng tìm trên trang sản phẩm Bosch.**

Khi truyền giữ liệu bằng *Bluetooth*® có thể sẽ xuất hiện thời gian ngưng (time delay) giữa thiết bị di động đầu cuối và máy đo. Điều này có thể là do khoảng cách giữa cả hai thiết bị hoặc do chính đối tượng đo.

Kích hoạt giao diện *Bluetooth*® để truyền dữ liệu tới một thiết bị di động đầu cuối

Hãy chắc chắn rằng, giao diện *Bluetooth*® trên thiết bị di động đầu cuối của bạn đã được kích hoạt.

Hãy nhấn nút **(1)** để mở menu *Bluetooth*® và nhấn lại nút **(1)** (hoặc nút **(6) [+]**) để kích hoạt giao diện *Bluetooth*®. Nếu phát hiện nhiều dụng cụ đo đã kích hoạt, hãy chọn dụng cụ đo phù hợp dựa theo số seri. Số seri **(11)** bạn hãy tìm trên nhãn thông tin nhận dạng dụng cụ đo. Trạng thái kết nối cũng như kết nối đang hoạt động **(b)** sẽ được hiển thị trong thanh trạng thái **(h)** của dụng cụ đo.

Các ứng dụng Bosch có sẵn để mở rộng phạm vi chức năng. Bạn có thể tải nó tùy theo thiết bị đầu cuối trong kho ứng dụng tương ứng.

Bỏ kích hoạt giao diện *Bluetooth*®

Hãy nhấn nút **(1)** để mở menu *Bluetooth*® và nhấn lại nút **(1)** (hoặc nút **(3) [–]**) để bỏ kích hoạt giao diện *Bluetooth*®.

Sự lắp vào

Lắp/thay ắc quy

Khuyến nghị nên sử dụng pin alkali-manganese hay pin Niken-kim loại hyđrua (đặc biệt là ở nhiệt độ vận hành thấp) cho sự hoạt động của dụng cụ đo.

Pin 1,2-V có thể có khả năng đo nhiều hơn so với pin 1,5-V phụ thuộc vào điện dung.

Để mở nắp đậy pin **(13)** bạn hãy nhấn lên khóa **(12)** và tháo nắp đậy pin ra. Lắp pin/pin nạp lại được. Xin hãy lưu ý lắp tương ứng đúng cực pin như được thể hiện mặt trong ngăn chứa pin.

Khi mức sạc ắc quy hoặc pin thấp, trên màn hình xuất hiện truy vấn kích hoạt chế độ tiết kiệm pin. Khi kích hoạt chế độ tiết kiệm pin, thời gian chạy pin sẽ được kéo dài và biểu tượng pin trên màn hình được đóng khung màu vàng (xem „Menu „Các cài đặt“ (xem Hình **B**)“, Trang 114).

Nếu biểu tượng pin cạn xuất hiện lần đầu tiên trên màn hình hiển thị, chỉ có thể thực hiện ít phép đo. Khi biểu tượng pin rỗng và nhấp nháy màu đỏ, không thể thực hiện phép đo nữa. Thay pin hoặc ắc quy.

Luôn luôn thay pin/pin nạp lại được cùng một thời điểm. Không được sử dụng pin/pin nạp lại được khác thương hiệu hay khác loại cùng chung với nhau.

- ▶ **Tháo ắc quy hoặc pin ra khỏi dụng cụ đo nếu bạn không muốn sử dụng thiết bị trong thời gian dài**. Khi cất giữ pin trong một thời gian dài, pin/pin nạp lại được có thể bị ăn mòn và tự phóng điện.

Vận Hành

Bắt Đầu Vận Hành

- ▶ **Không cho phép dụng cụ đo đang bật một cách không kiểm soát và hãy tắt dụng cụ đo sau khi sử dụng.** Tia Laser có thể chiếu vào những người khác.
- ▶ **Bảo vệ dụng cụ đo tránh khỏi ẩm ướt và không để bức xạ mặt trời chiếu trực tiếp vào.**
- ▶ **Không cho dụng cụ đo tiếp xúc với nhiệt độ khắc nghiệt hoặc dao động nhiệt độ.** Không để nó trong chế độ tự động quá lâu. Điều chỉnh nhiệt độ cho dụng cụ đo khi có sự dao động nhiệt độ lớn, trước khi bạn đưa nó vào vận hành. Trong trường hợp ở trạng thái nhiệt độ cực độ hay nhiệt độ thay đổi thái quá, sự chính xác của dụng cụ đo có thể bị hư hỏng.
- ▶ **Tránh va chạm mạnh hoặc làm rơi dụng cụ đo.** Sau khi có tác động mạnh từ bên ngoài lên dụng cụ đo, cần tiến hành kiểm tra độ chính xác trước khi tiếp tục (xem „Kiểm tra độ chính xác và hiệu chỉnh đo độ dốc (xem Hình **L**)“, Trang 123) và (xem „Kiểm tra độ chính xác của việc đo khoảng cách“, Trang 123).
- ▶ **Máy đo được trang bị một giao diện sóng vô tuyến. Hãy chú ý các giới hạn địa điểm hoạt động ví dụ như trên máy bay hoặc bệnh viện.**

Bật/tắt

– Để **Bật** dụng cụ đo và tia laze, bạn hãy ấn nhanh vào nút đo **(5)** [▲].

– Để **Bật** dụng cụ đo và tia laze, bạn hãy ấn nhanh vào nút bật/tắt/quay lại **(8)** [ ].

- ▶ **Không được chĩa luồng laze vào con người hay động vật và không được tự chính bạn nhìn vào luồng laze, ngay cả khi từ một khoảng cách lớn.**

Khi bật dụng cụ đo lần đầu tiên, bạn sẽ được yêu cầu đặt ngôn ngữ ưa tiên cho văn bản hiển thị.

Để **Tắt** dụng cụ đo, bạn hãy nhấn giữ nút bật/tắt/quay lại **(8)** [ ].

Khi tắt dụng cụ đo, các giá trị và các thiết lập thiết bị hiện có trong bộ nhớ sẽ được giữ lại.

Quy trình đo

Sau khi bật lên lần đầu tiên, dụng cụ đo ở chế độ đo độ dài. Sau mỗi lần bật khác, dụng cụ đo sẽ ở chức năng đo đã sử dùng gần đây. Để dùng chức năng đo khác hãy nhấn nút **(2)** [**Func**]. Hãy chọn chức năng đo mong muốn bằng nút **(6)** [**+**] hoặc nút **(3)** [**–**] Các chức năng đoKích hoạt chức năng đo bằng nút **(2)** [**Func**] hoặc bằng nút đo **(5)** [▲].

Có sẵn ba cài đặt cho mặt phẳng tham chiếu đo (xem „Chọn mặt phẳng tham chiếu (xem Hình **A**)“, Trang 114).

Đặt dụng cụ đo ở điểm đầu tiên muốn đo (ví dụ như bức tường).

Hướng dẫn: Nếu đã bật dụng cụ đo bằng nút bật/tắt/quay lại **(8)** [ ], bạn ấn nhanh nút đo **(5)** [▲] để bật laser.

Nhấn nút đo để kích hoạt đo **(5)** [▲]. Sau đó, chùm tia laser sẽ tắt. Đối với phép đo tiếp theo hãy lặp lại quy trình này.

- ▶ **Không được chĩa luồng laze vào con người hay động vật và không được tự chính bạn nhìn vào luồng laze, ngay cả khi từ một khoảng cách lớn.**

Hướng dẫn: Giá trị đo thường xuất hiện trong vòng 0,5 s và chậm nhất sau khoảng 4 s. Thời gian đo phụ thuộc vào độ xa, tình trạng ánh sáng và đặc tính phản xạ ánh sáng của bề mặt đối tượng. Sau khi kết thúc phép đo, chùm tia laser sẽ tự động tắt.

Chọn mặt phẳng tham chiếu (xem Hình A)

Để đo, bạn có thể chọn giữa ba mặt phẳng làm chuẩn qui chiếu:

– mép trước của dụng cụ đo (ví dụ ví dụ khi áp dụng ở tường),
– mép trước của dụng cụ đo (ví dụ khi đo từ một cạnh bàn),
– phần giữa của ren **(14)** (ví dụ đo bằng giá ba chân)

Để chọn mặt phẳng tham chiếu hãy nhấn nút **(7)** [✲]. Sau đó dùng nút đo **(5)** [▲] hoặc nút **(2)** [**Func**] để chọn cài đặt „Mặt phẳng tham chiếu“. Sau đó dùng nút **(6)** [**+**] hoặc nút **(3)** [**–**] để chọn mặt phẳng tham chiếu mong muốn. Sau mỗi lần bật dụng cụ đo, mặt phẳng tham chiếu đã chọn gần đây sẽ được thiết lập sẵn.

Menu „Các cài đặt“ (xem Hình B)

Để tới menu „Các cài đặt“ **(j)** hãy nhấn nút **(7)** [✲].

Chọn cài đặt mong muốn bằng nút **(6)** [**+**] hoặc nút **(3)** [**–**] và xác nhận bằng nút đo **(5)** [▲] hoặc bằng nút **(2)** [**Func**].

Chọn cài đặt mong muốn bằng nút **(6)** [**+**] hoặc nút **(3)** [**–**] và xác nhận bằng nút đo **(5)** [▲] hoặc nút **(2)** [**Func**].

Để thoát khỏi Menu „Các cài đặt“ hãy nhấn nhanh nút bật/tắt/quay lại **(8)** [ ].

Bật/tắt âm thanh

Bật âm thanh trong cài đặt cơ sở.

Bật/tắt rung

Bật rung trong cài đặt cơ bản.

Rung của dụng cụ đo có thể là sự hỗ trợ hữu ích khi có tiếng ồn lớn xung quanh. Hai rung động ngắn báo hiệu một phép đo thành công; một rung động dài cho biết một phép đo không chính xác.

Hiển thị Ánh Sáng

Đèn chiếu sáng màn hình sẽ sáng liên tục. Nếu không có nút nào được ấn, đèn chiếu sáng màn hình sẽ mờ đi sau khoảng 20 giây để tiết kiệm pin/ắc-quy.

Chế độ tiết kiệm pin

Chế độ tiết kiệm pin được tắt trong cài đặt cơ bản. Khi bật chế độ tiết kiệm pin, âm thanh và rung sẽ bị bỏ kích hoạt và độ sáng màn hình giảm. Điều này sẽ kéo dài thời gian chạy pin.

Chuyển đổi đơn vị đo ft/m

Thiết lập ban đầu là đơn vị đo "m" (Mét). Có sáu đơn vị đo lường khác nhau. Đặt đơn vị đo phù hợp cho mục đích của bạn.

Cài đặt ngôn ngữ

Khi bật dụng cụ đo lần đầu tiên, bạn sẽ được yêu cầu đặt ngôn ngữ ưa tiên cho văn bản hiển thị.

Bạn có thể thay đổi ngôn ngữ đã cài đặt bất cứ lúc nào.

PRO360

Kích hoạt lần đầu là cần thiết. Chỉ có thể truyền dữ liệu với ứng dụng hoặc chương trình PC tương ứng. Sau khi thay pin, dụng cụ đo phải được bật lại một lần để khởi động lại PRO360. PRO360 có thể bị bỏ kích hoạt bất cứ lúc nào. Hãy tham khảo các thông tin chi tiết về PRO360 tại www.pro360.com.

Thông tin về thiết bị

Hãy tham khảo các thông tin về dụng cụ đo tại đây ví dụ số seri và phiên bản phần mềm.

Khôi phục cài đặt gốc

Chức năng này dùng để thiết lập lại dụng cụ đo về cài đặt xuất xưởng/cài đặt cơ bản. Sau khi thiết lập lại, bạn được yêu cầu đặt ngôn ngữ ưa tiên cho màn hiển thị.

Các chức năng đo

Chức năng hỗ trợ (xem Hình C)

Để chọn chức năng đo hãy nhấn nút **(2)** [**Func**]. Hãy chọn chức năng đo mong muốn bằng nút **(6)** [**+**] hoặc nút **(3)** [**–**].

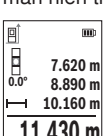
Nhấn vào nút **(7)** [☼] để khởi động chức năng trợ giúp. Chức năng trợ giúp hiển thị biện pháp chi tiết cho chức năng đo đã chọn.

Đo Chiều Dài

Hãy chọn phép đo độ dài ⊢.

Ấn nhanh vào nút đo để bật chùm tia laser **(5)** [▲].

Bạn hãy ấn nhanh vào nút đo **(5)** [▲]. Trị số đo được trình hiện ở bên dưới màn hiển thị.



Lặp lại bước trên với mỗi phép đo tiếp theo. Giá trị đo cuối cùng sẽ hiện ở góc dưới trong màn hình hiển thị, giá trị đo áp chót như trên.

Đo liên tục

Khi đo liên tục, dụng cụ đo có thể chuyển động tương tối đến đích, khi đó giá trị đo được cập nhật cứ 0,5 s một lần. Ví dụ bạn có thể đứng cách tường tới khoảng cách mong muốn, khoảng cách hiện tại luôn dễ đọc.

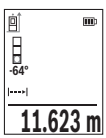
Hãy chọn phép đo độ dài ⊢⊣. Chọn một trong số các chức năng sau đây:

– tối thiểu/tối đa: Giá trị đo lớn nhất và nhỏ nhất được hiển thị liên tục trên màn hiển thị (xem Hình **I**).
– số lớn: Giá trị đo được phóng to để nhìn rõ hơn (xem Hình **J**).
– Thước dây: Khoảng cách được hiển thị bằng hình ảnh ở một thước dây (xem Hình **K**). **Hướng dẫn**: Khoảng cách tới đánh dấu trong màn hiển thị

được hiển thị trong chức năng thước dây. Điểm tham chiếu **không** phải là cạnh của dụng cụ đo.

Ấn nhanh vào nút đo để bật chùm tia laser **(5)** [▲].

Di chuyển dụng cụ đo cho đến khi trị số của khoảng cách yêu cầu được trình hiện ở bên dưới màn hiển thị.



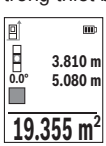
Bằng cách nhấn nút đo **(5)** [▲] bạn sẽ ngừng phép đo liên tục. Giá trị đo hiện tại sẽ được hiển thị ở góc dưới trong màn hình hiển thị. Nhấn lại nút đo **(5)** [▲] phép đo liên tục sẽ bắt đầu lại.

Phép đo liên tục được tự động tắt sau 4 phút.

Đo Diện Tích

Chọn phép đo diện tích ⬚.

Sau đó, bạn hãy đo chiều rộng và chiều dài liên tiếp như khi đo chiều dài. Giữa hai phép đo vẫn bật chùm tia laser. Khoảng cách đã đo nhấp nháy trong thiết bị hiển thị đo diện tích ⬚.



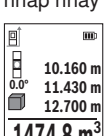
Giá trị đo đầu tiên được hiển thị ở góc trên trong màn hình hiển thị.

Sau khi kết thúc lần đo thứ hai phần diện tích sẽ được tính và hiển thị tự động. Kết quả sẽ hiển thị ở góc dưới trong màn hình hiển thị, đơn trị đo như trên.

Đo khối lượng

Chọn đo thể thích ⬚.

Sau đó, bạn hãy đo chiều rộng, chiều dài và chiều sâu liên tiếp như khi đo chiều dài. Giữa ba phép đo vẫn bật chùm tia laser. Khoảng cách đã đo nhấp nháy trong thiết bị hiển thị đo thể tích ⬚.



Giá trị đo đầu tiên được hiển thị ở góc trên trong màn hình hiển thị.

Sau khi thực hiện việc đo lần thứ ba, khối lượng được tự động tính toán và hiển thị. Kết quả sẽ hiển thị ở góc dưới trong màn hình hiển thị, đơn trị đo như trên.

Đo Gián Tiếp Khoảng Cách

Đối với việc đo gián tiếp chiều dài, có ba chế độ đo để ứng dụng, mỗi chế độ đo có thể sử dụng để xác định các khoảng cách khác nhau.

Đo gián tiếp khoảng cách được sử dụng để đo khoảng cách mà ta không thể đo trực tiếp được do có vật cản trở ngăn cản luồng laze, hoặc do không có bề mặt mục tiêu sẵn có nào được sử dụng như là vật phản chiếu. Qui trình đo này chỉ có thể sử dụng trong chiều thẳng đứng. Bất cứ sự lệch hướng nào ở chiều ngang cũng sẽ gây ra sự đo sai.

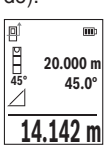
Hướng dẫn: Việc đo khoảng cách gián tiếp sẽ luôn đưa kết quả không chính xác bằng việc đo trực tiếp. Tùy các điều kiện áp dụng, xác suất lỗi đo có thể lớn hơn khi đo khoảng cách trực tiếp. Để cải thiện độ chính xác trong khi đo, nên sử dụng giá đỡ ba chân (phụ tùng).

Luồng laze duy trì ở trạng thái mở giữa các lần đo riêng lẻ.

a) Đo chiều cao gián tiếp (xem Hình D)

Hãy chọn phép đo chiều cao gián tiếp ⧋.

Hãy lưu ý dụng cụ đo được định vị ở cùng một chiều cao như điểm đo đáy. Nghiêng dụng cụ đo quanh mặt phẳng tham chiếu và đo khoảng cách như khi đo chiều dài **„1“** (được hiển thị trong màn hình hiển thị dạng vạch màu đỏ).



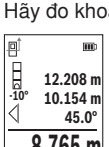
Sau khi kết thúc đo, kết quả của đoạn đường đã tìm kiếm **„X“** được hiển thị trong dòng kết quả **(e)**. Giá trị đo của đoạn đường **„1“** và góc **„α“** ở trong các hàng giá trị đo được **(d)**.

b) Đo chiều cao gián tiếp kép (xem Hình E)

Dụng cụ đo có thể đo gián tiếp tất cả các khoảng cách, mà nằm trong mặt phẳng thẳng đứng của dụng cụ đo.

Hãy chọn phép đo chiều cao kép gián tiếp ◁.

Hãy đo khoảng cách **"1"** và **"2"** theo trình tự này như khi đo chiều dài.



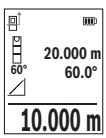
Sau khi kết thúc đo, kết quả của đoạn đường đã tìm kiếm **„X“** được hiển thị trong dòng kết quả **(e)**. Giá trị đo của đoạn đường **„1“**, **„2“** và góc **„α“** ở trong các hàng giá trị đo được **(d)**.

Hãy lưu ý rằng mặt phẳng tham chiếu của phép đo (ví dụ mép sau của dụng cụ đo) phải ở chính xác cùng một vị trí ở tất cả các lần đo riêng lẻ trong quá trình đo.

c) Đo chiều dài gián tiếp (xem Hình F)

Chọn phép đo chiều dài gián tiếp ⊿.

Hãy lưu ý dụng cụ đo được định vị ở cùng một chiều cao như cách tìm điểm đo. Nghiêng dụng cụ đo quanh mặt phẳng tham chiếu và đo khoảng cách **„1“** như khi đo chiều dài.



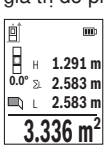
Sau khi kết thúc đo, kết quả của đoạn đường đã tìm kiếm **„X“** được hiển thị trong dòng kết quả **(e)**. Giá trị đo của đoạn đường **„1“** và góc **„α“** ở trong các hàng giá trị đo được **(d)**.

Đo bề mặt tường (xem Hình G)

Đo bề mặt tường được sử dụng để xác định tổng số của một số bề mặt riêng lẻ có cùng một chiều cao. Trong ví dụ minh họa, tổng diện tích của nhiều bức tường được xác định, trong đó có chiều cao phòng giống nhau **H**, nhưng các chiều dài khác nhau **L**.

Chọn phép đo diện tích tường ⌓.

Đo chiều cao phòng **H** như đo chiều dài. Giá trị đo được hiển thị trong dòng giá trị đo phía trên. Laser vẫn bật.



Sau đó đo chiều dài $\mathbf{L}_1$ của bức tường thứ nhất. Diện tích được tính toán tự động và được hiển thị trong dòng kết quả **(e)**. Giá trị đo chiều dài cuối cùng xuất hiện ở dòng giá trị đo dưới **(d)**. Laser vẫn bật.

Đo chiều dài $\mathbf{L}_2$ của bức tường thứ hai. Đơn trị đo hiển thị trong dòng giá trị đo **(d)** sẽ được cộng thêm vào chiều dài $\mathbf{L}_1$. Tổng hai chiều dài (được hiển thị trong dòng giá trị đo ở giữa **(d)**) sẽ được nhân với chiều cao đã lưu **H**. Tổng giá trị diện tích được hiển thị trong dòng kết quả **(e)**.

Bạn có thể tùy ý đo nhiều chiều dài tiếp theo $\mathbf{L}_X$ mà tự động được cộng thêm vào và được nhân với chiều cao **H**. Điều kiện để tính toán đúng diện tích, là chiều dài đã đo đầu tiên (trong ví dụ chiều cao phòng **H**) phải đồng nhất đối với tất cả các phần diện tích.

Chức năng khoanh cọc (xem Hình H)

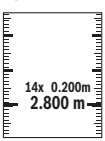
Chức năng khoanh cọc sẽ đo lại nhiều lần chiều dài xác định (khoảng cách). Những chiều dài này có thể được chuyển thành bề mặt, để cho phép cắt nguyên liệu thành miếng dài bằng nhau hoặc tạo các tường ngăn phụ dạng vách thạch cao. Chiều dài tối thiểu có thể thiết lập là 0,1 m, chiều dài tối đa là 50 m.

Hướng dẫn: Khoảng cách tới đánh dấu trong màn hiển thị được hiển thị trong chức năng phân ra. Điểm tham chiếu **không** phải là cạnh của dụng cụ đo.

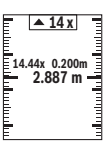
Hãy chọn chức năng khoanh cọc .

Thiết lập chiều dài mong muốn bằng nút **(6)** [**+**] hoặc nút **(3)** [**–**].

Khởi động chức năng khoanh cọc bằng cách nhấn nút đo **(5)** [▲], và từ từ dịch ra xa nút điểm khởi đầu.



Dụng cụ đo tiếp tục đo khoảng cách tới điểm khởi đầu. Khi đó chiều dài xác định cũng như giá tị đo hiện tại sẽ được hiển thị. Các mũi tên trên và dưới cho thấy khoảng cách nhỏ nhất đến ký hiệu đánh dấu kế tiếp hoặc trước đó.



Hệ số bên trái chỉ ra chiều dài xác định đã đạt được bao nhiêu lần. Giá trị đo màu xanh lá cho biết chiều dài đạt được cho mục đích đánh dấu.

Giá trị đo màu xanh dương hiển thị giá trị thực, nếu giá trị chuẩn nằm ngoài màn hiển thị.

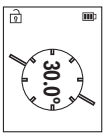
Đo độ dốc/Ống bọt nước kỹ thuật số

Hãy chọn đo độ nghiêng/ống bọt nước kỹ thuật số .

Dụng cụ đo tự động chuyển mạch giữa hai trạng thái.

Ống bọt nước kỹ thuật số được sử dụng để kiểm tra các hướng nằm ngang hoặc thẳng đứng của một đối tượng (ví dụ như máy giặt, tủ lạnh, vv).

Khi độ nghiêng 3° bị vượt quá, hình cầu trong màn hình hiển thị chiếu sáng màu đỏ.



Đo độ nghiêng được sử dụng để đo độ đốc hoặc độ nghiêng (ví dụ như cầu thang, tay vịn cầu thang, khi khớp các đồ gỗ, khi lắp đặt ống, vv).

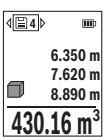
Cạnh trái của dụng cụ đo được dùng làm mặt phẳng tham chiếu để đo độ nghiêng.

Hiển thị giá trị bộ nhớ

Giá trị hoặc kết quả cuối cùng của mỗi lần đo xong sẽ được lưu trữ tự động.

30 giá trị tối đa (Giá trị đo hoặc kết quả cuối cùng) có thể gọi ra được.

Chọn chức năng nhớ [🖹].



Số giá trị đã lưu được hiển thị ở phía trên của màn hình, bên dưới là giá đã lưu lệ thuộc và bên trái là chức năng đo lệ thuộc.

Nhấn nút **(6)** [**+**], để lật về trước thông qua các giá trị đã lưu.

Nhấn nút **(3)** [**–**], để lật trở lại thông qua các giá trị đã lưu.

Giá trị cũ nhất ở vị trí 1 trong bộ nhớ, giá trị mới nhất ở vị trí 30 (ở 30 giá trị đã lưu khả dụng). Khi lưu một giá trị tiếp theo, giá trị cũ nhất trong bộ nhớ sẽ bị xóa.

Xóa bộ nhớ

Để xóa một giá trị bộ nhớ, hãy chọn giá trị này (xem „Hiển thị giá trị bộ nhớ“, Trang 121). Để xóa trước hết hãy nhấn nút bật/tắt/quay lại **(8)** [ ] và xác nhận bằng nút **(2)** [**Func**].

Để xóa toàn bộ nội dung bộ nhớ hãy nhấn nút **(7)** [☼] và chọn một chức năng bộ nhớ . Hãy nhấn nút **(6)** [**+**] và xác nhận bằng nút **(2)** [**Func**].

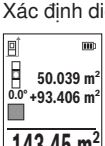
Cộng/trừ các giá trị

Các giá trị đo hoặc kết quả cuối cùng có thể được cộng vào hoặc bị trừ.

Cộng các giá trị

Ví dụ sau đây mô tả cộng diện tích:

Xác định diện tích theo phần "Đo diện tích" Đo Diện Tích.



Nhấn nút **(6)** [**+**]. Diện tích đã tính và biểu tượng „**+**“ được hiển thị.

Nhấn nút đo **(5)** [▲], để khởi động phép đo diện tích tiếp theo. Xác định diện tích theo phần "Đo diện tích" Đo Diện TíchNgay khi phép đo thứ hai hoàn thành, kết quả của

phép đo diện tích thứ hai sẽ được hiển thị ở bên dưới màn hình. Để hiển thị kết quả cuối cùng, hãy nhấn lại nút đo **(5)** [▲].

Hướng dẫn: Nếu là phép đo chiều dài, kết quả cuối cùng sẽ được hiển thị ngay lập tức.

Để thoát Cộng thêm, hãy nhấn nút **(2)** [**Func**].

Trừ các giá trị

Để trừ các giá trị hãy nhấn nút **(3)** [**–**]. Quy trình tiếp theo tương tự như "Cộng các giá trị".

Xóa Trị Số Đo

Bằng việc nhấn nhanh nút bật/tắt/quay lại **(8)** [ ] kết quả đo đơn mới nhất sẽ được xóa, áp dụng cho tất cả các chức năng đo. Bằng việc nhấn nhanh nhiều lần nút bật/tắt/quay lại **(8)** [ ] các kết quả đo sẽ được xóa theo thứ tự ngược.

Hướng Dẫn Sử Dụng

▶ **Máy đo được trang bị một giao diện sóng vô tuyến. Hãy chú ý các giới hạn địa điểm hoạt động ví dụ như trên máy bay hoặc bệnh viện.**

Thông Tin Tổng Quát

Ống kính thu nhận **(15)**, đầu ra của tia laser **(16)** không được bị che khi đo.

Không được di chuyển dụng cụ đo khi đang thực hiện phép đo (ngoài trừ ở chức năng đo liên tục và đo độ dốc). Vì vậy, bạn phải đặt dụng cụ đo lên một bề mặt chuẩn hoặc mặt đỡ.

Những Tác Động Ảnh Hưởng Đến Khoảng Đo

Phạm vi đo hiệu quả phụ thuộc vào tình trạng ánh sáng và đặc tính phản xạ ánh sáng của bề mặt đối tượng. Hãy sử dụng kính nhìn tia laser **(20)** (Phụ kiện) và bảng đích laser **(19)** (Phụ kiện) để cải thiện độ rõ của tia laser với ánh sáng từ bên ngoài, hoặc làm cho bề mặt đối tượng không hoạt động.

Những Tác Động Ảnh Hưởng Đến Kết Quả Đo

Do tác động vật lý, không thể tránh khỏi sự đo đạc bị sai khi đo những bề mặt khác nhau. Bao gồm các nguyên nhân sau đây:

– bề mặt trong suốt (ví dụ kính, nước),
– bề mặt phản chiếu (ví dụ thép mài nhẵn, kính),
– bề mặt rỗ (ví dụ kính, vật liệu cách nhiệt)

– bề mặt có kết cấu (ví dụ vữa nhám, đá tự nhiên).

Hãy sử dụng bảng đối tượng của tia laser **(19)** (phụ kiện) trên các bề mặt này nếu cần.

Thêm vào đó, sự đo sai cũng có thể xảy ra khi nhắm bề mặt một mục tiêu dốc nghiêng.

Cũng vậy, các tầng không khí có nhiệt độ thay đổi hay tiếp nhận sự phản chiếu gián tiếp có thể tác động đến trị số đo.

Kiểm tra độ chính xác và hiệu chỉnh đo độ dốc (xem Hình L)

Thường xuyên kiểm tra độ chính xác của đo độ dốc. Việc này được thực hiện bằng phép đo đường bao. Hãy đặt dụng cụ đo lên bàn và đo độ dốc. Hãy xoay dụng cụ đo 180° và đo lại độ đốc. Độ sai khác của giá trị được hiển thị tối đa là 0,3°.

Đối với độ sai lệch lớn hơn bạn phải hiệu chuẩn lại dụng cụ đo. Lựa chọn trong các cài đặt thiết bị. Làm theo các hướng dẫn trên màn hình hiển thị.

Sau những thay đổi mạnh về nhiệt độ và sau những sự va chạm, cần phải kiểm độ chính xác và nếu có thể hãy hiệu chỉnh máy. Sau khi có sự thay đổi về nhiệt độ máy đo phải được giảm nhiệt/làm mát trong thời gian nhất định trước khi hiệu chỉnh.

Kiểm tra độ chính xác của việc đo khoảng cách

Sự chính xác của dụng cụ đo có thể được kiểm tra như sau:

– Chọn một khu vực cố định, không thay đổi để đo, có chiều dài khoảng từ 3 đến 10 m; chiều dài của khu vực này phải được biết rõ chính xác (vd. chiều rộng của một căn phòng hay một khung cửa). Phép đo phải được thực hiện trong điều kiện thuận lợi, tức là khoảng cách đo phải ở trong phòng và bề mặt đối tượng của phép đo phải trơn nhẵn đồng thời có độ phản xạ tốt.
– Đo khoảng cách 10 lần liên tiếp.

Sai lệch của các phép đo riêng biệt so với giá trị trung bình được vượt quá ±4 mm tổng khoảng cách đo trong điều kiện thuận lợi. Ghi lại các phép đo để sau này có thể so sánh độ chính xác của các phép đo

Sử dụng giá đỡ ba chân (phụ kiện)

Sử dụng giá ba chân là đặc biệt cần thiết cho khoảng cách lớn. Hãy đặt máy đo có ren 1/4" **(14)** lên đĩa nhả hãm nhanh của giá ba chân **(21)** hoặc một chiếc giá ba chân của máy ảnh thông thường. Bắt chặt dụng cụ đo bằng vít khóa của mâm đỡ thay nhanh.

Hãy cài đặt mặt phẳng tham chiếu cho các phép đo bằng giá đỡ ba chân trong các cài đặt (xem „Chọn mặt phẳng tham chiếu (xem Hình **A**)“, Trang 114).

Kẹp đai (Phụ kiện) (xem Hình M)

Bằng kẹp đai **(17)** bạn có thể móc dụng cụ đo dễ dàng vào đai.

Thông báo lỗi

Khi phép đo đúng không thực hiện được, thông báo lỗi "Error" sẽ được hiển thị trong màn hình hiển thị. Khởi động lại phép đo.

Dụng cụ đo kiểm soát độ chính xác của mỗi phép đo. Nếu lỗi được phát hiện, màn hình chỉ hiển thị biểu tượng ở bên cạnh, và dụng cụ đo sẽ tắt. Trong trường hợp này, bạn hãy cung cấp dụng cụ đo cho phòng dịch vụ khách hàng của Bosch thông qua đại lý của mình.

Bảo Dưỡng và Bảo Quản

Bảo Dưỡng Và Làm Sạch

Chỉ được cất giữ và vận chuyển dụng cụ đo trong túi xách bảo vệ được giao kèm **(23)**.

Luôn luôn giữ cho dụng cụ đo thật sạch sẽ.

Không được nhúng dụng cụ đo vào trong nước hay các chất lỏng khác.

Lau sạch bụi bẩn bằng một mảnh vải mềm và ẩm. Không được sử dụng chất tẩy rửa.

Chăm sóc thấu kính **(15)** một cách cẩn thận giống như khi xử lý kính hoặc ống kính máy ảnh.

Trong trường hợp cần sửa chữa, hãy gửi dụng cụ đo trong túi bảo vệ **(23)**.

Dịch vụ hỗ trợ khách hàng và tư vấn sử dụng

Bộ phận phục vụ hàng sau khi bán của chúng tôi trả lời các câu hỏi liên quan đến việc bảo dưỡng và sửa chữa các sản phẩm cũng như phụ tùng thay thế của bạn. Sơ đồ mô tả và thông tin về phụ tùng thay thế cũng có thể tra cứu theo dưới đây: **www.bosch-pt.com**

Đội ngũ tư vấn sử dụng của Bosch sẽ giúp bạn giải đáp các thắc mắc về sản phẩm và phụ kiện.

Trong tất cả các phản hồi và đơn đặt phụ tùng, xin vui lòng luôn luôn nhập số hàng hóa 10 chữ số theo nhãn của hàng hóa.

Việt Nam
CN CÔNG TY TNHH BOSCH VIỆT NAM TẠI TP.HCM
Tầng 14, Ngôi Nhà Đức, 33 Lê Duẩn
Phường Bến Nghé, Quận 1, Thành Phố Hồ Chí Minh
Tel.: (028) 6258 3690
Fax: (028) 6258 3692 - 6258 3694
Hotline: (028) 6250 8555
Email: tuvankhachhang-pt@vn.bosch.com
www.bosch-pt.com.vn
www.baohanhbosch-pt.com.vn

Xem thêm địa chỉ dịch vụ tại:
www.bosch-pt.com/serviceaddresses