BOSCH

GLM 400 Professional

Robert Bosch Power Tools GmbH
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GERMANY

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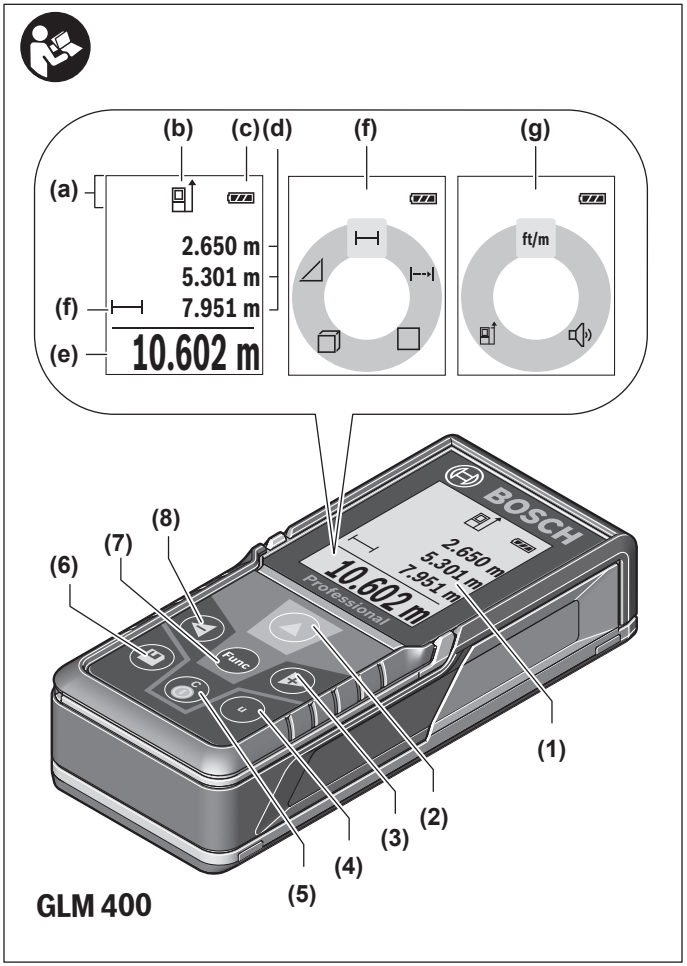
1 609 92A 5G9 (2019.11) O / 99

1 609 92A 5G9

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)
(e)
(f)
(g)
2.650 m
5.301 m
7.951 m
10.602 m
ft/m
BOSCH
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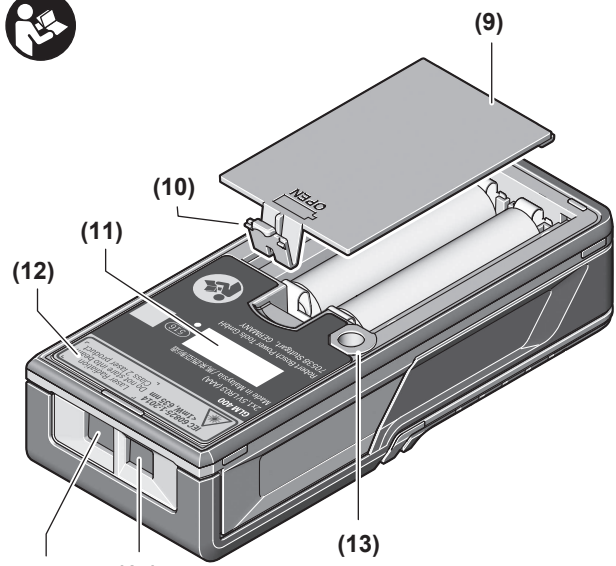
GLM 400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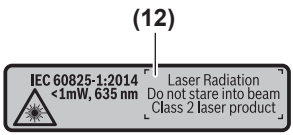
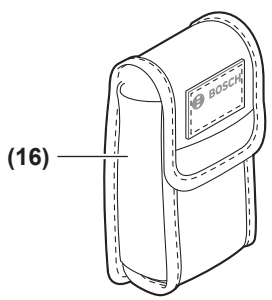

(12)
IEC 60825-1:2014
<1mW, 635 nm
Laser Radiation
Do not stare into beam
Class 2 laser product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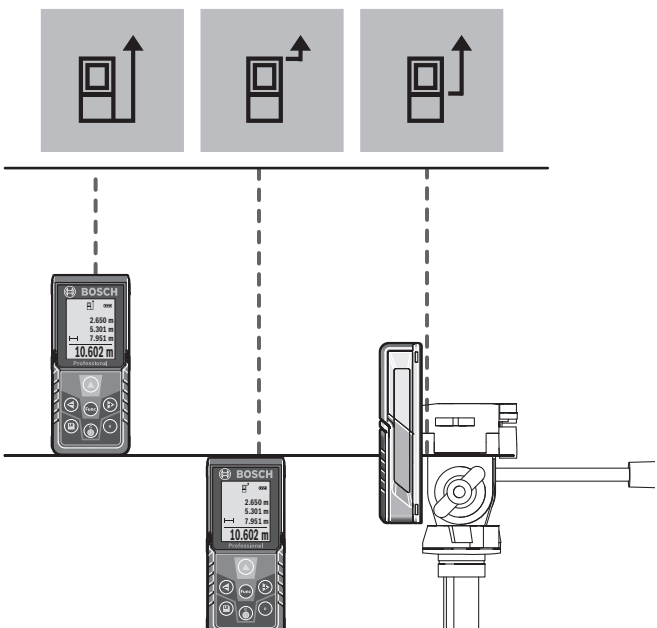
GLM 400

A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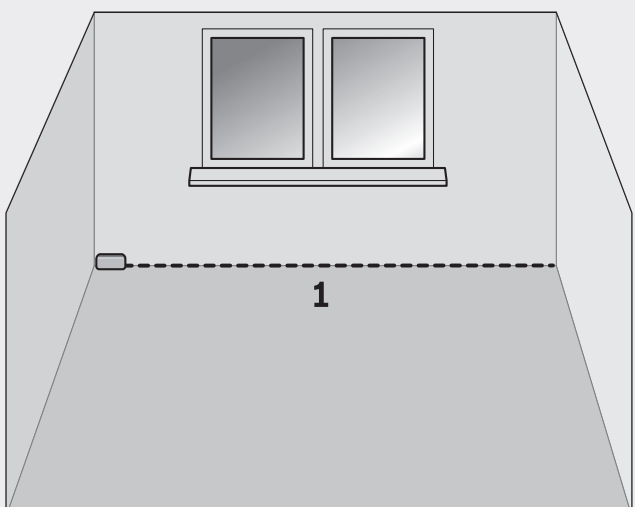
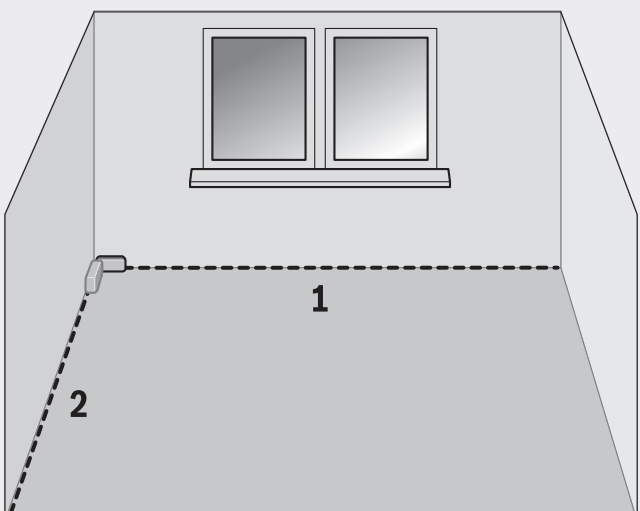
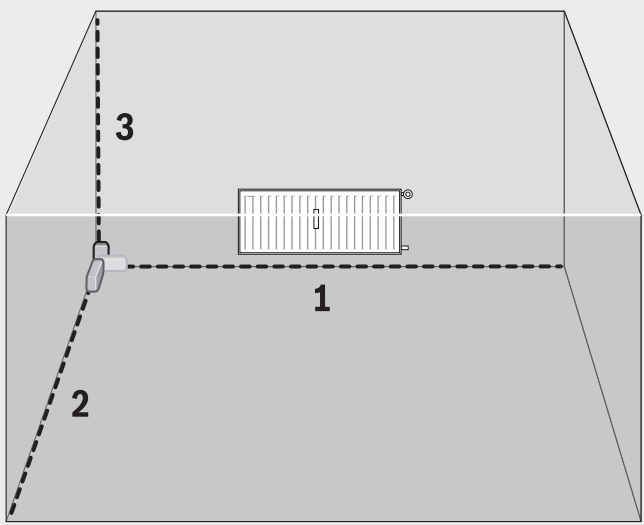
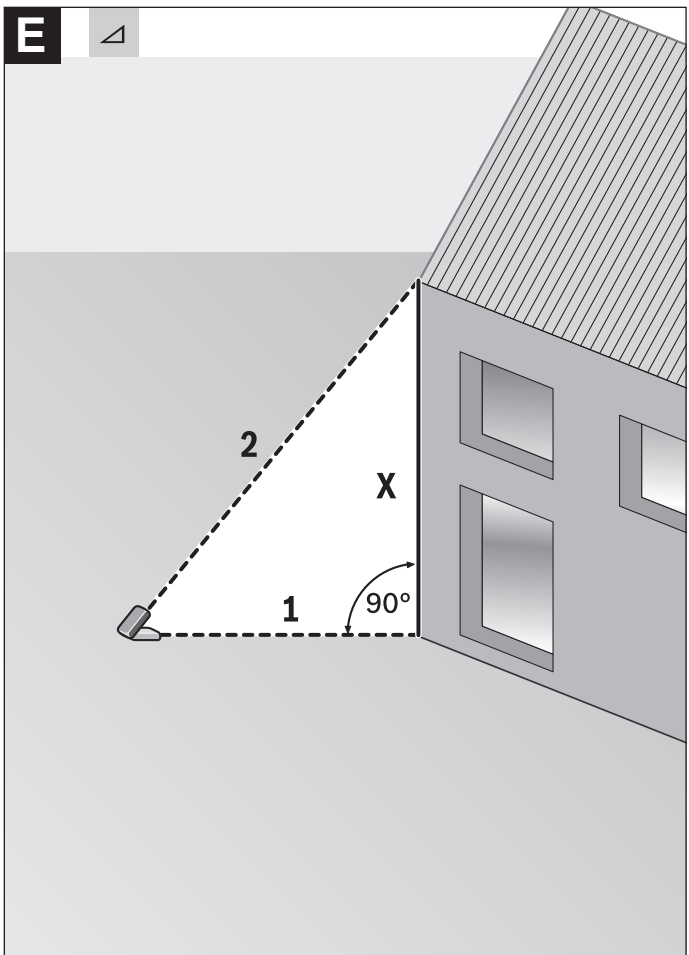


C



D




E
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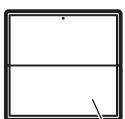
X
1
90°



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(18)
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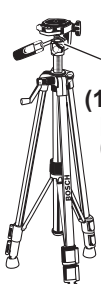


(19)
BT 150
0 601 096 B00

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 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 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 accidentally dazzle someone.

- ▶ **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.

Product Description and Specifications

Please observe the illustrations at the beginning of this operating manual.

Intended Use

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

The measuring tool is suitable for indoor and outdoor use.

Product features

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

(1) Display
(2) Measuring button [▲]
(3) Plus button [**+**]
(4) Button for selecting the measuring unit [**u**]
(5) On/off button [⏻]
(6) Memory button [💾]
(7) Function button [**Func**]
(8) Minus button [**–**]
(9) Battery compartment cover
(10) Locking mechanism of the battery compartment cover
(11) Serial number
(12) Laser warning label
(13) 1/4" tripod socket
(14) Reception lens
(15) Laser beam output
(16) Protective pouch[A)]
(17) Laser target plate[A)]
(18) Laser viewing glasses[A)]

(19) Tripod[A)]

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) Status bar

(b) Reference level of measurement

(c) Battery indicator

(d) Measured value lines

(e) Result line

(f) Measuring functions

(g) Basic settings

Technical data

Digital Laser Measure			**GLM 400**
Article number	**3 601 K72 R50**	**3 601 K72 RK0**	**3 601 K72 RC0**
Unit of measurement setting	m, cm	m, cm, ft, in (fractions), ft/in (fractions)	m, cm, ft, in (fractions), ft/in (fractions), Taiwan ft
Measuring range (typical)	0.05–40 m[A)]		
Measuring range (typical, unfavourable conditions)	20 m[B)]		
Measuring accuracy (typical)	±1.5 mm[A)]		
Measuring accuracy (typical, unfavourable conditions)	±3.0 mm[B)]		
Smallest display unit	0.5 mm		
General			
Operating temperature	−10 °C to +45 °C[C)]		
Storage temperature	−20 °C to +70 °C		
Relative air humidity max.	90%		
Max. altitude	2000 m		

Digital Laser Measure	GLM 400
Pollution degree according to IEC 61010-1	2[D)]
Laser class	2
Laser type	635 nm, < 1 mW
Laser beam diameter (at 25 °C) approx.	
– 10 m distance	9 mm[E)]
– 40 m distance	45 mm[E)]
Automatic switch-off after approx.	
– Laser	20 s
– Measuring tool (without measurement)	5 min
Weight according to EPTA-Procedure 01:2014	0.10 kg
Dimensions	106 x 45 x 24 mm
Protection rating	IP 54 (dust and splash-proof)[F)]
Batteries	2 x 1.5 V LR03 (AAA)
Rechargeable batteries	2 x 1.2 V HR03 (AAA)
Sound setting	●

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.

B) For measurements from the rear edge of the measuring tool, applies to low reflectivity of the target (e.g. a dark-painted wall), strong backlighting and −10 °C to +45 °C operating temperature. In addition, a deviation of ±0.15 mm/m must be taken into account.

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

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

E) At an operating temperature of 25 °C

F) Except battery compartment

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

Assembly

Inserting/changing the batteries

It is recommended that you use alkaline manganese batteries to operate the measuring tool.

With 1.2 V batteries fewer measurements may be possible than with 1.5 V batteries.

Press the locking mechanism **(10)** to open the battery compartment cover **(9)** and remove the battery compartment cover. Insert the batteries. When inserting the batteries, ensure that the polarity is correct according to the illustration on the inside of the battery compartment.

When the empty battery symbol first appears on the display, approx. 100 measurements are still possible. When the battery symbol is empty and flashes red, no further measurements are possible. Replace the 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 hard knocks to the measuring tool or dropping it.** Always carry out an accuracy check before continuing work if the measuring tool has been subjected to severe external influences (see "Accuracy check of the distance measurement", page 22).

Switching on/off

– To **switch on** the measuring tool and the laser, briefly press the measuring button **(2)** [▲].

– To **switch on** the measuring tool without the laser, briefly press the on/off button **(5)** [⏻].

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

To **switch off** the measuring tool, press and hold the on/off button **(5)** [⏻].

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

Measuring process

Once switched on, the measuring tool is in the length measurement function. For a different measuring function, press the [**Func**] button **(7)**. Use the [**+**] button **(3)** or the [**–**] button **(8)** to select the required measuring function (see "Measuring functions", page 17). Activate the measuring function with the [**Func**] button **(7)** or with the measuring button **(2)** [▲].

Once the measuring tool has been switched on, the rear edge of the measuring tool is selected as the reference level for measurement. For changing the reference level (see "Selecting the reference level (see figure **A**)", page 16).

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 button **(5)** [⏻], briefly press the measuring button **(2)** [▲] to switch the laser on.

To initiate the measurement, briefly press the measuring button **(2)** [▲]. Then the laser beam is switched 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 is automatically switched 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 **(13)** (e.g. for tripod measurements)

To select the reference level, press and hold the [**Func**] button **(7)**. Use the [**+**] button **(3)** or the [**–**] button **(8)** to select the required reference level. The rear edge of the measuring tool is preset as the reference level every time the measuring tool is switched on.

Basic settings menu

To enter the basic settings menu **(g)**, press and hold the [**Func**] button **(7)**.

Select the respective basic setting and choose your setting.

To exit the basic settings menu, press the on/off button **(5)** [⏻].

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.

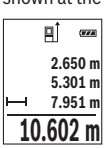
Measuring functions

Measuring length

Select the length measurement mode ⊢.

To switch on the laser beam, briefly press the measuring button **(2)** [▲].

To measure, briefly press the measuring button **(2)** [▲]. 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.

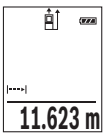
Continuous measurement

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 the continuous measurement mode ⊢--⊣.

To switch on the laser beam, briefly press the measuring button **(2)** [▲].

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



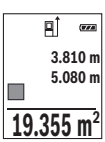
Briefly pressing the measuring button **(2)** [▲] will interrupt the continuous measurement. The current measured value will be shown at the bottom of the display. Pressing the measuring button **(2)** [▲] once more will start the continuous measurement again.

Continuous measurement automatically switches off after five 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 ⬜.



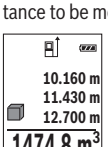
The first measured value is shown at the top of the display.

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 height measurement / Simple Pythagoras Measurement (see figure E)

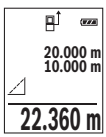
The indirect height measurement is used to measure distances that cannot be measured directly because an obstacle would obstruct the laser beam or no target surface is available as a reflector. Correct results are achieved only when the right angles required for the respective measurement are exactly adhered to (Pythagorean Theorem).

Pay attention that the reference plane of the measurement (e.g. the rear edge of the measuring tool) remains exactly at the same location for all individual measurements within a measuring sequence.

The laser beam remains switched on between the individual measurements.

Select the indirect height measurement ⊿.

Measure distances **„1“** and **„2“** in this sequence as for a length measurement. Pay attention that a right angle exists between distance **„1“** and the sought distance **„X“**.



Upon completion of the last measurement, the result for the sought distance **„X“** is displayed in the result line **(e)**. The individual measured values are displayed in the measured-value lines **(d)**.

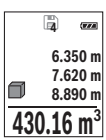
Memory functions

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

Memory value display

Maximum 15 values (measured values or end results) can be retrieved.

Press the memory button **(6)** [💾].



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 **(3)** to browse forwards through the saved values.

Press the [**–**] button **(8)** to browse backwards through the saved values.

If there is no value available in the memory, **0.000** is shown at the bottom of the display and **0** at the top.

The oldest value is located in position 1 in the memory, while the newest value is in position 15 (when 15 memory values are available). When a further value is saved, it is always the oldest value in the memory that is deleted.

Deleting the memory

Press the memory button **(6)** [💾] to delete the contents of the memory. Then briefly press the on/off button **(5)** [$\overset{c}{\Phi}$] to delete the displayed measured value.

To delete all values in the memory, press the button **(4)** and the on/off button **(5)** [$\overset{c}{\Phi}$] at the same time, then release the on/off button **(5)** [$\overset{c}{\Phi}$].

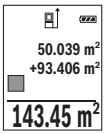
Adding/subtracting values

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 section on area measurement Area measurement.



Press the [**+**] button **(3)**. The calculated area and the **+** symbol will be displayed.

Press the measuring button **(2)** [▲] to start another area measurement. Measure the area as described in the section on area measurement 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 **(2)** [▲] once more.

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

To exit addition, press the [**Func**] button **(7)**.

Subtracting values

To subtract values, press the button **(8)** [**–**]. The subsequent steps are the same as for the section on adding values.

Deleting measured values

Briefly pressing the on/off button **(5)** [⏻] will delete the last measured value in all measuring functions. Repeatedly pressing the on/off button **(5)** [⏻] briefly will delete the measured values in reverse order.

Changing the unit of measurement

Unit of measure **„m“** (metres) is set by default.

Switch the measuring tool on.

Press and hold the **(7)** [**Func**] button to enter the “basic configurations ”menu. Select according to the type of your measuring tool:

- **„m/cm“** (**3 601 K72 R50**)
- **„ft/m“** (**3 601 K72 RK0**)
- **„Taiwan ft/m“** (**„尺/m“**) (**3 601 K72 RC0**)

Press button **(3)** [**+**] or button **(8)** [**–**], to change the unit of measure.

Or:

Press button **(4)** [**u**], to change the unit of measure:

– For the measuring tools **3 601 K72 R50** and **3 601 K72 RK0**, the next unit of measurement is selected in the configuration menu (clockwise).
– With measuring tool **3 601 K72 RC0**, it is possible to switch between **Taiwan ft** and **m**.

Press the On/Off button**(5)** [⏻] to exit the menu item. The selected setting remains saved after you switch off the measuring tool.

Switching sound on/off

The sound is switched on by default.

Switch on the measuring tool.

To enter the basic settings menu, press and hold the [**Func**] button **(7)**. Select 🔊. Press the [**+**] button **(3)** or the [**–**] button **(8)** to switch the sound on and off.

To exit the menu item, press the measuring button **(2)** [▲] or the on/off button **(5)** [⏻]. The selected setting remains saved after you switch off the measuring tool.

Practical advice

General advice

The reception lens **(14)** and the laser beam output **(15)** must not be covered during the measuring process.

The measuring tool must not be moved while a measurement is being taken. 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 **(18)** (accessory) and the laser target plate **(17)** (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 **(17)** (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.

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 with weak backlighting 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 later on.

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 **(13)** on the quick-release plate of the tripod **(19)** or a commercially availablel camera tripod. Tighten it using the locking screw of the quick-release plate.

Set the corresponding reference level for measurement with a tripod by pushing the [**Func**] button **(7)** (the reference level is the thread).

Error message

If a measurement cannot be performed correctly, the "Error" message appears in the display. Switch the measuring tool off and back on, and 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

Only store and transport the measuring tool in the protective bag provided.

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 **(14)**, 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 **(16)**.

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.

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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眼睛產生眩光
- ▶ **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。

產品和規格

請留意操作說明書中最前面的圖示。

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，並具有計算面積及體積之功能。

本測量工具可同時適用於室內及戶外應用。

插圖上的機件

機件的編號和儀器詳解圖上的編號一致。

(1) 螢幕
(2) 測量按鈕 [▲]
(3) 加號按鈕 [**+**]
(4) 尺寸單位選擇按鈕 [**u**]
(5) 電源開關 [⏻]
(6) 儲存按鈕 [💾]
(7) 功能按鈕 [**Func**]
(8) 減號按鈕 [**–**]
(9) 電池盒蓋
(10) 電池盒蓋鎖扣
(11) 序號
(12) 雷射警示牌
(13) 供三腳架使用的 1/4" 螺紋孔
(14) 接收點
(15) 雷射光束出口
(16) 保護套袋[A)]
(17) 雷射標靶[A)]
(18) 雷射眼鏡[A)]
(19) 三腳架[A)]

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) 狀態列
(b) 測量基準點
(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) 基本設定

技術性數據

數位雷射測距儀	GLM 400		
產品機號	**3 601 K72 R50**	**3 601 K72 RK0**	**3 601 K72 RC0**
測量單位調整	m、cm	m、cm、ft、in（分數表示法）、ft/in（分數表示法）	m、cm、ft、in（分數表示法）、ft/in（分數表示法）、台尺
測量範圍（標準值）	0.05–40 m[A)]		
測量範圍（標準值，在不利條件下）	20 m[B)]		
測量準確度（標準值）	±1.5 mm[A)]		
測量準確度（標準值，在不利條件下）	±3.0 mm[B)]		
最小顯示單位	0.5 mm		
一般資訊			
操作溫度	–10 °C ...+45 °C[C)]		
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[D)]		
雷射等級	2		
雷射種類	635 nm，< 1 mW		
雷射光束直徑（當 25 °C 時）約略值			
– 距離為 10 m	9 mm[E)]		
– 距離為 40 m	45 mm[E)]		

數位雷射測距儀	GLM 400
自動關機的執行時間點，約略值	
– 雷射	20 秒
– 測量工具（未進行測量）	5 分鐘
重量符合 EPTA-Procedure 01:2014	0.10 kg
尺寸	106 x 45 x 24 mm
防護等級	IP 54（防塵防潑濺） F)
電池	2 x 1.5 V LR03 (AAA)
電池數量	2 x 1.2 V HR03 (AAA)
音效調整	●

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。應額外再將誤差 ± 0.05 mm/m 列入計算。

B) 以測量工具後緣為測量起點、目標物的反射率低（例如深色漆牆）、背景照明強烈、操作溫度為 – 10 °C 至 +45 °C。應額外再將誤差 ±0.15 mm/m 列入計算。

C) 使用連續測量功能時的操作溫度最高為 +40 °C。

D) 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。

E) 在操作溫度 25 °C 下

F) 電池盒除外

從產品銘牌的序號 (11) 即可確定您的測量工具機型。

安裝

裝入／更換電池

建議使用鹼性錳電池或充電電池做為測量工具的電源。

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 **(9)**，請按壓鎖扣 **(10)** 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。

螢幕中的電池符號一變成無格數後，您大約還可以進行 100 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「檢查距離測量準確度」, 頁 40)。

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 **(2)** [▲]。

– 若要**啟動**測量工具但不需要開啟雷射功能，則請按一下電源開關 **(5)** [⏻]。

▶ **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。**

若要**關閉**測量工具，請按住電源開關 **(5)** [⏻] 不放。

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。

測量流程

測量工具開機後的模式為長度測量功能。如欲使用其他測量功能，按一下按鈕 **(7)** [**Func**]。利用按鈕 **(3)** [**+**] 或按鈕 **(8)** [**–**] 選擇所需測量功能(參見「測量功能」, 頁 36)。若要啟用該測量功能，請按一下按鈕 **(7)** [**Func**] 或測量按鈕 **(2)** [▲]。

啟動後，測量工具後緣即被選取做為測量基準點。若要切換基準點(參見「選擇基準點（請參考圖 **A**）」, 頁 36)。

將測量工具置於所需的測量起點上（例如：牆壁）。

提示：利用電源開關 **(5)** [⏻] 啟動測量工具後，按一下測量按鈕 **(2)** [▲] 即可開啟雷射功能。

短按一下測量按鈕 **(2)** [▲] 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 **(13)**（例如：使用三腳架進行測量）

若要選擇基準點，請按住按鈕 **(7)** [**Func**] 不放。請利用按鈕 **(3)** [**+**] 或按鈕 **(8)** [**–**] 選擇所需基準點。測量工具每次啟動之後一律以測量工具後緣為預設基準點。

「基本設定」功能表

若要進入「基本設定」**(g)** 功能表，請按住按鈕 **(7)** [**Func**] 不放。

請選擇相應的基本設定及其設定內容。

若要離開「基本設定」功能表，請按一下電源開關 **(5)** [⏻]。

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。

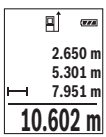
測量功能

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 **(2)** [▲]。

按一下測量按鈕 **(2)** [▲] 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。

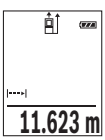
連續測量

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 ⊢--⊣。

若要啟動雷射光束，請按一下測量按鈕 **(2)** [▲]。

移動測量工具，直至所需距離出現在螢幕下方為止。



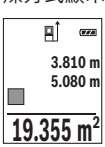
再按一下測量按鈕 **(2)** [▲] 即可中斷連續測量功能。目前的測量值將顯示於螢幕下方。若是再按一次測量按鈕 **(2)** [▲]，則連續測量將重頭開始。

連續測量功能將於 5 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。



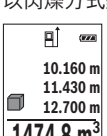
第一個測量值顯示於螢幕上方。

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。

間接高度測量／畢氏定理簡單測量功能（請參考圖 E）

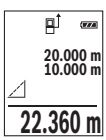
無法進行直接測量時（例如有障礙物會阻擋雷射，或者沒有目標可以充當反射體時），則必須以間接方式測量高度。進行每一次測量時，雷射與待測量線段必須一直保持直角，這樣測量結果才正確（畢氏定理）。

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。

雷射將在各次單一測量之間的空檔保持開啟。

請選擇間接高度測量 ⊿。

依照進行長度測量之方式依序測量線段**「1」**和**「2」**。請注意：線段 **「1」**與所求線段**「X」** 之間要呈直角。



完成最後一個測量後，測量結果顯示列 **(e)** 中顯示的測量結果即為您想要確認的線段**「X」**。測量值顯示列 **(d)** 中將詳列出每一個測量值。

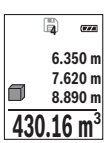
儲存功能

每次完成測量後，將自動儲存測量值或最後的計算結果。

儲存值顯示器

最多可叫出 15 個數值（測量值或最後的計算結果）。

按一下儲存按鈕 **(6)** [🖬]。



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 **(3)** [**+**]，即可往前翻頁至其他儲存值。

請按一下按鈕 **(8)** [**–**]，即可往後翻頁至其他儲存值。

如果記憶體中沒有數值，螢幕下方將出現**「0.000」**而上方則是出現**「0」**。

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 15 筆資料（儲存值達 15 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。

刪除記憶值

若要刪除儲存內容，請按一下儲存按鈕 **(6)** [🖬]。接著再按一下電源開關 **(5)** [⏻ᶜ]，即可刪除目前顯示的測量值。

若要刪除現存於記憶體中的所有數值，同時按下按鈕 **(4)** 和電源開關 **(5)** [⏻ᶜ] 然後放開電源開關 **(5)** [⏻ᶜ]。

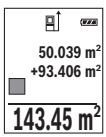
數值相加／相減

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。



請按一下按鈕 **(3)** [**+**]。隨即出現計算後得出的面積並加註**「+」**符號。

按一下測量按鈕 **(2)** [▲]，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。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 **(2)** [▲]。

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 **(7)** [**Func**]。

數值相減

若要將數值相減，請按一下按鈕 **(8)** [**–**]。後續步驟請比照「數值相加」。

刪除測量值

在所有測量功能中，只要按一下電源開關 **(5)** [⏻]，即可刪除您所測得的最後一項測量值。重複按壓電源開關 **(5)** [⏻]，即能反序刪除測量值。

切換尺寸單位

基本設定中的尺寸單位為 **「m」**（公尺）。

啟動測量工具。

請按住按鈕 **(7)** [**Func**] 不放，以便進入「基本設定」功能表。請依照測量工具型號，選擇以下設定：

- **「m/cm」**（**3 601 K72 R50**）
- **「ft/m」**（**3 601 K72 RK0**）
- **「台尺/m」**（「尺**/m**」）（**3 601 K72 RC0**）

按一下按鈕 **(3)** [**+**] 或按鈕 **(8)** [**–**]，即可切換尺寸單位。

或：

若要切換尺寸單位，請按一下按鈕 **(4)** [**u**]：

- 測量工具 **3 601 K72 R50** 和 **3 601 K72 RK0** 的設定功能表將選取為下一個尺寸單位（沿順時針方向）。
- 測量工具 **3 601 K72 RC0** 可在**台尺**與 **m** 之間切換。

若要離開此功能表項目，請按一下電源開關 **(5)** [⏻]。測量工具關機後，所選之設定仍將保留。

啟動／關閉音效

您可在基本設定中設定音效。

啟動測量工具。

請按住按鈕 **(7)** [**Func**] 不放，以便進入「基本設定」功能表。請選擇 🔊。按一下按鈕 **(3)** [**+**] 或按鈕 **(8)** [**–**]，即可開啟或關閉音效。

若要離開此功能表項目，請按一下測量按鈕 **(2)** [▲] 或電源開關 **(5)** [⏻]。測量工具關機後，所選之設定仍將保留。

作業注意事項

一般注意事項

測量時，接收點 **(14)** 和雷射光束出口 **(15)** 不得有遮蓋物。

進行測量期間，測量工具不得有任何移動。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 **(18)**（配件）和雷射標靶 **(17)**（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，無法排除在不同類型表面上進行測量時出現誤差的狀況。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 **(17)**（配件）放到表面上。

如果未正確地瞄準好目標物表面，也可能會出現測量誤差。

此外有溫差的空氣層和間接反射都可能影響測量值。

檢查距離測量準確度

您可按以下方式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 m 之間（例如房間的寬度，門口等）。該測量應在有利條件下進

行，亦即該測量位置室內、背景燈光微弱、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。請做好測量記錄，以便日後充當檢查儀器準確度的根據。

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 **(13)** 將測量工具安裝到三腳架 **(19)** 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。

請按一下按鈕 **(7)** [**Func**] 以便配合情況改設為使用三腳架時的測量基準點（螺紋孔基準點）。

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」。請將測量工具關機然後再重新啟動，接著再次開始該項測量。

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 **(14)**，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 **(16)** 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。

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한국어

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- **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 보안경을 일반 보안경으로 사용하지 마십시오.** 레이저 보안경은 레이저 광선을 보다 잘 감지하지만, 그렇다고 해서 레이저 광선으로부터 보호해주는 것은 아닙니다.
- ▶ **레이저 보안경을 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 사람의 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.

제품 및 성능 설명

사용 설명서 앞 부분에 제시된 그림을 확인하십시오.

규정에 따른 사용

본 측정공구는 거리, 길이, 높이 및 간격을 측정하고 면적과 체적을 계산하는 데 사용해야 합니다.

측정공구는 실내 및 실외에서 모두 사용할 수 있습니다.

제품의 주요 명칭

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

(1) 디스플레이
(2) 측정 버튼 [▲]
(3) 플러스 버튼 [**+**]
(4) 단위 선택 버튼 [**u**]
(5) 전원 버튼 [⏻]
(6) 저장 버튼 [💾]
(7) 기능 버튼 [**Func**]
(8) 마이너스 버튼 [**–**]
(9) 배터리 케이스 덮개
(10) 배터리 케이스 덮개 잠금쇠
(11) 일련 번호
(12) 레이저 경고판
(13) 1/4" 삼각대 소켓
(14) 수신 렌즈
(15) 레이저빔 발사구
(16) 보호 케이스 A)
(17) 레이저 표적판A)
(18) 레이저 보안경A)
(19) 삼각대 A)

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

디스플레이 요소(옵션)

(a) 상태 바
(b) 측정 기준 레벨
(c) 배터리 표시
(d) 측정치 표시열
(e) 결과 표시열
(f) 측정 기능
(g) 기본 설정

제품 사양

디지털 레이저 거리 측정기			GLM 400
제품 번호	**3 601 K72 R50**	**3 601 K72 RK0**	**3 601 K72 RC0**
측정 단위 설정	m, cm	m, cm, ft, in (fractions), ft/in (fractions)	m, cm, ft, in (fractions), ft/in (fractions), Taiwan ft
측정 영역(표준)	0.05-40 m[A)]		
측정 영역(표준, 부적절한 조건)	20 m[B)]		
측정 정확도(표준)	±1.5 mm[A)]		
측정 정확도(표준, 부적절한 조건)	±3.0 m[B)]		
최소 표시 단위	0.5 mm		
일반 사항			
작동 온도	−10 °C ...+45 °C[C)]		
보관 온도	−20 °C ...+70 °C		
상대 습도 최대	90 %		
기준 높이를 초과한 최대 사용 높이	2000 m		
IEC 61010-1에 따른 오염도	2[D)]		
레이저 등급	2		
레이저 유형	635 nm, < 1 mW		
레이저빔 직경(25 °C일 때) 약			
– 10 m 떨어진 거리	9 mm[E)]		
– 40 m 떨어진 거리	45 mm[E)]		
자동 꺼짐 기능이 활성화되는 시간, 약			
– 레이저	20 초 후		
– 측정공구(측정 미포함)	5 분 후		
EPTA-Procedure 01:2014에 따른 중량	0.10 kg		
치수	106 x 45 x 24 mm		

디지털 레이저 거리 측정기	GLM 400
보호 등급	IP 54(먼지 및 분무수 침투 방지) F)
배터리	1.5 V LR03 (AAA) 2개
충전용 배터리	1.2 V HR03 (AAA) 2개
음향 설정	●

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 ± 0.05 mm/m 정도 차이가 있을 수 있음을 고려해야 합니다.

B) 측정공구의 뒷 모서리부터 측정할 경우, 표적물(예: 어둡게 칠한 벽)의 반사율을 낮게, 배경 조명을 강하게 조성해야 합니다. 작동 온도는 – 10 °C ~ +45 °C입니다. 그 외에도 ±0.15 mm/m 정도 차이가 있을 수 있음을 고려해야 합니다.

C) 연속 측정 기능의 경우 최고 작동 온도는 +40 °C입니다.

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

E) 작동 온도 25 ℃

F) 배터리 케이스 탈거됨

형식판에 적힌 일련 번호 (11) 를 통해 측정공구를 식별할 수 있습니다.

조립

배터리 삽입하기/교환하기

측정공구 작동에는 알칼리 망간 배터리 또는 충전용 배터리를 사용할 것을 권장합니다.

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

배터리 케이스 덮개 **(9)** 를 열려면 잠금쇠 **(10)** 를 누른 뒤 배터리 케이스 덮개를 빼냅니다. 배터리 또는 충전용 배터리를 끼웁니다. 이때 배터리 케이스 안쪽 면에 나온 표시대로 제대로 전극을 맞추어 끼우십시오.

비어 있는 배터리 기호가 처음으로 디스플레이에 나타난 경우, 약 100 회의 측정이 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 „거리 측정 정확도 점검 “, 페이지 53).

전원 스위치 작동

– 측정공구와 레이저의 **스위치를 켜려면** 측정 버튼 **(2)** [▲]을 짧게 누릅니다.

– 레이저 없는 측정공구의 **스위치를 켜려면** 전원 버튼 **(5)** [⏻]을 짧게 누릅니다.

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

측정공구의 **전원을 끄려면** 전원 버튼 **(5)** [⏻]을 누르고 계십시오.

측정공구의 스위치를 끌 경우 메모리에 저장된 값들과 장치 설정은 그대로 유지됩니다.

측정 과정

스위치를 켜면 측정공구는 길이 측정 기능에 위치합니다. 다른 측정 기능을 사용하려면 버튼 **(7)** [**Func**]을 누르십시오. 버튼 **(3)** [**+**] 또는 버튼 **(8)** [**–**]을 눌러 원하는 (참조 „측정 기능 “, 페이지 49)을 선택하십시오. 버튼 **(7)** [**Func**] 또는 측정 버튼 **(2)** [**▲**]을 눌러 측정 기능을 활성화시키십시오.

전원을 켜면 측정용 기준 레벨로 측정공구의 뒷 모서리가 사전 설정되어 있습니다. 기준 레벨을 변경하려면 (참조 „기준 레벨 선택하기(그림 **A** 참조) “, 페이지 48).

측정공구를 원하는 측정 시작점(예: 벽)에 두십시오.

지침: 전원 버튼 **(5)** [⏻]을 눌러 측정공구를 켰으면 측정 버튼 **(2)** [▲]을 짧게 눌러 레이저를 켭니다.

측정을 위해 측정 버튼 **(2)** [▲]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 조건 및 대상물의 반사 정도에 따라 달라질 수 있습니다. 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 **(13)** 의 중간(예: 삼각대를 이용하여 측정할 경우)

기준 레벨을 선택하려면 버튼 **(7)** [**Func**]을 누른 상태로 유지하십시오. 버튼 **(3)** [**+**] 또는 버튼 **(8)** [**–**]을 눌러 원하는 기준 레벨을 선택하십시오. 측정공구를 켜면 항상 측정공구의 뒷 모서리가 기준 레벨로 사전 설정되어 있습니다.

“기본 설정” 메뉴

“기본 설정” **(g)** 메뉴로 이동하려면, 버튼 **(7)** [**Func**]을 누른 상태로 유지합니다.

해당되는 기본 설정 및 본인의 설정을 선택하십시오.

메뉴 “기본 설정”에서 벗어나려면, 전원 버튼 **(5)** [⏻]을 누르십시오.

디스플레이 조명

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

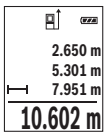
측정 기능

길이 측정

길이 측정 ⊢ 을 선택하십시오.

레이저빔을 켜려면 측정 버튼 **(2)** [▲]을 짧게 누르십시오.

측정을 위해 측정 버튼 **(2)** [▲]을 짧게 누릅니다. 디스플레이 하단에 측정값이 표시됩니다.



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

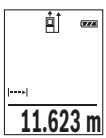
연속 측정

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

연속 측정 ⊢⊣ 을 선택하십시오.

레이저빔을 켜려면 측정 버튼 **(2)** [▲]을 짧게 누르십시오.

디스플레이 하단에 원하는 거리값이 보일 때까지 측정공구를 계속 움직입니다.



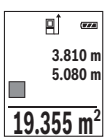
측정 버튼 **(2)** [▲]을 짧게 누르면 연속 측정이 중단됩니다. 디스플레이 하단에 현재 측정값이 표시됩니다. 측정 버튼 **(2)** [▲]을 다시 누르면 연속 측정이 새로 시작됩니다.

5분이 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.

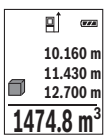
두 번째 측정이 끝난 후에 면적이 자동으로 계산되어 표시됩니다. 최종 결과가 디스플레이 하단에, 개별 측정값이 그 위에 표시됩니다.

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.

두 번째 측정이 끝난 후에 체적이 자동으로 계산되어 표시됩니다. 최종 결과가 디스플레이 하단에, 개별 측정값이 그 위에 표시됩니다.

간접 높이 측정 / 단순 피타고라스 측정(그림 E 참조)

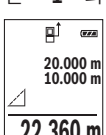
간접 높이 측정은 레이저빔 구간에 장애물이 있거나 표적면을 반사체로 사용할 수 없기 때문에 직접 거리 측정이 불가능한 경우 사용하십시오. 각 측정 시 정확한 직각을 이루고 있는 경우에만 정확한 결과를 얻을 수 있습니다(피타고라스 정의).

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

개별 측정을 하는 동안 레이저빔은 켜져 있습니다.

간접 높이 측정 ◿ 을 선택하십시오.

길이 측정할 때와 같이 구간 **“1”** 및 **“2”** 를 순서대로 측정하십시오. 구간 **“1”** 과 구하려는 구간 **“X”** 사이가 직각이 되도록 하십시오.



마지막 측정을 마치고 나면 구하려는 구간 **“X”** 가 결과 표시열 **(e)** 에 표시됩니다. 측정치 표시열 **(d)** 에 개별 측정치가 적혀 있습니다.

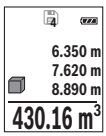
메모리 기능

측정이 종료될 때마다 해당 값 또는 최종 결과는 자동으로 저장됩니다.

메모리값 표시기

최대 15개의 값(측정값 또는 최종 결과)을 불러올 수 있습니다.

저장 버튼 **(6)** [💾]을 누릅니다.



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

저장된 값들을 앞으로 넘기려면 버튼 **(3)** [**+**]을 누릅니다.

저장된 값들을 뒤로 넘기려면 버튼 **(8)** [**–**]을 누릅니다.

메모리에 저장된 값이 없으면, 디스플레이 하단에 **“0.000”** 및 상단에 **“0”** 이 표시됩니다.

(제공되는 15개의 메모리 값 중에서) 가장 오래된 값은 메모리의 위치 1에, 마지막 값은 위치 15에 위치합니다. 다른 값을 저장하면 항상 메모리에서 가장 오래된 값이 삭제됩니다.

메모리 삭제하기

메모리 내용을 삭제하려면 저장 버튼 **(6)** [🖫]을 누릅니다. 그리고 나서 전원 버튼 **(5)** [⏻]을 짧게 눌러 표시된 값을 삭제합니다.

메모리에 있는 값을 삭제하려면 버튼 **(4)** 과 전원 버튼 **(5)** [⏻]을 동시에 누른 후 전원 버튼 **(5)** [⏻]에서 손을 떼십시오.

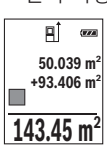
값 더하기/빼기

측정값 또는 최종 결과는 더하거나 뺄 수 있습니다.

값 더하기

다음과 같은 예시는 면적 더하는 방식을 설명합니다.

“면적 측정” 단락에 따라 면적을 산출하십시오 .



버튼 **(3)** [**+**]을 누르십시오. 산출된 면적 및 기호 **“+”** 가 표시됩니다.

다른 면적 측정을 시작하려면 다시 측정 버튼 **(2)** [▲]을 누르십시오. “면적 측정” 단락에 따라 면적을 산출하십시오 . 두 번째 측정이 완료되면, 두 번째 면적 측정의 결과가 디스플레이 하단에 표시됩니다. 최종 결과를 나타내려면 다시 측정 버튼 **(2)** [▲]을 누르십시오.

지침: 길이 측정 시에는 결과가 즉시 표시됩니다.

합산에서 벗어나려면 버튼 **(7)** [**Func**]을 누르십시오.

값 빼기

값을 빼려면 버튼 **(8)** [**–**]을 누르십시오. 다른 작업 절차는 “값 더하기” 와 동일하게 진행됩니다.

측정치 삭제하기

모든 측정 기능에서 전원 버튼 **(5)** [⏻]을 짧게 눌러서 마지막으로 측정된 값을 삭제할 수 있습니다. 전원 버튼 **(5)** [⏻]을 여러 차례 짧게 누르면 측정값들이 역순으로 삭제됩니다.

단위 변경하기

기본 설정의 측정 단위는 **“m”** (미터)입니다.

측정공구의 스위치를 켜십시오.

“기본 설정” 메뉴로 이동하려면, 버튼 **(7)** [**Func**]을 누른 상태로 유지합니다. 측정공구에 따라 단위를 선택하십시오:

– **“m/cm”** (**3 601 K72 R50**)
– **“ft/m”** (**3 601 K72 RK0**)
– **“Taiwan ft/m”** (**“尺/m”**) (**3 601 K72 RC0**)

버튼 **(3)** [**+**] 또는 버튼 **(8)** [**–**]을 눌러 측정 단위를 바꾸십시오.

또는:

버튼 **(4)** [**u**]을 눌러 측정 단위를 바꾸십시오.

– 측정공구 **3 601 K72 R50** 및 **3 601 K72 RK0** 의 경우 구성 메뉴에서 다음 단위가 (시계 방향으로) 선택됩니다.
– 측정공구 **3 601 K72 RC0** 의 경우 **Taiwan ft**와 **m** 사이에서 전환할 수 있습니다.

메뉴 항목을 벗어나려면 전원 버튼 **(5)** [⏻]을 누르십시오. 측정공구를 끄면 선택한 설정은 그대로 저장됩니다.

음향 켜기/끄기

기본 설정에는 음향이 켜져 있습니다.

측정공구의 스위치를 켜십시오.

“기본 설정” 메뉴로 이동하려면, 버튼 **(7)** [**Func**]을 누른 상태로 유지합니다. 🔊을 선택하십시오. 버튼 **(3)** [**+**] 또는 버튼 **(8)** [**–**]을 눌러 음향을 끄십시오.

메뉴 항목을 벗어나려면 측정 버튼 **(2)** [▲] 또는 전원 버튼 **(5)** [⏻]을 누르십시오. 측정공구를 끄면 선택한 설정은 그대로 저장됩니다.

사용 방법

일반 사항

측정 시 수신 렌즈 **(14)** 및 레이저빔 발사구 **(15)** 가 가려지지 않도록 하십시오.

측정공구는 측정 중 움직임이 있어서는 안 되므로 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 **(18)** (액세서리) 및 레이저 표적판 **(17)** (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 **(17)** (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.

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 배경 조명이 약한 상태에서 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. 추후에 정확도를 비교할 수 있도록 측정치를 기록해 놓으십시오.

삼각대(액세서리)를 이용해 작업하기

특히 먼거리를 측정할 때 삼각대를 사용하는 것이 필요합니다. 1/4" 나사부 **(13)** 와 함께 측정공구를 삼각대 **(19)** 의 순간 교환 플레이트 혹은 일반 카메라 삼각대 위에 놓습니다. 그리고 나서 이를 순간 교환 플레이트의 고정 나사를 사용하여 고정하십시오.

버튼 **(7)** [**Func**]을 눌러 측정을 위한 기준 레벨을 설정하십시오(나사부 기준 레벨).

오류 메시지

측정을 정확하게 실행할 수 없는 경우, 디스플레이에 오류 메시지 “Error” 가 표시됩니다. 측정공구를 껐다가 다시 켠 후 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 케이스에 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 **(14)** 는 안경이나 카메라 렌즈를 다루듯이 조심스럽게 관리하십시오.

수리하는 경우 측정공구를 안전 케이스 **(16)** 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 찾아볼 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

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**

- ▶ **อย่าใช้แว่นสำหรับมองแสงเลเซอร์เป็นแว่นนิรภัย** แว่นสำหรับมองแสงเลเซอร์ใช้สำหรับมองลำแสงเลเซอร์ให้เห็นชัดเจนยิ่งขึ้น แต่ไม่ได้ช่วยป้องกันรังสีเลเซอร์
- ▶ **อย่าใช้แว่นสำหรับมองแสงเลเซอร์เป็นแว่นกันแดดหรือใส่ขับรถยนต์** แว่นสำหรับมองแสงเลเซอร์ไม่สามารถป้องกันรังสีอัลตราไวโอเลต (UV) ได้อย่างสมบูรณ์ และยังลดความสามารถในการมองเห็นสี
- ▶ **ส่งเครื่องมือวัดให้ช่างผู้เชี่ยวชาญตรวจซ่อมและใช้อะไหล่เปลี่ยนของแท้เท่านั้น** ทั้งนี้เพื่อให้มั่นใจได้ว่าจะสามารถใช้งานเครื่องมือวัดได้อย่างปลอดภัยเสมอ
- ▶ **อย่าให้เด็กใช้เครื่องมือวัดด้วยเลเซอร์โดยไม่ควบคุมดูแล** เด็กๆ อาจทำให้คนตาพร่าโดยไม่ตั้งใจ
- ▶ **อย่าใช้เครื่องมือวัดในสภาพแวดล้อมที่เสี่ยงต่อการระเบิด ซึ่งเป็นที่ที่มีของเหลว แก๊ซ หรือฝุ่นที่ติดไฟได้** ในเครื่องมือวัดสามารถเกิดประกายไฟซึ่งอาจจุดฝุ่นละอองหรือไอระเหยให้ติดไฟได้

รายละเอียดผลิตภัณฑ์และข้อมูลจำเพาะ

กรุณาดูภาพประกอบในส่วนหน้าของคู่มือการใช้งาน

ประโยชน์การใช้งาน

เครื่องมือวัดนี้ใช้สำหรับวัดระยะทาง ความยาว ความสูง ระยะทาง และสำหรับคำนวณพื้นที่และปริมาตร

เครื่องมือวัดนี้เหมาะสำหรับใช้งานทั้งภายในและภายนอกอาคาร

ส่วนประกอบผลิตภัณฑ์

ลำดับเลขของส่วนประกอบอ้างถึงส่วนประกอบของเครื่องมือวัดที่แสดงในหน้าภาพประกอบ

(1) จอแสดงผล

(2) ปุ่มวัด [▲]

(3) ปุ่มบวก [**+**]

(4) ปุ่มสำหรับเลือกหน่วยของการวัด [**u**]

(5) ปุ่มเปิด-ปิด [⏻]

(6) ปุ่มหน่วยความจำ [💾]

(7) ปุ่มฟังก์ชั่น [**Func**]

(8) ปุ่มลบ [**–**]

(9) ฝาช่องใส่แบตเตอรี่

(10) ตัวล็อคฝาช่องใส่แบตเตอรี่

(11) หมายเลขเครื่อง

(12) ป้ายเตือนแสงเลเซอร์

(13) เกลียวขาตั้งแบบสามขา 1/4"

(14) เลนส์รับแสง

(15) ทางออกลำแสงเลเซอร์

(16) กระเป๋าใส่เครื่องมือวัด[A)]

(17) แผ่นเป้าหมายเลเซอร์[A)]

(18) แว่นตาสำหรับมองแสงเลเซอร์[A)]

(19) ขาตั้งแบบสามขา[A)]

A) **อุปกรณ์ประกอบที่แสดงภาพหรืออธิบายไม่รวมอยู่ในการจัดส่งมาตรฐาน กรุณาดูอุปกรณ์ประกอบทั้งหมดในรายการแสดงอุปกรณ์ประกอบของเรา**

ส่วนประกอบการแสดงผล (เลือก)

(a) แถบสถานะ

(b) ระนาบอ้างอิงของการวัด

(c) ไฟแสดงสถานะแบตเตอรี่

(d) บรรทัดแสดงค่าจากการวัด

(e) บรรทัดผลลัพธ์

(f) ฟังก์ชั่นการวัด

(g) การตั้งค่าพื้นฐาน

ข้อมูลทางเทคนิค

เครื่องวัดระยะด้วยเลเซอร์แบบดิจิตอล			GLM 400
หมายเลขสินค้า	3 601 K72 R50	3 601 K72 RK0	3 601 K72 RC0
การตั้งค่าหน่วยของการวัด	ม., ซม.	ม., ซม., ฟุต, นิ้ว (เศษส่วน), ฟุต/นิ้ว (เศษส่วน)	ม., ซม., ฟุต, นิ้ว (เศษส่วน), ฟุต/นิ้ว (เศษส่วน), ไต้หวัน ฟุต
ช่วงการวัด (ปกติ)	0.05-40 ม.[A)]		
ช่วงการวัด (ปกติ สภาวะที่ไม่เหมาะสม)	20 ม.[B)]		
ความแม่นยำการวัด (ปกติ)	±1.5 มม.[A)]		
ความแม่นยำการวัด (ปกติ สภาวะที่ไม่เหมาะสม)	±3.0 มม.[B)]		
หน่วยแสดงการวัดต่ำสุด	0.5 มม.		
ทั่วไป			
อุณหภูมิใช้งาน	−10 °C ...+45 °C[C)]		
อุณหภูมิเก็บรักษา	−20 °C ...+70 °C		
ความชื้นสัมพัทธ์ สูงสุด	90 %		
ความสูงใช้งานเหนือระดับอ้างอิง สูงสุด	2000 ม.		
ระดับมลพิษตาม IEC 61010-1	2[D)]		
ระดับเลเซอร์	2		
ชนิดเลเซอร์	635 นิวตันเมตร, < 1 มิลลิวัตต์		
เส้นผ่าศูนย์กลางลำแสงเลเซอร์ (ที่ 25 °C) ประมาณ			
– ที่ระยะ 10 ม.	9 มม.[E)]		

เครื่องวัดระยะด้วยเลเซอร์แบบดิจิตอล	GLM 400
– ที่ระยะ 40 ม.	45 มม.[E]
ระบบปิดสวิทช์อัตโนมัติ หลังประมาณ	
– เลเซอร์	20 วินาที
– เครื่องมือวัด (เมื่อไม่มีการวัด)	5 นาที
น้ำหนักตามระเบียบการ EPTA-Procedure 01:2014	0.10 กก.
ขนาด	106 x 45 x 24 มม.
ระดับการคุ้มกัน	IP 54 (ป้องกันฝุ่นและน้ำกระเด็นเปียก)[F]
แบตเตอรี่	2 x 1.5 V LR03 (AAA)
แบตเตอรี่ชาร์จไฟได้	2 x 1.2 V HR03 (AAA)
การตั้งค่าเสียง	●

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

B) สำหรับการวัดจากขอบหลังของเครื่องมือวัด ใช้ได้กับเป้าหมายที่มีการสะท้อนแสงน้อย (ต. ย. เช่น ผนังทาสีเข้ม) แสงไฟพื้นหลังแรง และอุณหภูมิใช้งาน – 10 °C ถึง +45 °C นอกจากนี้ต้องนำส่วนเบี่ยงเบน ±0.15 มม./ม. มาพิจารณาด้วย

C) ในฟังก์ชันการวัดต่อเนื่องอุณหภูมิใช้งานสูงสุดคือ +40 °C

D) เกิดขึ้นเฉพาะมลพิษที่ไม่นำไฟฟ้า ยกเว้นบางครั้งนำไฟฟ้าได้ชั่วคราวที่มีสาเหตุจากการกลั่นตัวที่ได้คาดว่าจะเกิดขึ้น

E) ที่อุณหภูมิใช้งาน 25 °C

F) ยกเว้นช่องใส่แบตเตอรี่

หมายเลขเครื่อง **(11)** บนแผ่นป้ายรุ่นมีไว้เพื่อระบุเครื่องมือวัดของท่าน

การติดตั้ง

การใส่/การเปลี่ยนแบตเตอรี่

ขอแนะนำให้ใช้แบตเตอรี่อัลคาไลน์-แมงกานีส หรือแบตเตอรี่แพ็คสำหรับการทำงานของเครื่องมือวัด

แบตเตอรี่แพ็ค 1.2 โวลท์ จะวัดได้น้อยกว่าแบตเตอรี่ 1.5 โวลท์

เปิดฝาช่องใส่แบตเตอรี่ **(9)** โดยกดบนตัวล็อค **(10)** และถอดฝาช่องใส่แบตเตอรี่ออก ใส่แบตเตอรี่หรือแบตเตอรี่แพ็คเข้าไป ขณะใส่แบตเตอรี่ต้องดูให้ขั้วแบตเตอรี่อยู่ในตำแหน่งที่ถูกต้องตามที่กำหนดไว้ที่ด้านในช่องใส่แบตเตอรี่

หากสัญลักษณ์แบตเตอรี่ที่ว่างเปล่าปรากฏบนจอแสดงผลเป็นครั้งแรก ยังสามารถวัดได้อีกประมาณ 100 ครั้ง หากสัญลักษณ์แบตเตอรี่ว่างเปล่าและกะพริบสีแดง ท่านไม่สามารถทำการวัดได้อีกต่อไป ให้เปลี่ยนแบตเตอรี่หรือแบตเตอรี่แพ็ค

เปลี่ยนแบตเตอรี่หรือแบตเตอรี่แพ็คทุกก้อนพร้อมกันเสมอ ใช้เฉพาะแบตเตอรี่หรือแบตเตอรี่แพ็คของผู้ผลิตเดียวกันและมีความจุเท่ากัน

- ▶ **เมื่อไม่ใช้งานเป็นเวลานาน ให้ถอดแบตเตอรี่หรือแบตเตอรี่แพ็คออกจากเครื่องมือวัด**เมื่อเก็บเป็นเวลานาน แบตเตอรี่หรือแบตเตอรี่แพ็คจะเกิดการกัดกร่อนและคายประจุไฟออกมาเอง

การปฏิบัติงาน

การเริ่มต้นปฏิบัติงาน

- ▶ **อย่าวางเครื่องมือวัดที่เปิดสวิทช์ทิ้งไว้โดยไม่มีผู้ดูแลและปิดสวิทช์เครื่องมือวัดเมื่อเลิกใช้งาน** คนอื่นอาจตาพร่าจากแสงเลเซอร์ได้
- ▶ **ป้องกันไม่ให้เครื่องมือวัดได้รับความชื้นและโดนแสงแดดส่องโดยตรง**
- ▶ **อย่าให้เครื่องมือวัดได้รับอุณหภูมิที่สูงมาก หรือรับอุณหภูมิที่เปลี่ยนแปลงมาก** ต. ย. เช่น อย่าปล่อยเครื่องไว้ในรถยนต์เป็นเวลานาน ในกรณีที่อุณหภูมิมีการเปลี่ยนแปลงมาก ต้องปล่อยให้เครื่องมือวัดปรับตัวเข้ากับอุณหภูมิรอบด้านก่อนใช้งาน ในกรณีที่ได้รับอุณหภูมิที่สูงมากหรือรับอุณหภูมิที่เปลี่ยนแปลงมาก เครื่องมือวัดอาจมีความแม่นยำน้อยลง

▶ **อย่าให้เครื่องมือวัดถูกกระแทกอย่างรุนแรงหรืออย่าให้ตกหล่น** เมื่อเครื่องมือวัดถูกกระทบจากภายนอกอย่างแรง ท่านควรตรวจสอบความแม่นยำทุกครั้งก่อนนำไปใช้งานต่อ (ดู "การตรวจสอบความแม่นยำของการวัดระยะทาง", หน้า 68)

การเปิด-ปิดเครื่อง

– เมื่อต้องการ**เปิดสวิทช์**เครื่องมือวัดและเลเซอร์ให้กดปุ่มวัด **(2)** [▲] สั้นๆ

– เมื่อต้องการ**เปิดสวิทช์**เครื่องมือวัดโดยไม่เปิดเลเซอร์ให้กดปุ่มเปิด-ปิด **(5)** [⏻] สั้นๆ

▶ **อย่าส่องลำแสงเลเซอร์ไปยังคนหรือสัตว์ และอย่าจ้องมองลำแสงเลเซอร์แม้จะอยู่ในระยะไกล**

เมื่อต้องการ**ปิดสวิทช์**เครื่องมือวัดให้กดปุ่มเปิด-ปิด **(5)** [⏻] ค้างไว้

เมื่อปิดสวิทช์เครื่องมือวัด ค่าที่เก็บไว้ในหน่วยความจำและค่าที่ตั้งไว้ในเครื่องจะยังคงอยู่

กระบวนการวัด

เมื่อเปิดสวิทช์ เครื่องมือวัดจะอยู่ในฟังก์ชั่นการวัดความยาว สำหรับฟังก์ชั่นการวัดอื่นๆ ให้กดปุ่ม **(7)** [**Func**] เลือกฟังก์ชั่นการวัดที่ต้องการด้วยปุ่ม **(3)** [**+**] หรือปุ่ม **(8)** [**–**] (ดู "ฟังก์ชั่นการวัด", หน้า 62) เรียกใช้งานฟังก์ชั่นการวัดด้วยปุ่ม **(7)** [**Func**] หรือด้วยปุ่มวัด **(2)** [▲]

เมื่อเปิดสวิทช์ ขอบหลังของเครื่องมือวัดจะถูกเลือกเป็นระนาบอ้างอิงสำหรับการวัด หากต้องการเปลี่ยนระนาบอ้างอิง (ดู "การเลือกระนาบอ้างอิง (ดูภาพประกอบ **A**)", หน้า 62)

วางเครื่องมือวัดที่จุดเริ่มต้นที่ต้องการวัด (ต. ย. เช่น ผนังห้อง)

หมายเหตุ: หากเปิดสวิทช์เครื่องมือวัดด้วยปุ่มเปิด-ปิด **(5)** [⏻] ให้กดปุ่มวัด **(2)** [▲] สั้นๆ เพื่อเปิดแสงเลเซอร์

กดปุ่มวัด **(2)** [▲] 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 **(13)** (ต. ย. เช่น สำหรับการวัดด้วยขาตั้งแบบสามขา)

เมื่อต้องการเลือกระนาบอ้างอิงให้กดปุ่ม **(7)** [**Func**] ค้างไว้ เลือกระนาบอ้างอิงที่ต้องการด้วยปุ่ม **(3)** [**+**] หรือปุ่ม **(8)** [**–**] ทุกครั้งที่เปิดสวิทช์เครื่องมือวัดระดับอ้างอิงจะปรับไปอยู่ที่ขอบหลังของเครื่องมือวัด

เมนู "การตั้งค่าพื้นฐาน"

เมื่อต้องการเข้าสู่เมนู "การตั้งค่าพื้นฐาน" **(g)** ให้กดปุ่ม **(7)** [**Func**] ค้างไว้

เลือกการตั้งค่าพื้นฐานที่เกี่ยวข้องและเลือกรายการที่ต้องการ

เมื่อต้องการออกจากเมนู "การตั้งค่าพื้นฐาน" ให้กดปุ่มเปิด-ปิด **(5)** [⏻]

การส่องสว่างหน้าจอแสดงผล

แสงสว่างหน้าจอแสดงผลจะติดขึ้นอย่างต่อเนื่อง ถ้าไม่มีการกดปุ่มใดๆ แสงสว่างหน้าจอแสดงผลจะหรี่ลงภายใน 20 วินาที ทั้งนี้เพื่อประหยัดแบตเตอรี่/แบตเตอรี่แพ็ค

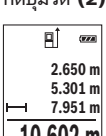
ฟังก์ชั่นการวัด

การวัดความยาว

เลือกการวัดความยาว ⊢

เมื่อต้องการเปิดลำแสงเลเซอร์ ให้กดปุ่มวัด **(2)** [▲] สั้นๆ

กดปุ่มวัด **(2)** [▲] สั้นๆ เพื่อทำการวัด ค่าจากการวัดแสดงอยู่ที่ด้านล่างของจอแสดงผล



สำหรับการวัดเพิ่มเติมแต่ละครั้ง ให้ทำซ้ำขั้นตอนข้างต้น ค่าจากการวัดครั้งล่าสุดแสดงที่ด้านล่างของจอแสดงผล ค่าจากการวัดก่อนครั้งล่าสุดแสดงที่ด้านบน ฯลฯ

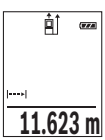
การวัดต่อเนื่อง

สำหรับการวัดต่อเนื่อง ท่านสามารถเคลื่อนย้ายเครื่องมือวัดเทียบกับเป้าหมายโดยที่ค่าจากการวัดจะได้รับการปรับปรุงทุกๆ 0.5 วินาที ต. ย. เช่น ท่านสามารถเดินออกจากผนังไปยังระยะห่างที่ต้องการในขณะที่สามารถอ่านระยะทางจริงได้เสมอ

เลือกการวัดต่อเนื่อง ⊢---⊣

เมื่อต้องการเปิดลำแสงเลเซอร์ให้กดปุ่มวัด **(2)** [▲] สั้นๆ

เลื่อนเครื่องมือวัดจนค่าระยะที่ต้องการแสดงที่ด้านล่างของจอแสดงผล



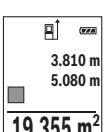
กดปุ่มวัด **(2)** [▲] สั้นๆ เพื่อหยุดการวัดต่อเนื่อง ค่าจากการวัดปัจจุบันแสดงที่ด้านล่างของจอแสดงผล กดปุ่มวัด **(2)** [▲] อีกครั้งเพื่อเริ่มต้นการวัดต่อเนื่องใหม่

การวัดต่อเนื่องจะปิดสวิทช์โดยอัตโนมัติหลังจากผ่านไป 5 นาที

การวัดพื้นที่

เลือกการวัดพื้นที่ □

หลังจากนั้นให้วัดความยาวและความกว้างตามลำดับในลักษณะเดียวกับการวัดความยาว ลำแสงเลเซอร์ยังคงเปิดอยู่ระหว่างการวัดทั้งสองครั้ง ระยะทางที่จะวัดจะกะพริบในจอแสดงผลสำหรับการวัดพื้นที่ □



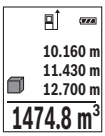
ค่าจากการวัดค่าแรกแสดงที่ด้านบนของจอแสดงผล

เมื่อการวัดค่าที่สองเสร็จสมบูรณ์ พื้นที่ผิวจะถูกคำนวณโดยอัตโนมัติและแสดงผล ผลลัพธ์สุดท้ายแสดงที่ด้านล่างของจอแสดงผล ค่าจากการวัดแต่ละค่าแสดงที่ด้านบน

การวัดปริมาตร

เลือกการวัดปริมาตร ⬚

หลังจากนั้นให้วัดความกว้าง ความยาว และความลึกตามลำดับในลักษณะเดียวกับการวัดความยาว ลำแสงเลเซอร์ยังคงเปิดอยู่ระหว่างการวัดทั้งสามครั้ง ระยะทางที่จะวัดจะกะพริบในจอแสดงผลสำหรับการวัดปริมาตร ⬚



ค่าจากการวัดค่าแรกแสดงที่ด้านบนของจอแสดงผล
เมื่อการวัดค่าที่สามเสร็จสมบูรณ์ ปริมาตรจะถูกคำนวณโดยอัตโนมัติ และแสดงผล ผลลัพธ์สุดท้ายแสดงที่ด้านล่างของจอแสดงผล ค่าจากการวัดแต่ละค่าแสดงที่ด้านบน

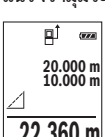
การวัดความสูงทางอ้อม / การวัดพีทาโกรัสอย่างง่าย (ดูภาพประกอบ E)

การวัดความสูงทางอ้อมใช้วัดระยะทางที่ไม่สามารถวัดได้โดยตรงเพราะมีสิ่งกีดขวางที่อาจขวางลำแสงเลเซอร์หรือไม่มีผิวเป้าหมายที่เป็นตัวสะท้อนแสง การวัดจะได้ผลลัพธ์ที่ถูกต้องเฉพาะเมื่อยึดตามมุมฉากที่จำเป็นสำหรับการวัดนั้นๆ อย่างเที่ยงตรง (ทฤษฎีบทพีทาโกรัส)

ตรวจสอบให้แน่ใจว่าระนาบอ้างอิงของการวัด (ต. ย. เช่น ขอบหลังของเครื่องมือวัด) ยังคงอยู่ที่ตำแหน่งเดียวกันอย่างพอดิบพอดีสำหรับการวัดแต่ละครั้งทั้งหมดในกระบวนการวัด ระหว่างการวัดแต่ละครั้งลำแสงเลเซอร์ยังคงเปิดอยู่

เลือกการวัดความสูงทางอ้อม ◿

วัดระยะทาง **"1"** และ **"2"** ตามลำดับในลักษณะเดียวกับการวัดความยาว ตรวจสอบให้แน่ใจว่ามุมระหว่างระยะทาง **"1"** และระยะทางที่ต้องการหา **"X"** เป็นมุมฉาก



เมื่อการวัดค่าครั้งสุดท้ายเสร็จสมบูรณ์ ผลลัพธ์สำหรับระยะทางที่ต้องการหา **"X"** จะแสดงในบรรทัดผลลัพธ์ **(e)** ค่าจากการวัดแต่ละค่าจะแสดงในบรรทัดแสดงค่าจากการวัด **(d)**

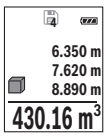
ฟังก์ชั่นหน่วยความจำ

ค่าและผลลัพธ์สุดท้ายของการวัดแต่ละครั้งที่เสร็จสมบูรณ์จะถูกเก็บไว้โดยอัตโนมัติ

การแสดงค่าในหน่วยความจำ

สามารถเรียกดูได้สูงสุด 15 ค่า (ค่าจากการวัดหรือผลลัพธ์สุดท้าย)

กดปุ่มหน่วยความจำ **(6)** [🖫]



หมายเลขของค่าที่เก็บไว้แสดงที่ด้านบนของจอแสดงผล ค่าที่เก็บไว้ที่สอดคล้องกันแสดงที่ด้านล่าง และฟังก์ชั่นการวัดที่สอดคล้องกันแสดงที่ด้านซ้าย

กดปุ่ม **(3)** [**+**] เพื่อเลื่อนดูค่าที่เก็บไว้ไปข้างหน้า

กดปุ่ม **(8)** [**–**] เพื่อเลื่อนดูค่าที่เก็บไว้ย้อนหลัง

หากไม่มีค่าในหน่วยความจำ **"0.000"** จะแสดงในบรรทัดล่างของจอแสดงผล **"0"** ในบรรทัดบน

ค่าเก่าที่สุดจะอยู่ที่ตำแหน่งที่ 1 ในหน่วยความจำ ค่าล่าสุดอยู่ในตำแหน่งที่ 15 (สำหรับค่าในหน่วยความจำ 15 ค่าที่มีอยู่) เมื่อมีการเก็บค่าต่อไป ค่าเก่าที่สุดจะถูกลบออกจากหน่วยความจำเสมอ

การลบหน่วยความจำ

เมื่อต้องการลบเนื้อหาหน่วยความจำให้กดปุ่มหน่วยความจำ **(6)** [M] จากนั้นจึงกดปุ่มเปิด-ปิด **(5)** [⏻] สั้นๆ เพื่อลบค่าที่แสดง

เมื่อต้องการลบค่าทั้งหมดที่เก็บไว้ในหน่วยความจำให้กดปุ่ม **(4)** และปุ่มเปิด-ปิด **(5)** [⏻] พร้อมๆ กัน จากนั้นจึงปล่อยนิ้วจากปุ่มเปิด-ปิด **(5)** [⏻]

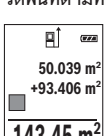
การเพิ่ม/การลดค่า

ท่านสามารถเพิ่มหรือลดค่าจากการวัดหรือผลลัพธ์สุดท้ายได้

การเพิ่มค่า

ตัวอย่างต่อไปนี้อธิบายการเพิ่มค่าของพื้นที่:

วัดพื้นที่ตามที่อธิบายไว้ในบท "การวัดพื้นที่"



กดปุ่ม **(3)** [**+**] พื้นที่ที่คำนวณได้และสัญลักษณ์ **"+"** จะปรากฏขึ้น

กดปุ่มวัด **(2)** [▲] เพื่อเริ่มต้นวัดพื้นที่อื่นๆ ต่อไป วัดพื้นที่ตามที่อธิบายไว้ในบท "การวัดพื้นที่" ทันทีที่การวัดที่สองเสร็จสมบูรณ์ ผลลัพธ์ของการวัดพื้นที่ที่สองแสดงที่ด้านล่างของจอแสดงผล เมื่อต้องการดูผลลัพธ์สุดท้ายให้กดปุ่มวัด **(2)** [▲] อีกครั้ง

หมายเหตุ: สำหรับการวัดความยาวผลลัพธ์สุดท้ายจะปรากฏทันที

เมื่อต้องการออกจากการเพิ่มค่าให้กดปุ่ม **(7)** [**Func**]

การลดค่า

เมื่อต้องการลดค่าให้กดปุ่ม **(8)** [**–**] ขั้นตอนต่อไปจะเหมือนกับ "การเพิ่มค่า"

การลบทิ้งค่าจากการวัด

กดปุ่มเปิด-ปิด **(5)** [⏻] สั้นๆ เพื่อลบทิ้งค่าจากการวัดครั้งล่าสุดแต่ละค่าที่กำหนดไว้ในฟังก์ชั่นการวัดทั้งหมด กดปุ่มเปิด-ปิด **(5)** [⏻] สั้นๆ ซ้ำๆ กันจะลบทิ้งค่าจากการวัดในลำดับย้อนกลับ

การเปลี่ยนหน่วยของการวัด

การตั้งค่าพื้นฐานคือหน่วยของการวัด **"ม."** (เมตร)

เปิดสวิทช์เครื่องมือวัด

กดปุ่ม **(7)** [**Func**] ค้างไว้เพื่อเข้าสู่เมนู "การตั้งค่าพื้นฐาน" เลือกหน่วยการวัดความยาวตามประเภทของเครื่องมือวัดของท่าน:

– **"ม./ซม."** (**3 601 K72 R50**)

– **"ฟุต/ม."** (**3 601 K72 RK0**)

– **"ไต้หวัน ฟุต/ม." ("尺/ม.")** (**3 601 K72 RC0**)

กดปุ่ม **(3)** [**+**] หรือปุ่ม **(8)** [**–**] เพื่อเปลี่ยนหน่วยของการวัด

หรือ:

กดปุ่ม **(4)** [**u**] เพื่อเปลี่ยนหน่วยของการวัด:

– สำหรับเครื่องมือวัด **3 601 K72 R50** และ **3 601 K72 RK0** ในเมนูคอนฟิกเกอเรชั่น หน่วยของการวัดถัดไป (ตามเข็มนาฬิกา) จะถูกเลือก

– สำหรับเครื่องมือวัด **3 601 K72 RC0** สามารถสลับระหว่าง **ไต้หวัน ฟุต** และ **ม.**

เมื่อต้องการออกจากรายการเมนูให้กดปุ่มเปิด-ปิด **(5)** [⏻] การตั้งค่าที่เลือกจะถูกเก็บไว้เมื่อปิดสวิทช์เครื่องมือวัด

การเปิด-ปิดเสียง

ในการตั้งค่าพื้นฐาน เสียงจะถูกเปิดใช้งานอยู่แล้ว

เปิดสวิทช์เครื่องมือวัด

กดปุ่ม **(7)** [**Func**] ค้างไว้เพื่อเข้าสู่เมนู "การตั้งค่าพื้นฐาน" เลือก 🕪 กดปุ่ม **(3)** [**+**] หรือปุ่ม **(8)** [**–**] เพื่อเปิดและปิดเสียง

เมื่อต้องการออกจากรายการเมนูให้กดปุ่มวัด **(2)** [▲] หรือปุ่มเปิด-ปิด **(5)** [⏻] เมื่อปิดสวิทช์เครื่องมือวัดค่าที่เลือกจะยังคงถูกเก็บไว้

ข้อแนะนำในการทำงาน

ข้อแนะนำทั่วไป

เลนส์รับแสง **(14)** และช่องทางออกลำแสงเลเซอร์ **(15)** ต้องไม่ถูกปิดคลุมขณะทำการวัด

ต้องไม่เคลื่อนย้ายเครื่องมือวัดในระหว่างทำการวัด ดังนั้นให้วางเครื่องมือวัดลงบนพื้นผิวรองรับหรือทาบกับผนังหยุดที่แข็งแรงเท่าที่เป็นไปได้

ปัจจัยที่ส่งผลกระทบต่อช่วงการวัด

ช่วงการวัดขึ้นอยู่กับสภาพแสงและคุณสมบัติการสะท้อนของพื้นผิวเป้าหมาย ใช้แว่นตาสำหรับมองแสงเลเซอร์ **(18)** (อุปกรณ์ประกอบ) และแผ่นเป้าหมายเลเซอร์ **(17)** (อุปกรณ์ประกอบ) หรือให้รัมเงาพื้นผิวเป้าหมายเพื่อจะได้มองเห็นลำแสงเลเซอร์ได้ดียิ่งขึ้นเมื่อแสงล้อมรอบจ้ามาก

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 **(17)** (อุปกรณ์ประกอบ) บนพื้นผิวเหล่านี้ หากจำเป็น

นอกจากนี้ความผิดพลาดจากการวัดอาจเกิดขึ้นได้เมื่อส่องพื้นผิวเป้าหมายที่อยู่ในตำแหน่งเอียง

ชั้นของอากาศที่มีอุณหภูมิแตกต่างกัน หรือแสงสะท้อนที่ได้รับทางอ้อม อาจส่งผลต่อค่าจากการวัดด้วยเช่นกัน

การตรวจสอบความแม่นยำของการวัดระยะทาง

ความแม่นยำของเครื่องมือวัดสามารถตรวจสอบได้ดังนี้:

– เลือกระยะวัดถาวรที่ไม่สามารถเปลี่ยนแปลงที่มีความยาวประมาณ 3 ถึง 10 เมตร โดยที่ท่านทราบความยาวนี้แล้วอย่างแม่นยำ (ต. ย. เช่น ความกว้างห้อง หรือ ช่องประตู) ควรทำการวัดภายใต้สภาวะที่เอื้ออำนวยนั่นคือระยะวัดควรอยู่ภายในอาคารโดยมีแสงพื้นหลังอ่อน และพื้นผิวเป้าหมายของการวัดควรราบเรียบและสะท้อนแสงได้ดี

– วัดระยะทาง 10 ครั้งต่อเนื่องกัน

ในระยะการวัดทั้งหมดและภายใต้เงื่อนไขที่ดี ส่วนเบี่ยงเบนสูงสุดของการวัดแต่ละครั้งจากค่าเฉลี่ยต้องไม่เกิน ±4 มม. บันทึกข้อมูลจากการวัดไว้เพื่อให้สามารถเปรียบเทียบความแม่นยำได้ในภายหลัง

การทำงานกับขาตั้งแบบสามขา (อุปกรณ์ประกอบ)

การใช้ขาตั้งแบบสามขาจำเป็นอย่างยิ่งสำหรับการวัดระยะทางไกลๆ วางเครื่องมือวัดที่มีเกลียวขนาด 1/4" **(13)** เข้าบนเพลตยึดแบบเปลี่ยนเร็วของขาตั้งแบบสามขา **(19)** หรือขาตั้งกล้องแบบสามขาทั่วไป ยึดเครื่องมือวัดโดยขันสกรูล็อคของเพลตยึดแบบเปลี่ยนเร็วเข้าให้แน่น

ตั้งระนาบอ้างอิงสำหรับการวัดด้วยขาตั้งแบบสามขาโดยกดปุ่ม **(7)** [**Func**] ที่สอดคล้อง (ระนาบอ้างอิงเกลียว)

ข้อความแสดงความผิดพลาด

หากไม่สามารถทำการวัดทำได้อย่างถูกต้องจะปรากฏข้อความแสดงข้อผิดพลาด "Error" ในจอแสดงผล ปิดสวิทช์เครื่องมือวัดและเปิดใหม่ และเริ่มการวัดอีกครั้ง

เครื่องมือวัดจะตรวจสอบการทำงานที่ถูกต้องของแต่ละการวัด หากตรวจพบข้อบกพร่องบนจอแสดงผลจะแสดงเฉพาะสัญลักษณ์ด้านข้างนี้และเครื่องมือวัดจะปิดสวิทช์ ในกรณีเช่นนี้ให้ส่งเครื่องมือวัดเข้ารับการตรวจสอบที่ศูนย์บริการหลังการขาย บ๊อช ผ่านตัวแทนจำหน่ายของท่าน

การบำรุงรักษาและการบริการ

การบำรุงรักษาและการทำความสะอาด

เก็บรักษาและขนย้ายเครื่องมือวัดเฉพาะเมื่อบรรจุอยู่ภายในกระเป๋าใส่เครื่องมือวัดที่จัดมาให้เท่านั้น

รักษาเครื่องมือวัดให้สะอาดตลอดเวลา

อย่าจุ่มเครื่องมือวัดลงในน้ำหรือของเหลวอื่นๆ

เช็ดสิ่งสกปรกออกด้วยผ้านุ่มที่เปียกหมาดๆอย่าใช้สารซักฟอกหรือตัวทำละลาย

บำรุงรักษาเลนส์รับแสง **(14)** เป็นพิเศษ เช่นเดียวกับการดูแลแว่นตาหรือเลนส์ของกล้องถ่ายรูป

ในกรณีซ่อมแซม ให้ส่งเครื่องมือวัดโดยบรรจุลงในกระเป๋าใส่เครื่องมือวัด **(16)**

การบริการหลังการขายและการให้คำปรึกษาการใช้งาน

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

ทีมงานที่ปรึกษาของ บ๊อช ยินดีให้ข้อมูลเกี่ยวกับผลิตภัณฑ์ของเราและอุปกรณ์ประกอบต่างๆ

เมื่อต้องการสอบถามและสั่งซื้ออะไหล่ กรุณาแจ้งหมายเลขสินค้า 10 หลักบนแผ่นป้ายรุ่นของผลิตภัณฑ์ทุกครั้ง

ไทย

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

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 sebagai kacamata pelindung.** Kacamata pelihat laser disediakan agar dapat mendeteksi laser dengan lebih baik, namun tidak melindungi dari sinar laser.
- ▶ **Jangan gunakan kacamata pelihat laser sebagai sunglasses 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.** Anda dapat secara tidak sengaja membuat orang menjadi buta.
- ▶ **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.

Spesifikasi produk dan performa

Perhatikan ilustrasi yang terdapat pada bagian depan panduan pengoperasian.

Tujuan penggunaan

Alat pengukur ini cocok untuk mengukur jarak, panjang, tinggi, sela serta untuk menghitung luas dan isi.

Alat ukur ditujukan untuk digunakan di dalam maupun di luar ruangan.

Ilustrasi komponen

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

(1) Display

(2) Tombol pengukuran [▲]

(3) Tombol plus [**+**]

(4) Tombol pemilih satuan ukur [**u**]

(5) Tombol on/off [⏻]

(6) Tombol penyimpanan [💾]

(7) Tombol fungsi [**Func**]

(8) Tombol minus [**–**]
(9) Tutup kompartemen baterai
(10) Penguncian tutup kompartemen baterai
(11) Nomor seri
(12) Label peringatan laser
(13) Soket tripod 1/4"
(14) Lensa penerima
(15) Outlet sinar laser
(16) Tas pelindung[A)]
(17) Panel sasaran laser[A)]
(18) Kacamata laser[A)]
(19) Tripod[A)]

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) Bilah status
(b) Bidang acuan pengukuran
(c) Indikator baterai
(d) Baris nilai pengukuran
(e) Baris hasil pengukuran
(f) Fungsi pengukuran
(g) Pengaturan standar

Data teknis

Laser pengukur jarak digital			**GLM 400**
Nomor seri	**3 601 K72 R50**	**3 601 K72 RK0**	**3 601 K72 RC0**
Pengaturan satuan ukur	m, cm	m, cm, ft, in (pecahan), ft/in (pecahan)	m, cm, ft, in (pecahan), ft/in (pecahan), Taiwan ft

Laser pengukur jarak digital	**GLM 400**
Rentang pengukuran (khusus)	0,05-40 m[A)]
Rentang pengukuran (kondisi khusus dan menyulitkan)	20 m[B)]
Akurasi pengukuran (khusus)	±1,5 mm[A)]
Akurasi pengukuran (kondisi khusus dan menyulitkan)	±3,0 mm[B)]
Unit display terkecil	0,5 mm
Umum	
Suhu pengoperasian	−10 °C ...+45 °C[C)]
Suhu penyimpanan	−20 °C ...+70 °C
Kelembapan relatif maks.	90%
Ketinggian maksimal di atas tinggi acuan	2000 m
Tingkat polusi sesuai dengan IEC 61010-1	2[D)]
Kelas laser	2
Jenis laser	635 nm, < 1 mW
Diameter sinar laser (pada suhu 25 °C) sekitar	
– dalam jarak 10 m	9 mm[E)]
– dalam jarak 40 m	45 mm[E)]
Penonaktifan otomatis setelah sekitar	
– Laser	20 detik
– Alat pengukur (tanpa pengukuran)	5 menit
Berat sesuai dengan EPTA-Procedure 01:2014	0,10 kg
Ukuran	106 x 45 x 24 mm
Tingkat keamanan	IP 54 (kedap debu dan tahan percikan air)[F)]
Baterai	2 x 1,5 V LR03 (AAA)
Sel baterai	2 x 1,2 V HR03 (AAA)

Laser pengukur jarak digital	**GLM 400**
Pengaturan bunyi	●

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 sebesar ± 0,05 mm/m juga harus diperhitungkan.

B) Pada saat mengukur dari tepi belakang alat pengukur, pencahayaan latar belakang yang kuat, dan suhu pengoperasian sebesar – 10 °C hingga +45 °C, berlaku untuk daya refleksi objek yang rendah (misalnya dinding yang dicat dengan warna gelap). Selain itu, penyimpangan sebesar ±0,15 mm/m juga harus diperhitungkan.

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

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

E) Pada suhu pengoperasian 25°C

F) kecuali kompartemen baterai

Nomor seri **(11)** pada label tipe berfungsi sebagai identifikasi alat pengukur Anda.

Pemasangan

Memasukkan/mengganti baterai

Dianjurkan untuk menggunakan baterai mangan-alkali atau baterai isi ulang untuk pengoperasian alat pengukur.

Dengan baterai 1,2 V, pengukuran yang lebih kecil dapat dilakukan daripada menggunakan baterai 1,5 V.

Untuk membuka tutup kompartemen baterai **(9)**, tekan pengunci **(10)** 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.

Jika simbol baterai kosong muncul pertama kali pada display, masih dapat dilakukan sekitar 100 pengukuran. Jika simbol baterai telah kosong dan lampu merah berkedip, maka pengukuran tidak dapat lagi dilakukan. Ganti baterai atau baterai isi ulang.

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.
- ▶ **Jagalah supaya alat pengukur tidak terbentur atau terjatuh.** Apabila terjadi guncangan atau benturan keras pada alat, disarankan untuk memeriksa akurasi alat pengukur sebelum digunakan kembali (lihat „Pemeriksaan akurasi pada pengukuran jarak“, Halaman 81).

Mengaktifkan/menonaktifkan

- – Untuk **mengaktifkan** alat pengukur dan laser, tekan singkat tombol pengukuran **(2)** [▲].
- – Untuk **mengaktifkan** alat pengukur tanpa laser, tekan singkat tombol on/off **(5)** [⏻].
- ▶ **Jangan mengarahkan sinar laser pada orang lain atau binatang dan jangan melihat ke sinar laser, juga tidak dari jarak jauh.**

Untuk **menonaktifkan** alat pengukur, tekan dan tahan tombol on/off **(5)** [⏻].

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

Prosedur pengukuran

Setelah diaktifkan, alat pengukur berada dalam fungsi pengukuran panjang. Tekan tombol **(7)** [**Func**] untuk fungsi pengukuran lainnya. Pilih fungsi pengukuran yang diinginkan menggunakan tombol **(3)** [**+**] atau tombol **(8)** [**–**] dari (lihat „Fungsi pengukuran“, Halaman 76). Aktifkan fungsi pengukuran menggunakan tombol **(7)** [**Func**] atau tombol pengukuran **(2)** [▲].

Setelah diaktifkan, tepi belakang alat pengukur telah dipilih sebagai bidang acuan untuk pengukuran. Untuk mengubah bidang acuan, (lihat „Memilih bidang acuan (lihat gambar **A**)“, Halaman 76).

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

Catatan: Jika alat pengukur diaktifkan menggunakan tombol on/off **(5)** [⏻], tekan singkat tombol pengukuran **(2)** [▲] untuk mengaktifkan laser.

Untuk memulai pengukuran, tekan singkat tombol pengukuran **(2)** [▲]. 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 4 detik. Periode pengukuran bergantung pada jarak, kondisi cahaya dan karakter refleksi permukaan target. Setelah pengukuran selesai, sinar laser akan dimatikan 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 **(13)** (misalnya untuk mengukur dengan tripod)

Tekan dan tahan tombol **(7)** [**Func**] untuk memilih bidang acuan. Pilih bidang acuan yang diinginkan dengan tombol **(3)** [**+**] atau tombol **(8)** [**–**]. Setelah setiap pengaktifan alat pengukur, tepi belakang alat pengukur akan ditetapkan sebagai bidang acuan.

Menu "Pengaturan dasar"

Untuk mengakses menu "Pengaturan dasar" **(g)**, tekan dan tahan tombol **(7)** [**Func**].

Pilih tiap pengaturan dasar dan pengaturan Anda.

Untuk keluar dari menu "Pengaturan dasar", tekan tombol on/off **(5)** [⏻].

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.

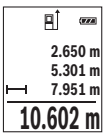
Fungsi pengukuran

Pengukuran panjang

Pilih pengukuran panjang ⊢⊣.

Untuk mengaktifkan sinar laser, tekan singkat tombol ukur **(2)** [▲].

Untuk pengukuran, tekan singkat tombol ukur **(2)** [▲]. 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.

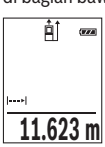
Pengukuran kontinu

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

Pilih pengukuran kontinu.

Untuk mengaktifkan sinar laser, tekan singkat tombol ukur **(2)** [▲].

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



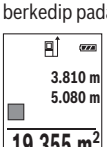
Dengan menekan singkat tombol ukur **(2)** [▲], pengukuran kontinu dibatalkan. Nilai ukur saat ini akan ditampilkan pada display bagian bawah. Pengukuran kontinu akan dimulai ulang dengan menekan kembali tombol ukur **(2)** [▲].

Pengukuran kontinu akan berhenti secara otomatis setelah 5 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 berkedip pada display pengukuran luas.



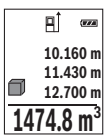
Nilai ukur pertama ditampilkan pada display bagian atas.

Setelah selesai pengukuran kedua, luas permukaan secara otomatis dihitung dan ditampilkan. Hasil akhir terletak di display bagian bawah, nilai ukur 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 berkedip pada display pengukuran volume.



Nilai ukur pertama ditampilkan pada display bagian atas.

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

Pengukuran tinggi tidak langsung/pengukuran Phytagoras sederhana (lihat gambar E)

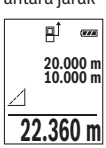
Dengan pengukuran tinggi tidak langsung, dapat diperoleh jarak-jarak yang tidak dapat diukur secara langsung karena ada sesuatu yang menghalangi jalannya sinar atau jika tidak ada permukaan yang dituju yang berguna sebagai reflektor. Hasil pengukuran yang benar hanya bisa didapatkan jika pada tiap pengukuran dibentuk sudut siku yang tepat (dalil Pythagoras).

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

Sinar laser akan tetap hidup di antara pengukuran tunggal.

Pilih pengukuran tidak langsung.

Ukur jarak **"1"** dan **"2"** seperti pada pengukuran panjang dalam urutan ini. Pastikan di antara jarak **"1"** dan jarak yang dicari **"X"** terdapat sudut siku-siku.



Setelah pengukuran terakhir selesai dilakukan, hasil untuk jarak **"X"** yang dicari ditampilkan pada baris hasil **(e)**. Nilai pengukuran tunggal terletak pada garis nilai pengukuran **(d)**.

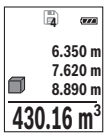
Fungsi memori

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

Display nilai yang disimpan

Maksimal 15 nilai (nilai ukur atau hasil akhir) dapat dipanggil.

Tekan tombol penyimpanan **(6)** [💾].



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

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

Tekan tombol **(8)** [**–**] untuk menggulir ke belakang pada nilai yang tersimpan.

Jika tidak terdapat nilai pada memori yang tersedia, maka akan ditampilkan pada display bagian bawah **"0,000"** dan bagian atas **"0"**.

Nilai terlama berada pada posisi 1 di memori, nilai terbaru berada pada posisi 15 (pada 15 nilai memori yang tersedia). Saat menyimpan nilai selanjutnya, maka nilai terlama di memori akan selalu terhapus.

Menghapus memori

Tekan tombol penyimpanan **(6)** [💾] untuk menghapus isi memori. Kemudian tekan singkat tombol on/off **(5)** [ⓒ⏻] untuk menghapus nilai yang ditampilkan.

Untuk menghapus semua nilai dalam memori, tekan tombol **(4)** dan tombol on/off **(5)** [ⓒ⏻] secara bersamaan lalu lepaskan tombol on/off **(5)** [ⓒ⏻].

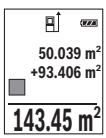
Menambah/mengurangi nilai

Nilai ukur atau hasil akhir dapat ditambah atau dikurangi.

Menambah nilai

Contoh berikut ini menggambarkan penambahan luas:

Tentukan luas sesuai dengan bagian "Pengukuran luas" .



Tekan tombol **(3)** [**+**]. Simbol dan permukaan yang dihitung **"+"** ditampilkan.

Tekan tombol ukur **(2)** [▲] untuk memulai pengukuran luas selanjutnya. Tentukan luas sesuai dengan bagian "Pengukuran luas " . Begitu pengukuran kedua selesai, hasil pengukuran luas kedua akan ditampilkan pada display bagian bawah. Untuk menampilkan hasil akhir, tekan ulang tombol ukur **(2)** [▲].

Catatan: Pada sebuah pengukuran panjang, hasil akhir akan segera ditampilkan.

Untuk keluar dari penambahan, tekan tombol **(7)** [**Func**].

Mengurangi nilai

Untuk mengurangi nilai, tekan tombol **(8)** [**–**]. Prosedur selanjutnya sama dengan "Menambahkan nilai pengukuran".

Menghapus nilai pengukuran

Dengan menekan singkat tombol on/off **(5)** [⏻], nilai pengukuran yang ditetapkan terakhir kali dapat dihapus pada semua fungsi pengukuran. Dengan menekan singkat tombol on/off **(5)** [⏻] beberapa kali, nilai pengukuran akan terhapus dalam urutan sebaliknya.

Mengubah satuan ukur

Satuan ukur pengaturan dasar adalah **"m"** (meter).

Nyalakan alat pengukur.

Tekan dan tahan tombol **(7)** [**Func**] untuk mengakses menu "Pengaturan dasar". Pilih berdasarkan tipe alat pengukur Anda:

- **"m/cm"** (**3 601 K72 R50**)
- **"ft/m"** (**3 601 K72 RK0**)
- **"Taiwan ft/m"** (**"尺/m"**) (**3 601 K72 RC0**)

Tekan tombol **(3)** [**+**] atau tombol **(8)** [**–**] untuk mengubah satuan ukur.

Atau:

Tekan tombol **(4)** [**u**] untuk mengubah satuan ukur:

- Pada alat pengukur **3 601 K72 R50** dan **3 601 K72 RK0**, satuan ukur berikutnya (searah jarum jam) dipilih dalam menu konfigurasi.
- Pada alat pengukur **3 601 K72 RC0**, terdapat opsi untuk beralih antara **Taiwan ft** dan **m**.

Untuk keluar dari pilihan menu, tekan tombol on/off **(5)** [⏻]. Setelah menonaktifkan alat pengukur, pengaturan yang dipilih akan tetap tersimpan.

Mengaktifkan/menonaktifkan bunyi nada

Dalam pengaturan dasar, suara diaktifkan.

Nyalakan alat pengukur.

Tekan dan tahan tombol **(7)** [**Func**] untuk mengakses menu "Pengaturan dasar". Pilih 🔊. Tekan tombol **(3)** [**+**] atau tombol **(8)** [**–**] untuk mengaktifkan dan menonaktifkan bunyi nada.

Untuk keluar dari pilihan menu, tekan tombol pengukuran **(2)** [▲] atau tombol on/off **(5)** [⏻]. Setelah menonaktifkan alat pengukur, pengaturan yang dipilih akan tetap tersimpan.

Petunjuk pengoperasian

Petunjuk umum

Lensa penerima **(14)** dan output sinar laser **(15)** tidak boleh tertutup selama pengukuran.

Alat pengukur tidak boleh digerakkan selama pengukuran. Untuk itu, letakkan alat sebisa mungkin pada permukaan dudukan atau penopang yang stabil.

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 **(18)** (aksesori) dan panel sasaran laser **(17)** (aksesori), atau bayangi permukaan target.

Pengaruh terhadap 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 panel sasaran laser **(17)** (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 pada pengukuran jarak

Akurasi alat pengukur dapat diperiksa dengan cara 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 sebaiknya dijalankan dalam kondisi yang menguntungkan, misalnya bagian yang diukur harus berada dalam ruangan dengan pencahayaan latar belakang yang lemah dan permukaan target harus halus dan dapat memantulkan dengan baik.
- 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 agar ketepatan dapat dibandingkan di lain waktu.

Bekerja dengan tripod (aksesori)

Tripod sangat perlu digunakan saat melakukan pengukuran jarak yang lebih jauh. Letakkan alat pengukur dengan ulir 1/4" **(13)** pada pelat penggantian cepat tripod **(19)** atau tripod foto biasa. Kencangkan alat pengukur dengan baut pengunci dari pelat tripod.

Atur bidang acuan untuk pengukuran menggunakan tripod dengan menekan tombol **(7)** [**Func**] (bidang acuan ulir).

Laporan kesalahan

Jika pengukuran tidak dapat dilakukan dengan benar, maka laporan kesalahan "Error" akan muncul pada display. Matikan alat pengukur dan hidupkan kembali lalu mulai pengukuran baru.

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 kantong pelindung yang telah 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 **(14)** secara khusus dengan perlakuan yang sama yang harus diberikan pada kacamata atau lensa kamera.

Jika alat akan dibawa untuk diperbaiki, simpan alat pengukur ke dalam kantong pengamannya **(16)** 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
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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

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 laze làm kính bảo vệ.** Kính nhìn tia laze dùng để nhận biết tốt hơn tia laze; tuy nhiên nó không bảo vệ khỏi tia laze.
- **Không sử dụng kính nhìn tia laze làm kính mát hoặc trong giao thông đường bộ.** Kính nhìn tia laze 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.** Bạn có thể vô tình làm lóa mắt người khác.
- **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.

Mô Tả Sản Phẩm và Đặc Tính Kỹ Thuật

Xin lưu ý các hình minh hoạt trong phần trước của hướng dẫn vận hành.

Sử dụng đúng cách

Dụng cụ đo được thiết kế để đo khoảng cách, chiều dài, chiều cao, khoảng hở hoặc để tính toán diện tích hay khối lượng.

Dụng cụ đo phù hợp để sử dụng trong vùng bên ngoài và bên trong.

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) Hiển thị
(2) Nút đo [▲]
(3) Nút cộng [**+**]
(4) Nú chọn đơn vị đo lường [**u**]
(5) Nút bật-tắt [⏻]
(6) Nút bộ nhớ [💾]
(7) Nút chức năng [**Func**]
(8) Nút trừ [**–**]
(9) Nắp đậy pin
(10) Lẫy cài nắp đậy pin
(11) Mã seri sản xuất
(12) Nhãn cảnh báo laser
(13) 1/4"-Lỗ cắm giá ba chân
(14) Thấu kính
(15) Lỗ chiếu luồng laze
(16) Túi bảo vệ[A)]
(17) Bảng đối tượng của tia laser[A)]
(18) Kính nhìn tia laser[A)]
(19) Giá đỡ ba chân[A)]

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) Thanh trạng thái
(b) Điểm xuất phát đo chuẩn
(c) Hiển thị pin
(d) Các hàng giá trị đo được
(e) Hàng kết quả
(f) Các chức năng đo
(g) Các thiết lập ban đầu

Thông số kỹ thuật

Máy định tầm laser kỹ thuật số			GLM 400
Mã số máy	**3 601 K72 R50**	**3 601 K72 RK0**	**3 601 K72 RC0**
Điều chỉnh đơn vị đo	m, cm	m, cm, ft, in (fractions), ft/in (fractions)	m, cm, ft, in (fractions), ft/in (fractions), ft Đài Loan
Biên độ đo (chung)	0,05-40 m[A)]		
Biên độ đo (chung, cho những điều kiện đo khó)	20 m[B)]		
Độ đo chính xác (tiêu biểu)	±1,5 mm[A)]		
Độ chính xác khi đo (chung, cho những điều kiện đo khó)	±3,0 mm[B)]		
Đơn vị biểu thị thấp nhất	0,5 mm		
Giới thiệu chung			
Nhiệt độ hoạt động	–10 °C ...+45 °C[C)]		
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[D)]		
Cấp độ laser	2		
Loại laser	635 nm, < 1 mW		
Đường kính chùm tia laser (ở 25 °C) khoảng.			
– khoảng cách 10 m	9 mm[E)]		
– khoảng cách 40 m	45 mm[E)]		
Tắt tự động sau khoảng.			
– Laser	20 s		

Máy định tầm laser kỹ thuật số	**GLM 400**
– Dụng cụ đo (không đo)	5 v/p
Trọng lượng theo Qui trình EPTA-Procedure 01:2014	0,10 kg
Khối lượng	106 x 45 x 24 mm
Mức độ bảo vệ	IP 54 (được bảo vệ chống bụi và tia nước)[F)]
Các pin	2 x 1,5 V LR03 (AAA)
Pin có thể nạp điện lại được	2 x 1,2 V HR03 (AAA)
Điều chỉnh âm thanh	•

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 khoảng ± 0,05 mm/m.

B) Đo từ mép phía sau của dụng cụ đo, áp dụng cho đối tượng có khả năng phản xạ thấp (ví dụ như một tường có màu tối), ánh sáng nền mạnh và nhiệt độ làm việc từ – 10 °C đến +45 °C. Thêm vào đó cần tính tới một mức sai lệch khoảng ±0,15 mm/m.

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

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

E) Ở nhiệt độ hoạt động 25 °C

F) không kể ngăn chứa pin

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

Sự lắp vào

Lắp/thay ắc quy

Khuyến nghị nên sử dụng pin alkali-manganese hay pin nạp điện lại được cho sự hoạt động của dụng cụ đo.

Pin 1,2V có thể có khả năng đo ít hơn so với pin 1,5V.

Để mở nắp đậy pin **(9)** bạn hãy nhấn lên khóa **(10)** 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 biểu tượng pin xuất hiện lần đầu tiên trên màn hình hiển thị, thì các phép đo vẫn còn khoảng 100. 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 của việc đo khoảng cách“, Trang 94).

Bật/tắt

– Để **Bật** dụng cụ đo và tia laze, bạn hãy ấn nhanh vào nút đo **(2)** [▲].

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

- ▶ **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.**

Để **Tắt** dụng cụ đo, bạn hãy nhấn giữ nút bật-tắt **(5)** [⏻].

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, dụng cụ đo ở chế độ đo độ dài. Để dùng chức năng đo khác hãy nhấn nút **(7)** [**Func**]. Hãy chọn chức năng đo mong muốn bằng nút **(3)** [**+**] hoặc nút **(8)** [**–**] từ (xem „Các chức năng đo“, Trang 90). Kích hoạt chức năng đo bằng nút **(7)** [**Func**] hoặc bằng nút đo **(2)** [▲].

Mép phía sau của dụng cụ đo được chọn làm mức tham chiếu để đo sau khi bật. Để thay đổi mặt phẳng tham chiếu (xem „Chọn mặt phẳng tham chiếu (xem Hình **A**)“, Trang 89).

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 **(5)**[⏻], bạn ấn nhanh nút đo **(2)** [▲] để bật laze.

Nhấn nút đo để kích hoạt đo **(2)** [▲]. 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 giây và chậm nhất sau khoảng 4 giây. 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 **(13)** (ví dụ đo bằng giá ba chân)

Để lựa chọn mặt phẳng tham chiếu hãy nhấn giữ nút **(7)** [**Func**]. Chọn mặt phẳng tham chiếu mong muốn bằng nút **(3)** [**+**] hoặc nút **(8)** [**–**]. Sau mỗi lần bật dụng cụ đo, mép sau của dụng cụ đo sẽ được thiết lập sẵn làm mặt phẳng tham chiếu.

Menu "Các thiết lập ban đầu"

Để đi đến Menu "Các thiết lập ban đầu" **(g)**, hãy nhấn giữ nút **(7)** [**Func**].

Hãy chọn thiết lập ban đầu tương ứng và thiết lập của nó.

Để thoát khỏi Menu các thiết lập ban đầu hãy nhấn nút bật-tắt **(5)** [⏻].

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.

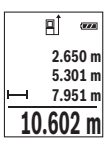
Các chức năng đo

Đo Chiều Dài

Hãy chọn phép đo độ dài ⊢.

Ấn nhanh vào nút đo để bật chùm tia laser **(2)** [▲].

Bạn hãy ấn nhanh vào nút đo **(2)** [▲]. 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.

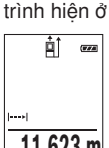
Đo liên tục

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 ⊢⊣.

Ấn nhanh vào nút đo để bật chùm tia laser **(2)** [▲].

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



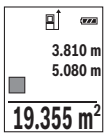
Bằng cách nhấn nút đo **(2)** [▲] bạn sẽ ngừng phép đo liên tục. Giá trị đo hiện tại sẽ được hiển thị ở góc dưới trong màn hình hiển thị. Nhấn lại nút đo **(2)** [▲] phép đo liên tục sẽ bắt đầu lại.

Phép đo liên tục được tự động tắt sau 5 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 ⬚.



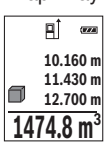
Giá trị đo đầu tiên được hiển thị ở góc trên trong màn hình hiển thị.

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 chiều cao gián tiếp / phép đo pitago đơn giản (xem Hình E)

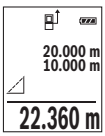
Sự đo chiều cao gián tiếp được sử dụng để đo khoảng cách mà ta không thể đo trực tiếp được bởi có vật cản ngăn che luồng laze, hay không có bề mặt mục tiêu nào khác có thể sử dụng được như một vật phản chiếu. Chỉ có kết quả đúng khi cần thiết phải có một góc vuông được gắn chính xác vào để đo theo tương ứng (định lý Pitago).

Hãy lưu ý rằng điểm 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.

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

Hãy chọn phép đo chiều cao gián tiếp .

Hãy đo khoảng cách **"1"** và **"2"** theo trình tự này như khi đo chiều dài. Cần đảm bảo rằng có góc vuông giữa độ giãn **"1"** và độ giãn theo yêu cầu **"X"**.



Sau khi hoàn thành phép đo cuối cùng, kết quả của khoảng cách đã tìm **"X"** sẽ được hiển thị trong dòng kết quả **(e)**. Các đơn trị đo ở trong hàng giá trị đo được **(d)**.

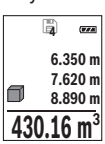
Chức Năng Bộ Nhớ

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

Hiển thị giá trị bộ nhớ

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

Hãy nhấn nút bộ nhớ **(6)** [💾].



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

Nhấn nút **(8)** [**–**], để lật trở lại thông qua các giá trị đã lưu.

Nếu không có giá trị nào trong bộ nhớ được hiển thị ở phía dưới của màn hình hiển thị **"0.000"** và phía trên **"0"**.

Giá trị cũ nhất ở vị trí 1 trong bộ nhớ, giá trị mới nhất ở vị trí 15 (ở 15 giá trị đã lưu khả dụng). Khi lưu một giá trị tiếp theo, giá trị cũ nhất trong bộ nhớ sẽ bị xóa.

Xóa lưu trong Bộ Nhớ

Để xóa nội dung bộ nhớ hãy nhấn nút bộ nhớ **(6)** [💾]. Sau đó hãy nhấn nhanh nút bật-tắt **(5)** [⏻] để xóa giá trị đã hiển thị.

Để xóa tất cả các giá trị trong bộ nhớ, hãy nhấn đồng thời nút **(4)** và nút bật-tắt **(5)** [⏻] và sau đó nhả nút bật-tắt **(5)** [⏻].

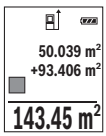
Cộng/trừ các giá trị

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" .



Nhấn nút **(3)** [**+**]. Diện tích đã tính và biểu tượng **"+"** được hiển thị.

Nhấn nút đo **(2)** [▲], để khởi động phép đo diện tích tiếp theo. Xác định diện tích theo phần "Đo diện tích" . Ngay 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 **(2)** [▲].

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 **(7)** [**Func**].

Trừ các giá trị

Để trừ các giá trị hãy nhấn nút **(8)** [**–**]. Quy trình tiếp theo tương tự như "Cộng các giá trị".

Xóa Trị Số Đo

Bằng việc nhấn nhanh nút bật-tắt **(5)** [⏻] 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 **(5)** [⏻] các kết quả đo sẽ được xóa theo thứ tự ngược.

Thay Đổi Đơn Vị Đo Lường

Thiết lập ban đầu là đơn vị đo **"m"** (Meter).

Bật công tắc cho máy hoạt động.

Để đi đến Menu "Các thiết lập ban đầu", hãy nhấn giữ nút **(7)** [**Func**]. Hãy chọn dụng cụ đo tùy thuộc vào kiểu loại:

– **"m/cm"** (**3 601 K72 R50**)
– **"ft/m"** (**3 601 K72 RK0**)
– **"ft/m Đài Loan"** (**"尺/m"**) (**3 601 K72 RC0**)

Nhấn nút **(3)** [**+**] hoặc nút **(8)** [**–**], để thay đổi đơn vị đo.

Hoặc:

Nhấn nút **(4)** [**u**], để thay đổi đơn vị đo:

– Ở các dụng cụ đo **3 601 K72 R50** và **3 601 K72 RK0** đơn vị đo tiếp theo (theo chiều kim đồng hồ) được chọn trong menu cấu hình.
– Ở dụng cụ đo **3 601 K72 RC0** có thể chuyển đổi giữa **ft Đài Loan** và **m**.

Để thoát mục Menu hãy nhấn nút bật-tắt **(5)** [⏻]. Sau khi tắt dụng cụ đo, thiết lập đã chọn sẽ được lưu lại.

Bật/tắt âm thanh

Bật âm thanh trong cài đặt cơ sở.

Bật công tắc cho máy hoạt động.

Để đi đến Menu "Các thiết lập ban đầu", hãy nhấn giữ nút **(7)** [**Func**]. Hãy chọn 🕪. Nhấn nút **(3)** [**+**] hoặc nút **(8)** [**–**], để bật và tắt tấn.

Để thoát mục Menu hãy nhấn nút đo **(2)** [▲] hoặc nút bật-tắt **(5)** [⏻]. Sau khi tắt dụng cụ đo, thiết lập đã chọn sẽ được lưu lại.

Hướng Dẫn Sử Dụng

Thông Tin Tổng Quát

Ống kính thu nhận **(14)** và đầu ra của tia laser **(15)** không được bị che khi đo.

Không được di chuyển dụng cụ đo trong quá trình đo. 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 **(18)** (Phụ kiện) và bảng đích laser **(17)** (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 **(17)** (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 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 có ánh sáng nền yếu 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" **(13)** lên đĩa nhả hãm nhanh của giá ba chân **(19)** 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 một cách phù hợp cho các phép đo bằng giá đỡ ba chân bằng cách nhấn nút **(7)** [**Func**] (Mặt phẳng tham chiếu ren).

Thông báo lỗi

Khi phép đo đúng không thực hiện được, thông báo lỗi "Error" sẽ được hiển thị trong màn hình hiển thị. Hãy tắt dụng cụ đo và bật lại và khởi động lại 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.

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 **(14)** 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 **(16)**.

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**

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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.

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