

PRO

GFM1000-15



Safety Instructions



All instructions must be read and observed. The safeguards integrated into

the measuring tool may be compromised if the measuring tool is not used in accordance with these instructions.

STORE THESE INSTRUCTIONS IN A SAFE PLACE.

- ▶ **Do not perform any measurements on electric circuits with voltages exceeding 1000 V.**
- ▶ **Take extra care when working with voltages over 30 V AC or 60 V DC!** Even at these voltages, contact with live cables can cause life-threatening electric shocks.
- ▶ **Remove the test leads from the input terminals, before you take a measurement of current.** There is a risk of an electric shock.
- ▶ **Do not apply more than the rated voltage, as marked on the measuring tool, between terminals or between any terminal and earth ground.**
- ▶ **Only use test leads that have the same voltage, category, and amperage ratings as the measuring tool.**
- ▶ **Check the insulation of the test leads regularly.** Damaged insulation of the test leads can lead to an electric shock.
- ▶ **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.
- ▶ **Verify the function of the measuring tool by measuring a known voltage.** If in doubt, have the measuring tool serviced.
- ▶ **Use the measuring tool only as specified in this manual.** The protection provided by the measuring tool might be impaired.
- ▶ **Use the measuring tool or the test leads only if they do not appear damaged.**
- ▶ **Use personal protective equipment if there is a risk that you may touch live parts in the system in which the current is to be measured.**
- ▶ **Have the measuring tool repaired only by a qualified specialist using only original replacement parts.** This will ensure that the safety of the measuring tool is maintained.
- ▶ **Do not modify or open the battery.** There is a risk of short-circuiting.
- ▶ **In case of damage and improper use of the battery, vapours may be emitted. The battery can set alight or explode.** Ensure the area is well ventilated and seek medical attention should you experience any adverse effects. The vapours may irritate the respiratory system.
- ▶ **If used incorrectly or if the battery is damaged, flammable liquid may be ejected from the battery. Contact with this liquid should be avoided. If contact accident-**

ally occurs, rinse off with water. If the liquid comes into contact with your eyes, seek additional medical attention. Liquid ejected from the battery may cause irritation or burns.

- ▶ **The battery can be damaged by pointed objects such as nails or screwdrivers or by force applied externally.** An internal short circuit may occur, causing the battery to burn, smoke, explode or overheat.
- ▶ **When the battery is not in use, keep it away from paper clips, coins, keys, nails, screws or other small metal objects that could make a connection from one terminal to another.** A short circuit between the battery terminals may cause burns or a fire.
- ▶ **Only use the battery with products from the manufacturer.** This is the only way in which you can protect the battery against dangerous overload.
- ▶ **Only charge the batteries using chargers recommended by the manufacturer.** A charger that is suitable for one type of battery may pose a fire risk when used with a different battery.

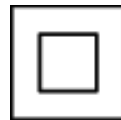


Protect the battery against heat, e.g. against continuous intense sunlight, fire, dirt, water and moisture. There is a risk of explosion and short-circuiting.



Symbols

Symbols and their meaning



Device with double or reinforced insulation



Caution: Risk of electric shock!



Use in the vicinity of non-insulated dangerous live conductors permitted



Connection for earth

Product Description and Specifications

Please unfold the fold-out page with the diagram of the measuring tool and leave it open while reading the instruction manual.

Intended Use

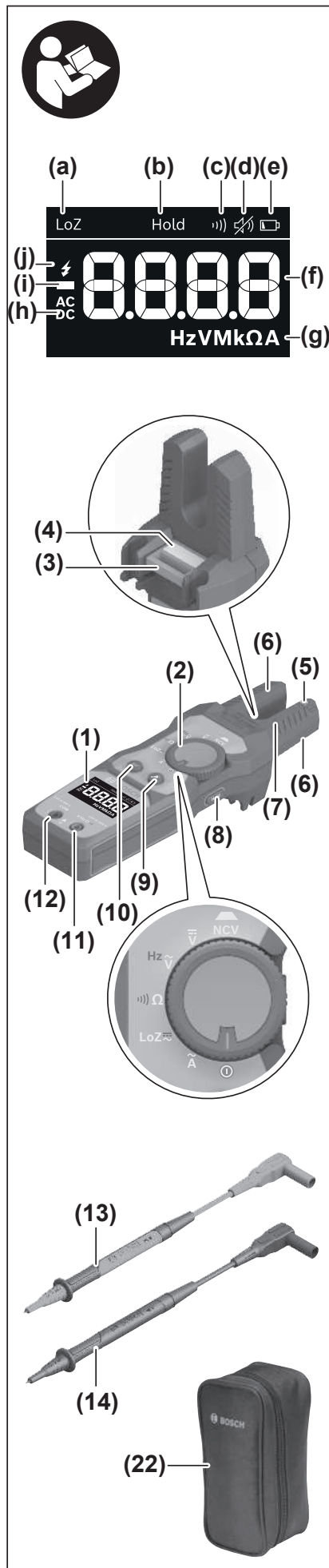
The measuring tool is intended for measuring alternating current, voltage (including with a lower input impedance [LoZ]) and resistance, and for continuity testing. It can also be used for measuring the frequency of alternating voltage and for non-contact voltage testing of alternating voltages between 24 and 1000 V.

The measuring tool may only be used in circuits with a rated voltage ≤ 1000 V DC/AC.

The measuring tool is suitable for indoor use.

Product Features

The numbering of the product features refers to the representation of the measuring tool in the images.



- (1) Display
- (2) Rotation switch (for selecting the measuring function)
- (3) Tab for fixing the magnetic hanger
- (4) Torch
- (5) Test probe for non-contact voltage testing
- (6) Measuring fork
- (7) Arrows for cable positioning
- (8) **Hold** button (holding of the measured value on the display or sound on/off)
- (9)  Torch on/off button
- (10) **Sel** button (second assignment of measuring function)
- (11) (+) input terminal (input terminal for measuring voltage, continuity and resistance)
- (12) **COM** input terminal (earth connection (return conductor) for measuring voltage, continuity and resistance)
- (13) Red test lead
- (14) Black test lead
- (15) Screw (2 ×) for attaching the battery compartment cover

- (16) Battery compartment cover
- (17) Inlay in the battery compartment cover
- (18) Battery pack locking mechanism
- (19) Li-ion battery pack^{A)}
- (20) Locking mechanism of the Li-ion battery pack^{A)}
- (21) Magnetic hanger^{A)}
- (22) Protective bag
- (23) Protective caps

A) **This accessory is not part of the standard scope of delivery.**

Display Elements

- (a) Measurement with lower input impedance
- (b) Measured value "frozen"
- (c) Continuity testing
- (d) Sound off
- (e) Battery warning
- (f) Measured value
- (g) Unit of measurement
- (h) Direct current/alternating current display
- (i) Sign of measured value (polarity)
- (j) Warning if voltage > 30 V

Technical data

Fork Meter	GFM1000-15
Article number	3 601 K77 4K.
Measuring range for voltage	1000 V AC/DC
Measuring range for voltage with lower input impedance (LoZ)	1000 V AC/DC
Measuring range for current	200 A AC
Measuring range for frequency	10 Hz to 50 kHz
Measuring range for resistance	60 MΩ
Continuity testing	●
Non-contact voltage testing (NCV)	●
True RMS (root mean square measurement)	●
General	
Operating temperature	−10 °C to +50 °C
Storage temperature ^{A)}	−40 °C to +70 °C
Relative air humidity max.	90 %
Max. altitude	2000 m
Pollution degree according to IEC 61010-1 ^{B)}	2
Automatic switch-off after approx.	20 min
Weight ^{C)}	297 g

Fork Meter	GFM1000-15
Protection rating	IP 54
Safety class	CAT III 1000 V ^{D)} CAT IV 600 V ^{E)}
Dimensions	69.1 × 49.6 × 226.3 mm
Test lead MS 90	
Safety class with protective cap	CAT III 1000 V ^{D)} CAT IV 600 V ^{E)}
Safety class without protective cap	CAT II 1000 V ^{F)}
Non-rechargeable batteries	2 × 1.5 V LR06 (AA)
Battery pack (accessory)	Li-ion
Recommended ambient temperature during charging	+10 °C to +35 °C
Recommended ambient temperature during operation and during storage	−10 °C to +45 °C
Type	BA 3.7V 1.0Ah A
Article number	1 607 A35 0N8 1 607 A35 17H
USB charging connection	Type-C®
Recommended USB Type-C® cable ^{G)}	1 600 A01 6A8

Fork Meter	GFM1000-15
Rated voltage	3.7 V 
Capacitance	1.0 Ah
Number of battery cells	1

- A) Without batteries and/or rechargeable batteries
- B) Only non-conductive deposits occur, whereby occasional temporary conductivity caused by condensation is expected.
- C) Weight without batteries
- D) MEASUREMENT CATEGORY III is applicable to test and measuring circuits connected to the distribution part of the building's low-voltage mains installation.
- E) MEASUREMENT CATEGORY IV is applicable to test and measuring circuits connected to the supply point of the building's low-voltage mains installation.
- F) MEASUREMENT CATEGORY II is applicable to test and measuring circuits connected directly to utilization points (socket outlets and similar points) of the low-voltage mains installation.
- G) USB Type-C® and USB-C® are trademarks of USB Implementers Forum.

Operation

Starting Operation

- ▶ **Never leave the measuring tool unattended when switched on, and ensure the measuring tool is switched off after use.**
- ▶ **Protect the measuring tool from moisture and direct sunlight.**
- ▶ **Do not expose the measuring tool to any extreme temperatures or variations in temperature.** For example, do not leave it in a car for extended periods of time. In case of large variations in temperature, allow the measuring tool to adjust to the ambient temperature before putting it into operation. The precision of the measuring tool may be compromised if exposed to extreme temperatures or variations in temperature.
- ▶ **Avoid substantial knocks to the measuring tool and avoid dropping it.**

Switching On and Off

- » Turn the rotary switch **(2)** to the required measuring function to switch on the measuring tool.
- » Turn the rotary switch to the **(1)** position to switch off the measuring tool.

If no value is measured for approx. 20 min or no button is pressed or the rotary switch is not adjusted, the measuring tool will automatically switch itself off to preserve the non-rechargeable batteries. To disable automatic shutdown, press and hold the **Hold** button while switching on the measuring tool (e.g. by turning the rotary switch to any position). **d.APO** will then appear in the display.

You can then switch the measuring tool back on by turning the rotary switch **(2)** or pressing one of the buttons.

Fork Meter	GFM1000-15
Power supply (accessory)	
Output voltage	5.0 V 
Output current	500 mA

Buttons

Hold Button

"Freezing" a Value on the Display

- » Briefly press the **Hold** button to "freeze" the measured value on the display **(1)**. **Hold** is shown on the display and an audio signal is output.
- » Briefly press the **Hold** button again to re-enable the display **(1)**.

Switching Sound Off/On

- » Press and hold the **Hold** button to switch off the sound output. The  symbol is shown on the display.
- » Press and hold the **Hold** button again to switch on the sound output again.

 Do not use the **Hold** button when determining the voltage. The voltage displayed does not change and there is a risk of injury due to electric shock.

Sel Button

Second assignment of measuring function on rotary switch

- » Briefly press the **Sel** button to switch between two measuring functions that have the same position on the rotary switch **(2)**. The respectively selected measuring function is shown on the display **(1)**.
→ If the position on the rotary switch is not doubly assigned, an audio signal is output when the **Sel** button is pressed.

Torch

- » Press the  button to switch the torch on or off.

If the measuring tool is not used for approx. 5 min, the torch will automatically switch off.

Connecting/Disconnecting Test Leads

» Always connect the black test lead **(14)** to the **COM** input terminal first, and then connect the red test lead **(13)** to the **(+)** input terminal. Proceed in reverse when disconnecting the test leads.

i To avoid electric shocks, injuries or damage to the measuring tool before performing resistance or continuity tests, ensure that the mains power connection is disconnected and all high-voltage capacitors are discharged.

Measuring functions

The measuring tool offers the following measuring functions:

- **~A** Measurement of alternating current
- **LoZ ∞** Measurement of alternating or direct voltage with lower input impedance (approx. 3 k Ω) to suppress reactive voltages (inductive/capacitive)
- **||| Ω** Measurement of resistance
- **||| Ω** Continuity testing
- **Hz $\sim$** Measurement of alternating voltage
- **Hz $\sim$** Measurement of the frequency of alternating voltage
- **$\overline{\sim}$** Measurement of direct voltage
- **NCV** Non-contact voltage testing

Measuring Process

- **Use for measurements always the proper input terminals, switch position and measuring range.**
- **Check the test leads for continuity before use. Do not use if the readings are high or noisy.**
- **Keep your fingers behind the finger guards while using the test leads.**

» Turn the rotary switch **(2)** to the position in the figure.

» Press the **Sel** button when it is shown in the figure.

When Using Test Leads:

» Connect test leads **(14)** and **(13)** as shown in the figure.

» Contact the test points with the test probes.

→ The measured value is shown on the display **(1)**.

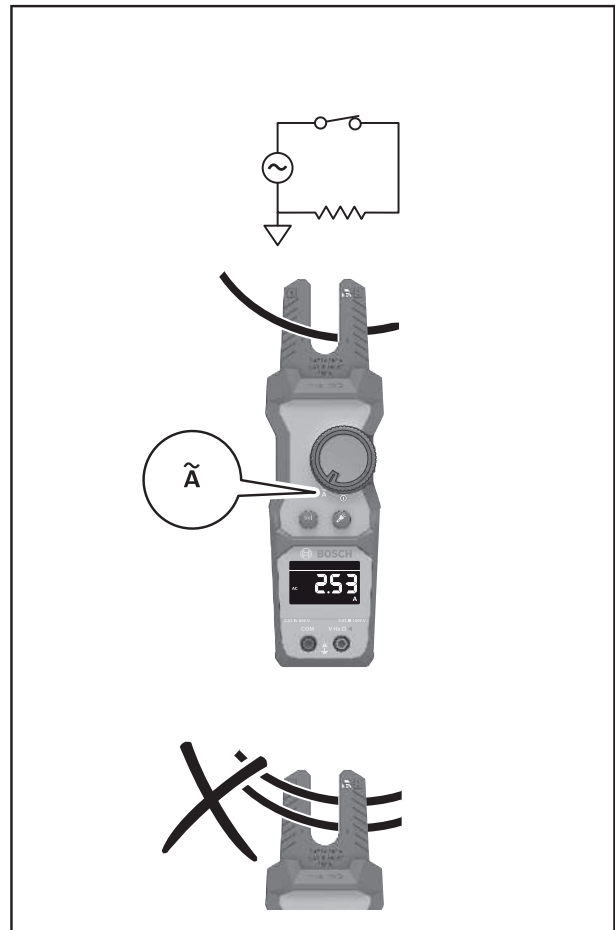
When using the measuring fork:

» Enclose the cable to be measured with the measuring fork **(6)** (maximum cable diameter 16 mm). Position it between the arrows **(7)**.

→ The measured value is shown on the display **(1)**.

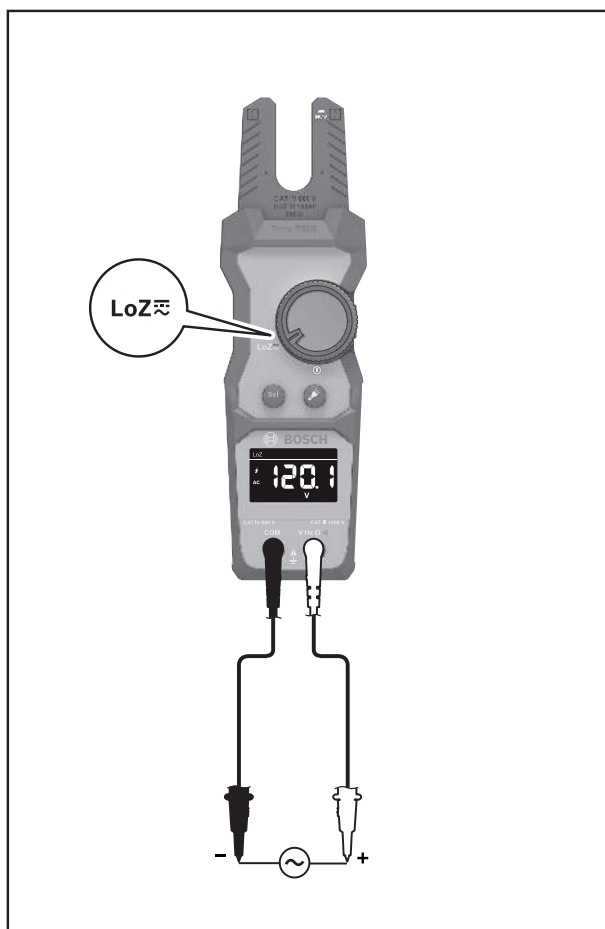
Measurement of Alternating Current

- **Keep your fingers behind the finger guard when using the measuring fork.**
- **Do not take any measurements if the open-circuit potential to earth is more than 1000 V.**



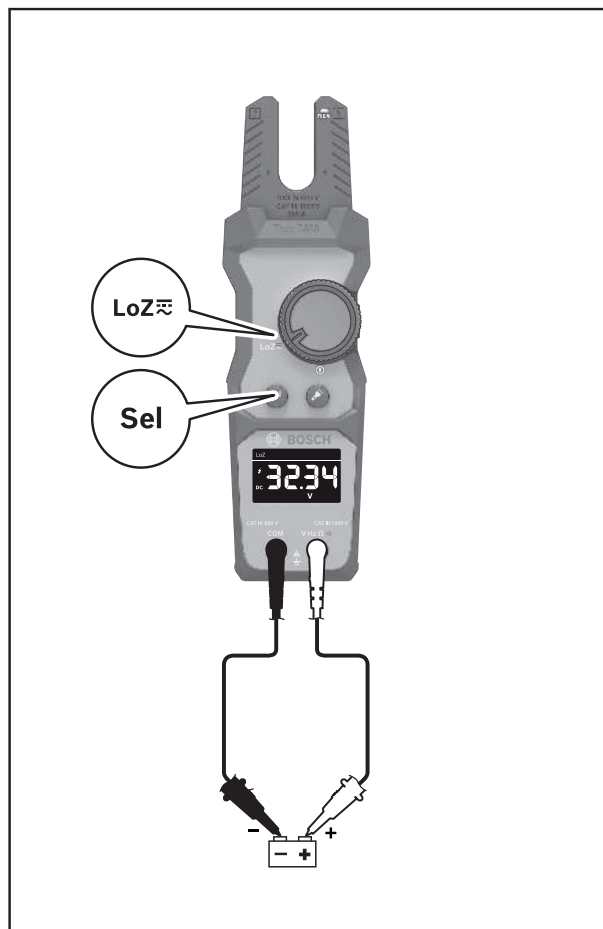
» Take the measurement with the measuring fork (see "Measuring Process", page 6).

Measurement of Alternating Voltage with Lower Input Impedance



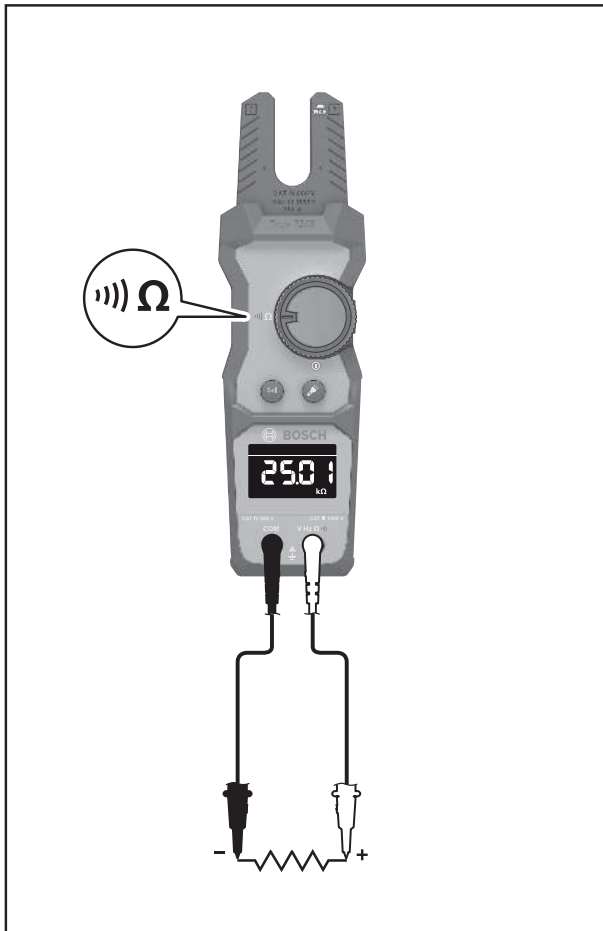
» Take the measurement with the test leads (see "Measuring Process", page 6).

Measurement of Direct Voltage with Lower Input Impedance



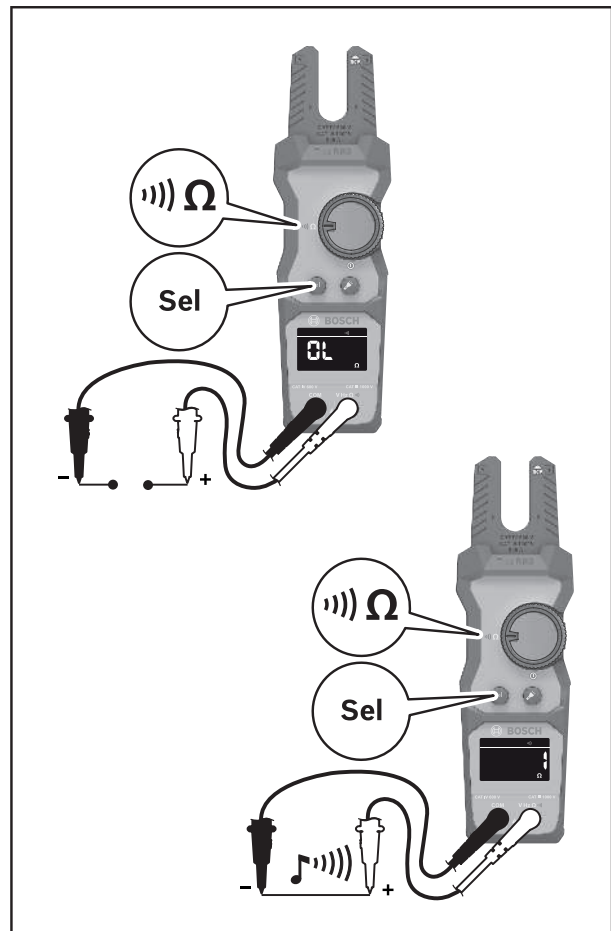
» Take the measurement with the test leads (see "Measuring Process", page 6).

Measurement of resistance



» Take the measurement with the test leads (see "Measuring Process", page 6).

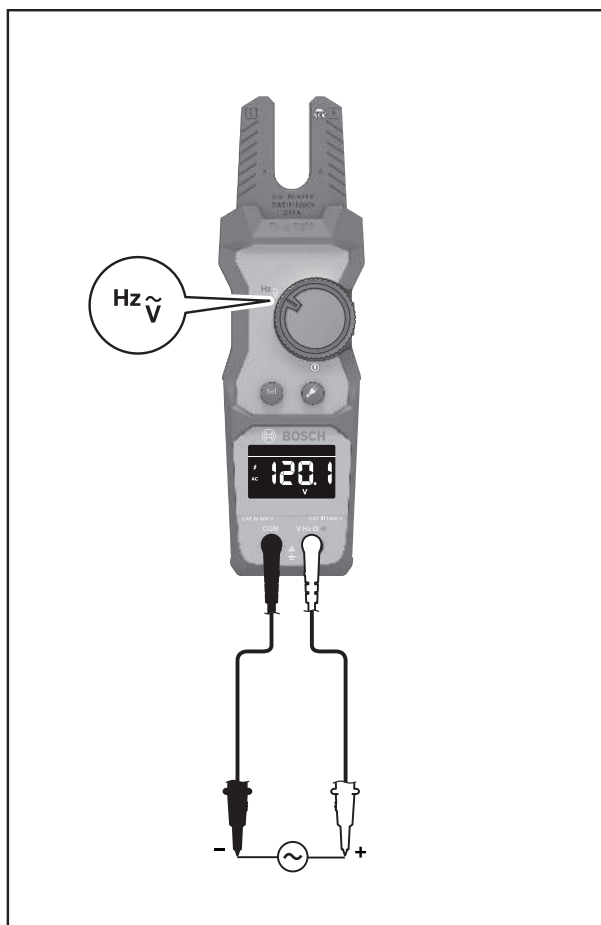
Continuity test



» Take the measurement with the test leads (see "Measuring Process", page 6).

→ If the continuity test is successful, a continuous tone is output.

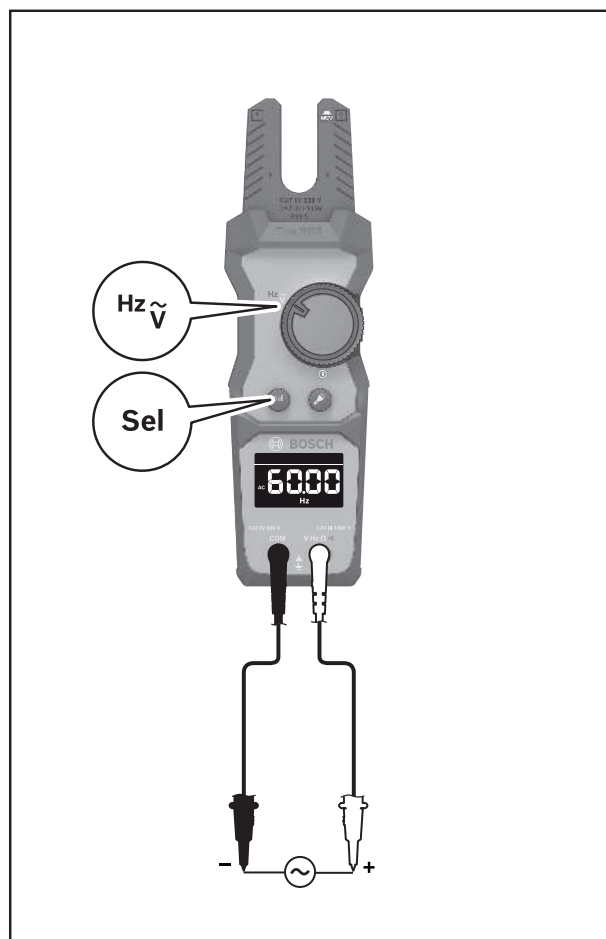
Measurement of alternating voltage



» Take the measurement with the test leads (see "Measuring Process", page 6).

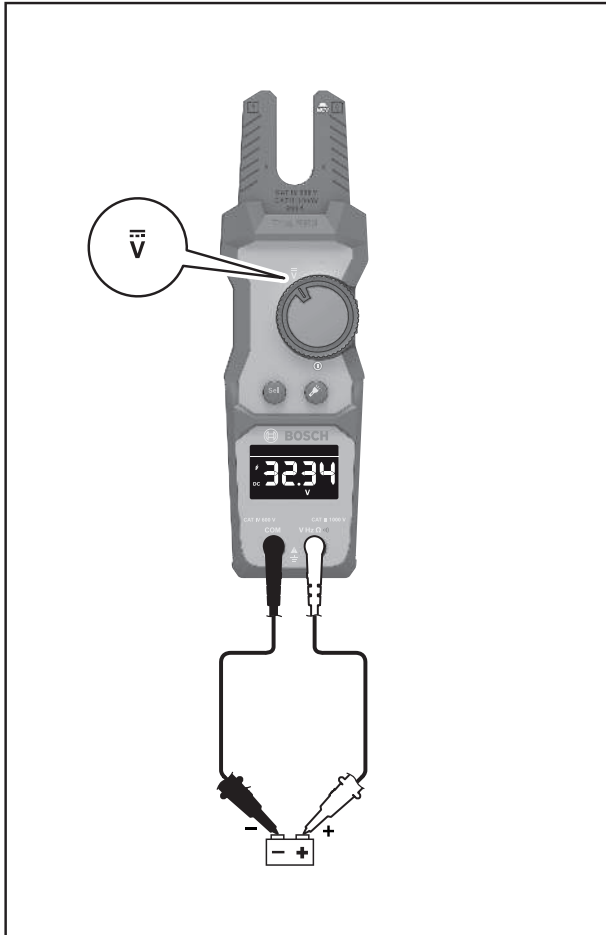
Measurement of the Frequency of Alternating Voltage

Frequency measurement is only carried out with alternating voltage.



» Take the measurement with the test leads (see "Measuring Process", page 6).

Measurement of direct voltage

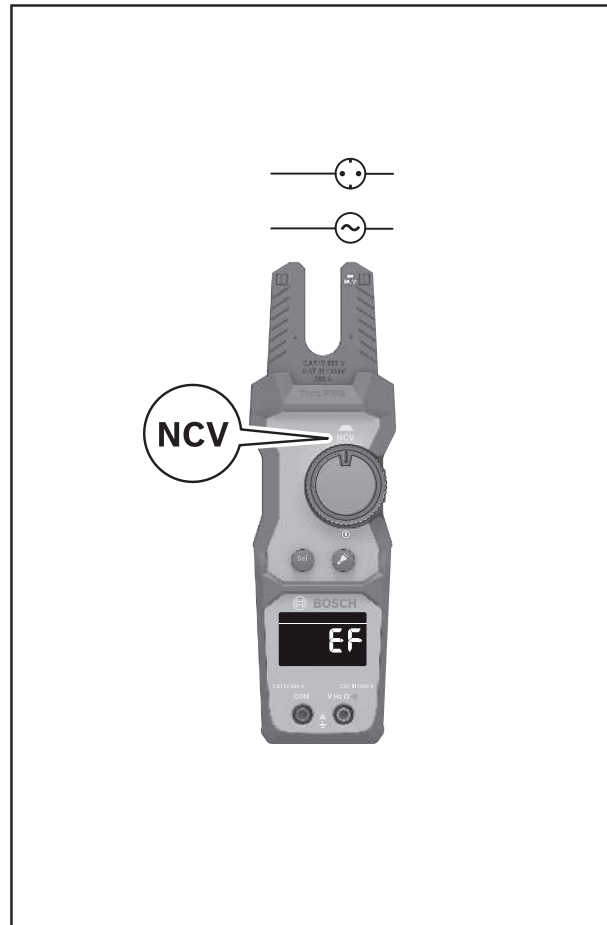


» Take the measurement with the test leads (see "Measuring Process", page 6).

Non-contact voltage testing

- **Make sure that you are properly earthed when taking measurements.** If you are not properly earthed (e.g. by wearing insulating footwear or by standing on a ladder), the voltage tester is unable to detect any voltages.
- **Even if there is no visual or acoustic signal, there may still be a voltage.** Insulation, wire size, cable shielding or the removal of the voltage source can influence the test.
- **The voltage tester cannot detect a voltage in DC circuits or in shielded cables.**

- **Do not use the voltage tester to determine the absence of voltages.**
- **Do not use the voltage tester if it looks damaged or it is not working properly. Test the test tips before using on cracks or breakages.**



- » Turn the rotary switch **(2)** to the **ncv** position. **EF** is shown on the display.
- » Hold the test probe **(5)** near the test object or the plug socket with AC voltage.
 - An audio signal will sound and the LED at the rotation switch position **ncv** will flash red when it detects an AC voltage ≥ 40 V AC.

Accuracy Specifications

Measuring function	Measuring range	Resolution	Accuracy $\pm$ ([% of the measured value] + [count values])
Alternating voltage (AC V)	600.0 V	0.1 V	$\pm$ (1.5 % + 5) (45–500 Hz)
	1000 V	1 V	
LoZ V (DC/AC)	600.0 V	0.1 V	$\pm$ (2.0 % + 3) (45–500 Hz)
	1000 V	1 V	
Alternating current (AC A)	200.0 A	0.1 A	$\pm$ (3.0 % + 3) (45–60 Hz)
Direct voltage (DC V)	600.0 V	0.1 V	$\pm$ (1.0 % + 2)
	1000 V	1 V	

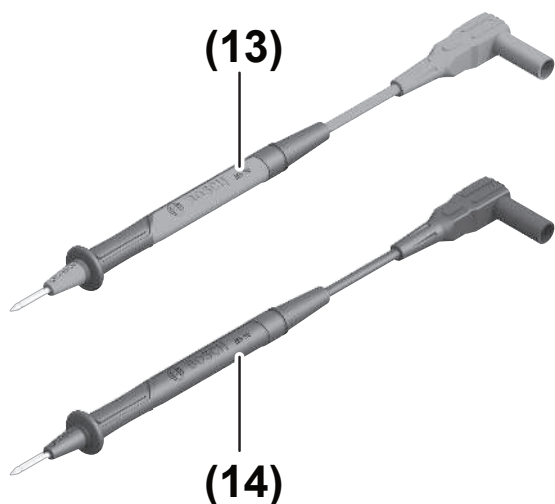
Measuring function	Measuring range	Resolution	Accuracy ± ([% of the measured value] + [count values])
Frequency (AC V)	99.99 Hz	0.01 Hz	± (0.1 % + 2)
	999.9 Hz	0.1 Hz	(10 V– 1000 V)
Pulse width > 10 µs	9.999 kHz	0.001 kHz	(10 V–800 V)
	50.00 kHz	0.01 kHz	(10 V–100 V)
Resistance (Ω)	600.0 Ω	0.1 Ω	± (1.0 % + 5)
	6.000 kΩ	0.001 kΩ	± (1.0 % + 2)
	60.00 kΩ	0.01 kΩ	
	600.0 kΩ	0.1 kΩ	
	6.000 MΩ	0.001 MΩ	
	60.00 MΩ	0.01 MΩ	± (2.0 % + 5)
Continuity	600.0 Ω	0.1 Ω	± (1.0 % + 5)
			≤ 30 Ω: Sound signal ≥ 50 Ω: No sound signal
NCV	40 V to 600 V		≤ 20 V: No sound signal, no flashing
			≥ 40 V: Sound signal and flashing

The specifications apply for an ambient temperature of between 18 °C and 28 °C and a relative humidity of ≤ 75 %. If the temperature is outside the previously specified range, an additional temperature error factor of 0.1 x the specified accuracy must be taken into account for every 1 °C.

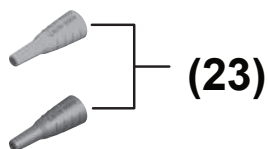
Accuracy is guaranteed for a period of one year from calibration at operating temperatures of -10 °C to 50 °C and a relative humidity of 0 % to 90 %.

Protective Caps

» To ensure safety when using test leads, make sure that the corresponding CAT measurement category is set.



CAT II 1000 V



CAT III 1000 V

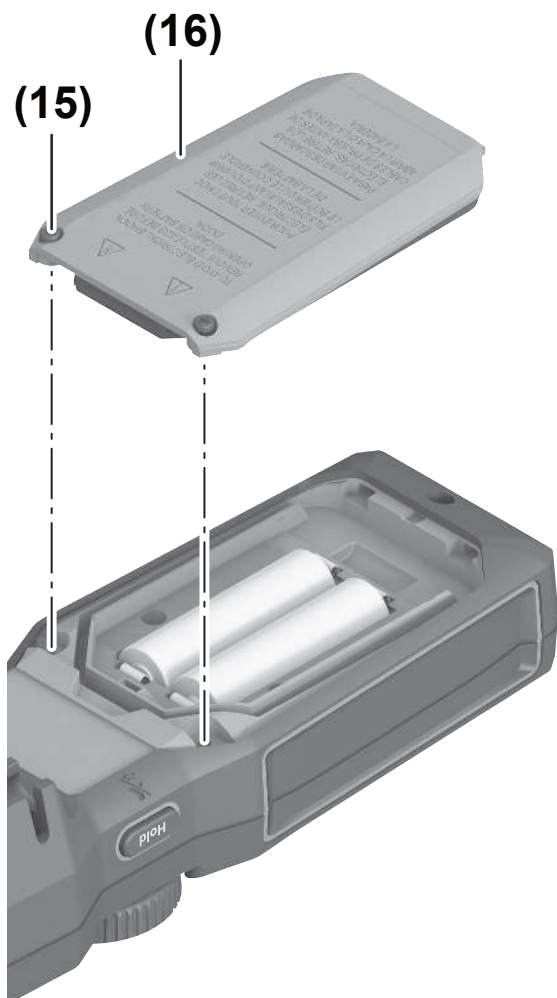
CAT IV 600 V

» You can change the safety class of the test leads ((13)/ (14)) by attaching the protective caps (23) to the test probes of the test leads or removing them from the test probes of the test leads.

Inserting/Changing the Battery

i The battery compartment cover (16) may only be opened with the test leads ((14) / (13)) removed. There is a risk of electric shock.

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



» Remove the test leads ((14)/(13)).
 » Unscrew the two screws (15) on the battery compartment cover (16) and remove the cover.
 » Insert the non-rechargeable batteries.
 » Reinsert the battery compartment cover (16) and secure it with the two screws (15).

i The measuring tool can only be switched on if the battery compartment cover (16) is screwed down correctly.

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

ⓘ When inserting the batteries, ensure that the polarity is correct according to the illustration on the inside of the battery compartment.

When the battery symbol  first appears on the display and an audio signal is output, only a few measurements will still be possible. When the non-rechargeable batteries are completely discharged, an audio signal is output and the measuring tool switches off.

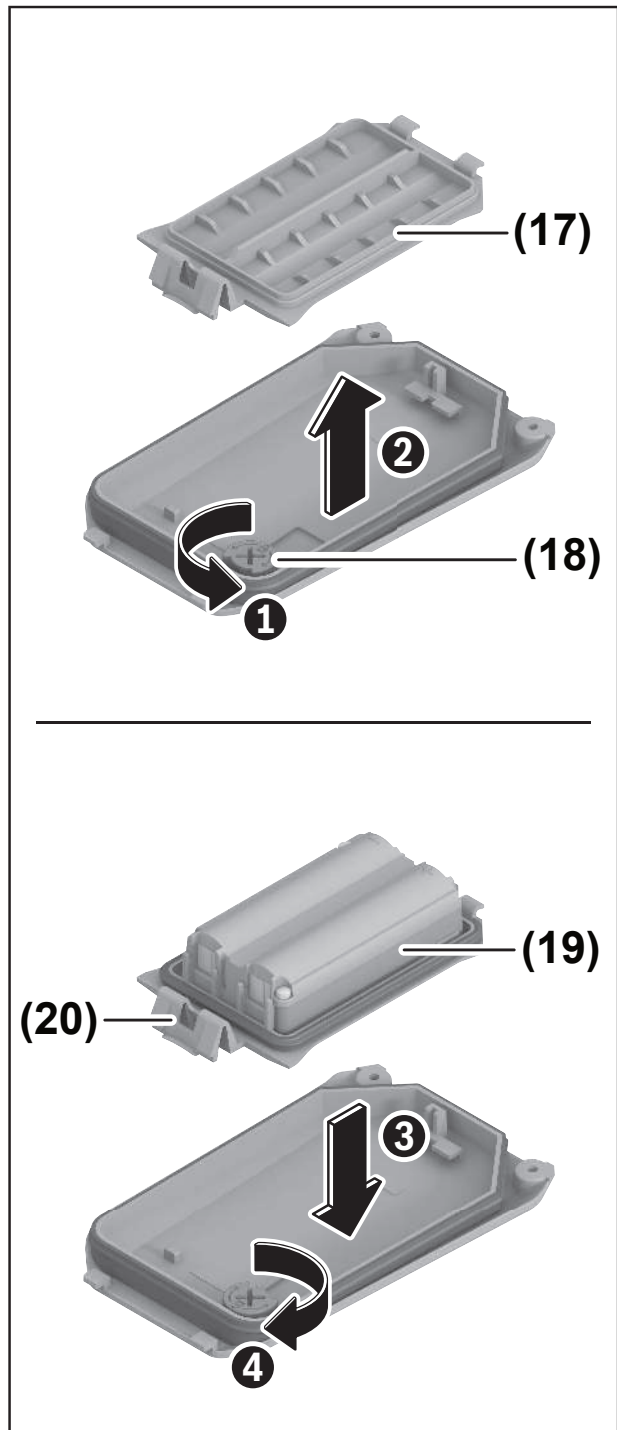
► **Take the batteries out of the measuring tool when you are not using it for a prolonged period of time.** The batteries can corrode during prolonged storage in the measuring tool.

ⓘ Never store the measuring tool without an inserted battery compartment cover (16), particularly in dusty or humid environments.

Lithium-ion battery pack (accessory)

ⓘ The battery compartment cover (16) may only be opened with the test leads ((14) / (13)) removed. There is a risk of electric shock.

Inserting/changing the lithium-ion battery pack (accessory)



- » Remove the test leads ((14)/(13)).
- » Unscrew the two screws (15) on the battery compartment cover (16) and remove the cover.
- » Unscrew the locking mechanism (18) in the battery compartment cover by approx. 1/2 revolution and remove the inlay (17).
- » Insert the lithium-ion battery pack (19) (accessory) and re-tighten the locking mechanism (18) by approx. 1/2 revolution.

- » Insert the battery compartment cover together with the lithium-ion battery pack **(19)** and secure the cover with the 2 screws **(15)**.
- » To remove the lithium-ion battery pack **(19)** (accessory), unscrew the two screws **(15)** on the battery compartment cover **(16)** and open the locking mechanism **(18)**. Remove the lithium-ion battery pack.

i The measuring tool can only be switched on if the battery compartment cover **(16)** is screwed down correctly.

Charging the lithium-ion battery pack (accessory)

- **For charging, use a USB power supply unit whose output voltage and minimum output current comply with the requirements in the "Technical Data" section. Observe the operating manual of the USB power supply unit.** Recommended power supply unit: See "Technical Data".
- **Pay attention to the mains voltage.** The voltage of the power source must match the voltage specified on the rating plate of the power adaptor. Power adaptors marked with 230 V can also be operated with 220 V.

i Never recharge the lithium-ion battery in the measuring tool.

i Lithium-ion rechargeable batteries are supplied partially charged according to international transport regulations. To ensure full rechargeable battery capacity, fully charge the rechargeable battery before using your tool for the first time.

The lithium-ion battery pack **(19)** must be removed from the battery compartment cover **(16)** to charge it.

The USB port for connecting the USB cable and the charging indicator light can be found under the flap for the USB port on the lithium-ion battery pack **(19)** (accessory).

- » Open the flap of the USB port.
- » Connect the USB cable.
 - During charging, the charging indicator light lights up yellow.
 - When the lithium-ion battery pack **(19)** (accessory) is fully charged, the charging indicator light will light up green.
 - A red charging indicator light indicates that the charging voltage or charging current is unsuitable.

Magnetic Hanger (Accessory)



- » The magnetic hanger **(21)** can be used to attach the measuring tool to metallic surfaces.

i The magnet of the hanger **(21)** must not get close to the measuring fork **(6)** during the measurement.

Troubleshooting

Battery warning

The symbol for battery warning  appears and an audio signal is output

Cause: Battery voltage is dropping (measurement still possible)

Remedy: Change the non-rechargeable batteries or the lithium-ion battery pack (accessory) or charge the lithium-ion battery pack (accessory) outside the measuring tool

An audio signal is output and the measuring tool switches off

Cause: Non-rechargeable batteries or lithium-ion battery pack (accessory) drained

Remedy: Change the non-rechargeable batteries or the lithium-ion battery pack (accessory) or charge the lithium-ion battery pack (accessory) outside the measuring tool

Measuring tool cannot be switched on

Cause: Non-rechargeable batteries or lithium-ion battery pack (accessory) drained

Remedy: Change the non-rechargeable batteries or the lithium-ion battery pack (accessory) or charge the lithium-ion battery pack (accessory) outside the measuring tool

Maintenance and Service

Maintenance and Cleaning

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.

If the measuring tool needs to be repaired, send it off in the protective bag (22).

After-Sales Service and Application Service

Malaysia

Tel.: (03) 79663194

You can find the link to our service addresses and warranty conditions on the last page.

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

Disposal

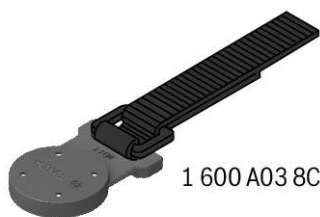
Measuring tools, rechargeable/non-rechargeable batteries, accessories and packaging should be sorted for environmental-friendly recycling.



Do not dispose of the measuring tools or battery packs/batteries with household waste.



1 608 M00 C43
1 608 M00 C5D



1 600 A03 8CY



1 600 A03 8D2