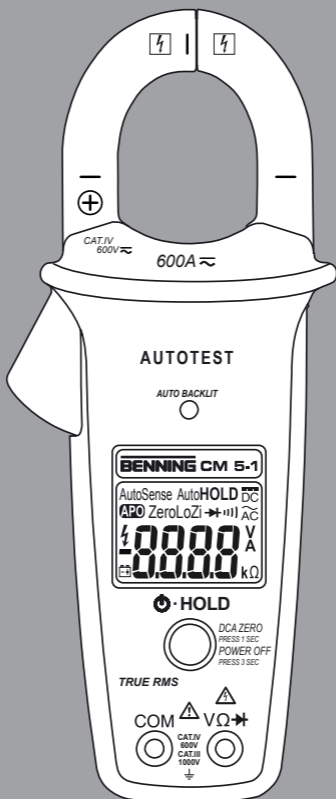


BENNING

- (D) Bedienungsanleitung
- (GB) Operating manual
- (F) Notice d'emploi
- (E) Instrucciones de servicio
- (CZ) Návod k obsluze
- (GR) Οδηγίες χρήσεως
- (H) Kezelési utasítás
- (I) Istruzioni d'uso
- (NL) Gebruiksaanwijzing
- (PL) Instrukcja obsługi
- (RO) Instrucțiuni de folosire
- (RUS) Инструкция по эксплуатации индикатора напряжения
- (S) Bruksanvisning
- (TR) Kullanma Talimatı



BENNING CM 5-1

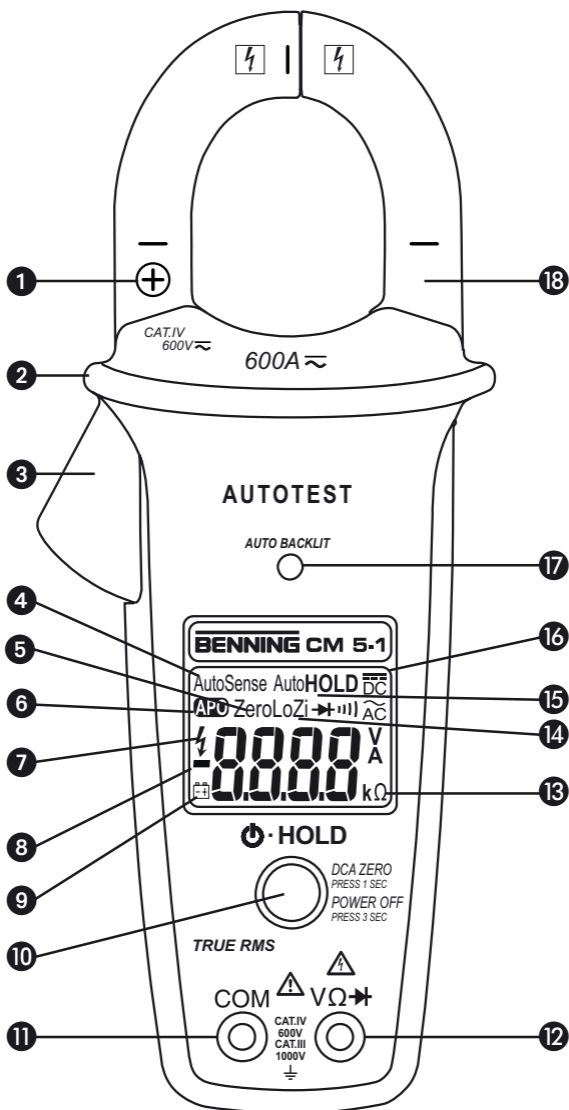
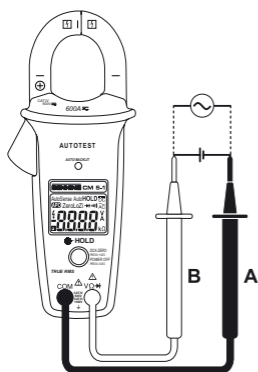


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 Fig. 1: Parte frontal del equipo
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 Σικόνα 1: Μπροστινή όψη
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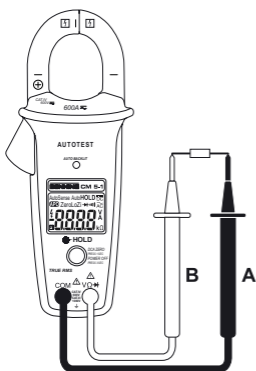


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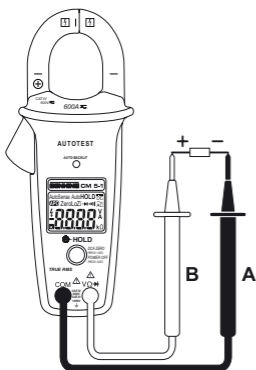
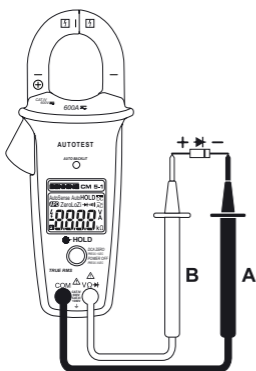
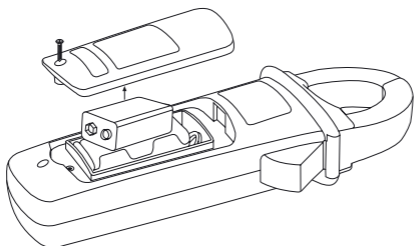


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Operating instructions

BENNING CM 5-1

Digital current clamp multimeter with AUTOTEST function for

- Direct voltage measurements
- Alternating voltage measurements
- Direct current measurements
- Alternating current measurements
- Resistance measurements
- Continuity testing
- Diode testing

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1. User notes

These operating instructions are intended for

- qualified electricians and
- electrotechnically trained persons.

The BENNING CM 5-1 is intended for making measurements in dry environment. It must not be used in power circuits with a nominal voltage higher than 1000 V DC and 750 V AC (More details in Section 6. "Ambient conditions").

The following symbols are used in these operating instructions and on the BENNING CM 5-1:



Application around and removal from HAZARDOUS LIVE conductors is permitted.



Warning of electrical danger!
Indicates instructions which must be followed to avoid danger to persons.



Important, comply with the documentation!
The symbol indicates that the information provided in the operating instructions must be followed with in order to avoid risks.



This symbol on the BENNING CM 5-1 means that the BENNING CM 5-1 is totally insulated (protection class II).



This symbol on the BENNING CM 5-1 means that the BENNING CM 5-1 complies with the EU directives.



This symbol appears on the display to indicate a discharged battery.



This symbol designates the „continuity test“ range.
The buzzer is used for the acoustic result output.



(DC) Direct voltage or current.



(AC) Alternating voltage or current.



Ground (Voltage against ground).

Note

After unmark the adhesive label „Warnung...“ (on battery compartment lid) the English text appears.

2. Safety note

The instrument is built and tested in accordance with DIN VDE 0411 part 1/ EN 61010-1

and has left the factory in perfectly safe technical condition.

To maintain this condition and to ensure safe operation of the multimeter, the user must observe the notes and warnings given in these instructions at all times. Improper handling and non-observance of the warnings might involve severe **injuries** or **danger to life**.



WARNING! Be extremely careful when working with bare conductors or main line carrier! Contact with live conductors will cause an electric shock!



The **BENNING CM 5-1** may be used only in electrical circuits of over voltage category III with a maximum voltage of 1000 V or of over voltage category IV with a maximum voltage of 600 V between the conductor and ground.

Remember that work on electrical components of all kinds is dangerous. Even low-voltages of 30 V AC and 60 V DC may be dangerous to human life.



Before starting the multimeter, always check it as well as all measuring leads and wires for signs of damage.

Should it appear that safe operation of the multimeter is no longer possible, it should be shut down immediately and secured to prevent that it is switched on accidentally.

It may be assumed that safe operation is no longer possible:

- if the instrument or the measuring leads show visible signs of damage, or
- if the multimeter no longer works, or
- after long periods of storage under unfavourable conditions, or
- after being subject to rough transportation, or
- if the device or the measuring leads are exposed to moisture, or
- if the self-test fails and „FAIL“ is shown on the display.



In order to avoid danger,

- do not touch the bare probe tips of the measuring leads
- insert the measurement leads in the appropriately designated measuring sockets on the multimeter



Maintenance:

Do not open the multimeter, because it contains no components which can be repaired by the user. Repair and service must be carried out by qualified personnel only!



Cleaning:

Regularly wipe the housing by means of a dry cloth and cleaning agent. Do not use any polishing agents or solvents!

3. Scope of delivery

The scope of delivery for the **BENNING CM 5-1** comprises:

- 3.1 one **BENNING CM 5-1**,
- 3.2 one safety measuring leads, red (L = 1.4 m; probe tip diameter = 4 mm)
- 3.3 one safety measuring leads, black (L = 1.4 m; probe tip diameter = 4 mm)
- 3.4 one compact protective pouch,
- 3.5 a 9 V block battery
- 3.6 one operating manual

Parts subject to wear:

- The **BENNING CM 5-1** is fed by a 9 V block battery (IEC 6 LR 61)
- The above-mentioned safety measuring leads **ATL-2** (tested accessories) correspond to CAT III 1000 V/ CAT IV 600 V and are approved for a current of 10 A (part no. 044118).

4. Description of current clamp multimeter

See figure 1: Appliance front face

The display and operator control elements specified in Fig. 1 are designated as follows:

- 1 **Polarity marking**, for assigning the DC current direction by means of the polarity indication,
 - 2 **Bulge of current clamp**, protects against contact with conductor,
 - 3 **Opening lever**, for opening and closing the current clamp,
 - 4 **AutoSense**, symbolizes the AUTOTEST function,
 - 5 **Zero**, null-balance indication for direct current (DC) measurements,
 - 6 **APO**, Auto Power Off is activated (device will switch off after 20 minutes),
 - 7 **V**, is indicated if a dangerous voltage is applied > 30 V,
 - 8 **Polarity indication**, any polarity opposed to the polarity markings shall be designated with „-“,
 - 9 **Battery status indication**, appears when the battery is discharged,
 - 10 **key (grey)**, with the following functions:
 - **POWER**, for switching the BENNING CM 5-1 on/ off
 - **(AUTO) POWER OFF**, for activating/ deactivating the automatic switch-off,
 - **ZERO balance**, null balance for direct current (DC) measurements,
 - **(AUTO) HOLD**, automatic storage of the measured value,
 - **HOLD**, storage of the measured value,
 - 11 **COM jack**, common socket for voltage, resistance measurement and continuity testing,
 - 12 **Jack (positive¹)**, for V, Ω and $\rightarrow+$,
 - 13 **Range indication**,
 - 14 **LoZi**, symbolizes a low input resistance for voltage measurements (4 k Ω ... 375 k Ω),
 - 15 **Auto, HOLD and AutoHOLD**, is displayed if the corresponding storage of measured values is activated,
 - 16 **Digital display**, for displaying the measured value and range exceedance,
 - 17 **AUTO BACKLIT**, sensor of the automatic background lighting,
 - 18 **Measuring pliers**, for clamping on the single wire current-carrying conductor,
- ¹) This is what the automatic polarity indication for DC voltage refers to,

5. General information

5.1 General details on the current clamp multimeter

- 5.1.1 The digital display 16 is a 4-digit liquid crystal display with 14 mm high numerals, complete with decimal point. The largest numerical value which can be displayed is 9999.
- 5.1.2 The polarity indication 8 is automatic. Only one polarity with respect to the socket/ polarity marking 1 marked „-“ is indicated.
- 5.1.3 The BENNING CM 5-1 can be switched on/ off by means of the key (grey) 10. For switching it off, press and hold the key for approx. 3 seconds.
- 5.1.4 The overranging is indicated by „OL” or „- OL” and, in part, an acoustic warning.
Warning, no indication and prior warning in the event of an overload condition!
- 5.1.5 **Null balance (ZERO)**
Press the key (grey) 10 for approx. 1 second to carry out a null balance for direct current (DC) measurements. The null balance is indicated by a flashing „ZERO” symbol 5 on the digital display.
- 5.1.6 **Storage of measured values „HOLD”**: The measuring result can be stored by actuating the key (grey) 10. The „HOLD” symbol 15 simultaneously appears on the display. By pressing the key 10 again, the device is switched back to the measuring mode.
With the storage of measured values „HOLD” being activated, the multimeter recognizes a measuring signal deviating from the displayed value, if the measuring signal of the same unit has increased by 50 digits or if a measuring signal of another measuring function is detected. The change of measuring signal is indicated by a flashing display or by a continuous acoustic signal.
- 5.1.7 **Automatic storage of measured values „AutoHOLD”** (only for AC/ DC measurements higher than 3 A): If during switch-on the key (grey) 10 is pressed for more than 5 seconds, the „AutoHOLD” symbol 15 flashes on the display and „AutoHOLD” is activated. If the multimeter detects a constant measured value, the buzzer can be heard three times and the measured value will be shown on the display together with the „AutoHOLD” symbol for approx. 5 seconds. The measured value can be stored by actuating the key (grey) 10. With the „AutoHOLD” function

- being activated, the APO function is deactivated.
- 5.1.8 The measuring rate of the BENNING CM 5-1 amounts nominally to 5 measurements per second for the digital display.
- 5.1.9 The BENNING CM 5-1 is provided with a self-test function. Do not use the BENNING CM 5-1, if „FAIL“ is shown on the display. In case of an error, switch the device off and on again. If the error persists, send the BENNING CM 5-1 to our service address (see section 9.4 „Calibration“).
- 5.1.10 The BENNING CM 5-1 is switched off automatically after approx. 20 minutes (**APO, Auto-Power-Off**). It switches on again when the key (grey) ⑩ is actuated. A buzzer sound indicates the automatic switch-off of the device. The automatic switch-off can be deactivated by pressing the key ⑩ for approx. 3 seconds during switch-on. The automatic switch-off is indicated by a flashing „APO“ symbol ⑥ on the digital display. When switching the device on again, briefly press the key ⑩ to reactivate the automatic switch-off.
- 5.1.11 Temperature coefficient of the measured value: $0.2 \times (\text{stated measuring precision}) / ^\circ\text{C} < 18 ^\circ\text{C} \text{ or } > 28 ^\circ\text{C}$, related to the value for the reference temperature of $23 ^\circ\text{C}$.
- 5.1.12 The BENNING CM 5-1 is supplied by a fitted 9 V block battery (IEC 6 LR 61).
- 5.1.13 If the battery voltage drops below the specified operating voltage of the BENNING CM 5-1, then a battery symbol ⑨ appears on the display.
- 5.1.14 The life span of a battery amounts to approx. 125 hours (alkali battery).
- 5.1.15 Appliance dimensions:
(L x W x H) = 215 x 85 x 51 mm
Appliance weight: 360 g
- 5.1.16 The safety measuring leads are designed in 4 mm plug-in type technology. The safety measuring leads supplied are expressly suited for the rated voltage and the rated current of the BENNING CM 5-1.
- 5.1.17 Largest opening of pliers: 35 mm
- 5.1.18 Largest cable diameter: 30 mm

6. Ambient conditions:

- The BENNING CM 5-1 is intended for making measurements in dry environment.
- Maximum barometric elevation for making measurements: 2000 m,
- Overvoltage category/ setting category: IEC 60664-1/ IEC 61010-1 → 600 V category IV, 1000 V category III
- Contamination class: 2,
- Protection class: IP 30 (DIN VDE 0470-1 IEC/ EN 60529)
IP 30 means: Protection against access to dangerous parts and protection against solid impurities of a diameter $> 2.5 \text{ mm}$, (3 - first index). No protection against water, (0 - second index).
- Operating temperature and relative humidity:
For operating temperatures from $0 ^\circ\text{C}$ to $30 ^\circ\text{C}$: relative humidity less than 80 %
For operating temperatures from $31 ^\circ\text{C}$ to $40 ^\circ\text{C}$: relative humidity less than 75 %
For operating temperatures from $41 ^\circ\text{C}$ to $50 ^\circ\text{C}$: relative humidity less than 45 %
- Storage temperature: The BENNING CM 5-1 can be stored at any temperature within the range of $- 20 ^\circ\text{C}$ to $+ 60 ^\circ\text{C}$ (relative humidity from 0 to 80 %). The battery should be removed from the instrument for storage.

7. Electrical specifications

Note: The measuring precision is specified as the sum of

- a relative fraction of the measured value and
- a number of digits (counting steps of the least significant digit).

This specified measuring precision is valid for temperatures within the range of $18 ^\circ\text{C}$ to $28 ^\circ\text{C}$ and for a relative humidity lower than 80 %.

7.1 Priority of the AUTOTEST function

The AUTOTEST function automatically switches to the correct measuring function and automatically selects the ideal measuring range: For this, the BENNING CM 5-1 works according to the following order:

The following criteria must be met:

V_{AC}, V_{DC} whichever is greater	Voltage measurement active, if: 1.3 V_{AC} ... 750.0 V_{AC} 2.1 V_{DC} ... 999.9 V_{DC} - 0.7 V_{DC} ... - 999.9 V_{DC}
Ω » Resistance/ continuity	Resistance measurement active, if 0 Ω ... $\infty \Omega$ 0.0 V_{AC} ... 0.9 V_{AC} - 0.4 V_{DC} ... - 0.2 V_{DC} 1.0 V_{DC} ... 2.0 V_{DC}
/ Diode	Diode test active, if: 0.4 V_{DC} ... 0.8 V_{DC} (forward voltage)
A_{AC}, A_{DC} whichever is greater	Current measurement active, if: 0.9 A_{AC} ... 600.0 A_{AC} 0.9 A_{DC} ... 600.0 A_{DC}

7.2 Direct voltage ranges

The input resistance for voltages of up to 30 V is at least 4 k Ω . The input resistance increases to 375 k Ω for 750 V with the input voltage increasing as well.

Measuring range	Resolution	Meas. precision	Overload protection ^{*1}
2.1 V ... 1000 V	0.1 V	\pm (0.3 % of the measuring value + 2 digits)	750 V_{eff}
- 0.7 V ... - 1000 V	0.1 V	\pm (0.3 % of the measuring value + 2 digits)	750 V_{eff}

^{*1} Maximum measuring time = 30 seconds for voltages higher than 30 V

7.3 Alternating voltage ranges

The input resistance for voltages of up to 30 V is at least 4 k Ω . The input resistance increases to 375 k Ω for 750 V with the input voltage increasing as well.

Measuring range	Resolution	Meas. precision ^{*2} within the frequency range 50 Hz - 60 Hz	Overload protection ^{*1}
1.3 ... 750 V	0.1 V	\pm (0.9 % of the measuring value + 3 digits)	750 V_{eff}
within the frequency range 61 Hz - 500 Hz			
1.3 ... 750 V	0.1 V	\pm (1.5 % of the measuring value + 3 digits)	750 V_{eff}

^{*1} Maximum measuring time = 30 seconds for voltages higher than 30 V

^{*2} The measuring value is gained and indicated as effective value (True RMS, AC coupling). The measuring accuracy is specified for sinusoidal curves and applies to the final value of the measuring range as well as for non-sinusoidal curves up to 50 % of the final value of the measuring range.

In case of non-sinusoidal curves, the indicating value becomes inaccurate.

Thus, an additional error occurs for the following crest factors:

crest factor from 1.4 to 2.0 additional error + 1 %

crest factor from 2.0 to 2.5 additional error + 2.5 %

crest factor from 2.5 to 3.0 additional error + 4 %

7.4 Direct current ranges

Measuring range	Resolution	Meas. precision	Overload protection
0.9 A ... 600.0 A	0.1 A	\pm (1.5 % of the measuring value + 5 digit)	600 A_{eff}

The indicated accuracy is specified for conductors which are gripped by means of the measuring clamp in the middle (see figure 3 direct/ alternating current measurement). For conductors which are not gripped in the middle, an additional error of 1 % of the indicating value has to be considered.

Maximum remanence error: 1 % (during repeating measurement)

7.5 Alternating current ranges

Measuring range	Resolution	Meas. precision ^{*2} within the frequency range 50 Hz - 60 Hz	Overload protection
0.9 A ... 600.0 A	0.1 A	\pm (1.5 % of the measuring value + 5 digit)	600 A_{eff}
within the frequency range 61 Hz - 400 Hz			
0.9 A ... 600.0 A	0.1 A	\pm (2 % of the measuring value + 5 digit)	600 A_{eff}

- ² The measuring value is gained and indicated as effective value (true RMS, AC coupling). The measuring accuracy is specified for sinusoidal curves and applies to the final value of the measuring range as well as for non-sinusoidal curves up to 50 % of the final value of the measuring range. In case of non-sinusoidal curves, the indicating value becomes inaccurate. Thus, an additional error occurs for the following crest factors:
- crest factor from 1.4 to 2.0 additional error + 1 %
 - crest factor from 2.0 to 2.5 additional error + 2.5 %
 - crest factor from 2.5 to 3.0 additional error + 4 %

The stated precision is specified for conductors that are centrally clamped by the current clamp **18** (see fig. 3 direct/ alternating current measurement). For conductors that are not centrally clamped, an additional error of 1 % of the display value needs to be taken into account.

7.6 Resistance measuring range and acoustic continuity testing

Overload protection: AC 750 V_{eff}/ DC 1000 V

Measuring range	Resolution	Meas. accuracy	Max. idling voltage
0 Ω ... 999 Ω	1 Ω	± (0.9 % of the measuring value + 2 digits)	1.8 V

The built-in buzzer sounds in the case of a resistance R less than 25 Ω up to 400 Ω. For a resistance R higher than 400 Ω (specified for temperatures of 0 °C up to 40 °C), the buzzer does not emit an acoustic signal.

7.7 Diode testing

Overload protection: AC 750 V_{eff}/ DC 1000 V

Measuring range	Resolution	Meas. accuracy	Max. idling voltage
0.4 V ... 0.8 V	0.1 V	± (0.9 % of the measuring value + 2 digits)	1.8 V

8. Measuring with the BENNING CM 5-1

8.1 Preparations for measuring

Operate and store the BENNING CM 5-1 only at the specified storage and operating temperatures conditions. Avoid continuous insulation.

- Check rated voltage and rated current details specified on the safety measuring leads. The nominal voltage and current ratings of the safety measuring leads included in the scope of delivery correspond to the ratings of the BENNING CM 5-1.
- Check the insulation of the safety measuring leads. Discard the safety measuring leads immediately if the insulation is damaged.
- Check safety measuring leads for continuity. If the conductor in the safety measuring lead is interrupted, the safety measuring lead must be disposed of immediately.
- Strong sources of interference in the vicinity of the BENNING CM 5-1 can lead to unstable readings and measuring errors.
- It is only possible to make measurements, if the conditions of the AUTOTEST function are met (see section 7.1 „Priority of the AUTOTEST function“).

Note:

Clocked signals, e.g. currents generated by chargers, might result in an incorrect AC/ DC indication.

8.2 Voltage measuring



Do not exceed the maximum permitted voltage with respect to earth potential! Electrical danger!

The highest voltage which may be applied to the jacks,

- COM socket **11**
- jack for V, Ω and **➔** **12**

of the BENNING CM 5-1 against ground, amounts to 600 V CAT IV/ 1000 V CAT III.

- Switch the BENNING CM 5-1 on by means of the key (grey) **10**.
- The black safety measuring lead has to be contacted with the COM jack **11** on the BENNING CM 5-1.
- The red safety measuring lead has to be connected to the jack for V, Ω and **➔** **12** on the BENNING CM 5-1.
- Bring the safety measuring leads into contact with the measuring points.
- On the digital display **16**, the AUTOTEST function is shown by the „AutoSense“ symbol **4**. It automatically determines the required measuring function (voltage) and the ideal measuring range.

- Read the measured value on the digital display 16 on the BENNING CM 5-1.



Please observe the restrictions in the lower measuring range!
DC voltage measurements are not possible within the range of
- 0.7 V_{DC} ... 2.1 V_{DC}.
AC voltage measurements are only possible starting from
voltages of > 1.3 V_{AC}.

See figure 2: Direct/ alternating voltage measurement with AUTOTEST function

8.3 Current measurement



Do not apply any voltage to the contacts of the BENNING CM 5-1!
Any possibly connected safety measuring leads have to be removed.

- Switch the BENNING CM 5-1 on by means of the key (grey) 10.
- Operate opening lever 3, clamp single wire live conductor centrally by means of the BENNING CM 5-1 current clamp.
- On the digital display 16, the AUTOTEST function is shown by the „AutoSense“ symbol 4. It automatically determines the required measuring function (current) and the ideal measuring range.
- Read the measured value on the digital display 16 on the BENNING CM 5-1.

See figure 3: Direct/ alternating current measurement with AUTOTEST function

8.4 Resistance measuring and acoustic continuity testing

- Switch the BENNING CM 5-1 on by means of the key (grey) 10.
- The black safety measuring lead has to be contacted with the COM jack 11 on the BENNING CM 5-1.
- The red safety measuring lead has to be connected to the jack for V, Ω and → 12 on the BENNING CM 5-1.
- Bring the safety measuring leads into contact with the measuring points.
- On the digital display 16, the AUTOTEST function is shown by the „AutoSense“ symbol 4. It automatically determines the required measuring function (resistance/ continuity) and the ideal measuring range.
- Read the measured value on the digital display 16 on the BENNING CM 5-1.
- If the conductor resistance between the COM jack 11 and the jack for V, Ω and → 12 25 Ω up to 400 Ω, the fitted buzzer sounds on the BENNING CM 5-1.

See figure 4: Resistance measurement

See figure 5: Continuity testing with buzzer

8.5 Diode testing

- Switch the BENNING CM 5-1 on by means of the key (grey) 10.
- The black safety measuring lead has to be contacted with the COM jack 11 on the BENNING CM 5-1.
- The red safety measuring lead has to be connected to the jack for V, Ω and → 12 on the BENNING CM 5-1.
- Bring the safety measuring leads into contact with the measuring points.
- On the digital display 16, the AUTOTEST function is shown by the „AutoSense“ symbol 4. It automatically determines the required measuring function (diode) and the ideal measuring range.
- Read the measured value on the digital display 16 on the BENNING CM 5-1.
- For a standard Si diode applied in conduction direction, a conduction voltage between 0.4 V and 0.8 V is displayed. If no forward voltage is detected, first check the polarity of the diode. If still no forward voltage is displayed, the forward voltage of the diode is beyond the measuring limits.

See figure 6: Diode testing


9. Maintenance



Before opening the BENNING CM 5-1, make sure that it is free of voltage! Electrical danger!

Work on the opened BENNING CM 5-1 under voltage may be carried out only by skilled electricians with special precautions for the prevention of accidents.

Make sure that the BENNING CM 5-1 is free of voltage as described below before opening the instrument:

- First remove the two safety measuring leads from the object to be measured.
- Then disconnect the two safety measuring leads from the BENNING CM 5-1.
- Switch off the BENNING CM 5-1. For switching it off, press and hold the key (grey)  for approx. 3 seconds.

9.1 Securing the instrument

Under certain circumstances safe operation of the BENNING CM 5-1 is no longer ensured, for example in the case of:

- Visible damage of the casing.
- Incorrect measurement results.
- Recognisable consequences of prolonged storage under improper conditions.
- Recognisable consequences of extraordinary transportation stress.
- Failure of the self-test; „FAIL“ is shown on the display.

In such cases the BENNING CM 5-1 must be switched off immediately, disconnected from the measuring points and secured to prevent further utilisation.

9.2 Cleaning

Clean the exterior of the housing with a clean dry cloth (exception: special cleaning wipers). Avoid using solvents and/ or scouring agents for cleaning the instrument. It is important to make sure that the battery compartment and battery contacts are not contaminated by leaking electrolyte.



If electrolyte contamination or white deposits occur in the area of the batteries or battery compartment, clean them too with a dry cloth.

9.3 Battery replacement



Before opening the BENNING CM 5-1, make sure that it is free of voltage! Electrical danger!

The BENNING CM 5-1 is fed by a 9 V block battery.

A battery replacement (see figure 7) is required, if the battery symbol  appears on the display .

Proceed as follows to replace the batteries:

- Disconnect the safety measuring leads from the measuring circuit.
- Disconnect the safety measuring leads from the BENNING CM 5-1.
- Switch off the BENNING CM 5-1.
- Lay the BENNING CM 5-1 face down and release the screws of the battery compartment cover.
- Lift the battery compartment lid (in the housing recess area) from the bottom part.
- Lift the discharged battery from the battery compartment and disconnect the battery supply lines from the battery.
- The new battery have to be connected to the battery supply lines, and arrange these such that they are not crushed between the housing parts. Then place the battery into the battery compartment provided for this purpose.
- Place the battery compartment cover onto the bottom part and tighten the screw.

See figure 7: Battery replacement



**Make your contribution to environmental protection!
Do not dispose of discharged batteries in the household garbage. Instead, take them to a collecting point for discharged batteries and special waste material. Please inform yourself in your community.**

9.4 Calibration

To maintain the specified accuracy of the measurement results, the instrument must be recalibrated at regular intervals by our factory service. We recommend a recalibration interval of one year. Send the multimeter to the following address:

Benning Elektrotechnik & Elektronik GmbH & CO. KG
Service Centre
Robert-Bosch-Str. 20
D - 46397 Bocholt

10. Technical data of the measuring accessories

4 mm Safety test leads ATL 2

- Standard: EN 61010-031,
- Maximum rated voltage to earth (\perp) and measuring category: 1000 V CAT III, 600 V CAT IV,
- Maximum rated current: 10 A,
- Protective class II (II), continuous double or reinforced insulation,
- Contamination class: 2,
- Length: 1.4 m, AWG 18,
- Environmental conditions:
Maximum barometric elevation for making measurements: 2000 m,
Temperatures: 0 °C to + 50 °C, humidity 50 % to 80 %
- Only use the test leads if in perfect condition and according to this manual, since the protection provided could otherwise be impaired.
- Throw the test leads out if the insulation is damaged or if there is a break in the cable/ plug.
- Do not touch the bare contact tips of the test leads. Only grab the area appropriate for hands!
- Insert the angled terminals in the measuring device.

11. Environmental note



At the end of the product's useful life, please dispose of the device at collection points provided in your community.

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