VOLTCRAFT Handheld multimeter Digital CAT III 600 V Display Instruction Manual

VOLTCRAFT®

Handheld multimeter Digital CAT III 600 V Display Instruction Manual

Contents

Introduction

Dear customer,
Thank you for purchasing this product.
This product complies with statutory, national and European regulations.
To ensure that the product remains in this state and to guarantee safe operation, always follow the instructions in this manual.

 These operating instructions are part of this product. They contain important notes on commissioning and handling. Do not give this product to a third party without the operating instructions.
Therefore, retain these operating instructions for reference!
If there are any technical questions, please contact: **www.conrad.com/contact**

Explanation of Symbols

 The symbol with the lightning in a triangle indicates that there is a risk to your health, e.g. due to an electric shock.

 The symbol with an exclamation mark in a triangle is used to highlight important information in these operating instructions that must be observed.
⟶ The arrow symbol indicates special information and tips on how to use the product.

 This product has been CE-tested and meets the relevant European guidelines

 Class 2 insulation (double or reinforced insulation)
CAT II Measurement Category II: for measurements on electric and electronic devices connected to the mains supply with a mains plug. This category also includes all lower categories (e.g. CAT I for measuring signal and control voltages).
CAT III Measurement Category III: For measuring circuits of installations in buildings (e.g. mains sockets or sub-distributions). This category also includes all lower categories (e.g. CAT II for measuring electrical devices). Measurement in CAT III is only permitted with protective caps over the probe tips.
CAT IV Measurement Category IV: for measurements at the source of the low-voltage installation (e.g. main

distribution, home delivery points of the utility companies, etc.).

Earth potential

Intended use

- Measurement and display of the electrical quantities in the range of measurement category CAT III (up to 600 V against earth potential according to EN 61010-1) and all lower categories. The measuring device must not be used in the CAT IV measurement category.
- Measurement of direct and alternating voltage up to 600 V
- Measurement of resistance values of up to 20 MOhm.
- Acoustic continuity test
- Non-contact 230 V/AC voltage test
- Temperature measurement from -40 to +300 °C / 572 °F

Only use batteries of the specified type. The measuring device must not be used when it is open, with an open battery compartment or when the battery compartment cover is missing. Measurements must not be made in damp rooms or in adverse environmental conditions.
For safety reasons, only use test leads or accessories that match the multimeter's specifications.
Adverse conditions include:

- Wetness or high air humidity,
- Dust and flammable gases, vapours or solvent,
- Thunderstorms or similar conditions such as strong electrostatic fields, etc.

Using this product for purposes other than those described above may damage the product and result in a short circuit, fire or electric shock. The product must not be modified or reassembled! Read the operating instructions carefully and keep them in a safe place for future reference. Always observe the safety information in these instructions.

Package contents

- Multimeter · 2 pcs of 1.5V AAA, LR3, Micro batteries
- Safety test leads with attached CAT III protective caps
- K-type temperature sensor (-40 to + 300°C)
- Operating instructions

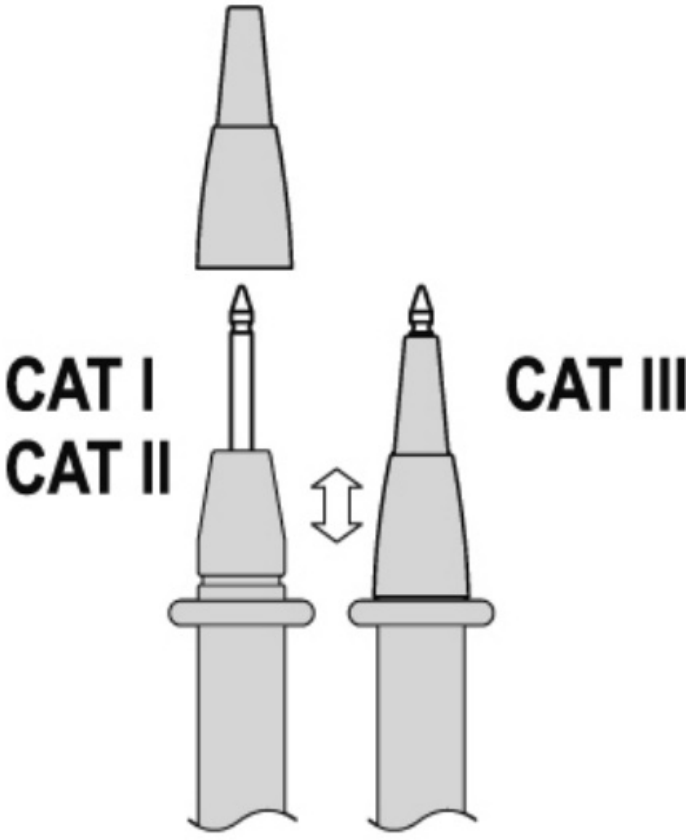
Up-to-date operating instructions

Download the latest operating instructions via the link www.conrad.com/downloads or scan the QR code. Follow the instructions on the website.

Safety instructions

Read the operating instructions and safety information carefully. If you do not follow the safety information and information on proper handling in these operating instructions, we will assume no liability for any resulting personal injury or damage to property. Such cases will invalidate the warranty/guarantee.

- This device was shipped in a safe condition. To ensure safe operation and to avoid damaging the device, always observe the safety information and warnings in these instructions.
- The unauthorised conversion and/or modification of the product is inadmissible for reasons of safety and approval.
- Consult an expert when in doubt about the operation, safety or connection of the device.
- The measuring device and its accessories are not toys and must be kept out of the reach of children.
- For installations in industrial facilities, follow the accident prevention regulations for electrical systems and equipment issued by the national safety organisation or the corresponding national authority. In schools and training establishments, hobby and DIY workshops, the handling of measuring instruments must be monitored responsibly by trained personnel.
- The voltage between the connection points of the measuring device and earth potential must not exceed 600 V (DC/AC) in CAT III.
- When using test leads without protective caps, measurements between the measuring device and the earth potential must not exceed the CAT II measurement category.
- When taking CAT III measurements, the protective caps must be placed on the probe tips to avoid accidental short circuits.



- Push the protective caps onto the probe tips until they click into place. To remove the caps, pull them off the

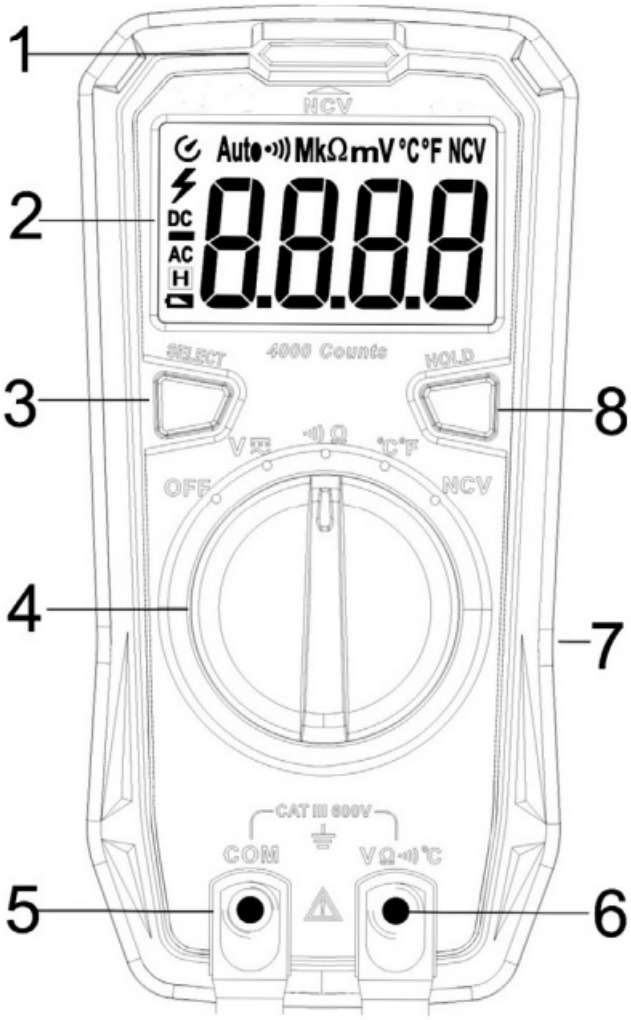
tips with some force.

- Always remove the probe tips from the measured object before changing the measurement range.
- Exercise particular caution when working with voltages higher than 33 V (AC) and 70 V (DC). Touching electrical conductors with these voltages may cause a fatal electric shock.
- Check the measuring device and test leads for signs of damage before each measurement. Never take measurements if the protective insulation is damaged (torn, missing, etc.).
- Measuring cables have a wear indicator. The second layer of insulation will become visible if the lead is damaged (the second layer of insulation is a different colour). If this occurs, discontinue use and replace the measurement accessory.
- To prevent an electric shock, do not touch the measuring points when taking measurements, either directly or indirectly. When taking measurements, do not touch any area beyond the grip markings on the probe tips.
- Do not use the multimeter just before, during or just after an electrical storm (electric shock /high-power surges!). Ensure that your hands, shoes, clothes, the floor, circuit and circuit components are dry.
- Avoid using the device in the immediate vicinity of:
  – Strong magnetic or electromagnetic fields
  – Transmitting antennas or HF generators.
  These may distort the measurements.
- If you suspect that safe operation is no longer possible, stop using the device immediately and prevent unauthorised use. Safe operation can no longer be assumed if: – There are signs of damage
  – The device does not function properly
  – The device was stored under unfavourable conditions for a long period of time
  – The device was subjected to rough handling during transport.
- Do not switch the measuring device on immediately after it has been brought from a cold room into a warm one. The condensation generated may destroy the product. Leave the device switched off and allow it to reach room temperature.
- Do not leave packaging material lying around carelessly, as it may become a dangerous toy for children.
- Observe the safety information in each section.

Product description

The multimeter (referred to as DMM in the following) indicates measured values on a digital display. The measuring value display of the DMM comprises 4000 counts (count = smallest display value). The DMM automatically sets the appropriate measuring range (AUTO range). The measuring device can be used in both hobby and professional fields (up to CAT III 600 V). The measurement modes are selected using the rotary dial. The DMM is switched on and off via the rotary switch position “OFF”. Always turn the measuring device off when it is not in use.
Insert the batteries before using the measuring device.
Insert the battery as described in the chapter “Cleaning and Maintenance”. The power supply requires two AAA 1.5 V batteries. These are supplied with the device.

Overview of parts



1. Contact-free voltage detector
2. LC display
3. SELECT button for function switching
4. Rotary switch
5. COM measuring socket (reference potential)
6. V-ohm passage temperature measuring socket
7. Battery compartment (backside)
8. HOLD button

Display elements and symbols

AUTO	Automatic measurement range selection
OL	Overload; the measurement range has been exceeded
	Battery replacement symbol; please change the battery as soon as possible
	Lightning symbol during voltage measurements
	Acoustic continuity tester symbol
AC	AC voltage
DC	DC voltage
mV	Millivolt
V	Volt (unit of electrical voltage)
Ω,	Ohm (unit of electrical resistance)
kΩ	Kilo ohms (exp.3)
MΩ	Mega ohms (exp.6)
°C	Unit of temperature
°F	Unit of temperature
COM	Reference potential
H	Symbol for active hold function
NCV	Non-contact AC voltage detection

Taking measurements

Never exceed the maximum permitted input values. Never touch circuits or parts of circuits when they may contain voltages greater than 33 V/ACrms 75 V/DC! Fatal hazard!
Before measuring, check the connected test leads for damage, such as cuts, tears and kinks. Defective test leads must no longer be used. Fatal hazard!
When taking measurements, do not touch any area beyond the grip markings on the probe tips.
For safety reasons, remove all unnecessary test leads from the device before taking a measurement.
If the measurement range is exceeded, an overflow is signalled in the display with “OL.”. The voltage range has an input resistance of >10 MOhm. In all measurement modes, the automatic range selection (Auto-Range) is active. This function automatically sets the appropriate measurement range.
a) Measuring voltage (“V”)
Before each measurement, make sure that the device is not set to a different measurement range. Measuring DC voltages (V): · Turn on the DMM using the rotary switch (4). **Select the measurement range “V”.**

- Connect both of the test prods to the measured object (battery, circuit etc.).
- If necessary, press the Select button (3). The display shows DC.
  Connect the red probe tip to the positive terminal and the black probe tip to the negative terminal.
- The measured value and polarity are indicated on display.
- A minus “-” symbol before the measured value indicates that the measured voltage is negative (or the test leads have been reversed).

- After measuring, remove the test leads from the measured object and turn the multimeter off. Turn the rotary switch to the “OFF” position.

Proceed as follows to measure “AC” voltages (V):

- Commission the DMM as described under “Measurement of DC voltage” and select the measurement range “V”
- Connect the two probe tips to the object to be measured (generator, circuit, etc.)
- If necessary, press the Select button (3). The display shows AC.
- The measured value appears on display.
- After measuring, remove the test leads from the measured object and turn the multimeter off. Turn the rotary switch to the “OFF” position.

b) Measuring resistance

⚠ **Make sure that all objects that you wish to measure (including circuit components, circuits and component parts) are disconnected and discharged. Follow the steps below to measure the resistance:**

- Switch on the DMM and select the measuring function “”.
- Press the Select button (3).
- Check the test leads for continuity by connecting both probe tips to one another.
- Thereupon a resistance of <0.5 Ohm must be set (inherent resistance of the measuring leads).
- Connect the probe tips to the object that you want to measure. The measurement will be indicated on display (2) (provided that the object you are measuring is not highly resistive or disconnected). Wait until the display stabilises. This may take a few seconds for resistances greater than 1 M.
- As soon as OL appears in the display, you have exceeded the measuring range or the measuring circuit is interrupted.
- After measuring, remove the test leads from the measured object and turn the multimeter off. Turn the rotary switch (4) to the “OFF” position.
  When taking a resistance measurement, make sure that the points that come into contact with the probe tips are free from dirt, oil, solder and other impurities. These substances may distort the measurement.

c) Continuity test

⚠ Make sure that all objects that you wish to measure (including circuit components, circuits and component parts) are disconnected and discharged.

- Turn the DMM on and select the measurement range .
- The measurement value is indicated on display.
- As a passage, a measured value of approximately <30 ohms is detected, an acoustic signal sounds and the NCV LED (1) lights up green.
- If a measured value of 31 ohms – 420 ohms is detected, no acoustic signal sounds and the NCV LED (1) lights up red.
- As soon as OL appears in the display, you have exceeded the measurement range (> 420 ohms) or the measurement circuit is interrupted. No sound comes out and the NCV LED (1) lights up red.

- After measuring, remove the test leads from the measured object and turn the multimeter off. Turn the rotary switch to the “OFF” position.

d) Measuring the temperature

- Switch on the DMM and select measuring range “°C”.
- Remove all test leads from the device.
- Connect the enclosed temperature sensor to the DMM. Pay attention to the correct connection (correct polarity).
- Insert the black plug into the “COM” socket (5) and the red plug into the “V °C” socket (7).
- Only expose the sensor tip to the temperatures.
- The display shows the temperature at the thermocouple. If “OL” appears, the measurement range has been exceeded or no sensor is connected.
- Press the Select button to select the measurement range °F.
- At the end of the measurement, remove the temperature sensor and switch off the DMM. Turn the rotary switch to the “OFF” position.

⟶ If the two “COM” (5) and “°C” (6) sockets are short-circuited, the ambient temperature of the measuring device is displayed.

e) Non-contact AC voltage test “NCV”

⚠**Make sure that all measuring sockets are unoccupied. Please remove all test leads from the measuring device.**
This function only serves as an aid. When working on these cables, it is essential to carry out preliminary contact measurements for no voltage.

- Switch on the DMM and select the measuring function “NCV”.
- Check this function in advance on a known AC voltage source.
- Guide the measuring device with the sensor surface (1) at a distance of maximum 10 mm to the site to be tested.
- For twisted lines, it is advisable to check the cable to a length of about 20 – 30 cm.
- When a voltage is detected, an acoustic signal sounds, the display shows a dash and the NCV LED flashes green.
- The closer you get to the voltage source, the faster the acoustic signal sounds, the display shows several dashes (maximum 4) and the NCV LED flashes yellow first and then changes to red in the immediate vicinity of the power source.
- Switch off the DMM after measuring. Turn the rotary switch to the “OFF” position.

⟶ Due to the sensitivity, static fields can also be displayed when touching. This is normal and does not affect the test result.

Select button

The SELECT button is used to change the function of the measuring range.

Voltage measurement V	Function switching between AC and DC measurement mode
Resistance / Continuity check	Function switching between resistance measurement and continuit y test
Temperature measurement mode	Function switching between °C and °F

HOLD function

The hold button (9) allows the measured value to be recorded on display. The symbol “H” appears in the display. This facilitates the reading or is for documentation purposes. Press again to switch back to measurement mode. The Hold function is not available with the non-contact AC voltage test “NCV”.

Automatic power-off

The DMM automatically shuts off after approximately 15 minutes. To switch on again, press any key or turn the rotary switch once to the “OFF” position and then select the desired measurement range again.

⟶ About 1 minute before the automatic power-off, the buzzer sounds five times in succession; before shutting down, a long beep sounds.

Battery test when switching on

When the DMM is switched on, the current battery voltage is indicated by the colour of the NCV LED (1) for approximately 2 seconds:

Green	voltage > 2.7 V
Yellow	voltage 2.4 V – 2.7 V
Red	voltage < 2.4 V

Maintenance and cleaning

a) General information

Apart from occasional cleaning and fuse replacements, the multimeter requires no servicing. Refer to the following sections for instructions on how to change the battery.

⚠**Regularly check the device and test leads for signs of damage.**

b) Cleaning

Always observe the following safety information before cleaning the device:

⚠ **Opening covers on the product or removing parts that cannot be removed by hand may expose voltage-carrying components.**

Before cleaning or servicing the multimeter, disconnect all cables from the multimeter and all measured objects. Power the multimeter off.

Do not use aggressive detergents, benzine, alcohols or similar products for cleaning. These may corrode the surface of the measuring device. In addition, the vapours emitted by these substances are explosive and harmful to your health.

Do not use sharp-edged tools, screwdrivers or metal brushes or similar objects for cleaning. Clean the device or the display and the test leads using a clean, lint-free, antistatic and slightly damp cleaning cloth.

c) Inserting/changing the batteries

Two 1.5V batteries (AAA. LR03 Micro) are required to operate the measuring device. At initial start-up or when the battery change symbol appears in the display, two new, fully charged batteries must be inserted.

Proceed as follows to insert/replace the battery:

- Disconnect the connected test leads from the measuring circuit and from the measuring device. Power the multimeter off.
- Loosen the rear screw on the battery compartment (7) and carefully pull the battery compartment lid off the measuring device.
- Insert a new battery with correct polarity into the battery insert of the measuring device.
- Slide the battery compartment cover into the DMM and close the housing carefully.

⚠ Never use the measuring device when the battery/fuse compartment is open.
FATAL HAZARD!
Do not leave flat batteries in the device. Even batteries protected against leaking can corrode and thus release chemicals which may be detrimental to your health or destroy the device.
Do not leave batteries unattended. They may be swallowed by children or pets. Seek immediate medical attention if a battery is swallowed.
If you do not plan to use the meter for an extended period, remove the battery to prevent it from leaking.
Leaking or damaged batteries may cause acid burns if they come into contact with your skin.
Always use protective gloves when handling leaking or damaged batteries.
Ensure that the batteries are not short-circuited. Do not throw batteries into fire!
Batteries (non-storage) must not be recharged. There is a risk of explosion.
Only use alkaline batteries, as alkaline batteries are more powerful and have a longer lifespan.

Disposal

a) General

 The product must not be disposed in the household waste. Dispose of the product at the end of its serviceable life in accordance with the current statutory requirements; e.g., return it to any suitable collection point.
Remove any normal or rechargeable batteries inserted and dispose of them separately from the product.

b) Disposal of spent rechargeable batteries

As the end user, you are required by law (Battery Ordinance) to return all spent rechargeable batteries; disposal of them in the household waste is prohibited!

 Contaminated rechargeable batteries are labelled with these symbols to indicate that disposal in the domestic waste is forbidden.
The symbols of the relevant heavy metals are: Cd = Cadmium, Hg = Mercury, Pb = Lead.
You can return used rechargeable batteries free of charge to any collection facility in your local authority, to our stores or to any other store where rechargeable batteries are sold. You thereby fulfil your statutory obligations and contribute to the protection of the environment.

Troubleshooting

In purchasing this measuring device, you have acquired a product which has been designed to state of the art and is operationally reliable.
However, problems and malfunctions may still occur.
This section tells you how to troubleshoot common issues:

⚠ **Always observe the safety information in these instructions.**

Error	Possible cause	Solution
The multimeter does not w ork.	Is the battery empty?	Check the status.
Check the status.	The HOLD function is active (dis-play “H ”)	Press the “HOLD” key again. The sym bol “H” disappears.
	Have you selected the wrong measurem ent mode (AC/DC)?	Check the display (AC/DC) and select another mode if necessary.
	Did you use the wrong measurement sockets?	Check the measuring sockets.

⚠**Repairs other than those described above should be performed only by an authorised specialist. If you have questions about the measuring device, please contact our technical support team** .

Technical data

Resolution……4000 Count
Sample rate ……approx. 3 readings/second
Measuring line length ……approx. 75 cm each
Input impedance……..>10 M (V range)
Operating voltage ……2x AAA / Micro / LR03 batteries
Operating conditions……..0 °C to +40 °C
Storage conditions……..10 °C to +50 °C
Relative humidity ……max. 75% RH, non-condensing
Operating altitude ……max. 2000 m
Weight ……..approx. 121 g without batteries
Dimensions (L x W x H)……130 x 65 x 32 (mm)
Measuring category……CAT III 600 V
Pollution degree……2
Acoustic continuity test……< 30 continuous tone
DC voltage……..4.000 V / 40.00 V / 400.0 V ± 0.7% ± 2 digits 600 V ± 1.0% ± 3 digits
AC voltage …….. 4.000 V / 40.00 V / 400.0 V ± 1.4% ± 3digit 600 V ± 1.4% ± 3 digits
Frequency range ……40 Hz 400 Hz
Resistance……..400.0 ±1.4% ± 2 digits 4.00 K/40.00 K/400.0 K ±1.1% ±2 digits 4.000 M / 20.00 M ±1.7% ±3 digits
Temperature …….. -40 to +40 °C ±4°C +40 °C – +300 °C ±1.4% ±5 digits -40 °F to +104 °F ± 6 °F +104 °F – +572 °F ±2.8% ±6 digits
Automatic power-off……after approximately 15 minutes
Battery test when switching on ……. green voltage > 2.7 V yellow voltage 2.4 V – 2.7 V red voltage < 2.4 V

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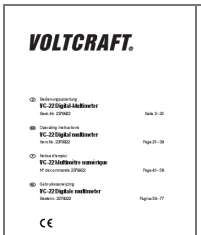
Documents / Resources

	VOLTCRAFT Handheld multimeter Digital CAT III 600 V Display [pdf] Instruction Manual Handheld multimeter Digital CAT III 600 V Display, multimeter Digital CAT III 600 V Display, Digital CAT III 600 V Display, CAT III 600 V Display

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