(D) Impressum

Dies ist eine Publikation der Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau (www.conrad.com).
Alle Rechte einschließlich Übersetzung vorbehalten. Reproduktionen jeder Art, z. B. Fotokopie, Mikroverfilmung, oder die Erfassung in elektronischen Datenverarbeitungsanlagen, bedürfen der schriftlichen Genehmigung des Herausgebers. Nachdruck, auch auszugsweise, verboten. Die Publikation entspricht dem technischen Stand bei Drucklegung.

(GB) Legal notice

This is a publication by Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau (www.conrad.com).
All rights including translation reserved. Reproduction by any method, e.g. photocopy, microfilming, or the capture in electronic data processing systems require the prior written approval by the editor. Reprinting, also in part, is prohibited. This publication represent the technical status at the time of printing.

(F) Information légales

Ceci est une publication de Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau (www.conrad.com).
Tous droits réservés, y compris de traduction. Toute reproduction, quelle qu'elle soit (p. ex. photocopie, microfilm, saisie dans des installations de traitement de données) nécessite une autorisation écrite de l'éditeur. Il est interdit de le réimprimer, même par extraits. Cette publication correspond au niveau technique du moment de la mise sous presse.

(NL) Colofon

Dit is een publicatie van Conrad Electronic SE, Klaus-Conrad-Str. 1, D-92240 Hirschau (www.conrad.com).
Alle rechten, vertaling inbegrepen, voorbehouden. Reproducties van welke aard dan ook, bijvoorbeeld fotokopie, microverfilming of de registratie in elektronische gegevensverwerkingsapparatuur, vereisen de schriftelijke toestemming van de uitgever. Nadruk, ook van uittreksels, verboden. De publicatie voldoet aan de technische stand bij het in druk bezorgen.

V3_0515_02_JH

VOLTCRAFT®

VC-890 OLED DIGITAL-MULTIMETER

VC-890 OLED DIGITAL MULTIMETER

VC-890 OLED MULTIMÈTRE NUMÉRIQUE

VC-890 OLED DIGITALE MULTIMETER

Best.-Nr. / Item No. / N° de commande / Bestnr.:
124600

CE

Version 05/15

(D) Diese Bedienungsanleitung gehört zu diesem Produkt. Sie enthält wichtige Hinweise zur Inbetriebnahme und Handhabung. Achten Sie hierauf, auch wenn Sie dieses Produkt an Dritte weitergeben.

Heben Sie deshalb diese Bedienungsanleitung zum Nachlesen auf! Eine Auflistung der Inhalte finden Sie in dem Inhaltsverzeichnis mit Angabe der entsprechenden Seitenzahlen auf Seite 4.

(GB) These Operating Instructions accompany this product. They contain important information on setting up and using the device. You should refer to these instructions, even if you are buying this product for someone else.

Please retain these Operating Instructions for future use! A list of the contents can be found in the Table of contents, with the corresponding page number, on page 45.

(F) Le présent mode d'emploi fait partie intégrante du produit. Il comporte des directives importantes pour la mise en service et la manipulation de l'appareil. Tenir compte de ces remarques, même en cas de transfert du produit à un tiers.

Conserver ce mode d'emploi afin de pouvoir le consulter à tout moment. La table des matières avec indication des pages correspondantes se trouve à la page 86.

(NL) Deze gebruiksaanwijzing hoort bij dit product. Zij bevat belangrijke informatie over de inbedrijfstelling en het gebruik. Let hierop, ook wanneer u dit product aan derden overhandigt.

Bewaar daarom deze gebruiksaanwijzing om in voorkomende gevallen te kunnen raadplegen. In de inhoudsopgave op pagina 127 vindt u een lijst met inhoudspunten met vermelding van het bijbehorende.

TABLE OF CONTENTS

Page

1. INTRODUCTION

Dear Customer,

In purchasing this Voltcraft® product, you have made a very good decision for which we would like to thank you.

Voltcraft® - In the field of measuring, charging and network technology, this name stands for high-quality products which perform superbly and which are created by experts whose concern is continuous innovation.

From the ambitious hobby electronics enthusiast to the professional user, products from the Voltcraft® brand family provide the optimum solution even for the most demanding tasks. And the remarkable feature is: we offer you the mature technology and reliable quality of our Voltcraft® products at an almost unbeatable price-performance ratio. In this way, we aim to establish a long, fruitful and successful co-operation with our customers.

We wish you a great deal of enjoyment with your new Voltcraft® product!

If there are any technical questions, please contact:

International:	www.conrad.com/contact
United Kingdom:	www.conrad-electronic.co.uk/contact

2. INTENDED USE

- Measuring and displaying electric parameters in the range of overvoltage category CAT IV up to max. 600 V or CAT III up to max. 1000 V against ground potential, pursuant to EN 61010-1 and all lower categories.
- Measurement of direct and alternating voltage up to max. 1000 V
- Measurement of direct and alternating currents up to max. 10 A
- Frequency measuring up to 60 MHz
- Measurement of capacities up to 60 mF
- Measurement of resistances up to 60 MΩ
- Continuity test (<10 Ω acoustic)
- Diode test
- Measurement of temperature from -40 to +1000 °C
- Display of duty cycle in % (10 – 90 %)
- 1 kHz low pass filter alternating voltage measurement
- Comparison value measurement
- Data memory and data logger for 1000 values with time stamp
- Data transmission to a PC via optical interface
- Date and time display

The measuring functions are selected using the rotary switch. The measuring range selection is automatic for all measuring functions (except for diode and continuity test). Manual setting is possible at any time.

The VC890 displays true RMS in both the direct and alternating voltage and current range.

For negative values, the polarity will automatically be displayed with the sign (-).

The two current measuring inputs are secured against overload with ceramic high-performance fuses.

The voltage in the current measuring circuit may not exceed 1000 V in CAT III or 600 V in CAT IV.

A low impedance (Low Imp) function allows measurement with reduced internal resistance. This suppresses phantom voltages which could appear in high-resistance measurements. Measurement with reduced impedance is only permitted in measuring circuits up to max. 1000 V and only for max. 3 s. When the Low Imp button is pressed, a signal will sound and a warning indicator will be displayed.

The multimeter is powered by a standard 9 V alkaline or lithium monobloc battery. Operation is only permitted with the specified battery type. An automatic power off prevents the battery from draining prematurely if the device is not used for a period of time (settings: 5 min., 15 min., 30 min. or OFF; see Chapter “19. Auto Power Off function”). The Auto Power Off function is switched off during data transmission to a PC via optical interface.

Do not operate the multimeter when it is open, when the battery compartment is open, or the battery compartment lid is missing. The safety mechanism prevents the opening of the battery and fuse lid when test leads are plugged into the measurement sockets. It also prevents test leads from being plugged in when the battery and fuse lid is open.

Measurements in damp rooms or under unfavourable environmental conditions are not permitted. Unfavourable environmental conditions are: dampness or high humidity, dust and flammable gases, vapours or solvents, as well as thunderstorms or similar conditions such as strong electrostatic fields, etc.

Use only test leads or measurement accessories which meet the specifications of the multimeter.

For safety and approval purposes (CE), you must not rebuild and/or modify this product. If you use the product for purposes other than those described above, the product may be damaged. In addition, improper use can cause hazards such as short circuiting, fire, electric shock etc. Read the instructions carefully and keep them. Make this product available to third parties only together with its operating instructions.

Observe all safety notes and information given in these instructions.

3. OPERATING ELEMENTS

See the fold-out page.

1 Rubber protective frame

2 Display

3 SHIFT/SETUP button
Switch the measuring function (red symbol on the rotary switch) / switch function of the buttons (blue button labels)

4 Rotary switch for measurement function selection

5 mAµA measurement socket

6 10 A measurement socket

7 °CHzVΩ measurement socket (for “plus” of the same size)

8 COM measurement socket (reference potential, “minus”)

9 ⚠-button
Low Imp. 400 kΩ button for impedance switching

10 **Function buttons**:

a H/LIGHT (+/COMP) button:
"H" = hold function to freeze the measurement display
"LIGHT" = set the display brightness
"+" = increase the value
"COMP" = comparison mode

b MAX/MIN (View/►) button:
"MAX/MIN" = for recording and displaying the max. and min. values
"View" = view the stored values
"► " = navigation in the SETUP menu

c REL/PC (Log/◄) button:
"REL" = reference value measurement
"PC" = data transmission to a PC via optical interface
"Log" = save measurements
"◄" = navigation in the SETUP menu

d RANGE (-) button:
"RANGE" = manual value range selection
"-" = reduce value

11 Optically insulated interface

12 Stand connection thread

13 Folding positioning bracket

14 Battery compartment

15 Screw for battery and fuse compartment

16 Fuse compartment

4. SYMBOL EXPLANATION

An exclamation mark in a triangle shows important notes in these operating instructions that must be strictly observed.

The triangle containing a lightning symbol warns against danger of electric shock or impairment of the electrical safety of the device.

→ The “arrow” symbol indicates that special advice and notes on operation are provided.

CE This device is CE-compliant and meets the necessary European directives.

Protection class 2 insulation (double or reinforced insulation)

CAT II Overvoltage category II for measurements on electric and electronic devices connected to the mains supply with a mains plug. This category also covers all lower categories (e.g. CAT I for measuring signal and control voltages).

CAT III Overvoltage category III for measuring in building installation (e.g. outlets or sub-distribution). This category also covers all lower categories (e.g. CAT II for measuring electronic devices).

CAT IV Overvoltage category IV for measuring at the source of the low-voltage installation (e.g. main distribution, house-transfer points of energy providers, etc.) This category also contains all lower categories.

Earth potential

5. SAFETY INSTRUCTIONS

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

a) Persons / Product

- The device is not a toy. Keep it out of the reach of children and pets.
- Do not leave packaging material lying around carelessly. These may become dangerous playing material for children.
- Protect the product from extreme temperatures, direct sunlight, strong jolts, high humidity, moisture, flammable gases, vapours and solvents.
- Do not place the product under any mechanical stress.
- If it is no longer possible to operate the product safely, take it out of operation and protect it from any accidental use. Safe operation can no longer be guaranteed if the product:
  - is visibly damaged,
  - is no longer working properly,
  - has been stored for extended periods in poor ambient conditions or
  - has been subjected to any serious transport-related stresses.
- Please handle the product carefully. Jolts, impacts or a fall even from a low height can damage the product.
- Also observe the safety and operating instructions of any other devices which are connected to the product.
- For safety and approval reasons (CE), unauthorised conversion and/or modification of the device is not permitted.
- Consult an expert when in doubt as to the operation, the safety or the connection of the device.
- On industrial sites, the accident prevention regulations of the association of the industrial workers' societies for electrical equipment and utilities must be followed.
- In schools, training centres, hobby and self-help workshops, handling of meters must be supervised by trained personnel in a responsible manner.

- Before measuring voltages, always make sure that the meter is not set to a measuring range for current.
- The voltage between the connection points of the meter and the earth potential must not exceed 1,000 V DC/AC in CAT IV III or 600 V in CAT IV.
- The measuring prods have to be removed from the measured object every time the measuring range is changed.
- Be especially careful when dealing with voltages higher than 25 V alternating (AC) or 35 V direct voltage (DC)! Even at these voltages it is possible to receive a fatal electric shock if you touch electrical conductors.
- Check the meter and its measuring lines for damage before each measurement.
- Never carry out any measurements if the protecting insulation is defective (torn, ripped off etc.).
- To avoid electric shock, make sure not to touch the connections/measuring points to be measured directly or indirectly during measurement.
- During measuring, do not grip beyond the grip range markings (which you can feel) present on the test prods.
- Do not use the multimeter just before, during or just after a thunderstorm (lightning!/ high-energy overvoltage!). Make sure that your hands, shoes, clothing, the floor, circuits and circuit components are dry.
- Avoid operating the product near:
  - strong magnetic or electromagnetic fields
  - transmitter aerials or HF generators.

  This could affect the measurement.
- Do not switch the meter on immediately after it was taken from a cold to a warm environment. The condensation that forms might destroy your device.
- Allow the device to reach room temperature before switching it on.
- Also observe the safety information in each chapter of these instructions.

b) (Rechargeable) batteries

- Correct polarity must be observed while inserting the (rechargeable) batteries.
- (Rechargeable) batteries should be removed from the device if it is not used for a long period of time to avoid damage through leaking. Leaking or damaged (rechargeable) batteries might cause acid burns when in contact with skin, therefore use suitable protective gloves to handle corrupted (rechargeable) batteries.
- (Rechargeable) batteries must be kept out of reach of children. Do not leave (rechargeable) batteries lying around, as there is risk, that children or pets swallow them.
- (Rechargeable) batteries must not be dismantled, short-circuited or thrown into fire. Never recharge non-rechargeable batteries. There is a risk of explosion.

c) Miscellaneous

- Consult an expert when in doubt about operation, safety or connection of the device.
- Maintenance, modifications and repairs are to be performed exclusively by an expert or at a qualified shop.

If you are not sure about the correct connection or use, or if questions arise which are not covered by these operating instructions, please do not hesitate to contact our technical support or another qualified specialist.

6. PRODUCT DESCRIPTION

The measurements are indicated on a digital display on the multimeter (hereinafter called DMM). The DMM measured value display comprises 60000 counts (count = smallest display value).

When the device is not operated for a specified time (settings: 5 min., 15 min., 30 min.), it will switch off automatically. This conserves the battery and allows a longer operating time. The Auto Power Off function is switched off during data transmission to a PC via optical interface.

The measuring device can be used for do-it-yourself or for professional applications up to CAT IV.

The DMM can be ideally positioned with the positioning bracket on the back for improved readability.

The battery and fuse compartment can only be opened when all test leads are removed from the measuring device. The test leads cannot be plugged into the measuring sockets when the battery and fuse compartment is open. This increases user safety.

In the voltage and current measuring range, there is an audio warning with display indicators when test leads are incorrectly connected. Connect the test leads correctly before measuring.

Rotary switch (4)

The individual measuring functions are selected via a rotary switch. The automatic range selection “AUTO” is active in some measuring functions. The appropriate range of measurement is set for each application individually. Always begin current measurements with the largest measuring range (10 A) and switch to a smaller measuring range as needed.

When the switch is in the “OFF” position, the multimeter is turned off. Always turn the measuring device off when it is not in use. Figure 1 shows the layout of the measuring functions.

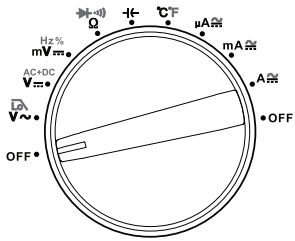

Fig. 1

7. DELIVERY CONTENT

- Multimeter with rubber protective frame
- 9 V alkaline monobloc battery
- 1 set of test leads
- 1 set of alligator clips
- Wire temperature sensor
- USB interface adaptor
- “VOLTSOFT” analysis software
- Operating instructions

8. DISPLAY INDICATIONS AND SYMBOLS

The symbols and indications vary depending on the model. This is a list of all possible symbols and indications in the VC890 series.

Δ	Delta symbol for relative measurement (= reference measurement)
AUTO	Stands for “automatic measuring range selection”
TrueRMS	True RMS measurement
H	Data hold function
COMP	Comparison mode
> <	Limiting value specification, measurement must remain between two specified values
< >	Limiting value specification, measurement must remain outside of two specified values
NG	Stands for “comparison test not passed”
PASS	Stands for “comparison test passed”
VIEW	View saved data
OL	Overload = the measuring range has been exceeded
OFF	Switch position “OFF”
▭	Symbol for battery replacement (battery charge low)
⊳|	Symbol for the diode test
)))	Symbol for the acoustic continuity tester
~ AC	Alternating voltage or current
MAX	Maximum measurement
MIN	Minimum measurement
AVG	Average measurement
APO	Automatic power off activated
CLR	Data memory will be deleted
LOG **H:**	Manual data memory
LOG **A:**	Automatic data memory
PC	Symbol for data transfer (active interface)
SHIFT	Function switch activated (blue button labelling)
VOID	Data memory contains no values
⎓ DC	Direct voltage or current
mV	Millivolt (=0.001 V)

V	Volt (unit of electrical voltage)
A	Ampere (unit of electrical current strength)
mA	Milliampere (=0.001 A)
µA	Microampere (=0.000001 A)
Hz	Hertz (unit of frequency)
kHz	Kilo Hertz
MHz	Mega Hertz
VA	Voltampere (unit of apparent electrical power)
%	Percentage display for duty cycle measurement
ºC	Degrees Celsius
ºF	Degrees Fahrenheit
Ω	Ohm (unit of electrical resistance)
kΩ	Kilo Ohm (=1000 Ω)
MΩ	Mega Ohm (=1000000 Ω)
nF	Nanofarad (unit of electrical capacitance = 0.000000001 F)
µF	Microfarad (=0.000001 F)
mF	Millifarad (=0.001 F)
⊣⊢	Symbol for the capacitance measurement range
ϟ	Warning symbol for voltages >30 V/AC and >42 V/DC
0 1 2 3 4 5 6	Bargraph display (only for V, A, Ω)
LoΩ	Low pass filter for alternating voltage
LoZ	Low imp function

9. BATTERY

Before you can work with the measuring device, you must first insert the enclosed battery.

a) Inserting and replacing the battery

A 9 V alkaline or lithium monobloc battery is needed to operate the measuring device. When using for the first time or when the battery status symbol ▭ (flat) appears in the display, you must insert a new, full (rechargeable) battery of the same type. Also note the safety guidelines for (rechargeable) batteries (page 53).

Proceed as follows to insert/replace:

1. Disconnect the connected test leads from the measuring circuit and from your measuring device. Switch off the DMM.
2. Open the housing as described in Chapter “23. Maintenance and cleaning” (page 76).
3. Replace the used battery with a new one of the same type. Insert the new battery in the battery compartment (14) with the correct polarity. Pay attention to the polarity directions in the battery compartment.
4. Carefully close the housing again.

b) Setting the battery type

1. Set the battery type used in the SETUP menu. This allows the device to display the battery level correctly.
2. With the measuring device switched on, hold down the SHIFT/SETUP button (3) for approx. 2 s. SHIFT will appear on the display. You are now in SHIFT mode.
3. Hold down the SHIFT/SETUP button again for approx. 2 sec to open the SETUP menu.
4. Now press the SHIFT/SETUP button several times until the menu item “BATTERY TYPE” is selected. An asterisk symbol * to the left of the menu item shows that the menu item is selected.
5. Press the REL/PC (Log/◄) or MAX/MIN (View/►) buttons to select “LI-AKKU” (lithium monobloc battery) or “ALKALINE” (alkaline monobloc battery).
6. Hold down the SHIFT/SETUP button for approx. 2 sec to save the setting and exit the SETUP menu. You will also exit SHIFT mode.

→ For a suitable alkaline battery, see the following part number: Item no. 652509

For a suitable lithium battery, see the following part number: Item no. 251292

10. SETTING THE TIME AND DATE

1. Set the time and date in the SETUP menu.
2. With the measuring device switched on, hold down the SHIFT/SETUP button (3) for approx. 2 s. SHIFT will appear on the display. You are now in SHIFT mode.
3. Hold down the SHIFT/SETUP button again for approx. 2 sec to open the SETUP menu.
4. The menu item “SET TIME” is selected. If not, press the SHIFT/SETUP button several times to select the menu item “SET TIME”. An asterisk symbol * to the left of the menu item “SET TIME” shows that the menu item is selected.

5. Using the REL/PC (Log/◄) and MAX/MIN (View/►) buttons, you can now select the hours, minutes, and seconds. Set the values with the H/LIGHT (+/COMP) or RANGE (-) buttons.
6. Once the settings are correct, press the SHIFT/SETUP button to set the date (menu item “SET DATE”). Here you also use the REL/PC (Log/◄) and MAX/MIN (View/►) buttons to select the individual items (day, month, year) and change their values with the H/LIGHT (+/COMP) or RANGE (-) buttons.
7. Hold down the SHIFT/SETUP button for approx. 2 sec to save the settings and exit the SETUP menu. You will also exit SHIFT mode.

If the date and time are no longer correctly displayed, the button cell battery must be replaced. The button cell battery has a lifetime of approx. 3 to 5 years. It supplies power for the date and time, in the event that the DMM battery is empty, or the battery is removed from the device if it is not used for a longer period of time. Replacing the button cell battery is described in Chapter “23. Maintenance and cleaning” (page 78).

11. MEASURING

Do not exceed the maximum permitted input values.

Do not touch any contacts or contact parts if these carry higher voltages than 25 V ACrms or 35 V DC! This may result in life-threatening danger!

Before starting a measurement, check the connected test leads for damage such as cuts, cracks, or pinching. Do not use defective test leads! This may result in life-threatening danger!

Never touch anything beyond the grip area marking on the test prods while measuring.

Measuring is only possible when the battery and fuse compartment is closed. If the compartment is open, all measuring sockets are mechanically secured against insertion.

Only two of the test leads which are needed for measuring may be attached to the device at one time. For reasons of safety, remove all test leads which are not needed from the device.

Measurements in circuits >50 V/AC and >75 V/DC are to be performed only by specialists and trained persons who are familiar with the relative regulations and the ensuing risks.

→ If “OL” (for overload) appears on the display, you have exceeded the measuring range.

a) Turning on the multimeter

The multimeter is turned on and off with the rotary switch (4). Turn the rotary switch to the appropriate measuring function. To turn it off, move the rotary switch to the “OFF” position. Always turn the measuring device off when it is not in use.

b) Voltage measurement “V”

Proceed as follows to measure direct voltage “DC” (V ⎓):

1. Turn on the DMM and select the measuring range “V ⎓ ”. For small voltages up to a max. 600 mV select “mV ⎓ ”.
2. Insert the red test lead into the °CHzVΩ measuring socket (7), the black test lead into the COM measuring socket (8) (Fig. 2).
3. Connect the two test prods with the object to be measured (battery, circuit, etc.). The red test prod corresponds to the positive pole, the black test prod to the negative pole.
4. The display indicates the polarity of the measured value together with the currently measured value.

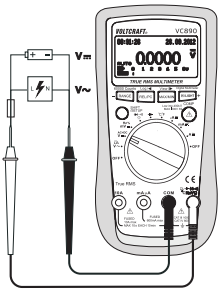

Fig. 2

➔ If a minus sign “-” appears in front of the measured value, the measured voltage is negative (or the test leads are reversed). The voltage range “V DC/AC” has an input resistance of >10 MΩ.

5. After the measurement has been completed, remove the test leads from the object being measured and turn the DMM off.

Proceed as follows to measure alternating voltage “AC” (V ~):

1. Turn on the DMM and select the measuring range “V ~ ”. The display will show “$\tilde{V}$”.

➔ If required you can select the “AC+DC” measuring function. Turn on the DMM and select the measuring range “V ⎓ “. Press the SHIFT/SETUP button (3) to switch to the “AC+DC” measuring function. The display will show “$\tilde{\tilde{V}}$”.

2. Insert the red test lead into the °CHzVΩ measuring socket (7), the black test lead into the COM measuring socket (8).
3. Connect the two test prods with the object to be measured (generator, circuit, etc.).
4. The measured value will be displayed.
5. After the measurement has been completed, remove the test leads from the object being measured and turn the DMM off.

c) Current measurement “A”

Never exceed the maximum allowable input values. Do not touch circuits or parts of circuits if there could be voltages higher than 25 VACrms or 35 VDC in them! This could pose a life-threatening danger!

The maximum permissible voltage in the current measuring circuit must not exceed 1000 V in CAT III. Measurements >5 A may only be carried out for a maximum of 10 seconds and only in 10 minute intervals.

➔ Always start the current measurement with the largest measuring range and switch to a smaller measuring range if necessary. Always unplug the circuit before changing the measuring range. All current measuring ranges are fused and thus protected against overload.

Proceed as follows to measure direct current (A ⎓):

1. Turn on the DMM and select the measuring range “A ⎓ ”, “mA ⎓ ” or “µA ⎓ ”.
2. The various measuring functions and the possible measuring ranges can be seen in the table. Select the measuring range and the associated measuring socket.

Measuring function	Measuring range	Measuring sockets
µA	0.01 µA - 6000 µA	COM + mAµA
mA	0.001 mA - 600 mA	COM + mAµA
10A	0.001 A - 10 A	COM + 10A

3. Insert the red test lead in the mAµA or 10A measuring socket (5, 6). Insert the black test lead in the COM measuring socket (8) (Fig. 3).
4. Connect the two test prods in series with the object to be measured (battery, circuit, etc.); the polarity of the measured value will be displayed with the current measured value.

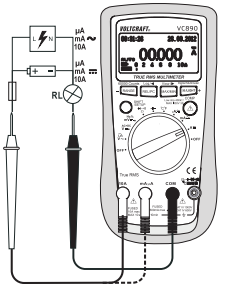

Fig. 3

➔ If a minus “-” appears in front of the measured value when measuring direct current, the current is flowing in the opposite direction (or the test leads are reversed).

5. After the measurement has been completed, remove the test leads from the object being measured and turn the DMM off.

Proceed as follows to measure alternating current (A ~).

1. Turn on the DMM and select the measuring range "A ⎓ ", "mA ⎓ " oder "µA ⎓ ".
2. Press the SHIFT/SETUP button (3) to switch to the AC measuring range. "$\widetilde{A}$", "m$\widetilde{A}$" or "µ$\widetilde{A}$" will appear in the display. Pressing the button again will switch back.
3. After the measurement has been completed, remove the test leads from the object being measured and turn the DMM off.

Never measure currents over 10 A in the 10 A range or currents over 600 mA in the mA/µA range, because this will trip the fuses.

d) Frequency measurement / duty cycle in %

The DMM can measure and display signal voltage frequencies from 10 Hz - 60 MHz.

Proceed as follows to measure frequencies:

1. Turn on the DMM and select the measuring range "mV ⎓ Hz %". Press the SHIFT/SETUP button (3) until "Hz" appears in the display.
2. Insert the red test lead in the °CHzVΩ measuring socket (7), the black test lead in the COM measuring socket (8) (Fig. 4).
3. Connect the two test prods with the object to be measured (signal generator, circuit, etc.).
4. The frequency will be displayed with the appropriate unit.
5. To measure the duty cycle, press the SHIFT/SETUP button again until "%" appears in the display.
6. After the measurement has been completed, remove the test leads from the object being measured and turn the DMM off.

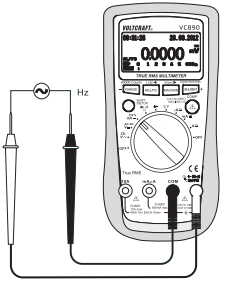

Fig. 4

e) Resistance measurement

Make sure that all circuit parts, switches and components, and other objects of measurement are disconnected from the voltage and discharged at all times.

Proceed as follows to measure resistance:

1. Turn on the DMM and select the measuring range "Ω".
2. Insert the red test lead in the °CHzVΩ measuring socket (7), the black test lead in the COM measuring socket (8) (Fig. 5).
3. Check the test leads for continuity by connecting the test prods with one another. After that the resistance value must be approximately 0 – 1.5 Ω (inherent resistance of the test leads).
4. For low-resistance measurements, press the REL/PC (Log/◄) button (10c) to prevent the inherent resistance of the test leads from being included in the subsequent resistance measurement. The delta symbol Δ appears on the display and 0 Ω is indicated. The automatic range selection (AUTO) is deactivated. The base value (Rel difference) is displayed next to the delta symbol Δ.

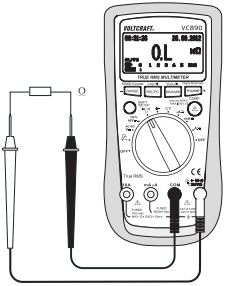

Fig. 5

5. Now connect the two test prods with the object to be measured. As long as the object to be measured is not high-resistive or interrupted, the measured value will be indicated on the display. Wait until the display has stabilised. This can take a few seconds for resistances >1 MΩ.
6. If "OL" (for overload) appears on the display, your measurement is above the measuring range or the measurement circuit is broken. Pressing the REL/PC (Log/◄) button again turns off the relative function and activates the autorange function.
7. After the measurement has been completed, remove the test leads from the object being measured and turn the DMM off.

→ When you carry out a resistance measurement, make sure that the measuring points which you contact with the measuring prods are free from dirt, oil, soldering varnish or similar. An incorrect measurement may result under such circumstances.

f) Diode test

Make sure that all circuit parts, switches and components, and other objects of measurement are disconnected from the voltage and discharged at all times.

1. Turn on the DMM and select the measuring range “Ω”. Press the SHIFT/SETUP button (3) until the diode test symbol appears in the display.
2. Insert the red test lead in the °CHzVΩ measuring socket (7), the black test lead in the COM measuring socket (8) (Fig. 6).
3. Check the test leads for continuity by connecting the test prods with one another. After that the value must be approx. 0.0000 V.
4. Connect the two test prods with the object to be measured (diode).
5. The display shows the continuity voltage “UF” in Volts (V). If “OL” is indicated, the diode is measured in reverse direction (UR) or the diode is faulty (interruption). Perform a measurement with the poles reversed as a control.

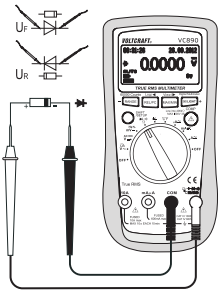

Fig. 6

6. After the measurement has been completed, remove the test leads from the object being measured and turn the DMM off.

g) Continuity test

Make sure that all circuit parts, switches and components, and other objects of measurement are disconnected from the voltage and discharged at all times.

1. Turn on the DMM and select the measuring range “Ω”. Press the SHIFT/SETUP button (3) until the continuity test symbol appears.
2. Insert the red test lead in the °CHzVΩ measuring socket (7), the black test lead in the COM measuring socket (8) (Fig. 7).
3. A measuring value of <10 Ω is identified as continuity and a beep will sound.
4. If “OL.” (for overload) is indicated on the display, you have exceeded the measuring range or the measuring circuit has been interrupted.
5. After the measurement has been completed, remove the test leads from the object being measured and turn the DMM off.

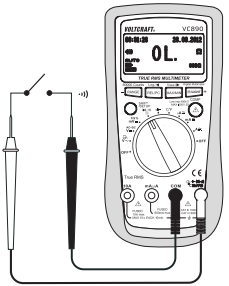

Fig. 7

h) Measuring capacitance

Make sure that all circuit parts, switches and components, and other objects of measurement are disconnected from the voltage and discharged at all times.

Always observe the polarity for electrolytic capacitors.

1. Turn on the DMM and select the measurement range "⊣⊢".
2. Insert the red test lead in the °CHzVΩ measuring socket (7), the black test lead in the COM measuring socket (8) (Fig. 8).
3. The unit "nF" will appear on the display.

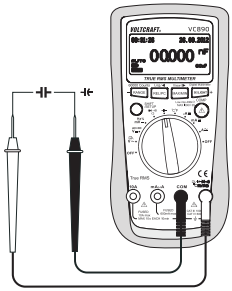

Fig. 8

➔ Due to the sensitivity of the measuring input, it is possible that a value is displayed when the test leads are "open". Pressing the REL/PC (Log/◄) button (10c) will set the display to "0". The base value (Rel difference) is displayed next to the delta symbol Δ. The autorange function is deactivated.

4. Now connect the two test prods (red = plus pole/black = minus pole) with the object to be measured (capacitor). After a short while the display shows the capacitance. Wait until the display has stabilised. For capacitances >400 µF this may take a few seconds.
5. If "OL" (for overload) appears on the display, you have exceeded the measuring range.
6. After the measurement has been completed, remove the test leads from the object being measured and turn the DMM off.

i) Measuring temperature

During the temperature measurement, expose only the temperature sensor to the temperature to be measured. The operating temperature of the measuring device must not be above or below the permissible range, because this can result in measuring errors.

The contact temperature probe may only be used on voltage-free surfaces.

All K-type thermosensors can be used to measure temperature. The temperature is displayed in °C and °F. The temperature probe included in delivery is designed for measurements between -40 to +400 °C. Optional sensors can be used for the complete measuring range (-40 to +1000 °C).

For measuring temperatures, proceed as follows:

1. Turn on the DMM and select the measurement range "°C".
2. Press the SHIFT/SETUP button (3) to switch to a display in °F.
3. Insert the thermosensor with the correct polarity with the plus pole in the °CHzVΩ measuring socket (7) and the minus pole in the COM measuring socket (8) (Fig. 9).
4. The temperature appears in the main display in °C or °F, depending on the pressing of the SHIFT/SETUP button.
5. If "OL." appears in the display, the measuring range (-40 to +1000 °C) has been exceeded.
6. After the measurement has been completed, remove the sensor and turn the DMM off.

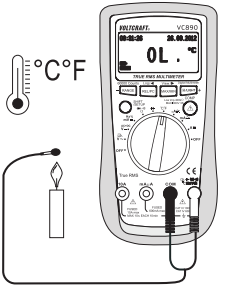

Fig. 9

→ When the measuring input (sockets: °CHzVΩ – COM) is bridged, the device temperature of the DMM is displayed. The temperature adjustment to the environment is very slow due to the sealed housing.

j) AC voltage measurement with 1 kHz low-pass filter Lo

Never use the low-pass filter option to test for the presence of dangerous voltages! The voltages present could be higher than indicated under some circumstances. Always measure voltage without the filter first to identify any dangerous voltages.

The DMM is equipped with an alternating current low-pass filter. This is an alternating current measurement which is led through a low-pass filter in order to block unwanted voltages above 1 kHz.

Proceed as follows for AC voltage measurement with the low-pass filter:

1. Turn on the DMM and select the measurement range " V ~ ". Press the SHIFT/SETUP button (3) to switch to the measurement range "Lo".
2. Insert the red test lead in the °CHzVΩ measuring socket (7), the black test lead in the COM measuring socket (8) (Fig. 10).
3. Connect the two test prods with the object to be measured (generator, circuit, etc.). The measuring value is indicated on the display.
4. After the measurement has been completed, remove the test leads and turn the DMM off.

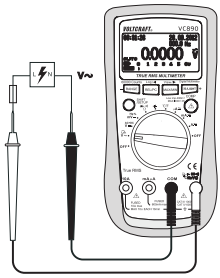

Fig. 10

12. RANGE FUNCTION, MANUAL MEASURING RANGE SELECTION

The RANGE function allows the manual selection of the measuring range in some functions with automatic measuring range selection (AUTO). At the threshold areas, it is advisable to fix the measuring range in order to prevent unwanted switching.

Press the RANGE (-) button (10d) to switch to the manual measuring range selection. The indication "AUTO" will go out in the display (if the manual measuring range selection is selected).

Set the desired measuring range by pressing the RANGE (-) button repeatedly.

To switch back to the automatic measuring range selection, hold down the RANGE (-) button for 2 s. "AUTO" will again appear in the display (provided the autorange function is possible in this measuring range).

13. REL FUNCTION

The REL function allows a reference measurement to be made to avoid possible line losses such as those occurring during resistance measurements. The currently displayed value is set to zero. A new reference value has been set. The base value (Rel difference) is displayed next to the delta symbol Δ.

This measuring function is activated by pressing the REL/PC (Log/◄) button (10c). Δ appears in the display. The automatic measuring range function is deactivated.

To switch off this function, press the REL/PC (Log/◄) button again or change the measuring function.

The REL function is not active in the measuring ranges temperature, continuity test, diode test, frequency, and in the low-pass filter voltage measurement.

14. HOLD FUNCTION

The HOLD function freezes the currently displayed measured value so that it can be read out or logged.

When checking live conductors, ensure that this function is deactivated at the start of the test. Otherwise, a false reading will result!

To turn on the hold function, press the H/LIGHT (+/COMP) button (10a); an acoustic signal confirms this action and H appears on the display.

To turn off the HOLD function, press the H/LIGHT (+/COMP) button again or change the measuring function.

15. MAX. / MIN. / AVG. FUNCTION

The MAX/MIN function allows the recording and display of the maximum and minimum values during a measurement. After activation of the MAX/MIN function, the maximum or minimum value will be retained, as required. The current measurement can still be seen in the upper area of the display (below the date).

The MAX function is switched on by pressing the MAX/MIN (View/►) button (10b). The maximum value will be continuously retained in the main display. The symbol MAX appears in the display.

Pressing the button again switches to the MIN function. The minimum value will be continuously retained in the main display. This value is identified by the symbol MIN.

Pressing the button again switches to the AVG function. The average value will be continuously retained in the main display. This value is identified by the symbol AVG.

To turn off this function, press the MAX/MIN (View/►) button for approx. 2 s.

The MAX/MIN function is not available in all measuring functions.

16. LOW IMP. 400 KΩ FUNCTION

This function may only be used for voltages of a max. of 1000 V and a max. of 3 seconds!

This function allows the reduction of the measuring impedance from 10 MΩ to 400 kΩ in the voltage measuring range. Reducing the measuring impedance suppresses possible phantom voltages which could falsify the measuring result.

Press the ⚠-button (9) during the voltage measurement (max. 1000 V!) for a max. 3 seconds. After release, the multimeter has the normal measuring impedance of 10 MΩ. While the button is pressed, a signal sounds and LoZ appears on the display.

17. COMPARISON MODE (COMP MODE)

In the comparative measurement, once an upper and lower limit of the current measured parameter is set, the main display will show only the actual status of the current measured value compared to the preset range limit.

Proceed as follows to set the limit values for comparison mode:

1. Turn on the DMM and select the appropriate measurement range.
2. Insert the test leads into the correct measuring sockets.
3. Hold down the SHIFT/SETUP button (3) for approx. 2 s. SHIFT will appear on the display. You are now in SHIFT mode.
4. Hold down the SHIFT/SETUP button again for approx. 2 s to enter the SETUP menu.
5. To set the upper limit for the comparison mode, press the SHIFT/SETUP button until the menu item “COMP MAX” is selected. An asterisk symbol * to the left of the menu item shows that the menu item is selected.
6. You can now select the individual number of digits using the REL/PC (Log/◄) and MAX/MIN (View/►) buttons and change their values with the H/LIGHT (+/COMP) or RANGE (-) button.

7. Once the setting has been made, press the SHIFT/SETUP button again to set the lower limit for the comparison mode (menu item “COMP MIN”). Here, too, you can now select the individual decimal places using the REL/PC (Log/◄) and MAX/MIN (View/►) buttons and change their values with the H/LIGHT (+/COMP) or RANGE (-) button.

➔ The limit settings do not have any units. The actual value of the limit results from the range set in the measurement.

Example:

You have set the lower limit as “00900” and the upper limit as “01000” in the SETUP menu. In a comparison measurement in the “mV ⎓ ” measuring range, the values will be displayed as follows: “009.00 mV” (lower limit); “010.00 mV” (upper limit)

8. Now press the SHIFT/SETUP button to set the measurement status (menu item “COMP TYPE”).
9. Press the REL/PC (Log/◄) or MAX/MIN (View/►) buttons to select “OUTER” or “INNER”. When “OUTER” is selected, the measured value is identified as passed (PASS) if it is outside the upper and lower limits; when “INNER” is selected, the measured value is identified as passed (PASS) if it is within the upper and lower limits.
10. Hold down the SHIFT/SETUP button (3) for approx. 2 sec to save the settings and exit the SETUP menu. You will also exit SHIFT mode.

Performing a comparison measurement:

1. Select the measuring range.
2. Hold down the SHIFT/SETUP button (3) for approx. 2 s. SHIFT will appear on the display. You are now in SHIFT mode.
3. Now press the H/LIGHT (+/COMP) button (10a). The symbol COMP and the preset limits will appear on the display.

The automatic measuring range selection is deactivated. Before beginning the measurement, make sure that you have set the correct measuring range. You can select this using the RANGE (-) button.

4. Connect the two test prods with the object to be measured.
5. The measured value is displayed with the appropriate units.
6. Depending on the previous setting the display will indicate if the currently measured value is within or outside of the preset limits with the symbols PASS (pass) and NG (did not pass).
7. Press the H/LIGHT (+/COMP) button (10a) again to end the comparison mode.

18. RECORDING AND MANAGING MEASURED VALUES

With its data logging function, the VC890 digital multimeter makes it possible to record up to 1000 measured values.

Proceed as follows to manually save measured values:

1. With the measuring device switched on, hold down the SHIFT/SETUP button (3) for approx. 2 s. SHIFT will appear on the display. You are now in SHIFT mode.
2. Now press the REL/PC (Log/◀) button (10c) to save the currently measured value. LOG **H:** will appear on the display and below that the first memory number "0001".
3. To record another value, press the REL/PC (Log/◀) button again. The second memory number "0002" is displayed.
4. To exit SHIFT mode, press the SHIFT/SETUP button.

→ If you have not stored any values for approx. 3 seconds, the symbol LOG **H:** and the memory number will go out. Press the REL/PC (Log/◀) button again to save more values. LOG **H:** and the memory number will appear on the display.

Saving measured values automatically:

1. First select the desired recording rate in the SETUP menu. The default setting of the device records one measured value per second.
2. With the measuring device switched on, hold down the SHIFT/SETUP button (3) for approx. 2 s. SHIFT will appear on the display. You are now in SHIFT mode.
3. Hold down the SHIFT/SETUP button again for approx. 2 sec to open the SETUP menu.
4. Now press the SHIFT/SETUP button several times until the menu item "LOGGER SAMPLING RATE" is selected. An asterisk symbol * to the left of the menu item shows that the menu item is selected.
5. Press the H/LIGHT (+/COMP) or RANGE (-) button to set the recording rate (setting range: 1 to 10 seconds).
6. Hold down the SHIFT/SETUP button (3) for approx. 2 sec to save the setting and exit the SETUP menu. You will also exit SHIFT mode.
7. To record measured values, you must switch to the SHIFT mode. With the measuring device switched on, hold down the SHIFT/SETUP button (3) for approx. 2 sec until SHIFT appears on the display.
8. Hold down the REL/PC (Log/◀) button for approx. 2 sec to start the automatic recording. LOG **A:** will appear on the display with the memory number below it. The device will now save the measured values at the recording rate you have set.
9. To stop recording, hold down the REL/PC (Log/◀) button again for approx. 2 s.

10. To continue recording, hold down the REL/PC (Log/◄) button again for approx. 2 s.
11. To exit the SHIFT mode, press the SHIFT/SETUP button.

Settings for the data memory:

1. Make the settings for the data memory in the SETUP menu.
2. With the measuring device switched on, hold down the SHIFT/SETUP button (3) for approx. 2 s. SHIFT will appear on the display. You are now in SHIFT mode.
3. Hold down the SHIFT/SETUP button again for approx. 2 sec to open the SETUP menu.
4. Now press the SHIFT/SETUP button several times until the menu item “LOGGER MEMORY” is selected. An asterisk symbol * to the left of the menu item shows that the menu item is selected.
5. Press the REL/PC (Log/◄) or MAX/MIN (View/►) button to select “FIX” or “OVERWRITE”.
6. The setting “FIX” means that the measured values will be stored until the memory is full (max. 1000 measured values). The measurement will be stopped at the memory number “1000”.
7. The setting “OVERWRITE” means that the measured values will be continually stored. If the measured value “1000” is reached, the device will begin to overwrite the measured values. The memory number will no longer be displayed. Instead, a blinking infinity symbol “∞” will appear.
8. The menu item “LOGGER MEMORY” is preset to “FIX” by default.
9. Hold down the SHIFT/SETUP button for approx. 2 sec to save the setting and exit the SETUP menu. You will also exit SHIFT mode.

Display setting for automatic measured value recording:

1. In the automatic measurement, it is possible to activate the energy saving mode.
2. Make these settings in the SETUP menu.
3. With the measuring device switched on, hold down the SHIFT/SETUP button (3) for approx. 2 s. SHIFT will appear on the display. You are now in SHIFT mode.
4. Hold down the SHIFT/SETUP button again for approx. 2 sec to open the SETUP menu.
5. Now press the SHIFT/SETUP button several times until the menu item “LOGGER DATA DISPLAY” is selected. An asterisk symbol * to the left of the menu item shows that the menu item is selected.
6. Press the REL/PC (Log/◄) or MAX/MIN (View/►) button to select “ON” or “OFF”.
7. The “ON” setting means that the display will always be switched on during the automatic continuous measurement.

8. The “OFF” setting turns the display off if the device is not operated for 5 minutes. Only the symbol LOG **A:** and the memory number are displayed. If the device is continually saving measured values (“OVERWRITE” setting) and “1000” measured values are exceeded, a blinking infinity symbol “∞” is displayed below LOG **A:**.
9. By default, the device is set to “OFF”.
10. Hold down the SHIFT/SETUP button for approx. 2 sec to save the setting and exit the SETUP menu. You will also exit SHIFT mode.

➔ When the display is switched off in energy saving mode, turn the rotary switch or press any button (apart from the ⚠-button (9)) to turn it back on.

Viewing saved measured values:

1. With the measuring device switched on, hold down the SHIFT/SETUP button (3) for approx. 2 s. SHIFT will appear on the display. You are now in SHIFT mode.
2. Now press the MAX/MIN (View/►) button (10b) to switch to the display mode. VIEW will appear on the display with the first memory number “0001” below it. The saved measured value is shown in the centre of the display.
3. Press the H/LIGHT (+/COMP) or RANGE (-) buttons to show the individual records.
4. Press the MAX/MIN (View/►) button again to exit the display mode.
5. Press the SHIFT/SETUP button to exit the SHIFT mode.

➔ The stored measured values of a comparison measurement are shown in the display with the symbols COMP and PASS.

If “VOID” appears in the display, that means that the measured value memory is empty.

Deleting saved measured values:

1. With the measuring device switched on, hold down the SHIFT/SETUP button (3) for approx. 2 s. SHIFT will appear on the display. You are now in SHIFT mode.
2. Hold down the MAX/MIN (View/►) button (10b) for approx. 2 s. The indication CLR and “VOID” will briefly appear on the display. All measured values are deleted.
3. Press the SHIFT/SETUP button to exit the SHIFT mode.

19. AUTO POWER OFF FUNCTION

1. The DMM will switch off automatically after a specified time if no button is pressed or the rotary switch is not turned. This function protects and conserves the battery and extends the operating time.
2. You can set a switch-off time in the SETUP menu. The default setting on the device is 5 minutes.
3. With the measuring device switched on, hold down the SHIFT/SETUP button (3) for approx. 2 s. SHIFT will appear on the display. You are now in SHIFT mode.
4. Hold down the SHIFT/SETUP button again for approx. 2 sec to open the SETUP menu.
5. Now press the SHIFT/SETUP button several times until the menu item “APO TIME” is selected. An asterisk symbol * to the left of the menu item shows that the menu item is selected.
6. Press the REL/PC (Log/◄) and MAX/MIN (View/►) buttons to set the switch-off time. The choices are 5 MIN, 15 MIN, 30 MIN, or OFF. The “OFF” setting means that the auto power off function is deactivated.
7. Hold down the SHIFT/SETUP button for approx. 2 sec to save the setting and exit the SETUP menu. You will also exit SHIFT mode.
8. If you have set a switch-off time, the symbol APO will appear on the display.

→ To switch the DMM back on after an automatic switch-off turn the rotary switch or press any button (apart from the ⚠-button (9)).

The auto power off function is deactivated when data is transmitted to a PC so as not to interrupt the data connection. The auto power off function is inactive until the data transmission to a PC (via optical interface) is switched off again.

The auto power off function is also deactivated during automatic recording of measured values.

20. OPTICAL INTERFACE

An optically insulated interface (11) is integrated into the back of the measuring device for transferring the measurement data to a computer where they can be further processed.

The data connection can be made with a free USB interface on your computer using the supplied USB interface adaptor (the software “Voltsoft” must already be installed on the computer).

Push the interface cover up from the housing. Insert the wedge-shaped adaptor from above into and flush with the housing slot on the measuring device.

Then insert the type A USB plug on the other end of the interface cable into a free USB port on the computer.

The interface is switched off during normal operation. To activate it, hold down the REL/PC (Log/◄) button (10c) for 2 sec with the device switched on. The activation is indicated by the interface symbol PC. To deactivate it, hold down the REL/PC (Log/◄) button for approx. 2 sec or turn off the DMM.

21. SOFTWARE INSTALLATION

1. Insert the CD into the CD-ROM of your computer.
2. The installation will start automatically. If not, please go to your CD-ROM directory, and open the installation file “autorun.exe”.
3. Select your desired language from German, English and French.
4. Follow the instructions on the dialog box, select the destination for the installation and complete the installation.
5. For further information, please refer to the operating instructions on the CD provided.
6. The enclosed software is the Voltsoft standard edition. The professional version (Voltsoft PRO, No. 10 13 33) is an optional item which you can purchase separately. If you purchase the professional version, you will get the license key. Follow the steps in the Voltsoft user manual, to register and upgrade your software to the professional version.
7. Voltsoft software updates to the latest version of the Voltsoft program are available when the program is running and the Internet is connected; or check for the latest Voltsoft update via “http://www.conrad.com”

22. DISPLAY BRIGHTNESS

1. The brightness of the display can be set in steps. Hold down the H/LIGHT (+/COMP) button (10a) for approx. 2 sec to switch between the three brightness steps.
2. You can activate or deactivate the energy saving mode for the display in the SETUP menu. The energy saving mode is active on the device by default.
3. If the energy saving mode is switched on, the display brightness will be automatically reduced during inactivity. If the device is not operated for 15 seconds, the display brightness will switch from the highest brightness level to the middle level. After another 15 seconds of inactivity the display will switch from the middle level to the lowest level.
4. With the measuring device switched on, hold down the SHIFT/SETUP button (3) for approx. 2 s. SHIFT will appear on the display. You are now in SHIFT mode.
5. Hold down the SHIFT/SETUP button again for approx. 2 sec to open the SETUP menu.

6. Now press the SHIFT/SETUP button several times until the menu item “AUTO BRIGHTNESS” is selected. An asterisk symbol * to the left of the menu item shows that the menu item is selected.
7. Press the REL/PC (Log/◄) or MAX/MIN (View/►) button to select “ON” or “OFF”.
8. The “ON” setting means that the energy saving mode is activated. The brightness of the display will be automatically reduced during inactivity.
9. The “OFF” setting switches off the energy saving mode.
10. Hold down the SHIFT/SETUP button for approx. 2 sec to save the setting and exit the SETUP menu. You will also exit SHIFT mode.

23. MAINTENANCE AND CLEANING

a) General

Calibrate the multimeter annually to guarantee the accuracy of the multimeter over a longer period of time.

The measuring device is absolutely maintenance-free except for occasional cleaning and the replacement of fuses.

You can find the fuse and battery replacement instructions below.

Regularly check the technical safety of the device and the test leads, for example damage to the housing, pinching of the test leads, etc.

b) Cleaning

Always observe the following safety instructions before cleaning the device:

Live components may be exposed when covers are opened or components are removed, except if this can be done by hand.

The connected lines must be disconnected from the measuring device and all measuring objects prior to cleaning or repairing the device. Turn off the DMM.

Do not use cleaning agents which contain carbon, petrol, alcohol or similar substances for cleaning purposes. These could corrode the surface of the measuring device. Furthermore, the fumes are hazardous to your health and explosive. You should also not use sharp-edged tools, screwdrivers, or metal brushes or similar for cleaning.

Use a clean, lint-free, antistatic and slightly damp cloth to clean the device and display. Allow the device to dry completely before using it for the next measuring task.

c) Opening the measuring device

For reasons of safety, it is only possible to replace the fuse and battery when all test leads have been removed from the measuring device. The battery and fuse compartment cannot be opened when test leads are plugged in.

In addition, when the housing is opened all measuring sockets are mechanically locked in order to prevent the later insertion of the test leads. The locking will be automatically removed when the battery and fuse compartment is again closed.

The housing is designed so that when the battery and fuse compartment is open only the battery and fuses can be accessed. The housing does not have to be opened completely or taken apart any longer. These measures increase the user safety and user-friendliness.

Proceed as follows to open:

1. Remove all test leads from the measuring device and switch it off.
2. Loosen and remove the battery compartment screw (15) on the back.
3. Fold out the positioning bracket (13). Pull the battery and fuse compartment lid downwards from the measuring device (Fig. 11).
4. The fuses and battery compartment are now accessible.
5. Close the housing in the reverse order and screw closed the battery and fuse compartment.
6. The measuring device is again ready for use.

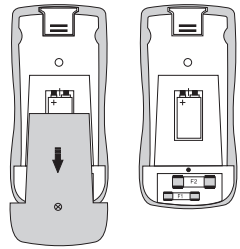

Fig. 11

d) Fuse check/fuse replacement

The current measuring ranges are protected with high breaking capacity fuses. If no measurement is possible in this range, the fuse must be replaced.

The measuring device allows the testing of fuses with the housing closed.

Proceed as follows to test:

1. On the rotary switch, select the measuring range “Ω”.
2. Insert a test lead in the °CHzVΩ socket (7).
3. Contact the current measuring socket to be tested with the test prod (Fig. 12).
4. If a measured value is displayed, the fuse is okay. However, if the display reads “OL”, the corresponding fuse is defective and must be replaced.

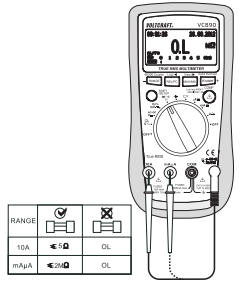

Fig. 12

Proceed as follows to replace the fuse:

1. Remove the attached test leads from the measuring circuit and from your measuring device. Turn off the DMM.
2. Open the housing as described in Section “c) Opening the measuring device” (page 76).
3. Replace the defective fuse with a new one of the same type and current rating or similar. The fuses have the following values:

Fuse	**F1**	**F2**
Nominal data	F600mA H 1000V	F10A H 1000V
Breaking capacity		30 kA
Dimension (ø x L)	6.35 x 31.8 mm	10.3 x 38 mm
Item no.	44 24 03	44 23 35

4. Close the housing again carefully.

For reasons of safety, the use of repaired fuses or the bridging of the fuse holder is not permitted. This can lead to fire or electric arc explosion. Do not use the measuring device in this state under any circumstances.

e) Replacing the button cell battery

If the date and time are no longer correctly displayed, the button cell battery must be replaced.

Proceed as follows to replace the button cell battery:

1. Remove the attached test leads from the measuring circuit and from your measuring device. Turn off the DMM.
2. Open the battery and fuse compartment as described in Section “c) Opening the measuring device” (page 76).
3. Then loosen the four screws on the back of the device and carefully remove the housing.
4. Carefully push the button cell battery out of the battery holder from below. Lift the battery holder slightly upwards while doing so.
5. Replace the used button cell battery with a new one of the same type (CR2032). Insert a new button cell battery into the battery compartment. Make sure that the plus pole points upwards.
6. Close the housing in the reverse order and screw closed the battery and fuse compartment.

➔ You can order a suitable button cell battery using the following part number:
Item no. 650183

24. DISPOSAL

a) Product

Electronic devices are recyclable waste and must not be disposed of in the household waste.

At the end of its service life, dispose of the product according to the relevant statutory regulations.

Remove any inserted (rechargeable) batteries and dispose of them separately from the product.

b) Batteries / Rechargeable batteries

You as the end user are required by law (Battery Ordinance) to return all used batteries/rechargeable batteries. Disposing of them in the household waste is prohibited.

Contaminated (rechargeable) batteries are labelled with this symbol to indicate that disposal in the domestic waste is forbidden. The designations for the heavy metals involved are: Cd = Cadmium, Hg = Mercury, Pb = Lead (name on (rechargeable) batteries, e.g. below the trash icon on the left).

Used (rechargeable) batteries can be returned to collection points in your municipality, our stores or wherever (rechargeable) batteries are sold.

You thus fulfil your statutory obligations and contribute to the protection of the environment.

25. TROUBLESHOOTING

The DMM you have purchased is equipped with state-of-the-art technology and is safe to operate.

Nevertheless, problems and faults might occur.

We would therefore like to explain some of the ways you can simply eliminate possible faults:

Always observe the safety instructions!

Error	Possible cause	Possible solution
The multimeter does not work.	Is the battery flat?	Check the condition. Replace the battery.
The measuring value does not change.	Is the wrong measuring function active (AC/DC)?	Check the display (AC/DC) and change the function if necessary.
	Are the test leads firmly inserted into the measuring sockets?	Check the seating of the test leads.
	Is the fuse defective?	Check the fuses.
	Is the hold function activated? (display **H**)	Press the H/LIGHT (+/COMP) button to deactivate this function.
The measuring device beeps and one of the following warning messages is displayed: ⚠ ERROR ON V INPUT ⚠ ERROR ON A INPUT ⚠ ERROR ON mA INPUT	Incorrectly attached or improper test leads.	Connect the test leads properly to the measuring device, exchange them, or change the measuring function.

Repairs other than those just described should only be performed by an authorised specialist.

26. TECHNICAL DATA

Display.....Max. 60000 counts (characters)

Measuring rate.....approx. 2 – 3 measurements/second, bargraph approx. 10 measurements/second

Measuring line length .....approx. 90 cm each

Measuring impedance .....>10 MΩ (V range)

Operating voltage .....9 V block battery

Working conditions .....0 to +30 ºC (<75 % RH), +30 to +40 ºC (<50 % RH)

Operating altitude .....max. 2000 m

Storage temperature.....-10 to +50 ºC

Weight .....approx. 380 g

Dimensions (L x W x H).....185 x 91 x 43 mm

Over-voltage category .....CAT III 1000 V, CAT IV 600 V, contamination degree 2

Measurement tolerances

Statement of accuracy in ± (% of reading + display error in counts (= number of smallest points)). The accuracy is valid for one year at a temperature of +23 °C (± 5 °C), and at a relative humidity of less than 75 %, non-condensing. Temperature coefficient: +0.1 x (specified accuracy)/1 °C

Direct voltage

Range	Accuracy	Resolution
600 mV	±(0,03 % + 10 digits)	0.01 mV
6 V	±(0,05 % + 10 digits)	0.0001 V
60 V		0.001 V
600 V		0.01 V
1000 V		0.1 V
Overload protection: 1000 V; Impedance: 10 MΩ		

Alternating voltage

Range	Resolution	Accuracy	Frequency range
6 V	0.0001 V	±(0.5 % + 40 digits)	45 Hz – 1 kHz
		±(1.2 % + 40 digits)	1 kHz - 10 kHz
		±(3 % + 40 digits)	10 kHz - 20 kHz
		±(4 % + 40 digits)	20 kHz - 100 kHz
60 V	0.001 V	±(0.5 % + 40 digits)	45 Hz - 1kHz
		±(1.2 % + 40 digits)	1 kHz - 10 kHz
		±(3 % + 40 digits)	10 kHz - 20 kHz
		±(6 % + 40 digits)	20 kHz - 100 kHz
600 V	0.01 V	±(0.5 % + 40 digits)	45 Hz - 1kHz
		±(1.2 % + 40 digits)	1 kHz - 10 kHz
		±(3 % + 40 digits)	10 kHz - 20 kHz
		Not specified	20 kHz - 100 kHz
1000 V	0.1 V	±(1.2 % + 40 digits)	45 Hz - 1kHz
		±(3 % + 40 digits)	1 kHz - 5 kHz
		±(6 % + 40 digits)	5 kHz - 10 kHz
		Not specified	10 kHz - 100 kHz
Overload protection: 1000 V; Impedance: approx. 10 MΩ TrueRMS in the measuring range of 10 – 100 %; Crest factor: max. 3.0 (at 1000 V max. 1.5)			

Measuring function AC + DC voltage

Range	Resolution	Accuracy	Frequency range
6 V	0.0001 V	±(1 % + 80 digits)	45 Hz - 1 kHz
		±(3 % + 40 digits)	1 kHz - 10 kHz
		±(6 % + 40 digits)	10 kHz - 35 kHz
60 V	0.001 V	±(1 % + 80 digits)	45 Hz - 1 kHz
		±(3% + 40 digits)	1 kHz - 10 kHz
		±(6 % + 40 digits)	10 kHz - 35 kHz
600 V	0.01 V	±(1 % + 80 digits)	45 Hz - 1 kHz
		Not specified	1 kHz - 10 kHz
		Not specified	10 kHz - 35 kHz
1000 V	0.1 V	±(1.2 % + 80 digits)	45 Hz - 1 kHz
		Not specified	1 kHz - 10 kHz
		Not specified	10 kHz - 35 kHz
Overload protection: 1000 V; Impedance: 10 MΩ			

Direct current

Range	Accuracy	Resolution
600 µA	±(0.3 % + 10 digits)	0.01 µA
6000 µA	±(0.5 % + 10 digits)	0.1 µA
60 mA		0.001 mA
600mA		0.01 mA
10 A	±(1.5 % + 20 digits)	0.001 A
Overload protection: Fuses; measuring time limit >5 A: max. 10 s with 10 min break		

Alternating current

Range	Resolution	Accuracy	Frequency range
600 µA	0.01 µA	±(0.6 % + 40 digits)	45 Hz - 1 kHz
		±(1.2 % + 40 digits)	1 kHz - 10 kHz
6000 µA	0.1 µA	±(0.6 % + 40 digits)	45 Hz - 1 kHz
		±(1.2 % + 40 digits)	1 kHz - 10 kHz
60 mA	0.001 mA	±(0.6 % + 40 digits)	45 Hz - 1 kHz
		±(1.2 % + 40 digits)	1 kHz - 10 kHz
600 mA	0.01 mA	±(0.6 % + 40 digits)	45 Hz - 1 kHz
		±(1.2 % + 40 digits)	1 kHz - 10 kHz
10 A	0.001 A	±(2 % + 40 digits)	45 Hz - 1 kHz
		±(4 % + 40 digits)	1 kHz - 10 kHz
Overload protection: Fuses; measuring time limit >5 A: max. 10 s with 10 min break; Overload protection: 1000 V; TrueRMS in the measuring range of 10 – 100 %			

Impedance

Range	Accuracy	Resolution
600 Ω	±(1.0 % + 10 digits) with REL function	0.01 Ω
6 kΩ	±(0.6 % + 10 digits)	0.0001 kΩ
60 kΩ		0.001 kΩ
600 kΩ		0.01 kΩ
6 MΩ	±(1.2 % + 10 digits)	0.0001 MΩ
60 MΩ	±(2 % + 5 digits)	0.001 MΩ
Overload protection: 1000 V		

Capacity

Range	Accuracy	Resolution
60 nF	±(2.5 % + 20 digits)	0.001 nF
600 nF	±(2.0 % + 20 digits)	0.01 nF
6 µF		0.0001 µF
60 µF		0.001 µF
600 µF		0.01 µF
6000 µF	±(5 % + 20 digits)	0.1 µF
60 mF	Not specified	0.001 mF
Overload protection: 1000 V		

Frequency

Range	Accuracy	Resolution
60 Hz	±(0.02 % + 8 digits)	0.001 Hz
600 Hz		0.01 Hz
6 kHz		0.0001 kHz
60 kHz		0.001 kHz
600 kHz		0.01 kHz
6 MHz		0.0001 MHz
60 MHz		0.001 MHz
Overload protection: 1000 V; For 10 Hz – 60 MHz, input amplitude a: 1 Vrms ≤ a ≤ 30 Vrms		

Duty-Cycle (pulse-break ratio)

Range	Accuracy	Resolution
10 Hz – 2 kHz (10 % – 90 %)	±(1.2 % + 30 digits)	0.01 %
Overload protection: 1000 V		

Temperature

Range	Accuracy	Resolution
-40 to +40 ºC	±(3 % + 20 digits)	0.1 ºC
+40 to +400 ºC	±(2 % + 20 digits)	
+400 to +1000 ºC	± 2.5 %	
-40 to +32 ºF	±(2.5 % + 40 digits)	0.2 ºF
+32 to +752 ºF	±(1.5 % + 40 digits)	
+752 to +1832 ºF	± 2.5 %	
Overload protection: 1000 V		

Diode test

Test voltage	Resolution
3.1 V	0.0001 V
Overload protection: 1000 V	

Acoustic continuity tester

Resolution: 0.01 Ω

Overload protection: 1000 V, <10 Ω continuous sound

Low-pass filter test

Range	Resolution	Remark
6 V	0.0001 V	Filter AC voltage signal higher than 1 kHz.
60 V	0.001 V	
600 V	0.01 V	
1000 V	0.1 V	