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# Model UT90D: OPERATING MANUAL

# **GB** Introduction

## Dear customer,

thank you for making the excellent decision to purchase this UNI-T product. You have acquired an above-average quality product from a brand family which has distinguished itself in the field of measuring, charging and network technology by particular competence and permanent innovation. The products of the UNI-T family offer optimum solutions even for the most demanding applications for ambitious hobby electricians as well as for professional users. UNI-T offers you reliable technology at an extraordinarily favourable cost-performance ratio.

Therefore, we are absolutely sure: Your decision for a UNI-T product is the beginning of a long and successful cooperation. And now enjoy your new UNI-T product!

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## Model UT90D: OPERATING MANUAL

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### Intended Use

- Measuring and displaying electric parameters in the range of excess voltage category III (up to max. 600V against ground potential, pursuant to EN 61010-1) and all lower categories.
- Measuring direct current up to max. 1000 V (CAT II)
- Measuring alternating current up to max. 750 V (CAT II) - Measurement of direct and alternating current up to 10 A
- Frequency measuring up to 10 MHz
- Capacity measuring up to 100 µF
- Measurement of resistance values of up to 40MOhm
- Continuity check (< 70 Ohm acoustic) - Diode test
- The two current measuring inputs are secured against overload. The voltage in the measuring circuit may not exceed 250 V. The 10 A measuring range is equipped with a fine fuse, the 400 mA measuring range with a self-resetting PTC fuse
- The device may only be operated with the specified batteries.
- The measuring instrument must not be operated when it is open, i.e. with an open battery compartment or when the battery compartment cover is missing. Measuring in damp rooms or under unfavourable ambient conditions is not admissible
- For safety reasons, when measuring only use measuring cables or accessories which are adjusted to the specifications of the multimeter. Unfavourable ambient conditions are:

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## Safety instructions



contain important information on the correct operation. The guarantee is rendered invalid when damage is incurred as a result of non-compliance with the operating instructions! We do not assume any liability for any damage arising as a consequence! We will also not assume any responsibility for damage to assets or for personal injury caused by improper handling or failure to observe the safety instructions! The warranty is voided in these cases.

Please read the entire operating instructions before using the product for the first time; they

### This device left the manufacture's factory in a safe and perfect condition. We kindly request the user to observe the safety instructions and warnings contained in this operating manual to preserve this condition and to ensure safe operation!



A triangle containing an exclamation mark indicates important information in these operating instructions which is to be observed without fail.



The triangle containing a lightning symbol warns of danger of an electric shock or of the impairment of

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The "hand" symbol indicates special information and advice on operation of the device.

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- CE This product has been CE-tested and meets the necessary European guidelines.
- 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 power plug. This category also covers all smaller 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 smaller categories (e.g. CAT II for measuring electronic devices).
- ÷ Ground potential
- The unauthorised conversion and/or modification of the unit is inadmissible because of safety and approval reasons (CE).

Consult an expert when in doubt about the operation, the safety or the connection of the device.

Measuring instruments and accessories are not toys and have no place in the hands of children. On industrial sites the accident prevention regulations of the association of the industrial workers' society for electrical equipment and utilities must be followed.

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- In schools, training centres, computer and self-help workshops, handling of measuring instruments must be supervised by trained personnel in a responsible manner. Before measuring voltages, always make sure that the measuring instrument is not set to a measuring range for cur-
- rents. The voltage between the connection points of the measuring device and the ground potential must not exceed 600 V
- DC/AC in overvoltage category III or 1000 V DC/AC in overvoltage category II. The test 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 25V AC or 35 V DC. Even at such voltages you can receive a life-threatening electric shock when you come into contact with electric wires.
- Check the measuring device 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 an electric shock, make sure not to touch the connections/measuring points to be measured neither directly
- nor indirectly during measurement. During measuring, do not grip beyond the tangible grip range markings present on the test prods.
- Do not use the multimeter just before, during or just after an electrical storm (electrical shock / high-energy overvoltages!). Please make sure that your hands, your shoes, your clothing, the floor, switches and switching components are dry.

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- Avoid an operation near: - strong magnetic or electromagnetic fields - transmitting aerials or HF generators.
- since this could affect the measurement

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- thunderstorms or similar conditions such as strong electrostatic fields etc. Any use other than the one described above damages the product. Moreover, this involves dangers such as e.g. short circuit, fire, electric shock, etc. No part of the product must be modified or rebuilt!

# **Operating elements**

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- Dust and flammable gases, vapours or solvents

The safety instructions must be followed unconditionally!

- Wetness or high air humidity

- 1 Detachable rubber holster
- 2 LC display with connection information
- 3 REL button for relative measuring function
- 4 Rotary switch
- 5 mAµAHz measuring socket (with self-resetting fuse) 6 10 A measuring socket (with fine-wire fuse)
- 7 VΩ capacity measuring socket (with commensurability "+")
- 8 COM measuring socket (reference potential)
- 9 SELECT button for function switching
- 10 Low imp. 400 k $\Omega$  button for short-time reduction of the measuring impedance from 10 MOhm to 400 kOhm

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- - - Please observe the following symbols:



the electrical safety of the device.

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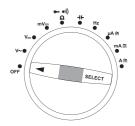
- If you have a reason to believe that the device can no longer be operated safely, disconnect it immediately and secure it against being operated unintentionally. It can be assumed that safe operation is no longer possible if:
- the device exhibits visible damage, - the device does not operate any longer and
- the device was stored under unfavourable conditions for a long period of time or - the device was exposed to extraordinary stress in transit.
- Do not switch the measuring instrument on immediately after it has been taken from a cold to a warm environment.
- Condensation water that forms might destroy your device. Leave the device switched off and wait until it has reached room temperature.
- Do not leave the packaging material lying around carelessly since such materials can become dangerous toys in the hands of children.
- You should also heed the safety instructions in each chapter of these instructions.

# **Product Description**

- The multimeter (referred to as DMM in the following) indicates measured values on the digital display. The measuring value display of the DMM comprises 4000 counts (count = smallest display value).
- The measuring device can be used for do-it-yourself or for professional applications.
- For better readability, the DMM can also be mounted with the clip on the rear.
- The mA current section shows an absolute novelty. With this measuring device, it is no longer necessary to replace an accidentally triggered mA fuse. The installed PTC fuse resets automatically after tripping. 9

### Rotary switch (4)

The individual measuring functions are selected using a rotary switch for which "auto range", the automatic range selection, is active. The appropriate range of measurement is set for each application individually. With the button "SELECT" (9), you switch to a sub-function if the measuring function is double assigned (e.g. switching resistance measuring - diode test and continuity test or AC/DC switching in the current range). If the rotary switch is set to "OFF", the measuring device is switched off. Always turn the measuring device off when it is not in use.



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Prior to working with the measuring device, you first have to insert the enclosed batteries. Insert the battery as described in the chapter "Cleaning and Maintenance". A 9V block battery is required for voltage supply. These are supplied with the device.

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Do not exceed the maximum permitted input values. Do not contact circuits or parts of circuits if there could be voltages higher than 25 V ACrms or 35 V DC present within them. Mor-

Before measuring, check the connected measuring lines for damage such as, for example, cuts, cracks or squeezing. Defective measuring cables must no longer be used. Mortal danger! During measuring, do not grip beyond the tangible grip range markings present on the test

You may only connect the two measuring leads to the measuring device that are required for measuring operation. Remove all measuring leads not required from the device for safety

The display shows the corresponding connection sequence of the measuring sockets for each mea-

suring function. Observe this when connecting the measuring leads to the measuring device. As soon as "OL" (overload) appears on the display, you have exceeded the measuring range.

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## Contents

Multimeter with removable rubber holster 9V block battery Safety measuring cable Operating instructions

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prods.

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Measuring

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## **Display indications and symbols**

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$\Delta$	Delta symbol for relative value measuring (= reference value measuring)
Auto range	stands for "automatic measuring range selection"
Connect terminal	Graphic notice to select the required measuring sockets
OL	Overload, the measuring range was exceeded
	Battery replacement symbol; please replace the batteries immediately to avoid measuring errors!
-▶ -	Symbol for the diode test
•)))	Symbol for the acoustic continuity tester
AC AC	Alternating size for voltage and current
DC	Direct magnitude for voltage and current
mV	millivolt (exp3)
V	Volt (unit of electric potential)
A	ampere (unit of electric current)
mA	Milliampere (exp3)
μΑ	Microampere (exp6)
Hz	Hertz (unit of frequency)
kHz	Kilohertz (exp.3)
MHz	Megahertz (exp.6)
Ω	Ohm (unit of electric resistance)
kΩ	Kiloohm (exp.3)
MΩ	Megaohm (exp.6)
nF	Nanofarad (unit of electric capacity, exp9, symbol ++)

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Microfarad (exp.-6)

### a) Voltage measuring "V"

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- Proceed as follows to measure DC voltages "DC" (V === ): - Turn the DMM on at the rotary switch and select measuring range "V === ". For lower voltages up to max. 400 mV, select the measuring range "mV
- Plug the red measuring lead into the V measuring socket and the black measuring lead into the COM measuring socket.
- Now connect the two test prods to the object to be measured (battery, circuit etc.).
- The red measuring tip indicates the positive pole, the black measuring tip the
- negative pole - The polarity of the respective measuring value is indicated on the together with the current measuring value.
- As soon as a minus "-" appears for direct voltage in front of the R measured value, the measured voltage is negative (or the
- measuring leads have been mixed up). The voltage range "V DC/AC" shows an input resistance of >10
- MOhm, the "mV DC" measuring range >4000 MOhm.
- After measuring, remove the measuring leads from the measuring object and turn the DMM off. Turn the rotary switch to "OFF"

### Proceed as follows to measure AC voltages (V ~):

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Proceed as follows to measure DC voltages:

"A" for max. 10 A. The display shows "DC".

Pressing this button again, takes you back etc.

measuring lead into the COM socket.

the currently measured value.

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to "OFF".

- Turn the DMM on at the rotary switch and select measuring range "V ~ ". - Plug the red measuring lead into the V measuring socket and the black measuring lead into the COM measuring socket
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- Now connect the two measuring prods to the object to be measured (generator, switching etc.).

- The measuring value is indicated on the display - After measuring, remove the measuring leads from the measuring object and turn the DMM off. Turn the rotary



Do not exceed the maximum permitted input values. Do not contact circuits or parts of circuits if there could be voltages higher than 25 V ACrms or 35 V DC present within them. Mortal danger! The voltage in the measuring circuit may not exceed 250 V.

Measuring in the 10 A range may only be performed for max. 10 seconds and at 15 minute intervals. Current measuring operations are possible in three ranges. The first range is from 0 to 4000µA, the second from 0 to 400mA and the third from 0 to 10 Å. All current measuring ranges are protected against overload.

If the mA fuse tripped (measured value does not change etc.), turn the DMM off (OFF) and wait R. about five minutes. The self-resetting fuse cools down and then functions again.

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The mA measuring input has a self-resetting PTC fuse; fuse changes are not required.

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### c) Frequency measurement

The DMM can be used to measure and indicate signal voltage frequencies up to 10 MHz.

- Proceed as follows to measure frequencies:
- Turn the DMM on at the rotary switch and select measuring range "Hz". The display reads "Hz".
- Plug the red measuring lead into the Hz measuring socket and the black measuring lead into the COM measuring socket. - Now connect the two test prods with the object to be measured (signal generator,
- circuit etc.). - The frequency and corresponding unit are displayed.
- After measuring, remove the measuring leads from the measuring object and turn the DMM off. Turn the rotary switch to "OFF".



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Do not measure any currents above 10 A in the 10A range and no currents above 400 mA in the mA/µA range, otherwise the fuses trigger.

- If you want to measure currents of up to max. 4000µA, set the rotary switch to position "µA" or to position "mA" respectively up to max. 400 mA or to position

- Plug the red measuring lead into the 10 A measuring socket (with currents > 400

mA) or into the mAµA measuring socket (with currents <400 mA). Plug the black

- Now connect the two test prods in series with the object to be measured (battery,

After measuring, remove the measuring leads from the measuring object and turn the DMM off. Turn the rotary switch to ",OFF".

the measuring tips have been mixed up).

Proceed as described above to measure alternating currents. Press "SELECT" (9) to switch to the AC range. "AC" appears on the display.

circuit etc.); the display indicates the polarity of the measured value together with

As soon as a minus "-" appears for the direct voltage measuring in

front of the measuring value, the measured voltage is negative (or

After measuring, remove the measuring leads from the measuring object and turn the DMM off. Turn the rotary switch

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switch to "OFF" b) Current measuring "A"



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# Model UT90D: OPERATING MANUAL d) Resistance measuring

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ing lead into the COM measuring socket.

- The display indicates the symbol "Continuity test" •))

beep sounds. A permanent beep sounds as of <10 Ohm.

suring range or the measuring circuit has been broken.

turn the DMM off. Turn the rotary switch to "OFF".

f) Continuity check

tance measuring) etc.

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

## Proceed as follows to measure the resistance:

- Turn the DMM on at the rotary switch and select measuring range " $\Omega^{\mu}$ . - Plug the red measuring lead into the  $\Omega$  measuring socket and the black measuring lead into the COM measuring socket. - Check the measuring leads for continuity by connecting both measuring prods to

one another. After that the resistance value must be approximately 0.5 Ohm (inherent resistance of the measuring leads). - Press the button "REL" (3) to not let the inherent resistance of the measuring

leads flow into the following resistance measuring. The display shows 0 Ohn - Now connect the measuring prods to 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. With resistances of >1 MOhm, this may take a few seconds.

- As soon as "OL" (overload) appears on the display, you have exceeded the measuring range or the measuring circuit has been broken.

- After measuring, remove the measuring leads from the measuring object and turn the DMM off. Turn the rotary switch to "OFF".

ment are disconnected from the voltage and discharged.

- Turn the DMM on at the rotary switch and select measuring range •)) - Plug the red measuring lead into the  $\Omega$  measuring socket and the black measur-

- To activate the acoustic continuity test function, press the button "SELECT" (9). Pressing this button again takes you back to the first measuring function (resis-

- A measuring value of less than 70 Ohm is identified as continuity; in this case a

- As soon as "OL" (overload) appears on the display, you have exceeded the mea-

- After measuring, remove the measuring leads from the measuring object and

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

Make sure that all the circuit parts, switches and components and other objects of measure-

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### e) Diode test

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

- Turn the DMM on at the rotary switch and select measuring range " + ". - Plug the red measuring lead into the  $\Omega$  measuring socket and the black measuring lead into the COM measuring socket. - To activate the function "Diode test", press the button "SELECT" (9). Pressing this button again takes you to the next measuring function (continuity check) etc.

- The display indicates the diode symbol → . - Check the measuring leads for continuity by connecting both measuring prods to one another. After that the value must be approximately 0 V. - Now connect the two measuring prods with the object to be measured (diode). - The display shows the continuity voltage in volt (V). If "OL" is indicated, the diode is measured in reverse direction or the diode is faulty (interruption). Perform a counter-pole measuring for control reasons.

- After measuring, remove the measuring leads from the measuring object and turn the DMM off. Turn the rotary switch to "OFF".



### g) Capacity measuring

Make sure that all the circuit parts, switches and components and other objects of measurement are disconnected from the voltage and discharged. With electrolyte capacitors, observe the polarity.

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- Turn the DMM on at the rotary switch and select measuring range -++

### - Plug the red measuring lead into the V measuring socket and the black measuring lead into the COM measuring socket.

- The display shows the unit "nF".

Due to the sensitive measuring input, the display may show a value B in case of "open" measuring leads. By pressing the button "RELA", the display is set to "0".

- Now connect the two test prods (red = positive pole/black = negative pole) with the object to be measured (condenser). After a short while the display shows the capacity. Wait until the display has stabilised. With capacities of >40 µF, this may

take a few seconds. - As soon as "OL" (overload) appears on the display, you have exceeded the measuring range.

- After measuring, remove the measuring leads from the measuring object and turn the DMM off. Turn the rotary switch to "OFF".

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To reactivate the DMM after automatic shutdown, use the rotary switch or press the "REL" or "SELECT" button. You can turn the auto power-off function manually.

To do so, turn the measuring device off (OFF). Keep the button "SELECT" depressed and turn the DMM on at the rotary switch. This function remains inactive until the measuring device is turned off via the rotary switch.

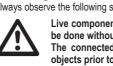
# Maintenance and cleaning

General information To ensure the accuracy of the multimeter over an extended period of time, it should be calibrated once a year. Apart from occasional cleaning and fuse replacements, the multimeter requires no servicing. Information on changing the battery and fuse appears below.



Regularly check the technical safety of the instrument and measuring lines, e.g. check for damage to the housing or squeezing etc.

Cleaning Always observe the following safety instructions before cleaning the device:



Live components may be exposed if covers are opened or parts are removed (unless this can be done without tools). The connected lines must be disconnected from the measuring device and all measuring objects prior to cleaning or repairing the device. Switch the DMM off.

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Using mended fuses or bridging the fuse holder is not admissible for safety reasons. Never operate the measurement device when it is open. !RISK OF FATAL INJURY!

Inserting/changing the batteries Operation of the measuring device requires a 9V battery (1604A). You need to insert a new, charged battery prior to

initial operation or when the battery change symbol 📇 appears on the display. To insert/replace the battery, proceed as follows:

- Separate the connected measuring leads from the measuring circuit and the measuring device. Switch the DMM off. - Slide the rubber holster off the device.

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- Unscrew the three screws on the back of the device and carefully pull the casing apart. - Connect a new battery with the battery clip in the DMM observing the right polarity.

- Now close the casing carefully.

Never operate the measuring instrument when it is open. !RISK OF FATAL INJURY!

rode and thus release chemicals which may be detrimental to your health or damage the appli-

The REL function allows a reference value measurement to avoid possible line losses which may caused e.g. during resistance measurements. For this purpose, the current indicated value is set to zero. A new reference value is set. Press the "REL $\Delta$ " button to activate this measuring function. The display shows " $\Delta$ ". The automatic measuring range

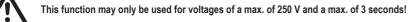
### Low Imp. 400 k $\Omega$ function

selection is deactivated now.

**REL**∆ function

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To turn this function off, keep the button <code>"RELΔ"</code> depressed until <code>"Δ"</code> goes off.



This measuring function enables the reduction of the measuring impedance from 10 MW to 400 kW. Through the reduction of the measuring impedance, possible phantom voltages are suppressed, which could falsify the measuring result. Press this button during voltage measurement (max. 250 V) for a max. of 3 seconds. After release, the multimeter has the normal measuring impedance of 10  $M\Omega$ .

### Auto power OFF function

The DMM turns off automatically after 30 minutes if no button or switch is operated. This function saves battery power and extends the service life.

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Do not use any carbon-containing cleaning agents or petrol, alcohol or the like to clean the product. These could corrode the surface of the measuring instrument. The fumes are furthermore a health hazard and are explosive. Moreover, you should not use sharp-edged tools, screwdrivers or metal brushes or similar for cleaning. For cleaning the device or the display and the measuring lines, use a clean, fuzz-free, antistatic slightly damp cloth.

### Changing the 10 A fuse

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- The 10 A measuring range is protected against overload with a standard fine-wire fuse. If measuring in this range is no longer possible, you have to change the fuse.
- Proceed as follows for replacement - Separate the connected measuring leads from the measuring circuit and the measuring device. Switch the DMM off.

- Slide the rubber holster off the device.

- Unscrew the three screws on the back of the device and carefully pull the casing apart. - Replace the defective fuse with a new fuse of the same type and nominal voltage. The fuse has the following values:

Fine-wire fuse, quick-action, 10A / 250 V (5 x 20 mm) Common name F10A250V. - Now close the casing carefully. Replace the rubber holster on the device.

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Disposal



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