HT6 Two Pole Voltage Meter with LED Indications User Manual

6 Two Pole Voltage Meter with LED Indications
User Manual

Contents

PRECAUTIONS AND SAFETY MEASURES

The instrument has been designed in compliance with directive IEC/EN61010-1 relevant to electronic measuring instruments. For your safety and in order to prevent damaging the instrument, please carefully follow the procedures described in this manual and read all notes preceded by the symbol  with the utmost attention. Before and after carrying out the measurements, carefully observe the following instructions:

- Do not carry out any voltage or current measurement in humid environments.
- Do not carry out any measurements in case gas, explosive materials or flammables are present, or in dusty environments.
- Avoid any contact with the circuit being measured if no measurements are being carried out.
- Avoid any contact with exposed metal parts, unused measuring probes, circuits, etc.
- Do not carry out any measurement in case you find anomalies in the instrument such as deformation, breaks, substance leaks, etc.

- Do not carry out any measurements in case of rain or bad weather.
- Do not carry out any measurement with an open battery compartment.
- Pay special attention when measuring voltages higher than 20V, since the risk of electrical shock exists  .

In this manual, and/or on the instrument, the following symbols are used:

 **Warning:** observe the instructions given in this manual; improper use could damage the instrument or its components.

 High voltage danger: electrical shock hazard.

 Double-insulated meter.

PRELIMINARY INSTRUCTIONS

This instrument has been designed for use in environments of pollution degree 2.

- It can be used for **VOLTAGE** measurements on installations with measurement category CAT IV 600V – CAT III 690V. For a definition of measurement categories, see
  § 1.4.
- We recommend following the normal safety rules devised by the procedures for carrying out operations on live systems and using the prescribed PPE to protect the user against dangerous currents and the instrument against incorrect use.
- Do not test circuits exceeding the specified voltage limits.
- Make sure the batteries are installed correctly.

DURING USE

Please carefully read the following recommendations and instructions:

 **WARNING**
Failure to comply with the caution notes and/or instructions may damage the instrument and/or its components or be a source of danger for the operator.

- When the instrument is connected to the circuit being tested, do not touch any unused terminal.
- Avoid measuring continuity if external voltages are present.

AFTER USE

- If the instrument is not to be used for a long time, remove the batteries.

DEFINITION OF MEASUREMENT (OVERVOLTAGE) CATEGORY

Standard CEI 61010: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1: General requirements, define what measurement category, commonly called overvoltage category, is. § 6.7.4: Measured circuits and circuits are divided into the following measurement categories:
(OMISSIONS)

- **Measurement category IV** is for measurements performed at the source of the low voltage installation. Examples are electricity meters and measurements on primary overcurrent protection devices and ripple control units.
- **Measurement category III** is for measurements performed on installations inside buildings. Examples are measurements on distribution boards, circuit breakers, wiring, including cables, bus bars, junction boxes, switches, socket-outlets in the fixed installation, and equipment for industrial use and some other equipment, for example, stationary motors with a permanent connection to fixed installation.
- **Measurement category II** is for measurements performed on circuits directly connected to the low-voltage installation. Examples are measurements on household appliances, portable tools, and similar equipment.
- **Measurement category I** is for measurements performed on circuits not directly connected to MAINS.

Examples are measurements on circuits not derived from MAINS and specially protected (internal) MAINS-derived circuits. In the latter case, transient stresses are variable; for that reason, the standard requires that the transient withstand capability of the equipment is made known to the user.

GENERAL DESCRIPTION

This manual refers to the following products: HT6, HT8, and HT9. The characteristics of the models are listed in the following table:
Tab. 1: Characteristics of the models

Function	HT6	HT8	HT9
Test lamps with internal gas			✓
AC/DC voltage and polarity measurement	✓	✓	✓
Phase sequence	✓	✓	✓
Continuity test/ Diode test	✓	✓	✓
Phase detection function with 1 terminal	✓	✓	✓
Torch function	✓	✓	✓
LCD display		✓	✓

The instrument can also be used to check reactors, starters, capacitors, and resistors, further to the following kinds of lamps:

- Fluorescent lamps
- Low-pressure sodium lamps
- High-pressure sodium lamps
- Neon tubes
- Mercury-vapour lamps and halogen lamps

PREPARATION FOR USE

INITIAL CHECKS

Before shipping, the instrument has been checked from an electric as well as mechanical point of view. All possible precautions have been taken so that the instrument is delivered undamaged.
However, we recommend generally checking the instrument in order to detect possible damage suffered during transport. In case anomalies are found, immediately contact the forwarding agent.
We also recommend checking that the packaging contains all components indicated in § 7.4. In case of discrepancy, please contact the Dealer.
In case the instrument should be returned, please follow the instructions given in § 8.2.

INSTRUMENT POWER SUPPLY

The instrument is supplied with two 1.5V AA IEC LR03 alkaline batteries, included in the package.
In order to prevent battery discharge, batteries have not been inserted into the instrument. For battery installation and replacement, follow the instructions given in § 6.2.

CALIBRATION

The instrument has the technical specifications described in this manual. The instrument's performance is guaranteed for 12 months.

STORAGE

In order to guarantee precise measurement, after a long storage time under extreme environmental conditions, wait for the instrument to come back to normal condition (see the environmental specifications contained in § 7.3.1 before use).

OPERATING INSTRUCTIONS

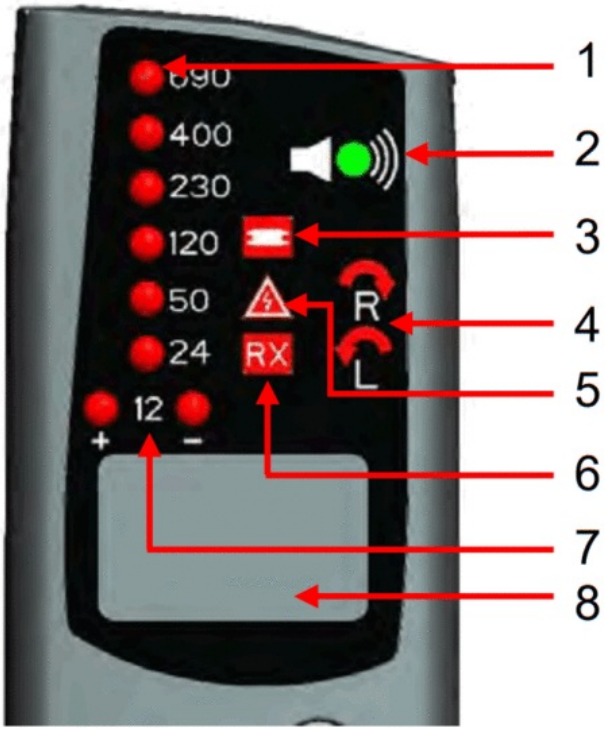
INSTRUMENT DESCRIPTION

Fig. : 1: Instrument description

CAPTION:

1. Protective cap
2. Fixed lead L2
3. Mobile lead L1
4. Torchlight
5. Leds and Display
6. Electrode for phase detection, phase rotation, continuity function
7. “Torch” button
8. “Lamp test” button (HT9) / ON/Reset button (HT6, HT8)
9. Banana connector

Fig. 2: Led and display description



CAPTION:

1. Voltage indication leds
2. Buzzer hole for acoustic signal
3. Indication led Lamp test
4. Indication led Phase sequence
5. Indication led Phase detection / Dangerous voltage
6. Indication led Continuity test
7. Indication led to 12V and positive or negative polarity
8. LCD display with voltage, polarity, and flat battery indication

AUTO POWER ON MODE / SWITCHING ON

The instruments switch on in the following cases:

- if continuity is detected;
- if an AC or DC voltage higher than 10V is detected;
- if a live phase is connected to lead L2;
- of the Torch button is pressed;
- if the ON/Reset button is pressed (on models HT6 and HT8);
- if the Lamp test button is pressed (on model HT9)

AUTO POWER OFF MODE

The following conditions are possible:

- the instruments automatically switch off if no signal is detected in contact with leads for 5 seconds;
- the torchlight turns off after 10 seconds after the torch button has been released;

- the lamp test is stopped and the instrument switches off after 5 seconds when the Lamp test button is released.

INSTRUMENT FUNCTIONS

VOLTAGE MEASUREMENT AND POLARITY INDICATION

WARNING

- The maximum input AC and DC voltage are 690V. Do not measure voltages exceeding the limits given in this manual. Exceeding these limits could result in electrical shocks to the user and damage to the instrument.
- The Dangerous voltage led (see Fig. 2 – no. 5) lights up and the buzzer sounds, in case of voltage between terminals >50V AC or >50V DC, even in case of low battery charge or when no batteries are installed (without batteries the buzzer does not sound).
- After a lamp test, it is necessary to wait 5 seconds before being able to perform a voltage measurement.

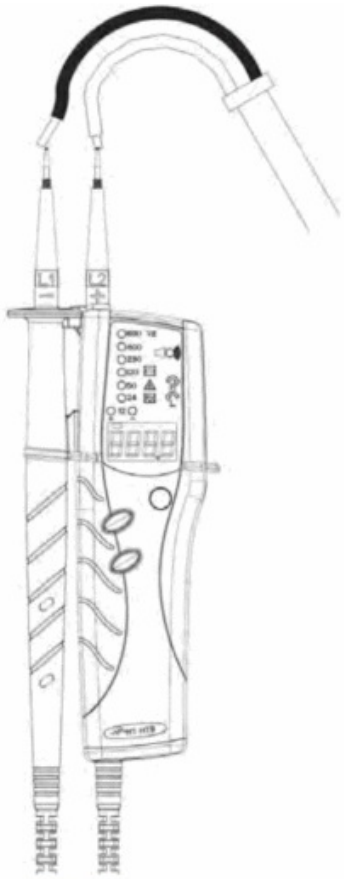


Fig. : 3: Voltage measurement

1. Connect the measuring leads L1 and L2 to the object to be tested. Measurement is only carried out by contact between the leads and the metal parts of the conductors.
2. The instrument automatically switches on and the measured voltage value is indicated when the leds turn on and, for models HT8 and HT9, also on the LCD display (see Fig. 2 – nos. 1 and 8).
3. While measuring, the instrument could also show leds R) or (L on. This is no indication of malfunction.

Polarity is indicated as follows (see Fig. 2 – no. 7):

- AC: leds + and – 12V are on;
- +DC: led +12V is on (lead L2 connected to positive pole);
- -DC: led -12V is on (lead L2 connected to negative pole).

In case of measurements in environments with poor light, press the Torch button (see Fig.: 1 – no. 7) to activate the white LED pointer.

PHASE DETECTION FUNCTION WITH 1 TERMINAL

WARNING

- The maximum input AC and DC voltage are 690V. Do not measure voltages exceeding the limits given in this manual. Exceeding these limits could result in electrical shocks to the user and damage to the instrument.
- The quality of the indication cannot be reliable if you work under unfavorable conditions for example, on wooden ladders, in rooms with insulated floors, etc.
- The correct indication is only guaranteed for AC voltage in a range between 100V and 690V and with a frequency between 50Hz and 60Hz

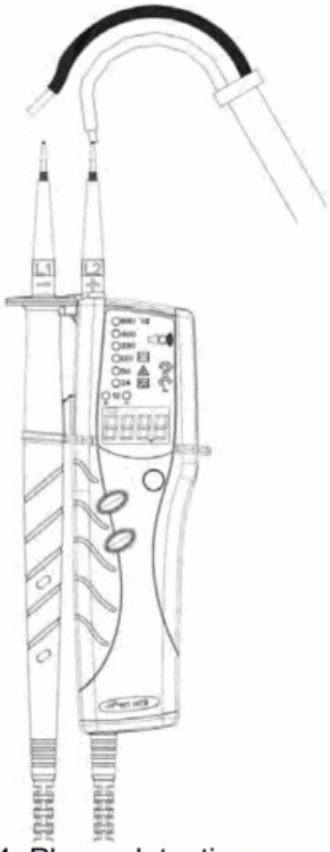


Fig. : 4: Phase detection

1. Touch the contact “Electrode” with a finger (see Fig.: 1– no. 6).
2. Connect the fixed lead L2 to the point of the object to be tested where the presence of AC voltage needs to be verified. The test is **only** carried out **by contact between the lead and the metal part of the conductor.**
3. The instrument switches on automatically and the Phase detection/Dangerous voltage LED turns on (see Fig. 2 – no. 5) and the buzzer sounds continuous to indicate that an AC voltage higher than 100V has been detected.

In case of measurements in environments with poor light, press the Torch button (see Fig.: 1 – no. 7) to activate the white LED pointer.

PHASE SEQUENCE

WARNING

- The maximum input AC and DC voltage are 690V. Do not measure voltages exceeding the limits given in this manual. Exceeding these limits could result in electrical shocks to the user and damage to the instrument.
- The correct indication is only guaranteed for AC voltage in a range between 100V and 690V and with a frequency between 50Hz and 60Hz on three-phase 4-wire electrical systems.
- The quality of the indication cannot be reliable if you work under unfavorable conditions for example, on wooden ladders, in rooms with insulated floors, etc.

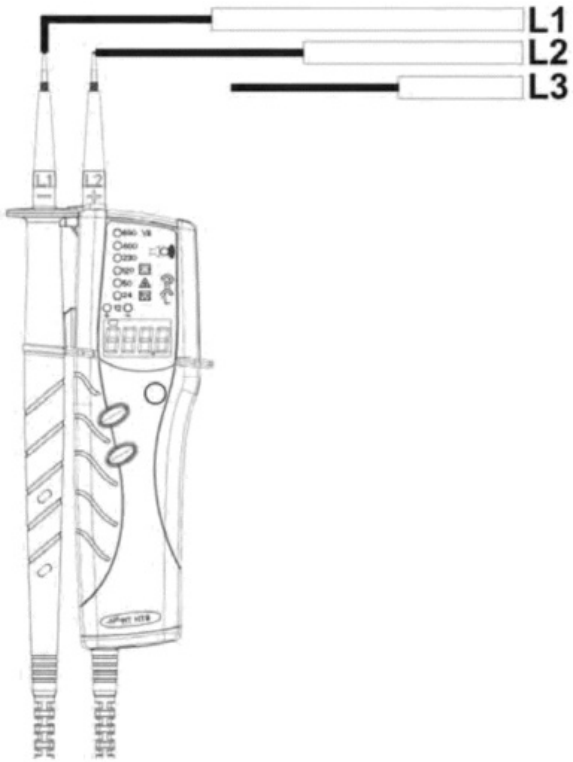


Fig. : 5: Phase sequence function

1. Touch the contact “Electrode” with a finger (see Fig.: 1– no. 6).
2. Connect the measuring lead L1 onto Phase L1 and the measuring lead L2 onto Phase L2 of the three-phase system being tested. The test is only carried out by contact between the lead and the metal part of the conductor.
3. The instrument turns on automatically and the led R) (clockwise rotation) turns on in case of correct sequence.
   The led (L (counterclockwise rotation) turns on in case of incorrect sequence.

In case of measurements in environments with poor light, press the Torch button (see Fig.: 1 – no. 7) to activate the white LED pointer.

CONTINUITY TEST / DIODE TEST

WARNING

Before carrying out any continuity test, check that the resistance to be measured is not live. Failure to respect this prescription may seriously harm the operator.

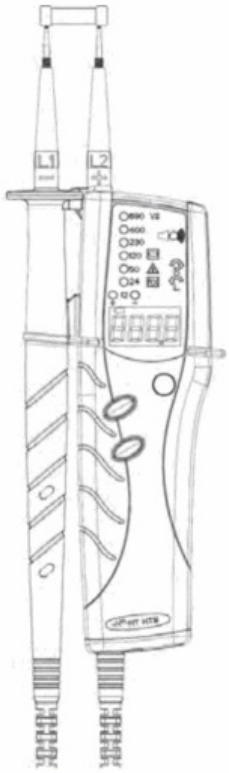


Fig. 6: Continuity test

Continuity test procedure:

1. Connect the measuring leads L1 and L2 to the object to be tested (see Fig. 6).
2. The instrument switches on automatically together with led RX (see Fig. 2 – no. 6) and the buzzer sounds continuously in case the result of the continuity test is positive.
3. The continuity test is active if the resistance to be tested is lower than 500kΩ.

Diode test procedure (this test is OK for standard diodes rectifying, signaling, Schottky, but not working for LEDs):

1. touch with the tip L2 (see Fig.: 1 – point 2) the cathode and with the tip L1 (see Fig.: 1 – point 3) the anode → Rx led is on and the buzzer beeps
2. touch with the tip L1 the cathode and with the tip L2 the anode → Rx led is off and the buzzer does not beep

In case of measurements in environments with poor light, press the Torch button (see Fig.: 1 – no. 7) to activate the white LED pointer.

LAMP TEST

WARNING

- During the test, do not touch the socket of the lamp, as you may obtain unreliable results.
- During the test, do not touch the test lead, as a high test voltage is present.

- During the test with the test lead, do not touch any other object than the lamp is tested.
- After a lamp test, it is necessary to wait 5 seconds before being able to perform a voltage measurement

The instrument allows quickly detecting of the presence of faults on discharge lamps filled with low or high-pressure gas.
Measuring procedure:

- Use the L2 lead (see Fig.: 1 – no. 2) to touch the glass or the supply socket of the lamp.
- Press and hold the “Test” button (see Fig.: 1 – no. 8) for the whole duration of the test.
- After approx. 0.5 seconds, if the gas inside the lamp is efficient, the lamp starts flashing.

Fluorescent tube test
If during the test, fluorescent tubes light up but they do not work once installed, the coiled filament or the supply may be defective.
The filaments and the supplies may be tested using the instrument’s Continuity test function (see § 5.4).

⚠WARNING
Check the supplies and the capacitors only when they have been disconnected from live circuits and when the capacitors are flat. These conditions must be verified through voltage measurements.

Low-pressure sodium lamp test
Touch the glass or a supply pole of the tube with the lead and press the “Test” button. If the tube lights up it means that the tube is intact. In some cases, only a part of the tube lights up; to check the other part, repeat the test procedure by touching the other supply pole.

High-pressure sodium lamp test
Touch the glass or a supply pole of the tube with the lead and press the “Test” button. If a light blue line appears inside the tube, it means that the tube is intact. Possible other results indicate a defective tube.

Neon tube test
Touch the glass or a supply pole of the tube with the lead and press the “Test” button. If lighting is not visible, the tube must be replaced.

Mercury-vapour lamp and halogen lamp test
Touch the glass of the tube or a supply pole with the lead and press the “Test” button. If lighting is not steady, the tube is defective. If the tube only operates when it is not installed and turns off and on or seems unsteady when it is installed, check that the tube is not unusually overheated, as this may cause a repeated opening and closing of the tube switch.

MAINTENANCE

GENERAL INFORMATION

1. While using and storing the instrument, carefully observe the recommendations listed in this manual in order to prevent possible damage or danger during use.
2. Do not use the instrument in environments with high humidity levels or high temperatures. Do not expose to direct sunlight.
3. In case the instrument is not to be used for a long time, remove the batteries to avoid liquid leaks that could damage the instrument’s internal circuits.

BATTERY REPLACEMENT

⚠WARNING
Only expert and trained technicians should perform this operation. Before carrying out this operation, make sure that the instrument has been disconnected from all circuits.

1. Loosen the battery cover fasten screws and remove the cover.
2. Remove the flat batteries from the battery compartment.
3. Insert the new batteries of the same type. Pay attention to the correct polarity.
4. Position the battery cover back over the compartment and fasten it with the relevant screws.
5. Do not scatter old batteries into the environment. Use the relevant containers for disposal.

CLEANING THE INSTRUMENT

Use a soft and dry cloth to clean the instrument. Never use wet cloths, solvents, water, etc.

END OF LIFE

WARNING: the symbol on the instrument indicates that the appliance and its accessories must be collected separately and correctly disposed of.

TECHNICAL SPECIFICATIONS

TECHNICAL CHARACTERISTICS

Voltage measurement with LEDs

Voltage range:	12 690V AC (16 400Hz), DC (±)
Rated voltages:	12/24/50/120/230/400/690V AC (16 400Hz),
Tolerance:	DC: in compliance with EN61243-3
ELV indications:	>50VAC, >50VDC
Response time:	< 1s at 100% of any rated voltage
Working time:	after the 30s of continuous measurement, the instrument must ma ke a pause of 240s before starting a new measurement.
Consumption during measurement:	approx. 50mA (battery 3V, measuring 690V AC) (HT6, HT8)

Voltage measurement with LCD (HT8, HT9)
Accuracy indicated as [%reading + (number of digits)] at 23°C±5°C, <70%HR
AC/DC voltage

Range [V]	10.0÷690.0
Resolution [V]	0.1
Precision	±(3%rdg+5digits)
Input impedance	200KΩ
Max voltage	690VAC/DC
Max input current:	**<**3.5mA (at 690V); Automatic AC/DC voltage detection;
Frequency range:	16 – 400Hz; “OL”: Over Range indication

Phase detection function (HT6, HT8, HT9)	
Voltage range:	100÷690V
Frequency:	50 / 60Hz
Phase sequence (HT6, HT8, HT9)	
Voltage range:	120÷400V Phase-Earth;
Frequency range:	50/60Hz;
Measuring mode:	2 terminals on non-isolated p
Continuity test (HT6, HT8, HT9)	
Detection range:	0÷500kΩ + 50%
Lamp test (HT9)	
Voltage with new battery:	approx. 3kV / 240kHz
Range intensity 200-280 kHz:	approx. 100µV/m
Indications:	“Test” LED on
Charging time before the test:	<0.5 sec
Flashing frequency:	2Hz
Test time:	typically <2 sec
Working time:	may operate in continuous m
Consumption during the test:	approx. 500mA

GENERAL CHARACTERISTICS

Power supply	
Internal power supply:	2×1.5V AAA, IEC LR03
Mechanical characteristics	
Size:	255(L) x 60(La) x 35(H)mm
Weight (battery included):	approx. 170g
Mechanical protection:	IP64
Considered standards	
Instrument safety:	IEC/EN61010-1 (HT8, HT9); IEC/EN61010-2-030 (HT8, HT9); IEC/EN61243-3:2010 (HT6, HT8, HT9)
Insulation:	double Insulation
Overvoltage category:	CAT III 690V; CAT IV 600V
Max height:	2000m
Pollution level:	2

ENVIRONMENT

Environmental conditions for use

Calibration reference temperature:	23 ± 5°C
Operating temperature:	-15 ÷ 55°C
Allowable relative humidity:	<85%
Storage temperature:	-20 ÷ 70°C

This instrument satisfies the requirements of Low Voltage Directive 2006/95/EEC (LVD) and of EMC Directive 2004/108/EEC

ACCESSORIES

Accessories provided

- Batteries (not inserted)
- User manual
- Protective cap for test leads, 2 pcs
- Adapter for 4mm test lead tip, 2 pcs

SERVICE

WARRANTY CONDITIONS

This instrument is warranted against any material or manufacturing defect, in compliance with the general sales conditions. During the warranty period, defective parts may be replaced. However, the manufacturer reserves the right to repair or replace the product.
Should the instrument be returned to the After-sales Service or to a Dealer, transport will be at the Customers charge. However, shipment will be agreed upon in advance.
A report will always be enclosed to a shipment, stating the reasons for the return of the product. Only use the original packaging for shipment; any damage due to the use of non-original packaging material will be charged to the Customer.
The manufacturer declines any responsibility for injury to people or damage to property.
The warranty shall not apply in the following cases:

- Repair and/or replacement of accessories and batteries (not covered by warranty).
- Repairs that may become necessary as a consequence of incorrect use of the instrument or due to its use together with non-compatible appliances.
- Repairs that may become necessary as a consequence of improper packaging.
- Repairs may become necessary as a consequence of interventions performed by unauthorized personnel.
- Modifications to the instrument were performed without the manufacturer's explicit authorization.
- Use not provided for in the specifications of the instrument or in the instruction manual.

SERVICE

If the instrument does not operate properly, before contacting the After-sales Service, please check the conditions of the battery and replace it, if necessary. Should the instrument still operate improperly, check that the product is operated according to the instructions given in this manual.
Should the instrument be returned to the After-sales Service or to a Dealer, transport will be at the Customers charge. However, shipment will be agreed upon in advance.
A report will always be enclosed to a shipment, stating the reasons for the return of the product. Only use the original packaging for shipment; any damage due to the use of non-original packaging material will be charged to the Customer.

Documents / Resources

	HT HT6 Two Pole Voltage Meter with LED Indications [pdf] User Manual HT6, HT8, HT9, Two Pole Voltage Meter with LED Indications