ENGLISH

User’s manual

Release EN 2.00 - 24/01/2013

Content:

1. SAFETY PRECAUTIONS AND PROCEDURES

This instrument conforms with safety Standard EN 61010-1 related to electronic measuring instruments.
For your own safety and to avoid damaging the instrument follow the procedures described in this instruction manual and read carefully all notes preceded by this symbol ⚠.

When taking measurements:
- Avoid doing that in humid or wet places.
- Avoid doing that in rooms where explosive gas, combustible gas, steam or excessive dust is present.
- Keep you insulated from the object under test.
- Do not touch exposed metal parts such as test lead ends, sockets, fixing objects, circuits etc.
- Avoid doing that if you notice anomalous conditions such as breakages, deformations, fractures, leakages of battery liquid, blind display etc.
- Be particularly careful when measuring voltages exceeding 20V to avoid risks of electrical shocks.

The following symbols are used:


CAUTION - refer to the instruction manual - an improper use may damage the instrument or its components


Danger high voltage: risk of electric shock


Double insulated meter


AC voltage or current


DC voltage or current

1.1. PRELIMINARY

- This instrument has been designed for use in environments of pollution degree 2.
- It can be used for **VOLTAGE** and **CURRENT** measurements on installations of overvoltage category III 1000V and IV 600V.
- When using the instrument always respect the usual safety regulations aimed at:
  - ♦ Protecting you against the dangerous electric currents.
  - ♦ Protecting the instrument against incorrect operations.
- Only the leads supplied with the instrument guarantee compliance with the safety standards in force. They must be in good conditions and, if necessary, replaced with identical ones.
- Do not test or connect to any circuit exceeding the specified overload protection.
- Do not effect measurements under environmental conditions exceeding the limits indicated in paragraph 6.2.1.
- Make sure that batteries are properly installed.

- Before connecting the test probes to the installation, make sure that the function selector is positioned on the required measurement.
- Make sure that LCD and function selector indicate the same function.

1.2. DURING USE

Read the recommendations which follow and the instructions in this manual:

CAUTION

An improper use may damage the instrument and/or its components or injure the operator.

- When changing the range, first disconnect the test leads from the circuit under test in order to avoid any accident.
- When the instrument is connected to measuring circuits never touch any unused terminal.
- When measuring resistors do not add any voltage. Although there is a protection circuit, excessive voltage could cause malfunctioning.
- If during measurement the displayed values remain constant check whether the HOLD function is active.

1.3. AFTER USE

- After using the instrument turn it off.
- If you expect not to use the instrument for a long period remove the battery to avoid leakages of battery liquids which may damage its inner components.

1.4. MEASURING (OVERVOLTAGE) CATEGORIES DEFINITIONS

EN 61010-1: Safety requirements for electrical equipment for measurement, control and laboratory use, Part 1: General requirements, gives a definition of measuring category, usually called overvoltage category. Paragraph 6.7.4: Measuring circuits:

(OMISSIS)

circuits are divided into the following measurement categories:

- **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 in the building installation.

  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 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 norm requires that the transient withstand capability of the equipment is made known to the user.

2. GENERAL DESCRIPTION

This instrument performs the following measurements:

- DC and AC TRMS Voltage
- DC and AC TRMS Current
- Resistance and Continuity test
- Diode test
- Frequency
- Capacitance

All selectable by means of a 10-position function selector (including OFF position). 4 FUNCTION keys are also available to hold the displayed value and select the desired function. The selected quantity is displayed with indication of measuring unit and active functions.

The instrument disposes of an Auto Power Off function consisting in an automatic switching off 10 minutes after last pressure on keys or rotation of selector. To resume normal operation turn the selector on OFF and switch it on again.

2.1. MEAN VALUE AND TRMS : DEFINITION

Safety testers for AC quantities are divided in two big families:

- MEAN VALUE instruments, measuring only the value of the wave at the fundamental frequency (50 or 60 Hz)
- TRUE ROOT MEAN SQUARE (or “TRMS”) instruments, measuring the true root mean square value of the quantity under test.

In presence of a perfectly sinusoidal wave, both families provide identical results. While in presence of distorted waves, readings are different. Mean value instruments provide only the value of the fundamental wave while TRMS instruments provide the value of the entire wave, including harmonics (within the passband of the instrument). Accordingly, if the same quantity is measured with both kinds of instruments, the measured values are identical only if the wave is purely sinusoidal. Should it be distorted, TRMS instruments provide higher values than MEAN VALUE instruments.

2.2. TRUE ROOT MEAN SQUARE VALUE AND CREST FACTOR : DEFINITION

The effective current value is defined as follows: “In an interval of time equivalent to a period, an alternate current with effective value having an intensity of 1A, by passing on a resistor, disperses the same energy which would be dispersed in the same period of time by a direct current having an intensity of 1A”. From this definition comes the numerical expression: $G=\sqrt{\frac{1}{T}\int_{t_0}^{t_0+T} g^2(t)dt}$ The effective value is indicated as RMS (*root mean square*).

The crest factor is defined as the ratio between the peak value of a signal and its effective value: CF (G)=$\frac{G_p}{G_{RMS}}$. This value varies according to the waveform of the signal, for a purely sinusoidal wave it’s worth $\sqrt{2}$ =1.41. In presence of distortions the crest factor assumes higher values as long as the wave distortion is higher.

3. PREPARATION FOR USE

3.1. INITIAL

This instrument was checked both mechanically and electrically prior to shipment.
All possible cares and precautions were taken to let you receive the instrument in perfect conditions.

Notwithstanding we suggest you to check it rapidly (eventual damages may have occurred during transport – if so please contact the local distributor from whom you bought the item).

Make sure that all standard accessories mentioned in paragraph 6.3. are included.

Should you have to return back the instrument for any reason please follow the instructions mentioned in paragraph 7.

3.2. SUPPLY VOLTAGE

The instrument is powered by batteries mod. 9V NEDA1604, JIS006P, IEC6F22 included in the packaging. Battery life is approx. 300 hours. When batteries are low the symbol "" is displayed.
To replace/insert batteries follow the instructions indicated in paragraph 5.2.

3.3. CALIBRATION

The instrument complies with the technical specifications contained in this manual and such compliance is guaranteed for 1 year.

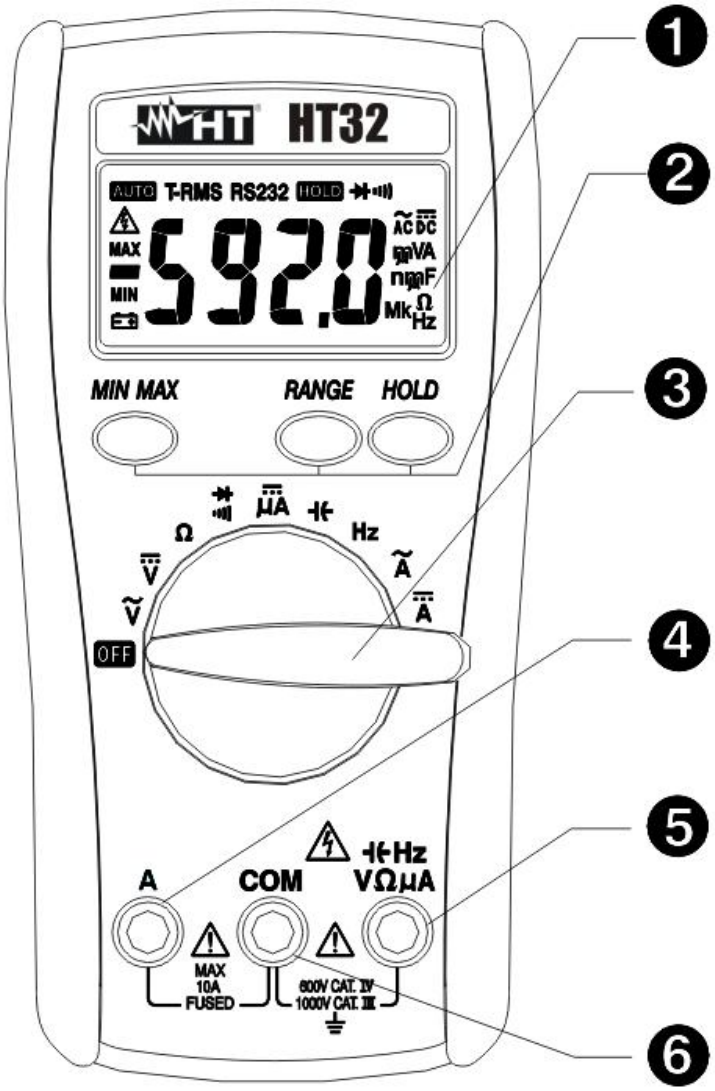
3.4. STORAGE

After a period of storage in extreme environmental conditions exceeding the limits mentioned in paragraph 6.2.1 let the instrument resume normal operating conditions before using it.

4. OPERATING INSTRUCTIONS

4.1. INSTRUMENT DESCRIPTION

4.1.1. Front panel



LEGEND:

1. LCD display.
2. Functions keys.
3. Rotary selector.
4. **A** input for AC/DC current measurements.
5. **HzVΩμA** input for other measurements.
6. **COM** input.

Fig. 1: Instrument description

4.2. FUNCTION KEYS

When pressing a key, the corresponding symbol is displayed with a beep. To resume default state turn the selector on another function.

4.2.1. MIN MAX

By pressing **MIN MAX** key, maximum and minimum values are measured. Both values are stored and can be recalled by pressing the same key. The symbol corresponding to the desired function is displayed: “MAX” for maximum value, “MIN” for minimum value. **MIN MAX** key is disabled when HOLD function is active. To exit this function keep **MIN MAX** key pressed for at least 1 second or rotate the selector to another position.

4.2.2. RANGE

By pressing **RANGE** key, the manual mode is activated and the “**AUTO**” symbol disappears from the display. Press **RANGE** cyclically to change the measuring range and fix the decimal point on the display.
To exit this function keep **RANGE** key pressed for at least 1 second or rotate the selector to another position.

4.2.3. HOLD

By pressing HOLD the measured value is frozen on the display where the symbol “**HOLD**” appears. To exit this function press **HOLD** again or rotate the selector to another position.

4.2.4. Disable Auto Power OFF

When the meter is to be used for long periods of time, the operator might want to disable the Auto Power OFF function. Once the Auto Power OFF function is disabled the meter stays on continuously. To disable the Auto Power OFF function:

- Switch OFF the meter.
- Turn ON the meter keeping pressed **MIN MAX** and **RANGE** keys.

The Auto Power OFF function is automatically activated when turning ON again the meter.

4.3. MEASUREMENTS

4.3.1. DC Voltage measurement

CAUTION

Maximum input for DC voltage is 1000V. Do not attempt to take any voltage measurement that exceeds the limits. Exceeding the limits could cause electrical shock and damage the multimeter.

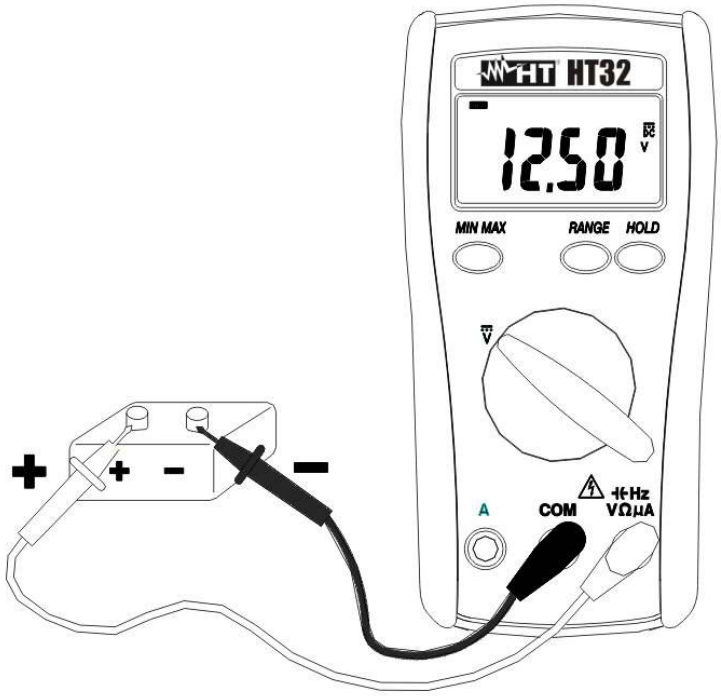


Fig. 2: DC Voltage measurement

1. Turn the selector on ⎓**V**.
2. Insert the test leads into the jacks, the red plug into ⊣⊢**HzVΩμA** jack and the black plug into **COM** jack (Fig. 2).
3. Connect the red and black test leads to the positive and negative poles of the circuit under test respectively. The voltage value will be displayed with automatic detection of the range.
4. Press **RANGE** key to activate the manual mode; the “AUTO” symbol disappears from display. Press cyclically **RANGE** to change the position of the decimal point on the display. To activate the Autorange function keep pressed **RANGE** for at least 1 second.
5. The message "**OL**" means that the voltage exceeds the measuring limits. In this case disconnect the test leads from the circuit under test to avoid damaging the instrument or endanger your own safety.
6. The symbol "**-**" on the display means that voltage has opposite direction than shown in Fig. 2.
7. For minimum and maximum value measurement and HOLD function please refer to paragraph 4.2.

4.3.2. AC Voltage measurement

CAUTION

Maximum input for AC voltage is 750V rms. Do not attempt to take any voltage measurement exceeding such limit to avoid the risk of electrical shock and damages to the instrument.

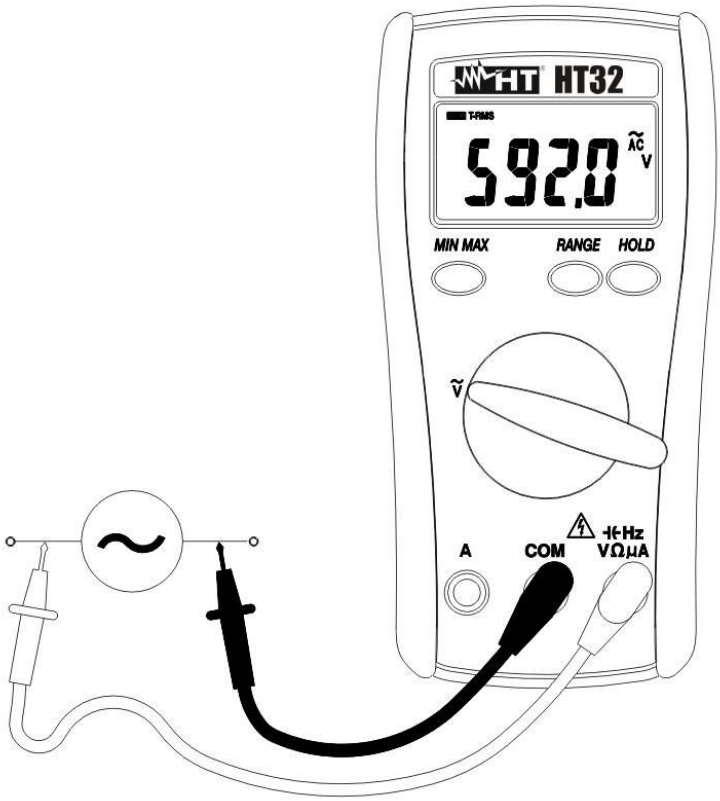


Fig. 3: AC Voltage measurement

1. Turn the selector on **~V**.
2. Insert the test leads into the jacks, the red plug into **HzVΩμA** jack and the black plug into **COM** jack (Fig. 3).
3. Connect the red and black test leads to the positive and negative poles of the circuit under test respectively. The voltage value will be displayed with automatic detection of the range.
4. Press **RANGE** key to activate the manual mode; the “AUTO” symbol disappears from display. Press cyclically **RANGE** to change the position of the decimal point on the display. To activate the Autorange function keep pressed **RANGE** for at least 1 second.
5. The message "**OL**" means that the voltage exceeds the measuring limits. In this case disconnect the test leads from the circuit under test to avoid damaging the instrument or endanger your own safety.
6. For minimum and maximum value measurement and HOLD function please refer to paragraph 4.2.

4.3.3. DC Current measurement

CAUTION

Maximum input for DC current is 10A. Do not attempt to take any current measurement exceeding such limit to avoid the risk of electrical shock and damages to the instrument.

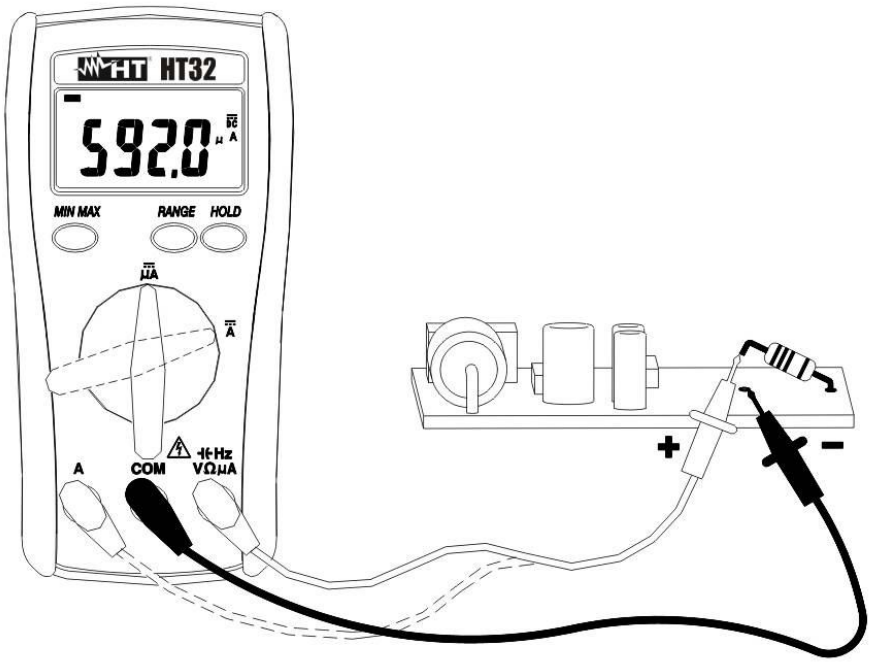


Fig. 4: DC Current measurement

1. Switch OFF the circuit under test.
2. Turn the selector on ⎓**A**.
3. Insert the red test lead into **A** jack and the black plug into **COM** jack (Fig. 4).
4. Connect red and black plugs in series with the circuit under test respecting the polarity and current flow indicated in Fig. 4.
5. Power the circuit under test. The current value is displayed.
6. Press **RANGE** key to activate the manual mode; the “AUTO” symbol disappears from display. Press cyclically **RANGE** to change the position of the decimal point on the display. To activate the Autorange function keep pressed **RANGE** for at least 1 second.
7. The message "**OL**" means that the current exceeds the measuring limits. In this case disconnect the test leads from the circuit under test to avoid damaging the instrument or endanger your own safety.
8. If the measured value is lower than **6mA**, to get a better resolution:
   - Switch off the circuit under test.
   - Turn the selector on ⎓**μA**.
   - Remove the red test lead from **A** jack, and insert it into ⊣⊢**HzVΩμA** jack.
   - Power the circuit under test.
9. The symbol "**-**" on the display means that current has opposite direction than shown in Fig. 4.
10. For minimum and maximum value measurement and HOLD function please refer to paragraph 4.2.

4.3.4. AC Current measurement

CAUTION

Maximum input for AC current is 10A. Do not attempt to take any current measurement exceeding such limit to avoid the risk of electrical shock and damages to the instrument.

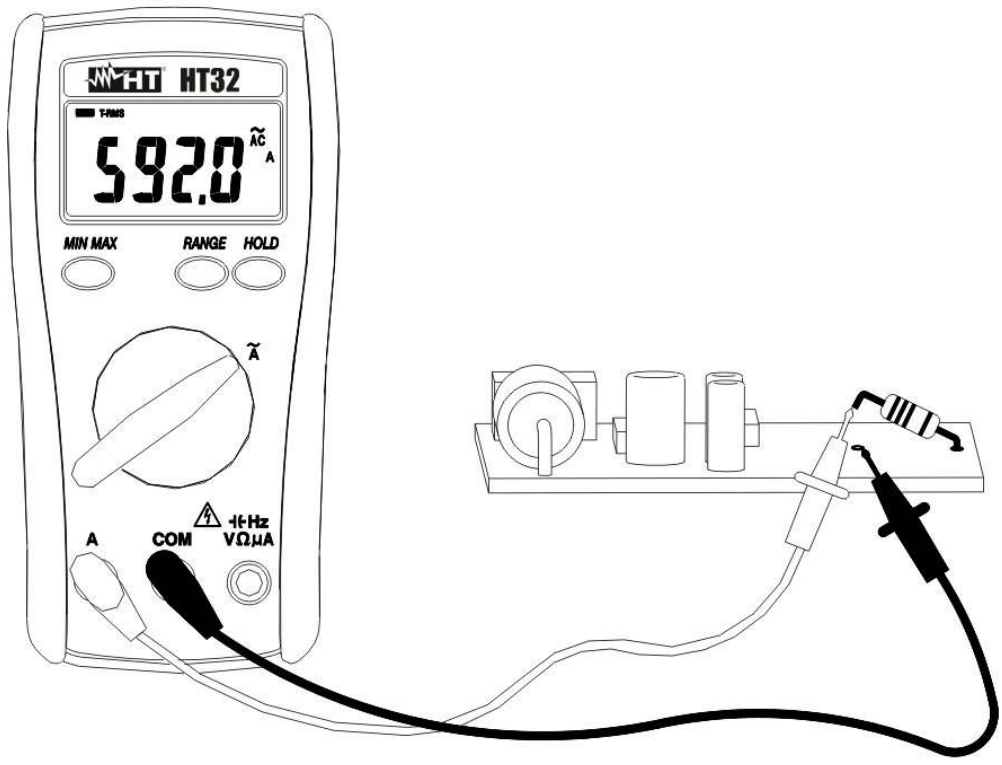


Fig. 5: AC Current measurement

1. Switch OFF the circuit under test.
2. Turn the selector on **~A**.
3. Insert the test leads into the jacks, the red plug into **A** jack and the black plug into **COM** jack (Fig. 5).
4. Connect red and black plugs in series with the circuit under test as indicated in Fig. 4.
5. Power the circuit under test. The current value is displayed.
6. Press **RANGE** key to activate the manual mode; the “AUTO” symbol disappears from display. Press cyclically **RANGE** to change the position of the decimal point on the display. To activate the Autorange function keep pressed **RANGE** for at least 1 second.
7. The message "**OL**" means that the current exceeds the measuring limits. In this case disconnect the test leads from the circuit under test to avoid damaging the instrument or endanger your own safety.
8. For minimum and maximum value measurement and HOLD function please refer to paragraph 4.2.

4.3.5. Frequency measurement

CAUTION

Maximum input for AC voltage is 750V rms. Do not attempt to take any voltage measurement exceeding such limit to avoid the risk of electrical shock and damages to the instrument.

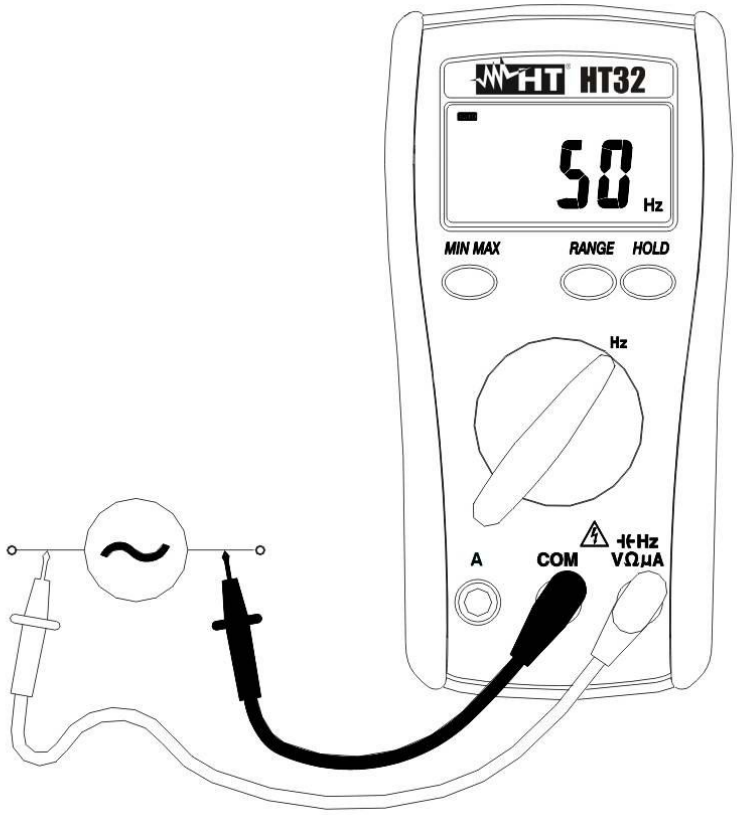


Fig. 6: Frequency measurement

1. Turn the selector on **Hz**.
2. Insert the test leads into the jacks, the red plug into **HzVΩμA** jack and the black plug into **COM** jack (Fig. 6).
3. Connect the red and black test leads to the positive and negative poles of the circuit under test respectively. The voltage value will be displayed with automatic detection of the range.
4. Press **RANGE** key to activate the manual mode; the “AUTO” symbol disappears from display. Press cyclically **RANGE** to change the position of the decimal point on the display. To activate the Autorange function keep pressed **RANGE** for at least 1 second.
5. The message "**OL**" means that the frequency exceeds the measuring limits. In this case disconnect the test leads from the circuit under test to avoid damaging the instrument or endanger your own safety.
6. For minimum and maximum value measurement and HOLD function please refer to paragraph 4.2.

4.3.6. Resistance measurement

CAUTION

Before taking resistance measurements in circuit remove power from the circuit being tested and discharge all capacitors.

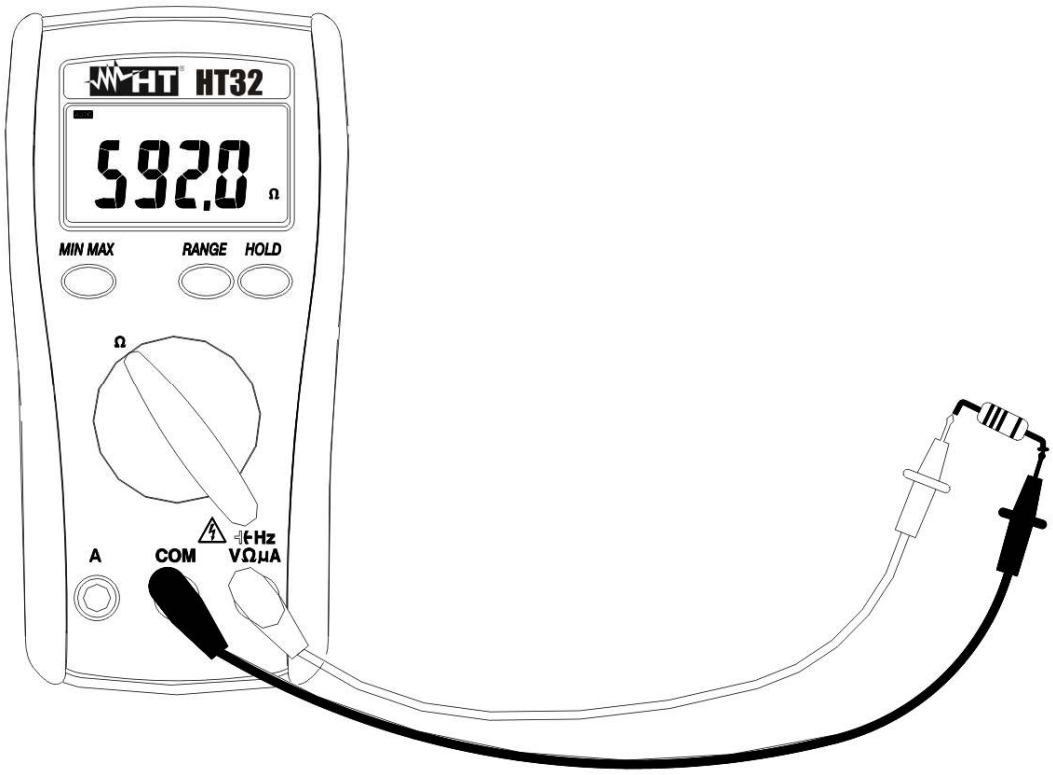


Fig. 7: Resistance measurement

1. Turn the selector on **Ω**.
2. Insert the test leads into the jacks, the red plug into **HzVΩμA** jack and the black plug into **COM** jack (Fig. 7).
3. Connect the red and black test leads to the circuit under test, the resistance value will be displayed with automatic detection of the range.
4. Press **RANGE** key to activate the manual mode; the “AUTO” symbol disappears from display. Press cyclically **RANGE** to change the position of the decimal point on the display. To activate the Autorange function keep pressed **RANGE** for at least 1 second.
5. The message "**OL**" means that the resistance exceeds the measuring limits. In this case disconnect the test leads from the circuit under test to avoid damaging the instrument or endanger your own safety.
6. For minimum and maximum value measurement and HOLD function please refer to paragraph 4.2.

4.3.7. Diode test and continuity test

CAUTION

Before taking resistance measurements in circuit remove power from the circuit being tested and discharge all capacitors.

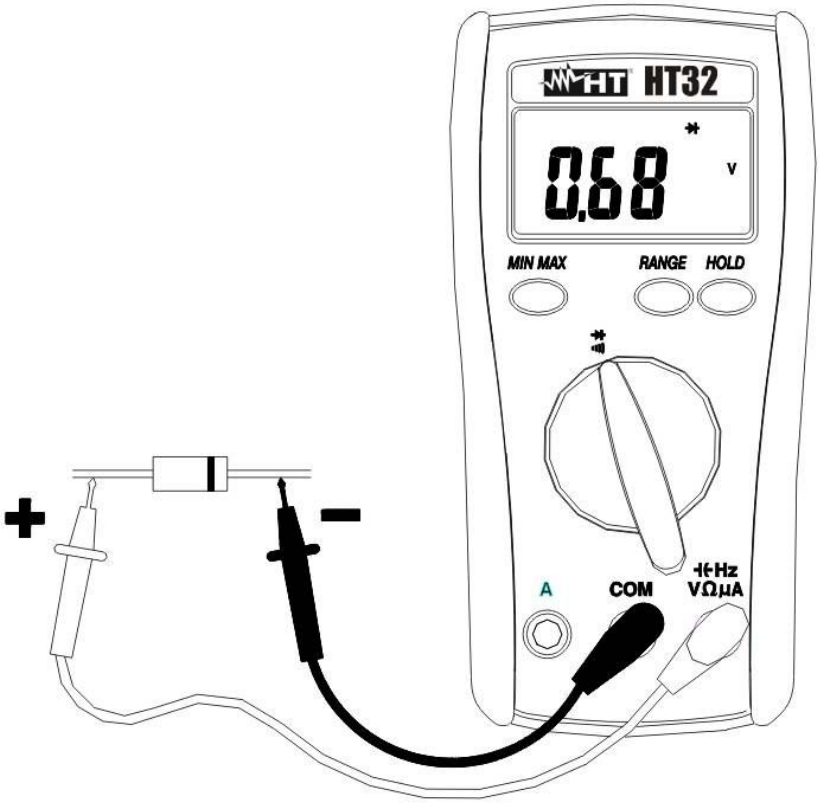


Fig. 8: Diode test and continuity test

1. Turn the selector on ⊣◀ / •))) .
2. Insert the test leads into the jacks, the red plug into ⊣⊢**HzVΩμA** jack and the black plug into **COM** jack (Fig. 8).
3. Connect the red lead to the positive side (anode) of the diode and the black lead to the negative side (cathode). The meter displays the diode voltage to approximately 0.4 ~ 0.9V for good junction.
4. Reverse the connections and measure the voltage across the diode again. The message "**OL**" on the display corresponds to a correct junction.
5. The continuity test is always active and the test is performed using the test leads in the same way of resistance measurement (refer to paragraph 4.3.6). The buzzer is on for resistance values <500Ω.

4.3.8. Capacitance measurement

CAUTION

Before taking any in circuit or capacitance measurement, remove power from the circuit being tested and discharge all capacitors. Use the short test lead pair for measurement in order to reduce the stray capacitance. Before connecting the test capacitor, note the display, which may show a reading other than zero whenever the range is changed. Subtract this offset reading from the test result of a capacitor to obtain the true value. Connect the test capacitor to the input clamps noting the polarity connections when required.

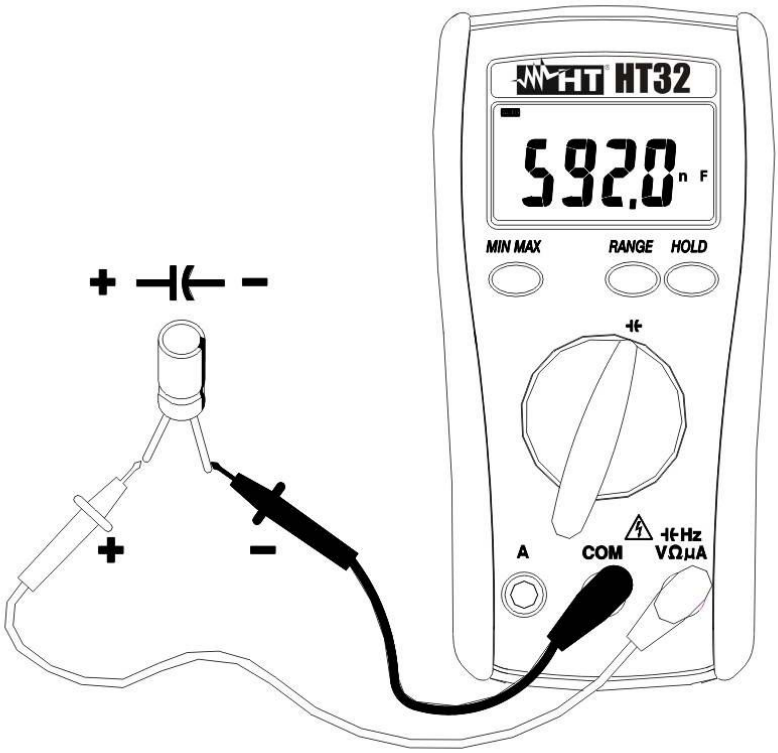


Fig. 9: Capacitance measurement

1. Turn the selector on ⊣⊢.
2. Insert the test leads into the jacks, the red plug into ⊣⊢**HzVΩμA** jack and the black plug into **COM** jack (Fig. 9).
3. Connect the test leads to the capacitor terminals taking care of the shown polarity. The capacitance value will be displayed with automatic detection of the range.
4. Press **RANGE** key to activate the manual mode; the “AUTO” symbol disappears from display. Press cyclically **RANGE** to change the position of the decimal point on the display. To activate the Autorange function keep pressed **RANGE** for at least 1 second.
5. The message "**OL**" means that the capacitance exceeds the measuring limits. In this case disconnect the test leads from the circuit under test to avoid damaging the instrument or endanger your own safety.
6. For minimum and maximum value measurement and HOLD function please refer to paragraph 4.2.

5. MAINTENANCE

5.1. GENERAL INFORMATION

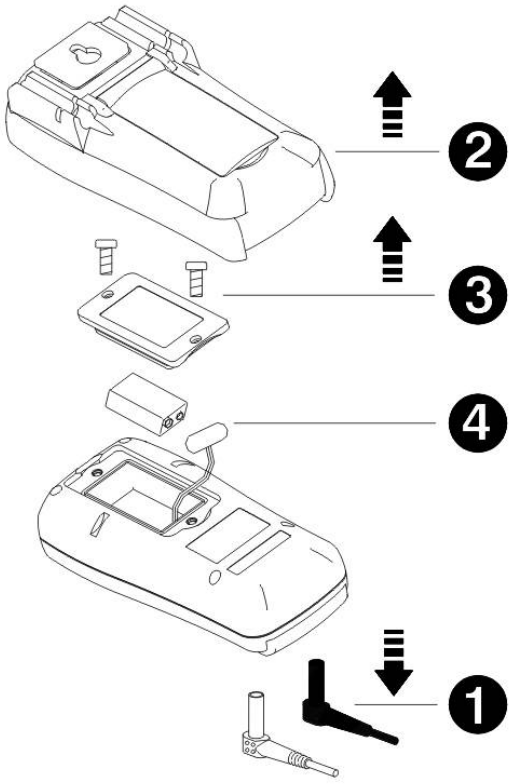
1. This is a precision instrument. To guarantee its performances be sure to use it according to these instructions and keep it stored on suitable environmental conditions.
2. Do not expose it to high temperatures or humidity or direct sunlight.
3. Be sure to turn it off after use. If you expect not to use the instrument for a long period remove batteries to avoid leakages of battery liquid which could damage the its inner components.

5.2. BATTERY REPLACEMENT

When the symbol "⊞" is displayed, batteries need replacement.

CAUTION

Before replacing batteries disconnect the test leads from any energized circuits to avoid electrical shocks.



LEGEND:

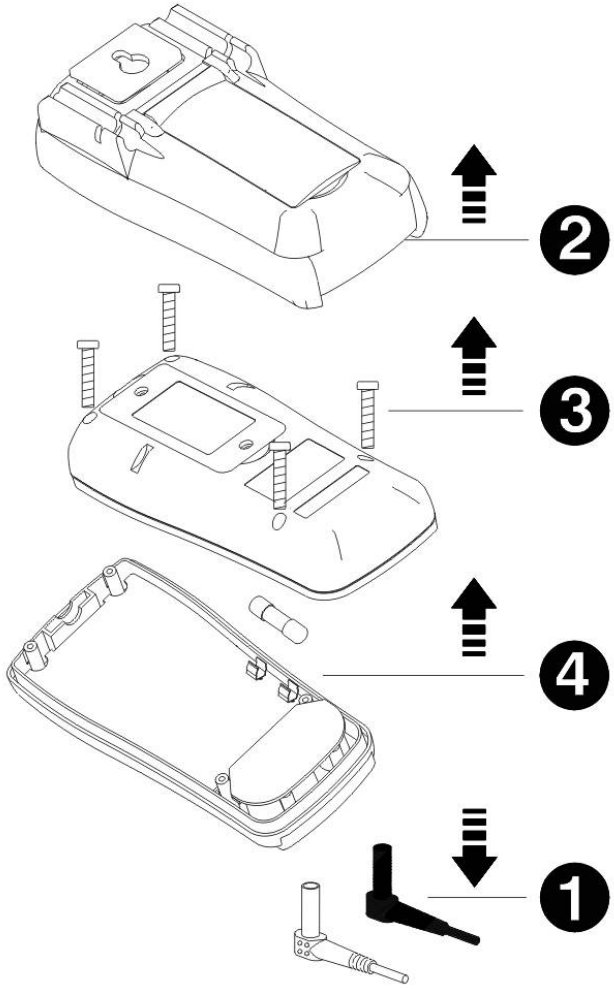
1. Turn OFF the meter and disconnect the test leads from the input terminals.
2. Remove the protective holster from the meter.
3. Unscrew the battery cover and remove the battery.
4. Insert a new battery of the same type (9V NEDA1604, JIS006P, IEC6F22) observing the proper polarity, re-screw the battery cover and reposition the protective holster.

Fig. 10: Battery replacement

5.3. FUSE REPLACEMENT

CAUTION

Before replacing fuses, disconnect test leads from any energized circuit to avoid electrical shock.



LEGEND:

1. Turn OFF the meter and disconnect the test leads from the input terminals.
2. Remove the protective holster from the meter.
3. Unscrew the battery cover and remove the battery.
4. Remove the defective fuse and install a new fuse of the same size and rating (fast type 10A/1000V). Make sure the new fuse is centered in the fuse holder. Re-screw the battery cover and reposition the protective holster.

Fig. 11: Fuse replacement

5.4. CLEANING

To clean the instrument use a soft dry cloth. Never use a wet cloth, solvents or water.

5.5. END OF LIFE

CAUTION: this symbol indicates that equipment and its accessories shall be subject to a separate collection and correct disposal.

6. TECHNICAL SPECIFICATIONS

6.1. TECHNICAL FEATURES

The accuracy is indicated as [% of reading + number of digits]. It is referred to the following environmental conditions: temperature 23°C ± 5°C, relative humidity < 80%.

DC Voltage

Range	Resolution	Accuracy	Input impedance	Overload protection
600.0mV	0.1mV	±(0.5%rdg+2dgt)	10MΩ // less of 100pF	1000VDC 750VACrms
6.000V	0.001V			
60.00V	0.01V			
600.0V	0.1V			
1000V	1V			

AC TRMS Voltage

Range	Resolution	Accuracy (*) (50 ÷ 500Hz)	Input impedance	Overload protection
600.0mV	0.1mV	±(0.9%rdg+5dgt)	10MΩ // less then100pF	1000VDC 750VACrms
6.000V	0.001V			
60.00V	0.01V			
600.0V	0.1V			
750V	1V			

(*) NOTES

- Sinusoidal waveform 50/60Hz only for 600.0mV range
- Basic accuracy is specified for sinusoidal waveform up to 4000 counts. Over 4000 counts add 0.6%rdg to the accuracy
- For non-sinusoidal waveform below 2000 counts add ± 1.5%rdg for crest factor from 1.4 to 3

DC Current

Range	Resolution	Accuracy	Output voltage	Overload protection
600.0μA	0.1μA	±(1.0%rdg+2dgt)	<4mV/μA	600Vrms
6000μA	1μA			
6.000A	1mA		2V max	Fast fuse 10A / 1000V
10A	10mA			

AC TRMS Current

Range	Resolution	Accuracy (50 ÷ 500Hz)	Output voltage	Overload protection
6.000A	1mA	±(1.5%rdg+5dgt)	2V max	Fast fuse 10A / 1000V
10A	10mA			

Frequency

Range	Resolution	Accuracy	Sensitivity (**)	Overload protection
6000Hz	1Hz	±(0.1%rdg+1dgt)	100mVrms (*)	600Vrms
60.00kHz	0.01kHz			
600.0kHz	0.1kHz			
6.000MHz	0.001MHz		250mVrms	
60.00MHz	0.01MHz		1Vrms	

(*) for measurements < 20Hz sensitivity is 1.5Vrms

(**) Max sensitivity: <5VACrms

Resistance

Range	Resolution	Accuracy	Open voltage	Overload protection
600.0Ω	0.1Ω	±(0.7%rdg+2dgt)	1.3V	600V rms
6.000kΩ	0.001kΩ			
60.00kΩ	0.01kΩ			
600.0kΩ	0.1kΩ			
6.000MΩ	0.001MΩ	±(1.0%rdg+2dgt)		
60.00MΩ	0.01MΩ	±(1.5%rdg+2dgt)		

Diode test

Range	Resolution	Accuracy (0.4 ÷ 0.8V)	Test current	Open voltage	Overload protection
→|	10mV	±(1.5%rdg+5dgt)	1.5mA	<3V	600V rms

Continuity test

Range	Buzzer	Overload protection
·))	R<500Ω	600V rms

Capacitance

Range	Resolution	Accuracy	Overload protection
6.000nF	0.001nF	±(1.9%rdg+8dgt)	600V rms
60.00nF	0.01nF		
600.0nF	0.1nF		
6.000µF	0.001µF		
60.00µF	0.01µF		
600.0µF	0.1µF		
6.000mF	0.001mF		

6.1.1. Electrical specifications

Conversion: TRMS
Measuring rate: 1.5 times per second
Temperature coefficient: 0.15×(accuracy)/°C (<18°C and >28°C)
NMRR Normal Mode Rejection Ratio: > 50dB for DC parameters and 50/60Hz
CMRR Common Mode Rejection Ratio: >100dB from DC up to 60Hz on DCV
> 60dB from DC up to 60Hz on ACV

6.1.2. Safety

The instrument complies with: EN 61010-1
Insulation: class 2, double insulation
Pollution degree: 2
Overvoltage category: CAT IV 600V, CAT III 1000V (**V/Ω/µA)**
CAT IV 500V (**A**)
For indoor use, max height: 2000m

6.1.3. General data

Mechanical characteristics

Dimensions (with holster):	164x82x44mm; 6.45x3.23x1.75in
Weight (including battery):	about 400g; 12.9ounce

Power supply

Battery type:	9V NEDA1604, JIS006P, IEC6F22.
Low battery indication:	"+ -" is displayed when battery voltage is too low.
Battery life:	about 300 hours.
AutoPowerOFF:	10 minutes after last pressure on keys or rotation of selector.

Display

Specifications:	4 Digits with max. reading 6000 counts + symbol and decimal point.
Over range indication:	"**OL**" or "**-OL**".

6.2. ENVIRONMENT

6.2.1. Environmental conditions

Reference temperature:	23° ± 5°C; 73° ± 41°F
Working temperature:	0° ÷ 30°C; 32° ÷ 86°F
Relative humidity:	<80%
Storage temperature:	-20° ÷ 60°C; -4° ÷ 140°F
Storage humidity:	<80%

6.2.2. EMC and LVD

This product conforms to the prescriptions of the European directive on low voltage 2006/95/EEC (LVD) and to EMC directive 2004/108/EEC.

6.3. ACCESSORIES

Standard accessories

- HT32 meter.
- Test leads.
- Battery (fitted).
- Instruction manual.
- Warranty card.

Optional accessories

- Carrying bag – Cod. B80.

7. SERVICE

7.1. WARRANTY CONDITIONS

This instrument is guaranteed for one year against material or production defects, in accordance with our general sales conditions. During the warranty period the manufacturer reserves the right to decide either to repair or replace the product.
Should you need for any reason to return back the instrument for repair or replacement take prior agreements with the local distributor from whom you bought it. Do not forget to enclose a report describing the reasons for returning (detected fault). Use only original packaging. Any damage occurred in transit due to non original packaging will be charged anyhow to the customer.

The warranty doesn't apply to:

- Accessories and batteries (not covered by warranty).
- Repairs made necessary by improper use (including adaptation to particular applications not foreseen in the instructions manual) or improper combination with incompatible accessories or equipment.
- Repairs made necessary by improper shipping material causing damages in transit.
- Repairs made necessary by previous attempts for repair carried out by non skilled or unauthorized personnel.
- Instruments for whatever reason modified by the customer himself without explicit authorization of our Technical Dept.
- Use not provided by the instrument's specifications or in the instruction manual.

Our products are patented and our logotypes registered. We reserve the right to modify specifications and prices in view of technological improvements or developments which might be necessary.

7.2. SERVICE

Shouldn't the instrument work properly, before contacting your distributor make sure that batteries are correctly installed and working, check the test leads and replace them if necessary.
Should you need for any reason to return back the instrument for repair or replacement take prior agreements with the local distributor from whom you bought it. Do not forget to enclose a report describing the reasons for returning (detected fault). Use only original packaging. Any damage occurred in transit due to non original packaging will be charged anyhow to the customer.
The manufacturer will not be responsible for any damage to persons or things.