

TENMA®



Digital Multimeter

Model: 72-2655 and 72-10390A










IMPORTANT SAFETY INFORMATION

Please read these instructions carefully before use and retain for future reference.

This instrument is designed and manufactured in compliance with: G84793, IEC61010-1, CAT III 600V, Pollution Degree 2 and Double Insulation standards.

- Check the test leads, probes and case insulation before using. If you find any breakage or abnormality, or you consider the device is broken, stop using the device immediately.
- When using the test probes, keep your fingers behind the finger protection ring.
- Do not use the meter with the back cover open.
- Select appropriate test range for measurements.
- Ensure all inputs are less than the range selected otherwise it may cause electrical shock or meter damage.
- Do not change the range selector position during voltage or current measurements.
- Do not apply a voltage over 600V between COM terminal and ground.
- Take caution when working voltages are above 60V DC or 30V AC rms.
- Do not connect the meter to voltage signals when the range selector is on current, resistance, diode or continuity range.
- When measuring current, each single measurement should be shorter than 10 seconds. For current values over 5A, the wait period between each measurement must be longer than 15 minutes.
- When a measurement has been completed, disconnect the testing probes from the circuit under test.
- Replace the batteries as soon as the low battery indicator appears on the display.
- Remove dead batteries from the meter or if it is not going to be used for a long time.
- Never mix old and new batteries together, or different types of batteries.
- Never dispose of batteries in a fire, or attempt to recharge ordinary batteries.
- Before replacing the battery, turn off the meter and disconnect all the test probes.
- To prolong battery life turn off the meter after use.
- CAT III: Measurement category III is for measurements performed in the building installation. Examples are measurements on distribution boards, circuit-breakers, and wiring, such as cables, bus-bars, junction boxes, switches and socket-outlets in the fixed installation, and equipment for industrial application and some other equipment such as stationary motors with permanent connection to the fixed installation.
- Only use test leads and probes that are in compliance with IEC 61010-031, and rated CAT III 600V.

SYMBOL GUIDE

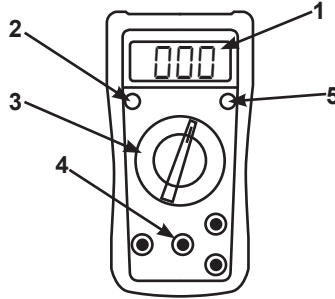
	Low battery		Grounding		Warning
	Continuity Buzzer		AC		DC
	Fuse		Double insulated		Diode

WHAT'S INCLUDED

- Digital multimeter
- User manual
- Set of test leads
- K-type temperature probe (72-10390 only)

FUNCTIONS

1. LCD Display
2. POWER button
3. Range selector
4. Input terminals
5. HOLD button



OPERATING PARAMETERS

- Ambient temperature $23^{\circ} \pm 5^{\circ}$
- Relative Humidity: $<75\%$

DC VOLTAGE

Range	Resolution	Accuracy
200mV	100 μ V	$\pm(0.5\%+2)$
2000mV	1mV	
20V	0.01V	
200V	0.1V	$\pm(0.8\%+2)$
600V	1V	

Note:

Input Impedance: 10M Ω for all ranges

AC VOLTAGE

Range	Resolution	Accuracy
200V	0.1V	$\pm(1.2\%+3)$
600V	1V	

Note:

- Input Impedance: 4.5M Ω
- Frequency range: 45Hz-400Hz
- Overload protection: 600Vrms
- Display: Mean value (5% RMS value of sine wave)

DC CURRENT

Range	Resolution	Accuracy
2000 μ A	0.1 μ A	$\pm(1\%+2)$
20mA	0.01mA	$\pm(1\%+2)$
200mA	0.1mA	$\pm(1.2\%+2)$
10A	0.01A	$\pm(2.0\%+5)$

Notes:

- Overload protection.
- mA input: 500mA/600V Φ 6x32mm.
- 10A input: 10A/600V Φ 6x32mm.
- Maximum input current: 10A (For current over 5A, measurement time must not exceed 10 seconds and the wait period between each measurement must be longer than 15 minutes).

AC CURRENT

Range	Resolution	Accuracy	
		72-2590	72-2595
200 μ A	0.1 μ A	$\pm(1.0\%+3)$	N/A
2mA	1 μ A	$\pm(1.0\%+3)$	N/A
20mA	10 μ A	N/A	$\pm(1.0\%+3)$
200mA	100 μ A	$\pm(1.8\%+3)$	
10A	10mA	$\pm(3.0\%+5)$	

Notes:

- Overload Protection
- μ A, mA input: 500mA/600V Fuse Φ 6x32mm.
- 10A input: 10A/600V Fuse Φ 6x32mm.
- Maximum input current: 10A (For current over 5A, measurement time must not exceed 10 seconds and the wait period between each measurement must be longer than 15 minutes).

TEMPERATURE (72-10390 ONLY)

Range		Resolution	Accuracy
TEMP $^{\circ}$ C (-40 $^{\circ}$ C~1000 $^{\circ}$ C)	-40 $^{\circ}$ C~20 $^{\circ}$ C	1 $^{\circ}$ C	-(8%+5)
	>20 $^{\circ}$ C~0 $^{\circ}$ C		$\pm(4\%)$
	0 $^{\circ}$ C ~100 $^{\circ}$ C		$\pm(1\%+3)$
	>100 $^{\circ}$ C~1000 $^{\circ}$ C		$\pm(2.5\%+2)$



RESISTANCE

Range	Resolution	Accuracy
200Ω	0.1Ω	±(0.8%+5)
2kΩ	1Ω	
20kΩ	0.01kΩ	
200kΩ	0.1kΩ	
2000kΩ	1kΩ	
20MΩ	0.01kΩ	±(1.0%+5)
200MΩ	100kΩ	±5%(reading-10)+10

Notes

- Open-circuit voltage: ≤ 700mV (The open circuit voltage is about 2.9V at 200MΩ range).
- Overload protection: 600Vrms DC or AC for all ranges.
- Relative Humidity <65% for measurements at 200MΩ range.

CONTINUITY AND DIODE TEST

Range	Description	Testing Condition
	Displays the forward voltage of the diode (approximate value) in mV.	Forward DC current is about 1mA. Reverse DC voltage is about 2.8V.
	When resistance ≤10Ω, the buzzer beeps and an approximate resistance value in Ω displays.	Open circuit voltage is about 2.8V.

Note: Overload protection, 600Vrms DC or AC.

BATTERY TEST (72-2590 ONLY)

Range	Resolution	Accuracy	Description
12V	10mV	±(2.5%+2)	Built-in load resistance: 240Ω
9V	10mV		Built-in load resistance: 1.8kΩ
1.5V	1mV		Built-in load resistance: 30Ω

Note: Overload protection 500mA/600V fuse.

OPERATION

Measuring DC Voltage

- Insert the test leads into the input terminals (red to V and black to COM).
- Turn the range selector to **V_{DC}** range.
- Connect the test probes with the power or load being measured in parallel, and the polarity of the point touched by the red test probe displays.

Measuring AC Voltage

- Insert the test leads into the input terminals (red to V and black to COM).
- Turn the range selector to a **V_{AC}** range, and connect the test probes to the power or load being measured in parallel.

Notes:

- If the voltage to be measured is unknown, choose the maximum measuring range (600V) and reduce it step by step until a satisfactory reading is obtained.
- Disconnect from the circuit under test when changing the range.
- If the Display shows "OL", it indicates the measured voltage is out of range. In this case, turn the range selector to a higher range.
- "**⚠**" on the meter indicates that inputting a voltage higher than 600V is not allowed. Otherwise, the meter will be damaged.
- Special attention should be given to avoid electrical shock when measuring high voltage.

Measuring DC Current

- Insert the black test lead into COM terminal. If the current under test is $\leq 200\text{mA}$, insert the red test lead into the mA terminal. If the current is higher, insert the red test lead into 10A terminal.
- Turn the range selector to **A_{DC}** range, and connect the test probes in series with the circuit to be measured. The polarity of the point touched by the red test probe together with the measured value is displayed.

Measuring AC Current

- Insert the black test lead into COM terminal. If the current under test $\leq 200\text{mA}$, insert the red test lead into mA terminal. If the current is higher, insert the red test lead into 10A terminal.
- Turn the range selector to a **A_{AC}** range, and connect the test probes with the circuit being measured in series.

Notes:

- If the current to be measured is unknown, choose the maximum measuring range (10A) and reduce it step by step until a satisfactory reading is obtained.
- Disconnect from the circuit under test when changing the range.
- If the display only shows "OL", it indicates the measured current is out of range. In this case, turn the range selector to a higher range.
- "**⚠**" on the meter indicates that the maximum input current is 200mA. The built-in fuse of 500mA/600V $\Phi 6 \times 32\text{mm}$ can effectively protect the circuit from burn-out. The 10A range uses a fuse of 10A/600V $\Phi 6 \times 32\text{mm}$ for protection.

Measuring Resistance

- Insert the test leads into the input terminals (red to Ω and black to COM).
- Turn the range selector to a Ω range, and connect the test probes to the resistor being measured.



Notes:

- If the measured resistance is out of the range selected, "OL" will be displayed and you should select a higher range. It normally takes several seconds to display a stable reading in a high-resistance ($>1\text{M}\Omega$) measurement.
- When there is no input, such as in open-circuit condition, the instrument will display "OL".
- When making an in circuit measurement, disconnect all power supplies and discharge all the capacitors.
- In $200\text{M}\Omega$ range, a 10-digit reading is produced on a short circuit. It should be subtracted from the measured value. For instance, when you measure $100\text{M}\Omega$, the meter will display 101.0, subtract 10 digits from 101.0 to get the precise reading.

Measuring Temperature (72-10390 only)

- Insert the test probe banana plugs into the input terminals (mA and V).
- Turn the range selector to $^{\circ}\text{C}$ range, and the LCD displays the ambient temperature.
- Place the probe near the object being measured.
- Read the measured temperature directly from the Display in $^{\circ}\text{C}$.

Testing Diodes and Continuity

- Insert the test leads into the input terminals (red to  and black to COM, the polarity of the red test lead is "+"). Then turn the range selector to  range.
- Connect the test probes with the diode being tested. The reading obtained is the approximate value of the forward voltage drop.

Warning:

Do not input higher than DC 60V and AC 30V voltage to prevent any damage.

- The LCD display "OL" indication open-circuit of the tested diodes or testing the diodes with incorrect polarity.
- To maintain the diode measurement accuracy disconnect the circuit power and discharge all the high voltage capacitors during the measuring procedure.
- The open circuit of diodes is around 2.3V.

Auto Power Off

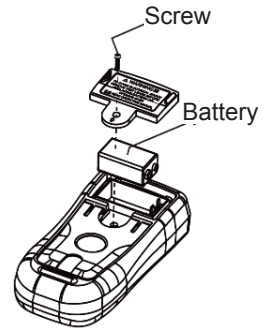
- The meter features an Auto Power Off function. It will power off automatically after 15 minutes inactivity and enter the sleep mode which reduces battery power consumption.
- If you want to power on the meter again, press the POWER button twice.

BATTERY REPLACEMENT

Warning: Only replace the battery after the test leads are removed and the power is off.

To replace the battery,

- Unscrew and remove the battery cover.
- Replace the battery with a new 9V battery of the same type.
- Refit the cover.



CLEANING

- Clean the meter with a clean, soft cloth.
- Do not use any chemicals, abrasives or solvents that could damage the meter.



INFORMATION ON WASTE DISPOSAL FOR CONSUMERS OF ELECTRICAL & ELECTRONIC EQUIPMENT

These symbols indicate that separate collection of Waste Electrical and Electronic Equipment (WEEE) or waste batteries is required. Do not dispose of these items with general household waste. Separate for the treatment, recovery and recycling of the materials used. Waste batteries can be returned to any waste battery recycling point which are provided by most battery retailers. Contact your local authority for details of the battery and WEEE recycling schemes available in your area.



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