



## Digital Multimeter Model: 72-2590 and 72-2595

#### 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.

Ħ	Low battery	÷	Grounding	$\land$	Warning
•1))	Continuity Buzzer	2	AC		DC
-8-	Fuse		Double insulated	<b>→</b> +	Diode
			0		

## SYMBOL GUIDE

#### WHAT'S INCLUDED

- Digital multimeter
- User manual
- Set of test leads
- K-type temperature probe (72-2595 only)

#### FUNCTIONS

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



#### **OPERATING PARAMETERS**

- Ambient temperature 23° ± 5°
- Relative Humidity: <75%

#### DC VOLTAGE

Range	Resolution	Accuracy
200mV	100µV	
2V	1mV	
20V	10mV	±(0.3%+1)
200V	100mV	
600V	1V	±(0.8%+2)

#### Note:

Input Impedance: 10MΩ for all ranges

#### AC VOLTAGE

Range	Resolution	Accuracy
2V	1mV	
20V	10mV	±(0.8%+3)
200V	100mV	
600V	1V	±(1.5%+5)

#### Note:

- Input Impedance: 10MΩ for all ranges
- Frequency range: 45Hz-400Hz
- Overload protection: 600Vrms or 850Vpk-pk
- Display: Mean value (RMS value of sine wave)

## AC VOLTAGE

Banga	Resolution	Accuracy		
Range		72-2590	72-2595	
200µA	0.1µA	±(0.8%+1)	N/A	
2mA	1µA	1µA ±(0.8%+1)		
20mA	10µA	N/A	±(0.8%+1)	
200mA 100µA		±(1.5%+1)		
10A	10mA	±(2.0%+5)		

#### Notes:

- Overload protection.
- μA, mA input: 500mA/600V Φ6x32mm.
- A input: 10A/600V Φ6x32mm.
- Maximum input current: 10A (For current over 5A, measuring time must not exceed 15 seconds).
- Measured voltage drop: 200mV for full range.

#### AC CURRENT

Danca	Decolution	Accuracy		
Kange	Resolution	72-2590	72-2595	
200μΑ	0.1μΑ	±(1.0%+3)	N/A	
2mA	1μΑ	±(1.0%+3)	N/A	
20mA	10µA	N/A	±(1.0%+3)	
200mA	100µA	±(1.8%+3)		
10A	10mA	±(3.0%+5)		

#### Notes:

- Overload Protection
- uA, mA input: 500mA/600V Φ6x32mm.
- A input: 10A/600V Φ6x32mm.
- 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).
- Measured voltage drop: 200mV for full range.
- Display: Mean value (RMS value of sine wave).

#### RESISTANCE

Damas	Resolution	Accuracy		
Range		72-2590	72-2595	
200Ω	0.1Ω	±(1.2%+2)		
2kΩ	1Ω	 ±(1.0%+2)		
20kΩ	10Ω			
200kΩ	100Ω			
2ΜΩ	1kΩ	±(1.2%+2)		
20ΜΩ	10kΩ	±(1.5%+2)		
200ΜΩ	100kΩ	±[5.0%(reading-10)+10)] N/A		

#### 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.

## CAPACITANCE

Banga	Baselution	Accuracy		
Kange	Resolution	72-2590	72-2595	
2nF	1pF	N/A	±(4.0%+3)	
20nF	10pF	N/A	±(4.0%+3)	
200nF	100pF	N/A	±(4.0%+3)	
2µF	1nF	±(4.0%+3)		
200µF	100nF	$\leq$ 50µF ±(5.0%+4) >50µF, for reference only		

Note: Testing signal is about 200Hz, 40mVrms.

## TEMPERATURE (72-2595 ONLY)

Range	Resolution	Accuracy	
	-40°C~0°C		±(3%+9)
TEMP °C (-40°C~1000°C)	0°C~400°C	1ºC	±(1%+5)
(-40 C * 1000 C)	400°C ~1000°C		±(2%+10)
	-40°F~3°F		±(3%+10)
I EM ⁰F (-40ºF~1832ºF)	32ºF~75ºF	2ºF	±(1%+8)
	752°F~1832°F		±(2%+18)

## 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.
•1))	When resistance $\leq 10\Omega$ , the buzzer beeps and an approximate resistance value in $\Omega$ 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		Built-in load resistance: 240Ω
9V	10mV	±(2.5%+2)	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... 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.

## B. Measuring AC Voltage

- Insert the test leads into thv v ut terminals (red to V and black to COM).
- Turn the range selector to a 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 ≤ 200mA, 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... 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 ≤ 200mA, 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 ~ 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 Φ6 x 32mm can effectively protect the circuit from burn-out. The 10A range uses a fuse of 10A/600V Φ6 x32mm 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  $\Omega$  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 (>1MΩ) 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 200MΩ range, a 10-digit reading is produced on a short circuit. It should be subtracted from the measured value. For instance, when you measure 100MΩ, the meter will display 101.0, subtract 10 digits from 101.0 to get the precise reading.

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#### Measuring Capacitance

- Before connecting to the capacitor to be tested, note that the zeroing after range change takes some time and the existing drift reading cannot influence the testing precision.
- Insert the test leads into the centre pair of terminals marked +(-.
- Turn the range selector to Fcx range, and connect the test probes to the capacitor under test.
- The capacitance is displayed.

## Notes

- Although the capacitance ranges have been protected internally, you must fully discharge the capacitor to be measured to avoid possible meter damage and measuring errors.
- During large-capacitance measurement, it will take some time to get a stable reading.
- Unit, 1000pF=1nF, 1000nF=1µF

## Measuring Temperature (72-2595 only)

- Insert the test probe banana plugs into the input terminals (red to mA and black to COM).
- Turn the range selector to °C or °F 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 °C or °F.

## **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 in range.

- Connect the test probes with the diode being tested. The reading obtained is the approximate value of the forward voltage drop.
- Connect the test probes with the circuit under test, if the resistance between the two tested points is <10Ω, the built-in buzzer sounds.

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## Battery Test (72-2590 only)

- Insert the test leads into the input terminals (red to ⊣⊢ and black to COM).
- Turn the range selector to a  $\stackrel{i}{\vdash}$  range.
- Connect the test probes with the battery being measured in series and ensure the polarity is correct (red with "+", black with "-").
- The measured value shows on the display, which is the voltage between the cathode and anode of the battery.

**Note:** When battery testing has been completed, disconnect the test probes from the battery under test.

## 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.

Screw

Battery

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.



- 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.