

# Digital Multimeter

Owners manual for 830 series

- Read this owners manual thoroughly before use

EM






## WARRANTY

This instrument is warranted to be free from defects in material and workmanship for a period of one year. Any instrument found defective within one year from the delivery date and returned to the factory with transportation charges prepaid, will be repaired, adjusted, or replaced at no charge to the original purchaser. This warranty does not cover expandable items such as batteries or fuses. If the defect has been caused by a misuse or abnormal operation conditions, the repair will be billed at a nominal cost.

## SAFETY INFORMATION

830 series multimeter have been designed according to IEC-1010 concerning electronic measuring instruments with a measurement category (CAT I 600V). The max. permitted transient voltage: 2500V, and pollution2.


## ELECTRICAL SYMBOLS

- ~ AC (Alternating Current)
- ≡ DC (Direct Current)
-  Important safety information. Refer to the manual.
-  Dangerous voltage may be present.
-  Earth ground
-  Fuse
- CE Conforms to European Union directives
-  Double insulated

## WARNING

To avoid possible electric shock or personal injury, follow these guidelines:

- Do not use the meter if it is damaged. Before you use the meter, inspect the case. Pay particular attention to the insulation surrounding the connectors
- Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads before you use the meter.
- This meter is designed to be indoor use.

- Do not use the meter if it operates abnormally. Protection may be impaired. When in doubt, have the meter serviced.
- Do not operate the meter around explosive gas, vapor, or dust.
- Do not apply more than the rated voltage, as marked on the meter, between terminals or between any terminal and earth ground.
- Before use, verify the meter's operation by measuring a known voltage.
- When measuring current, turn off circuit power before connecting the meter in the circuit. Remember to place the meter in series with the circuit.
- When servicing the meter, use only specified replacement parts.
- Use with caution when working above 30V ac rms, 42V peak, or 60V dc. Such voltages pose a shock hazard.
- When using the probes, keep your fingers behind the finger guards on the probes.
- Connect the common test lead before you connect the live test lead. When you disconnect test leads, disconnect the live test lead first.
- Remove the test leads from the meter before you open the battery door.
- Do not operate the meter with the battery door or portions of the cover removed or loosened.
- To avoid false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the low battery indicator ( "BAT" or "  ") appears.

- Remaining endangerment:

When an input terminal is connected to dangerous live potential it is to be noted that this potential at all other terminals can occur!

- Never attempt to use the test leads to measure voltage which is more than 1000V or measure current which is more than 10A.
- CAT I-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, the transient stresses are variable; for that reason, its necessary that the transient-withstand -capability of equipment is made known to the user.). Don't use the equipment for measurement within Measurement Categories II, III, and IV.

## **CAUTION**

To avoid possible damage to the meter or to the equipment under test, follow these guidelines:




- Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes, or capacitance.
- Use the proper terminals, function, and range for your measurements.
- Before measuring current, check the meter's fuses and turn power OFF to the circuit before connecting the meter to the circuit.
- Before rotating the range switch to change functions, disconnect test leads from the circuit under test.
- Before attempting to insert transistors for testing, always be sure that the test leads have been disconnected from any measurement circuits.
- Remove test leads from the Meter before opening the Meter case.

## **MAINTENANCE**

- Before opening the case, always disconnect the test leads from all live circuits.
- For continue protection against fire, replace fuse only with the specified voltage and current ratings: F 250mA/250V (Fast Blown)  $\phi$  5 x 20
- Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.

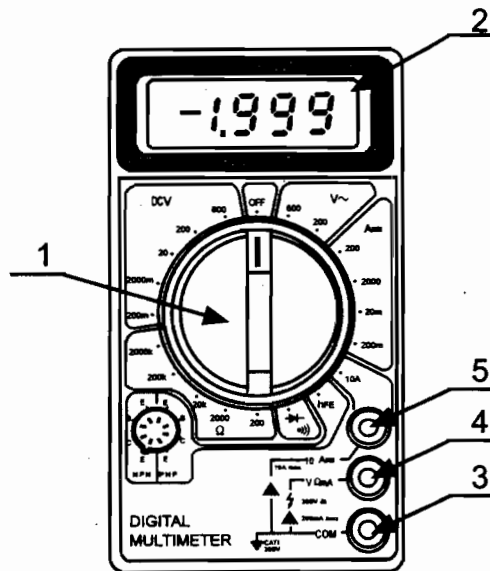
## **GENERAL DESCRIPTION**

830 series multimeters are pocket-sized 3 1/2-digit digital multimeters for measuring DC and AC Voltage, DC Current, Resistance and Testing Diode. Some models also provide transistor test function, signal output or performing continuity test. Overload protection and low battery indication are provided. Following table shows functions of the series multimeters.

MODEL	DCV	ACV	DCA	$\Omega$	hFE			TEMP	 ▲	BAT
830	*	*	*	*		*	*			*
830A	*	*	*	*		*			50Hz	*
830B	*	*	*	*	*	*				
830C	*	*	*	*	*	*	*	*		
830D	*	*	*	*	*	*	*		50Hz	

▲ This function allows the meter to output a signal as a signal generator.

## FRONT PANEL DESCRIPTION



## **1. FUNCTION AND RANGE SWITCH**

This switch is used to select the functions and desired ranges as well as to turn ON/OFF the meter.

To extend the life of the battery, the switch should be in the "OFF" position when the meter is not in use.

## **2. DISPLAY**

3 1/2 digit, LCD(12mm)

## **3. "COM" JACK**

Plug in connector for black (negative) test lead.

## **4. "VΩmA" JACK**

Plug in connector for red (positive) test lead for all voltage, resistance and current ( up to 200mA ) measurements.

## **5. "10A" JACK**



Plug in connector for red (Positive) test lead for current ( between 200mA and 10A ) measurement. There is no fuse for "10A" jack. To use safely, each measurement can not last for more than 10 seconds, and the interval between each measurement must be more than 15 minutes.

## SPECIFICATION

Accuracies are guaranteed for 1 year, at 18°C~28°C, less than 75%RH.

### 1. DC VOLTAGE

RANGE	RESOLUTION	ACCURACY
200mV	100 $\mu$ V	$\pm 0.5\% \pm 5D$
2000mV	1mV	
20V	10mV	
200V	100mV	
600V	1V	$\pm 1.0\% \pm 5D$

Input impedance: 1M $\Omega$

Max. input voltage: 600V DC or 600V AC rms.

### 2. AC VOLTAGE

RANGE	RESOLUTION	ACCURACY
200V	100mV	$\pm 1.2\% \pm 10D$
600V	1V	

Input impedance: 1M $\Omega$

Freq. response: 45-400Hz

Max. input voltage: 600V AC rms

Display: sine wave rms. average response

### 3. DC CURRENT

RANGE	RESOLUTION	ACCURACY
200 $\mu$ A	100nA	$\pm 1.0\% \pm 5D$
2000 $\mu$ A	1 $\mu$ A	
20mA	10 $\mu$ A	
200mA	100 $\mu$ A	$\pm 1.2\% \pm 5D$
10A	10mA	$\pm 2.0\% \pm 5D$

Overload protection:F 250mA/250V Fused (10A unfused)

### 4. RESISTANCE

RANGE	RESOLUTION	ACCURACY
200 $\Omega$	0.1 $\Omega$	$\pm 1.2\% \pm 5D$
2000 $\Omega$	1 $\Omega$	$\pm 1.0\% \pm 5D$
20k $\Omega$	10 $\Omega$	
200k $\Omega$	100 $\Omega$	
2000k $\Omega$	1k $\Omega$	$\pm 1.2\% \pm 5D$

Max. open circuit voltage: about 3V.

### 5. TEMPERATURE

RANGE	RESOLUTION	ACCURACY
0 $^{\circ}$ C ~ +1000 $^{\circ}$ C	1 $^{\circ}$ C	$\pm 3^{\circ}\text{C} \pm 2D < 150^{\circ}\text{C}$
		$\pm 3\% > 150^{\circ}\text{C}$

### 6. hFE

Vcc about 3V, Ib about 10 $\mu$ A, display hFE 1-1000



## 7. DIODE AND BUZZER

Diode: Testing Voltage about 2.8V, current about 1mA. The approximate forward voltage drop in mV will be displayed.

Buzzer: The buzzer will sound when it is less than about 50Ω.

## 8. SIGNAL OUTPUT


Signal output: 50Hz, square wave

Level output: 3Vp-p

## 9. BATTERY TEST

Range	Description	Test Condition
1.5V	The working voltage of the battery will be displayed on the LCD, so that the quality of the battery can be judged.	The working current is about 20mA.
9V		The working current is about 5mA.

## GENERAL SPECIFICATION

- Display: ----- 3 1/2 digits LCD with a max. reading of 1999
- Polarity: ----- Auto polarity indication.
- Overrange indication: ----- Only figure "1" on the display.
- Operating environment: --- temp. 0 ~ 40°C ; relative humidity < 75%.
- Storage temperature: ----- -15°C ~ 50°C
- Battery: ----- 9V 6F22
- Low battery indication: ----- "  " or "BAT" appears on the display.
- Dimensions: ----- 139mm × 78mm × 40mm
- Weight: ----- 170g
- Power consumption: ----- 20mW

# **OPERATING INSTRUCTION**

## **DC CURRENT MEASUREMENT**

1. Connect the red test lead to the "VΩmA" jack and the black test lead to the "COM" jack.
2. Set the range switch to the desired A= range.
3. Open the circuit in which the current is to be measured, and connect the test leads in series with the circuit.
4. Read the current value on the LCD display along with the polarity of the red test lead.

## **DC VOLTAGE MEASUREMENT**

1. Connect the red test lead to the "VΩmA" jack and the black test lead to the "COM" jack.
2. Set the range switch to the desired V= range. If the voltage is not known beforehand, set the range switch at the highest range position and then reduce it range by range until satisfactory resolution is obtained.
3. Connect the test leads across the device or circuit to be measured. Read the voltage value on the LCD display along with the polarity of the red test lead.

## **AC VOLTAGE MEASURE**

1. Connect the red test lead to the "VΩmA" jack and the black test lead to the "COM" jack.
2. Set the range switch to the desired V~ range.
3. Connect test leads across the device or circuit to be measured and read the voltage value on the LCD display.

## **RESISTANCE MEASUREMENT**

1. Connect the red test lead to the "VΩmA" jack and the black test lead to the "COM" jack.
2. Set the range switch to the desired Ω range.
3. If the resistor to be measured is connected to a circuit, disconnect circuit power and discharge all capacitors before measuring resistance.

4. Connect the test leads across the resistor to be measured and read the resistance value on the LCD display.

### **TEMPERATURE MEASUREMENT**

1. Set the range switch to the "TEMP" range, and the meter will show the current room temperature without any external thermocouple connections.
2. Connect the K type thermocouple to the "V $\Omega$ mA" and "COM" jacks. Contact the object to be measured with the thermocouple carefully. Read the temperature value on the LCD display.

### **TRANSISTOR TEST**

1. Set the range switch to the "hFE" range.
2. Determine whether the transistor to be tested is PNP or NPN type and locate the emitter, base, collector leads. Insert the leads into the proper holes of the hFE socket on the front panel. The meter will display the approximate hFE value.

### **DIODE & CONTINUITY MEASUREMENT**

1. Connect the red test lead to the "V $\Omega$ mA" jack and the black test lead to the "COM" jack.
2. Set the range switch to the  $\rightarrow$  range.
3. Connect the red test lead to the anode of the diode to be tested and the black test lead to the cathode of the diode.
4. The approximate forward voltage drop of the diode will be displayed in mV. If the connection is reversed, only figure "1" will be shown on the LCD.
5. Connect the test leads to the two terminal of the circuit to be tested. If the resistance is lower than about 50 $\Omega$  , the built-in buzzer will sound.

### **TEST SIGNAL OUTPUT**

1. Set the range switch to "  $\square$  " range.
2. A test signal will appear between the "V $\Omega$ mA" and "COM" jacks. The voltage is approximate 3Vp-p. A coupling capacitor should be used when connecting the meter to a circuit.


### **Cautions:**

- a. This is output signal. be sure not to measure voltage
- b. There is no shortcircuit protection.
- c. The voltage of the reversed signal of the output terminal should not exceed 40Vp-p.

### **BATTERY MEASUREMENT**

1. Set the range switch to the desired "BATT" range (1.5V or 9V).
2. Connect the red test lead to the "VΩmA" jack and the black test lead to the "COM" jack. And connect the test leads to the two terminals of the battery to be measured and read the value on the LCD display.

### **BATTERY AND FUSE REPLACEMENT**

If the sign "BAT" or " " appears on the LCD display, it indicates that the battery should be replaced. If the error of the reading is too much, it also indicates that the battery should be replaced. To replace the battery, loosen the screws on the back cover and open the case. Replace the exhausted battery with a new one of the same type.

The fuse rarely needs to be replaced and is blown as a result of the operator's error. To replace the fuse, open the case and replace the blown fuse with the ratings specified: F 250mA/250V.

#### **WARNING**

Before attempting to open the case, always be sure that test leads have been disconnected from measurement circuits. Close case and tighten screws completely before using the meter to avoid electrical shock hazard.