

# OPERATING INSTRUCTIONS

## SERIES MM10 DIGITAL MULTIMETER

### SAFETY INFORMATION

The following safety information must be observed to insure maximum personal safety during the operation of this meter.

Do not use the meter if the meter or test leads look damaged, or if you suspect that the meter is not operating properly.

Never ground yourself when taking electrical measurements. Do not touch exposed metal pipes, outlets, fixtures, etc., which might be a ground potential. Keep your body isolated from ground by using dry clothing, rubber shoes, rubber mats, or any approved insulating material.

Turn off power to the circuit under test before cutting, unsoldering, or breaking the circuit. Small amounts of current can be dangerous.

Use caution when working above DC 60V or AC 30Vrms. Such voltages pose a shock hazard.

When using the probes, keep your fingers behind the finger guards on the probes.

Measuring voltage which exceeds the limits of the multimeter may damage the meter and expose the operator to a shock hazard. Always recognize the meter voltage limits as stated on the front of the meter.

### GENERAL SPECIFICATIONS

**Display:** 3-1/2 digit liquid crystal display (LCD) with a maximum reading of 1999.

**Polarity:** Automatic, positive implied, and (-) for negative polarity indication.

**Overload:** (1) or (-1) is displayed on LCD.

**Low Battery Indication:** When "  " shows on LCD, battery needs to be replaced.

**Sampling Rate:** 2.5 times per second.

**Operating Environment:** 0°C~40°C 80% RH.

**Storage Temperature:** -10°C~60°C 0~80% RH with battery removed from meter.

**Power:** One 006P 9V standard battery.

**Battery Life:** 150 hours approx.

**Dimension:** 125 mm (H) x 68 mm (W) x 25 mm (D).

**Weight:** 150g approx. including battery.

**Accessory:** Instruction manual, test leads, (1) 9V battery.

### SPECIFICATIONS

#### DCV

Range	Resolution	Accuracy	Input Impedance	Overload Protection
2V	1mV	0.5% + 1 dgt	10MΩ	DC 600V AC 600V rms
20V	10mV	1.5% + 1 dgt		
200V	100mV			
600V	1V			

#### ACV

Range	Resolution	Accuracy	Input Impedance	Overload Protection
200V	100mV	2% + 3 dgt (40 Hz-500 Hz)	4.5MΩ	DC 600V AC 600V rms
600V	1V	2.5% + 3 dgt		

#### DCA

Range	Resolution	Accuracy	Input Impedance	Overload Protection
2mA	1μA	1.5% + 1 dgt	0.3V	0.5A Fuse & Diodes
20mA	10μA			
200mA	100μA			
10A	10mA	2% + 1 dgt	0.7V	

#### Resistance (Ω)

Range	Resolution	Accuracy	Open Voltage	Overload Protection
200Ω	0.1Ω	2% + 2 dgt	2.8V	DC/AC 500V rms
2KΩ	1Ω	1.5% + 2 dgt		
20KΩ	10Ω			
200KΩ	100Ω			
2MΩ	1KΩ			
20MΩ	10KΩ	2.5% + 2 dgt	0.3V	

#### Diode Test

Range	Resolution	Test Current	Open Voltage	Overload Protection
	1mV	1mA	≈2.8V	DC/AC 500V rms

#### Continuity Test (·)))

Range	Resolution	Sound	Open Voltage	Overload Protection
·)))	0.1Ω	<30Ω	≤2.8V	AC/DC 500V rms

#### Transistor hFE

Range	Measuring Scope	Test Voltage	Test Current	Overload Protection
NPN PNP	0-1000	<3.2V	IB≈10μA	

#### LED

Range	Measuring Scope	Test Voltage	Test Current	Overload Protection
LED	1.5-3V	3V	≈25mA	

## **OPERATION**

### **DCV (ACV) Measurement**

1. Plug red test lead to "V $\Omega$ mA" jack, and black test lead to "COM" jack.
2. Turn the function/range selector to "DCV" or "ACV" region. (If measuring an unknown voltage, start from the highest range then adjust to a proper lower range for the best resolution.)
3. Connect the other ends of the test leads to the desired circuit.
4. Get the reading from the LCD.

### **DCA Measurement**

1. Plug red test lead to "V $\Omega$ mA" jack (if measuring a current between 200mA and 10A, plug to "10A" jack instead), and black test lead to "COM" jack.
2. Turn the function/range selector to "DCA" region. (If measuring an unknown current, start from the highest range then adjust to a proper lower range for the best resolution.)
3. Connect the other ends of the test leads in series with the desired circuit.
4. Get the reading from the LCD.

### **Resistance Measurement**

1. Plug red test lead to "V $\Omega$ mA" jack, and black test lead to "COM" jack.
2. Turn the function/range selector to " $\Omega$ " region (if measuring an unknown resistance, start from the highest range, then adjust to a proper lower range for the best resolution).
3. Connect the other ends of the test leads to the desired resistor.
4. Get the reading from the LCD.

### **Diode (↔) Measurement**

1. Plug red test lead to "V $\Omega$ mA" jack, and black test lead to "COM" jack.
2. Turn the function/range selector to "↔" range.
3. Connect the other end of red test lead to the positive pole (P) of the diode, and the other end of the black test lead to the negative pole (N).
4. Get the reading from the LCD. (If connection to poles of diode is reverse, LCD would display "1".)

### **Continuity (·))) Measurement**

1. Plug red test lead to "V $\Omega$ mA" jack, and black test lead to "COM" jack.
2. Turn the function/range selector to "·)))" range.
3. Connect the other ends of the test leads to the desired resistor.
4. Get the reading from the LCD.

### **hFE Measurement (for Transistor)**

1. Turn the function/range selector to "hFE" (NPN or PNP) region.
2. Insert the transistor pins into "hFE" jack according to E.B.C. sequence.
3. Get the reading from the LCD.

### **LED Test**

1. Turn the function/range selector to "NPN/LED" range.
2. Insert the LED into the measuring jack according to the "+" "-" position, and a normal LED will be bright.
3. This function is used only to judge a LED rated 15V~3V for its brightness or not. The reading on LCD means nothing.

## **MAINTENANCE**

**WARNING:** Remove test leads before changing battery or fuse or performing any servicing.

### **Battery Replacement**

Power is supplied by a 9 volt "transistor" battery (006P DC9V). The "🔋" shown on the LCD indicates that replacement is needed. When replacing, remove the two screws from the back of the meter and lift off the rear case. Remove the battery from the case on bottom.

### **Fuse Replacement**

If no current measurements are possible, check for a blown overload protection fuse. Replace the fuse with the original type 0.5A/250V, fast acting type.