Digital Multimeter

Users Manual

Read this manual thoroughly before use

INTRODUCTION

This meter is a compact 3 ½ digit, digital multimeter, designed to measure DC and AC voltage, DC and AC current, resistance, diode, continuity and battery.
Some models also have temperature measurement function, frequency measurement function, non-contact AC voltage detection function, or live ac wire detection function
This multimeter features backlight, data hold, full-range overload protection, illumination function, etc

It is an easy to operate, useful testing tool.

SAFETY INFORMATION

This meter has been designed according to IEC 61010 concerning electronic measuring instruments with a measurement category (CAT III 300V) and pollution degree 2.

⚠ 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.
- 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 where explosive gas, vapor, or dust is present.
- 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 caution when working with voltage 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 cover or the case.
- Do not operate the meter with the battery cover or portions of the case removed or loosened.
- To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the low battery indicator () appears.
- Do not use the meter in a manner not specified by this manual or the safety features provided by the meter may be impaired.
- Adhere to local and national safety codes. Individual protective equipment must be used to prevent shock and arc blast injury where hazardous live conductors are exposed.
- To void electric shock and personal injury, do not touch any naked conductor with hand or skin; and do not ground yourself while using this meter.
- Do not use the meter if the meter, a test lead or your hand is wet.

- Remaining endangerment:
  When an input terminal is connected to dangerous live potential it is to be noted that this potential can occur at all other terminals!
- **CAT III** - 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 the fixed installation.
  Do not use the meter for measurements within Measurement Categories IV.

Caution

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

- Disconnect circuit power and discharge all capacitors thoroughly before testing resistance, diode, continuity or temperature.
- Use the proper terminals, function and range for your measurements.

- Before measuring current, check the meter's fuses and turn off power to the circuit before connecting the meter to the circuit.
- Before turning the rotary switch to change functions, disconnect the test leads from the circuit under test.

Electrical Symbols

~ Alternating Current

⎓ Direct Current

≂ Both direct and alternating current

⚠ Caution, risk of danger, refer to the operating manual before use.

⚠ Caution, risk of electric shock.

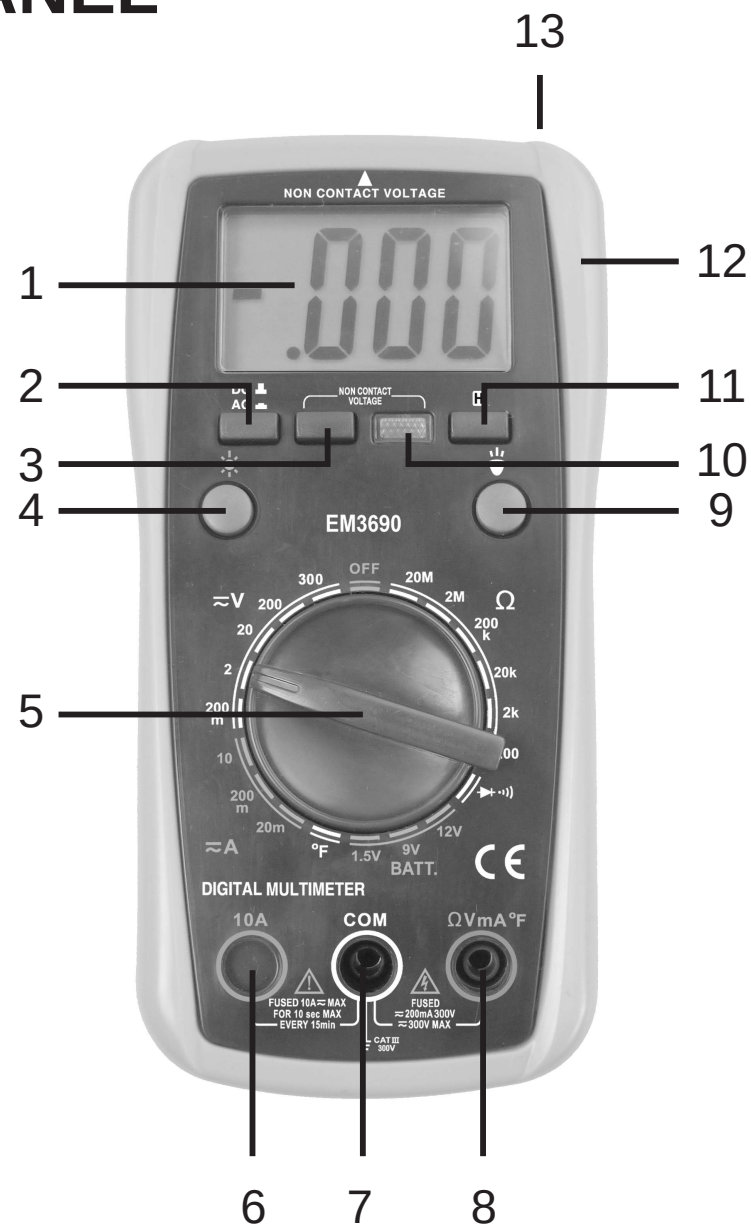
⏚ Earth (ground) Terminal

⎓ Fuse

CE Conforms to European Union directives

⧈ The equipment is protected throughout by double insulation or reinforced insulation.

FRONT PANEL



1. **Display**

   3 1/2-digit LCD, with a max. reading of 1999

2. **" AC/DC " Button**

   Used to switch between DC and AC functions.

3. **AC Voltage Detection Button**

4. **Backlight Button**

   Press this button to turn on or off the backlight. The backlight will turn off automatically about 30 secs later after it is turned on.

5. **Function/Range Switch**

   Used to select desired function or range as well as to turn on or off the meter.

   To preserve battery life, set this function/range switch in the " **OFF** " position when the meter is not in use.

6. **" 10A " Terminal**

   Plug-in connector for the red test lead for current (200mA - 10A) measurements.

7. **" COM " Terminal**

   This terminal is a plug-in connector for the black test lead. It is also a plug-in connector for the negative (–) plug of the K type thermocouple for temperature measurements.

8. **" ΩVmA " Terminal**

   This terminal is a plug-in connector for the red test lead for all measurements except temperature measurements and the current measurements ⩾ 200mA. It is also a plug-in connector for the positive (+) plug of the K type thermocouple for temperature measurements.

9. Illumination Button

Press and hold down this button to turn on the illumination lamp. To turn off the illumination lamp, just release this button.

10. AC Voltage Detection Indicator

11. " H " Button

Used to enter/exit Data Hold mode.

12. Holster

13. Illumination Lamp

GENERAL SPECIFICATION

Display: 3 1/2-digit LCD, with a max. reading of 1999

Negative Polarity Indication: Negative sign " – " shown on the display automatically

Sampling Rate: About 2 - 3 times/sec

IP Degree: IP20

Battery: 9V battery, 6F22 or equivalent, 1 pieces

Low Battery Indication: "  " shown on the display

Operating Environment: Temperature: 0°C to 40°C
Relative Humidity: < 75%

Storage Environment: Temperature: -10°C to 50°C
Relative Humidity: < 85%

Size: 170×86×40mm

Weight: About 290g (including battery)

SPECIFICATIONS

Accuracy is specified for a period of one year after calibration and at 18°C to 28°C, with relative humidity < 75%.

Accuracy specifications take the form of:
± ([% of Reading] + [number of Least Significant Digits])

DC Voltage

Range	Resolution	Accuracy	Overrange Indication
200mV	100µV	± (0.5% + 5)	"OL" shown on the display
2V	1mV	± (0.8% + 5)	
20V	10mV		
200V	100mV		
300V	1V	± (1.0% + 5)	

Input Impedance: 10MΩ

Max. Allowable Input Voltage: 300V DC

AC Voltage

Range	Resolution	Accuracy	Overrange Indication
200mV	100µV	± (1.0% + 5)	"OL" shown on the display
2V	1mV	± (1.2% + 5)	
20V	10mV		
200V	100mV		
300V	1V		

Frequency Range: 40Hz - 400Hz

Response: Average, calibrated in rms of sine wave

Max. Allowable Input voltage: 300V AC rms

DC Current

Range	Resolution	Accuracy	Overrange Indication
2mA	1µA	± (1.0% + 5)	"OL" shown on the display
20mA	10µA		
200mA	100µA	± (1.5% + 5)	
10A	10mA	± (2.0% + 5)	——— [1]

Overload Protection:

250mA/300V FAST Fuse (for " **ΩVmA** " terminal inputs)

10A/300V FAST Fuse (for "**10A** " terminal inputs)

Max. Allowable Input Current: 10A

(For inputs > 2A: measurement duration < 10 secs, and interval > 15 minutes)

AC Current

Range	Resolution	Accuracy	Overrange Indication
2mA	1µA	± (1.3% + 5)	"OL" shown on the display
20mA	10µA		
200mA	100µA	± (1.8% + 5)	
10A	10mA	± (3.0% + 5)	——— [1]

Overload Protection:

250mA/300V FAST Fuse (for " **ΩVmA** " terminal inputs)

10A/300V FAST Fuse (for " **10A** " terminal inputs)

Max. Allowable Input Current: 10A

(For inputs > 2A: measurement duration < 10 secs, and interval > 15 minutes)

Frequency Range: 40Hz - 400Hz

Response: Average, calibrated in rms of sine wave

Resistance

Range	Resolution	Accuracy	Overrange Indication
200Ω	0.1Ω	± (1.2% + 5)	"OL" shown on the display
2kΩ	1Ω		
20kΩ	10Ω		
200kΩ	100Ω		
2MΩ	1kΩ		
20MΩ	10kΩ	± (1.5% + 7)	

Max. Open Circuit Voltage: About 2.8V

Battery Test

Range	Description	Test Current
1.5V	The working voltage of the battery will be shown on the display so that the quality of the battery can be judged.	about 20mA
9V		about 5mA
12V		about 4mA

Temperature

Model	Range	Reso-lution	Accuracy	Overrange Indication
	0°C – 400°C	1°C	± (1.0% + 5)	
	400°C – 1000°C		± (2.5% + 10)	[

[1] If the temperature being measured is out of the range of 0°C to 1000°C , the display may show a reading; but the measurement error may be large or the thermocouple may be damaged.

Note:

1. Use K type thermocouple.
2. Accuracy does not include error of the thermocouple probe.
3. Accuracy specification assumes ambient temperature is stable to ±1°C (or ±1.8°F). For ambient temperature

changes of ±5°C (or ±9°F), rated accuracy applies after 1 hour.

Diode and Continuity Test

Range	Description	Test Condition
	The approx. forward voltage drop of the diode will be displayed.	Open Circuit Voltage: about 2.8V Test Current: about 1mA

OPERATING INSTRUCTION

Data Hold Mode

Press the " **H** " button to hold the present reading on the display. " **H** " appears on the display as an indicator.
To exit the Data Hold mode, press the button again. " **H** " disappears.

Measuring DC or AC Voltage

1. Connect the black test lead to the "**COM**" terminal and the red test lead to the "**ΩVmA**" terminal.
2. Set the range switch to desired ≂**V** range position. If the magnitude of the voltage to be measured is not known beforehand, set the range switch to the highest

range first and then reduce it range by range until satisfactory resolution is obtained.

3. Select DC or AC voltage measurement with the " **AC/DC** " button according to the marks beside this button.
4. Connect the test leads across the source or circuit to be tested.
5. Read the reading on the display. For DC voltage measurements, the polarity of the red test lead connection will be indicated as well.

Note:

To avoid electric shock to you or damages to the meter, do not apply a voltage higher than 300V between the terminals.

Measuring DC or AC Current

1. Connect the black test lead to the " **COM** " terminal. Connect the red test lead to the " **ΩVmA** " terminal if the current to be measured is less than 200mA. If the current is between 200mA and 10A, connect the red test lead to the " **10A** " terminal instead.
2. Set the range switch to desired **≂A** range position.
3. Select dc or ac current measurement with the " **AC/DC** " button according to the marks beside this button.

4. Turn off power to the circuit to be tested. Then discharge all high-voltage capacitors.
5. Break the circuit path to be tested, then connect the test leads in series with the circuit.
6. Turn on power to the circuit, then read the reading on the display. For DC current measurements, the polarity of the red test lead connection will be indicated as well.

Note:

1. If the magnitude of the current to be measured is not known beforehand, set the range switch to the highest range first and then reduce it range by range until satisfactory resolution is obtained.
2. If the red test lead is connected to the " **10A** " terminal, the range switch must be set in the 10A range position. If the range switch is set in the 10A range position, the red test lead must be connected to the " **10A** " terminal.

Measuring Resistance

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the " **ΩVmA** " terminal.
2. Set the range switch to desired Ω range position.
3. Connect the test leads across the object to be tested.
4. Read the reading on the display.

Note:

1. For measurements > 1MΩ, the meter may take a few seconds to stabilize reading. This is normal for high resistance measurements.
2. When the input is not connected, i.e. at open circuit, " OL " will be displayed as an overrange indication.
3. Before test, disconnect all power to the circuit to be tested and discharge all capacitors thoroughly.

Diode Test

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the " **ΩVmA** " terminal. (**Note:** The polarity of the red lead is positive " **+** ".)
2. Set the range switch to ⊣▶⊢ position.
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 display shows the approximate forward voltage drop of the diode. If the connection is reversed, "OL" will be shown on the display.

Note:

Before test, disconnect all power to the circuit to be tested and discharge all capacitors thoroughly.

Continuity Test

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the " **ΩVmA** " terminal.
2. Set the range switch to position.

4. Connect the test leads across the circuit to be tested.
5. If the resistance is less than about 20 Ω, the buzzer will sound.

Note:

Before test, disconnect all power to the circuit to be tested and discharge all capacitors thoroughly.

Battery Test

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the " **ΩVmA** " terminal.
2. According to the rated voltage of the battery to be tested, set the range switch to the corresponding **BATT.** range

position (or the corresponding **BAT.** range position).

3. Connect the test leads to the two terminals of the battery to be tested.
4. The display shows the working voltage of this battery.

Measuring Temperature

Note

To avoid possible damage to the meter or other equipment, remember that while the meter is rated for 0°C to 1000°C or 32°F to 1832°F, the K Type Thermocouple provided with the meter is rated to 250°C (or 482°F). For temperatures out of that range, use a higher rated thermocouple.

The K type Thermocouple provided with this meter is not suitable for professional usage and should only be used for non-critical measurements

1. Connect the negative (−) plug of the K type thermocouple to the "**COM**" terminal and the positive (+)

plug of the K type thermocouple to the "**ΩVmA**" terminal .

2. set the range switch to the **°C** position.

3. Carefully touch the probe tip of the thermocouple to the object to be tested.
4. Wait a while until thermal equilibrium between the object and the thermocouple probe is reached, then read the reading on the display.

Non-Contact AC Voltage Detection

Press and hold down the AC Voltage Detection Button and move the top of the meter close to the object to be tested. When the meter detects AC voltage, the built-in buzzer will sound discontinuously and the AC Voltage Detection Indicator will flash.

Note:

1. To avoid electric shock, do not touch any naked conductor with hand or skin.
2. Because of the meter's detection limit, a line (or conductor) under test may be live even if the buzzer does not sound and the AC Voltage Detection Indicator does not light.
3. Before use, verify the meter's operation by detecting a known AC voltage.
4. When you just press and hold down the AC Voltage Detection Button, the buzzer may sound two beeps and the AC Voltage Detection Indicator may flash twice. This is normal and doesn't matter.
5. Don't use the meter in an environment with intense electromagnetic field.

Live AC Wire Detection

Connect the plug of a test lead to an input terminal of the meter, and connect the probe tip of this test lead to the line's conductor to be tested. Press and hold down the AC Voltage Detection Button. When the meter detects AC voltage, the built-in buzzer will sound discontinuously and the AC Voltage Detection Indicator will flash.

Note:

1. To avoid electric shock, do not touch any naked conductor with hand or skin.
2. Because of the meter's detection limit, a line (or conductor) under test may be live even if the buzzer does not sound and the AC Voltage Detection Indicator does not light.
3. Before use, verify the meter's operation by detecting a known live ac wire (or conductor).
4. When you just press and hold down the AC Voltage Detection Button, the buzzer may sound two beeps and the AC Voltage Detection Indicator may flash twice. This is normal and doesn't matter.
5. Don't use the meter in an environment with intense electromagnetic field.

MAINTENANCE

Warning

Except replacing fuse and battery, never attempt to repair or service the meter.

Store the meter in a dry place when not in use. Don't store it in an environment with intense electromagnetic field.

General Maintenance

Periodically wipe the case with damp cloth and a little mild detergent. Do not use abrasives or solvents.

Dirt or moisture in the terminals can affect readings. Clean the terminals as follows:

1. Set the range switch to **OFF** position and remove all test leads from the meter.
2. Shake out any dirt which may exist in the terminals.
3. Soak a new swab with alcohol.
4. Work the swab around in each terminal.

If the meter fails, check and replace (as needed) the battery and fuses, and/or review this manual to verify proper use of the meter.

Battery and Fuse Replacement

Warning

To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the low battery indicator ( ) appears.

To prevent damage or injury, use only replacement fuses specified.

Before opening the battery cover or the case , turn off the meter and remove the test leads.

When the symbol " " appears on the display, the battery is low and must be replaced immediately. To replace the battery, remove the holster from the meter. Then remove the screw on the battery cover and remove the battery cover. Replace the exhausted battery with a new one of the same type, make sure that the polarity connections are correct. Reinstall the battery cover, the screw and the holster.

To replace the fuse, remove the holster from the meter. Remove the screws on the back cover, open the back cover and move it aside gently. Replace the damaged fuse with a new one of the same ratings. Reinstall the back cover, the screws and the holster properly.

This meter uses two fuses:

F1: 250mA/300V FAST fuse, Min. Interrupt Rating 1500A, Ø5X20mm

F2: 10A/300V FAST fuse, Ø5X20mm
(**Note:** 10A/300V FAST fuse can only be replaced at specified service station.)

ACCESSORIES

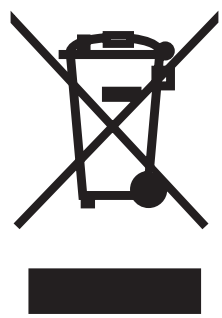
Manual: 1 piece

Test lead: 1 pair

K Type Thermocouple: 1 piece

DISPOSAL OF THIS ARTICLE

Dear Customer,
If you at some point intend to dispose of this article, then please keep in mind that many of its components consist of valuable materials, which can be recycled.



Please do not discard it in the garbage bin, but check with your local council for recycling facilities in your area.