

EM382 SERIES

DIGITAL MULTIMETER

USERS MANUAL

Read this manual thoroughly before use

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 battery or fuse. If the defect has been caused by a misuse or abnormal operating conditions, the repair will be billed at a nominal cost.

SAFETY INFORMATION

This meter has been designed according to IEC-61010 concerning electronic measuring instruments with a measurement category (CAT II 250V) 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.
- To avoid electrical shock, do not touch any conductor with hand or skin.
- 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 II** - Measurement Category II is for measurements performed on circuits directly connected to low voltage installation. (Examples are measurements on household appliances, portable tools and similar equipments .)
Do not use the meter for measurements within Measurement Categories **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 capacitors before testing resistance, diode, continuity and temperature.

- Use the proper terminals, function, and range for your measurements.
- Before measuring current, check the meter's fuses and turn off the power 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.

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.

GENERAL DESCRIPTION

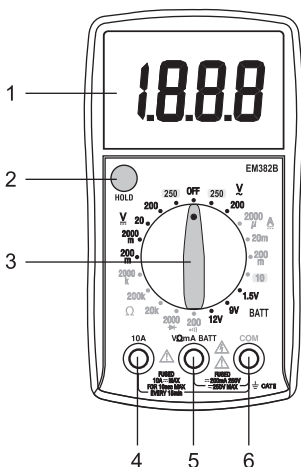
This series multimeters are compact 3 1/2-digit digital multimeters for measuring DC and AC voltage, DC current, resistance, continuity, diode, battery (EM382B only), and temperature (EM382C only). For EM382D, squarewave signal output is also provided.

They are easy to operate and are ideal measurement tools.

Different models have different functions, see the table:

FUNC MODEL	ACV	DCV	DCA	•)))	➔	⏏	Ω	BATT	TEMP
EM382B	✓	✓	✓	✓	✓		✓	✓	
EM382C	✓	✓	✓	✓	✓		✓		✓
EM382D	✓	✓	✓	✓	✓	✓	✓		

FRONT PANEL



1. Display

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

2. " HOLD " Button

Used to enter/exit Data Hold mode.

3. Function / Range Switch

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

To preserve battery life, set this switch to the " **OFF** "

position if you don't use the meter.

4. " 10A " Terminal

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

5. " V Ω mA " Terminal

Plug-in connector for the red test lead for all measurements except temperature measurements (EM382C only) and the current measurements $\geq 200\text{mA}$.

For EM382C, this " V Ω mA " terminal is also a plug-in connector for the positive plug of the thermocouple for temperature measurements.

6. " COM " Terminal

Plug-in connector for the black test lead.

For EM382C, this " **COM** " terminal is also a plug-in connector for the negative plug of the thermocouple for temperature measurements.

GENERAL SPECIFICATION

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

Overrange Indication: Only figure " 1 " shown on the display

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

Sampling Rate: About 2 to 3 times/sec

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

Low Battery Indication: "  " shown on the display

Operating Environment: Temperature: 0°C to 50°C
Relative Humidity: < 75%RH

Storage Environment: Temperature: -10°C to 60°C
Relative Humidity: < 85%RH

Dimensions: 138X74X32mm

Weight: About 163g (including battery)

SPECIFICATION

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:

$\pm$ ([% of Reading]+[number of Least Significant Digits])

DC Voltage

Range	Resolution	Accuracy
200mV	100 μ V	$\pm$ (0.5% + 5)
2000mV	1mV	$\pm$ (0.8% + 5)
20V	10mV	
200V	100mV	
250V	1V	$\pm$ (1.0% + 5)

Input Impedance: 1M Ω

Max. Allowable Input Voltage: 250V

AC Voltage

Range	Resolution	Accuracy
200V	100mV	$\pm$ (1.2% + 5)
250V	1V	

Frequency Range: 40Hz - 400Hz

Max. Allowable Input Voltage: 250V

Response: Average, calibrated in rms of sine wave

DC Current

Range	Resolution	Accuracy				
		EM382B	EM382C	EM382D		
200μA	0.1μA		± (1.0% + 5)			
2000μA	1μA					
20mA	10μA					
200mA	100μA	± (1.2% + 5)				
10A	10mA	± (2.0% + 5)				

Overload Protection:

F1: Fuse, 250mA/250V, Fast action

F2: Fuse, 10A/250V, Fast action

Max. Allowable Input Current: 10A

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

Resistance

Range	Resolution	Accuracy
200 Ω	0.1 Ω	$\pm (1.2\% + 5)$
2000 Ω	1 Ω	$\pm (1.0\% + 5)$
20k Ω	10 Ω	
200k Ω	100 Ω	
2000k Ω	1k Ω	$\pm (1.2\% + 5)$

Max. Open Circuit Voltage: about 2.8V

Overload Protection: 250V ac

Battery (EM382B only)

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

Overload Protection: 250V ac

Temperature (EM382C only)

Range	Resolution	Accuracy
0°C - 400°C	1°C	$\pm (1.0\% + 5)$
400°C - 1000°C		$\pm (1.5\% + 15)$

Overload Protection: 250V ac

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 $\pm 1^{\circ}\text{C}$. For ambient temperature changes of $\pm 5^{\circ}\text{C}$, rated accuracy applies after 1 hour.

Signal Output (EM382D only)

Range	Frequency	Output Level
	50Hz square wave	about 3Vp-p

Overload Protection: 250V ac

Diode and Continuity

Range	Description	Test Condition
	The approx. forward voltage drop of the diode is shown on the display.	Open Circuit Voltage: about 2.8V Test Current: about 1mA.
	The built-in buzzer will sound if the resistance is less than about 30Ω. The buzzer may or may not sound if the resistance is between 30Ω and 150Ω. The buzzer will not sound if the resistance is more than 150Ω.	Open Circuit Voltage: about 2.8V

Overload Protection: 250V ac

OPERATION INSTRUCTION

Data Hold Mode

Press the "**HOLD**" button to enter Data Hold mode, the present reading will be held on the display. To exit Data Hold mode, just press this button again.

Note:

If the display blanks or the reading on the display does not change after you turn on the meter, the cause may be that "**HOLD**" button is depressed. Exit Data Hold mode to solve this problem.

Measuring DC Voltage

1. Connect the black test lead to the "**COM**" terminal and the red test lead to the "**VΩmA**" 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. Connect the test leads across the source or circuit to

be tested.

4. Read the reading on the display. 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 250V between terminals.

Measuring AC Voltage

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the " **VΩmA** " 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 until satisfactory resolution is obtained.
3. Connect the test leads across the source or circuit to be tested.
4. Read the reading on the display.

Note:

To avoid electric shock to you or damages to the meter, do not apply a voltage higher than 250V between terminals.

Measuring DC Current

1. Connect the black test lead to the " **COM** " terminal.
Connect the red test lead to the " **VΩmA** " 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. Turn off power to the circuit you want to measure. Then discharge all capacitors of the circuit.
4. Break the circuit path to be measured, and connect the test leads in series with the circuit.
5. Turn on power to the circuit.
6. Read the reading on the display. The polarity of the red test lead connection will be indicated as well.

Note:

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.

Measuring Resistance

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

Note:

1. For measurements $> 1000k\Omega$, 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, " 1 " will be displayed as an overrange indication.
3. Before measuring in-circuit resistance, 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 " **VΩmA** " terminal.
2. Set the range switch to the $\bullet|||$ position.
3. Connect the test leads across the circuit to be measured.

4. If the resistance is lower than about 30Ω , the built-in buzzer will sound.

Note:

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 " **V Ω mA** " terminal (**Note:** The polarity of the red test 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 will show the approximate forward voltage drop of the diode. If the connection is reversed, only figure " 1 " will be shown on the display.

Battery Test (EM382B only)

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the " **VΩmA** " terminal.
2. According to the rated voltage of the battery to be tested, set the range switch to the corresponding **BATT** range position.
3. Connect the test leads to the two terminals of the battery to be measured.
4. Read the working voltage of the battery on the display.

Signal Output (EM382D only)

1. Connect the black test lead to the " **COM** " terminal and the red test lead to the " **VΩmA** " terminal.
2. Set the range switch to  position.
3. An output signal will appear between the two probes.

Note:

1. Don't apply voltage to the meter when the range switch is in the  position.
2. A coupling capacitor should be used when you connect the meter to a circuit.

Measuring Temperature (EM382C only)

Note

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

The K Type Thermocouple provided with the meter is a present, it is not professional and can only be used for non-critical reference measurements. For accurate measurements, use a professional thermocouple.

1. Set the range switch to °C position.
2. Connect the negative (–) plug of the K type thermocouple to the " **COM** " terminal and the positive (+) plug of this K type thermocouple to the " **VΩmA** " terminal.
3. Carefully touch the sensing end of the thermocouple to the object to be measured.
4. Wait a while, then read the reading on the display.

MAINTENANCE

Warning

Except replacing fuse and battery, never attempt to repair or service the meter unless you are qualified to do so and have the relevant calibration, performance test, and service instructions.

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

General Maintenance

Periodically wipe the case with a 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 the 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 does not seem to work properly, check and replace (as needed) the battery or fuses, or review this manual to verify correct operation.

BATTERY AND FUSE REPLACEMENT

When the symbol "  " appears on the display, it means that the battery is low and must be replaced immediately.

To replace battery, remove the screw on the battery cover and remove the battery cover. Replace the exhausted battery with a new one of the same type. Reinstall the battery cover and the screw.

Fuse rarely needs to be replaced and is blown almost always as a result of operator's error. To replace fuse, remove the screws on the back cover and move the back cover aside gently. Replace the blown fuse with a new one of the same ratings. Reinstall the back cover and the screws.

This meter uses two fuses:

F 1: 250mA/250V FAST fuse, Ø20X5mm

F 2: 10A/250V FAST fuse, Ø20X5mm

ACCESSORIES

Manual: 1 piece

Test Lead: 1 pair

PRESENT

K Type Thermocouple: 1 piece (EM382C only)

NOTE

1. This manual is subject to change without notice.
2. Our company will not take the other responsibilities for any loss.
3. The contents of this manual can not be used as the reason to use the meter for any special application.

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 discharge it in the garbage bin, but check with your local council for recycling facilities in your area.

