

# TRUE RMS DIGITAL MULTIMETER

## USERS MANUAL

**Read this manual thoroughly before use**



6000



## 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 operating conditions, the repair will be billed at a nominal cost.

## GENERAL DESCRIPTION

This multimeter is compact 3 <sup>5</sup>/<sub>6</sub>-digit true rms digital multimeter with the USB2.0 standard interface. It can be used for measuring DC voltage, DC current, true-rms AC voltage, true-rms AC current, resistance, capacitance, frequency, diode, temperature, continuity and duty cycle. It features polarity indication, data hold, backlight, overrange indication, low battery indication, relative measurement, MAX/MIN recording mode and automatic power-off. It is easy to operate and is an ideal measurement tool.

## Features

1. Measures true-rms AC voltage and true-rms AC current.
2. Transfers the measurement readings of the meter to a computer through standard USB port.
3. Provides analog bar graph, reading unit indication and backlight.
4. The sampling rate is about 3 times/sec.
5. Provides automatic polarity indication, manual range mode and autorange mode.
6. Provides low battery indication, overrange indication, automatic power-off, manual power-off, relative measurement, and max/min value recording.
7. Measures DC/AC voltage, DC/AC current, resistance, capacitance, frequency, diode, temperature ( $^{\circ}\text{C}$ / $^{\circ}\text{F}$ ), continuity and duty cycle.
8. Provides overload protection for all ranges.
9. Low power consumption.

## SAFETY INFORMATION



This meter has been designed according to IEC-61010 concerning electronic measuring instruments with a measurement category (CAT III 600 V) and pollution degree 2.

### **Warning**

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

- a. 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.
- b. 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.
- c. Do not use the meter if it operates abnormally. Protection may be impaired. When in doubt, have the meter serviced.
- d. Do not operate the meter around explosive gas, vapor, or dust.
- e. Do not apply more than the rated voltage, as marked on the meter, between terminals or between any terminal and earth ground.
- f. Before use, verify the meter's operation by measuring a known voltage.
- g. When measuring current, turn off circuit power before connecting the meter in the circuit. Remember to place

the meter in series with the circuit.

- h. When servicing the meter, use only specified replacement parts.
- i. Use caution when working with voltage above 30V ac rms, 42V peak, or 60V dc. Such voltages pose a shock hazard.
- j. When using the probes, keep your fingers behind the finger guards on the probes.
- k. When making connections, connect the common test lead before you connect the live test lead. When you disconnect test leads, disconnect the live test lead first.
- l. Remove the test leads from the meter before you open the battery cover or the case.
- m. Do not operate the meter with the battery cover or portions of the case removed or loosened.
- n. 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.
- o. When in Relative mode ( "  " is displayed ) or in MIN mode ( "MIN" is displayed ), caution must be used because hazardous voltage may be present.
- p. Do not use the meter in a manner not specified by this manual or the safety features of the meter may be impaired.
- q. 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. Do not touch any naked conductor with hand or skin.

r. 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!

s. 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:

- a. Disconnect circuit power and discharge all capacitors before measuring resistance, diode, capacitor, temperature and continuity.
- b. Use the proper terminals, function, and range for your measurements.
- c. Before measuring current, check the meter's fuses and turn off the power to the circuit before connecting the meter to the circuit.

- d. Before rotating the range switch to change functions, disconnect test leads from the circuit under test.
- e. Remove test leads from the meter before opening the meter case or the battery cover.
- f. Because of anti-interference designs, the meter may stop working in strong interference environment. Turning on the meter again can solve this problem.

## Symbols

- ~ Alternating Current
- ≡ Direct Current
- ≈ DC or AC
- ⚠ 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.



# INSTRUCTION

## Meter Instruction

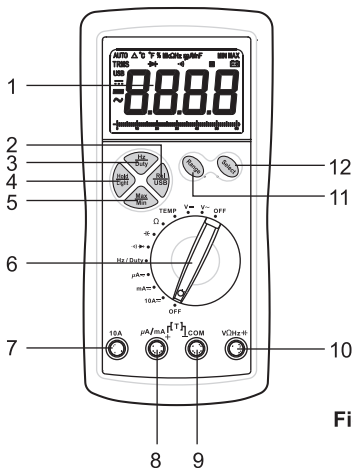


Figure 1

### 1. Display

LCD display, with a max. reading of 9999

### 2. "Rel" Button



Press this button to set the meter in Relative mode, " $\Delta$ " appears as an indicator. To exit Relative mode, press this button again, " $\Delta$ " disappears.

Press and hold down this button for about 2 seconds to enter the USB communication mode (In this mode, you can transfer the readings of the meter to a computer by the USB interface and the communication application.), " **USB** " appears as an indicator. To exit the USB communication mode, press and hold down this button for about 2 seconds, "USB" disappears.

### 3. " $\frac{\text{Hz}}{\text{Duty}}$ " Button

Pressing this button switches the meter between frequency and duty cycle measurements when the range switch is in the " **Hz/DUTY** " position.

### 4. " $\frac{\text{Hold}}{\text{Light}}$ " button

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

Press and hold down this button for about 2 seconds to turn on or off the backlight.

### 5. " $\frac{\text{Max}}{\text{Min}}$ " Button

Used to enter the MIN MAX Recording mode.

### 6. 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.

### 7. "10A" Jack

Plug-in connector for the red test lead for current ( 600mA ~ 10A ) measurements.

### **8. " $\mu$ A/mA " Jack**

It is a plug-in connector for the red test lead for current (< 600mA ) measurements.

It is also a plug-in connector for the positive plug of the thermocouple couple for temperature measurements.

### **9. " COM " Jack**

It is a plug-in connector for the black test lead for all measurements except temperature measurements.

It is also a plug-in connector for the negative plug of the thermocouple couple for temperature measurements.

### **10." V $\Omega$ Hz-1 $\leftarrow$ " jack**

Plug-in connector for the red test lead for all measurements except current and temperature measurements.

### **11." Range " Button**

In voltage, current and resistance measurement modes this button can be used to switch the meter between autorange mode and manual range mode and can also be used to select desired manual range.

### **12. " Select " Button**

This button can be used to switch the meter :

- between AC and DC current measurements.
- between diode and continuity test functions.
- between fahrenheit and celsius measurements.

## LCD Display

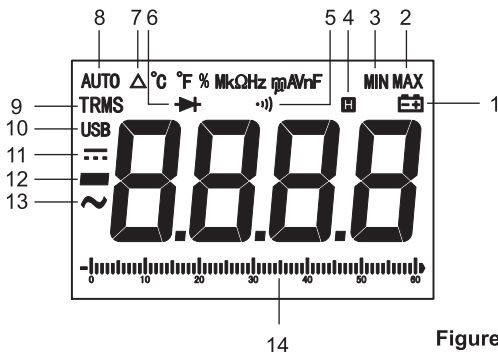







Figure 2

1. **Battery** ---- Battery is low and should be replaced immediately
2. **MAX** --- Maximum reading is being displayed
3. **MIN** ---- Minimum reading is being displayed
4. **H** ---- Data Hold is enabled
5. **Continuity** ---- Continuity test is selected
6. **Diode** --- Diode test is selected
7. **Relative** ---- Relative mode is active
8. **AUTO** ---Auto range mode is selected
9. **TRMS** ---True RMS value is being displayed.
10. **USB**---USB serial port communication is enabled

- 11.  ---- DC
- 12.  --- Negative sign
- 13.  --- AC
- 14. Bar graph

## Using the Bar Graph

The bar graph at the bottom part of the LCD is a analog display. The length of its lit segments is proportional to the present reading on the LCD.

The bar graph is like the needle on an analog meter. It has an overload indicator ("  ") on its right and a negative polarity indicator ("  ") on its left. The number of lit segments indicates the measured value and is relative to the full-scale value of the selected range. In the 600V range, for example, the major divisions on the scale represent 0, 100, 200, 300, 400, 500 and 600V, respectively. An input of –100V lights the negative sign and the segments up to the "10" on the scale.

## Units on the LCD

mV, V	Voltage unit mV: Millivolt ; V: Volt; $1V=10^3mV$
$\mu A$ , mA, A	Current unit $\mu A$ : Microamp; mA: Milliamp; A: Ampere; $1A=10^3mA=10^6\mu A$
$\Omega$ , k $\Omega$ , M $\Omega$	Resistance unit $\Omega$ : Ohm; k $\Omega$ : Kilohm; M $\Omega$ : Megohm; $1M\Omega=10^3k\Omega=10^6\Omega$
nF, $\mu F$	Capacitance unit nF: Nanofarad; $\mu F$ : Microfarad; $1F=10^6\mu F=10^9nF=10^{12}pF$
$^{\circ}C$ , $^{\circ}F$	Temperature unit $^{\circ}C$ : Celsius degree; $^{\circ}F$ : Fahrenheit degree;
Hz, kHz, MHz	Frequency unit Hz:Hertz; kHz:Kilohertz; MHz:Megahertz; $1MHz=10^3kHz=10^6Hz$
%	Unit of duty cycle %: Percent

## GENERAL SPECIFICATION

**Maximum Voltage between**

**any Terminal and Earth Ground:** 600Vrms

**Fuse Protection for "μA/mA" Jack Inputs:**

630mA, 690V, FAST, Min. Interrupt Rating 20000A

**Fuse Protection for "10A" Jack Inputs:**

10A, 690V, FAST, Min. Interrupt Rating 20000A

**Display:** LCD, with a max. reading of 9999

**Overrange Indication:** "OL" shown on the display.

**Negative Polarity Indication:** "—" shown on the display  
automatically

**Sampling Rate:** about 3 times/sec

**Operating Environment:** 0°C ~ 40°C, <75%RH

**Temperature Coefficient:**

0.2 x (specified accuracy)/°C (<18°C or >28°C)

**Storage Environment:** -30°C ~ 60°C, < 85%RH

**Operating Altitude:** 0 to 2000 meters

**Battery:** 9V, 6F22 or equivalent

**Low Battery Indication:** "  " shown on the display

**Size:** 185X86X44mm

**Weight:** about 380g (including battery and the holster)

## SPECIFICATION

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

Except the ranges specified specially, accuracy is specified from 5 % to 100% of range.

Accuracy specifications take the form of :

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

### DC Voltage

Range	Resolution	Accuracy
600mV	0.1mV	$\pm(0.8\%+5)$
6V	1mV	$\pm(0.5\%+5)$
60V	10mV	$\pm(0.8\%+5)$
600V	0.1V	$\pm(1.0\%+7)$

**Input Impedance:** the 600mV range: >100M $\Omega$   
the other ranges: 10M $\Omega$



## AC Voltage

Range	Resolution	Accuracy
6V	1mV	$\pm(1.6\%+10)$
60V	10mV	$\pm(1.5\%+10)$
600V	0.1V	

**Input Impedance:** 10M $\Omega$

**Crest Factor:** 3.0

**Reading:** True rms

**Frequency:** 40Hz ~ 1kHz

**Note:**

When the input terminals are shorted, the display may show a reading. It doesn't matter and will not affect the measurement accuracy.

## DC Current

Range	Resolution	Accuracy
600.0 $\mu$ A	0.1 $\mu$ A	$\pm(1.0\%+7)$
6000 $\mu$ A	1.0 $\mu$ A	
60.00mA	0.01mA	
600.0mA	0.1mA	
6.000A	1mA	$\pm(1.5\%+7)$
10A	10mA	

**Overload Protection:**

Protection for "μA/mA" jack inputs: Fuse, 630mA/690V, Fast

Protection for "10A" jack inputs: Fuse, 10A/690V, Fast

**Max. Input Current:** 10A ( For inputs > 2A : measurement duration<10 secs, interval >15 minutes )

**Note:** The 10A range is specified from 20% to 100% of range.

**AC Current**

Range	Resolution	Accuracy
600.0μA	0.1μA	±(1.8%+10)
6000μA	1.0μA	
60.00mA	0.01mA	
600.0mA	0.1mA	
6.000A	1mA	±(2.5%+10)
10A	10mA	

**Overload Protection:**

Protection for "μA/mA" jack inputs: Fuse, 630mA/690V, Fast

Protection for "10A" jack inputs: Fuse, 10A/690V, Fast

**Max. Input Current:** 10A ( For inputs > 2A : measurement duration<10 secs, interval >15 minutes )

**Frequency:** 40Hz ~ 1kHz

**Crest Factor:** 3.0

**Reading:** True rms

**Note:**

1. The 10A range is specified from 20% to 100% of range.
2. In the manual range of 10A, it may take several seconds for reading to stabilize if the reading is less than 0.2A.
3. When the input terminals are shorted, the display may show a reading. It doesn't matter and will not affect the measurement accuracy.

## Resistance

Range	Resolution	Accuracy
600.0 $\Omega$	0.1 $\Omega$	$\pm(1.0\%+5)$
6.000k $\Omega$	1 $\Omega$	$\pm(0.8\%+5)$
60.00k $\Omega$	10 $\Omega$	
600.0k $\Omega$	100 $\Omega$	
6.000M $\Omega$	1k $\Omega$	$\pm(1.5\%+5)$
60.00M $\Omega$	10k $\Omega$	$\pm(3.0\%+10)$

**Open Circuit Voltage:** < 0.7V

## Frequency

Range	Resolution	Accuracy
9.999Hz	0.001Hz	$\pm(1.0\%+5)$
99.99Hz	0.01Hz	
999.9Hz	0.1Hz	
9.999kHz	1Hz	
99.99kHz	10Hz	
999.9kHz	100Hz	
9.999MHz	1kHz	Not specified

**Input Voltage:** 1V rms ~ 20V rms

**Note :** Frequency measurements are autoranging.

## Duty Cycle

Scope	Resolution	Accuracy	Remark
5% ~ 95%	0.1%	$\pm(2\%+7)$	Autorange

**Input Voltage:** 4 ~ 10Vp-p;

**Frequency Range:** 4Hz ~ 1kHz

## Capacitance (use Relative mode)

Range	Resolution	Accuracy
40.00nF	10pF	$\pm(3.5\%+20)$
400.0nF	100pF	$\pm(2.5\%+5)$
4.000 $\mu$ F	1nF	$\pm(3.5\%+5)$
40.00 $\mu$ F	10nF	$\pm(4.0\%+5)$
400.0 $\mu$ F	100nF	$\pm(5.0\%+5)$
4000 $\mu$ F	1 $\mu$ F	not specified

## Temperature

Range	Scope	Resolution	Accuracy
°C	-20°C~0°C	0.1°C	$\pm(6.0\%+5^{\circ}\text{C})$
	0°C~400°C	0.1°C	$\pm(1.5\%+4^{\circ}\text{C})$
	400°C~1000°C	1°C	$\pm(1.8\%+5^{\circ}\text{C})$
°F	-4°F~32°F	0.1°F	$\pm(6.0\%+9^{\circ}\text{F})$
	32°F~752°F	0.1°F	$\pm(1.5\%+7.2^{\circ}\text{F})$
	752°F~1832°F	1°F	$\pm(1.8\%+9^{\circ}\text{F})$

### Temperature sensor :

K Type thermocouple - Nickel Chromium/Nickel Silicon

**Overload Protection:** Fuse, 630mA/690V, Fast


### Note:

1. Accuracy does not include error of the thermocouple probe.
2. 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.

3. The meter's operating temperature must be between  $18^{\circ}\text{C}$  and  $28^{\circ}\text{C}$ ; otherwise measurement accuracy is not guaranteed.

## Diode

Range	Introduction	Remark
	The approximate forward voltage drop of the diode will be displayed. If the voltage drop is more than 2V, the display shows the overrange indicator "OL".	Open Circuit Voltage: about 3V  Test Current : about 0.8mA

## Continuity

Range	Introduction	Remark
	The built-in buzzer will sound if the resistance is less than about $20\Omega$ . The buzzer will not sound if the resistance is more than $150\Omega$ .	Open Circuit Voltage: < 0.7V

## OPERATION INTRODUCTION

### Using Relative Mode

Relative mode is available in some functions. Selecting relative mode causes the meter to store the present reading as a reference for subsequent measurements.

1. Press the  $\frac{\text{Rel}}{\text{USB}}$  button, the meter enters the Relative mode and store the present reading as a reference for subsequent measurements, and " $\Delta$ " appears as an indicator. The display reads zero.
2. When you perform a new measurement, the display shows the difference between the reference and the new measurement.
3. Press the  $\frac{\text{Rel}}{\text{USB}}$  button again, the meter exits the Relative mode.

#### Note:

When you use Relative mode, the actual value of the object under test must not exceed the full-range reading of the selected range . Use a higher measurement range if necessary.

## Data Hold Mode

Press the <sup>Hold</sup><sub>Light</sub> 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.

## Manual Ranging and Autoranging

The meter defaults to autorange mode in measurement functions which have both autorange mode and manual range mode. When the meter is in autorange mode, the symbol "AUTO" is displayed.

1. Press the **Range** button to enter the manual range mode, the symbol " AUTO " disappears.  
Each press of the **Range** button increases the range. When the highest range is reached, the meter wraps to the lowest range.
2. To exit the manual range mode, press and hold down the **Range** button for more than about 2 seconds. The meter returns to the autorange mode and " AUTO " is displayed.



## MIN MAX Recording Mode

The MIN MAX mode records minimum and maximum values of all input values since this mode is activated. When the inputs go below the recorded minimum value or above the recorded maximum value, the meter records the new value.

### To use MIN MAX recording:

1. Make sure the meter is in the desired function and range.
2. Press the  $\frac{\text{Max}}{\text{Min}}$  button to activate the MIN MAX mode, the display shows the maximum reading and " MAX " appears on the display as an indicator.
3. Continue to press the  $\frac{\text{Max}}{\text{Min}}$  button to show the minimum reading ( " MIN " appears ) or the maximum reading ( " MAX " appears ).
4. To exit the MIN MAX mode and erase stored readings, press and hold down the  $\frac{\text{Max}}{\text{Min}}$  button for about 1 second or turn the range switch.

### Note:

For the measurements which have both autorange mode and manual range mode, the meter changes to manual range mode when you enter the MIN MAX mode. Select the desired manual range before you enter the MIN MAX mode.

## Measuring DC Voltage

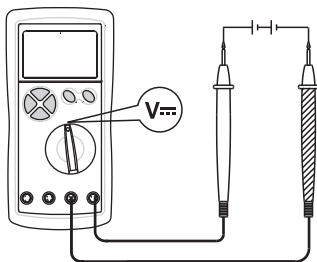


Figure 3

1. Connect the black test lead to the "**COM**" jack and the red test lead to the "**V $\Omega$ Hz $\text{---}$** " jack.
2. Set the range switch to the **V $\text{---}$**  range.
3. Select autorange mode or manual range mode with the **Range** button.

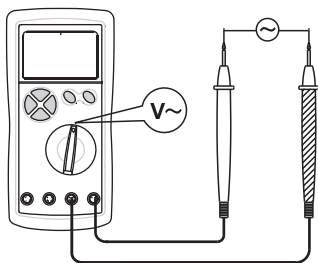
If you use manual range mode and don't know the magnitude of the voltage to be measured beforehand, select the highest range and then reduce it range by range until satisfactory resolution is obtained.

4. Connect the test leads across the source or circuit to be measured.
5. Read the reading on the display. The polarity of the red lead connection will be indicated as well.

**Note:**

To avoid electric shock to you or damages to the meter, do not apply voltage higher than 600V dc between terminals.

## Measuring AC Voltage



**Figure 4**

1. Connect the black test lead to the "**COM**" jack and the red test lead to the "**VΩHz**" jack.
2. Set the range switch to the **V~** range.
3. Select autorange mode or manual range mode with the **Range** button.

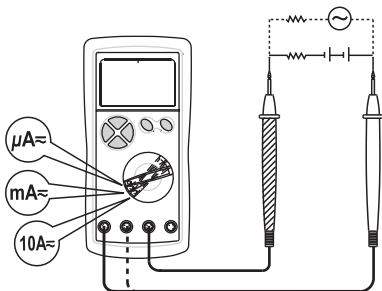
If you use manual range mode and don't know the magnitude of the voltage to be measured beforehand, select the highest range and then reduce it range by range until satisfactory resolution is obtained.

4. Connect the test leads across the source or circuit to be measured.
5. Read the reading on the display.

**Note:**

To avoid electric shock to you or damages to the meter, do not apply voltage higher than 600V ac rms between terminals.

## Measuring DC or AC Current



**Figure 5**

1. Connect the black test lead to the "**COM**" jack. If the current to be measured is less than 600mA, connect the red test lead to the "**μA/mA**" jack. If the current is between 600mA and 10A, connect the red test lead to the "**10A**" jack instead.

2. Set the range switch to **10A**, **mA** or  **$\mu$ A** range.
3. Press the **Select** button to select DC or AC current measurement, the display shows the corresponding symbol.
4. Turn off power to the circuit which you want to measure. Discharge all capacitors.
5. Break the circuit path to be measured, connect the test leads in series with the circuit.
6. Turn on power to the circuit, then read the display.  
For DC current measurements, the polarity of the red test lead connection will be indicated as well.

**Note :**

1. If you don't know the magnitude of the current to be measured beforehand, select the highest range and then reduce it range by range until satisfactory resolution is obtained.
2. If you perform AC current measurement in autorange mode, " OL " will appear on the display momentarily and the built-in buzzer will sounds several beeps when the meter changes from 6A range to 10A range. It is normal and does not affect measurement.

## Measuring Resistance

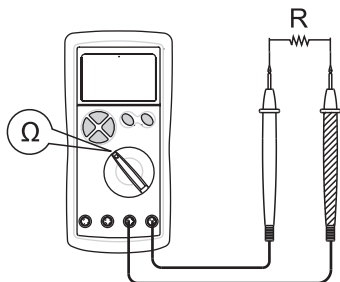


Figure 6

1. Connect the black test lead to the **"COM"** jack and the red test lead to the **"VΩHz"** jack. (Note: The polarity of the red lead is positive "+".)
2. Set the range switch to  $\Omega$  range.
3. Connect test leads across the load to be measured.
4. Read the reading on the display.

### Note:

1. For measurements  $> 1\text{M}\Omega$ , 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, "OL" will be displayed as overrange indication.
3. Before measurement, disconnect all power to the circuit to be measured and discharged all capacitors thoroughly.

## Continuity Test

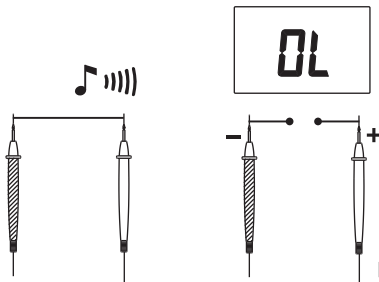


Figure 7

1. Connect the black test lead to the "**COM**" jack and the red test lead to the "**VΩHz**" jack. (Note: The polarity of the red lead is positive "+". )
2. Set the range switch to  $\bullet \cdot \cdot \cdot \rightarrow \rightarrow$  position.
3. Press the **Select** button until the display shows " $\bullet \cdot \cdot \cdot$ ".
4. Connect the test leads across the circuit to be measured.
5. If the circuit's resistance is less than about  $20\Omega$ , the built-in buzzer will sound.

### Note:

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

## Measuring Capacitance

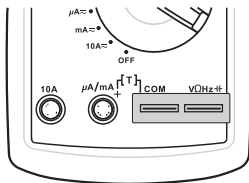


Figure 8

1. Set the range switch to  $\overline{\overline{\text{f}}}$  position.
2. Refer to Figure 8, connect the adapter to the "COM" jack and the "V $\Omega$ Hz $\overline{\overline{\text{f}}}$ " jack.
3. Press the  $\frac{\text{Rel}}{\text{USB}}$  button, the meter enters the Relative mode and " $\Delta$ " appears as an indicator. The display reads zero.
4. Discharge the capacitor to be measured, and then connect it to the capacitance test socket of the adapter.
5. Wait until the reading is stable, then read the reading.

### Note:

1. Before measurement, make sure that the capacitor to be measured has been discharged thoroughly.
2. For capacitance measurements, the max. reading is "3999", all the ranges are autoranging.
3. Because the meter measures capacitance by measuring the time of charging and discharging the



capacitor, measuring a higher capacitance will take more time.

## Measuring Frequency

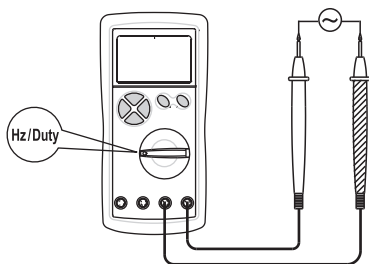


Figure 9

1. Connect the black test lead to the "**COM**" jack and the red test lead to the "**VΩHzHz**" jack.
2. Set the range switch to **Hz / Duty** position.  
Press the  $\frac{\text{Hz}}{\text{Duty}}$  button until the display shows " Hz ".
3. Connect the test leads across the source or load to be measured.
4. Read the reading on the display.

Note:

1. For frequency measurements, the range exchange is automatic. The max. reading is 9999. Measurement range is: 0 ~ 10MHz.
2. The voltage of input signal should be between 1V rms and 20V rms. The higher the frequency, the higher the required input voltage.

## Measuring Duty Cycle

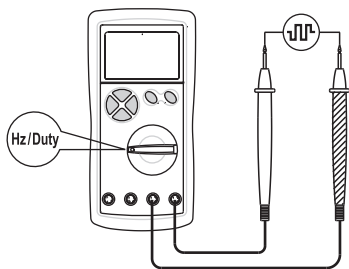


Figure 10

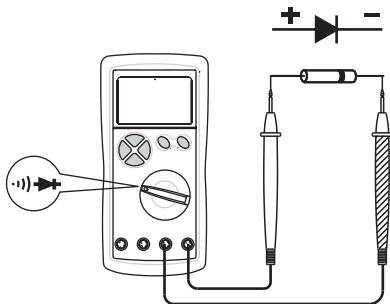
1. Connect the black test lead to the "**COM**" jack and the red test lead to the "**VΩHzHz**" jack.
2. Set the range switch to **Hz / Duty** position.
3. Press the  $\frac{\text{Hz}}{\text{Duty}}$  button until the display shows " % ".
4. Connect the test leads across the circuit to be measured.

5. The reading is the duty cycle reading of the square wave under test.

**Note:**

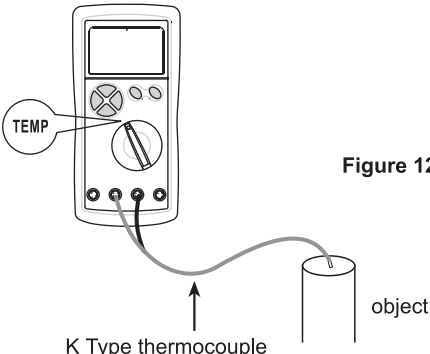
1. The voltage of the input signal should be between 4Vp-p and 10Vp-p.
2. After you remove the measured signal, its reading may still remain on the display. Pressing the  $\frac{\text{Hz}}{\text{Duty}}$  button twice will zero the display.

## Diode Test



**Figure 11**

1. Connect the black test lead to the "**COM**" jack and the red test lead to the "**VΩHz**" jack (Note :The polarity of the red lead is positive " + " ).



### Figure 12

## Note

To avoid possible damage to the meter or other equipment, remember that while the meter is rated for  $-20^{\circ}\text{C}$  to  $+1000^{\circ}\text{C}$  and  $-4^{\circ}\text{F}$  to  $1832^{\circ}\text{F}$ , the K Type Thermocouple provided with the meter is rated to  $250^{\circ}\text{C}$ . 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 measurements.

For accurate measurements, use a professional thermocouple.

1. Set the range switch to **TEMP** position, the display will show the compensation temperature which is similar to the environment temperature. (If you want to measure environment temperature accurately, you must connect the K Type thermocouple to the meter. )
2. Connect the negative "-" plug of the K Type thermocouple to the "**COM**" jack and the positive "+" plug of the K Type thermocouple to the " **$\mu\text{A}/\text{mA}$** " jack.
3. Connect the sensing end of the thermocouple to the object to be measured.
4. Wait a while, then read the reading on the display.
5. To switch the meter between celsius and fahrenheit measurements, press the **Select** button.

### Note:

When the temperature exceeds  $1000^{\circ}\text{C}$ , the display will show " OL ".

## Automatic Power-Off

The display will blank and the meter will go into Sleep mode if you have not turned the rotary switch or pressed a button for about 15 minutes. Pressing any button arouses the meter from Sleep.

To disable the automatic power-off feature, press and hold down a button while rotating the range switch from " OFF " position.

When the USB communication mode is active ( " USB " appears ), the automatic power-off feature is disabled.

## COMMUNICATION FEATURE

To establish the communication between the meter and a PC, refer to the instruction of the communication application on the CD provided with the meter.

You can use the supplied data cable and the communication application to transfer the measurement readings to a computer in a real-time mode through the USB interface, these readings will be displayed on the computer in several forms, and can be stored as a file.

## 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 dry place when not in use. Don't store it in intense electromagnetic field environment.

### General Maintenance

Periodically wipe the case with a damp cloth. 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 the **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.

## Replacing the Battery or Fuse

### 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, install only replacement fuses with the specified amperage, voltage, and interrupt ratings.

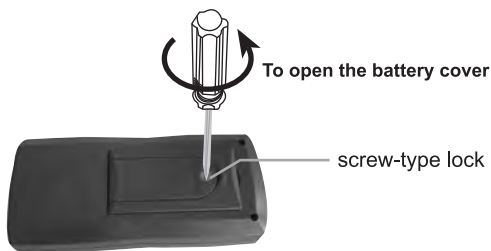
Disconnect the test leads before opening the back cover or the battery cover.

To replace the battery, use an appropriate screwdriver to gently rotate the screw-type lock on the battery cover by 90° in the direction indicated on the battery cover ( refer to Figure 13 ). Remove the battery cover and replace the exhausted battery with a new one of the same type. Reinstall the battery cover and gently rotate the screw-type lock by 90° clockwise.

### Note:

Excess force will cause damage to the screw-type lock. Don't use a screwdriver which is not big enough.





**Figure 13**

This meter uses two fuses:

**Fuse 1:** 630mA, 690V, FAST, Min. Interrupt Rating 20000A, Ø10X38mm

**Fuse 2:** 10A, 690V, FAST, Min. Interrupt Rating 20000A, Ø10X38mm

To replace the fuse, remove the meter from its holster, remove the screws on the back cover, remove the back cover, replace the fuse with a new one of the same ratings. Reinstall the cover, the screws and the holster.

## ACCESSORIES

<b>Manual :</b>	1 piece
<b>Test Lead :</b>	1 pair
<b>USB Data Cable :</b>	1 piece
<b>Adapter :</b>	1 piece
<b>CD ( containing USB driver and the communication application ) :</b>	1 piece

## PRESENT

<b>K Type Thermocouple :</b>	1 piece
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## 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.

