

TRUE RMS DIGITAL MULTIMETER

OWNERS MANUAL

<http://www.all-sun.com>

Read this owners 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 5/6-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, transistor, temperature, continuity and duty cycle. It has the functions of polarity indication, data hold, backlight, overrange indication, low battery indication, relative value measurement, max/min value measurement and automatic power-off. It can be operated easily and is an ideal measurement tool.

FEATURES

1. Measures the true-rms values of ac voltage and 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 3 times/sec. The bar graph updates at 30 times/sec.
5. Provides automatic polarity indication, manual range mode and autorange mode.
6. Provides low battery indication, automatic power-off, manual power-off, relative value measurement, and max/min value measurement.
7. Measures DC/AC voltage, DC/AC current, resistance, capacitance, frequency, diode, transistor, temperature (*/*), 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 above 30Vac rms, 42V peak, or 60Vdc. 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, the symbol "Δ" is displayed. Caution must be used because hazardous voltage may be present.
- p. When in MIN mode, the symbol "MIN" is displayed. Caution must be used because hazardous voltage may be present.

- q. Do not use the meter in a manner not specified by this manual or the safety features of the meter may be impaired.
- 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. CATII - 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:

- a. Disconnect circuit power and discharge all capacitors before testing 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

- ~ AC (Alternating Current)
- ≡ DC (Direct Current)
- ≈ DC or AC (alternating current or direct current)
- ⚠ Important safety information. Refer to the manual.
- ⚡ Dangerous voltage may be present. Be cautious.
- ⏚ Earth ground
- ⏚ Fuse
- CE Conforms to European Union directives
- Double insulated
- 🔋 Low battery
- Diode

INSTRUCTION

Meter Instruction

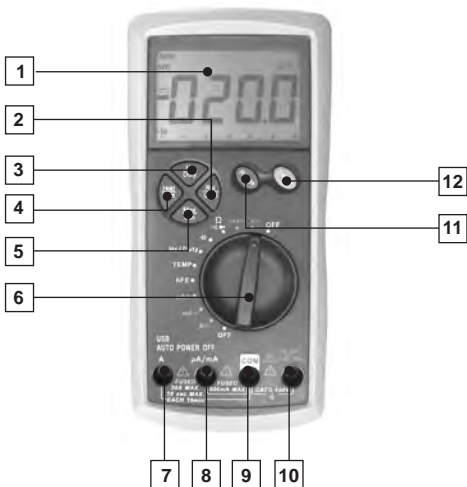


Figure 1

1. Display

LCD display, with a max. reading of 9999

2. "^{Rel}USB" button


Press this button to set the meter to Relative Mode, and " Δ " will appear as an indicator. To exit Relative Mode, press this button again, and " Δ " will disappear. Pressing and holding down this button for about 2 seconds set the meter to USB communication mode (In this mode, you can transfer the readings of the meter to a PC by the USB interface and the communication application.), and "**USB**" appears as an indicator. To exit the USB communication mode, press and hold down this button for about 2 seconds, and "**USB**" disappears.


3. "^{Hz}Duty" button

When measuring ac voltage (or ac current), you can press this button to select frequency, duty cycle or ac voltage (or ac current) measurement function, and the display will show the relevant symbol.

In frequency or duty cycle measurement mode, you can press this button to switch between frequency and duty cycle measurements.

4. "^{Hold}Light" button

Press this button to hold the present reading on the display, and " " will appear as an indicator. Press this

button again to exit Data Hold mode, and "  " will disappear.

Press and hold down this button for about 2 seconds to enable or disable the backlight. The backlight will turn off automatically about 10 seconds later after it is turned on.

5. " " button

*Press this button, the meter enters the MAX mode, and the LCD shows "MAX" as an indicator, the present reading on the LCD is the maximum reading of all readings taken since the mode was activated. Press this button again, the meter enters the MIN mode, and the LCD shows "MIN" as an indicator, the present reading on the LCD is the minimum reading of all readings taken since the mode was activated. Press and hold down this button for about 2 seconds to exit MAX and MIN modes.

6. Function / Range switch

It can be 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. "A" jack

Plug-in connector for the red test lead for current (600mA*20A) measurements.

8. "A/mA" jack

Plug-in connector for the red test lead for current
* < 600mA * measurements.

9. "COM" Jack

Plug-in connector for the black test lead for all
measurements.

10. "V*Hz" jack

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

11. "Range" button

In voltage, current or resistance function, pressing this
button causes the symbol "AUTO" on the display to
disappear, it means that the meter changes from
autorange mode to manual range mode. In manual
range mode, press this button to select desired range.

12. "Select" button

This button can be used to switch the meter :

- a. between ac and dc measurement functions.
- b. among resistance, diode and continuity measurement
functions.
- c. between fahrenheit temperature measurement mode
and celsius temperature measurement mode.

Turning on the meter while holding down this button will
disable the automatic power-off feature, and the symbol
"APO" on the display will disappear.

How to Connect the Adapter

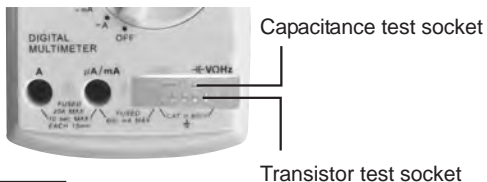


Figure 2

LCD Display

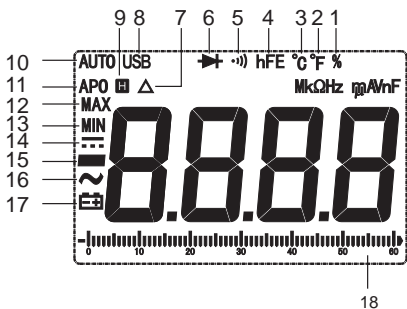


Figure 3

1. **%** ----- Duty Cycle is selected
2. **°F** -----Fahrenheit temperature test is selected
3. **°C** -----Celsius degree test is selected
4. **hFE** --- Transistor hFE test is selected
5. **••••** ---- Continuity test is selected
6. **▶** --- Diode test is selected
7. **△** ---- Relative mode is active
8. **USB**--- USB serial port communication is enabled
9. **□** ---- Data Hold is enabled
10. **AUTO** ---Autorange mode is selected
11. **APO** --- Automatic power-off mode is selected
12. **MAX** --- Maximum reading is being displayed
13. **MIN** ---- Minimum reading is being displayed
14. **—** ---- DC
15. **—** --- Negative sign
16. **~** --- AC
17. **🔋** ---- Battery is low and should be replaced immediately
18. Bar graph

Using the Bar Graph

The bar graph at the bottom part of the LCD is an analog display only for the measurements of ac/dc voltage, ac/dc current and resistance. The length of its lit segments is proportional to the present reading on the LCD. The bar graph is unavailable for the other measurements. 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.

Because the bar graph updates about 30 times per second, which is 10 times faster than the digital display, the bar graph is useful for making peak and null adjustments and for observing rapidly changing inputs.

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. 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; $1V=10^3mV$
μA^*mA^* A	Current unit μA : Microamp; mA: Milliamp; A: Ampere; $1A=10^3mA=10^6\mu A$
**k Ω^* M Ω	Resistance unit Ω : Ohm; k Ω : Kiloohm; M Ω : Megohm; $1M\Omega=10^3k\Omega=10^6\Omega$
nF* μF	Capacitance unit nF: Nanofarad; μF : 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; $a (^{\circ}F) = 32 + 1.8 \times b (^{\circ}C)$
Hz*kHz* MHz	Frequency unit Hz:Hertz; kHz:Kilohertz; MHz:Megahertz; $1MHz=10^3kHz=10^6Hz$

GENERAL SPECIFICATION

Maximum Voltage between

any Terminal and Earth Ground: 600Vrms

Fuse Protection for "μAmA" Jack Inputs:

500mA, 1000V, FAST, Min. Interrupt Rating 20000A

Fuse Protection for "A" Jack Inputs:

20A, 1000V, FAST, Min. Interrupt Rating 20000A

Display: LCD, with a max. reading 9999

Overrange Indication: "OL" shown on the LCD.

Negative Polarity Indication: "-" displayed automatically

Sampling Rate: 2~3 times/sec

Operating Temperature: 0°C*40°C*<75%RH

Storage Temperature: -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%. Accuracy specifications take the form of:

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

DC Voltage

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

Input Impedance: 60mV and 600mV ranges: >100M Ω
the other ranges: 10M Ω

Overload Protection: AC600V

AC Voltage

Range	Resolution	Accuracy
60mV	10 μ V	$\pm(2.0\%+10)$
600mV	0.1mV	$\pm(1.6\%+10)$
6V	1mV	$\pm(1.5\%+10)$
60V	10mV	
600V	0.1V	

Input Impedance: 60mV and 600mV ranges: >100M*
the other ranges: 10M*

Overload Protection: AC600V; **Crest Factor:** 3.0

Reading: True rms

Frequency: 40Hz~400Hz

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	Remark
600.0 μ A	0.1 μ A	$\pm(1.0\%+7)$	autorange
6000 μ A	1.0 μ A		
60.00mA	0.01mA		autorange
600.0mA	0.1mA		
6.000A	1mA	$\pm(1.5\%+7)$	autorange
20A	10mA		

Overload Protection:

For " μ A/mA" jack inputs: Fuse, 500mA/1000V, fast action,

For "A" jack inputs: Fuse, 20A/1000V, fast action,

Max. Input Current: 20A (For inputs > 5A : measurement duration < 10 secs, interval > 15 minutes)

AC Current

Range	Resolution	Accuracy	Remark
600.0 A	0.1 A	$\pm(2.0\%+15)$	autorange
6000 A	1.0 A		
60.00mA	0.01mA		autorange
600.0mA	0.1mA		
6.000A	1mA	$\pm(2.5\%+10)$	autorange
20A	10mA		

Overload Protection:

For " A/mA " jack inputs: Fuse, 500mA/1000V, fast action,

For "A" jack inputs: Fuse, 20A/1000V, fast action,

Max. Input Current: 20A (For inputs > 5A : measurement duration < 10 secs, interval > 15 minutes)

Frequency: 40Hz~400Hz

Crest Factor: 3.0

Reading: True rms

Note: 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
600.0Ω	0.1Ω	±(1.0%+5)
6.000kΩ	1Ω	±(0.8%+5)
60.00kΩ	10Ω	
600.0kΩ	100Ω	
6.000MΩ	1kΩ	±(1.5%+5)
60.00MΩ	10kΩ	±(3.0%+5)

Overload Protection: AC600V

Open Circuit Voltage: < 0.7V

Frequency

Range	Resolution	Accuracy
9.999Hz	0.001Hz	±(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: 0.5 ~ 3Vpp

Overload Protection: AC600V

Note : Frequency measurements are autoranging.

Transistor hFE

Range	Resolution	Test Condition
hFE	1	$V_{ce} \approx 2.2V * I_b \approx 4\mu A$

Overload Protection: AC600V

Capacitance (use Relative mode)

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

Overload Protection: AC600V

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 :

Type K thermocouple - Nickel Chromium/Nickel Silicon

Note: Don't use the type k thermocouple supplied with the meter to measure temperature above 230°C.

Duty Cycle


Scope	Resolution	Accuracy
5% ~ 95%	0.1%	*(2%+7)

The Duty range is an autorange.

Input Voltage: 4 ~ 10Vp-p; **Frequency Range:** 1Hz~5kHz


Overload Protection: AC600V

Diode

Range	Resolution	Test Current	Open Circuit Voltage
	1mV	about 0.8mA	about 3V

Overload Protection: AC600V

Continuity

Range	Introduction	Remark
	The built-in buzzer will sound if the resistance is less than about 20*. The buzzer will not sound if the resistance is more than about 70*.	Open circuit voltage: < 0.7V

Overload Protection: AC600V

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 "^{Rel}USB" button, the meter enters the relative mode and store the present reading as a reference for subsequent measurements, and "Δ" appears as an indicator. The display reads zero.
2. The display shows the difference between the reference and a new measurement.
3. Press the "^{Rel}USB" button again, the meter exits the relative mode.

Data Hold Mode

After pressing the "^{Hold}Light" button, the present reading is held on the display, meanwhile "H" is displayed on the LCD as an indicator. To exit the Data Hold mode, press the button again and the indicator "H" will disappear.

Note: For diode, continuity or transistor function, the Data Hold mode is not available.

Measuring Voltage

1. Connect the black test lead to the "COM" jack and the red test lead to the " $\overline{1}$ V Ω Hz" jack.
2. Set the range switch to the desired V_{\approx} or mV_{\approx} range. If the magnitude of the voltage to be measured is not known beforehand, select the highest range and then reduce it range by range until satisfactory resolution is obtained.
3. Press "**Select**" button to select dc or ac measurement.
4. Connect the test leads across the load to be measured.
5. Read LCD display. For dc voltage measurement, the polarity of red lead connection will be indicated as well.
6. In the ac measurement mode, you can press the " $\frac{Hz}{Duty}$ " button to make the display show "Hz" and then measure the frequency. It means that you don't have to set the range switch to the "**Hz/Duty**" range position for frequency measurement. Press the " $\frac{Hz}{Duty}$ " button twice to restore the meter to ac voltage function.

Note: For frequency measurement, the display will show a zero value or other indefinite values if the voltage of the input signal is less than about 300mV rms. It is normal.

Measuring Current

1. Set the range switch to desired μA , mA or A range.
If the magnitude of the current to be measured is not known beforehand, select the highest range and then reduce it range by range until satisfactory resolution is obtained.
2. Press "**Select**" button to select dc or ac measurement.
3. 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 " $\mu\text{A}/\text{mA}$ " jack. If the current is between 600mA and 20A, connect the red test lead to the "A" jack instead.
4. Turn off power to the circuit which you will measure.
Discharge all capacitors of the circuit.
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 measurement, the polarity of the red test lead connection will be indicated as well.
7. In the ac measurement mode, you can press the " $\frac{\text{Hz}}{\text{Duty}}$ " button to make the display show "Hz" and then measure the frequency. It means that you don't have to set the range switch to the "**Hz/Duty**" position for frequency measurement. Press the " $\frac{\text{Hz}}{\text{Duty}}$ " button twice to restore the meter to ac current function.

Note: For frequency measurement, the display will show zero or other indefinite values if the voltage of the input signal is less than about 300mV rms. It is normal.

Note:

When the range switch is in the "A≈" range position, you must use the "A" jack.

When you use the "A" jack, the range switch must be in the "A≈" range position.

Measuring Resistance

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 "Ω" range, the display shows "Ω".
3. Connect test leads across the load to be measured.
4. Read the reading on the display.

Note:

1. For resistance above 1MΩ, the meter may take a few seconds to stabilize reading. This is normal for high resistance measuring.
2. When the input is not connected, i.e. at open circuit, "OL" will be displayed for the overrange condition.

3. Before measuring in-circuit resistance, make sure that the circuit under test has all power removed and all capacitors are fully discharged.

Continuity Test

1. Connect the black test lead to the "COM" jack and the red test lead to the " $\overline{V}\Omega Hz$ " jack (Note: The polarity of the red lead is positive "+").
2. Set the range switch to " Ω " position.
3. Press the "Select" button to make the display show "•|)" .
4. Connect the test leads to the circuit to be measured.
5. If the circuit resistance is less than about 20Ω , the built-in buzzer will sound.
If the circuit resistance is more than about 70Ω , the buzzer will not sound.
If the circuit resistance is between 20Ω and 70Ω , the buzzer may sound or may not sound.
If the circuit resistance is more than about 600Ω , the display will show "OL".

Note :

Before performing in-circuit continuity test, make sure that the circuit under test has all power removed and all capacitors are fully discharged.

Measuring Capacitance

1. Set the range switch to "←" position.
2. Refer to the Figure 2, connect the adapter to the "COM" jack and the "←VΩHz" jack. Don't reverse the connection.
3. Press the " $\frac{Rel}{USB}$ " button, the meter enters the Relative mode and "Δ" 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.
Note: For electrolytic capacitor, the polarity connection must be correct ("+" to "+", "-" to "-").
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.
2. For capacitance measurement, the max. reading is "3999", the lowest range is 40nF, the highest range is 4000F, all the ranges are autoranges.
3. Because the meter measures capacitance by measuring the time of charging and discharging the capacitor, measuring a higher capacitance will take more time. For the range of 4000F, it will take about 30 seconds for the meter to measure capacitance.

Measuring Frequency

1. Connect the black test lead to the "COM" jack and the red test lead to the "Hz/VΩHz" jack (Note: The polarity of the red lead is positive "+").
2. Set the range switch to **Hz/DUTY** position, the display shows "Hz".
3. Connect the test leads across the source or load to be measured.
4. Read the reading.

Note

1. For frequency measurements, the range exchange is automatic. The max. reading is 9999. Measurement scope is 0 ~ 10MHz.
2. The scope of the voltage of input signal should be :
0.5 ~ 3Vpp

Measuring Duty Cycle

1. Connect the black test lead to the "COM" jack and the red test lead to the " Hz " jack.
2. Set the range switch to **Hz/DUTY** position.
3. Press the " $\frac{\text{Hz}}{\text{Duty}}$ " button to select duty cycle measurement, the display shows "%".
4. Connect the test leads across the circuit to be measured.
5. The reading is duty cycle reading of the square wave under test.

Note:

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

Diode

1. Connect the black test lead to the "COM" jack and the red test lead to the " Hz " jack (Note: The polarity of the red lead is positive "+").
2. Set the range switch to " $\frac{\Omega}{\text{Diode}}$ " position.
3. Press the "**Select**" button to make the display show " $\rightarrow+$ ".

4. Connect the red test lead to the anode of the diode to be tested, and the black test lead to the cathode.
5. The display will show the approximate forward voltage of the diode. If the connection is reversed, "OL" will be shown on the display.

Transistor hFE

1. Set the range switch to "**hFE**" position.
2. Refer to the Figure 2, connect the adapter to the "COM" jack and the " \overline{h} V Ω Hz" jack.
3. Identify whether the transistor is NPN or PNP type and locate emitter, base and collector lead. Insert leads of the transistor to be tested into proper holes of the transistor test socket of the adapter.
4. LCD display will show the approximate hFE value.

Note:

This measurement can be used to determine whether the transistor is good, and be used to compare the hFE of one transistor with the hFE of another transistor, the reading on the display is only for reference.

If you want to measure a transistor accurately, please use a professional measurement tool.

Measuring temperature

1. Set the range switch to "**TEMP**" position, the display will show the compensation temperature which is similar to the environment temperature.
2. Connect the negative "-" plug of the k type thermocouple to the "COM" jack, and the positive "+" plug to the "VΩHz" jack.
3. Connect another end of the thermocouple to the object to be measured.
4. Read the reading on the display.
5. To change the meter between the celsius temperature mode and the fahrenheit temperature mode, press the "**Select**" button.

Auto Power Off

The display blanks and the meter goes into "Sleep" mode if you do not turn the rotary switch or press any button for about 15 minutes. While in Sleep mode, pressing any button or turning the rotary switch turns on the meter.

To disable the automatic power-off feature, press and hold down the "**Select**" button while turning on the meter.

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, and these readings will be displayed on the computer in several patterns, and can be stored as a file.

MAINTENANCE

Warning

Except replacing fuses 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.

The meter should be stored in dry place. Don't store it in intensive 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 and Fuse

Warning

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

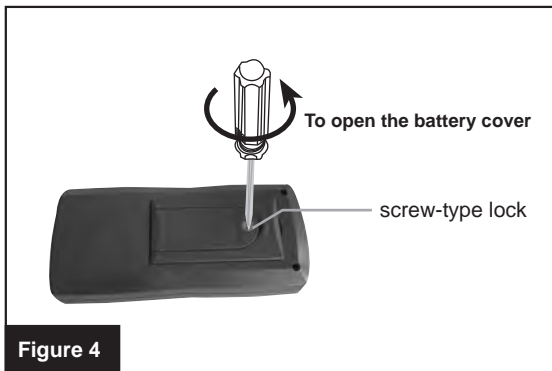
To prevent damage or injury, install only replacement fuses with the specified amperage, voltage, and interrupt ratings.

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 4). Remove the battery cover and replace the exhausted battery with a new one of the same type. Rejoin the battery cover and the 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.



This meter uses two fuses:

Fuse1 : 500mA, 1000V, FAST, Min. Interrupt Rating
20000A, Ø10X38mm

Fuse 2 : 20A, 1000V, 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. Rejoin the cover, reinstall the screws and the holster.

ACCESSORIES

Owners Manual :	1 piece
Test Lead :	1 pair
USB Data Cable :	1 piece
Thermocouple :	1 piece
Adapter :	1 piece
CD (containing USB driver and the communication application) :	1 piece

<http://www.all-sun.com>

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.



DATA TRANSMISSION PROGRAM

operation instruction

SYSTEM REQUIREMENT

To run this application, there are some requirements for the system as follows:

Operating system : Microsoft Windows 98SE/2000/XP/2003/VISTA

Memory: 128MB RAM or more

Monitor: SuperVGA monitor (or better), with the resolution of 800 x 600 or higher

Harddisk space: 10MB (or more) free space

CD-ROM drive

USB port

Mouse or equivalent device

Printer (optional)

INSTALLATION

1. Place the CD supplied with the meter to the CD-ROM of the computer.
2. Run the drivers.exe application in the CD, the Install Driver dialog box appears. In the Install Driver dialog box, click the "Install" button to install the USB driver (It may take several minutes).
3. Connect the USB data cable supplied with the meter to the terminal on the top of the meter, connect the other end of this USB data cable to the USB port of the computer. The computer will prompt that a new hardware has been found and the USB driver will be installed automatically.
4. Run the Setup.exe application in the CD , complete the program installation according to the prompts of the computer.
5. Press and hold down the meter's " ^{Rel} RS232 " button for about 2 seconds, the symbol "RS232" appears on the meter's LCD display.

OPERATION INSTRUCTION

After the installation finishes, click EM6000.exe to run it, the following window appears.

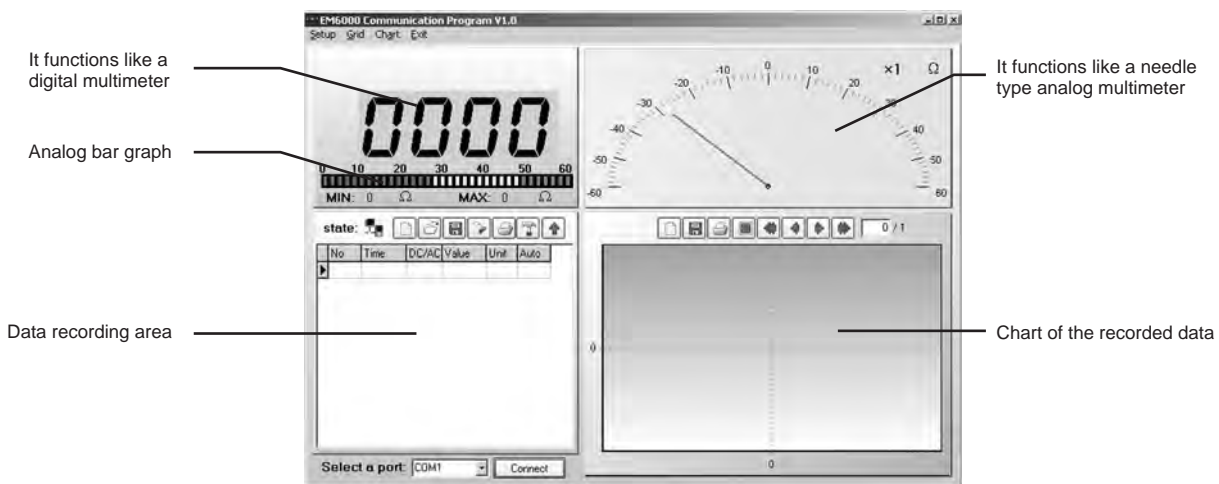


Figure 1

In figure 1, the Select a port combo box is for you to select the desired port, it is not necessary for you to do any selection, just press Connect button to connect to the multimeter (Tip: The application has the auto-identification function). To disconnect from the meter, just press this button again.
NOTE: In Windows Vista system, don't disconnect the USB data cable before you disconnect from the meter.

The left-top area is for displaying the measurement readings through a digital display and an analog bar graph. The maximum reading recorded and the minimum reading recorded are shown below the bar graph at the same time.

The right-top area is an analog meter. The measurement value of this meter is the result of that the number indicated by the needle is multiplied by the multiplicity factor in the right-top corner of this area.

The right-bottom area is for the chart of the recorded data which are obtained by sampling from the measurement readings.

The left-bottom area is for displaying the currently saved file in which the readings obtained by sampling are shown sequentially.

BUTTON BAR INSTRUCTION:

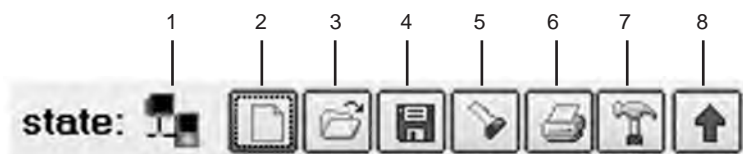


Figure 2

- 1 State : Indicate the status of the present data transmission.
- 2 New : Click to establish a new database.
- 3 Open : Open the databases with the extension of ".db".
- 4 Save as : Save the present file as another file in one of the 6 formats. The extensions for the 6 formats are: ".db", ".xls", ".txt", ".csv", ".htm", and ".rtf".
- 5 Search by time : After you click this button, the Search By Time dialog box appears.
In the Search By Time dialog box, fill the Time box with the time in a correct format, the filled time acts as a key word for search. The data recording area will locate the recorded data of this time. Click the Close button on the Search By Time dialog box to close the box.



Figure 3

- 6 Print : Print all the data of the file in the present data recording area.
- 7 Options : After you click this button, the Options window appears.

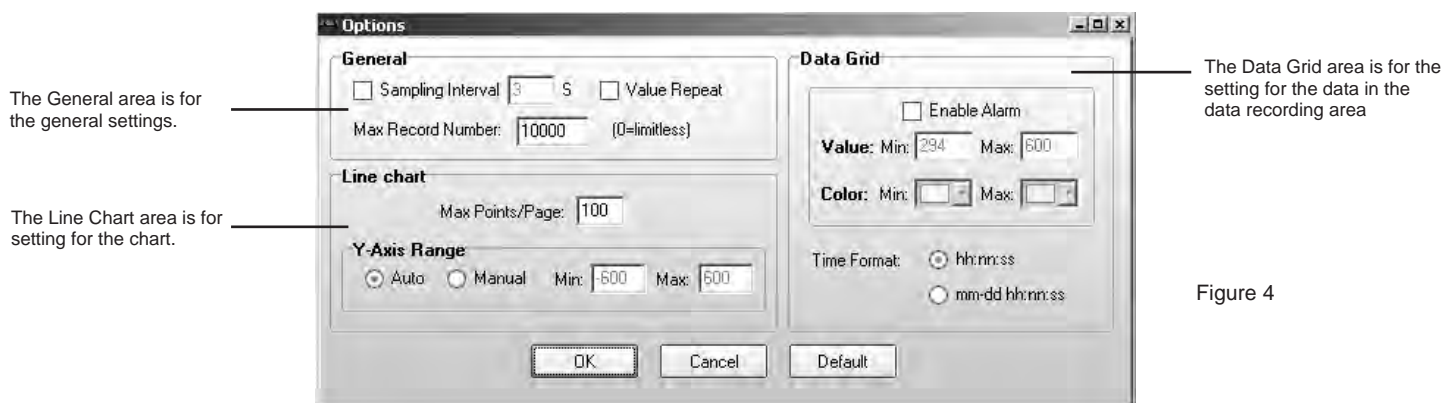


Figure 4

The General area is for the general settings.

Sampling Interval box : Fill the box with the desired sampling interval, the unit is second. Click to select the check box at the left of the Sampling Interval box to enable custom setting, otherwise the default sampling interval will be adopted instead.

Value Repeat check box : Click this check box to determine whether to record a reading which is same as the previous reading.

Max Record Number box: Fill the box with a number of the upper limit of data recording. The application will disconnect from the meter and stop recording when the maximum record number has been reached. For example, if the max. record number is 10, it means that the max. recording ability is 10 readings for each connection.

Note: Depending on the configuration of the computer, too many recorded data will affect the performance of the system. If you fill the box with the number "0", there will be no limit for record number. Please keep in mind.

Line chart box is for the setting for the chart in right-bottom area.

Note: Readings on the chart are same as the readings on the data recording area, these readings were obtained by sampling from the measurement readings at the specified sampling interval.

Max Points/Page box : Set the max. number of division of the X axis in one page. Excess recorded data will cause this chart changes to the next page.

Y-Axis Range area : Set the scale on the Y axis.

There are two setting modes. If you select the Manual mode, the desired upper limit and lower limit of the scale should be typed into the Min box and the Max box respectively, the readings beyond the the limits are not visible in the chart.

If you select the Auto mode, the computer will automatically adjust the scale on the Y axis to fit all the recorded data.

The Data Grid area is for setting for the data in the data recording area.

Enable Alarm check box : Enable or disable the color-data alarm feature when the recorded readings are beyond the upper or lower limit which will be specified later.

Value box : The two Value boxes are used for setting the lower and upper limits respectively: The Min box is for setting the lower limit, the Max box is for setting the upper limit.

Color box : The two Color boxes are for setting the alarm colors. The Min box is for selecting the color of the readings which are smaller than the lower limit, the Max box is for selecting the color of the readings which are larger than the upper limit.

Time Format check box : Click the desired option button to select the desired time format for the readings in the data recording area.

"hh : nn : ss" means "hour : minute : second". "mm-dd hh : nn : ss" means "month-day hour : minute : second"

Press the OK button to save the settings and close the Options dialog box. Press the Cancel button to close the box without saving the settings. Press the Default button to adopt the system default setting and close the box.

8 Stretch / Shrink button : Stretch or shrink the data recording area

RIGHT- BOTTOM AREA INSTRUCTION

The Right-bottom area is a chart area.

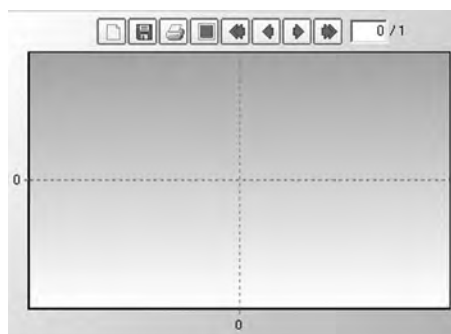


Figure 5

To zoom in the chart, perform one of the following steps :

1. Place the mouse pointer to the left-top corner of the area, press and hold down the left button of the mouse, and then drag the mouse pointer to the right-bottom corner.
2. Place the mouse pointer to the left-bottom corner of the area, press and hold down the left button of the mouse, and then drag the mouse pointer to the right-top corner.

To zoom out the chart to the default size, perform one of the following steps:

1. Place the mouse pointer to the right-top corner of the area, press and hold down the left button of the mouse, and then drag the mouse pointer to the left-bottom corner.
2. Place the mouse pointer to the right-bottom corner of the area, press and hold down the left button of the mouse, and then drag the mouse pointer to the left-top corner.

Tool bar



Figure 6

1 New Chart : Click to establish a new chart and clear the present data.

2 Save as : Click to save the chart. The data of the chart can be saved in TXT, XML, HTML or XLS format.

The chart can be saved in BMP, JMP or EMF format. You can also copy the chart or the data of the chart onto the clipboard, or send it as an email.

3 Print: Click to print the present chart

4 Full view / Normal view : Click to switch between the full-screen chart and the part-screen chart.

5 First page : Click to change to the first page.

6 Pervious page : Click to change to the previous page.

7 Next page : Click to change to the next page.

8 Last page : Click to change to the last page.

9 Page number : Indicates the page number of the currently shown chart. After the communication connection has been disconnected, input a page number in this box, then press ENTER key to display the chart of this page number.

10 Total page number : Indicates the total page number.