

# **DIGITAL MULTIMETER**

## **Intelligent MS8203**

With RS232 interface

## **USERS MANUAL**

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## **SAFETY PRECAUTIONS**







- Read these operation instructions thoroughly and completely before operating your meter. Pay particular attention to **WARNING**. The instructions in these warnings must be followed.
- You must be careful when working with voltages above 30V AC. Keep fingers behind the probe barriers while measuring.
- Never use the meter to measure voltages that might exceed the allowable maximum input value of any function measurement mode.
- Always inspect your meter and test leads before every use. If any abnormal conditions exist :broken test leads, cracked cases, LCD not reading, etc, do not attempt to take any measurement.
- Never replace the protective fuse inside the instrument with a fuse other than the specified or approved equal fuse. Replace only with same type of fuses. To avoid electrical shock, turn off the instrument and disconnect the test leads and any input signals before replacing the fuses.
- Using the meter with the equipped test leads is only conform to safety requirements. If you need instead broken test leads, you must replaced with the same as type and electric specification.
- Never touch a voltage source when the test leads are plugged into a current jack.
- Do not expose the instrument to direct sunlight, extreme temperature or moisture.

## **SAFETY INFORMAMTION**

Intelligence digit multimeter complies with

IEC1010-1, Protection Class II, pollution degree 2  
AC 700V. If the instrument is used in a manner not  
specified, the protection provided by the equipment  
may be impaired.

### **SAFETY SYMBOLS**

-  Important safety information, refer to the  
operating manual
-  Dangerous voltage may be present.
-  Earth ground
-  Double insulation (Protection class II)
-  AC (Alternating Current)
-  DC (Direct Current)

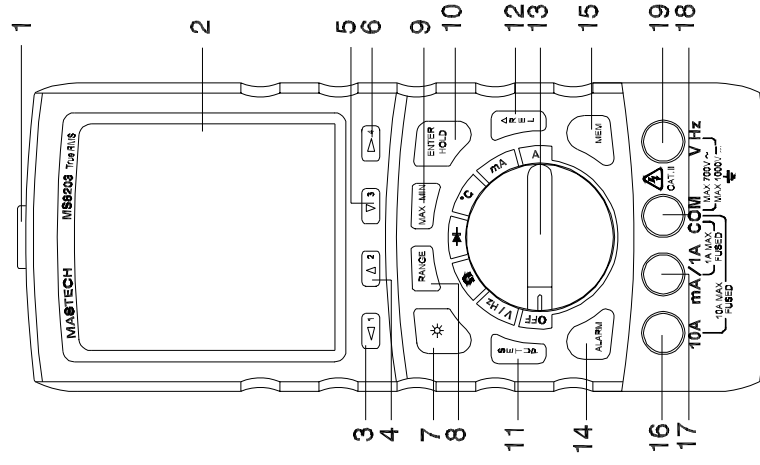
### **READ THE INSTRUCTIONS BEFORE USING THE INSTRUMENT**

#### **FEATURE**

1. Large LCD window, double digital 8000 count and  
analogue bar graph display
2. Calendar clock real display, record measurement  
time.
3. Button control multilevel setup, upper limit of  
measurement value, lower limit of measurement  
value, upper limit and lower limit of measurement  
alarm function.
4. Record the measured value and read recorded  
values having calendar, can record 33 measured  
value.
5. Four display modes: bar graph display, double  
digital display and calendar clock display, display

- true RMS value and frequency or maximum value and minimum value at the same time, also can display relative quantity and error percent of the relative value, display Fahrenheit and Celsius .
6. Match PC photo electricity interface and PC windows software, record data and export graph.

### LAYOUT

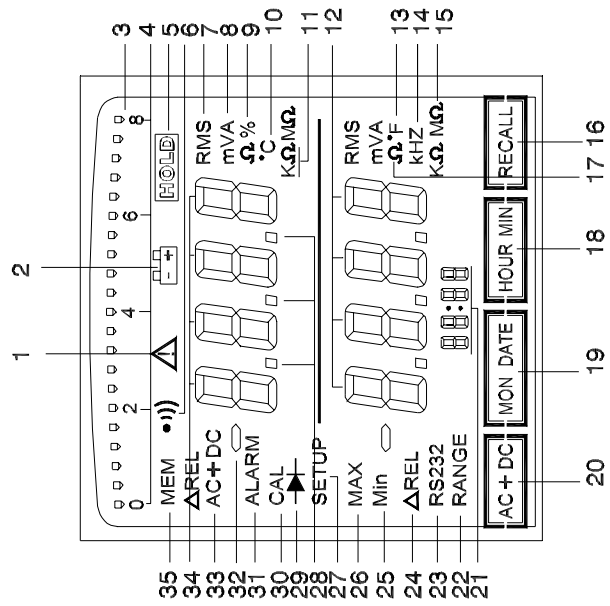


( Figure 1 )

1. RS232 interface
2. LCD
3. 1 button
4. 2 button
5. 3 button
6. 4 button
7. Backlight button
8. RANGE button
9. MAX MIN button
10. ENTER HOLD button
11. SETUP button
12. REL button
13. Function Switch  
Used to select measurement mode
14. ALARM button
15. MEM button
16. 10A current input jack
17. mA /1A current input jack
18. COM common jack
19. VHz voltage input jack

## **DISPLAY**

1. Dangerous voltage symbol
2. Battery symbol
3. Bar graphic
4. Digit symbol
5. HOLD symbol
6. Buzzer symbol
7. RMS symbol
8. Voltage/current unit symbol



( Figure 2 )

9. % symbol
10. Celsius temperature unit
11. KΩ Resistance unit
12. 4 digits LCD display ( down display )
13. Fahrenheit Temperature unit
14. Frequency unit
15. MΩ Resistance unit
16. Read memory menu
17. Ω resistance unit
18. Time menu

19. Date menu
20. AC/ DC menu
21. 4 digit LCD display (display time or date)
22. Range symbol
23. RS232 symbol
24. Relatively symbol
25. Minimum symbol
26. Maximum symbol
27. Setup symbol
28. Decimal point
29. Diode symbol
30. Calibrate symbol
31. Alarm symbol
32. negative symbol
33. AC DC symbol
34. 4 digits LCD display (up display)
35. Save symbol

## **SYNOPSIS OF MEASUREMENT FUNCTION AND BUTTON FUNCTIN**

FUNCTION	V	mV	$\Omega$	$\rightarrow$ +	•))	$^{\circ}\text{C}$	mA	A
1	○	○	○	○	○	○	○	○
2	○	○	○	○	○	○	○	○
3	○	○	○	○	○	○	○	○
4	○	○	○	○	○	○	○	○
RS232	○	○	○	○	○	○	○	○
RANG	○	-	○	-	-	-	-	○
MAX	○	○	○	-	-	○	○	○
MIN	○	○	○	-	-	○	○	○
HOLD	○	○	○	○	○	○	○	○
SETUP	○	○	○	-	-	○	○	○
ALARM	○	○	○	-	-	○	○	○
REL	○	○	○	-	-	○	○	○
MEM	○	○	○	○	○	○	○	○

## BUTTON FUNCTION TOUR

### 1. F1 FUNCTION BUTTON

- ( I ) Press F1 button to select one of the three measurement functions: DC, AC, DC+AC, when the instrument is in the voltage measurement or current measurement mode.
- ( II ) Resistance or continuity test •)) or diode test  $\rightarrow$  is changed by pressing F1 button in resistance measurement mode.

- (III) When the instrument is in the SETUP mode, press F1 button to select the bit of time value or alarm value that you want to change, the twinkling selected bit moves left by each press.

## 2. F2 FUNCTION BUTTON

- (I) In the measurement mode, press F2 button to change clock display mode of the instrument to display the month and the day of current date.
- (II) In the SETUP mode, press F2 button to change the time value or alarm value, twinkling selected bit added 1 by each press.

## 3. F3 FUNCTION BUTTON

- (I) In the measurement mode, press F3 button to change clock display mode of the instrument to display the hour and the minute of current time.
- (II) In SETUP mode, press F3 button to change the time value or alarm value, twinkling selected bit decreases by each press.

## 4. F4 FUNCTION BUTTON

- (I) In measurement mode, press F4 button to read stored data in the memory, the LCD displays "MEM-n" symbol at first, then displays measuring value. "n" is 1 to 33 serial number in the memory. Press the button to

increase the saved serial number, then LCD display the stored measurement value, press F4 button time after time, the data in memory is displayed circularly.

(II) In SETUP mode, press F4 button to select the bit of the time value or alarm value that you want to change, twinkling selected bit move right by each press.

## **5. ALARM BUTTON**

In measurement mode, press ALARM button, then the LCD displays "ALARM" symbol, the meter enters measuring alarm state.

There are three alarm modes:

1. **HIGH ALARM MODE**  
Use this mode estimate to whether the measurement value exceeds the Alarm Max threshold value.  
when the measurement value exceeds the Alarm Max threshold value, a continuous beep at low frequency comes out.
2. **LOW ALARM MODE**  
Use this mode to estimate whether the measurement value is below the Alarm Min threshold value.  
when the measurement value is below the Alarm Min threshold value, a continuous beep at low frequency comes out.
3. **AREA ALARM MODE**  
Use this mode to estimate whether the

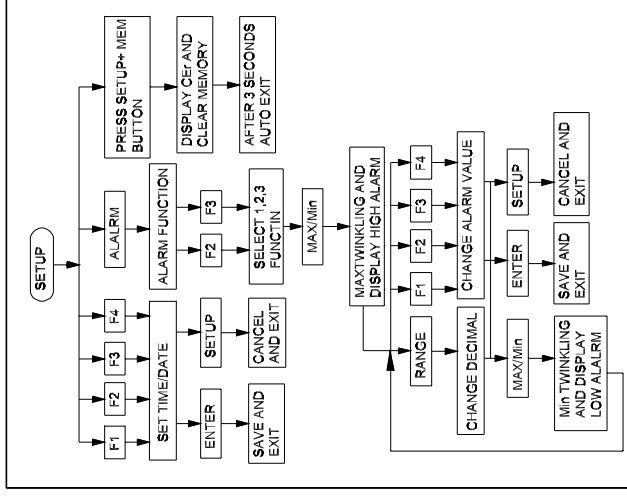
measurement value is in the area that you set.  
When the measurement value exceeds the Alarm Max threshold value or is below the Alarm Min threshold value, a continuous beep at low frequency comes out.  
Use this mode can measure voltage, current, temperature. when the measurement value exceed the threshold value, the buzzer emits beep. You can also use this mode to sieve the resistance in resistance mode.  
Press ALARM button again to cancel the alarm mode, the "ALARM" symbol is disappeared on the display.

## 6. **SETUP BUTTON**

It is setup function button. press SETUP button to set time value or alarm value or alarm mode. Refer to Figure 3.

## 7. **BACKLIGHT BUTTON**

Back light button. press this button to turn backlight on. The backlight turn on over 8 seconds, then the backlight is auto turn off.



( Figure 3 )

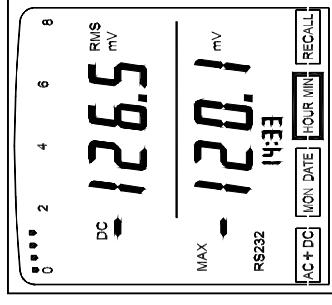
### 8. RANGE BUTTON

Select to Autorange mode or manual range mode. When the LCD displays "RANGE", the meter is in the manual mode; when "RANGE" symbol no display, the meter is in the autorange mode. After the instrument power on, it is in the autorange mode automatically, then press the RANGE button. the meter changes into the manual range mode; press the button again, the range switch once more. When you press the

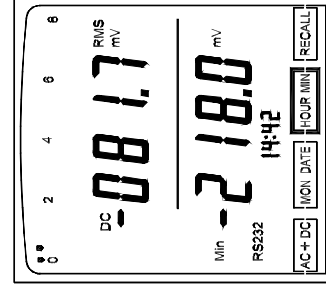
RANGE button for 2 seconds, it return the autorange mode.

### 9. MAX MIN BUTTON

Press this button, the LCD displays "MAX" symbol and maximum value on the second line symbol and maximum value on the second line of the display, press this button again, LCD displays "Min" symbol and minimum value on the same position. (As Figure 4 and Figure 5)



( Figure 4 )

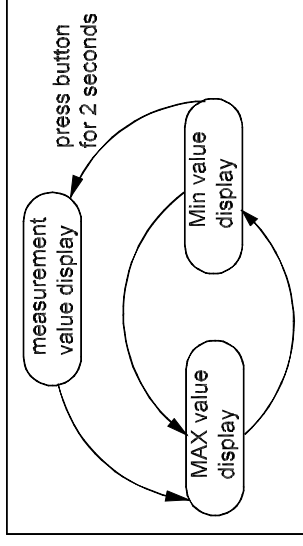


( Figure 5 )

When it is not on the MAX or MIN mode, the instrument can automatic record the maximum measurement value and minimum measurement value. To observe maximum value and minimum value, you can press this MAX MIN button to change display.

Press and hold down this button for over 2 seconds, the prompts of MAX function or MIN function are disappeared. When you press REL button, the instrument is in REL measurement mode, MAX or MIN function is canceled.

MAX、MIN BUTTON FLOW (Figure 6)



(Figure 6)

### 10. ENTER HOLD BUTTON

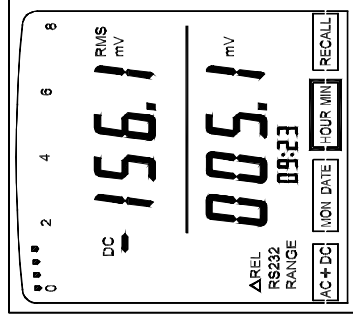
In measurement mode, press ENTER HOLD button to enter the hold data mode, current data is held on the LCD; press this button again to cancel hold data function.

In SETUP mode, press ENTER HOLD button to

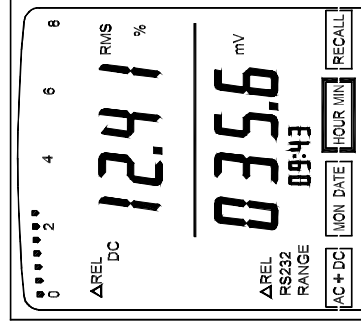
save the data which you had already set and exit setup mode.

### 11. REL BUTTON

When press REL button at first time, the LCD displays current measurement value on the first line and displays “ $\Delta$ REL” symbol and relative value on the second line . ( Figure 7 )



( Figure 7 )



( Figure 8 )

Press REL button again, the LCD displays percent error of the relative value on the first line, and displays relative measurement value on the second line. ( Figure 8 )

Press REL button time after time, the display change the mode between as Figure 7 and Figure 8. Press this button for over 2 seconds, REL mode is canceled, the instrument return to measurement mode.

When you press the MAX MIN button in REL mode, the instrument automatically enter MAX measurement mode.

## **12. MEM BUTTON**

When you press MEM button in measurement mode, the current measurement value is saved in the meter. The LCD displays “MEM n” for 2 seconds at first, the “n” can be 1 to 33. The instrument can save 33 times at most. If the LCD displays “FULL” symbol, the memory of the instrument is full. If you want to save data again, you must press the SETUP button, then press the MEM button to clear the memory. After that you can save data again.

## **FUNCTION SWITCH TOUR**

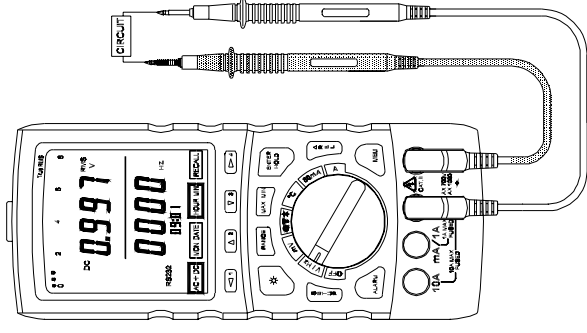
**VHz:** Voltage Measurement  
Range: 800V,80V,8V

- MV:** Voltage Measurement  
Range: 800mV
- $\Omega$  :** Resistance Measurement, Diode Test and Continuous Test
- $^{\circ}\text{C}$ :** Temperature Measurement
- 80mA:** Current Measurement  
Range: 80mA
- A:** Current Measurement  
Range: 1A, 10A
- When the current signal is input into the mA/1A jack, press RANGE button, the LCD displays "mA" symbol, the range is 1A.  
When the current signal is input into the 10A jack, press RANGE button, the LCD displays "A" symbol, the range is 10A.

## OPERATION

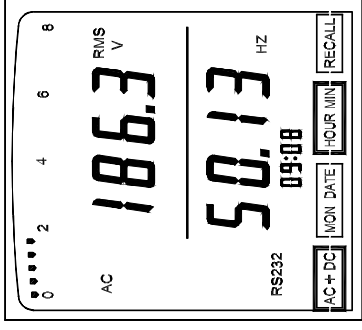
### 1. MEASURING VOLTAGE

- 1.1 Insert the red and black test leads into the VHz jack and COM jack respectively. Turn the Function Switch to "VHz" or "mV", the LCD displays "DC" symbol, it is in DC voltage measurement mode. ( Figure 9 )



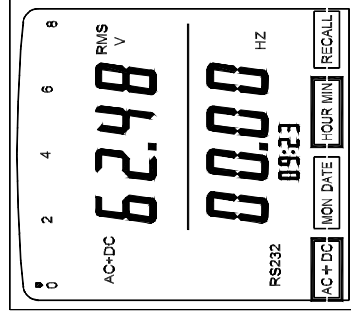
( Figure 9 )

- 1.2 press F1 button, LCD displays “AC” symbol, then it is in AC voltage measurement mode. LCD displays current voltage measuring value on the above line of the LCD, and displays the frequency value of the signal on the below line of the LCD. The extent of the minimum measurement frequency is 50mV.



( Figure 10 )

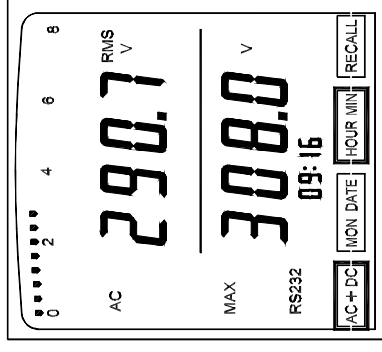
1.3 Press F1 button again, it is the "DC+AC" symbol not "AC" symbol on the LCD. The instrument is in AC and DC measurement mode. (Figure 11)



( Figure 11 )

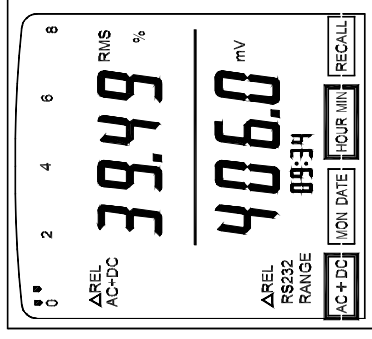
1.4 When it is in the voltage measurement mode, press the MAX MIN button, the instrument can

measure and display current measuring value and maximum value or minimum value at one time. ( Figure 12 )

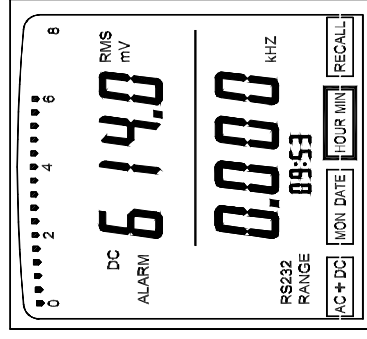


( Figure 12 )

- 1.5 If you press the REL button, the instrument can display relative value and percent error of the relative value.( Figure 13 )
- 1.6 If you had set the ALARM function before measurement, you press the ALARM button, the LCD displays the "ALARM" symbol. When the measurement value exceed the alarm threshold value, the instrument comes out buzzer sound. ( Figure 14 )



( Figure 13 )



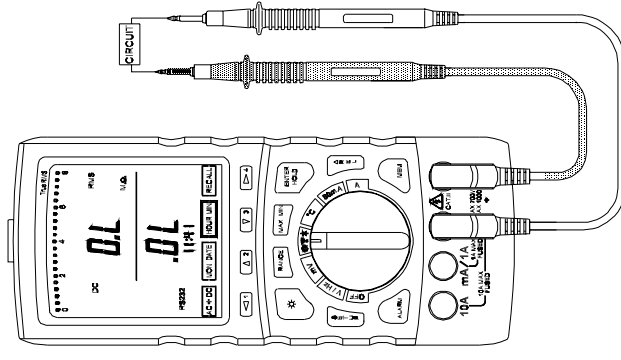
( Figure 14 )

If you want to cancel the ALARM function, you should press ALARM button again.

## 2. MEASURING RESISTANCE

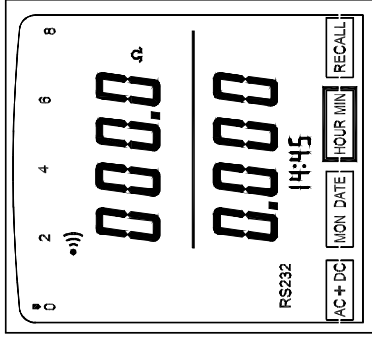
- 2.1 Insert the red and black test leads into the VHz jack and COM jack respectively. Turn the function switch to “Ω”, the instrument is

in resistance measurement mode.  
(Figure 15)

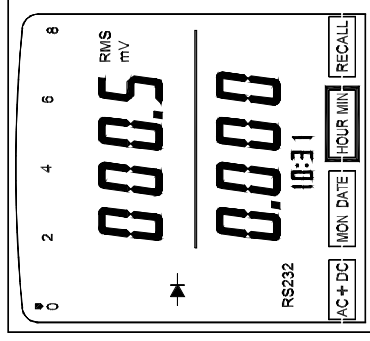


(Figure 15)

2.2 Press F1 button in turn, the instrument can be in Resistance Measurement or Continuity Test (•) or Diode Test (→) .  
(Figure 16 and Figure 17)



( Figure 16 )



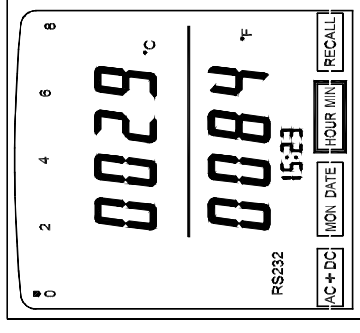
( Figure 17 )

- 2.2 In resistance measurement mode, if you press the MAX button or the REL button or the ALARM button, the instrument can measure MAX value or Min value or relative value or enter ALARM function mode.
- 2.3 Using the REL function and the ALARM

function, you can filter a batch of resistance and compare the error, and you can use the equipped PC data record software to record and analyse data.

### 3. MEASURING TEMPERATURE

3.1 Insert the positive test lead and the negative test lead of the thermocouple into VH<sub>z</sub> jack and COM jack respectively. Turn the function switch to “°C”, the instrument enter the temperature measurement mode. Then the LCD displays Celsius value and displays Fahrenheit value at one time. ( Figure 18 )



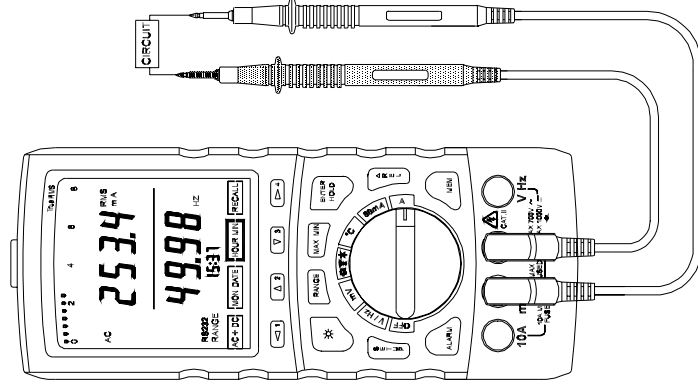
( Figure 18 )

3.2 You can select MAX, Min, REL, ALARM function in temperature measurement mode, the unit is Celsius in these functions.

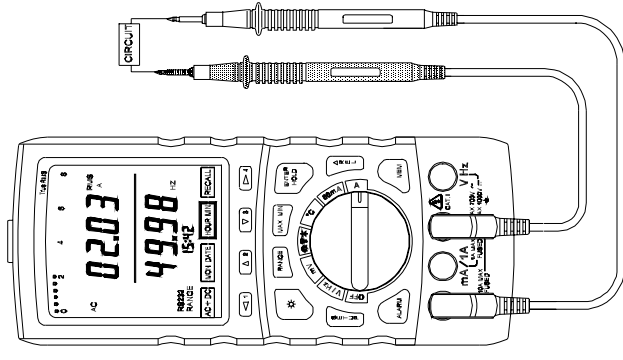
### 4. MEASURING CURRENT

4.1 In the current measurement mode, there is

two positions: 80mA and A by turning the function switch. It is one range on the 80mA position; it is two ranges: 10A and 1A on the A position, you can press the RANGE button to switch range. In 1A range, the LCD displays as Figure 19, current signal is input in the mA/1A jack and the COM jack; in 10A range, the LCD displays as Figure 20, current signal is input in the 10A jack and the COM jack.



( Figure 19 )



( Figure 20 )

4.2 You can press the F1 button to switch DC, AC, DC+AC mode in current measurement mode.

4.3 The LCD displays frequency value of the measured current in AC current measurement mode. The minimum extent of current frequency measurement is as following.

RANGE	MINIMUM	EXTENT
80mA		2mA
1A		20mA
10A		200mA

4.4 You can select MAX, Min, REL, ALARM function in current measurement mode, the operation is the same as voltage measurement mode.

### **RS232 DATA INTERFACE**

The instrument can transmit data to PC computer by a RS232 infrared photoelectricity interface in real-time mode.

You can connect the RS232 interface to a serial port of PC computer, then install the user data record software into the computer according to the README.TEXT file in the SETUP disk. After that, you can record and print the measured data of the instrument in real-time mode on the WINDOWS. The user data record special software can complete to record, collate, plot, print data in real-time mode.

Note: In all measurement mode, the measured data can be transmitted to the PC serial port automatically, but the instrument will stop transmitting in the SETUP mode.



### **AUTO POWER OFF FUNCTION**

The instrument has Auto Power OFF function. After no operation for 10 minutes, the instrument will switch to OFF automatically. By now you can turn the function switch to any position to switch the instrument on.

## BACKLIGHT

When you press the  button, the backlight turn ON. After about 8 seconds, the backlight auto turn OFF.

## LOW VOLTAGE INDICATION

When the batteries is , the LCD displays the "  " symbol.

## REPLACING THE FUSE

### WARNING

To avoid electrical shock, the instrument must be power off and disconnect the test leads or any input signals before replacing the fuses. Replace only with same type fuses. The mA input terminal is protected by a  $\frac{1}{100}$  A /250V fast blow ceramic fuse. The A input terminal is protected by 10A/ 600V fast blow ceramic fuse.

Use the following procedure to replace the blown fuses of the instrument:

1. Disconnect test leads from the measured circuit, turn the function switch to OFF, remove the test leads from the input jacks.
2. Remove the battery cover.
3. Unscrew the screw on the back cover, and remove the back cover.
4. Remove the blown fuse, replace with the same size and rating fuses.
5. The mA input terminal is protected by a


1A/ 250V fast blow ceramic fuse, the A input terminal is protected by a 10A/600V fast blow ceramic fuse.

6. Make sure the new fuse is centered in the fuse holder.
7. Reinstall the back cover and the screw.
8. Reinstall the battery cover.

## REPLACING THE BATTERIES

### WARNING

**To avoid electrical shock , the instrument must be power off and disconnect the test leads or any input signals before replacing the batteries. Never use the instrument unless the back cover of the instrument is fastened completely. Replace only with same type or rating batteries.**

When the LCD displays the " " symbol, the batteries must be replaced to maintain proper operation.

Use the following procedure to replace the batteries:

1. Remove the test leads from tested circuit, turn the function switch to "OFF". Remove the test leads from the input jacks.
2. Open the battery cover.
3. Remove the exhausted battery and replace with new batteries which is the same type or rating.
4. Reinstall the battery cover.

**Note**

There is a calendar clock battery in the instrument, the type is CR1220 3V button battery. A new CR1220 battery can be used for about three years. If the clock battery is exhausted, the display of calendar clock on the LCD is deviant. In this case the instrument maybe switch the power to OFF at once when you switch it power on. You must replace a new CR1220 battery now.

To check the calendar clock battery, you can press the SETUP button to enter the setup time mode after switching the power to ON. Set the time, then switch the power to OFF; power on the instrument again, if the time is not that you has set just now, the clock battery is exhausted, you must replace a new battery.

Use the following procedure to replace the clock battery:

1. Disconnect the test leads from the measured circuit, turn the function switch to OFF, remove the test leads from the input jacks.
2. Remove the battery cover.
3. Unscrew the screw on the back cover.
4. Remove the back cover.
5. Remove the exhausted battery, replace a new battery CR1220.
6. Reinstall the back cover.

## SPECIFICATION

### \* DC VOLTAGE

RANGE	ACCURACY	RESOLUTION
800mV	$\pm(0.5\%+6\text{dgt})$	0.1mV
8V	$\pm(0.5\%+6\text{dgt})$	0.001V
80V	$\pm(0.5\%+6\text{dgt})$	0.01V
800V	$\pm(0.5\%+6\text{dgt})$	0.1V

Input Impedance:  $10\text{M}\Omega$

Max Input Voltage: 1000V DC or 750V AC ( RMS )

### \* AC VOLTAGE

RANGE	ACCURACY	RESOLUTION
800mV	$\pm(1\%+8\text{dgt})$	0.1mV
8V	$\pm(1\%+8\text{dgt})$	0.001V
80V	$\pm(1\%+8\text{dgt})$	0.01V
700V	$\pm(1\%+8\text{dgt})$	0.1V

Input Impedance:  $10\text{M}\Omega$

Max Input Voltage: 1000V DC or 750V AC ( RMS )

### \* AC+DC VOLTAGE

RANGE	ACCURACY	RESOLUTION
800mV	$\pm(1.5\%+8\text{dgt})$	0.1mV
8V	$\pm(1.5\%+8\text{dgt})$	0.001V
80V	$\pm(1.5\%+8\text{dgt})$	0.01V
700V	$\pm(1.5\%+8\text{dgt})$	0.1V

Input Impedance:  $10\text{M}\Omega$

Max Input Voltage: 1000V DC or 750V AC ( RMS )

\* DC CURRENT

RANGE	ACCURACY	RESOLUTION
80mA	$\pm (1\%+6\text{dgts})$	0.01mA
1A	$\pm (1\%+6\text{dgts})$	0.15mA
10A	$\pm (2\%+6\text{dgts})$	0.01A

Overload Protection: 1A/250V for 80mA, 1A range  
10A/600V for 10A range

Max Input Current: mA jack is 1A, 10A jack is 10A  
Potential Difference : 800mV

\* AC CURRENT

RANGE	ACCURACY	RESOLUTION
80mA	$\pm (1.5\%+8\text{dgts})$	0.01mA
1A	$\pm (1.5\%+8\text{dgts})$	0.15mA
10A	$\pm (2.5\%+8\text{dgts})$	0.01A

Overload Protection: 1A/250V for 80mA, 1A range  
10A/600V for 10A range

Max Input Current: mA jack is 1A, 10A jack is 10A  
Potential Difference : 800mV

\* AC+DC CURRENT

RANGE	ACCURACY	RESOLUTION
80mA	$\pm (2.5\%+8\text{dgts})$	0.01mA
1A	$\pm (2.5\%+8\text{dgts})$	0.15mA
10A	$\pm (3\%+8\text{dgts})$	0.01A

Overload Protection: 1A/250V for 80mA, 1A range  
10A/600V for 10A range

Max Input Current: mA jack is 1A, 10A jack is 10A  
Potential Difference : 800mV

\* RESISTANCE

RANGE	ACCURACY	RESOLUTION
800 Ω	±(1%+6dgts)	0.1 Ω
8k Ω	±(1%+6dgts)	0.001k Ω
80k Ω	±(1%+6dgts)	0.01k Ω
800k Ω	±(1%+6dgts)	0.1k Ω
8M Ω	±(1.5%+6dgts)	0.001M Ω
40M Ω	±(2.5%+8dgts)	0.05M Ω

Open Circuit Voltage: 4V

Overload Protection: 250V DC or AC (RMS)

\* FREQUENCY

RANGE	ACCURACY	RESOLUTION
10~100Hz	±0.5%	0.01Hz
100~1000Hz	±0.5%	0.1Hz
1~10kHz	±0.5%	1Hz

Overload protection: 1000V DC or 750V AC (RMS)

Sensitivity 800mV: ≥50mV

8V: ≥500mV

80V: ≥5V

700V: ≥50V

\* TEMPERATURE

RANGE	ACCURACY	RESOLUTION
-50~300°C	±3°C	1°C
300~1300°C	±1%	1°C

Overload Protection: 250V DC or AC (RMS)

\* TESTING CONDITIONS

Frequency Range in voltage measurement mode : 40~400Hz

Input Impedance : 10M $\Omega$

Temperature : 23 $^{\circ}$ C $\pm$ 3 $^{\circ}$ C

Humidity : 50%RH $\pm$ 10%

Battery Voltage : 2.5V~3V

\* POWER SUPPLY 2 $\times$  1.5V AA BATTERIES

\* DIMENSION SIZE : 79mm $\times$  190mm $\times$  34mm

\* WEIGHT: approx. 300g

\* RS232C INTERFACE

**ACCESSORY**

Users Manual		1
Battery	1.5V AA	2
Test Leads	( MS3000 )	1
Thermocouple	( MS3400 )	1
Leather Sheath		1
Carry Case		1
PC Data Record Software		1
RS232 Cable		1