

*micro SD card real time data logger  
CAT III 1000V, true rms, L/C*

# MULTIMETER

**Model : DM-9962SD**



Your purchase of this MULTIMETER marks a step forward for you into the field of precision measurement. Although this MULTIMETER is a complex and delicate instrument, its durable structure will allow many years of use if proper operating techniques are developed. Please read the following instructions carefully and always keep this manual within easy reach.



## OPERATION MANUAL

## Caution Symbol



*Caution :*

- \* Risk of electric shock !



*Caution :*

- \* Do not apply the overload voltage, current to the input terminal !
- \* Remove test leads before open the battery cover !
- \* Cleaning - Only use the dry cloth to clean the plastic case !

## Environment Conditions

- \* *Installation Categories III-1000V.*
- \* *Pollution Degree 2.*
- \* *Altitude up to 2000 meters.*
- \* *Indoor use.*
- \* *Relative humidity 80% max.*

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## 1. FEATURES

- \* Real time Datalogger, save the into the micro SD memory card and can be downloaded to the Excel, extra software is no need.
- \* Real time Datalogger, it Built-in Clock (year/month/date/ hour/minute/second ), sampling time set from 2 seconds to 3600 seconds.
- \* Manual datalogger is available ( set the sampling time to be 0 seconds).
- \* Meet IEC 1010 CAT III 1000 V safety requirement.
- \* LCD with green light backlight, easy reading.
- \* 6000 counts A/D, high resolution.
- \* Accepts micro SD memory cards of up to 32 GB capacity.
- \* Multi function measurement. DCV, ACV, DCA, ACA, Resistance, Capacitance, Inductance, Frequency, Temperature, Diode, Continuity beeper.
- \* Max. & Min. measurement value with recall.
- \* Relative, Data hold.
- \* Auto range with manual range selection.
- \* Temperature measurement possibility.
- \* V/A/Hz button, when execute the ACV, ACA function also can measure the frequency of signal.
- \* Both 10 A, mA, uA current are build fuse for safety consideration.
- \* 10 M ohm impedance for voltage circuit.
- \* Operates from 9 V ( 006P, MIN1604 ) batteries.
- \* Built-in overload protection for most ranges.
- \* Photo couple RS 232 computer serial interface.
- \* Uses durable, long-lasting components, enclosed in strong, light weight ABS-plastic housing.
- \* Full line optional adapters : Clamp adapter, Pressure adapter, Sound level adapter, Anemometer adapter, Light adapter, EMF adapter.

## 2. SPECIFICATIONS

### 2-1 General Specifications

Display	60 mm x 39 mm large LCD display	
Measurement	DCV, ACV, DCA, ACA, Resistance, Diode, Continuity beeper, Capacitance, Inductance, Frequency, Temperature.	
Datalogger Sampling Time Setting range	Auto	2 seconds to 3600 seconds
	Manual	Push the data logger button once will save data one time. <i>@ Set the sampling time to 0 seconds.</i>
Data error no.	≤ 0.1% no. of total saved data typically.	
micro SD card Capacity	4 GB to 32 GB	
A/D counts no.	6000 counts.	
Range selection	Auto range with manual range selecting.	
Special function	Relative measurement, Data hold,	
Data hold	To freeze the display reading on the LCD display.	
Power On/Off management	Auto power off or manual power off. <i>@ Details please refer page 7</i>	
Memory recall	Records Maximum & Minimum readings with recall.	
Relative measurement	To offset the measurement value.	
V/A/Hz button	When execute the voltage or current function also can measure the frequency of signal.	
Data output	RS 232 PC serial interface, photo couple.	
Polarity	Automatic Switching, " - " indicates negative polarity.	
Zero adjustment	Automatic.	
Sampling time of display	Approx. 0.5 to 1 second.	
Operating Temp. & humidity	0 °C to 50 °C (32 °F to 122 °F), Max. 80% RH.	
Power supply	9 V ( 006P, MIN1604 )	
	DC 9V adapter input *AC/DC Power adapter is optional.	
Power consumption	Normal operation (w/o Micro SD card save data). Approx. DC 5.5 mA	
	When Micro SD card save the data Approx. DC 25 mA.	

Dimension	190 x 88 x 40 mm ( 7.5 x 3.5 x 1.6 inch ).
Weight	387 g/0.85 LB ( w.o battery ).
Accessories Included	Red and Black Test Leads ( CAT III 1KV Test Leads )..... 1 Set 600 mA Spare Fuse..... 1 PC Instruction Manual..... 1 PC
Optional accessories	Full line adapters : ACA/DCA current adapter, Pressure adapter, Light adapter, EMF adapter, Sound level adapter, High voltage probe.
	AC to DC 9V Adaptr..... AP-9VA
	Holster..... HS-03
	Type K Temperature probe..... TP-11
	Soft carrying case..... CA-05A
	RS232 cable to D-Sub 9 connector..... UPCB-06
	RS232 cable to USB connector..... USB-11
	Micro SD card..... AC-MICROSD
	Data Acquisition software..... SW-U801-WIN SW-E802

### **2-2 Electrical Specifications (23±5 °C)**

<b>DC Voltage</b>		
Range	600.0 mV /6 V/60 V/600 V /1000 V	
Resolution	0.1 mV /0.001V /0.01V /0.1V/1 V	
Accuracy	± ( 0.5% + 2d )	600 mV
	± ( 0.8% + 1d )	6 V, 60 V, 600 V, 1000 V
Input impedance	10 M ohm.	
Over load protection	600 mV range	± 380 DCV, 380 ACV
	other ranges	±1000 DCV, 1000 ACV

<b>AC Voltage ( True RMS )</b>		
Range	600.0 mV /6 V/60 V/600 V /1000 V	
Resolution	0.1 mV /0.001V /0.01V /0.1V/1 V	
Accuracy	± ( 1% + 2d )	
	<i>* Spec. are tested under 50/60 Hz.</i>	
Input impedance	10 M ohm.	
Over load protection	600 mV range	± 380 DCV, 380 ACV
	other ranges	±1000 DCV, 1000 ACV

<b>DC Current, AC Current ( True RMS )</b>			
Range	10 A/6 A/600 mA/60 mA/6000 uA/600 uA		
Resolution	0.01 A/0.001 A/0.1 mA/0.01 mA/1 uA/0.1 uA		
Accuracy		DCA	ACA
	600 uA	$\pm ( 0.5 \% + 2d )$	$\pm ( 1 \% + 7d )$
	6000 uA	$\pm ( 0.5 \% + 2d )$	$\pm ( 1 \% + 7d )$
	60 mA	$\pm ( 0.5 \% + 2d )$	$\pm ( 1 \% + 7d )$
	600 mA	$\pm ( 0.5 \% + 2d )$	$\pm ( 1 \% + 7d )$
	6 A	$\pm ( 1.5 \% + 5d )$	$\pm ( 1.5 \% + 5d )$
	10 A	$\pm ( 1.5 \% + 2d )$	$\pm ( 1.5 \% + 2d )$
	<i>*ACA spec. are tested under 50/60 Hz.</i>		
Over load protection	10A range : 10A / 600V fuse.		
	uA, mA range : 600 mA / 600V fuse.		

<b>Diode ( Forward voltage, VF )</b>	
Range	2.9 V DC.
Accuracy	$\pm( 0.5\% + 2d )$

<b>Capacitance</b>		
Auto Range	600 pF/6 nF/60 nF/600 nF/6 uF/60 uF/100 uF/600 uF	
Resolution	0.1 pF/0.001 nF/0.01nF/0.1 nF/0.001 uF/0.01 uF/0.1 uF/1uF	
Accuracy	600 pF	$\pm( 2.5\% + 5d )$
	6 nF/60 nF/600 nF/6 uF/60 uF	$\pm( 1.5\% + 5d )$
	100uF/600 uF	$\pm( 5\% + 5d )$
Test frequency	100Hz /1KHz /10KHz <b>(Auto frequency configuration)</b>	
Remark	Discharge capacitor before testing.	
Over load protection	$\pm 30$ DCV, 30 ACV.	

<b>Inductance</b>		
Auto Range	600 uH/6 mH/60 mH/600 mH/6 H/60 H/100 H	
Resolution	0.1uH/0.001mH/0.01 mH/0.1 mH/0.001 H/0.01 H/0.1 H	
Test frequency	100Hz /1KHz /10KHz <b>(Auto frequency configuration)</b>	
Accuracy	600 uH	$\pm( 5\% + 5d )$
	6 mH/60 mH/600 mH/6 H	$\pm( 1.5\% + 5d )$
	60 H/100 H	$\pm( 2.5\% + 5d )$
Over load protection	$\pm 30$ DCV, 30 ACV.	



<b>Frequency</b>	
Range	600 Hz/6 KHz/60 KHz/600 KHz/6 MHz/20 MHz
Resolution	0.1 Hz/0.001 KHz/0.01 KHz/0.1 KHz/0.001 MHz/0.01 MHz
Accuracy	$\pm( 0.5\% + 2d )$
Sensitivity	Min. 1 V rms, Max. 5 V rms.

<b>OHMS</b>	
Range	600 $\Omega$ /6 K $\Omega$ /60 K $\Omega$ /600 K $\Omega$ /6 M $\Omega$ /60 M $\Omega$
Resolution	0.1 $\Omega$ /0.001 K $\Omega$ /0.01 K $\Omega$ /0.1 K $\Omega$ /0.001 M $\Omega$ /0.01 M $\Omega$
Accuracy	600 ohm : $\pm( 1\% + 2d )$ 6K/60K/600K/6 M : $\pm( 1.5\% + 2d )$ 60 M : $\pm( 3\% + 5d )$
Over load protection	$\pm 350$ DCV, 350 ACV.

<b>Continuity Beeper</b>
Beeper will sound if measured resistance less than 20 ohm.

<b>Max. &amp; Min. Measurement</b>
During the operation can memorize the maximum and the minimum measurement value.

<b>Temperature</b>		
Auto Range	Resolution	Accuracy
-100.0 °C to 199.9 °C	0.1 °C	$\pm( 1\% + 1\text{ °C} )$
200 °C to 1000 °C	1 °C	
-148.0 °F to 391.9 °F	0.1 °F	$\pm( 1\% + 2\text{ °F} )$
392 °F to 1832 °F	1 °F	
Temp. probe	The temperature probe ( TP-11 ) is the optional accessory.	

Remark :

- \* Spec. tested under the environment RF Field Strength less than 3 V/M & frequency less than the 30 MHz only.

### 3. FRONT PANEL DESCRIPTION

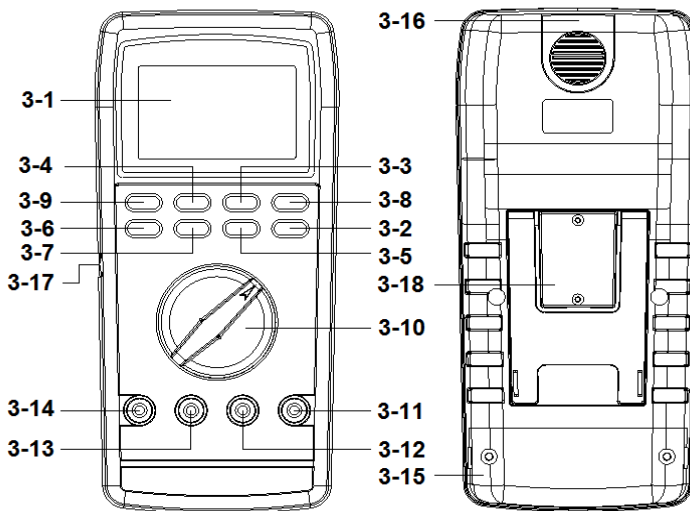


Fig. 1



- |                           |                                       |
|---------------------------|---------------------------------------|
| 3-1 Display               | 3-10 Function rotary switch           |
| 3-2 MAX/MIN ( ▼ ) button  | 3-11 Temp./ohm/V/Cap. input terminal  |
| 3-3 TIME (SET) button     | 3-12 COM input terminal               |
| 3-4 REL(Backlight) button | 3-13 mA/uA input terminal             |
| 3-5 HOLD ( ▲ ) button     | 3-14 10A input terminal               |
| 3-6 RANGE button          | 3-15 Battery compartment/Cover        |
| 3-7 V/A/Hz button         | 3-16 RS232 terminal                   |
| 3-8 ENTER (LOG) button    | 3-17 DC 9V Power Adapter Input Socket |
| 3-9 AC/DC button          | 3-18 micro SD card socket             |

#### 4. PRECAUTIONS & PREPARATIONS FOR MEASUREMENT

- 1) Ensure that the DC 9 V ( 006P, MIN1604 ) batteries are connected with the right polarity and placed in the battery compartment correctly.
- 2) Place the Red & Black Test Leads into the proper input terminal before making measurement.
- 3) Remove either of the test leads from the circuit when changing the measurement range.
- 4) Except operate the " Data Hold " function, it should cancel the " Data Hold " function, otherwise the display reading will freeze permanently.
- 5) Do not exceed the maximum rated voltage and current to the input terminal.
- 6) Always switching the " Function Rotary Switch " to the " Off " position when the instrument is not operation.
- 7) Remove the battery if the instrument is not to be used in a long period of time.
- 8) For safety consideration, when change the new test leads, it should use the replace test leads that already approval of " CATIII-1000 V " at least.
- 9) Power On/Off management :
  - a. When not use the meter, should rotate the " Function rotary switch " ( 3-10, Fig. 1 ) to the " OFF " position.
  - b. During the measurement, after 10 minutes the meter will auto power off. If intend to power on again, it should rotate the " Function switch " to " OFF " position then set to the new desiring function position.
  - c. **Disabling auto power off ( not auto power off )**  
**Press the " TIME button " ( 3-3, Fig. 1 ) into the setting mode,the Poff set " no "**  
**auto power off function can be lifted.**

## 5. MEASURING PROCEDURE

### 5-1 Symbols & units of display

Symbols Units	Descriptions
<b>AUTO</b>	Appears when selecting " Automatic range " mode.
<b>MANU</b>	Appears when selecting " Manual range " mode.
<b>DC</b>	Appears when selecting DC mode. ( DC voltage or DC current )
<b>AC</b>	Appears when selecting AC mode. ( AC voltage or AC current )
<b>HOLD</b>	Appears when the " Data hold " function is operated.
<b>REL</b>	Appears when the " Relative " function is operated.
<b>Max Min</b>	Appears when " Max and Min. value record " function is operated.
	Battery voltage is already under the low condition.
<b>((●))</b>	Appears when the " Continuity beeper " is operated.
<b>mV, V</b>	Units for" voltage " measurements.
<b>Ω,KΩ,MΩ</b>	Units for " resistance" measurements.
<b>uA,mA,A</b>	Units for " Current " measurement.
<b>uH,mH,H</b>	Units for " Inductance " measurement.
<b>pF,nF,uF</b>	Units for " Capacitance " measurement.
<b>Hz,KHz,MHz</b>	Units for " Frequency " measurement.
	Appears when the " Diode " function is operated.
<b>-</b>	Appears when measuring a DCV or DCA value is negative.
<b>°C °F</b>	Units for " Temperature " measurement.
<b>-----</b>	Over range indicator
<b>AdP</b>	Notice must be inserted 9V ADAPTER

### **5-2 DC Voltage, AC voltage true rms Measurement**

- 1) Connect BLACK test lead into " COM " terminal ( 3-12, Fig. 1 ).
- 2) Connect RED test lead into " V " terminal ( 3-11, Fig. 1 ).
- 3) Select the " Function rotary switch " ( 3-10, Fig. 1 ) to the " V " position.
- 4) Push the " AC/DC button " ( 3-9, Fig. 1 ) to select the " ACV " or " DCV " measurement,
- 5) When LCD show the " AUTO " marker, the meter is under the " auto range " mode. Meter will select the suitable measurement range automatically.
- 6) Under the operation of " auto range " mode, push the " Range button " ( 3-6 Fig. 1 ) once will execute the " Manual Range " mode and hold the range, the LCD will show the " MANU " marker.  
Under the manual range operation, push the " Range button " ( 3-6 Fig. 1 ) > 2 seconds, will return to auto range operation.

#### **Remark :**

*During the measurement, if push the " V/A/Hz button " ( 3-7 Fig. 1 ) once, until the LCD show the " Hz " marker and the display will show the frequency value of the measurement signal.*

### **5-3 Resistance Measurement**

- 1) Connect BLACK test lead into " COM " terminal ( 3-12, Fig. 1 ).
- 2) Connect RED test lead into "  $\Omega$  " terminal ( 3-11, Fig. 1 ).
- 3) Select the " Function rotary switch " ( 3-10, Fig. 1 ) to the "  $\Omega$  " position.
- 4) When LCD show the " AUTO " marker, the meter is under the " auto range " mode. Meter will select the suitable measurement range automatically.

5) Under the operation of " auto range " mode, push the " Range button " ( 3-6 Fig. 1 ) will execute the " Manual Range " mode and hold the range, the LCD will show the " MANU " marker.

Under the manual range operation, push the " Range button " ( 3-6 Fig. 1 ) > 2 seconds, will return to auto range operation.

#### **5-4 DC Current, AC Current true rms Measurement**

**A : 10A range, 6A range.**

**mA : 600 mA range, 60 mA range.**

**uA : 6000 uA range, 600 uA range.**

- 1) Connect BLACK test lead into " COM " terminal ( 3-12, Fig. 1 ).
- 2) For the " mA, uA " measurement, connect RED test lead into " mA uA " terminal ( 3-13, Fig. 1 ).  
For the " 10 A " current measurement, connect RED test lead into " A " terminal ( 3-14, Fig. 1 ).

***Open the circuit in which current is to be measured. Now securely connect test leads in series with the load in which the current is be measured.***

- 3) For the " uA " measurement ( 600 uA, 6000 uA ), select the " Function rotary switch " ( 3-10, Fig. 1 ) to " uA " position.  
For the " mA " measurement ( 60 mA, 600 mA ), select the " Function rotary switch " ( 3-10, Fig. 1 ) to " mA " position.  
For the " 10 A " measurement ( 6A,10A ), select the " Function rotary switch " ( 3-10, Fig. 1 ) to " A " position.
- 4) Push the " AC/DC button " ( 3-9, Fig. 1 ) to select the " ACA " or " DCA " measurement,
- 5) When LCD show the " AUTO " marker, the meter is under the " auto range " mode. Meter will select the suitable measurement range automatically.



- 6) Under the operation of " auto range " mode, push the " Range button " ( 3-6 Fig. 1 ) once will execute the " Manual Range " mode and hold the range, the LCD will show the " MANU " marker.

Under the manual range operation, push the " Range button " ( 3-6 Fig. 1 ) > 2 seconds, will return to auto range operation.



**Remark :**

*During the measurement, if push the " V/A/Hz button " ( 3-7 Fig. 1 ) once, until the LCD show the " Hz " marker and the display will show the frequency value of the measurement signal.*

**5-5 Continuity Check**

- 1) Connect BLACK test lead into " COM " terminal.
- 2) Connect RED test lead into "  $\Omega$  " terminal.
- 3) Select the " Function rotary switch " ( 3-10, Fig. 1 ) to the "  " position.
- 4) The LCD display will show the "  " marker.
- 5) when the resistance value is less than 20 ohm, the beeper sound will be generated.

**5-6 Diode Test**

- 1) Connect BLACK test lead into " COM " terminal.
- 2) Connect RED test lead into " V " terminal.
- 3) Select the " Function rotary switch " ( 3-10, Fig. 1 ) to the "  " position.  
The LCD display will show the "  " marker.
- 4) a. When connected with polarity as shown in Fig. 2, a forward current flow is established and the approx. Diode Forward Voltage (VF) value in volt will appears on the display reading. If the diode under test is defective, " 0.000 " or near " 0.000 " value ( short circuit ) " - - - - " ( open circuit ) will be displayed.

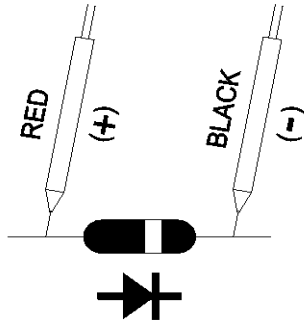


Fig.2

- b. When connected as shown in Fig. 3, a reverse check on the diode is made. If the diode under test is good, "\_\_\_\_\_" will be displayed. If the diode under test is defective, " 0.000 " or other numbers will be displayed. Proper diode testing should include both steps a. and b. above.

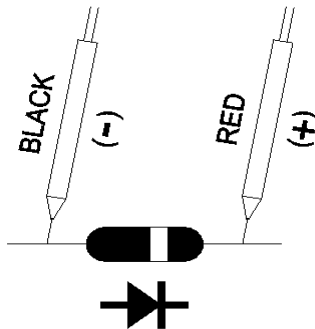


Fig.3



### **5-7 Capacitance Measurement**

- 1) Select the " Function rotary switch " ( 3-10, Fig. 1 ) to the "  $\text{--}\text{||}\text{--}$  " position.
- 2) Connect the tested capacitor to " Input terminals " directly.

- \* ***If the measured capacity existing the polarity, then should connect the " + " polarity of the measured capacitor to the "  $\text{--}\text{||}\text{--}$  " terminal ( 3-11, Fig. 1 ), connect the " - " polarity of the measured capacitor to the " COM " terminal ( 3-12, Fig. 1 ),***
- \* ***Full discharge the measured capacitor before the make the measurement.***

- 3) When LCD show the " AUTO " marker, the meter is under the " auto range " mode. Meter will select the suitable measurement range automatically.
- 4) Capacitance measurement mode, no manual functions, " Range button " ( 3-6 Fig. 1 ) is invalid.

### **5-8 Inductance Measurement**

- 1) Connect BLACK test lead into " COM " terminal ( 3-12, Fig. 1 ).
- 2) Connect RED test lead into "  $\text{--}\text{L}\text{--}$  " terminal ( 3-11, Fig. 1 ).
- 3) Select the " Function rotary switch " ( 3-10, Fig. 1 ) to the "  $\text{--}\text{L}\text{--}$  " position.
- 4) When LCD show the " AUTO " marker, the meter is under the " auto range " mode. Meter will select the suitable measurement range automatically.
- 5) Inductance measurement mode, no manual functions, " Range button " ( 3-6 Fig. 1 ) is invalid.

### **5-9 L/C Calibration**

In order to improve the accuracy of a high / low impedance, Recommend doing open / short calibration Before measurement.

#### **Open / short calibration procedure:**

- 1) **Simultaneously push " AC / DC " and " REL " button more** to start open / short calibration, The display will show "OPEn", than 2 seconds, then push "ENTER" key once, LCD will display 30, and the countdown to zero,
- 2) The display will show " Short ", set the input of a short circuit, then push the " ENTER " key once, LCD will display 30, and the countdown to zero, then the calibration data is saved to the EEPROM, complete the calibration.

### **5-10 Frequency Measurement**

- 1) Connect BLACK test lead into " COM " terminal ( 3-12, Fig. 1 ).
- 2) Connect RED test lead into " Hz " terminal ( 3-11, Fig. 1 ).
- 3) Select the " Function rotary switch " ( 3-10, Fig. 1 ) to the " Hz " position, LCD will show the " Hz " marker.
- 4) When LCD show the " AUTO " marker, the meter is under the " auto range " mode. Meter will select the suitable measurement range automatically.
- 5) Under the operation of " auto range " mode, push the " Range button " ( 3-6 Fig. 1 ) once will execute the " Manual Range " mode and hold the range, the LCD will show the " MANU " marker.  
Under the manual range operation, push the " Range button " ( 3-6 Fig. 1 ) > 2 seconds, will return to auto range operation.

### **5-11 Temperature Measurement**

- 1) Plug in the optional " Type K Temperature probe, TP-11 " into the input terminals, " TEMP input terminal " ( 3-11, Fig. 1 ) and the " COM input terminal " ( 3-12, Fig. 1 )
- 2) Select the " Function rotary switch " ( 3-10, Fig. 1 ) to the " TEMP. " position.
- 3) Temperature measurement mode, no manual functions, " Range button " ( 3-6 Fig. 1 ) is invalid.

### **5-12 Relative Measurement**

- 1) During the measurement of ACV, ACA, DCV, DCA, ohm, Capacitance, Inductance, Frequency and Temperature, the circuit will memorize the last measured values if push the " REL. button " ( 3-4, Fig. 1 ) at once, then LCD will show zero value & a " REL " indicator.
- 2) The input measured values will deduct last measured values automatically, then show those new value on the display.
- 3) It will cancel the Relative Measurement function if push the " REL. button " at once again, at same time the " REL ." marker will disappear.

### **5-13 Data Hold Operation**

- 1) During the measurement, pushing the " Hold button " ( 3-5, Fig. 1 ) once a while will freeze the measured value & the LCD will indicate " HOLD " symbol.
- 2) Push the " Hold Button " again to cancel the data hold function.

### **5-14 LCD Backlight ON/OFF**

During the measurement, press the

" REL Button " ( 3-2, Fig. 1 ) > 2 seconds will turn ON the " LCD Backlight " .

Press the " REL Button " once again > 2 will turn OFF the " LCD Backlight " .

### **5-15 Max and Min. value record**

- 1) Application : To record the maximum and the minimum reading value during the measurement.
- 2) Push the " MAX/MIN button " ( 3-2, Fig. 1 ) at once , the display will show the " REC " markers  
Start recording meter the " MAX " and " MIN " value.
- 3) Push the " MAX/MIN button " ( 3-2, Fig. 1 ) once again the display will show the " MAX " maker along with the maximum measured value.  
Push the " MAX/MIN button " ( 3-2, Fig. 1 ) once again the display will show the " MIN " maker along with the minimum measured value.
- 4) If intend to cancel the " MAX/MIN Record function" just push the " MAX/MIN button " ( 3-2, Fig. 1 ) > 2 seconds the " REC " marker will disappear.

### **5-16 RS232 computer interface**

- 1) Connect the optional RS232 cable (UPCB-06) of RS232 terminal (3-16, Fig. 1)
- 2) The meter will be the serial data via " RS232 Terminal " is transferred to the computer.

The data output is a 16 digit stream which can be utilized for user's specific application.

The 16 digits data stream will be displayed in the following format :

D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0
---

**Each digit indicates the following status :**

D15	Start Word (0X02)		
D14	4		
D13	When send the upper display data = 1		
D12, D11	Annunciator for Display		
	DC mV = 18	AC mV = 49	uH = 68
	DC V = 34	AC V = 50	mH = 41
	DC uA = 35	AC uA = 51	H = 42
	DC mA = 37	AC mA = 53	Hz = 31
	DC A = 36	AC A = 52	KHz = 33
	$\Omega$ = 38	pF = A4	MHz = 67
	K $\Omega$ = 39	uF = 44	$^{\circ}$ C = 01
	M $\Omega$ = 40	nF = 43	$^{\circ}$ F = 02
D10	DIODE = 46		
D10	Polarity 0 = Positive                      1 = Negative		
D9	Decimal Point(DP), position from right to the left 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP		
D8 to D1	Display reading, D1 = LSD, D8 = MSD For example : If the display reading is 1234, then D8 to D1 is : 00001234		
D0	End Word (0x0D)		

**RS232 FORMAT : 9600, N, 8, 1**

Baud rate	9600
Parity	No parity
Data bit no.	8 Data bits
Stop bit	1 Stop bit

## 6. DATALOGGER

### 6-1 Preparation before execute datalogger function

a. Insert the micro SD card

Prepare a " micro SD memory card "( 4 GB to 32 GB, optional )

Open the Micro SD card cover(3-18, Fig. 1), follow the instructions to the micro SD card inserted .

**\* It recommend use memory card capacity is  $\geq$  4 GB.**

**\* When the instrument power use AC to DC Adapter, Micro SD Card data logger will be enable.**

b. micro SD card Format

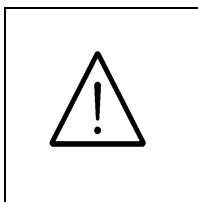
If micro SD card just the first time use into the meter, it recommend to make the " micro SD card Format " at first,please refer chapter 8-1, page 23.

**\* If the micro SD card exist the trouble during format by the meter, use the computer to reformat again can fix the problem.**

c. Time setting

If the meter is used at first time, it should to adjust the clock time exactly, please refer chapter 8-6, page 26.

d. Decimal format setting



The numerical data structure of micro SD card is default used the " ." as the decimal, for example "20.6" "1000.53" . But in certain countries ( Europe ...) is used the " ," as the decimal point, for example " 20, 6 " "1000,53". Under such situation, it should change the Decimal character at first, details of setting the Decimal point, refer to Chapter 8-5, page 25.

### 6-2 Auto Datalogger ( Set sampling time $\geq$ 2 seconds )

a. Start the datalogger

Press the " LOG Button ( 3-8, Fig. 1 ) > 1.5 seconds continuously, the LCD will show the text of " LOGGER " indicator and flashing per sampling time, at the same time the measuring data along the time information will be saved into the memory circuit.

**Remark :**

- \* **How to set the sampling time, refer to Chapter 8-2 , page 24 .**
- \* **How to set the beeper sound is enable, refer to Chapter 8- 4, page 25 .**

**b. Pause the datalogger**

During execute the Datalogger function, if press the " LOG Button " ( 3-8, Fig. 1 ) once will pause the Datalogger function ( stop to save the measuring data into the memory circuit temporally ). In the same time the " LOGGER " symbol will stop flashing.

**Remark :**

**If press the " LOG Button " ( 3-8, Fig. 1 ) once again will execute the Datalogger again, the " LOGGER " symbol will flashing.**

**c. Finish the Datalogger**

During execute the Datalogger function, press the " LOG Button ( 3-8, Fig. 1 ) > 1.5 seconds continuously again will finish the Datalogger function, the " LOGGER " text will be disappeared and finish the Datalogger function.

**6-3 Manual Datalogger ( Set sampling time = 0 seconds )**

**a. Set sampling time is to 0 seconds**

Press the " LOG Button ( 3-8, Fig. 1 ) > 1.5 seconds, the LCD will show the indicator " LOGGER " and " ((●)) " symbol then press the " LOG Button " ( 3-8, Fig. 1 ) once , the " ((●)) " and " Position no. " symbol will flashing once and Beeper will sound once, at the same time the measuring data along the time information will be saved into the memory circuit .

**Remark :**

**During execute the Manual Datalogger, it can use the " ▲ Button " ( 3-5, Fig. 1) or " ▼ Button " ( 3-2, Fig. 1 ) to set the measuring position ( 1 to 99, for example room 1 to room 99 ) to identify the measurement location , the Display will show Px ( x = 1 to 99 ).**

**b. Finish the Datalogger**

During execute the Datalogger function, press the " LOG Button " ( 3-8, Fig. 1 ) > 1.5 seconds continuously again will finish the Datalogger function, the " LOGGER " indication will be disappeared and finish the Datalogger.

**6-4 To check the time and sampling time information**

During the normal measurement ( not execute the Datalogger ), If press " Time " ( 3-3, Fig. 1 ) once , the LCD display will present the time information of Year/Month/Date , Hour/Minute/Second and the Sampling time information .

**6-5 Micro SD Card Data structure**

- 1) When the first time, the Micro SD card is used into the meter, the Micro SD card will generate a route :

**DMA01**

- 2) If the first time to execute the Datalogger, under the route DMA01\, will generate a new file name DMA01001.XLS.  
After exist the Datalogger, then execute again, the data will save to the DMA01001.XLS until Data column reach to 30,000 columns, then will generate a new file, for example DMA01002.XLS



- 3) Under the folder DMA01\, if the total files more than 99 files, will generate anew route, such as DMA02\ .....
- 4) The file's route structure :
  - DMA01\
    - DMA01001.XLS
    - DMA01002.XLS
    - .....
    - DMA01099.XLS
  - DMA02\
    - DMA02001.XLS
    - DMA02002.XLS
    - .....
    - DMA02099.XLS
  - DMAXX\
    - .....
    - .....

*Remark :*

*XX : Max. value is 10.*

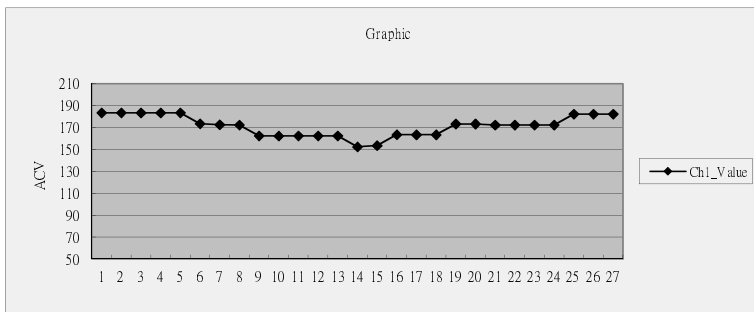
## 7. Saving data from the Micro SD card to the computer ( EXCEL software )

- 1) After execute the Data Logger function, take away the SD card out from the " Micro SD card socket " ( 3-18, Fig. 1 ).
- 2) Plug in the Micro SD card into the Computer's Micro SD card slot ( if your computer build in this installation ) or insert the Micro SD card into the " Micro SD card adapter ". then connect the " Micro SD card adapter " into the computer.
- 3) Power ON the computer and run the " EXCEL software ". Download the saving data file ( for example the file name : DMA01001.XLS, DMA01002.XLS ) from the SD card to the computer. The saving data will present into the EXCEL software screen ( for example as following EXCEL data screens ) , then user can use those EXCEL data to make the further Data or Graphic analysis usefully.

EXCEL data screen ( for example )

	A	B	C	D	E	F	G
1	Position	Date	Time	Ch1_Value	Ch1_Unit		
2	1	2000/1/1	22:02:48	183.5	ACV		
3	2	2000/1/1	22:02:50	183.5	ACV		
4	3	2000/1/1	22:02:52	183.4	ACV		
5	4	2000/1/1	22:02:54	183.4	ACV		
6	5	2000/1/1	22:02:56	183.5	ACV		
7	6	2000/1/1	22:02:58	173.5	ACV		
8	7	2000/1/1	22:03:00	172.6	ACV		
9	8	2000/1/1	22:03:02	172.4	ACV		
10	9	2000/1/1	22:03:04	162.4	ACV		
11	10	2000/1/1	22:03:06	162.3	ACV		
12	11	2000/1/1	22:03:08	162.4	ACV		
13	12	2000/1/1	22:03:10	162.4	ACV		
14	13	2000/1/1	22:03:12	162.4	ACV		
15	14	2000/1/1	22:03:14	152.4	ACV		
16	15	2000/1/1	22:03:16	153.5	ACV		
17	16	2000/1/1	22:03:18	163.5	ACV		
18	17	2000/1/1	22:03:20	163.4	ACV		
19	18	2000/1/1	22:03:22	163.4	ACV		
20	19	2000/1/1	22:03:24	173.3	ACV		
21	20	2000/1/1	22:03:26	173.3	ACV		
22	21	2000/1/1	22:03:28	172.3	ACV		
23	22	2000/1/1	22:03:30	172.4	ACV		
24	23	2000/1/1	22:03:32	172.4	ACV		
25	24	2000/1/1	22:03:34	172.4	ACV		
26	25	2000/1/1	22:03:36	182.3	ACV		
27	26	2000/1/1	22:03:38	182.3	ACV		

EXCEL graphic screen ( for example, graphic )



## 8. ADVANCED SETTING

Under do not execute the Datalogger function, press the " SET Button " ( 3-3, Fig. 1 ) continuously at least two seconds will enter the " Advanced Setting " mode. then press the " SET Button " ( 3-3, Fig. 1 ) once a while in sequence to select the six main function, the display will show :

**Sd F**..... Micro SD memory card Format  
**SP- t**..... Set sampling time ( 0 to 3600 seconds )  
**PoFF**..... SET Auto power OFF management  
**bEEP**..... Set beeper sound ON/OFF  
**dEC**..... Set Micro SD card Decimal character  
**dAtE**..... Set clock time ( Year/Month/Date, Hour/Minute/Second )  
**t-CF**..... Set Temperature unit °C or °F

*Remark :*

*In the implementation of the "Advanced Settings" function, If within 10 seconds without work, will exit " Advanced Settings " function, the LCD will return Normal screen.*

### 8-1 Micro SD memory card Format

When the display show " Sd F "

- 1) Use the " ▲ Button " ( 3-5, Fig. 1 ) or " ▼ Button " ( 3-2, Fig. 1 ) to select the upper text to "YES " or " no ".

**YES - Intend to format the Micro SD memory card**  
**no - Not execute the Micro SD memory card format**

- 2) If select the upper to " YES ", press the " Enter Button " ( 3-8, Fig. 1 ) once again, the Display will show text " Ent " to confirm again, if make sure to do the Micro SD memory card format, then press " Enter Button " once will format the Micro SD memory clear all the existing data that already saving into the Micro SD card.

### **8-2 Set sampling time (Second )**

When the display show " SP - t "

- 1) Use the " ▲ Button " (3-5, Fig. 1) or " ▼ button " (3-2, Fig. 1) to adjust the value ( 0 → to Manual Datalogger or 2 ~ 3600 seconds → to Auto Datalogger ), the adjusted value will be flashed. When the desired value is set, press the " Enter key " (3-8, Fig. 1) once, save the default sample value.
- 2) " sp-t " setting is complete, then display will go to the " Auto power Off " settings screen (Chapter 8-3).

### **8-3 Set Auto power OFF management**

When the display show " PoFF "

- 1) Use the " ▲ Button " ( 3-5, Fig. 1 ) or " ▼ Button " ( 3-2, Fig. 1 ) to select the upper text to "YES " or "no ".

**YES - Auto Power Off management will enable.**  
**no - Auto Power Off management will disable.**

- 2) After select the upper text to " YES " or " no ", press the " Enter Button " ( 3-8, Fig. 1 ) will save the setting function with default.

#### **8-4 Set beeper sound ON/OFF**

When the display show " bEEP "

- 1) Use the " ▲ Button " ( 3-5, Fig. 1 ) or " ▼ Button " ( 3-2, Fig. 1 ) to select the upper text to " YES " or " no ".

**YES - Meter's beep sound will be ON with default.**  
**no - Meter's beep sound will be OFF with default.**

- 2) After select the upper text to " YES " or " no ", press the " Enter Button " ( 3-8, Fig. 1 ) will save the setting function with default.

#### **8-5 Set Decimal point of Micro SD card setting**

When the display show " dEC "

The numerical data structure of Micro SD card is default used the " ." as the decimal, for example "20.6" "1000.53" . But in certain countries ( Europe ...) is used the " ," as the decimal point, for example " 20,6 " "1000,53". Under such situation, it should change the Decimal character at first.

- 1) Use the " ▲ Button " ( 3-5, Fig. 1 ) or " ▼ Button " ( 3-2, Fig. 1 ) to select the upper text to " USA " or " Euro ".

**USA - Use " ." as the Decimal point with default.**  
**Euro - Use " ," as the Decimal point with default.**

- 2) After select the upper text to " USA " or " Euro ", press the " Enter Button " ( 3-8, Fig. 1 ) will save the setting function with default.

### **8-6 Set clock time ( Year/Month/Date,Hour/Minute/ Second )**

When the upper display show " dAtE "
--------------------------------------

- 1) Use the " ▲ Button " ( 3-5, Fig. 1 ) or " ▼ Button " ( 3-2, Fig. 1 ) to adjust the value ( Setting start from Year value ). After the desired value is set, press the " Enter Button " ( 3-8, Fig. 1 ) once will going to next value adjustment ( for example, first setting value is Year then next to adjust Month, Date, Hour, Minute, Second value ).

*Remark :*

*The adjusted value will be flashed.*

- 2) After set all the time value ( Year, Month, Date, Hour, Minute, Second ), press the " SET Button " ( 3-3, Fig. 1 ) once will save the time value, then the screen will jump to " Temp. °C, °F unit " setting screen .

*Remark :*

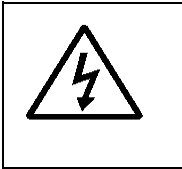
*After the time value is setting, the internal clock will run precisely even Power off if the battery is under normal condition ( No low battery power ).*

### **8-7 Set Change the Temp. °C, °F unit**


- a. Use " ▲ button " ( 3-5, Fig. 1 ) to select " °C " or " °F " .
- b. After select the desiring text ( °C or °F ), press the " Enter button " ( 3-8, Fig. 1 ) to save the data with default.

## 9. MAINTENANCE

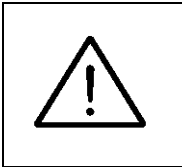
### 9-1 Battery replacement



**Caution : *Remove test leads before opening the battery cover !***

- 1) When the LCD display showing the mark of "", it is necessary to replace the battery, However in-spec. measurement may still be made for several hours after " Low battery indicator " appears before the instrument become inaccurate.
- 2) Open the screw of " Battery Cover " ( 3-15, Fig. 1 ) by loosening the screws, then move the battery.
- 3) Replace with 9 V batteries ( 006P, MIN1604 ) and reinstate the cover.

### 9-2 Cleaning



**Caution : *Cleaning - Only use the dry cloth to clean the plastic case !***

### 9-3 Replacement of Fuse



**Caution :** *When make the replacement, should change the right spec fuse.*

#### a. Fuse A -

**Rating :600 mA, Size : 5 mm dia. x 20 mm**

To be protected the circuit from overload current at " 600  $\mu$ A, 6000  $\mu$ A, 60 mA, 600 mA " range.

#### b. Fuse B -

**Rating : 10 A, Size : 5.2 mm dia. x 20 mm**

To be protected the circuit from overload current at " 10 A " range.

- 2) When the  $\mu$ A, mA current range can not operation, please check if the Fuse A is broken or not:  
When the 10 A current range can not operation, please check if the Fuse B is broken or not:
- 3) When replace the fuse should take the test leads from the measuring circuit and power off the meter.
- 4) Take the screws away from the down case, loose the housing case, the fuses are install on the fuse socket on the PCB.
- 5) For safety consideration, when replace the fuse according the spec. ( should use the approval fuse ) and reinstall the cover.
- 6) Make sure the housing case is secured with the screw after replace the fuse.



## 10. OPTIONAL ACCESSORIES & ADAPTERS

Memory card	micro SD memory card ( 8 GB )
RS232 cable UPCB-06	* Computer interface cable. * Used to connect the meter to the computer ( COM port ).
USB cable USB-11	* Computer interface cable. * Used to connect the meter to the computer ( USB port ).

<b><i>Item</i></b>	<b><i>Model</i></b>
<b><i>Carrying Case</i></b>	<b><i>CA-05A</i></b>
<b><i>Light Adapter</i></b>	<b><i>LX-02</i></b>
<b><i>EMF Adapter</i></b>	<b><i>EMF-824</i></b>
<b><i>Pressure Adapter</i></b>	<b><i>PS-403</i></b>
<b><i>Anemometer Adapter</i></b>	<b><i>AM-402</i></b>
<b><i>Tachometer Adapter</i></b>	<b><i>TA-601</i></b>
<b><i>Sound Adapter</i></b>	<b><i>SL-406</i></b>
<b><i>High Voltage Probe</i></b>	<b><i>HV-40</i></b>

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