Bench type, SD card real time data logger

MULTIMETER

Model : DM-9971SD

Your purchase of this MULTI METER with SD CARD DATA LOGGER marks a step forward for you into the field of precision measurement. Although this meter 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

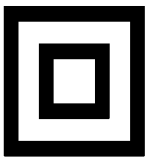
Caution Symbol

Caution :

* Risk of electric shock !
* During the measurement , do not open the cabinet.

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 !



* Double insulation

Environment Conditions

* *Installation Categories III-1000V , IV-600V*
* *Pollution Degree 2.*
* *Altitude up to 2000 meters.*
* *Indoor use.*
* *Relative humidity 80% max.*

TABLE OF CONTENTS

1. FEATURES..... 1
2. SPECIFICATIONS..... 2
3. FRONT PANEL DESCRIPTION..... 7
4. MEASURING PROCEDURE..... 8
    4-1. DMM Measurement 8
        A). mV Measurement (AC true rms Measurement)..... 8
        B). V Measurement (AC true rms Measurement) 8
        C). A Measurement (AC true rms Measurement)..... 9
        D). mA Measurement (AC true rms Measurement)..... 9
        E). μA Measurement (AC true rms Measurement)..... 10
        F). Ω Measurement 10
        G). Diode Measurement 11
        H). Continuity Measurement..... 12
        I). Hz Measurement..... 12
        J). Duty Measurement..... 12
    4-2 Data Hold..... 12
    4-3 Data Record (Max., Min. reading)..... 13
    4-4 LCD Backlight ON/OFF..... 13
    4-5 Relative Measurement..... 13
5. DATALOGGER..... 14
6. Download the saving data from the SD card
   to the computer (EXCEL software)..... 18
7. ADVANCED SETTING 20
    7-1 Set clock time (Year/Month/Date,Hour/Minute/ Second) 20
    7-2 Set sampling time (Seconds)..... 21
    7-3 Auto power OFF management..... 21
    7-4 Set beeper sound ON/OFF..... 22
    7-5 Decimal point of SD card setting..... 22
    7-6 SD memory card Format..... 23
8. POWER SUPPLY from DC ADAPTER..... 24
9. BATTERY REPLACEMENT..... 24
10. FUSE REPLACEMENT..... 24
11. RS232 PC SERIAL OUTPUT..... 25
12. PATENT..... 27

1. FEATURES

DMM FEATURES

* Real time Datalogger, save the into the 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 0 second to 3600 seconds.
* Manual datalogger is available (set the sampling time to be 0 second).
* Meet IEC 1010 CAT III 1000 V ,CAT IV 600 V safety requirement.
* LCD with green light backlight, easy reading.
* 6000 counts A/D, high resolution.
* Accepts SD memory cards of up to 32 GB capacity.
* Multi function measurement. DCV, ACV, DCA, ACA, Resistance, Diode, Continuity beeper, Frequency, Duty .
* Max. & Min. measurement value with recall.
* Relative, Data hold.
* Auto range with manual range selection.
* 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 1.5 V (UM3/AA) x6 batteries or DC 9V Adapter.
* 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	97 mm x 56 mm large LCD display	
Measurement	DCV, ACV, DCA, ACA, Resistance,Diode, Continuity beeper, Frequency, Duty.	
Datalogger Sampling Time Setting range	Auto	1,2,5,10,30,60,120,300,600,1800, *3600 seconds*
	Manual	Push the data logger button once will save data one time. *@ Set the sampling time to 0 sec.*
Data error no.	≦ 0.1% no. of total saved data typically.	
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. *@ Details please refer page 20 , 21*	
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 ℃ to 50 ℃ (32 ℉ to 122 ℉), Max. 80% RH.	
Power supply	9 V (UM-3 1.5V X 6 PCS)	
	DC 9V adapter input (Linear 110V/220V) *AC/DC Power adapter is optional.	

Power consumption	operation DC V , A , Hz Approx. : DC 50 mA operation AC V , A Approx. : DC 53 mA operation Ω , Diode , continuity Approx. : DC 85 mA Normal operation(w/o SD card save data and backlight off)
	When SD card save the data and LCD Backlight is OFF) will increase: Approx. DC 30 mA.
	If LCD backlight on, the power consumption will increase approx.8 mA.
Dimension	292 x 236 x 98 mm (11.5 x 9.3 x 3.9 inch).
Weight	1972 g/4.30 LB (w.o battery).
Accessories Included	LN-TL339R (CAT III 1KV Test Leads)..... 1 Set 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 Adapter…… AA110V9 / AG220V9
	RS232 cable to USB connector..... USB-01
	SD memory card (4 G)…… SD-4GB
	Data Acquisition software…… SW-U801-WIN SW-E802

2-2 DMM Electrical Specifications (23±5 ℃)

DC Voltage		
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	± 350 DCV, 350 ACV
	other ranges	±1000 DCV, 1000 ACV

AC Voltage (True RMS)		
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% + 3d) ** Spec. are tested under 50/60 Hz.*	
Input impedance	10 M ohm.	
Over load protection	600 mV range	± 350 DCV, 350 ACV
	other ranges	±1000 DCV, 1000 ACV

DC Current, AC Current (True RMS)			
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	± (0.5 % + 2d)	± (1 % + 7d)
	6000 uA	± (0.5 % + 2d)	± (1 % + 7d)
	60 mA	± (0.5 % + 2d)	± (1 % + 7d)
	600 mA	± (0.5 % + 2d)	± (1 % + 7d)
	6 A	± (1.5 % + 5d)	± (1.5 % + 5d)
	10 A	± (1.5 % + 2d)	± (1.5 % + 2d)
	** ACA spec. are tested under 50/60 Hz.*		
Over load protection	10A range : 10A / 600 V fuse.		
	uA, mA range : 600 mA / 600 V fuse .		

Diode (Forward voltage, VF)	
Range	2.7 V DC.
Accuracy	±(0.5% + 2d)

Frequency	
Range	60 Hz/600 Hz/6 KHz/60 KHz/600 KHz/6 MHz/60 MHz
Resolution	0.01 Hz/0.1 Hz/0.001 KHz/0.01 KHz/0.1 KHz/0.001 MHz /0.01 MHz
Accuracy	±(0.5% + 2d)
Sensitivity	Min. 1 V rms, Max. 5 V rms.

Continuity Beeper
Beeper will sound if measured resistance less than 3 ohm.

Duty cycle Range (Input senstivity > 2Vpp @duty = 5,0% & 90.0%)		
Frequency Range	Duty Range	Accuracy
60 Hz ~ 600 Hz	5.0% to 90.0%	±(0.5% +5d)
601HZ ~ 6 KHz	10% to 90.0%	
6.1 KHz ~ 60 KHz	20.0% to 80.0%	
61 KHz ~ 1MHz	30.0% to 80.0%	
＞1MHz ~ 10MHz	Reference	
Sensitivity	Min. 1 V rms, Max. 5 V rms.	

OHMS	
Range	600 Ω/6 KΩ/60 KΩ/600 KΩ/6 MΩ/60 MΩ
Resolution	0.1Ω/0.001 KΩ/0.01 KΩ/0.1 KΩ/0.001 MΩ/0.01 MΩ
Accuracy	600 ohm : ±(1 % + 2d) 6K/60K/600K/6 M : ±(1.5 % + 2d) 60 M : ±(3 % + 5d)
Over load protection	±350 DCV, 350 ACV.

Max. & Min. Measurement
During the operation can memorize the maximum and the minimum measurement value.

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

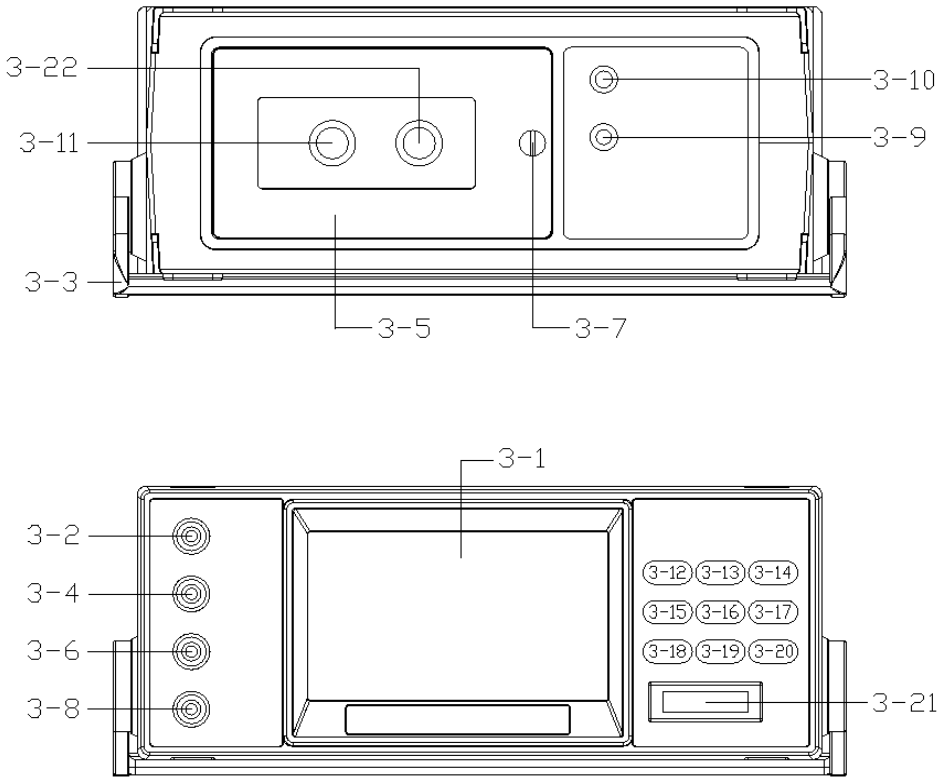


Fig. 1

3-1 LCD Display
3-2 V/Ω/diode/Continuity Terminal
3-3 Stand
3-4 COM Terminal
3-5 Battery Compartment/Cover
3-6 mA/μA Input Terminal
3-7 Battery Cover Screws
3-8 10A Input Terminal
3-9 DC 9V Power Adapter Socket
3-10 RS-232 Output Terminal
3-11 10A Fuse Socket
3-12 FUNCTION Button
3-13 REC/▲ Button
3-14 V/A/Hz Button
3-15 RANGE Button
3-16 POWER/Backlight Button
3-17 TIME/SET Button
3-18 AC/DC (REL) Button
3-19 HOLD/▼ Button
3-20 ENTER/Log Button
3-21 SD card Socket
3-22 600 mA Fuse Socket

4. MEASUREMENT PROCEDURE

4-1 DMM Measurement

A). mV Measurement (AC true rms Measurement)

1) : Connect BLACK test lead into " COM " terminal (3-4, Fig. 1).
2) : Connect RED test lead into " V " terminal (3-2, Fig. 1).
3) : Press the " Function Button " (3-12, Fig. 1) Select to the " DC mV " Function.
4) : Use the " AC/DC button " (3-18, Fig. 1) short press to select the " AC mV " or " DC mV "measurement.
5) : When the connection is completed, the test value will be show on the LCD displayed .

B). V Measurement (AC true rms Measurement)

1) : Connect BLACK test lead into " COM " terminal (3-4, Fig. 1).
2) : Connect RED test lead into " V " terminal (3-2, Fig. 1).
3) : Press the " Function Button " (3-12, Fig. 1) Select to the " DC V " Function.
4) : Use the " AC/DC button " (3-18, Fig. 1) short press to select the " AC V " or " DC V "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, short press the " Range Button " (3-15, Fig.1)select to the Manual Range ,Manual Range can select 6,60,600, 1000V. LCD will show the " MANU " marker, and Under the manual range operation, press and hold the" Range Button " (3-15,Fig.1) > 2 seconds, will return to auto range operation.
7) : When the connection is completed, the test value will be show on the LCD displayed.

Remark :

Under ACV measurement ,can short press the "V/A/Hz Button" to select ACV or Hz measurement , display will show ACV or Hz measure value

C). A Measurement (AC true rms Measurement)

1) : Connect BLACK test lead into " COM " terminal (3-4, Fig. 1).
2) : Connect RED test lead into " 10A " terminal (3-8, Fig. 1).
3) : Press the " Function Button " (3-12, Fig. 1) Select to the " DC A " Function.
4) : Use the " AC/DC button " (3-18, Fig. 1) short press to select the " AC A " or " DC A "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, short press the " Range Button " (3-15, Fig. 1)select to the Manual Range ,Manual Range can select 6A,10A. LCD will show the " MANU " marker, and Under the manual range operation, press and hold the" Range Button " (3-15,Fig.1) > 2 seconds, will return to auto range operation.
7) : When the connection is completed, the test value will be show on the LCD displayed.

Remark :

Under ACA measurement ,can short press the "V/A/Hz Button" to select ACA or Hz measurement , display will show ACA or Hz measure value

D). mA Measurement (AC true rms Measurement)

1) : Connect BLACK test lead into " COM " terminal (3-4, Fig. 1).
2) : Connect RED test lead into " mA/uA " terminal (3-6, Fig. 1).
3) : Press the " Function Button " (3-12, Fig. 1) Select to the " DC mA " Function.
4) : Use the " AC/DC button " (3-18, Fig. 1) short press to select the " AC mA " or " DC mA "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, short press the " Range Button " (3-15, Fig. 1) select to the Manual Range, Manual Range can select 60mA, 600mA. LCD will show the " MANU " marker, and Under the manual range operation, press and hold the" Range Button " (3-15,Fig.1) > 2 seconds, will return to auto range operation.
7) : When the connection is completed, the test value will be show on the LCD displayed.

Remark :

Under AC mA measurement ,can short press the "V/A/Hz Button" to select AC mA or Hz measurement , display will show AC mA or Hz measure value

E). μA Measurement (AC true rms Measurement)

1) : Connect BLACK test lead into " COM " terminal (3-4, Fig. 1).
2) : Connect RED test lead into " mA/uA " terminal (3-6, Fig. 1).
3) : Press the " Function Button " (3-12, Fig. 1) Select to the " DC μA " Function.
4) : Use the " AC/DC button " (3-18, Fig. 1) short press to select the " AC μA " or " DC μA "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, short press the " Range Button " (3-15,Fig.1) select to the Manual Range ,Manual Range can select 600.0uA, 6000uA. LCD will show the " MANU " marker, and Under the manual range operation, press and hold the" Range Button " (3-15,Fig.1) > 2 seconds, will return to auto range operation.
7) : When the connection is completed, the test value will be show on the LCD displayed .

Remark :

Under AC μA measurement ,can short press the "V/A/Hz Button" to select AC μA or Hz measurement , display will show AC μA or Hz measure value

F). Ω Measurement

1) : Connect BLACK test lead into " COM " terminal (3-4, Fig. 1).
2) : Connect RED test lead into " V/Ω/Diode/Continuity " terminal (3-2, Fig. 1).
3) : Press the " Function Button " (3-12, Fig. 1) Select to the " Ω " Function.
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, short press the " Range Button " (3-15,Fig.1) select to the Manual Range ,Manual Range can select 600Ω,6KΩ,60KΩ,600KΩ,6MΩ,60MΩ. LCD will show the " MANU " marker, and Under the manual range operation, press and hold the" Range Button " (3-15,Fig.1) > 2 seconds, will return to auto range operation.
7) : When the connection is completed, the test value will be show on the LCD displayed .

G). Diode Measurement

1) : Connect BLACK test lead into " COM " terminal (3-4, Fig. 1).

2) : Connect RED test lead into " V/Ω/Diode/Continuity " terminal (3-2, Fig. 1).

3) : Press the " Function Button " (3-12, Fig. 1) Select to the " Diode " Function.

4) : When the connection is completed, the test value will be show on the LCD displayed .

5) 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.

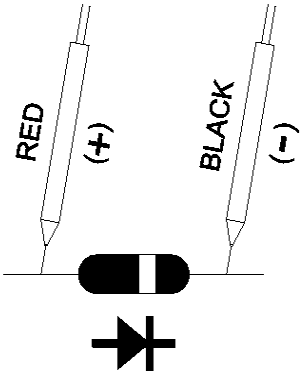


Fig.2

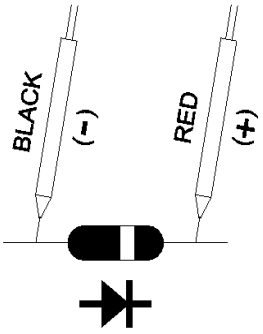


Fig.3

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.

H). Continuity Measurement

1) : Connect BLACK test lead into " COM " terminal (3-4, Fig. 1).
2) : Connect RED test lead into " V/Ω/Diode/Continuity " terminal (3-2, Fig. 1).
3) : Press the " Function Button " (3-12, Fig. 1) Select to the " Continuity " Function.
4) : When the connection is completed, the test value will be show on the LCD displayed.
5) When the test resistance value is less than 3 ohm, the beeper sound will be generated.

I). Hz Measurement

1) : Connect BLACK test lead into " COM " terminal (3-4, Fig. 1).
2) : Connect RED test lead into " V/Ω " terminal (3-2, Fig. 1).
3) : Press the " Function Button " (3-12, Fig. 1) Select to the " Hz " Function.
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, short press the " Range Button " (3-15,Fig.1) select to the Manual Range ,Manual Range can select 60Hz, 600Hz,6KHz,60KHz,600KHz,6MHz,60MHz. LCD will show the " MANU " marker, and Under the manual range operation, press and hold the " Range Button "(3-15,Fig.1) > 2 seconds, will return to auto range operation.
6) : When the connection is completed, the test value will be show on the LCD displayed.

J). Duty Measurement

1) : Connect BLACK test lead into " COM " terminal (3-4, Fig. 1).
2) : Connect RED test lead into " V/Ω " terminal (3-2, Fig. 1).
3) : Press the " Function Button " (3-12, Fig. 1) Select to the " Duty " Function.
4) : When the connection is completed, the test value will be show on the LCD displayed.

4-2 Data Hold

During the measurement, press the " Hold Button " (3-19,Fig. 1) once will hold the measured value & the LCD will display a " HOLD " symbol. Press the " Hold Button " once again will release the data hold function.

4-3 Data Record (Max., Min. reading)

1) The data record function records the maximum and minimum readings. Press the " REC Button " (3-13, Fig. 1) once to start the Data Record function and there will be a " REC " symbol on the display.
2) With the " REC " symbol on the display :
   a) Press the " REC Button " (3-13, Fig. 1) once, the " REC MAX " symbol along with the maximum value will appear on the display.
   b) Press the " REC Button " (3-13, Fig. 1) again, the " REC MIN " symbol along with the minimum value will appear on the display.
   c) Press the " REC Button " (3-13, Fig. 1) again, the " MIN " symbol will be disappeared, LCD only show the " REC " symbol, the meter start the Data Record function again.
3) To exit the memory record function, just press the "REC Button " (3-13, Fig. 1) > 3 seconds continuously. The display will revert to the current reading.

4-4 LCD Backlight ON/OFF

1) After power ON, the " LCD Backlight " will light automatically. During the measurement, Push the "Backlight Button " (3-16, Fig. 1) once , will turn OFF the " LCD Backlight ".
2) Push the " Backlight Button " once will turn ON the " LCD Backlight " again.

4-5 Relative Measurement

1) In measuring any function, the circuit will memorize the last measurement if it pushes " REL. Button " > 2 seconds (3-18, Figure 1) , then LCD will display shows zero value and "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" > 2 seconds again, at same time the " REL ." marker will disappear.

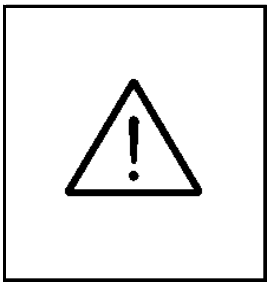
5. DATALOGGER

5-1 Preparation before execute datalogger function

a. Insert the SD card
Prepare a " SD memory card " (4 G to 32 G, optional), insert the SD card into the " SD card socket " (3-21, Fig. 1).

b. SD card Format
If SD card just the first time use into the meter, it recommend to make the " SD card Format " at first. please refer chapter 7(page 20) & chapter 7-6 (page 23).
c. Time setting
If the meter is used at first time, it should to adjust the clock time exactly, please refer chapter 7 & chapter 7-1 (page 20).

d. Decimal format setting



The numerical data structure of 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 7 (page 20) & chapter 7-5 (page 22).

5-2 Auto Datalogger (Set sampling time ≧1 second)

a. Start the datalogger

Press the " LOG Button (3-20, Fig. 1) > 3 seconds continuously, the upper LCD will show the text of "Logger "then "Logger " symbol will 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 7 (page 20) & Chapter 7-2 (page 21).*
* *How to set the beeper sound is enable, refer to Chapter 7 (page 20) & Chapter 7-4 (page 22).*

b. Pause the datalogger

During execute the Datalogger function, if press the "LOG Button " (3-20, 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,
the upper LCD will show the text of " Logger ".

Remark :
If press the " LOG Button " (3-20, 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 (3-20, Fig. 1) > 3 seconds continuously again will finish the Datalogger function, the " Logger " text will be disappeared and finish the Datalogger.

5-3 Manual Datalogger (Set sampling time = 0 second)

a. Set sampling time is to 0 second

Press the " LOG Button (3-20, Fig. 1) > 3 second , the LCD will show the " Position no. " , then press the " LOG Button " (3-20, Fig. 1) once, the " Logger " 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 " (3-13, Fig. 1) or " ◤ Button " (3-19, Fig. 1) to set the measuring position (1 to 99, for example room 1to room 99) to identify the measurement location , the Display will show P x (x = 1 to 99).

b. Finish the Datalogger

During execute the Datalogger function, press the " LOG Button (3-20, Fig. 1) > 3 seconds continuously again will finish the Datalogger function.

5-4 Check time information

During the normal measurement, If press " TIME Button " (3-17, Fig. 1) once , the lower LCD display will present the time information of Year/Month/Date , Hour/Minute/Second and the Sampling time information in sequence.

5-5 SD Card Data structure

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

   DMD01

2) If the first time to execute the Datalogger,under the route DMD01\, will generate a new file name DMD01001.XLS.After exist the Datalogger, then execute again, the data will save to the DMD01001.XLS until data column reach to 30,000 columns, then will generate a new file, for example DMD01002.XLS
3) Under the folder DMD01\, if the total files more than 99 files, will generate anew route, such as DMD02\ .....
4) The file's route structure :

DMD01\	DMD01001.XLS
	DMD01002.XLS
	.....
	DMD01099.XLS
DMD02\	DMD02001.XLS
	DMD02002.XLS
	.....
	DMD02099.XLS
DMDXX\	.....

   Remark :
   XX : Max. value is 10.

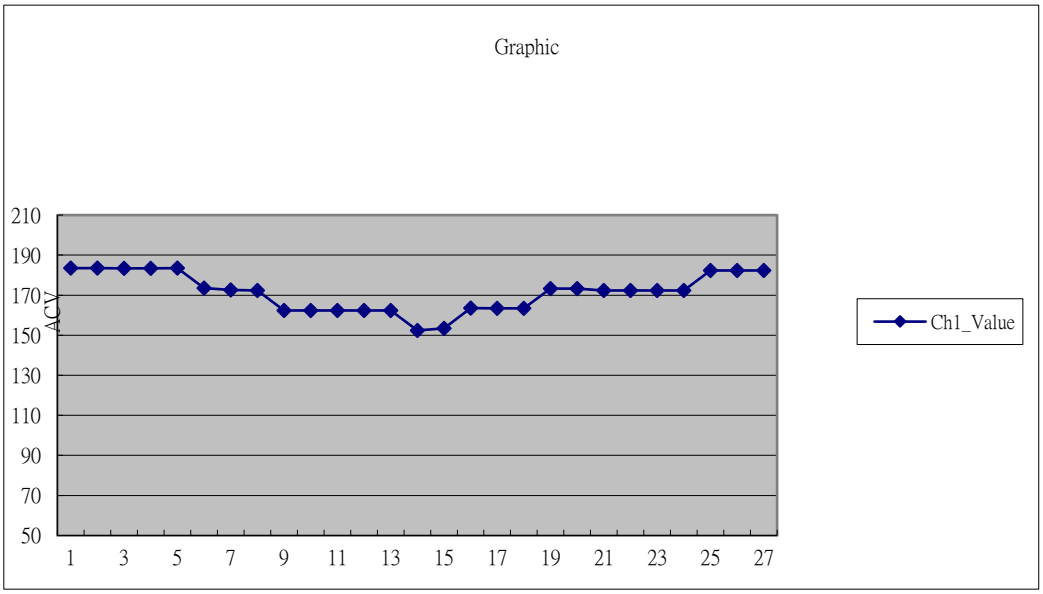
6. Saving data from the SD card to the computer (EXCEL software)

1) After execute the Data Logger function, take away the SD card out from the " SD card socket " (3-21, Fig. 1).
2) Plug in the SD card into the Computer's SD card slot (if your computer build in this installation) or insert the SD card into the " SD card socket ". then connect the " SD card socket " into the computer.
3) Power ON the computer and run the " EXCEL software ".Down load the saving data file (for example the file name : DMD01001.XLS, DMD01002.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)



7. ADVANCED SETTING

Under do not execute the Datalogger function, press the " SET Button " (3-17, Fig. 1) continuously at least two seconds will enter the " Advanced Setting " mode. then press the " SET Button " (3-17, Fig. 1) once a while in sequence to select the six main function, the display will show :

Sd F..... SD memory card Format
dAtE..... Set clock time (Year/Month/Date, Hour/Minute/ Second)
SP-t..... Set sampling time (0~3600 Seconds)
PoFF..... Auto power OFF management
bEEP..... Set beeper sound ON/OFF
dEC..... Set SD card Decimal character

Remark :
During execute the " Advanced Setting " function, if all key button release > 10 seconds will exit the " Advanced Setting " function, the LCD will return to normal screen.

7-1 Set clock time (Year/Month/Date,Hour/Minute/ Second)

When the display show " dAtE "

1) Use the " ▲ Button " (3-13, Fig. 1) or " ▼ Button " (3-19, Fig. 1) to adjust the value (Setting start from Year value). After the desired value is set, press the " Enter Button " (3-20, 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).

2) After set all the time value (Year, Month, Date, Hour, Minute, Second), press the " ENTER Button " (3-20, Fig. 1) once will save the time value.

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).

7-2 Set sampling time (Seconds)

When the display show " SP-t "

1) Use the " ▲ Button " (3-13, Fig. 1) or " ▼ Button " (3-19, Fig. 1) to adjust the value (0, 1, 2, 5, 10, 30, 60, 120, 300, 600, 1800,3600 seconds).
2) After the Sampling value is selected, press the " Enter Button " (3-20, Fig. 1) will save the setting function with default.

7-3 Auto power OFF management

When the lower display show " PoFF "

1) During the measurement, after 10 minutes the meter will auto power off.
2) Use the " ▲ Button " (3-13, Fig. 1) or " ▼ Button " (3-19, Fig. 1) to select the upper value to " yES " or " no ".

   yES - Auto Power Off management will enable.
   no - Auto Power Off management will disable.

3) After select the upper text to " yES " or " no ", press the " ENTER Button " (3-20, Fig. 1) will save the setting function with default.

Remark :

Using the POWER ADAP Auto Power off function will be disable.

7-4 Set beeper sound ON/OFF

When the lower display show " bEEP "

1) Use the " ▲ Button " (3-13, Fig. 1) or " ▼ Button " (3-19, Fig. 1) to select the upper value 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 " (3-20, Fig. 1) will save the setting function with default.

7-5 Decimal point of SD card setting

The numerical data structure of 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.

When the lower display show " dEC "

1) Use the " ▲ Button " (3-13, Fig. 1) or " ▼ Button " (3-19, 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 " (3-20, Fig. 1) will save the setting function with default.

7-6 SD memory card Format

When the lower display show " Sd F "

1) Use the " ▲ Button " (3-13, Fig. 1) or " ▼ Button " (3-19, Fig. 1) to select the upper value to " yES " or " no ".

   yES - Intend to format the SD memory card
   no - Not execute the SD memory card format

2) If select the upper to " yES ", press the " Enter Button " (3-20, Fig. 1) once again, the Display will show text " Sd F Ent " to confirm again, if make sure to do the SD memory card format, then press " Enter Button " once will format the SD memory clear all the existing data that already saving into the SD card.

8. POWER SUPPLY from DC ADAPTER

The meter also can supply the power supply from the DC 9V Power Adapter (optional). Insert the plug of Power Adapter into " DC 9V Power Adapter Input Socket " (3-9, Fig. 1).

9. BATTERY REPLACEMENT

1) When the left corner of LCD display show "  ", 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) Loose the screw of the " Battery Cover Screws " (3-7, Fig. 1) and take away the " Battery Cover " (3-5, Fig. 1) from the instrument and remove the battery.
3) Replace with DC 1.5 V battery (UM3, AA, Alkaline/heavy duty) x 6 PCs, and reinstate the cover.
4) Make sure the battery cover is secured after changing the battery.

10. FUSE REPLACEMENT

1) When the uA, mA current range can not operation, please check if the Fuse A(3-22, Fig.1) is broken or not: When the 10 A current range can not operation, please check if the Fuse B(3-11, Fig.1) is broken or not:
2) When replace the fuse should take the test leads from the measuring circuit and power off the meter.

3) Loose the screws of the " Battery Cover Screws " (3-7, Fig. 1) and take away the " Battery Cover " (3-5, Fig. 1) from the instrument and remove the battery.
4) Use a screwdriver to open the fuse holder(10A 3-11, Fig.1), (600 mA 3-22 Fig.1) and replace the fuses,
   * 10A Fuse and 600 mA place,please refer chapter 3, (page 7, Fig,1.)
5) Reinstate the DC 1.5 V battery (UM3, AA, Alkaline/heavy duty) x 6 PCs, and reinstate the cover.
6) Make sure the battery cover is secured after changing the fuses.

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

a. Fuse A - Rating : 600 mA, Size : 5.0 mm dia. x 20 mm
To be protected the circuit from overload current at " 600 uA, 6000 uA, 60 mA, 600 mA " range.

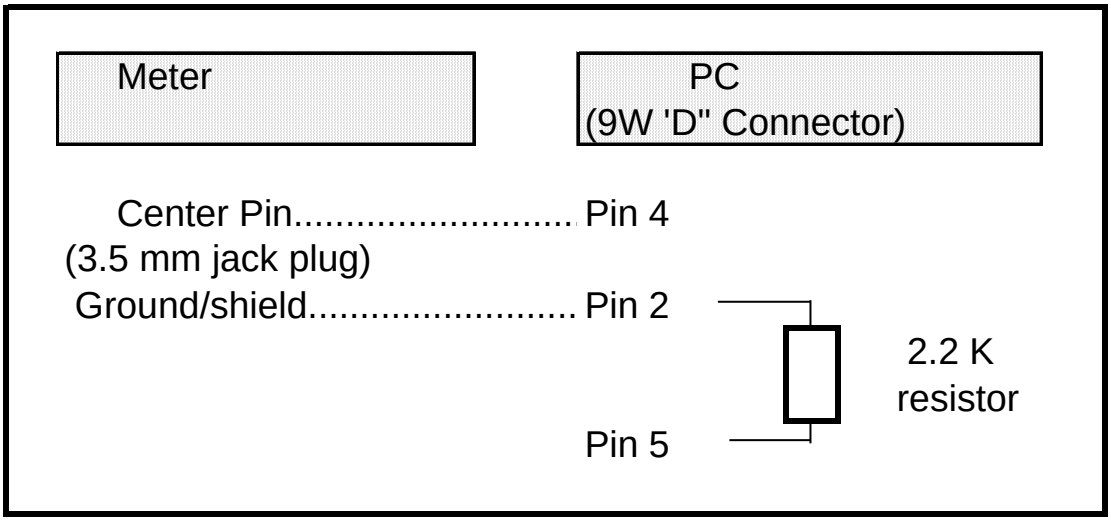
b. Fuse B - Rating : 10 A, Size : 5.2 mm dia. x 20 mm
To be protected the circuit from overload current at " 10 A " range.

11. RS232 PC SERIAL INTERFACE

The instrument has RS232 PC serial interface via a 3.5 mm terminal (3-10, Fig. 1).

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

A RS232 lead with the following connection will be required to link the instrument with the PC serial port.



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

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

RS232 FORMAT : 9600, N, 8, 1

Each digit indicate the following status :

D15	Start Word		
D14	4		
D13	1 ~ 2		
D12 & D11	Annunciator for Display		
	35 = uA	37 = mA	18 = m V
	31= HZ	34 = V	36 = A
	38 = OHM	39 = K OHM	40 = M OHM
	46 = DIODE	49 = AC mV	50 = ACV
	52 = ACA		
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		

12. PATENT

The meter (SD card structure) already get patent or patent pending in following countries :

Germany	Nr. 20 2008 016 337.4
JAPAN	3151214
TAIWAN	M 456490
CHINA	ZL 2008 2 0189918.5
	ZL 2008 2 0189917.0