

SD Card real time data recorder

12 channels TEMPERATURE RECORDER



Your purchase of this 12 channels TEMPERATURE RECORDER with SD CARD DATALOGGER marks a step forward for you into the field of precision measurement. Although this METER 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

TABLE OF CONTENTS

1. FEATURES.....	1
2. SPECIFICATIONS.....	2
3. FRONT PANEL DESCRIPTION.....	6
3-1 Display.....	6
3-2 Power Button (ESC, Backlight Button).....	6
3-3 Hold Button (Next Button).....	6
3-4 REC Button (Enter Button).....	6
3-5 Type Button (▲ Button).....	6
3-6 Page Button (▼ Button).....	6
3-7 Logger Button (OFFSET Button, Sampling time check Button).....	6
3-8 SET Button (Time check Button).....	6
3-9 T1 to T12 input socket.....	6
3-10 SD card socket.....	6
3-11 RS232 socket.....	6
3-12 Reset button.....	6
3-13 DC 9V power adapter socket.....	6
3-14 Battery Cover/Battery compartment.....	6
3-15 Stand.....	6
4. MEASURING PROCEDURE.....	7
4-1 Type K measurement.....	7
4-2 Type J/T/E/R/S measurement.....	8
4-3 Data Hold.....	8
4-4 Data Record (Max./ Min. reading).....	8
4-5 LCD Backlight ON/OFF.....	9
5. DATALOGGER.....	9
5-1 Preparation before execute datalogger function.....	9
5-2 Auto Datalogger (Set sampling time ≥ 1 second).....	10
5-3 Manual Datalogger (Set sampling time = 0 second).....	11
5-4 Loop Datalogger.....	12
5-5 Check time information.....	12
5-6 Check sampling time information.....	13
5-7 SD Card Data structure.....	13
6. Saving data from the SD card to the computer.....	14
7. ADVANCED SETTING.....	15
7-1 Set clock time (Year/Month/Date, Hour/Minute/ Second).....	16
7-2 Set loop time of recorder.....	17
7-3 Decimal point of SD card setting.....	19
7-4 Auto power OFF management	19
7-5 Set beeper Sound ON/OFF.....	20
7-6 Select the temperature unit to $^{\circ}\text{C}$ or $^{\circ}\text{F}$	20
7-7 Set sampling time	21
7-8 SD memory card format.....	21
8. POWER SUPPLY from DC ADAPTER.....	22
9. BATTERY REPLACEMENT.....	22
10. RS232 PC serial interface.....	22
11. Optional Type K Temp. probe.....	24
12. PATENT.....	25

1. FEATURES

- * 12 channels Temperature recorder, use SD card to save the data along with time information, paperless.
- * Real time data logger, save the 12 channels Temp. measuring data along the time information (year, month, date, minute, second) into the SD memory card and can be down load to the Excel, extra software is no need. User can make the further data or graphic analysis by themselves.
- * Channels no. : 12 channels (CH1 to CH12) temperature measurement.
- * Sensor type : Type J/K/T/E/R/S thermocouple.
- * Auto datalogger or manual datalogger.
Data logger sampling time range : 1 to 3600 seconds.
- * Type K thermometer : -100 to 1300 °C .
- * Type J thermometer : -100 to 1200 °C .
- * Page select, show CH1 to CH8 or CH9 to CH12 in the same LCD.
- * Display resolution : 1 degree/0.1 degree.
- * Offset adjustment.
- * SD card capacity : 1 GB to 16 GB.
- * RS232/USB computer interface.
- * Microcomputer circuit provides intelligent function and high accuracy.
- * Jumbo LCD with green light backlight, easy reading.
- * Can default auto power off or manual power off.
- * Data hold to freeze the measurement value.
- * Record function to present the max. and min. reading.
- * Power by UM3/AA (1.5 V) x 8 batteries or DC 9V adapter.
- * RS232/USB PC COMPUTER interface.
- * Heavy duty & compact housing case.

2. SPECIFICATIONS

2-1 General Specifications

Circuit	Custom one-chip of microprocessor LSI circuit.	
Display	LCD size : 82 mm x 61 mm. <i>* with green color backlight.</i>	
Channels	12 channels : T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11 and T12.	
Sensor type	Type K thermocouple probe. Type J/T/E/R/S thermocouple probe.	
Resolution	0.1°C / 1°C, 0.1°F / 1 °F.	
Datalogger Sampling Time Setting range	Auto	1 second to 3600 seconds <i>@ Sampling time can set to 1 second, but memory data may loss.</i>
	Manual	Push the data logger button once will save data one time. <i>@ Set the sampling time to 0 second.</i>
Data error no.	0.1% of total saved data max.	
Loop Datalogger	The record time can set for the duration every day. <i>For example the user intend set the record time from the 2:00 to 8:15 every day or record time 8:15 to 14:15.</i>	
Memory Card	SD memory card. 1 GB to 16 GB.	
Advanced setting	* Set clock time (Year/Month/Date, Hour/Minute/ Second) * Set loop time of recorder * Decimal point of SD card setting * Auto power OFF management * Set beep Sound ON/OFF * Set temperature unit to °C or °F * Set sampling time * SD memory card Format	

Temperature Compensation	Automatic temp. compensation for the type K/J/T/E/R/S thermometer.
Linear Compensation	Linear Compensation for the full range.
Offset Adjustment	To adjust the zero temperature deviation value.
Probe Input Socket	2 pin thermocouple socket. 12 sockets for T1 to T12.
Over Indication	Show " - - - - ".
Data Hold	Freeze the display reading.
Memory Recall	Maximum & Minimum value.
Sampling Time of Display	Approx. 1 second.
Data Output	RS 232/USB PC computer interface. <i>* Connect the optional RS232 cable UPCB-02 will get the RS232 plug.</i> <i>* Connect the optional USB cable USB-01 will get the USB plug.</i>
Power off	Auto shut off saves battery life or manual off by push button, it can select in the inner function.
Operating Temperature	0 to 50 °C .
Operating Humidity	Less than 85% R.H.
Power Supply	* .Alkaline or heavy duty DC 1.5 V battery (UM3, AA) x 8 PCs, or equivalent.
	* .DC 9V adapter input. (AC/DC power adapter is optional).

Power Current	Normal operation (w/o SD card save data and LCD Backlight is OFF) : <i>Approx. DC 7.5 mA.</i>
	When SD card save the data but and LCD Backlight is OFF) : <i>Approx. DC 25 mA.</i>
	<i>* .If LCD backlight on, the power consumption will increase approx. 11 mA.</i>
Weight	Meter : 827 g/1.84 LB.
Dimension	225 X 125 X 64 mm (8.86 X 4.92 X 2.52 inch)
Accessories Included	* Instruction manual..... 1 PC * Type K Temp. probe, TP-01..... 2 PC * Hard carrying case, CA-08..... 1 PC * SD memory card (2 GB).....1 PC
Optional Accessories	* Type K thermocouple probe. TP-01, TP-02A. TP-03, TP-04 * USB cable, USB-01. * RS232 cable, UPCB-02. * Data Acquisition software, SW-U811-WIN. * AC to DC 9V adapter.

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

Sensor Type	Resolution	Range	Accuracy
Type K	0.1 °C	-50.1 to -100.0 °C	± (0.4 % + 1 °C)
		-50.0 to 999.9 °C	± (0.4 % + 0.5 °C)
	1 °C	1000 to 1300 °C	± (0.4 % + 1 °C)
	0.1 °F	-58.1 to -148.0 °F	± (0.4 % + 1.8 °F)
		-58.0 to 999.9 °F	± (0.4 % + 1 °F)
	1 °F	1000 to 2372 °F	± (0.4 % + 2 °F)
Type J	0.1 °C	-50.1 to -100.0 °C	± (0.4 % + 1 °C)
		-50.0 to 999.9 °C	± (0.4 % + 0.5 °C)
	1 °C	1000 to 1150 °C	± (0.4 % + 1 °C)
	0.1 °F	-58.1 to -148.0 °F	± (0.4 % + 1.8 °F)
		-58.0 to 999.9 °F	± (0.4 % + 1 °F)
	1 °F	1000 to 2102 °F	± (0.4 % + 2 °F)
Type T	0.1 °C	-50.1 to -100.0 °C	± (0.4 % + 1 °C)
		-50.0 to 400.0 °C	± (0.4 % + 0.5 °C)
	0.1 °F	-58.1 to -148.0 °F	± (0.4 % + 1.8 °F)
		-58.0 to 752.0 °F	± (0.4 % + 1 °F)
Type E	0.1 °C	-50.1 to -100.0 °C	± (0.4 % + 1 °C)
		-50.0 to 900.0 °C	± (0.4 % + 0.5 °C)
	0.1 °F	-58.1 to -148.0 °F	± (0.4 % + 1.8 °F)
		-58.0 to 999.9 °F	± (0.4 % + 1 °F)
	1 °F	1000 to 1652 °F	± (0.4 % + 2 °F)
Type R	1 °C	0 to 1700 °C	± (0.5 % + 3 °C)
	1 °F	32 to 3092 °F	± (0.5 % + 5 °F)
Type S	1 °C	0 to 1500 °C	± (0.5 % + 3 °C)
	1 °F	32 to 2732 °F	± (0.5 % + 5 °F)

Remark :

- a. Accuracy value is specified for the meter only.
- b. Accuracy is tested under the meter's environment temperature within 23 ± 5°C.
- c. Linearity Correction :
Memorize the thermocouple's curve into the intelligent CPU circuit,

@ Above specification tests under the environment RF Field Strength less than 3 V/M & frequency less than 30 MHz only.

3. FRONT PANEL DESCRIPTION

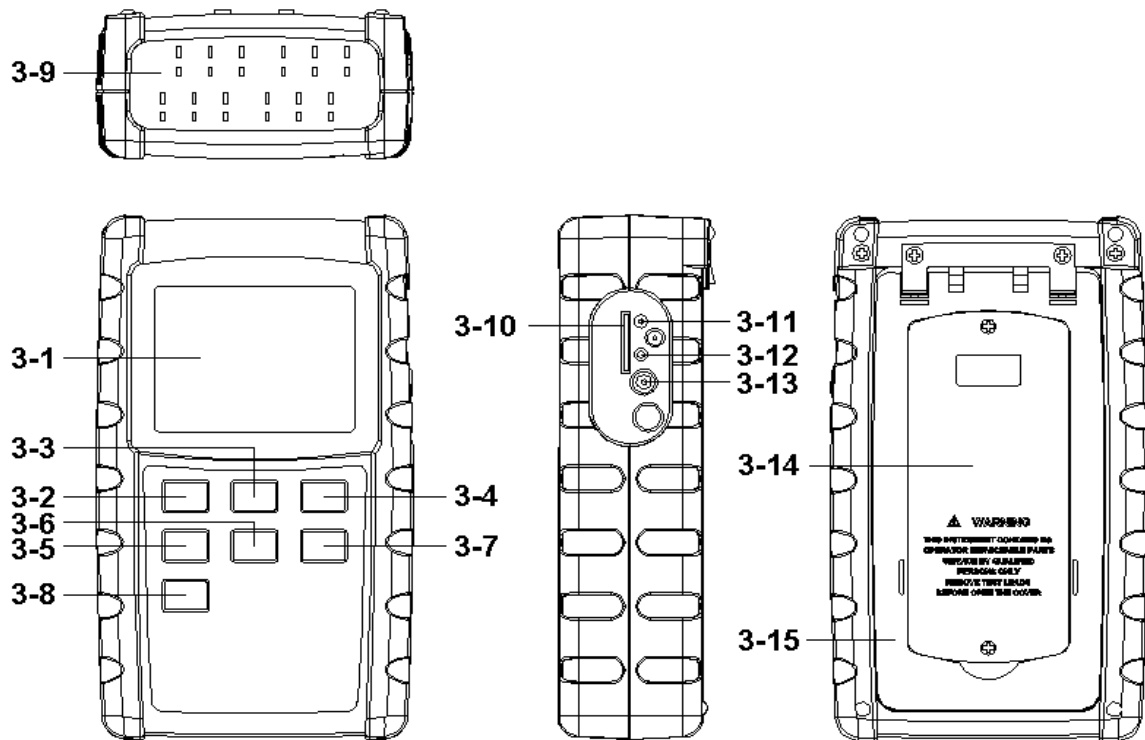


Fig. 1

- 3-1 Display.
- 3-2 Power Button (ESC, Backlight Button)
- 3-3 Hold Button (Next Button)
- 3-4 REC Button (Enter Button)
- 3-5 Type Button (▲ Button)
- 3-6 Page Button (▼ Button)
- 3-7 Logger Button (OFFSET Button, Sampling time check Button
- 3-8 SET Button (Time check Button)
- 3-9 T1 to T12 input socket
- 3-10 SD card socket
- 3-11 RS232 socket
- 3-12 Reset button
- 3-13 DC 9V power adapter socket
- 3-14 Battery Cover/Battery compartment
- 3-15 Stand

4. MEASURING PROCEDURE

4-1 Type K measurement

- 1) Power on the meter by pressing the " Power button " (3-2, Fig. 1) once.

** After already power on the meter, pressing the " Power button " > 2 sec continuously will turn off the meter.*

- 2) Meter default Temp. sensor type is Type K, the up Display will show " K " indicator.

The default temperature unit is $^{\circ}\text{C}$ ($^{\circ}\text{F}$), the method to change the Temp. unit from $^{\circ}\text{C}$ to $^{\circ}\text{F}$ or $^{\circ}\text{F}$ to $^{\circ}\text{C}$, please refer to Chapter 7-6, page 20.

- 3) Insert the Type K probes into the " T1, to T12 input socket " (3-9, Fig. 1).

The LCD will show the 8 channels (CH1, CH2, CH3, CH4, CH6, CH7, CH8) temperature value at the same time.

Page selection

If intend to show the other 4 channels (CH9, CH10, CH11, CH12) temperature value, just press the " Page Button " (3-6, Fig. 1) once , the Display will show those channels' Temp. value following, press the " Page Button " (3-6, Fig. 1) once again, the Display will revert to the 8 channels (CH1, CH2, CH3, CH4, CH6, CH7, CH8) screen.

** The CHx (1 to 12) value is the measurement Temp. value sense from the Temp. probe that plug into the input socket Tx (1 to 12) For example, the CH1 value is the measurement value sense from the Temp. probe that plug into the input socket T1.*

** If the certain input socket do not insert the temperature probes, the relative channel Display will show over range " - - - - - ".*

4-2 Type J/T/E/R/S measurement

All the measuring procedures are same as the Type K (chapter 4-1), except to select the Temp. Sensor type to " Type J, T, R, S " by pressing the " Type Button " (3-5, Fig. 1) once in sequence until the up LCD display show the " J, K,T, E, R, S " indicator.

4-3 Data Hold

During the measurement, press the " Hold Button " (3-3, 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.

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

1) The data record function records the maximum and minimum readings. Press the " REC Button " (3-4, 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 " (3-4, Fig. 1) once, the " REC MAX " symbol along with the maximum value will appear on the Display.

If intend to delete the maximum value, just press the " Hold Button " (3-3, Fig. 1) once, the Display will show the " REC " symbol only & execute the memory function continuously.

- b) Press the " REC Button " (3-4, Fig. 1) again, the " REC MIN " symbol along with the minimum value will appear on the Display.
If intend to delete the minimum value, just press the " Hold Button " (3-3, Fig. 1) once, the Display will show the " REC " symbol only & execute the memory function continuously.
- c) To exit the memory record function, just press the " REC " button > 2 seconds at least. The Display will revert to the current reading.

4-5 LCD Backlight ON/OFF

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

Press the " Backlight Button " once again will turn ON the " LCD Backlight " again.

5. DATALOGGER

5-1 Preparation before execute datalogger function

a. Insert the SD card

Prepare a " SD memory card " (1 GB to 16 GB, optional),

** It recommend use memory card ≤ 4 GB.*

insert the SD card into the " SD card socket " (3-10, Fig. 1).

Please plug the SD card in the right direction, the front name plate of the SD card should face against the up case.

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 7-8 (page 21).

** It recommend strongly, do not use memory cards that have been formatted by other meter or by a computer. Reformat the memory card with your meter.*

c. Time setting

If the meter is used at first time, it should to adjust the clock time exactly, please refer chapter 7-1 (page 16).

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 7-3, page 19.

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

a. Start the datalogger

Press the " REC Button (3-4, Fig. 1) once , the LCD will show the text " REC ", then press the " Logger Button " (3-7, Fig. 1), the " REC " will flashing and beeper will sound, 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 7-7, page 21.*

** How to set the beeper sound is enable, refer to Chapter 7-5, page 20.*

b. Pause the datalogger

During execute the Datalogger function , if press the " Logger Button " (3-7, Fig. 1) once will pause the Datalogger function (stop to save the measuring data into the memory circuit temporally). In the same time the text of " REC " will stop flashing.

Remark :

If press the " Logger Button " (3-7, Fig. 1) once again will execute the Datalogger again, the text of " REC " will flashing .

c. Finish the Datalogger

During pause the Datalogger, press the " REC Button " (3-4, Fig. 1) continuously at least two seconds, the " REC " indicator 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 " REC Button (3-4, Fig. 1) once , the LCD will show the text " REC ", then press the " Logger Button " (3-7, Fig. 1) once, the " REC " will flashing once and Beeper will sound once, at the same time the measuring data along the time information and the Position no. will be saved into the memory circuit.

Remark :

- * When make the manual Datalogger measurement, the left Display will show the Position/Location no. (P1, P2... P99) and the CH4 measurement value alternately.*
- * During execute the Manual Datalogger, press the " ▲ Button " (3-5, Fig. 1) once will enter the " Position /Location no. setting. use the " ▲ Button " or " ▼ Button " (3-6, Fig. 1) to select the measuring location no. (1 to 99, for example room 1 to room 99) to identify the measurement location. After the position no. is selected, press the " Enter Button " (3-4, Fig. 1) once will save the Position/Location no. automatically.*

b. Finish the Datalogger

Press the " REC Button " (3-4, Fig. 1) continuously at least two seconds, the " REC " indication will be disappeared and finish the Datalogger.

5-4 Loop Datalogger (every day to record the data with certain duration)

The record time can set for the certain period every day.

For example the user can set the record time from the 2:00 to 8:15 ever day or record time 8:15 to 15:15...

Detail operation procedures, refer to chapter 7-2, page 17.

5-5 Check time information

During the normal measurement (not execute the Datalogger), If press " Time check Button " (3-8, Fig. 1) once , the left lower LCD display will present the time information of Year/Month, Date/Hour, Minute/Second in sequence.

5-6 Check sampling time information

During the normal measurement (not execute the Datalogger), If press " Sampling time check Button " (3-7, Fig. 1) once , the left lower LCD display will present the Sampling time information in second unit.

5-7 SD Card Data structure

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

TMB01

- 2) If the first time to execute the Datalogger, under the route TMB01\, will generate a new file name TMB01001.XLS.
After exist the Datalogger, then execute again, the data will save to the TMB01001.XLS until Data column reach to 30,000 columns, then will generate a new file, for example TMB01002.XLS
- 3) Under the folder TMB01\, if the total files more than 99 files, will generate anew route, such as TMB02\
- 4) The file's route structure :

```
TMB01\  
TMB01001.XLS  
TMB01002.XLS  
  
.....  
TMB01099.XLS  
  
TMB02\  
TMB02001.XLS  
TMB02002.XLS  
  
.....  
TMB02099.XLS  
  
TMBXX\  
.....  
.....
```

Remark : XX : Max. value is 10.

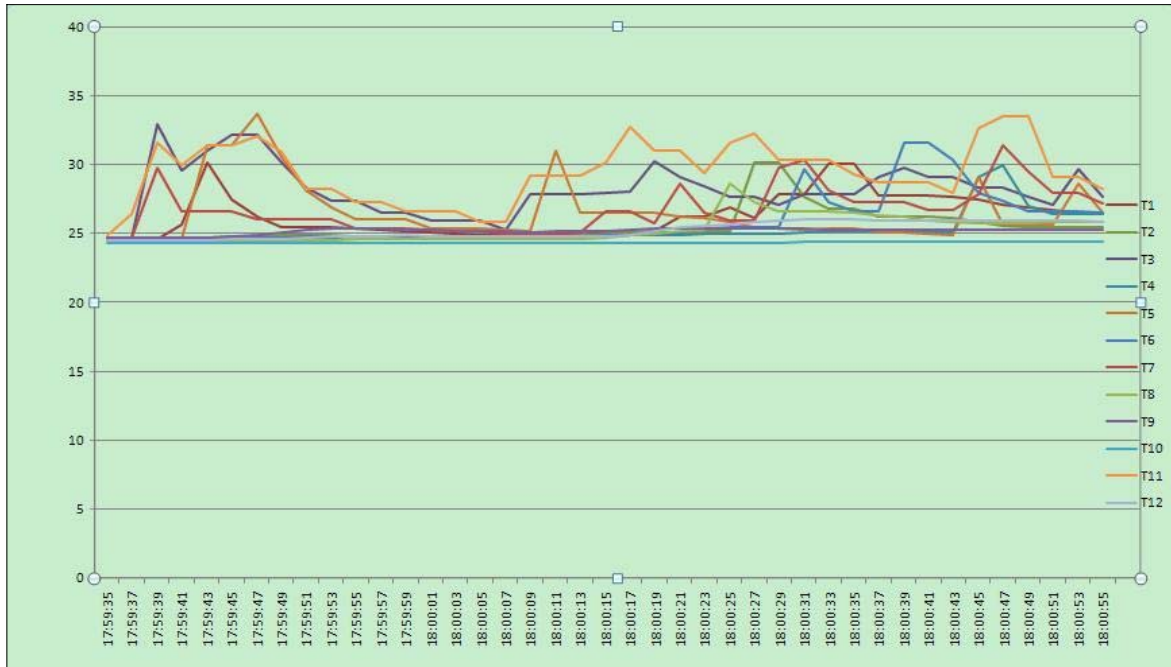
6. Saving data from the SD card to the computer (EXCEL software)

- 1) After execute the Data Logger function, take away the SD card out from the " SD card socket " (3-10, 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 adapter ". then connect the " SD card adapter " into the computer.
- 3) Power ON the computer and run the " EXCEL software ". Down load the saving data file (for example the file name : TMB01001.XLS, TMB01002.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)

Place	Date	Time	T1 Unit	T2 Unit	T3 Unit	T4 Unit	T5 Unit	T6 Unit	T7 Unit	T8 Unit	T9 Unit	T10 Unit	T11 Unit	T12 Unit
1	2009/11/06	17:59:35	24.6 T1KTemp C	24.6 T2KTemp C	24.7 T3KTemp C	24.6 T4KTemp C	24.6 T5KTemp C	24.6 T6KTemp C	24.7 T7KTemp C	24.5 T8KTemp C	24.7 T9KTemp C	24.3 T10KTemp C	24.9 T11KTemp C	24.5 T12KTemp C
2	2009/11/06	17:59:37	24.6 T1KTemp C	24.6 T2KTemp C	24.7 T3KTemp C	24.6 T4KTemp C	24.6 T5KTemp C	24.6 T6KTemp C	24.7 T7KTemp C	24.5 T8KTemp C	24.7 T9KTemp C	24.3 T10KTemp C	26.4 T11KTemp C	24.5 T12KTemp C
3	2009/11/06	17:59:39	24.6 T1KTemp C	24.6 T2KTemp C	32.9 T3KTemp C	24.6 T4KTemp C	24.6 T5KTemp C	24.6 T6KTemp C	29.8 T7KTemp C	24.5 T8KTemp C	24.7 T9KTemp C	24.3 T10KTemp C	31.6 T11KTemp C	24.5 T12KTemp C
4	2009/11/06	17:59:41	25.7 T1KTemp C	24.6 T2KTemp C	29.6 T3KTemp C	24.6 T4KTemp C	24.6 T5KTemp C	24.6 T6KTemp C	26.6 T7KTemp C	24.5 T8KTemp C	24.7 T9KTemp C	24.3 T10KTemp C	30 T11KTemp C	24.5 T12KTemp C
5	2009/11/06	17:59:43	30.2 T1KTemp C	24.7 T2KTemp C	31 T3KTemp C	24.6 T4KTemp C	31.4 T5KTemp C	24.6 T6KTemp C	26.6 T7KTemp C	24.5 T8KTemp C	24.7 T9KTemp C	24.3 T10KTemp C	31.4 T11KTemp C	24.5 T12KTemp C
6	2009/11/06	17:59:45	27.5 T1KTemp C	24.8 T2KTemp C	32.1 T3KTemp C	24.7 T4KTemp C	31.4 T5KTemp C	24.6 T6KTemp C	26.6 T7KTemp C	24.5 T8KTemp C	24.8 T9KTemp C	24.3 T10KTemp C	31.4 T11KTemp C	24.6 T12KTemp C
7	2009/11/06	17:59:47	26.2 T1KTemp C	24.8 T2KTemp C	32.1 T3KTemp C	24.7 T4KTemp C	33.7 T5KTemp C	24.7 T6KTemp C	26 T7KTemp C	24.5 T8KTemp C	24.9 T9KTemp C	24.3 T10KTemp C	32.1 T11KTemp C	24.6 T12KTemp C
8	2009/11/06	17:59:49	25.5 T1KTemp C	24.9 T2KTemp C	30.1 T3KTemp C	24.7 T4KTemp C	30.5 T5KTemp C	24.7 T6KTemp C	26 T7KTemp C	24.5 T8KTemp C	25.1 T9KTemp C	24.3 T10KTemp C	30.9 T11KTemp C	24.6 T12KTemp C
9	2009/11/06	17:59:51	25.5 T1KTemp C	24.9 T2KTemp C	28.3 T3KTemp C	24.7 T4KTemp C	28.1 T5KTemp C	24.8 T6KTemp C	26 T7KTemp C	24.5 T8KTemp C	25.3 T9KTemp C	24.3 T10KTemp C	28.2 T11KTemp C	24.7 T12KTemp C
10	2009/11/06	17:59:53	25.5 T1KTemp C	24.9 T2KTemp C	27.4 T3KTemp C	24.7 T4KTemp C	26.9 T5KTemp C	24.8 T6KTemp C	26 T7KTemp C	24.5 T8KTemp C	25.4 T9KTemp C	24.3 T10KTemp C	28.2 T11KTemp C	24.8 T12KTemp C
11	2009/11/06	17:59:55	25.4 T1KTemp C	24.8 T2KTemp C	27.4 T3KTemp C	24.8 T4KTemp C	26 T5KTemp C	24.8 T6KTemp C	25.4 T7KTemp C	24.6 T8KTemp C	25.4 T9KTemp C	24.3 T10KTemp C	27.3 T11KTemp C	24.8 T12KTemp C
12	2009/11/06	17:59:57	25.3 T1KTemp C	24.8 T2KTemp C	26.5 T3KTemp C	24.8 T4KTemp C	26 T5KTemp C	24.8 T6KTemp C	25.4 T7KTemp C	24.6 T8KTemp C	25.4 T9KTemp C	24.3 T10KTemp C	27.3 T11KTemp C	24.8 T12KTemp C
13	2009/11/06	17:59:59	25.2 T1KTemp C	24.8 T2KTemp C	26.5 T3KTemp C	24.8 T4KTemp C	26 T5KTemp C	24.8 T6KTemp C	25.4 T7KTemp C	24.6 T8KTemp C	25.3 T9KTemp C	24.3 T10KTemp C	26.6 T11KTemp C	24.9 T12KTemp C
14	2009/11/06	18:00:01	25.1 T1KTemp C	24.8 T2KTemp C	25.9 T3KTemp C	24.8 T4KTemp C	25.4 T5KTemp C	24.8 T6KTemp C	25.3 T7KTemp C	24.6 T8KTemp C	25.3 T9KTemp C	24.3 T10KTemp C	26.6 T11KTemp C	24.8 T12KTemp C
15	2009/11/06	18:00:03	25 T1KTemp C	24.8 T2KTemp C	25.9 T3KTemp C	24.8 T4KTemp C	25.4 T5KTemp C	24.8 T6KTemp C	25.2 T7KTemp C	24.6 T8KTemp C	25.2 T9KTemp C	24.3 T10KTemp C	26.6 T11KTemp C	24.8 T12KTemp C
16	2009/11/06	18:00:05	24.9 T1KTemp C	24.8 T2KTemp C	25.9 T3KTemp C	24.8 T4KTemp C	25.4 T5KTemp C	24.8 T6KTemp C	25.2 T7KTemp C	24.6 T8KTemp C	25.2 T9KTemp C	24.3 T10KTemp C	25.9 T11KTemp C	24.8 T12KTemp C
17	2009/11/06	18:00:07	24.9 T1KTemp C	24.7 T2KTemp C	25.3 T3KTemp C	24.8 T4KTemp C	25.3 T5KTemp C	24.8 T6KTemp C	25 T7KTemp C	24.6 T8KTemp C	25.2 T9KTemp C	24.3 T10KTemp C	25.9 T11KTemp C	24.8 T12KTemp C
18	2009/11/06	18:00:09	24.9 T1KTemp C	24.7 T2KTemp C	27.8 T3KTemp C	24.8 T4KTemp C	25.2 T5KTemp C	24.8 T6KTemp C	25 T7KTemp C	24.6 T8KTemp C	25.1 T9KTemp C	24.3 T10KTemp C	29.2 T11KTemp C	24.8 T12KTemp C
19	2009/11/06	18:00:11	24.9 T1KTemp C	24.8 T2KTemp C	27.8 T3KTemp C	24.8 T4KTemp C	31 T5KTemp C	24.8 T6KTemp C	25 T7KTemp C	24.6 T8KTemp C	25.2 T9KTemp C	24.3 T10KTemp C	29.2 T11KTemp C	24.8 T12KTemp C
20	2009/11/06	18:00:13	24.9 T1KTemp C	24.9 T2KTemp C	27.8 T3KTemp C	24.8 T4KTemp C	26.5 T5KTemp C	24.8 T6KTemp C	25.1 T7KTemp C	24.6 T8KTemp C	25.2 T9KTemp C	24.3 T10KTemp C	29.2 T11KTemp C	24.8 T12KTemp C
21	2009/11/06	18:00:15	25.1 T1KTemp C	25 T2KTemp C	27.9 T3KTemp C	24.8 T4KTemp C	26.5 T5KTemp C	24.9 T6KTemp C	26.6 T7KTemp C	24.7 T8KTemp C	25.2 T9KTemp C	24.3 T10KTemp C	30.2 T11KTemp C	24.8 T12KTemp C
22	2009/11/06	18:00:17	25.1 T1KTemp C	25.1 T2KTemp C	28 T3KTemp C	24.9 T4KTemp C	26.5 T5KTemp C	24.9 T6KTemp C	26.6 T7KTemp C	24.9 T8KTemp C	25.3 T9KTemp C	24.3 T10KTemp C	32.7 T11KTemp C	24.9 T12KTemp C
23	2009/11/06	18:00:19	25.2 T1KTemp C	25.1 T2KTemp C	30.2 T3KTemp C	24.9 T4KTemp C	26.5 T5KTemp C	25 T6KTemp C	25.8 T7KTemp C	25 T8KTemp C	25.4 T9KTemp C	24.3 T10KTemp C	31 T11KTemp C	25.2 T12KTemp C
24	2009/11/06	18:00:21	26.2 T1KTemp C	25.1 T2KTemp C	29.1 T3KTemp C	24.9 T4KTemp C	26.2 T5KTemp C	25.1 T6KTemp C	28.6 T7KTemp C	25.2 T8KTemp C	25.4 T9KTemp C	24.3 T10KTemp C	31 T11KTemp C	25.4 T12KTemp C
25	2009/11/06	18:00:23	26.2 T1KTemp C	25.2 T2KTemp C	28.4 T3KTemp C	25 T4KTemp C	26.1 T5KTemp C	25.4 T6KTemp C	26.5 T7KTemp C	25.3 T8KTemp C	25.4 T9KTemp C	24.3 T10KTemp C	29.4 T11KTemp C	25.5 T12KTemp C

EXCEL graphic screen (for example)



7. ADVANCED SETTING

Under do not execute the Datalogger function, press the SET Button " (3-8, Fig. 1) continuously at least two seconds will enter the " Advanced Setting " mode, then press the " Next Button " (3-3, Fig. 1) once a while in sequence to select the eight main function, the Display will show :

dAtE	bEEP
LoOP	t-CF
dEC	SP-t
PoFF	Sd-F

dAtE..... Set clock time (Year/Month/Date, Hour/Minute/Second)
LOOP... Set loop time of recorder
dEC..... Set SD card Decimal character
PoFF..... Auto power OFF management
bEEP..... Set beeper sound ON/OFF
t-CF..... Select the Temp. unit to °C or °F
SP-t..... Set sampling time
Sd-F..... SD memory card Format

Remark :

During execute the " Advanced Setting " function, if press " ESC Button " (3-2, Fig. 1) once 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's text " dAtE " is flashing

- 1) Press the " Enter Button " (3-4, Fig. 1) once, Use the " ▲ Button " (3-5, Fig. 1) or " ▼ Button " (3-6, Fig. 1) to adjust the value (Setting start from Year value). After the desired year value is set, press the " Enter Button " (3-4, 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), will jump to " Set loop time of recorder " setting screen (Chapter 7-2).

Remark :

After the time value is setting, the internal clock will run precisely even Power is off (The battery is under normal condition, no low battery condition).

7-2 Set loop time of recorder

The record time can set for the duration every day.

Forexample the user intend set the record time from the 2:00 to 8:15 every day or record time 8:15 to 14:15....

When the Display's text " Loop " is flashing

- 1) Press the " Enter Button " (3-4, Fig. 1) once, Use the " ▲ Button " (3-5, Fig. 1) or " ▼ Button " (3-6, Fig. 1) to adjust the record loop time value (setting hour of " Start time " first). After the desired value is set, press the " Enter Button " (3-4, Fig. 1) once will going to next value adjustment (minute/Start time , hour/End time, then minute/End time).
- 2) After set all time value (Start time, End Time) press the " Enter Button " (3-4, Fig. 1) once will jump to following screen

StAr Loop
no

- 3) Use the " ▲ Button " (3-5, Fig. 1) or " ▼ Button " (3-6, Fig. 1) to select the upper value to " yES " or " no ".

yES - Record the data during the Loop time duration.
no - Disable to record the data during the Loop time duration.

4) After select the upper text to " yES " or " no ", press the " Enter Button " (3-4, Fig. 1) will save the setting function with default.

5) The procedures to execute the Loop time record function :

- a. For the above point 4) should select " yES "
- b. Press the " REC Button " (3-4, Fig. 1) the " REC " symbol will show on the Display.
- c. Now the meter will ready for recoding the data within the Loop time period, start to record from the " Start time " and end to record on the " End time " .
- d. **Pause the Loop record function :**
During the Loop time. meter already execute the record function, if press the " Logger Button " (3-7, Fig. 1) once will pause the Datalogger function (stop to save the measuring data into the memory circuit temporally). In the same time the text of " REC " will stop flashing.

Remark :

If press the " Logger Button " (3-7, Fig. 1) once again will execute the Datalogger again, the text of " REC " will flashing.

Finish the Loop Datalogger :

During pause the Datalogger, press the " REC Button " (3-4, Fig. 1) continuously at least two seconds, the " REC " indicator will be disappeared and finish the Datalogger.

e. Screen text description for the Loop Datalogger :

StAr	=	Start
-t-	=	Time
End	=	End

7-3 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 Display's text " dEC " is flashing

- 1) Press the " Enter Button " (3-4, Fig. 1) once, use the " ▲ Button " (3-5, Fig. 1) or " ▼ Button " (3-6, Fig. 1) to select the upper value 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 " (3-4, Fig. 1) will save the setting function with default.

7-4 Auto power OFF management

When the Display's text " PoFF " is flashing
--

- 1) Press the " Enter Button " (3-4, Fig. 1) once, use the " ▲ Button " (3-5, Fig. 1) or " ▼ Button " (3-6, 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.

- 2) After select the upper text to " yES " or " no ", press the " Enter Button " (3-4, Fig. 1) will save the setting function with default.

7-5 Set beeper sound ON/OFF

When the Display's text " bEEP " is flashing

- 1) Press the " Enter Button " (3-4, Fig. 1) once, use the " ▲ Button " (3-5, Fig. 1) or " ▼ Button " (3-6, 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 " (3-4, Fig. 1) will save the setting function with default.

7-6 Select the Temp. unit to °C or °F

When the Display text " t-CF " is flashing

- 1) Press the " Enter Button " (3-4, Fig. 1) once, use the " ▲ Button " (3-5, Fig. 1) or " ▼ Button " (3-6, Fig. 1) to select the upper Display text to " C " or " F ".

C - Temperature unit is °C
F - Temperature unit is °F

- 2) After Display unit is selected to " C " or " F ", press the " Enter Button " (3-4, Fig. 1) will save the setting function with default.

7-7 Set sampling time (Seconds)

When the Display's text " SP-t " is flashing

- 1) Press the " Enter Button " (3-4, Fig. 1) once, use the " ▲ Button " (3-5, Fig. 1) or " ▼ Button " (3-6, Fig. 1) to adjust the value (0, 1, 2, 5, 10, 30, 60, 120, 300, 600, 1800, 3600 seconds).

Remark :

If select the sampling time to " 0 second ", it is ready for manual Datalogger.

- 2) After the Sampling value is selected, press the " Enter Button " (3-4, Fig. 1) will save the setting function with default.

7-8 SD memory card Format

When the Display's text " Sd-F " is flashing

- 1) Press the " Enter Button " (3-4, Fig. 1) once, use the " ▲ Button " (3-5, Fig. 1) or " ▼ Button " (3-6, 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

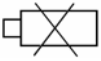
- 2) If select the upper to " yES ", press the " Enter Button " (3-4, Fig. 1) once again, the Display will show text " yES Ent " to confirm again, if make sure to do the SD memory card format, then press " Enter Button " once will format the SD memory clear all the existing data that already saving into 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 " (3-13, Fig. 1).

The meter will permanent power ON when use the DC ADAPTER power supply (The power Button function is disable).

9. BATTERY REPLACEMENT

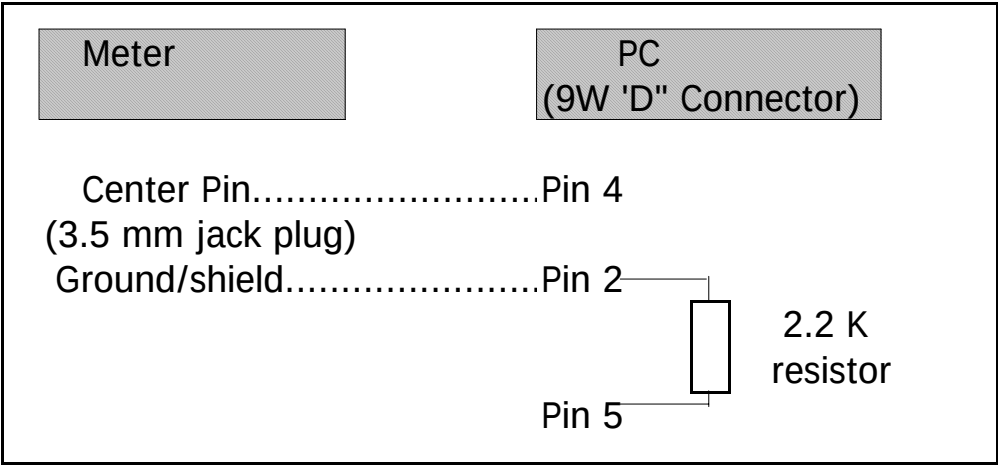
- 1) When the left corner of LCD display show " , it is necessary to replace the battery. However, in-spec. measurement may still be made for several hours after low battery indicator appears before the instrument become inaccurate.
- 2) Loose the " Battery Cover Screws ", take away the " Battery Cover " (3-14, Fig. 1) from the instrument and remove the battery.
- 3) Replace with DC 1.5 V battery (UM3, AA, Alkaline/heavy duty) x 8 PCs, and reinstate the cover.
- 4) Make sure the battery cover is secured after changing the battery.

10. RS232 PC SERIAL INTERFACE

The instrument has RS232 PC serial interface via a 3.5 mm terminal (3-11, 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.



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
D14	4
D13	When send the CH1 Temp. data = 1 When send the CH2 Temp. data = 2 When send the CHx Temp. data = x When send the CH10 Temp. data = A When send the CH11 Temp. data = B When send the CH12 Temp. data = C
D12, D11	Annunciator for Display °C = 01 °F = 02
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

RS232 FORMAT : 9600, N, 8, 1

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

11. Optional Type K Temp. probe

(Type K) TP-01	* Measuring Range : -40 to 250 °C (-40 to 482 °F) * Max. short-term operating Temp. : 300 °C * It's an ultra fast response naked-bead thermocouple suitable for many general purpose application.
Thermocouple Probe (Type K), TP-02A	* Measure Range: -50 °C to 900 °C , -58 °F to 1650 °F. * Dimension:12cm tube, 3.2mm Dia.
Thermocouple Probe (Type K), TP-03	* Measure Range: -50 °C to 1100 °C , -58 °F to 2012 °F. * Dimension: 13.6cm tube, 8mm Dia.
Surface Probe (Type K), TP-04	* Measure Range: -50 °C to 400 °C , -58 °F to 752 °F. * Size : Temp. sensing head - 15 mm Dia. Probe length - 120 mm.

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 358970 M 359043
CHINA	ZL 2008 2 0189918.5 ZL 2008 2 0189917.0
USA	Patent pending