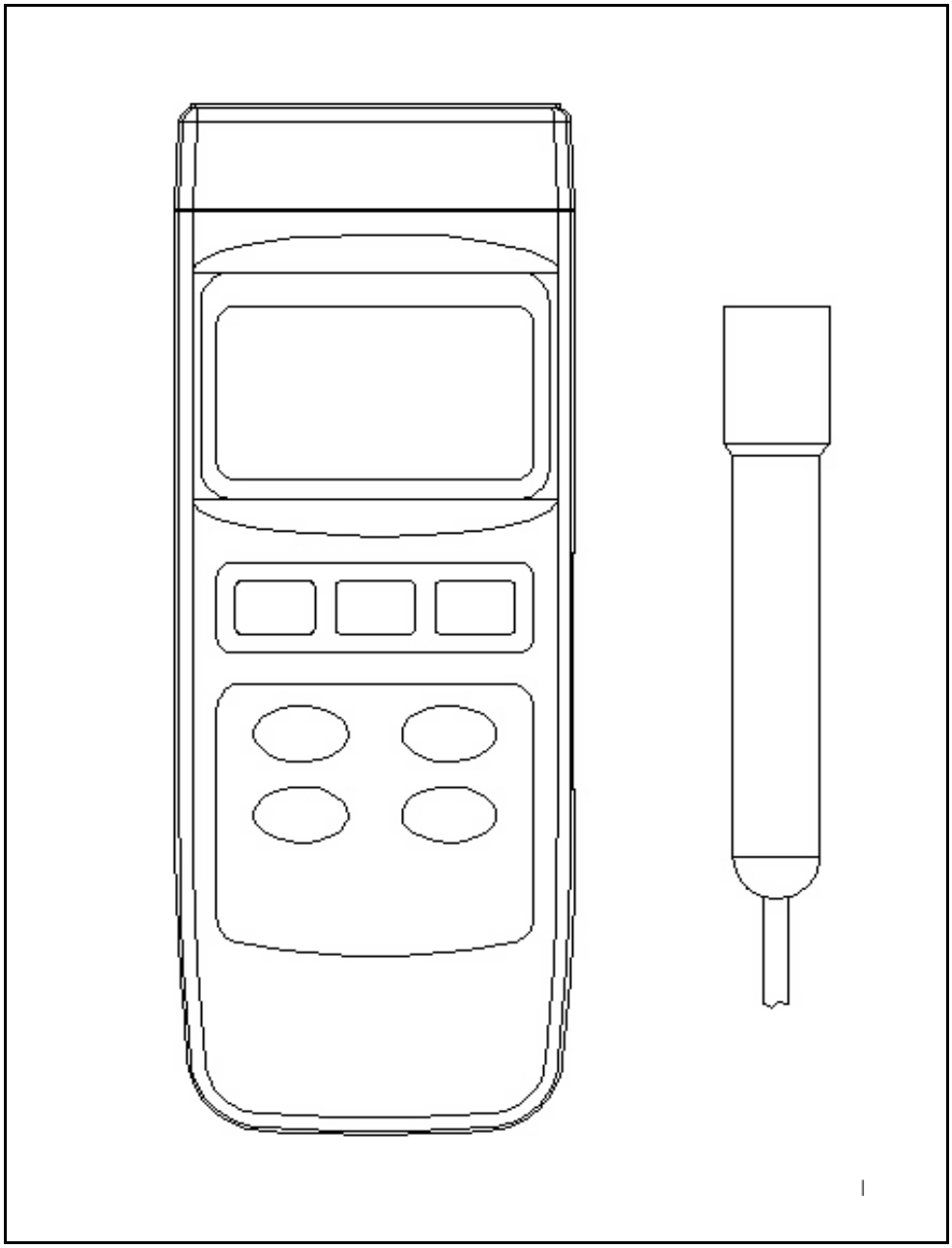
200 uS/2 mS/20 mS/200 mS, TDS (PPM)
Real time data logger, 16000 Data logger no., RS232

CONDUCTIVITY METER

Model : YK-2005CD



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1. FEATURES

* Innovative feature with built-in automatic temperature compensation factor adjustable between 0 to 5.0% per ℃.
* Wide range, 200 uS/2 mS/20 mS/200 mS.
* Selecting " 0% per ℃ " of Temp. Coefficient Adjust, allows you to take uncompensated conductivity readings (absolute conductivity measurement).
* Temperature compensation range : 0 to 50 ℃.
* Carbon rod electrode for long life.
* Conductivity measurement (uS, mS) or TDS (Total Dissolved Solids, PPM) can be selected.
* Auto range or manual range can be selected.
* Real time data logger, build in clock (hour-min.-sec., year-month-date).
* Auto or manual data record, 16,000 Data logger no.
* Wide sampling time adjustment range from two seconds to 8 hours 59 minutes 59 seconds.
* RS232 computer interface.
* Can default auto power off or manual power off.
* Super large LCD display with contrast adjustment for best viewing angle.
* Data hold, record max. and min. reading.
* Power by UM3 (1.5 V) x 4 batteries or DC 9V adapter.
* RS232 PC serial interface.
* Separate probe, easy for operation of different measurement environment.
* Wide applications: water conditioning, aquariums, beverage, fish hatcheries, food processing, photography, laboratory, paper industry, plating industry, quality control, school & college, water conditioning.

2. SPECIFICATIONS

2-1 General Specifications

Circuit	Custom one-chip of microprocessor LSI circuit.	
Display	LCD size : 58 mm x 34 mm.	
Measurement	* Conductivity (uS, mS) * TDS (Total Dissolved Solids, PPM) * Temperature (℃,℉)	
Temperature Compensation	Automatic from 0 to 60 ℃ (32 - 140 ℉), with temperature compensation factor variable between 0 to 5.0% per C.	
Conductivity Probe Structure	Carbon rod electrode for long life.	
Sampling Time of Data Logger	Manual	Push the data logger button once will save data one time. *@Set the sampling time to 0 second*
	Auto	2 sec to 8 hour 59 min. 59 sec.
Data Hold	Freeze the display reading.	
Memory Recall	Maximum & Minimum value.	
Power off	Auto shut off saves battery life or manual off by push button. *@Can default auto power or manual power off.* *@When default auto power function, power will off automatically after 10 min., if no button be pressed.*	

Sampling Time of display	Approx. 1 second.
Data Output	RS 232 PC serial interface.
Operating Temperature	0 to 50 ℃. - Main instrument. 0 to 60 ℃ - Conductivity probe only.
Operating Humidity	Less than 80% R.H.
Power Supply ** main instrument*	DC 1,5 V battery (UM3) x 4 PCs, (Heavy duty type).
	DC 9V adapter input. *@ AC/DC power adapter is optional.*
Power Supply ** clock module*	DC 3V silver battery.
	Type : CR2032.
Power Current	Approx. DC 15.2 mA
Weight	425 g/ 0.94 LB. *@ Battery is included.*
Dimension	*Main instrument :* 203 x 76 x 38 mm Conductivity PROBE : Round, 22 mm Dia. x 120 mm length.
Accessories Included	Instruction manual.....1 PC Conductivity probe.....1 PC DC 3V silver battery, CR2032.....1 PC Carrying case.....1 PC
Optional Accessories	* 1.413 mS Conductivity Standard Solution * AC to DC 9V adapter. * RS232 cable, UPCB-02. * Data Acquisition software, SW-U801-WIN. * Data Logger software, SW-DL2005.

2-2 Electrical Specifications (23± 5 ℃)

A. Conductivity

Range	Measurement	Resolution	Accuracy
200 uS	0 to 200.0 uS	0.1 uS	± (2% F.S.+1d) * F.S. - Full scale
2 mS	0.2 to 2.000 mS	0.001 mS	
20 mS	2 to 20.00 mS	0.01 mS	
200 mS	20 to 200.0 mS	0.1 mS	

** Temperature Compensation :*
Automatic from 0 to 60 ℃ (32 - 140 ℉), with temperature compensation factor variable between 0 to 5.0% per C.
** The accuracy is specified under measurement value ≦ 100 mS.*
** mS - milli Simens * @ 23± 5℃*

B. TDS (Total Dissolved Solids)

Range	Measurement	Resolution	Accuracy
200 PPM	0 to 132 PPM	0.1 PPM	± (2% F.S.+1d) * F.S. - Full scale
2,000 PPM	132 to 1,320 PPM	1 PPM	
20,000 PPM	1,320 to 13,200 PPM	10 PPM	
200,000 PPM	13,200 to 132,000 PPM	100 PPM	

** Temperature Compensation :*
Automatic from 0 to 60 ℃ (32 - 140 ℉), with temperature compensation factor variable between 0 to 5.0% per ℃.
** The accuracy is specified under measurement value ≦ 66,000 PPM.*
** PPM - parts per million * @ 23± 5℃*

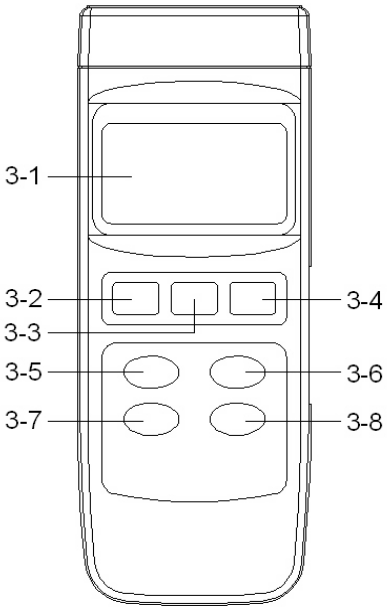
C. Temperature

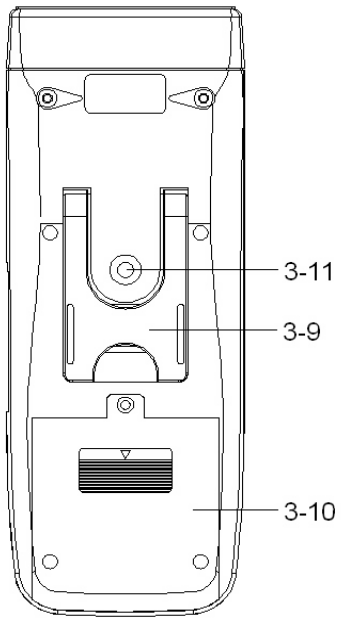
Function	Measuring Range	Resolution	Accuracy
℃	0 ℃ to 60 ℃	0.1 ℃	0.8 ℃
℉	32 ℉ to 140 ℉	0.1 ℉	1.5 ℉

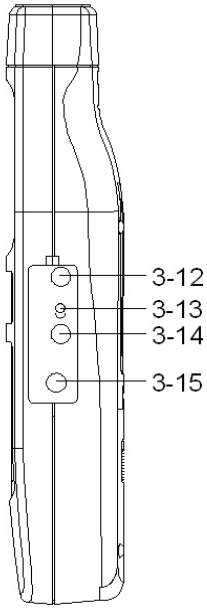
** @ 23± 5℃*

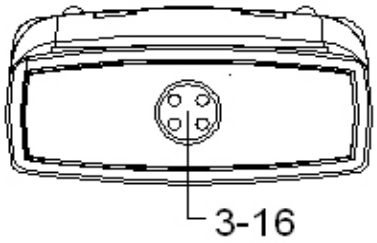
@ Above specification tests under the environment RF Field Strength less than 3 V/M & frequency less than 30 MHz only.

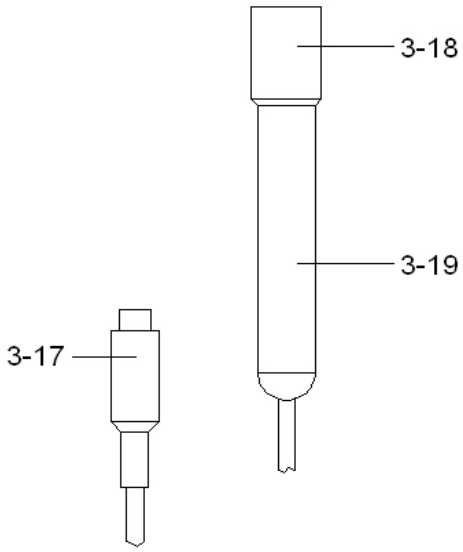
3. FRONT PANEL DESCRIPTION











3-1 Display
3-2 Power Button
3-3 HOLD Button (ESC Button)
3-4 REC Button (Enter Button)
3-5 ▲ Up Button
3-6 Range Button (▼ Down Button)
3-7 Send Button (Clock Button)
3-8 SET Button (Logger Button)
3-9 Stand
3-10 Battery Compartment/Cover
3-11 Tripod Fix Nut
3-12 LCD Brightness Adjust VR
3-13 System Reset Switch
3-14 RS-232 Output Terminal
3-15 DC 9V Power Adapter Input Socket
3-16 Probe Input Socket
3-17 Probe Plug
3-18 Sensing head
3-19 Probe Handle

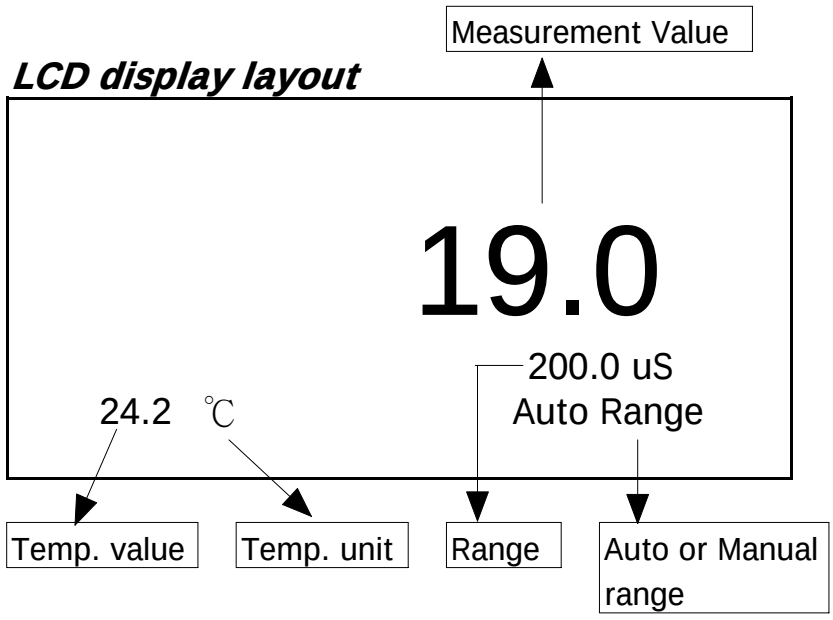
**

4. GENERAL MEASURING PROCEDURE

The meter default function are following :

* The display unit is set to conductivity (uS, mS).
* The temperature unit is set to ℃.
* Temp. compensation factor is set to 2.0% per C.
* Auto range.
* Auto power off.
* The sampling time of data logger function is 2 seconds.

LCD display layout



4-1 Conductivity (uS, mS) measurement

1) Install the " Probe Plug " (3-17, Fig. 1) into the " Probe Input Socket " (3-16, Fig. 1).
2) * Press and release the " Power Button " (3-2, Fig. 1) to power on the meter.
   * Hold the " Probe Handle " (3-19, Fig. 1) by hand and let the " Sensing head " (3-18, Fig. 1) immersed wholly into the measured solution. Shake the probe to let the probe's internal air bubble drift out from the sensing head.

Display will show the conductivity mS (uS) values. at the same time the left bottom display will show the Temp. value of the measured solution.

Manual range operation

The meter is default to be used for the auto range mode.
Under the auto range measurement, the bottom right display will show the " Auto Range " indicator.
If intend to let the meter be used under the manual range mode, the procedures are following :

* Press the " Range Button " (3-6, Fig. 1) continuously at least two seconds until the bottom right display show the " Manual Range " Indicator, then release the " Range Button ", now the meter is ready for the manual range operation.
* Push the " Range Button " once a while, it can change the range, the range value (200 uS, 2 mS, 20 mS, 200 mS) will show under the measurement value.

* If the display shows " ----- ", it indicates an overload condition, select the next higher range.
* If the display shows " -----", it indicates an out-of-range, select the next lower range.
* If intend to change the operation mode from Manual range back to Auto range, then Press the " Range Button " (3-6, Fig. 1) continuously at least two seconds until the bottom right display show the " Auto Range " Indicator, release the " Range Button ". Now the meter is ready for the Auto range mode again.

Change the Temp. unit to ℉

If intend to change the Temp. unit from ℃ to ℉, please refer page 16, chapter 5-7 (Temp. Unit Default Setting)

Change the Temp. Coefficient Factor

The default Temp. compensation factor value is to 2.0% per ℃. If intend to change it, please refer page 16, chapter 5-8 (Temp. Compensation Default Setting).

4-2 TDS (PPM) measurement

The measuring procedures are same as above *4-1 Conductivity (uS, mS) measurement,* except to change the display from uS, mS to PPM. The detail procedures please refer page 16, chapter 5-8 CD (uS, mS), TDS (PPM) Default Setting.

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)

* 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.
* 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, then 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, then 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 for 2 seconds at least. The display will revert to the current reading.

4-5 Data Logger

The data logger function can save 16,000 measuring data with the clock time (Real time data logger, build in clock (hour-min.-sec., year-month-date).

The data logger procedures are as following :

a) If push the " Logger Button " (3-8, Fig. 1) once will show the sampling time value on the bottom left display then disappeared.

b) 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.

c) **Auto Data Logger (Sampling time set from 2 seconds to 8 hours 59 minutes 59 seconds)**
Press the " Logger Button " (3-8, Fig. 1) once to start the Auto Data Logger function, at the same the bottom right display will show the indicator " Recording.... ", now the Data Logger function is executed. The upper display will show " DATA " indicator along with " REC " marker.

d) **Manual Data Logger (Sampling time set to 0 second)**
Press the " Logger Button " (3-8, Fig. 1) once will save the data one time into the memory, at the same time the bottom right display will show the indicator " Recording.... " a while. Now the Data logger function is executed. The upper display will show " DATA " indicator along with " REC " marker.

e) **Memory full**
Under execute the data logger, if the bottom right display show the " Full ", it indicate the memory data already over 16,000 no. and the memory is full.

f) During the Data Logger function is executed, press the " Logger Button " (3-8, Fig. 1) once will stop to execute the data logger function, the " DATA " indicator will be disappeared.
If press the " Logger Button " (3-8, Fig. 1) once again will continuous the Data Logger function.
Remark :
1) If intend to change the data logger sampling time, please refer chapter 5-4.
2) If intend to know the space of balance data numbers into the memory IC, please refer chapter 5-1.
3) If intend to clear the saving data from the memory please refer chapter 5-2.

5. ADVANCED ADJUSTMENT PROCEDURES

When execute the following Advanced Adjustment Procedures should cancel the " Hold function " and the " Record function " first. The display will not show the " HOLD " and the " REC " marker.

a. Press the " SET Button " (3-8, Fig. 1) at least two seconds until the lower display show

XXXXX Memory Space

* If push the " ESC Button " (3-3, Fig. 1) will escape the selecting function and return to the normal measuring display.

b. One by one to press the " Set Button " (3-8, Fig. 1) once a while to select the ten main function, at the same time lower display will show on the lower display will show on the lower display as :

Memory Space
Clear Memory
Date/Time Set
Sample Time
Auto Power Off
Temp. Unit
Temp. Comp.
CD, TDS Select
ESC→Finish

c. When make Advanced Adjustment Procedure will use the following key buttons :

ESC Button (3-3, Fig. 1), Enter Button (3-4, Fig. 1)
▲ Up Button (3-5, Fig. 1), ▼ Down Button (3-6, Fig. 1)
SET Button (3-8, Fig. 1), SEND Button (3-7, Fig. 1)

5-1 Check Memory Space

To check the balance data numbers that exist into the memory (allow memorize data no.).

@ XXXXX is the balance data numbers, for example XXXXX=15417.

5-2 Clear Memory

* To delete the existing save data numbers from the memory.
* Push ENTER Button once, then push ENTER Button to confirm.
* Press the ESC Button once to quite and return to the main measurement manual.

5-3 Date/Time Setting

* Use ▲ Up Button, ▼ Down Button and Enter (→) Button to select the expect Date (year-month-date) and the time (HOUR-MIN.-SEC.).
* After finish the Date/Time adjustment, Push the " Enter Button " , then press the " ESC Button " will quite and save the clock data into the memory.

5-4 Sample Time Setting

* Use ▲ Up Button, ▼ Down Button and Enter (→) Button to select the expect Sample Time (HOUR-MIN.-SEC.).
* After finish the Sample Time adjustment, Push the " Enter Button " , then press the " ESC Button " will quite and save the clock data into the memory.

5-5 Auto Power Off Default Setting

* Use ▲ Up Button, ▼ Down Button to select " 1 " or " 0 ".

1 = Auto power On.
0 = Auto power Off.

* After finish the Auto Power Off adjustment, push the " Enter Button " , then press the " ESC Button " will quite and return to the normal measurement display.

5-6 Temp. Unit Default Setting

* Use ▲ Up Button, ▼ Down Button to select " 1 " or " 0 ".

1 = ℉
0 = ℃

* After finish the Temperature unit adjustment, push the " Enter Button " , then press the " ESC Button " will quite and return to the normal measurement display.

5-7 Temp. Compensation Factor Default Setting.

* Use ▲ Up Button, ▼ Down Button and SEND (→) Button to select the Temp. Compensation Factor value.
* After setting the desired value, push the " Enter Button " , then press the " ESC Button " will quite and return to the normal measurement

5-8 CD (uS, mS), TDS (PPM) Default Setting

* Use ▲ Up Button, ▼ Down Button to select the " 1 " or " 0 ".

0 = uS, mS
1 = PPM

* After finish the unit (CD, TDS) adjustment, push the " Enter Button " , then press the " ESC Button " will quite and return to the normal measurement display.

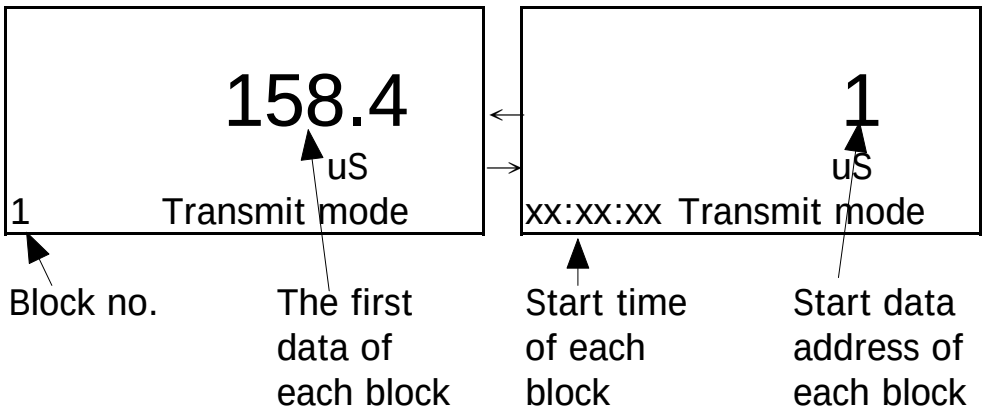
5-9 Escape from the SETTING function

Press the " ESC Button " once a while will quite and return to the normal measurement display.

6. HOW TO SEND THE DATA OUT FROM THE METER

1) If intend to send the data out from the meter, it should cancel the " Hold function " and the " Record function " first. The display will not show the " HOLD " and the " REC " marker.
2) Press the " SEND Button " (3-7, Fig. 1) at least 2 seconds until the bottom right display show " Transmit mode ", then release the button.

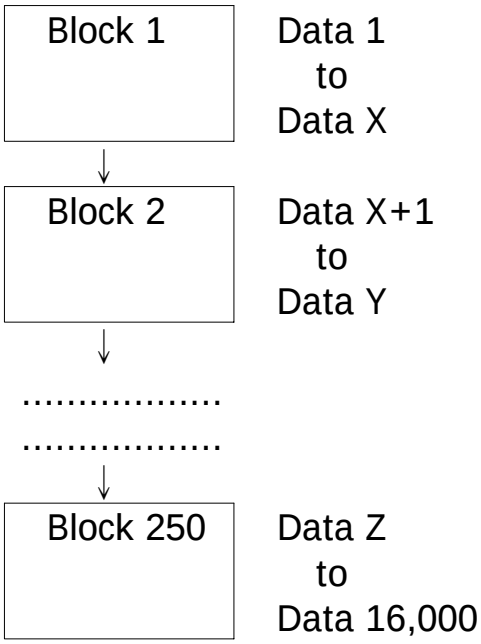
LCD display will show the fowling screen alternately.



Use ▲ Up Button, ▼ Down Button to select the different data memory block no. (1 to 250).

The meter can save 16,000 data max. , those data will saved into 250 memory block max.

* One " Memory Block " means :
The data that save into one routine Data Logger procedures (Push " REC " button , following push the " Logger " button to save the data, the display will show the " REC " and " DATA " . After save the data push the " Logger " button, following push the " REC " button, will exist the Data Logger function. The " REC " and " DATA " indicator of LCD will be disappeared). Please refer Chapter 4-6, page 12.



3) Until the desired Memory Block no. be selected. Push the " Send Button " (3-5, Fig. 1) once, the data in the Memory Block will send out. During the data send out, the bottom right display will show the " Sending Data ! " indicator. When data already send out completely, the bottom right display will show the Transmit mode " indicator again.
5) Push the " ESC Button " (3-3, Fig. 1) will exist the data sending function and return to the normal display.

Remarks :

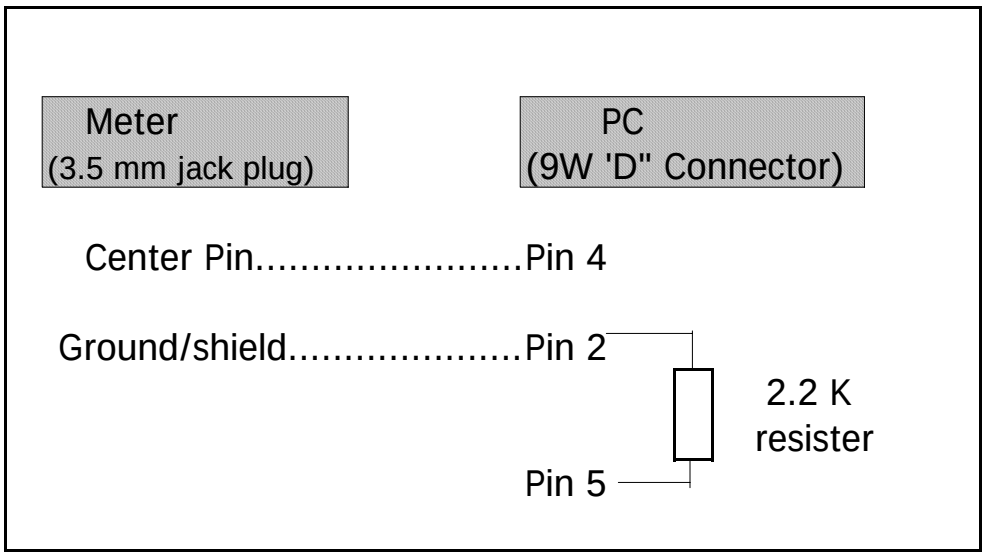
@ If intend up load the data to the computer, then should connect the RS232 cable (optional, model : UPCB-02) and apply the Data Logger software (optional, Model : SW-DL2005).

@ When sending the data, each time just can send one Memory Block data out. for example block 1 data, block 2 data... or block 250 data.

7. RS232 PC SERIAL INTERFACE

The instrument has RS232 PC serial interface via a 3.5 mm terminal (3-14, 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 :

D0	End Word = 0D		
D1 & D8	Display reading, D1 = LSD, D8 = MSD For example : If the display reading is 1234, then D8 to D1 is : 00001234		
D9	Decimal Point(DP), position from right to the left 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP		
D10	Polarity 0 = Positive 1 = Negative		
D11 & D12	Annunciator for Display		
	uS = 13	mS = 14	PPM = 19
D13	When send the upper display data = 1 When send the lower display data = 2		
D14	4		
D15	Start Word = 02		

RS232 setting

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

8. OFFSET (ZERO) PROCEDURE

If no signal out from the probe (probe's sensing head is not immersed into the measuring solution) but the display exist certain value (not zero), it can make the offset (zero) adjustment as :

1) To let The " Sensing head " (3-18, Fig, 1) is not immersed into the measurement solution and dry completely.
2) Press the " ▲ Up Button " (3-5, Fig. 1) " continuously at least two seconds until the meter generate a " beeper " sound, at the same time the display will change to zero value.

9. CALIBRATION PROCEDURE

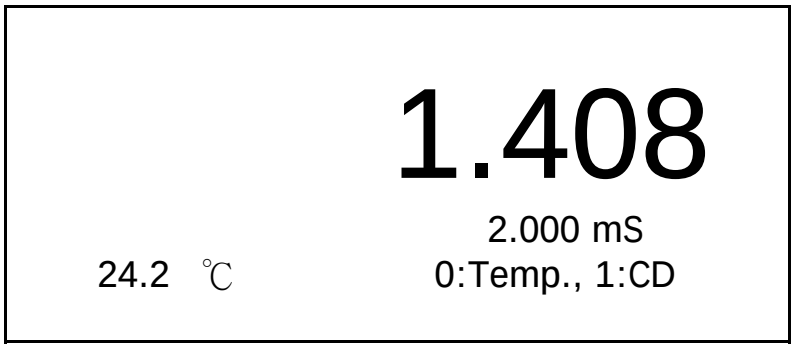
The meter has been calibrated carefully during manufacture. However, it may be necessary to re-calibrate periodically. Particularly if the instrument is used foe a long period or if the conductivity electrode is changed.
To re-calibrate the instrument, follow the procedures shown below :

1) Prepare a " 1.413 mS Calibration Solution " (optional, or other standard conductivity solution can also be done for the calibration procedure).
2) Power ON the meter
   Select the auto range mode.

3) Immerse the " Sensing Head "(3-18, Fig. 1)
into the calibration solution up to the immersion level.
4) To press the follow two buttons at the same time.

HOLD Button (3-3, Fig. 1)
REC Button (3-4, Fig. 1)

The bottom display will show " 0:Temp., 1:CD ", then release the two buttons, The LCD will show for example as :



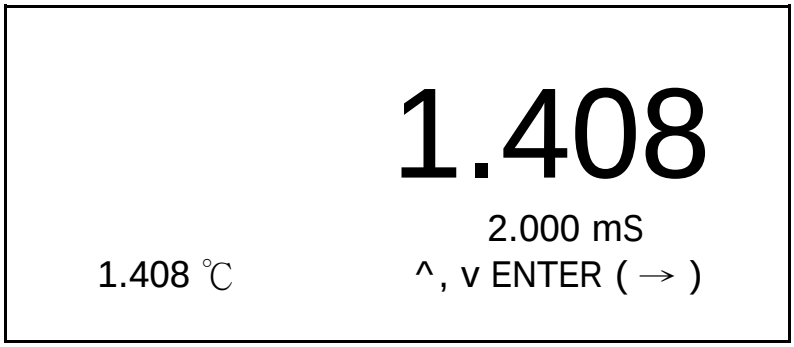
The up big display will show the conductivity value that measured from the standard solution.

5) Use ▲ Up Button, ▼ Down Button to select the " 1 " or " 0 ".

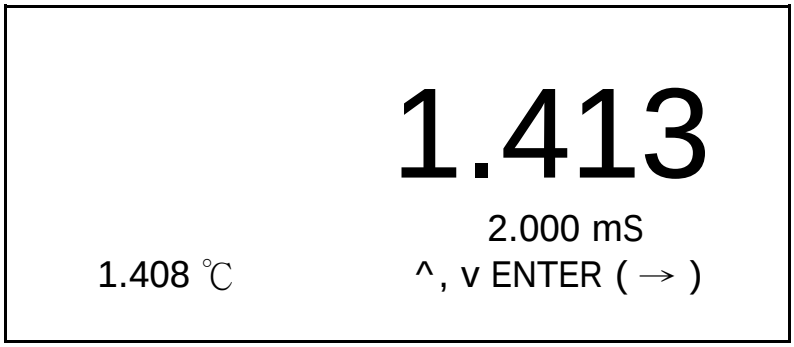
1 = Conductivity calibration
0 = Temp. calibration

For the conductivity calibration, select " 1 ", then press the " Enter Button " (3-4, Fig. 1).

The display will show for example as :



Use ▲ Up Button, ▼ Down Button to select the desired calibration value, for example : 1.413



Until desired value is selected, press " Enter Button " twice to entry the data, then the display will return to the normal display and finish the calibration procedures.

Remark :
For each range of 200 uS, 2 mS, 20 mS, 200 mS can entry one calibration value, that means each range can do its independent calibration procedures.

10. BATTERY REPLACEMENT

1) The time to change the UM3 (1.5 V) x 4 PCs

When the left corner of LCD display show "  ", it is necessary to replace the batteries (UM3/1.5 V x 4 PCs).

The time to change the CR2032 (3V silver battery)

When the clock is not accurate or power off the meter then on, the clock time is disappeared or garbled, it is necessary to replace the battery (CR2032)

2) Slide the " Battery Cover " (3-10, Fig. 1) away from the instrument and remove the battery.
3) Replace with batteries (UM3/1.5 V x 4 PCs or CR2032) and reinstate the cover.
4) Make sure the battery cover is secured after changing the battery.

11. SYSTEM RESET

If the meter happen the troubles such as :

CPU system is garbled (for example, the key button can not be operated.....).

Then make the system RESET will fix the problem.
The system RESET procedures will be either following method :

1) **Slide the " Probe Lock Switch/System On/Off Switch " from the On to Off, then On again.**
2) **Or during the Power On, used a pin tool to push the " System Reset Switch " (3-13, Fig. 1) once a while.**

12. OPTIONAL ACCESSORIES

RS232 cable UPCB-02	* Isolated RS232 cable. * Used to connect the meter to the computer
Data Logger software SW-DL2005	* Software the used to download the data logger (data recorder) from the meter to computer.
Data Acquisition software SW-U801-WIN	* The SW-U801-WIN is a multi displays (1/2/4/6/8 displays) powerful application software, provides the functions of data logging system, text display, angular display, chart display, data recorder high/low limit, data query, text report, chart report.. .xxx.mdb data file can be retrieved for EXCEL, ACESS.., wide intelligent applications.

Calibration Cal. Solution	1.413 mS calibration solution. Model : CD-14