CONDUCTIVITY METER

Your purchase of this CONDUCTIVITY METER marks a step forward for you into the field of precision measurement.

Although this CONDUCTIVITY 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

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1. FEATURES

* Innovative feature with built-in automatic temperature compensation values adjustable between 0 to 5.0% per ℃.
* Selecting "0% per ℃" of Temp. Coefficient Adjust, allows you to take uncompensated conductivity readings.
* Wide automatic temperature compensation range from 0 ℃ to 50 ℃.
* Carbon rod electrode for long life.
* Microprocessor circuit assures high accuracy and provides special functions and features.
* Super large LCD display with contrast adjustment for best viewing angle.
* Dual LCD display, show both conductivity & temp. values.
* Heavy duty & compact housing case.
* Records Maximum, Minimum and Average readings with RECALL facilities.
* Data hold function.
* Auto shut off prolongs battery life.
* Operates from DC 9V battery, MN1604 (PP3) or equivalent.
* RS 232 PC serial interface.
* Uses durable, long-lasting components, enclosed in a strong, light weight ABS-plastic housing case.
* Use selectable temperature units, i.e. ℃ or ℉.
* Wide applications: water conditioning, aquariums, beverage, fish hatcheries, food processing, photography, laboratory, paper industry, plating industry, quality control, school & college, water conditioning.
* The portable conductivity meter provides fast, accurate readings, with digital readability and the convenience of a remote probe.

2. SPECIFICATIONS

2-1 General Specifications

Circuit	Custom one-chip microprocessor LSI circuit.
Display	Dual function display, 13 mm(0.5") Super large LCD display with contrast adjustment for best viewing angle.
Measurement	Conductivity : 3 ranges 199.9 uS, 1.999 mS, 19.99 mS.
	Temperature: 0 - 60 ℃ / 32 - 140 ℉.
Temperature Compensation	Automatic from 0 to 60 ℃(32 - 140 ℉), with temperature compensation factor variable between 0 to 5.0% per C.
Memory Recall	Records Maximum, Minimum and Average readings with RECALL facility.
Power off	Manual off by push button or Auto shut off offer 10 minuite(Not activated during memory record function).
Data Output	RS 232 PC serial interface.
Over load indication	Indicated by "- - - -".
Sampling Time	Approx. 0.8 second.
Operating Temperature	0 to 50 ℃ - main instrument. 0 to 60 ℃ - probe only.
Operating Humidity	Max. 80% RH.
Power Supply	DC 9V battery, MN1604(PP3) or equivalent. Heavy duty type.
Power Current	Approx. DC 7.8 mA.

Weight	350 g/0.77 LB (included batteries)
Size	Main instrument: 180 x 72 x 32 mm(7.1 x 2.8 x1.3 inch).
	Probe : Round, 22 mm Dia. x 120 mm length.
Accessories Included	Instruction manual..... 1 PC. Sensor probe..... 1 PC. carrying case..... 1 PC.

2-2 Electrical Specifications(23± 5℃)

A. Conductivity

Range	Measurement	Resolution	Accuracy
200 uS	0.1 to 199.9 uS	0.1 uS	± (2 % F.S. + 1 d) * F.S. - Full scale
2 mS	0.2 to 1.999 mS	0.001 mS	
20 mS	2 to 19.99 mS	0.01 mS	
* uS - micro Simens, mS - milli Simens			

B. Temperature

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

3. FRONT PANEL DESCRIPTION

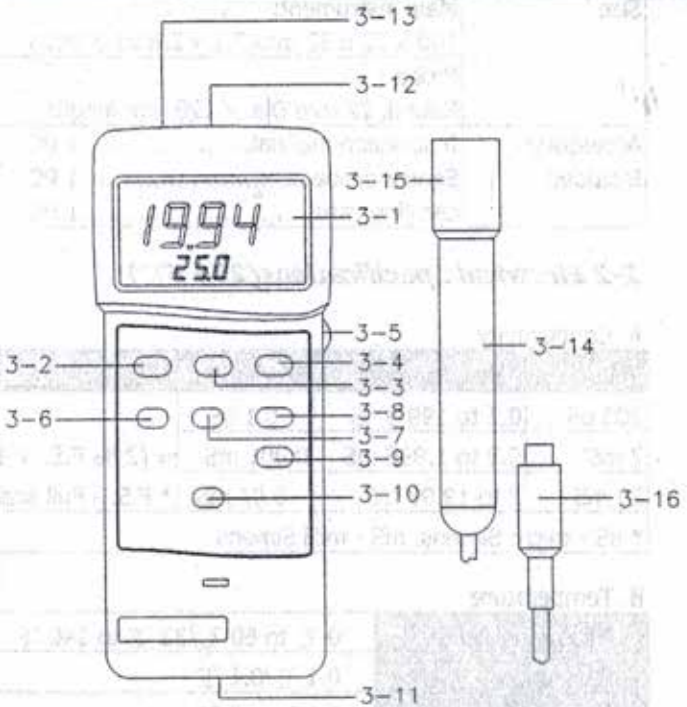


Fig. 1

3-1 Display
3-2 Power Off/On button
3-3 Data Hold Button
3-4 ℃/ ℉ button
3-5 LCD Contrast Adjust
3-6 Memory "Record" Button
3-7 Memory "Call" Button
3-8 Factor Button (Temp. Coefficient Adjust)
3-9 Range Select Switch
3-10 Temp. Coefficient Button
3-11 Battery Compartment/ Cover
3-12 Input Socket
3-13 RS-232 Output terminal
3-14 Electrode Handle
3-15 Conductivity Electrode
3-16 Electrode Plug Electrode

4. MEASURING PROCEDURE

4-1 Conductivity measurement

(1) Push the "Power Off/On Button"(3-2, Fig. 1) to power the instrument.

(2) The instrument will default to 2% per ℃ Temperature Compensation factor. The meter has built-in Automatic Temperature Compensation adjustable between 0 to 5% per ℃.

In order to change the default value carry out the following procedures :

a. Push the "Temp. Compensation Button"(3-10, Fig.1) ,the display will show

2.0 %
P ℃

b. Push the "Factor Adjust Button"(3-8, Fig. 1) to select the desired compensation factor. The value will increment in steps of 0.1 % per ℃.

c. Once the desired value is reached, push the "Temp. Compensation Button"(3-10, Fig. 1) to set the new value.

(3) Select the applicable range, using the "Range Select Button"(3-9, Fig. 1).

* If the display shows "- - - -", it indicates an overload condition, select the next higher range.
* If the display shows "_ _ _ _", it indicates an out-of-range condition, select the next lower range.

(4) Immerse the "Conductivity Electrode "(3-15, Fig. 1) into the solution, up to the immersion level.

(5) During the measurement, the lower LCD Display will show the temperature of the solution.

** Push the "℃/℉ Button"(3-4, Fig. 1) to change the temperature display unit from "℃ to ℉" or "℉ to ℃".*

4-2 Data Hold

* During measurement, pushing the "Data Hold Button"(3-3, Fig. 1) will hold the display values & the LCD will show the "D.H" symbol.

* To cancel the Data Hold function, Press the Data Hold Button, once more.

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

* The DATA RECORD function displays the maximum, minimum and average readings. To start the DATA RECORD function, press the "Record Button"(3-6, Fig. 1) once. "REC" symbol will appear on the LCD display.

* With the "REC" symbol indicated on the display

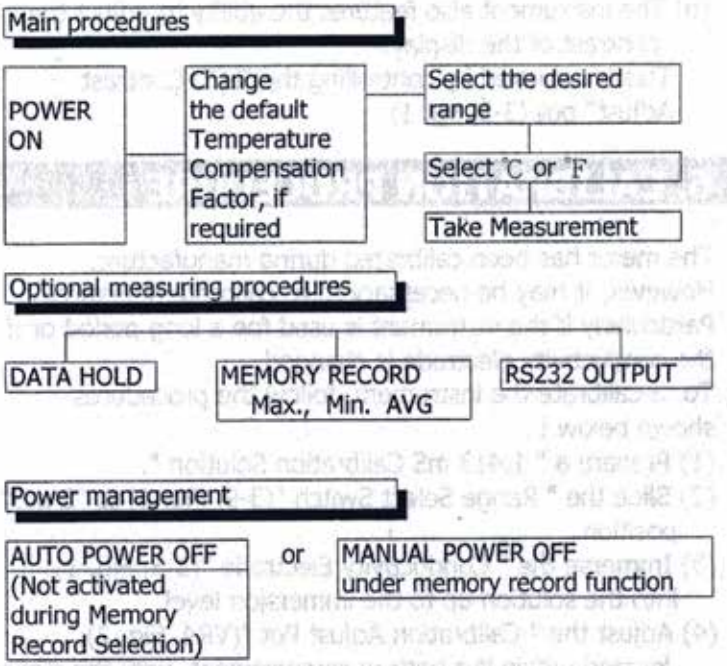
(a) Push the "CALL Button"(3-7, Fig. 1) once, then the "Max" symbol with the maximum values recorded will appear on the LCD display.

(b) Push the "CALL Button" once again, the "Min" symbol with the minimum values recorded will appear on the LCD display.

(c) Push the "CALL Button" once more, the "AVG" symbol with the average values will appear on the LCD display.

(d) To de-activate the Data Record function, Press the "Record Button" (3-6, Fig. 1) once again. All associated anunciators will disappear from the display.

4-4 For quick measurement, follow the procedures shown below :



5. ADDITIONAL FEATURES

(a) The instrument has built-in "Auto Power Shut-off" in order to prolong battery life. The meter will switch off automatically if none of the buttons are pressed within 10 min.
To de-activate this feature, Select the memory record function during measurement, by pressing the "RECORD" button(3-6, Fig.1).

(b) The instrument also features the ability to adjust the contrast of the display.
This is achieved by controlling the "LCD Contrast Adjust" pot (3-5, fig. 1).

6. CALIBRATION PROCEDURE

The meter has been calibrated 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 ".
(2) Slide the " Range Select Switch "(3-9, Fig. 1) to "2 mS" position.
(3) Immerse the " Conductivity Electrode "(3-5, Fig. 1) into the solution up to the immersion level.
(4) Adjust the " Calibration Adjust Pot "(VR4, Fig. 2), located within the battery compartment, until the display indicates the value of the calibration solution.

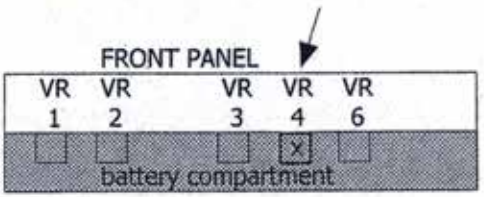


Fig. 2

7. RS232 PC INTERFACE

The instrument features an RS232 output via 3.5 mm Terminal (3-13, Fig. 1).
The connector output is a 16 digit data stream which can be utilized to the user's specific application.

An RS232 lead with the following connection will be required to link the instrument with the PC serial input.

Meter (3.5 mm jack plug)	PC (9W 'D" Connector)
Center Pin	Pin 2
Ground/shield	Pin 5

The 16 digit 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 indicate the following status :

D0	End Word
D1 to D4	Upper Display reading, D1=LSD, D4=MSD
D5 to D8	Lower Display reading, D5=LSD, D8=MSD
D9	Decimal Point(DP) for Upper display. 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP
D10	Decimal Point (DP) for lower display 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP

D11 & D12	Anunuciator for Upper Display		
	01 =℃	13 = uS	
	02 =℉	14 =mS	
D13	Anunuciator for Lower Display		
	0 = No Symbol	1 =C	2 = F
D14	Reading Polarity for the Display		
	0 = Both upper & lower display value are "+". 1 = Upper "-", Lower "+". 2 = Upper "+", Lower "-". 3 = Both upper & lower display value are "-".		
D15	Start Word		

8. BATTERY REPLACEMENT

(1) When the left corner of LCD display show "LBT", 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) Slide the Battery Cover(3-11, Fig. 1) away from the instrument and remove the battery.

(3) Install a 9V battery(heavy duty type) and replace the