Sensorex

Operation Manual

SKU: CM1000

Microcomputer Based
Conductivity /TDS/ Salinity
Temperature
Benchtop Meter

CM1000

CONTENTS

GENERAL INTRODUCTION

Thank you for selecting the meter. The CM1000 is a precision tool that measures Conductivity, TDS, Salinity and Temperature. A built-in microprocessor stores, calculates and compensates for all parameters related to Conductivity, TDS, Salinity and Temperature determinations.

This meter has a waterproof IP54 case. The mechanical keys are highly reliable with tactile and audio feedback. This meter is powered by six AAA-size alkaline batteries or with a UL approved AC adapter (OUTPUT: DC9V). The meter also displays a “BAT” message when the batteries are in need of replacement. Re-calibration is not required when power is restored.

The front of the meter has a large LCD that displays Conductivity or TDS or Salinity and Temperature simultaneously along with user prompts and mode indicators. The unit prompts the user through calibration and measurement procedures.

The model CM1000 micro-processor allows the user to easily recalibrate the parameters for the probe. A few keystrokes will adjust all the parameters for conductivity. Accepted cell constant choices include K =0.01, 0.1, 1.0, 10.0 And the user can input K value of the cell by keypad directly.

The system simultaneously displays temperature in ℃ along with either Conductivity or TDS or Salinity. The user can switch back and forth from all these displays by just pushing a single “MODE” key.

Other features include automatic conductivity ranging, automatic temperature compensation, and 50/60 Hz AC noise rejection. This meter is user-friendly for laboratory application.

INITIAL INSPECTION

Carefully unpack the unit and accessories. Inspect for any damage during shipment. If any damage is found, notify your **Sensorex** representative immediately. All packing materials should be saved until satisfactory operation is confirmed.

POWER INPUT

The model CM1000 can be powered by an 115V or 230VAC adaptor as well as 6 “AAA” alkaline batteries. Check the label on the AC adaptor supplied with the instrument to make sure that the AC line voltage is correct. If the wrong AC adaptor is supplied, notify your **Sensorex** representative immediately.

INSTALLING THE BATTERIES

To insert the batteries into the meter, follow the procedure outlined below.

1. Use a Phillips screw driver and unlock the battery cover by turning the screw driver in the counter clockwise direction. After unlocking the screw, take off the battery cover (Fig.1)

2. Replace the old batteries with new ones and be sure install them in the correct polarity position.

3. Put the battery cover back on the instrument. Use a Phillips screw driver and turn the screw in the clockwise direction to lock the battery cover.

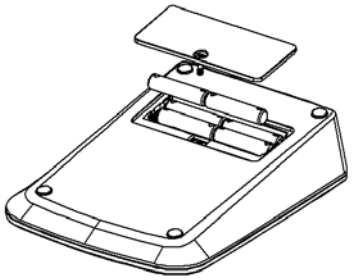


Figure 1: Battery compartment

DISPLAY & KEYS FUNCTIONS

A. Display

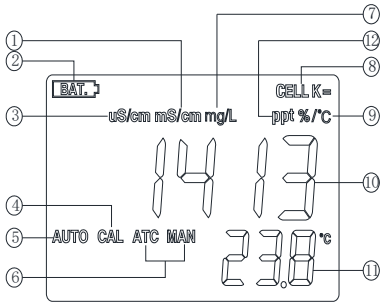
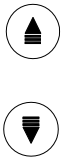


Figure2: Active LCD screen

1. **mS/cm-** Millisiemens , indicates Conductivity measurement.	7. **mg/L-** Milligrams/Liter indicates TDS measurement.
2. **BAT-** Low battery indicator.	8. **CELL K=** Indicates conductivity cell constant value.
3.**uS/cm-** Microsiemens, indicates Conductivity measurement.	9. **%/ ℃-** Indicates Temperature Coefficient
4. **CAL-** This will be displayed when the unit enters into the calibration mode.	10. **MAIN DISPLAY-** For Conductivity and TDS values.
5. **AUTO-** Auto ranging indicator	11. **SECONDARY DISPLAY-** For temperature in ℃ display.
6. **ATC/MAN-** ATC, indicates Compensated Conductivity. MAN, indicates Uncompensated Conductivity.	12. **ppt-** Indicates Salinity measurement.

B. Keys

	**On/Off-** Press and hold this key for 3 seconds to power on and shut off the meter.
	**Cal-** During normal operation, this key will change the mode from “Measure” mode to “Calibration” mode.
	**Mode-** Selects display mode. In normal operation, press this key to sequentially display Compensated Conductivity / Uncompensated Conductivity and TDS. **Clear-** When this key is pressed, it clears all calibration values stored in the internal memory. Under normal use the key will not be activated unless pressed and held for 5 seconds to prevent accidental erasing of stored memory.
	**Up/Down-** Increases or decreases the displayed value as desired.
	**Enter-** In Calibration mode, press this key to save the current parameter to memory.

OPERATIONAL PROCEDURES

A. Preparing Standard Solutions

Suitable conductivity standards are available commercially or the user can prepare them using research grade reagents.

Here are some standard solutions the user can prepare to calibrate the probe of the model CM1000.

1. Standard solution of 1413uS at 25℃: Accurately weight out 0.746 grams of research grade dried Potassium Chloride (KCL). Dissolve in 1000ml of distilled water.

2. Standard solution of 12.90mS at 25℃: Accurately weight out 7.4365 grams of research grade dried Potassium Chloride (KCL). Dissolve in 1000ml of distilled water.

3. Standard solution of 111.9mS at 25℃: Accurately weight out 74.264 grams of research grade dried Potassium Chloride (KCL). Dissolve in 1000ml of distilled water.

   [Note: You can store the remaining solution in a plastic container for one week but the air space between the cap and the solution must be kept to an absolute minimum. Storing the excess solution below 4℃ can increase the storage life. If you have any doubt of the accuracy of the stored solution, a fresh batch should be prepared.**]**

B. Calibration

Calibration setup contains six sections: TDS Constant, Temperature Coefficient, Temperature Reference, Probe Basic Cell Constant, Cell Constant Calibration and K Value Input. To access these sections:

1. Connect the conductivity probe to the unit and turn the unit on.

2. Allow temperature reading to stabilize, press "**Cal**" key to enter the calibration mode. **CAL** appears on the LCD.

   [Note: Press "**Enter**" key to accept any values changes in each section and automatically advance to the next section. If there are no changes, the unit accepts the current value and proceeds to the next section.**]**

TDS Constant

TDS is determined by multiplying conductivity (mS) by a TDS factor. The default factor value is 0.65. To change the TDS factor, use the **"up"** and **"down"** keys to adjust the value between 0.30 and 1.00. Press "**Enter**" key to save the new value and go to the next calibration parameter.

Temperature Coefficient

The unit uses the temperature coefficient to calculate temperature compensated conductivity. The default value is 1.91%. To change the Temperature Coefficient, use the **"up"** and **"down"** keys to adjust the value between 0 and 4.00%. Press "**Enter**" key to save the new value and go to the next calibration parameter.

Temperature Reference

The unit uses the temperature reference value to calculate temperature compensated conductivity. The default value is 25℃. To change the Temperature Reference, use the **"up"** and **"down"** keys to adjust the value between 15 and 25℃. Press "**Enter**" key to save the new value and go to the next calibration parameter.

Probe Basic Cell Constant

The main display shows the deviation of the conductivity probe (calibrated previously or default, the deviation range is 70%~130%, 100% without error). The secondary display shows the current selected cell constant. Using the **"up"** and **"down"** keys to adjust the probe basic cell constant to that you use from the 4 available cell constants (0.01, 0.1,1.0 and 10.0). Press "**Enter**" key to save the new value and go to the next calibration parameter.

Cell Constant Calibration

(a) Immerse the probe in a standard of known conductivity solution (See section **Preparing Standard Solutions**), preferably a standard in the middle range of the solutions to be measured. Immerse the probe (at least 2" to 3" or 5~7cm from the tip) without touching the sides of the calibration container. Shake the probe lightly to remove any air bubbles trapped in the conductivity cell. The unit will display the conductivity value of the standard solution. During cell constant calibration, the following parameters

are over-ridden: temperature reference (fixed to 25.0℃) and temperature coefficient (fixed to 1.91%).

[Note: If you want input **K value** directly, please press the "**Enter**" key to go to the **K Value Input.]**

(b) Wait for the values of temperature and conductivity to stabilize for a few seconds. Using the **"up"** and **"down"** keys to adjust the reading of the display until it matches the value of the known standard conductivity solution at 25℃.

(c) Press "**Enter**" key to calculate and save the new value of **Cell Constant** or press the "**Enter**" key to the next calibration parameter.

K Value Input

(a) The unit will display the conductivity value of the standard solution with the **CELL K=** staying on.
[Note: If the **Cell Constant** has been calibrated, please press the **"Enter"** key to exit calibration and return to normal operation.**]**

(b) Press and hold the **"up"** or **"down"** key, the main display will show the deviation of the conductivity probe. You can now input the K value (from 70%~130% of the probe basic cell constant). After releasing the up or down key, the unit will display the conductivity value with the **CELL K=** staying on.

(c) adjust the K value until the conductivity value displayed on the LCD matches the value of the known standard conductivity solution at 25℃.

(d) Press "**Enter**" key to save the new **K value** of the cell to exit calibration and return to normal operation mode.

C. Conductivity Measurements

1. Turn the unit on. Place the probe in the solution to be measured. Immerse the probe (at least 2" to 3" or 5~7cm from the tip). Shake the probe lightly to remove any trapped air bubbles in the conductivity cell.

2. Press **"Mode"** key to enter the desired measurement mode (Conductivity or TDS or Salinity). The message "over" or "undr" may appear briefly on the display indicate auto-ranging; this is normal. Allow temperature to stabilize before meausuring.

ERROR DISPLAYS AND TROUBLESHOOTING

[Note: If the meter still does not perform normally after the above measures are taken, call **Sensorex** representative.**]**

Main Display	Secondary Display	Possible cause(s)	Corrective Action(s)
"over" during measurements	0.0~100.0℃	● Sample Conductivity value > 200.0mS; Sample TDS > 200g/L. Sample Salinity > 70.0ppt. ● Conductivity cell contaminated or defective. ● Incorrect K constant value input.	●Sample cannot be tested ●Decontaminate / clean cell or replace cell. ●Input correct K value.
"over" during calibration	/	● Incorrect standard solution. ● Conductivity cell contaminated or defective. ● Incorrect K constant value input.	●Replace standard solution. ●Decontaminate / clean cell or replace cell. ●Input correct K value.
"over " during measurements	over	● Sample temperature >100℃.	●Reduce sample temperature.
		● Defective conductivity cell.	●Replace cell.
	undr	● Sample temperature <0.0℃	●Increase sample temperature.
		● Defective conductivity cell.	●Replace cell.

SPECIFICATIONS

Display	Range	Resolution	Accuracy
Conductivity	0.000~1.999uS/cm/0.000~1.999mg/L	0.001uS/cm/0.001mg/L	±0.5% FS
/TDS	2.00 ~ 19.99uS/cm/2.00~19.99mg/L	0.01uS/cm/0.01mg/L	±0.5% FS
K=0.01	20.0~199.9uS/cm/20.0~199.9mg/L	0.1uS/cm/0.1mg/L	±0.5% FS
Conductivity	0.00~ 19.99uS/cm/0.00~ 19.99mg/L	0.01uS/cm/0.01mg/L	±0.5% FS
/TDS	20.0~199.9uS/cm/20.0~199.9mg/L	0.1uS/cm/0.1mg/L	±0.5% FS
K=0.1	200 ~ 1999uS/cm/200 ~ 1999mg/L	1uS/cm/1mg/L	±0.5% FS
Conductivity	0.0~ 199.9uS/cm/0.0~ 199.9mg/L	0.1uS/cm/0.1mg/L	±0.5% FS
/TDS	200~ 1999uS/cm/200~ 1999mg/L	1uS/cm/1mg/L	±0.5% FS
K=1.0	2.00~19.99mS/cm/2.00~19.99g/L	0.01mS/cm/0.01g/L	±0.5% FS
Conductivity	0 ~ 1999uS/cm/0 ~ 1999mg/L	1uS/cm/mg/L	±0.5% FS
/TDS	2.00~19.99mS/cm/2.00~19.99g/L	0.01mS/cm/0.01g/L	±0.5% FS
K=10.0	20.0~199.9mS/cm/20.0~199.9g/L	0.1mS/cm/0.1g/L	±0.5% FS
Salinity	0.0~70.0ppt	0.1ppt	±0.5% FS
Temperature	0.0 to 100.0 °C	0.1 °C	±0.3°C

Reference Temperature	15.0 to 25.0 °C, 25.0 °C is default
Temperature Coefficient	0.0% to 4.0%. 1.91% is default
Cell Constant	0.01; 0.10; 1.00; 10.0
TDS Constant Range	0.30 to 1.00, default at 0.65
Power	Six “AAA” Alkaline Batteries or AC adapter
Calibration Back-up	EEPROM
Audio Feedback	All Touch Keys
Display (Conductivity/TDS: Temp)	22mm : 14.5mm high LCD
Ambient Temperature Range	0 to 50 °C
Relative Humidity	up to 90%
Case	IP54
Dimensions (W x D x H)	150mm x 200mm x 45mm
Weight	430 grams

WARRANTY

Sensorex warrants this product to be free from significant deviations in material and workmanship for a period of 1 year from date of purchase. If repair or adjustment is necessary and has not been the result of abuse or misuse, within the year period, please return-freight-prepaid and the correction of the defect will be made free of charge. If you purchased the item from our **Sensorex** distributors and it is under warranty, please contact them to notify us of the situation. **Sensorex** Service Department alone will determine if the product problem is due to deviations or customer misuse.

Out-of-warranty products will be repaired on a charge basis.

RETURN OF ITEMS

Authorization must be obtained from one of our representatives before returning items for any reason. When applying for authorization, have the model and serial number handy, including data regarding the reason for return. For your protection, items must be carefully packed to prevent damage in shipment and insured against possible damage or loss. **Sensorex** will not be responsible for damage resulting from careless or insufficient packing. A fee will be charged on all authorized returns.

NOTE: Sensorex reserves the right to make improvements in design, construction and appearance of our products without notice.

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