

JENCO®

QUALITY INSTRUMENTS

Operation Manual

MODEL 3177MB

Cond/TDS/Salt/Temperature

Based Bluetooth Benchtop Meter

3177MB

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GENERAL INTRODUCTION

Thank you for selecting the 3177MB meter. The 3177MB is a precision tool that measures Conductivity, Salinity, TDS and temperature. A built-in microprocessor stores, calculates and compensates for all parameters related to Conductivity. The 3177MB is a 5th generation Conductivity/ Salinity/TDS/temperature Bluetooth benchtop meter with iOS and Android tablet connectivity.

This meter has a waterproof IP54 case. The mechanical keys are highly reliable with tactile and audio feedback. It is powered by six AAA-size alkaline batteries or with a UL/CE approved AC adapter (OUTPUT:DC9 V). 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, TDS, Salinity and temperature simultaneously along with user prompts and mode indicators. The unit prompts the user through calibration and measurement procedures.

The unit is also equipped with a non-volatile memory allowing the user to store 750 different sets of readings. This unit will assign a site number for each set of reading so the user can review the data easily.

The model 3177MB comes with a Conductivity probe. Other features include 1 point calibration for Conductivity, 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 damages made in shipment. If any damage is found, notify your **JENCO** representative immediately. All packing materials should be saved until satisfactory operation is confirmed.

POWER INPUT

The model 3177MB can be powered by an UL/CE approved 100 to 240 V AC adaptor as well as 6 "AAA" alkaline batteries. Check the label on the AC adaptor supplied with the meter to make sure that the AC line voltage is correct. If the wrong AC adaptor is supplied, notify your **JENCO** representative immediately.

INSTALLING THE BATTERIES

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

1. Use a Philip 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 install them on the correct polarity position.
3. Put the battery cover back on the meter. Use a Philip screw driver and turn the screw in the clockwise direction to lock the battery cover.

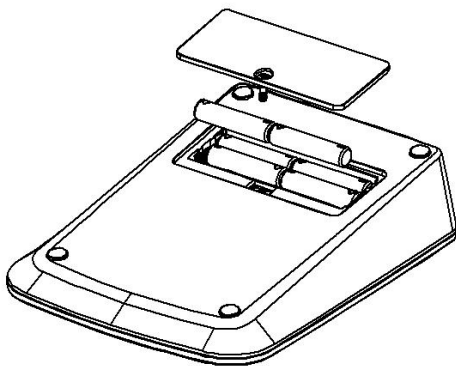


Figure 1: Battery compartment

CONNECTORS

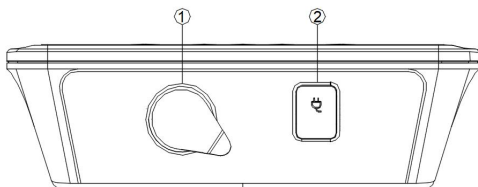


Figure 2: Connectors

1. Conductivity/ATC connector (8 PIN connector)
2. AC adaptor input connector

DISPLAY & KEY FUNCTIONS

A. Display

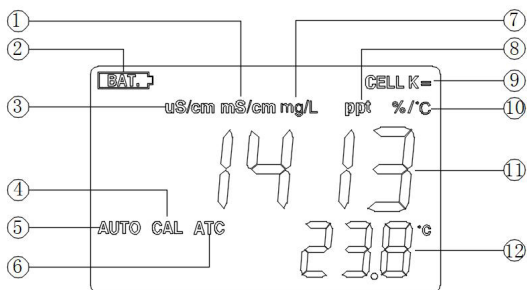


Figure 3 : Active LCD screen for Conductivity, TDS and Salt

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

B. Operational Keys Description

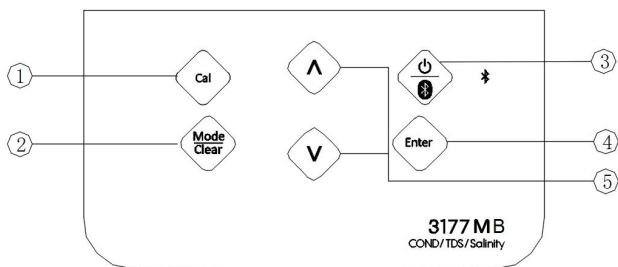








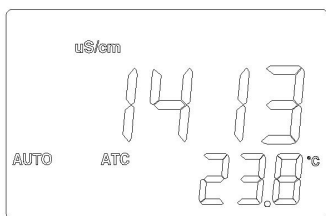
Figure 4

NO.	Key	Description
1		Cal- In conductivity measure mode, press this key to go to the “Calibration” mode.
2		Mode/Clear- Selects display mode. Pressing this key changes the display sequentially to display Conductivity, Salinity, TDS, Recall, Delete One and Delete All. In the conductivity (salinity, TDS) mode, when the “ Mode/Clear ” key is pressed for 5 seconds, the meter clears all calibration values stored in the internal memory. In the Recall and Delete modes, press “ Mode/Clear ” key to exit “Recall” and “Delete” modes respectively.
3		Power/BLE (Bluetooth)- Press and hold this key for 2 seconds to power on and shut off the meter. In the measure mode, press this key to turn Bluetooth on or off.
4		Enter- In the measure mode, press “ Enter ” key for 2 seconds to save reading into the data storage site. In the calibration mode, press “ Enter ” key to save the current parameter to memory. In the Recall mode, press “ Enter ” key to display the last set of saved data. In the “Delete All” mode, press “ Enter ” and enters the selection screen. In the “Delete One” mode, press “ Enter ” key to delete a single set of data.

5	 	<p>Up & Down- In the calibration mode, these two keys are used to adjust the conductivity display value or K value. In the "Recall" mode, view saved data and data storage site number by pressing these keys. In the "Delete ALL" mode, select between the "YES" and "no" for data all delete. In the "Delete One" mode, view to be deleted data and data site numbers by pressing these keys.</p>
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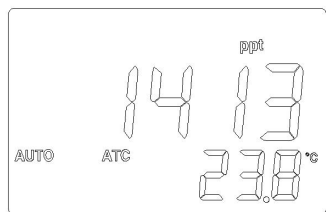
MODES OF THE METER

This instrument has six modes as follow:



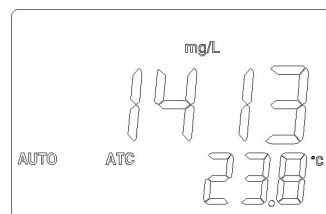
1. Conductivity mode:

A measurement of the conductive material in the solution.



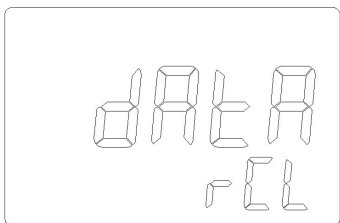
2. Salinity modes:

A measurement of the salinity in the solution, the calculation is based on the conductivity and temperature.



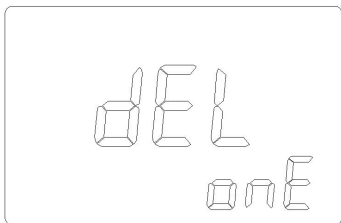
3. TDS modes:

A measurement of the total dissolved solids (TDS), the calculation is based on the compensated conductivity.



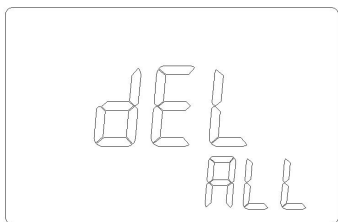
4. Recall modes:

User can recall data saved in memory.



5. Delete One modes:

User can delete one data saved in memory.



6. Delete ALL modes:

User can delete ALL data saved in memory.

OPERATIONAL PROCEDURES

A. Calibration

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

1. Turn the unit on. In the conductivity/TDS/salinity mode, press **"Mode/Clear"** key for 5 seconds, all LCD elements will lit up. The meter clears all calibration values stored in internal memory.
2. Connect the conductivity probe to the unit.
3. Press **"Mode/Clear"** key to go to conductivity mode. "ATC" icon, "uS/cm" icon and "AUTO" icon will lit up.

4. Rinse the conductivity probe in distilled water and immerse them in the standard solution. Allow temperature reading to stabilize, then press “**Cal**” key to enter the calibration mode. “**CAL**” and “**ATC**” icons 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/cm) by a TDS factor. The default factor value is 0.65. To change the TDS factor, use the “**Up**” or “**Down**” keys to adjust the value between 0.30 to 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**” or “**Down**” keys to adjust the value between 0.00 to 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 °C. To change the temperature reference, press the “**Up**” or “**Down**” keys to adjust the value between 15 to 25 °C. Press “**Enter**” key to save the new value and go to the next calibration parameter.

Probe Basic Cell Constant

The main display shows the Cell Constant of the conductivity probe (calibrated previously or default, the deviation range is 70% to 130%). The secondary display shows the current selected cell constant which is either 0.10 or 0.475. Press the “**Up**” or “**Down**” keys to select the one you want to use. Press “**Enter**” key to save the new value and go to the next calibration parameter.

Standard Solutions Calibration

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 to 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. Wait for the values of temperature and conductivity to stabilize for a few seconds. Press the **"Up"** or **"Down"** keys to adjust the reading of the display until it matches the value of the known standard conductivity solution at 25 °C. Press the **"Enter"** key to save and exit the calibration.

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

K Value Input

The unit will display the cell constant value of the conductivity probe with the **CELL K=** staying on. Adjust the probe constant to a known value by pressing the **"Up"** or **"Down"** keys. You can now input the K value (from 70% to 130% of the probe basic cell constant). Press the **"Enter"** key to exit calibration and return to normal operation.

B. Conductivity, Salinity, TDS Measurements

1. Turn the unit on. Connect the conductivity probe to the unit.
2. Press **"Mode/Clear"** key to go to conductivity/salinity/TDS mode. "ATC" icon, "uS/cm (ppt/mg/L)" icon and "AUTO" icon will lit up. Place the probe in the solution to be measured. Immerse the probe (at least 2" to 3" or 5 to 7cm from the tip). Shake the probe lightly to remove any trapped air bubbles in the conductivity cell.
3. Allow sufficient time for the display to stabilize. The meter will display the conductivity/salinity/TDS value of the sample at the displayed sample temperature.

[Note: Press "Mode/Clear" key to enter the desired measurement mode (Conductivity, Salinity or TDS). The message "rAn9" may appear briefly on the display indicating auto-ranging; this is normal. Allow temperature to stabilize before taking measurements.]

C. Save, Recall And Delete Data

1. Saving readings to memory.

- a. In the measure modes, press and hold **“Enter”** key for 2 seconds to save data. The **“ID”** icon and number with the corresponding site number will lit up for a brief moment to indicate a successful data save. Saving is now complete.
- b. If **“Full”** lit up, this means that all 750 data saving sites are used up. No new data can be saved until existing saved data are deleted.

2. Recalling readings from memory.

- a. Press **“Mode/Clear”** key until **“dAtA rCL”** shows. Press **“Enter”** key to go into **“Recall”** mode.
- b. To view data, press **“Up”** or **“Down”** key to select the storage site number and displays the corresponding record.
- c. Press **“Mode/Clear”** key to exit **“Recall”** mode.

3. Deleting data.

- a. Press **“Mode/Clear”** key until the **“dEL onE”** or **“dEL ALL”** shows. Then press the **“Enter”** key to go into the corresponding **“Delete one ”** or **“Delete ALL”** mode.
- b. In the **“Delete ALL”** mode, press the **“Enter”** and enters the selection screen. Use the **“Up”** or **“Down”** key to select YES/no for clearing all stored data. To clear all data, select YES and press the **“Enter”** key. **“nonE”** will show after data is completely deleted.
- c. In the **“Delete one”** mode, use **“Up”** or **“Down”** key to select data to be deleted. Then press **“Enter”** key to delete. Deletion is now complete. The next set of saved data will automatically move up a slot in the storage site.
- d. Press **“Mode/Clear”** key to exit **“Delete”** mode.

D. Preparing Conductivity 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 3177MB.

1. Standard solution of 1413 $\mu\text{S}/\text{cm}$ at 25 $^{\circ}\text{C}$: Accurately weight out 0.746 grams of research grade dried Potassium Chloride (KCL). Dissolve in 1000 ml of distilled water.
2. Standard solution of 12.90 mS/cm at 25 $^{\circ}\text{C}$: Accurately weight out 7.4365 grams of research grade dried Potassium Chloride (KCL). Dissolve in 1000 ml of distilled water.
3. Standard solution of 111.9 mS/cm at 25 $^{\circ}\text{C}$: Accurately weight out 74.264 grams of research grade dried Potassium Chloride (KCL). Dissolve in 1000 ml of distilled water.

[Note: You can store the unused portion of the standard solution in a plastic container for six months but the air space between the cap and the solution must be kept to an absolute minimum. Storing the excess solution below 4 $^{\circ}\text{C}$ can increase the storage life. If you have any doubt of the accuracy of the stored solution, a fresh batch should be prepared.]

APP NAVIGATION

A. App Functions

The 3177MB is a conductivity/salinity/TDS/temperature Bluetooth benchtop meter with iOS and Android apps for tablets. Functions of the App includes, graphing, guided calibration procedures, data storage, data sharing and data print. Basic functionality of a conductivity/salinity/TDS/temperature benchtop meter such as taking measurements, calibration and storing data can be performed on the meter or on the paired tablets.

B. App Download And Installation

Download the companion App for the 3177MB from the Apple Store or Google Play Store. Continue to the next step after the correct App is installed to the tablets.

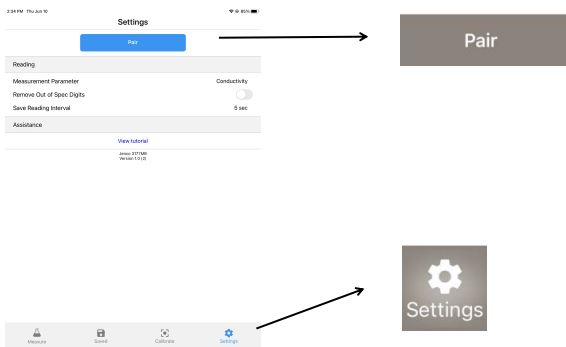
C. Connecting The Meter With The App

1. Prepare the 3177MB for Bluetooth connection

Press the "**Power/BLE**" key for 2 seconds to turn on the 3177MB device. Press the "**Mode/Clear**" key to go to the measure mode. Press and release the "**Power/BLE**" Key again to turn on the 3177MB Bluetooth connection. The Bluetooth light on the 3177MB will fast blink and it is ready for Bluetooth connection.

3. Pair the 3177MB to the tablet.

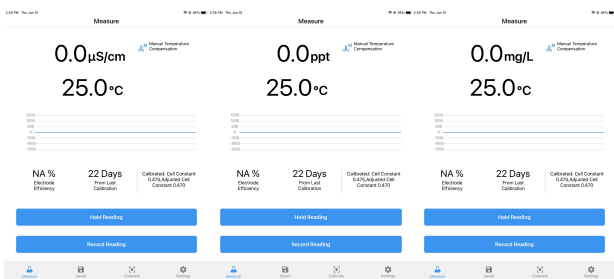
- Tap the “Settings” tab at the lower right of the App screen.
- Tap the “Pair” button.
- The tablet will search for any JENCO Bluetooth devices within close proximity. When the App discovers and displays the 3177MB, tap the “Connect” button.
- Once the 3177MB is connected to the tablet, the device Bluetooth light will blink slowly.



After the App has been installed, calibrate the 3177MB to ensure the best reading quality.

D. Measurement Screen

The Measure Screen displays measurement readings, measurement mode, temperature compensation mode, parameter measurement curve, calibration information and days since last calibration.



From this screen, tap the "Hold Reading" button to freeze or unfreeze the readings, or tap the "Record Reading" button to

save the current readings for future use.

E. Saved Readings Screen

The Saved Reading Screen displays a listing of reading values saved to the App, and provides access to view saved reading detail information such as timestamp and notes. (Fig.1).

F. Calibration Screen

The Calibration Screen displays past calibration data. From this screen, tap the “Calibrate” button and follow the step-by-step instructions to calibrate the 3177MB. (Fig.2)

G. Settings Screen

The Settings Screen displays the various settings that affects the measurements of the 3177MB. (Fig.3)

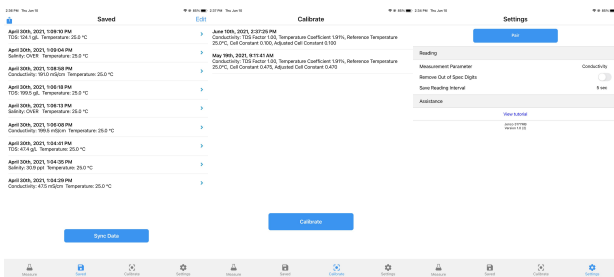


Fig.1

Fig.2

Fig.3

H. Key Operations

1. Take measurements

Tap the “Measure” tab in the navigation bar.

2. Calibrate

- Tap the “Calibrate” tab in the navigation bar.
- Tap the “Calibrate” button.
- Follow the on-screen instructions.

3. Save readings

- Tap the “measure” tab in the navigation bar.

- b. Tap the "Record Reading" button. At this moment the "Record Reading" button change to "Cancel Record" button. To stop recording, tap "Cancel Record" button.

4. Sync data

- a. Tap the "Saved" tab in the navigation bar.
- b. "Sync Data" button is displayed. Tap "Sync Data" button.
- c. The App will display the loading diagram and the estimated time at the bottom. The display shall return to the Saved screen when the data transmission is completed.

5. View saved readings and add Notes to saved readings

- a. Tap the "Saved" tab in the navigation bar.
- b. Saved readings are displayed. Tap on a saved reading to view its detail information.
- c. From the saved reading detail screen, tap the Notes field to add notes.
- d. Tap the "<" button to save and exit the detail screen.

6. Share and print saved readings

- a. Tap the "Saved" tab in the navigation bar.
- b. Saved readings are displayed. Tap the "Share" icon on the upper left area of the screen.
- c. Tap to check the saved readings to be shared.
- d. Tap "Send" on the upper right corner of the screen.
- e. Choose "Share" to other application or "Print" the selected data.
- f. Tap "Print" again at the top right print preview page.

[Note: Tablet must be connected to the same wireless network as the designation printer. Appropriate Print plug-in must be downloaded and installed from Google Play for Android tablets. Print plug-in is different between printer brand/model. For example: Epson Print Enable for Epson printers.]

7. Delete saved readings

- a. Tap the “Saved” tab in the navigation bar.
- b. Saved readings are displayed. Tap “Edit” on the upper right area of the screen.
- c. Tap to check the saved readings to be deleted.
- d. Tap “Done” on the upper right corner of the screen.

8. View and change settings

- a. Tap the “Settings” tab in the navigation bar.
- b. Tap the value for the setting to be changed.
- c. Click the “Save” button to save changes.

9. Pair meter to App

- a. Pressing and releasing the “**Power/BLE**” key in the measure mode.
- b. Tap the “Settings” tab in the navigation bar.
- c. Tap the "Pair" button.
- d. Wait for the App to discover the 3177MB.
- e. Tap the "Connect" button.

I. Notes:

1. One meter can be paired to only one App at a time. To put an already-paired meter into pairing mode, one must first close the App it is paired to.
2. Bluetooth must be turned on on the tablet. (Select Optimized Power Mode on Android tablets).
3. Grant Bluetooth and GPS permissions during App installation.
4. After first pairing with the meter, App records the meter’s Bluetooth information. Hence, no pairing is needed the next time when opening the same App. After App is successfully connected to the meter, tablet displays meter reading values on the “Measure” page.
5. On Android OS system, if the connection between the App and the meter is lost for over 2 minutes, force close and reopen the

same App for normal operation.

6. Switching operation control between meter and App during calibration affects data integrity. Hence, it is not recommended.
7. Log data on the meter can be in sync with the App saved data but not vice versa.

FCC WARNING STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter. To comply with FCC RF exposure compliance requirements, this grant is applicable to only Mobile Configurations. The antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

NOTE: THE MANUFACTURER IS NOT RESPONSIBLE FOR ANY RADIO OR TV INTERFERENCE CAUSED BY UNAUTHORIZED MODIFICATIONS TO THIS EQUIPMENT. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

ERROR DISPLAYS AND TROUBLESHOOTING

Main Display	Secondary Display	Possible cause(s)	Corrective Action(s)
"over" during measurements	-10.0 to 120.0 °C	<ol style="list-style-type: none"> 1. Sample Conductivity value > 200.0 mS/cm; Sample TDS > 200 g/L. Sample Salinity > 80.0 ppt 2. Conductivity cell contaminated or defective. 3. Incorrect K constant value input. 	<ol style="list-style-type: none"> 1. Sample cannot be tested. 2. Decontaminate/clean cell or replace cell. 3. Input correct K value.
"over" during calibration	-10.0 to 120.0 °C	<ol style="list-style-type: none"> 1. Incorrect standard solution. 2. Conductivity cell contaminated or defective. 3. Incorrect K constant value input. 	<ol style="list-style-type: none"> 1. Replace standard solution. 2. Decontaminate/clean cell or replace cell. 3. Input correct K value.
"over " during measurements	over	<ol style="list-style-type: none"> 1. Sample temperature > 120 °C. 2. Defective conductivity cell. 	<ol style="list-style-type: none"> 1. Reduce sample temperature. 2. Replace cell.
	undr	<ol style="list-style-type: none"> 1. Sample temperature < -10.0 °C 2. Defective conductivity cell. 	<ol style="list-style-type: none"> 1. Increase sample temperature. 2. Replace cell.

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

SPECIFICATIONS

Display	Range	Resolution	Accuracy
Conductivity	K=0.1 : 0.00 to 99.99 $\mu\text{S/cm}$ 100.0 to 200.0 $\mu\text{S/cm}$ K=0.475: 0.0 to 474.9 $\mu\text{S/cm}$ 475 to 4749 $\mu\text{S/cm}$ 4.75 to 47.49 mS/cm 47.5 to 200.0 mS/cm	0.01 $\mu\text{S/cm}$, 0.1 $\mu\text{S/cm}$, 1 $\mu\text{S/cm}$, 0.01 mS/cm , 0.1 mS/cm	$\pm 0.5\%$ F.S.
TDS	K=0.1 : 0.00 to 99.99 mg/L 100.0 to 200.0 mg/L K=0.475: 0.0 to 474.9 mg/L 475 to 4749 mg/L 4.75 to 47.49 g/L 47.5 to 200.0 g/L	0.01 mg/L , 0.1 mg/L , 1 mg/L , 0.01 g/L , 0.1 g/L	$\pm 0.5\%$ F.S.
Salinity	0.0 to 80.0 ppt	0.1 ppt	$\pm 0.5\%$ F.S.
Temperature	-10.0 to 120.0 $^{\circ}\text{C}$	0.1 $^{\circ}\text{C}$	± 0.2 $^{\circ}\text{C}$

Conductivity calibration	1 point
Reference Temperature	15.0 to 25.0 $^{\circ}\text{C}$, default at 25.0 $^{\circ}\text{C}$
Temperature Coefficient	0.0% to 4.0%, default at 1.91%
TDS Factor	0.30 to 1.00, default at 0.65
Cell Constant	0.10 (2 wire), 0.475 (4 wire)
Temperature sensor	Thermistor, 10 $\text{k}\Omega$ at 25 $^{\circ}\text{C}$
Connectivity	Bluetooth
Calibration Back-up	EEPROM
Memory	750 sets
Audio Feedback	All Touch Keys
Screen	Segmented LCD w/backlight
Power	6 X 1.5 V AAA Batteries or 100 to 240 V AC adapter
Ambient Temperature Range	0 to 50 $^{\circ}\text{C}$
Relative Humidity	up to 90%
Case	IP 54
Dimensions (W x D x H)	150 x 210 x 45 mm
Weight	430 grams

WARRANTY

JENCO 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 **JENCO** distributors and it is under warranty, please contact them to notify us of the situation. **JENCO** 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. **JENCO** will not be responsible for damage resulting from careless or insufficient packing. A fee will be charged on all authorized returns.

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

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