

JENCO®

QUALITY INSTRUMENTS

Operation Manual

MODEL 3177M

Cond/TDS/Salt/Temperature

Based Benchtop Meter

3177M

CONTENTS

GENERAL INTRODUCTION.....	2
INITIAL INSPECTION.....	2
POWER INPUT.....	2
INSTALLING THE BATTERIES.....	3
CONNECTORS.....	3
DISPLAY & KEY FUNCTIONS.....	4
A. Display.....	4
B. Operational Keys Description.....	5
OPERATIONAL PROCEDURES.....	6
A. Calibration.....	6
B. Conductivity, Salinity, TDS Measurements.....	8
C. Save, Recall and Delete Data.....	8
D. Preparing Conductivity Standard Solutions.....	9
ERROR DISPLAYS AND TROUBLESHOOTING.....	10
SPECIFICATIONS.....	11
WARRANTY.....	12

GENERAL INTRODUCTION

Thank you for selecting the 3177M meter. The 3177M 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 3177M is a 5th generation Conductivity/ Salinity/TDS/temperature benchtop meter.

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 3177M 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 3177M can be powered by an UL/CE approved 100 to 240 VAC 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.

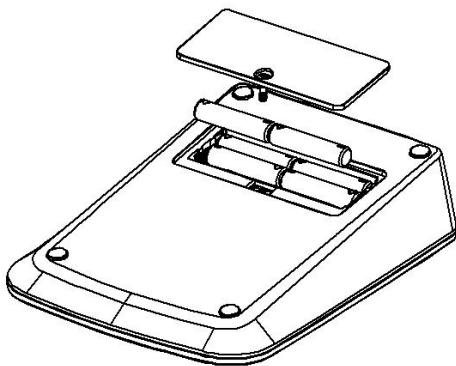


Figure 1: Battery compartment

CONNECTORS

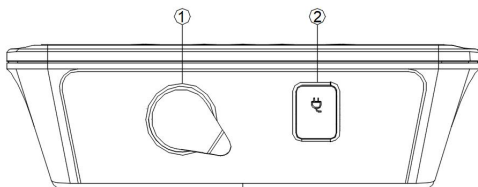


Figure 2: Connectors

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

DISPLAY & KEY FUNCTIONS

A. Display

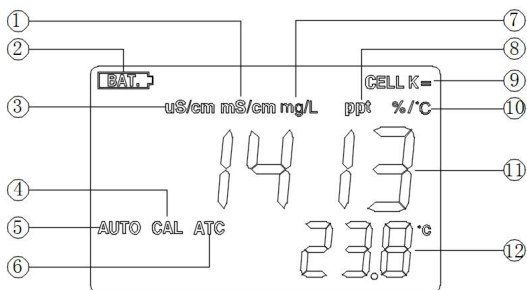


Figure 3 : Active LCD screen for Conductivity, TDS and Salt

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

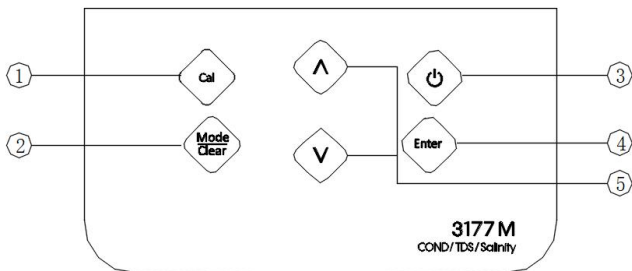








Figure 4

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- Press and hold this key for 2 seconds to power on and shut off the meter.
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>
---	--	---

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 3177M.

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.]

ERROR DISPLAYS AND TROUBLESHOOTING

Main Display	Secondary Display	Possible cause(s)	Corrective Action(s)
"over" during measurements	0.0 to 100.0 °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	0.0 to 100.0 °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 > 100 °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 < 0.0 °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 μ S/cm 100.0 to 200.0 μ S/cm K=0.475: 0.0 to 474.9 μ S/cm 475 to 4749 μ S/cm 4.75 to 47.49 mS/cm 47.5 to 200.0 mS/cm	0.01 μ S/cm, 0.1 μ S/cm, 1 μ 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	0.0 to 100.0 $^{\circ}$ C	0.1 $^{\circ}$ C	\pm 0.2 $^{\circ}$ C

Conductivity calibration	1 point
Reference Temperature	15.0 to 25.0 $^{\circ}$ C, default at 25.0 $^{\circ}$ 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 k Ω at 25 $^{\circ}$ C
Power	6 X 1.5 V AAA Batteries or 100 to 240 VAC adapter
Calibration Back-up	EEPROM
Memory	750 sets
Audio Feedback	All Touch Keys
Screen	Segmented LCD w/backlight
Ambient Temperature Range	0 to 50 $^{\circ}$ 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.

Jenco Instruments, Inc.

7968 Arjons Drive, Suite C San Diego, CA 92126 USA

TEL: 858-578-2828

FAX: 858-578-2886

E-Mail: jencoinfo@jencoi.com; sales@jencoi.com

Website: www.jencoi.com

Jenco Electronics, Ltd.

6F., NO. 81, Sec.2, Chang-an E. Rd., Jhongsan District, Taipei City 104, Taiwan

TEL: 886-2-2508-2928

FAX: 886-2-2508-2938

E-Mail: sales@jenco.com.tw

Website: www.jenco.com.tw

Shanghai Jenco Instruments, Ltd.

18 Wang Dong Zhong Road Sijing Town, Songjiang Shanghai, China 201601

TEL: 86-021-5761-9599

FAX: 86-021-5761-9598

E-Mail: jencos@jenco.com.cn

Website: www.jenco.com.cn