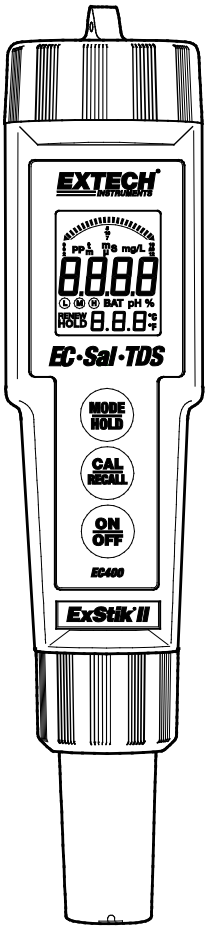
EXTECH®

USER MANUAL

Conductivity / TDS / Salinity / Temperature Meter

ExStik II® EC400



Introduction

Congratulations on your purchase of the EC400 Conductivity / Total Dissolved Solids (TDS) / Salinity / Temperature meter. The EC400 uses dynamic cell-constant technology, allowing one electrode to do the job of many. Careful use and maintenance will provide years of reliable service.

Powering the Meter

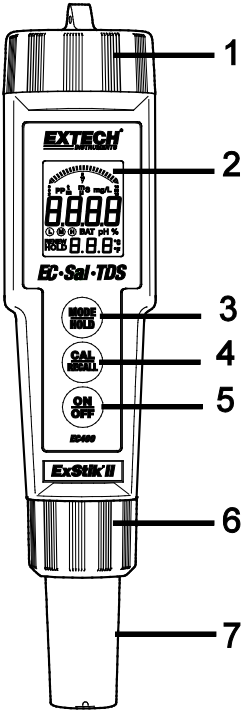
The EC400 uses four (4) CR2032 lithium-ion batteries (included). If the batteries are weak, the **BAT** indicator appears. Press the **ON/OFF** key to switch ON/OFF the EC400. The auto power off feature switches OFF the EC400 after 10 minutes of inactivity.

Getting Started

- Remove the cap from the bottom of the meter to expose the conductivity electrode.
- Before the first use, or after storage, rinse the electrode in deionized water and dry.
- For best results, calibrate conductivity with a standard in the expected range of the sample. For maximum accuracy calibrate from a low conductivity standard to a high conductivity standard.
- Store the electrode dry.

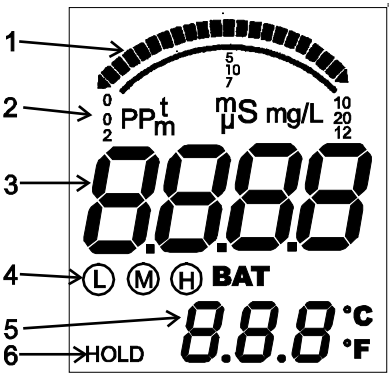
Meter Description

Front Panel



1. Battery compartment
2. LCD
3. MODE/HOLD button (change mode, access Data Hold, store reading)
4. CAL/RECALL button (calibrate, change temperature units, recall reading)
5. ON/OFF button
6. Electrode Collar
7. Electrode

Display

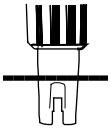


1. Bar graph display
2. Measurement units
3. Main display
4. Range calibration and low battery indicators
5. Temperature display
6. Reading Hold Indicator

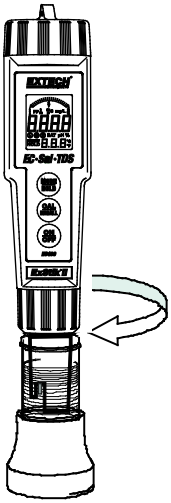
Operation

Sample Preparation

For Conductivity, TDS or Salinity place the test sample in a sample cup with sufficient depth to cover the electrode (1 in. minimum). Stir the solution to remove air bubbles.

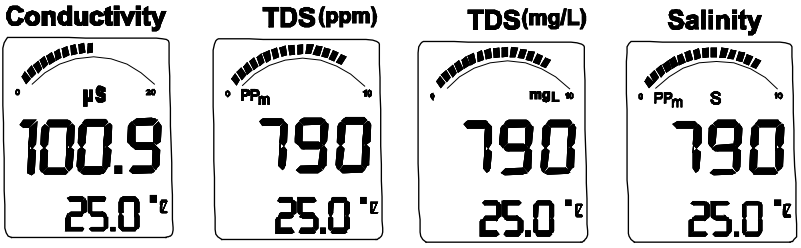


Measurements



1. Press the **ON** button. The icons 8888 and **SELF CAL** will appear during the power-up diagnostics.
2. Long press the **MODE/HOLD** button to scroll to the desired measurement mode.
3. Place the electrode in the sample.
4. Slowly stir the solution with the electrode to remove air bubbles.
5. The meter will select the proper range and display the reading, as shown in the examples below.

Note: Always rinse the electrode in de-ionized water between measurements to avoid cross contamination of the sample. Double rinsing is recommended when high accuracy is required.



Changing Measurement Function

The meter can be set to measure Conductivity, TDS, or Salinity. To change the mode:

1. Long press the **MODE/HOLD** button for 2 seconds, to begin scrolling through the units.

   µS (Conductivity)

   ppm (TDS)

   mg/l (TDS)

   ppm S (Salinity)

2. When the desired units are displayed, release the **MODE/HOLD** button.

Note: The HOLD function cannot be engaged when changing the measurement function. If **HOLD** is displayed, short press the **HOLD** button to switch it OFF.

Changing Temperature Units

To change the displayed temperature units (°C, °F):

1. With the meter OFF, long press the **CAL/RECALL** button.
2. With the **CAL/RECALL** button pressed, short press the **ON/OFF** button. When **SELF CAL** appears in the display, release the **CAL/RECALL** button. The meter will switch ON, with the newly selected units.

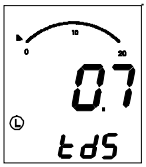
TDS Compensation Ratio

The TDS value is determined by multiplying a conductivity reading by a known ratio factor. The meter allows for selecting a conversion ratio in the range of 0.4 to 1.0. The ratio varies with the application but is typically set between 0.5 and 0.7.

Note: The stored ratio will briefly appear in the lower temperature display when the meter is first turned on, or when changing measurement function to TDS.

Note: In the Salinity mode the ratio is 0.4 to 0.6 automatic.

To change the ratio, while in the TDS measurement mode (ppm or mg/l):



1. Press and release the **CAL/RECALL** button twice in succession. The stored ratio will appear in the display.
2. Press the **MODE/HOLD** button to increase the ratio value in steps of 0.1.
3. When the desired ratio is displayed, short press the **CAL/RECALL** button to store the value and return to the normal mode.
4. If no buttons are pressed in 5 seconds, the meter returns to measure mode.

Data Hold Mode

Press the **MODE/HOLD** button to freeze a reading on the display. The **HOLD** indicator will appear. Note: This also stores the reading. Press the **MODE/HOLD** button again to return to normal operation.

Low Battery Indication

When the batteries become weak the **BAT** icon will appear. Refer to the Maintenance section for battery replacement information.

Auto Power OFF (APO)

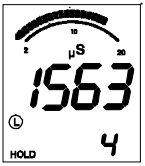
APO switches OFF the meter after 10 minutes of inactivity.

APO Disable

1. Switch ON the meter.
2. Short press **CAL/RECALL**.
3. Immediately long press the **MODE/HOLD** and **ON/OFF** buttons, simultaneously, for approximately 2 seconds, until **oFF** is briefly displayed. APO is now disabled.
4. On the next power cycle, APO will be enabled again.

Storing, Recalling, Clearing Readings

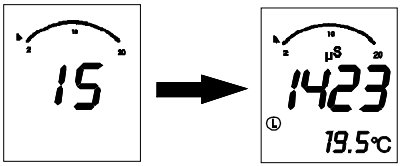
Storing Readings



1. Press the **MODE/HOLD** button to store a reading. The storage location number will be displayed on the lower display, while the main display shows the stored reading. The meter will enter the HOLD mode and the **HOLD** indicator will appear.
2. Press the **MODE/HOLD** button again to exit the HOLD mode and return to normal operation.
3. The maximum number of readings that the EC400 can store is 25. Previously stored readings (starting with number 1) are overwritten when the limit is reached.

Recalling Readings

1. Press the **CAL/RECALL** button and then press the **MODE/HOLD** button. A location number (1 through 25) will briefly appear and then the value stored in that location will appear. The displayed units will flash, indicating that the storage recall mode is active.



2. The last stored reading will be displayed first. Short press the **MODE/HOLD** button to step through the stored readings. The location number is displayed first, then the stored reading.
3. To exit the storage mode, press the **CAL/RECALL** button; the meter will return to normal operation, after displaying **End**.

Clear Stored Memory

With the meter ON, long press the **ON/OFF** button for 4 seconds; **clr** will briefly appear when the memory has cleared.

Calibration (Conductivity)

Verify meter accuracy approximately once per month. If calibration is required, use a conductivity standard solution. The meter can be calibrated in any or all three of its ranges. ONLY standardizing solutions of 84µS/cm, 1413µS/cm, and/or 12.88mS/cm (12,880µS/cm) may be used for the automatic calibration recognition procedure. No other calibration values are permitted.

Calibration must be performed in conductivity mode. Salinity and TDS values are calculated from conductivity values, so no further calibration is required.

Note: To meet the published accuracy specifications, calibrate the meter with the conductivity standards and meter at 77°F (25°C) or as noted on the label of the standard solution.

1. Fill a sample cup with the standard solution.
2. Switch ON the meter and place the electrode in the solution. Tap or move the electrode in the sample to dislodge air bubbles.
3. Long press the **CAL/RECALL** button (approximately 2 seconds) until **CAL** appears. The main display will start flashing.
4. The meter will automatically recognize and calibrate to the solution. When the calibration is completed, the display will briefly indicate **SA** and **End**, and the meter will return to the measurement mode. Note: **SA** will not appear if the calibration fails.
5. The **L**, **M**, or **H** symbol will appear for the range(s) calibrated during the current power cycle.

   (L) Low range, 84µS/cm

   (M) Medium range, 1413µS/cm

   (H) High range, 12.88mS/cm (12,880µS/cm)

Note: Each time the calibration mode is entered all calibration symbols on the display are cleared. However, only the calibration *data* for the currently calibrated range are replaced. The other two ranges retain their existing calibration data, only the *symbols* are removed. Calibration of all three ranges must be performed during one power-on period for all three range calibration symbols to appear.

See **Reset Calibration Data** to clear all calibration data from the meter.

Note: The meter allows for a 1, 2 or 3 point calibration. If calibration is done for more than one point, the lowest value standard should be done first to obtain the best accuracy.

Reset Calibration Data

Perform this procedure to clear all calibration data. Resetting the calibration data may be necessary when new calibration solutions are used or if measurement accuracy is in question.

1. Switch OFF the meter.
2. Long press the **CAL** and **MODE** buttons and, while holding them down, press the **ON/OFF** button. The display will switch ON, release all buttons.
3. The display will show **dFLt rSt** (default reset) and all calibration data will be erased. If **dFLt rSt** does not appear, retry the procedure.
4. Proceed to the calibration sections of this manual.

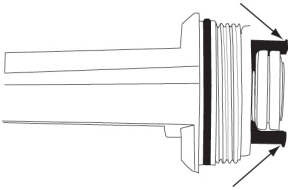
Operational Matrix

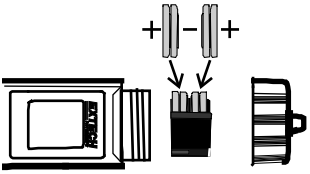
Function/Action	***Power Status***	***Mode***	***Button-Press Sequence***
On/Off	On or Off	Any	Short press ON/OFF
Calibration	On	Conductivity	Long press CAL/RECALL for 2 seconds, until it enters CAL function
Store Reading	On	Any measure mode	Short press MODE/HOLD
Hold Release	On	Hold Mode	Short press MODE/HOLD
Enter Memory Retrieval	On	Any measure mode	Short press CAL/RECALL then short press MODE/HOLD (within 4 seconds)
Scroll Stored Readings	On	Memory Recall	Short press MODE/HOLD
Exit Memory Retrieval	On	Memory Recall	Short press CAL/RECALL
Clear Stored Memory	On	Any Measure Mode	Long press ON/OFF for 4 seconds, until **clr** is displayed.
Change Measurement Mode	On	Any	Long press MODE/HOLD for at least 2 seconds (the modes will scroll, until the button is released)
Enter Cond/TDS Ratio	On	TDS (ppm or mg/l)	Short press CAL/RECALL twice in quick succession
Change Cond/TDS Ratio	On	TDS ratio	Short press MODE/HOLD (to increase the ratio by 0.1)
Exit Cond/TDS Ratio	On	TDS ratio	Short press CAL/RECALL
Change Temperature Units	Off	n/a (off mode)	Long press CAL/RECALL then short press ON/OFF. Release CAL/RECALL when SELF CAL is lit.
Override Auto Power Off	On	Any measure mode	Short press CAL then simultaneously long press ON/OFF and MODE/HOLD for 2 seconds or until **oFF** is displayed.

Maintenance

Battery Replacement

1. Twist off the battery compartment cap.
2. Holding the battery housing in place, pull out the battery carrier, using the two small tabs.
3. Replace the four (4) CR2032 batteries observing correct polarity.
4. Replace the battery compartment cap.





Battery Safety

- Remove and immediately recycle or dispose of used batteries according to local regulations, keeping the batteries away from children. Do NOT dispose of batteries in household trash or incinerate.
- Used batteries can cause severe injury or death.
- Call a local poison control center for treatment information.
- This unit contains four (4) CR2032, 3.0 V, lithium batteries.
- Non-rechargeable batteries are not to be recharged.
- Do not force discharge, recharge, disassemble, heat above 122°F (50°C), or incinerate. Doing so may result in injury due to venting, leakage, or explosion resulting in chemical burns.
- Ensure that the batteries are installed correctly according to correct polarity (+ and -).
- Do not mix old and new batteries, different brands or types of batteries, such as Alkaline, carbon-zinc, or rechargeable batteries.
- Always completely secure the battery compartment. If the battery compartment does not close securely, stop using the product, remove the batteries, keeping the batteries away from children.

Electrode Replacement

1. To remove an electrode, unscrew and completely remove the electrode collar (turn the collar counterclockwise to remove).
2. Gently rock the electrode from side to side, pulling it downwards, until it disconnects from the meter.
3. To attach an electrode, carefully plug the electrode into the meter socket (note that the electrode connector is keyed, ensuring proper connection).
4. Tighten the electrode collar firmly enough to make a good seal (a rubber gasket seals the electrode with the meter).

Cleaning and Storage Recommendations

- When cleaning the probe, take care not to scratch or damage the platinized electrode surfaces.
- Do not touch the inner surfaces of the conductivity electrodes. Touching the surface of the platinized electrodes may damage and reduce the life of the probe.
- Store the electrode dry, in the storage cap.

Contaminant	***Cleaning Solution***	***Instructions***
Water soluble substances	Deionized water	Soak or scrub gently with a soft brush. Rinse thoroughly with DI water, and dry
Grease & Oil	Warm water and household detergent	Soak or scrub with a soft brush, maximum of 10 minutes. Rinse thoroughly with DI water, and dry
Heavy grease & Oil	Alcohol	Maximum 5-minute soak, scrub with a soft brush. Rinse thoroughly with DI water, and dry
Lime and hydroxide coatings	10% acetic acid	Soak until coating dissolved, maximum of 5 minutes. Rinse thoroughly with DI water, and dry.

Troubleshooting

Problem	***Possible Cause***	***Action***
Reading is frozen	Unit is in HOLD mode	Press HOLD to exit mode
BAT message	Batteries are low	Replace batteries
Unit will not calibrate in conductivity mode	Contaminated conductivity standard	Use fresh standard
Unit will not calibrate in conductivity mode	Dirty probe	Clean conductivity probe (See cleaning instructions)
Unit will not calibrate in conductivity mode	Damaged conductivity probe	Replace electrode
Unit will not calibrate in conductivity mode	Trapped air bubbles	Tap or stir to release air bubbles
Unit will not switch ON	Batteries are low	Replace batteries
Unit will not switch ON	Batteries installed with incorrect polarity	Replace batteries, observing correct polarity
Unit will not respond to button presses	Internal fault	Remove batteries, press ON/OFF button for 10 seconds, replace batteries

Specifications

Display	2000 count LCD with bar graph
Conductivity ranges	0 to 199.9µS/cm 200 to 1999µS/cm 2.00 to 19.99mS/cm
TDS ranges	0 to 99.9ppm or mg/L
(Variable ratio)	100 to 999ppm or mg/L 1.00 to 9.99ppt or g/L
Salinity range	0 to 99.9ppm
	100 to 999ppm 1.00 to 9.99ppt
TDS Ratio	0.4 to 1.0 adjustable
Salinity Ratio	0.4 to 0.6 automatic
Conductivity ATC	2.0% per °C
Conductivity ATC Range	32.0°F to 140°F (0.0°C to 60.0°C)
Temperature Range	32.0°F to 149°F (0.0°C to 65.0°C)
Temperature Resolution	0.1 up to 99.9 (1 > 100)
Temperature Accuracy	±1.8°F (1.0°C) from 32 to 122°F (0 to 50°C)
	±5.4°F (3.0°C) from 122 to 149°F (50 to 65°C)
Accuracy	Conductivity: ±2% full scale TDS: ±2% full scale Salinity: ±2% full scale
Measurement Memory	25 tagged (numbered) readings
Low battery indication	**BAT** appears
Power	Four (4) CR2032 lithium-ion batteries
Auto power off	After 10 minutes of inactivity (override available)
Operating temperature	23°F to 122°F (-5°C to 50°C)
Dimensions	1.6 x 7.4 x 1.6 in. (40 x 187 x 40 mm)
Weight	3.1 oz. (87 g)

Two-year Warranty

***Teledyne FLIR warrants this Extech brand instrument** to be free of defects in parts and workmanship for **two years** from date of shipment. To view the full warranty text please visit:*
https://www.flir.com/support-center/warranty/instruments/extech-product-warranty/

Calibration and Repair Services

***Teledyne FLIR offers calibration and repair services** for the Extech brand products we sell. We offer NIST traceable calibration for most of our products.*

Customer Support

Local Telephone Support List: *https://support.flir.com/contact*

Return Material Authorization (RMA): *https://customer.flir.com/Home*

Customer Service: *https://support.flir.com/ContactService*

Technical Support: *https://support.flir.com*

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