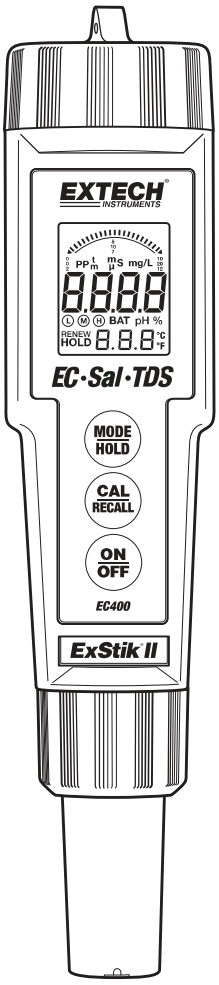
EXTECH INSTRUMENTS

User Manual

ExStik®II EC400

Conductivity / TDS / Salinity / Temperature Meter



Additional User Manual Translations available at www.extech.com

Introduction

Congratulations on your purchase of the ExStik®II EC400 Conductivity/Total Dissolved Solids (TDS) / Salinity / Temperature meter. With the EC400's dynamic cell-constant technology it is possible to measure a wide range of Conductivity, TDS, and Salinity with the same electrode. Careful use and maintenance will provide years of reliable service.

Powering the ExStik®II

The ExStik®II uses four (4) CR2032 Lithium Ion Batteries (included). If the batteries are weak, the 'BAT' indicator appears on the LCD. Press the ON/OFF key to turn the ExStik®II on or off. The auto power off feature shuts the ExStik®II off automatically after 10 minutes of inactivity to preserve battery life.

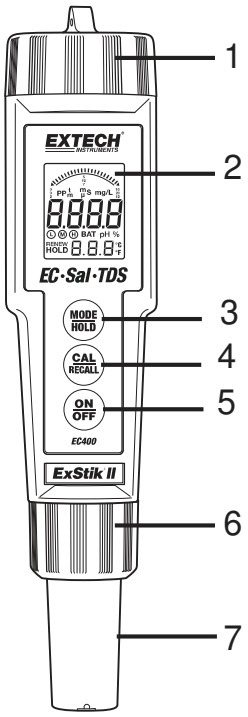
Getting Started

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

Meter Description

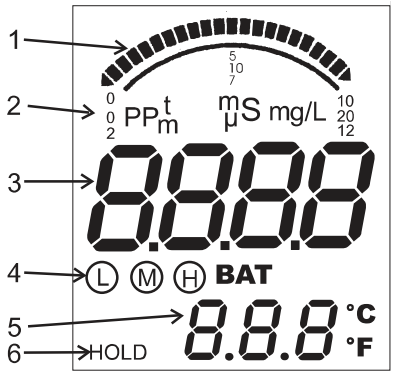
Front Panel Description

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



LCD Display

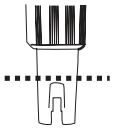
1. Bargraph display
2. Measurement units
3. Main display
4. Range calibration and low battery indicators
5. Temperature display
6. Reading Hold Indicator



Measurement Procedure

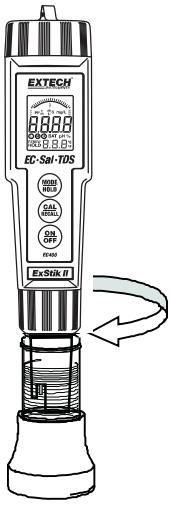
Sample Preparation:

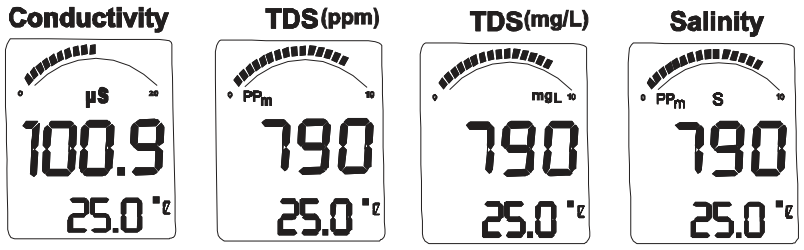
1. For Conductivity, TDS or Salinity place the test sample in a sample cup with enough depth (2.5cm minimum) to cover the electrode. Stir the solution to remove any air bubbles.



Measurement:

1. Press the **ON** button. (8888 and then "SELF CAL" will appear in the display during the turn-on diagnostics)
2. Depress and hold the **MODE/HOLD** key to scroll to the desired measurement mode.
3. Insert the electrode into the sample making sure that the electrodes are completely submersed.
4. Slowly stir the solution with the electrode to remove air bubbles.
5. The meter will auto-range to the proper range and then display the reading.





Changing Measurement Function

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

1. Press and Hold the **MODE**/**HOLD** button for 2 seconds and the display will begin to scroll through the units.

   µS (Conductivity); **ppm** (TDS); **mg/l** (TDS); **ppm S** (Salinity);

Note: The "HOLD" function cannot be on when changing the measurement function. If "HOLD" is displayed in the lower left corner of the display, briefly press the **MODE**/**HOLD** button to turn it off.

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

TDS Compensation Ratio

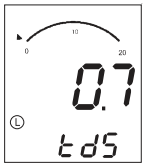
The TDS value is determined by multiplying a conductivity reading by a known ratio factor. The meter allows for selecting a conversion ratio in the range of 0.4 to 1.0. The ratio varies with the application, but is typically set between 0.5 and 0.7.

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.

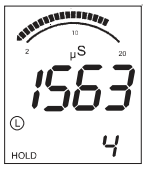
To change the ratio, while in the TDS measurement mode (ppm or mg/l):

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, press and release the **CAL**/**RECALL** button to store the value and return to the normal mode.
4. If no buttons are pressed for 5 seconds, the meter returns to measure mode.



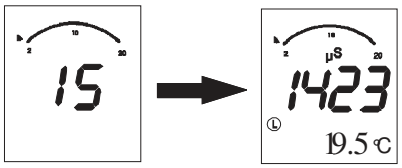
Storing Readings

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. If more than 25 readings are stored, previously stored readings (starting with number 1) will be overwritten.



Recalling Stored 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. Pressing and releasing the **MODE**/**HOLD** button will scroll through the stored readings one at a time. The location number is displayed first, followed by the reading stored in that location.
3. To exit the storage mode, press the **CAL**/**RECALL** button and the meter will return to normal operation, after displaying "End".

Clear Stored Memory

With the unit on, press and hold ON/OFF for 4 seconds. "**clr**" will be briefly displayed when the memory is cleared.

Changing Temperature Units

To change the displayed temperature units (ºC or ºF):

1. With the unit OFF, press and hold down the **CAL**/**RECALL** button.
2. With the **CAL**/**RECALL** button depressed momentarily press the **ON**/**OFF** button. When "SELF CAL" appears in the display release the **CAL**/**RECALL** button. The unit will power on with temperature displayed in the new units.

Data Hold Mode

Press the **MODE**/**HOLD** button to hold (freeze) a reading in the display. The meter will enter the HOLD mode and the "HOLD" indicator will appear.

Note: This also stores the reading.

Press the **MODE**/**HOLD** button again to return to normal operation.

Auto Power OFF

The auto power off feature automatically shuts the meter off after 10 minutes of button inactivity.

Auto Power OFF Disable

To disable the Auto Power Off feature:

1. Turn the unit on
2. Press **CAL**/**RECALL** once (**Quickly**)
3. Immediately and simultaneously press the **MODE**/**HOLD** and **ON**/**OFF** buttons for approximately 2 seconds, until "**oFF**" is briefly displayed

To disengage this feature, turn the unit off with the **ON**/**OFF** button. The next time the unit is powered up, Auto Power OFF mode will be engaged again.

Low Battery Indication

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

Measurement and Display Considerations

- If the unit appears to be locked (display frozen). It is possible that the Data Hold mode has been inadvertently accessed by pressing the **MODE**/**HOLD** button. ("HOLD" will be displayed in the bottom left of the LCD.) Simply press the MODE button again or turn the meter off and then on.
- For maximum accuracy, allow sufficient time for the temperature of the probe to reach the temperature of the sample before calibrating. This will be indicated by a stable temperature reading on the display.

Reset Calibration Data

Follow this procedure to clear all calibration data from the meter. Resetting the calibration data may be necessary when new calibration solutions are used or accuracy of measurements is in question.

1. Turn off the meter.
2. Press and Hold the Cal/Recall and Mode/Hold buttons.
3. Momentarily press the On/Off button, as soon as the display comes on, release all 3 buttons.
4. The display will show "**dFLt rSt**" (default reset) and all of the calibration data will be erased. If "**dFLt rSt"** does not appear, retry the procedure.
5. Proceed to the calibration routine for pH and Conductivity.

Calibration - Conductivity

Meter accuracy verification should be performed on a periodic basis. Once per month is the recommended cycle for normal use. If calibration is required, a conductivity standardizing solution must be obtained. The meter can be calibrated in any or all of the three ranges. Standardizing solutions of 84µS/cm, 1413µS/cm or 12.88mS/cm (12,880µS/cm) are used for the automatic calibration recognition procedure. No other calibration values are permitted.

Calibration is always done in conductivity mode. Since salinity and TDS values are calculated from conductivity values, this procedure also calibrates the salinity and TDS ranges.

1. Fill a sample cup with the standardizing solution.
2. Turn the meter ON and insert the electrode into the solution. Tap or move the electrode in the sample to dislodge any air bubbles.
3. Press and hold the **CAL**/**RECALL** button (approximately 2 seconds) until "CAL" appears in the lower (temp) display. The main display will start flashing.
4. The meter will automatically recognize and calibrate to the standardizing solution. The display will briefly indicate "SA", "End" and then return to the measurement mode after a calibration. Note: The "SA" will not appear if the calibration fails.
5. The "range calibrated" symbol will appear in the display for each range that is calibrated during that power on 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, but only the calibration data for the currently calibrated range is replaced. The other two ranges keep the existing calibration data, just 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.

Considerations and Techniques

- Do not touch the inner surfaces of the conductivity electrodes. Touching the surface of the platinized electodes may damage and reduce the life of the probe.
- Store the electrode dry, in the storage cap.
- 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.

Operational Matrix

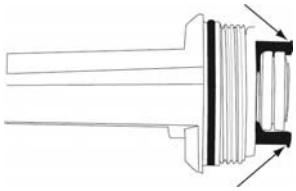
Function / Resulting Action	***Power Status***	***Mode Setting***	***Required Key Press Sequence***
On/Off	On or Off	Any	Momentary press of the ON/OFF key
Calibration	On	Conductivity	Press & hold CAL/RECALL key for 2 seconds, until it enters CAL function
Store Reading	On	Any measure mode	Momentary press of the MODE/HOLD key
Hold Release	On	While In Hold Mode	Momentary press of the MODE/HOLD key
Enter Memory Retrieval	On	Any measure mode	Momentary press of the CAL/RECALL key followed by a momentary press of the MODE/HOLD key (Within 4 seconds)
Scroll Stored Readings	On	Memory Recall	Momentary press of the MODE/HOLD key (Displays “last in first out”)
Exit Memory Retrieval	On	Memory Recall	Momentary press of the CAL/RECALL key
Clear Stored Memory	On	Any Measure Mode	Press and hold the ON/OFF key for 4 seconds, until “clr” is displayed.
Change Measurement Mode	On	Any	Press and hold the MODE/HOLD key for at least 2 seconds (the modes will scroll by until the key is released)
Enter Cond/TDS Ratio	On	TDS (ppm or mg/l)	Press and release the CAL/RECALL key twice in quick succession
Change Cond/TDS Ratio	On	TDS ratio	Momentary press of the MODE/HOLD key (each key press increases the ratio by 0.1, the value cycles from 0.4 - 1.0)
Exit Cond/TDS Ratio	On	TDS ratio	Momentary press of the CAL/RECALL key
Change Temperature Units	Off	n/a (off mode)	Press and hold the CAL/RECALL key then momentarily press the On/Off key. Release the CAL/RECALL key after the "SELF CAL" lights
Override Auto Power Off	On	Any measure mode	Momentarily press the Cal Key then simultaneously press and hold the ON/OFF & MODE/HOLD key for approximately 2 seconds, until “oFF” is displayed
Default Reset	OFF	n/a	Simultaneously press ON/OFF, CAL/RECALL and MODE/HOLD momentarily. “dFLt” will be displayed.

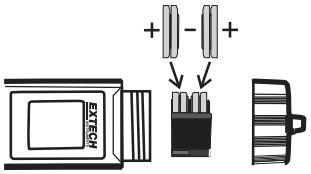
Specifications

Display	2000 count LCD with Bargraph
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	0.0°C to 60.0°C (32.0°F to 140°F)
Temperature Range	0.0°C to 65.0°C (32.0°F to 149°F)
Temperature Resolution	0.1 up to 99.9, 1 >100
Temperature Accuracy	±1°C; 1.8°F (from 0 to 50°C; 32 to 122°F)
	±3°C; 5.4°F (from 50 to 65°C; 122 to 149°F)
Accuracy	Conductivity: ±2% full scale TDS: ±2% full scale Salinity: ±2% full scale
Measurement Memory	25 tagged (numbered) readings
Low battery indication	'BAT' appears on the LCD
Power	Four (4) CR2032 Lithium Ion Batteries
Auto power off	After 10 minutes (override available)
Operating conditions	-5°C to 50°C (23°F to 122°F)
Dimensions	40 x 187 x 40 mm (1.6 x 7.4 x 1.6")
Weight	87 g (3.1 oz)

Battery Replacement

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





Never dispose of used batteries or rechargeable batteries in household waste.
As consumers, users are legally required to take used batteries to appropriate collection sites, the retail store where the batteries were purchased, or wherever batteries are sold.
Disposal: Do not dispose of this instrument in household waste. The user is obligated to take end-of-life devices to a designated collection point for the disposal of electrical and electronic equipment.

Electrode Replacement

1. To remove an electrode, unscrew and completely remove the electrode collar (turn the collar counter-clockwise 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 Recommendations

When cleaning the probe, take care not to scratch or damage the platinized electrode surfaces.

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 of 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 MODE/HOLD key to exit “HOLD” mode
“BAT” message	Batteries are low	Replace batteries
Unit will not calibrate in conductivity mode	Contaminated conductivity standards	Use fresh standards
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 turn on	Batteries are low or dead	Replace batteries
Unit will not turn on	Batteries installed with incorrect polarity	Replace batteries, observe polarity
Unit will not respond to any key presses	Internal fault	Perform hard reboot: Remove batteries, hold ON/OFF switch down for 5 seconds, replace batteries