EXTECH®

USER MANUAL

ExStik® EC500

pH / Conductivity / TDS / Salinity / Temperature Meter

CE

Introduction

Congratulations on your purchase of the ExStik EC500 pH / Conductivity / Total Dissolved Solids (TDS) / Salinity meter. With the EC500's dynamic cell-constant technology it is possible to measure a wide range of Conductivity, TDS, and Salinity samples using the same electrode. Careful use and maintenance will provide years of reliable service.

Powering the Meter

The EC500 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 EC500. The auto power off feature switches OFF the EC400 after 10 minutes of inactivity.

Getting Started

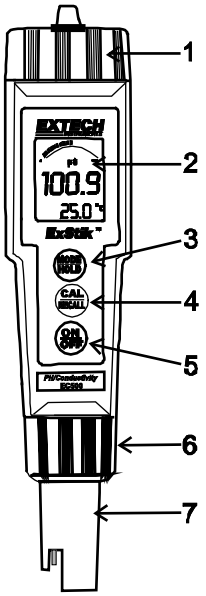
- Remove the cap from the bottom of the meter to expose the pH electrode, reference junction and conductivity electrodes.
- Before the first use or after storage, soak the electrode in tap water or pH 4 buffer solution for about 10 minutes.
- White KCL crystals may be present in the cap or on the electrode. This is to be expected depending on the length of time in storage. These crystals will dissolve while soaking the electrode or they can be rinsed with tap water.
- For best results calibrate with pH 7 buffer solution first, then calibrate with the buffer solution closest to the expected pH value of the solution or material to be tested.
- To preserve the pH electrode life, keep the sponge in the protective cap soaked with tap water or pH 4 buffer solution.
- 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.

Meter Description

Front Panel Description

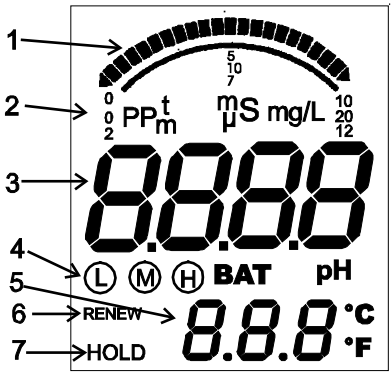
1. Battery compartment cover
2. LCD
3. MODE/HOLD button
4. CAL/RECALL button
5. ON/OFF button
6. Electrode Collar
7. pH/Conductivity Electrode

(Note: The Electrode cap is not shown)



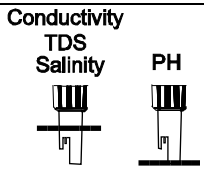
LCD Display

1. Bar graph display
2. Measurement units
3. Main display
4. Range calibration and low battery indicators
5. Temperature display
6. Renew indicator
7. Reading hold indicator



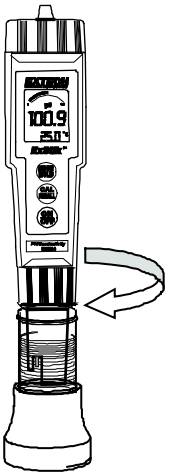
Operation

Sample Preparation

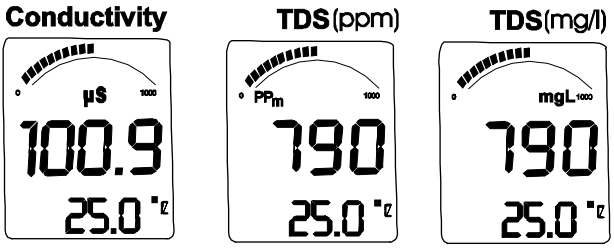


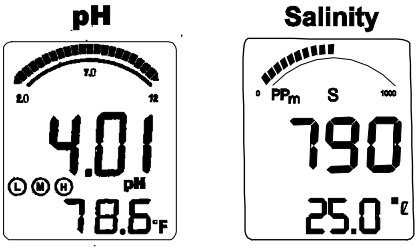
1. For Conductivity, TDS or Salinity place the test sample in a sample cup with sufficient depth (1 in., minimum) to cover the electrode. Stir the solution to remove air bubbles.
2. For pH, place the tip of the electrode in the sample or make contact with a wet surface.

Measurements



1. Press the **ON** button. The icons 8888 and **SELF CAL** will appear during the power-up diagnostics.
2. Long press **MODE/HOLD** 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 if in the Conductivity, TDS or Salinity mode.
5. If in the Conductivity, TDS or Salinity modes, the meter will auto-range and display the reading, as shown below.





Changing Measurement Function

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

1. Long press **MODE/HOLD** for 2 seconds; the display will begin to scroll through the units.

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

   Note: The HOLD function cannot be ON when changing the measurement function. If **HOLD** is displayed, press the **HOLD** button to turn it off.

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

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

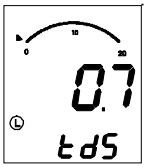
The TDS value is determined by multiplying a conductivity reading by a known ratio factor. The meter allows for selecting a conversion ratio in the range of 0.4 to 1.0. The ratio varies with the application, but is typically set between 0.5 and 0.7.

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. Short press **CAL/RECALL** twice. The stored ratio will appear in the display.
2. Press **MODE/HOLD** to increase the ratio value in steps of 0.1.
3. When the desired ratio is displayed, short press **CAL/RECALL** to store the value and return to the normal mode.
4. If no buttons are pressed within 5 seconds, the meter returns to the measure mode.
5. Data Hold Mode
6. 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 **BAT** icon appears, replace the batteries. Refer to the Maintenance section.

Auto Power OFF

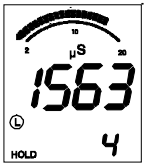
APO switches OFF the meter after 10 minutes of inactivity.

Auto Power OFF Disable

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

Storing, Recalling, Clearing Readings

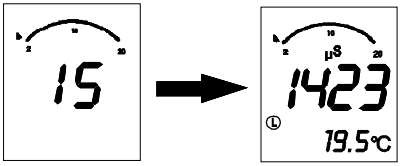
Storing Readings



1. Press **MODE/HOLD** 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 **MODE/HOLD** again to exit the HOLD mode and return to normal operation.
3. The maximum number of readings that can be stored is 25. Previously stored readings (starting with number 1) are overwritten when the limit is reached.

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. 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**.

Clearing Stored Readings

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

Calibration

pH Calibration (1, 2, or 3 points)

1. Place the electrode into a buffer solution (4, 7, or 10). Long press CAL/RECALL until CAL appears in the lower (temp.) display. When performing a 2- or 3-point calibration, use a pH 7 buffer first, then follow with a pH 4 and then a pH 10 buffer.
2. The meter automatically recognizes the solution and calibrates to that value (the circled number on the LCD will match the solution). Note that if the solution is more than 1 pH unit different than the L (4), M (7), or H (10) pH buffer, or if the electrode slope is low, the meter will assume an error and abort the calibration (End will appear, and the unit will return to the measure mode.)
3. During calibration, the pH reading flashes on the main display.
4. When calibration is complete, the meter displays SA, then End, and exits the mode.
5. The relevant circled indicator (L, M, or H) appears when a particular calibration or series of calibrations has been completed within one power on cycle. When the meter is turned off, the circled indicator configuration and the calibration data will be retained.
6. For a two- or three-point calibration, repeat steps 1-4.
7. See the section Reset Calibration Data to clear all calibration data.

CAL Reminder

When in pH measurement mode, the CAL icon appears if a pH calibration has not been performed after 15 on/off power cycles. The CAL icon is a reminder only and will switch OFF after calibration.

RENEW Display

A flashing **RENEW** warning indicates that the probe is not performing to expected specifications. If cleaning and recalibration does not clear the **RENEW** icon, replace the probe (see optional accessories list). The **RENEW** icon appears because the pH electrode slope has fallen below 70% of nominal.

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. Release all buttons when the display switches ON.
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.

Conductivity Calibration

Accuracy verification should be performed once per month, under normal use. If calibration is required, a conductivity solution must be used. The meter can be calibrated in any or all three ranges. ONLY standardizing solutions of 84µS/cm, 1413µS/cm or 12.88mS/cm (12,880µS/cm) may be used for the automatic calibration procedure. No other calibration values are permitted.

Calibration is always performed in conductivity mode (salinity and TDS is calculated from conductivity measurements, and do not require calibration).

1. Fill a sample cup with the standardizing solution.
2. Switch ON the meter and insert the electrode in the solution. Tap or move the electrode in the sample to dislodge air bubbles.
3. Long press **CAL/RECALL** (approximately 2 seconds) until **CAL** appears in the lower (temperature) 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** and **End,** and then return to the measurement mode after calibration.
   Note: **SA** will not appear if the calibration fails.
5. The **L**, **M**, and/or **H** symbol(s) will appear for the range(s) calibrated during the current power ON/OFF cycle.
   - Ⓛ Low range: 84µS/cm
   - Ⓜ Medium range: 1413µS/cm
   - Ⓗ 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 the section **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 performed for more than one point the lowest value standard should be used first, to obtain the best accuracy.

Best Practices for Calibration and Measurements

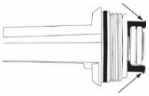
- Do not touch the inner surfaces of the conductivity electrodes. Touching the surface of the platinized electodes may damage and reduce the life of the probe.
- Always rinse the electrode in de-ionized water between measurements to avoid cross contamination of the sample. Double rinsing is recommended when high accuracy is required.
- Periodically, accumulated salt deposits from the reference electrode may build up in the storage cap, and should be rinsed away. These deposits could affect measured values of low conductivity samples.
- When measuring low conductivity samples, extra care is recommended in rinsing the probe to avoid contamination of the sample with electrolyte from the pH reference electrode. This will only be a factor when measuring in the low range, and can be further minimized by increasing the volume of the sample. (Example: Try a 200 to 500 mL sample.)
- If the 20mL sample cup is to be used, then the electrode should not be allowed to sit in the sample for any longer than necessary, to avoid pH electrolyte leakage into the sample, raising the conductivity value.

Operational Matrix

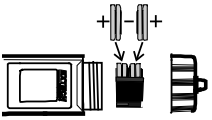
Function / Action	***Power Status***	***Mode***	***Button-Press Sequence***
On/Off	On or Off	Any	Short press ON/OFF
Calibration	On	pH or Conductivity	Long press CAL/RECALL for 2 seconds, until it enters the CAL function
Store Reading	On	Any measure mode	Short press MODE/HOLD
Hold Release	On	While In 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 (last in reading, first reading out)
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 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 (each press increases the ratio by 0.1, the value cycles from 0.4 to 1.0)
Exit Cond/TDS Ratio	On	TDS ratio	Short press CAL/RECALL
Change Temperature Units	Off	n/a (off mode)	Short press ON/OFF while holding down CAL/RECALL. Release CAL/RECALL when **SELF CAL** is lit
Override Auto Power Off	On	Any measure mode	Short press CAL/RECALL, then simultaneously long press ON/OFF and MODE/HOLD for approximately 2 seconds (until **oFF** is displayed)
Default Reset	OFF	n/a	Simultaneously short press ON/OFF, CAL/RECALL and MODE/HOLD. **dFLt** will appear.

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.
- Even 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 122ºF (50ºC), 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.
- Remove and immediately recycle or dispose of batteries from equipment not used for an extended period of time, according to local regulations.

⚠ WARNING

- **INGESTION HAZARD** : This product contains a button cell or coin battery.
- **DEATH** or serious injury can occur if ingested.
- A swallowed button cell or coin battery can cause **Internal Chemical Burns in as little as 2 hours.**
- **KEEP** new and used batteries **OUT OF REACH of CHILDREN.**
- **Seek immediate medical attention** if a battery is suspected to be swallowed or inserted inside any part of the body.

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).

Storage

Store the electrode in the wetting cap with the sponge moistened with pH 4.01 buffer solution.

Cleaning

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

Contaminant	***Cleaning Solution***	***Instructions***
Water soluble substances	Deionized water	Soak or scrub with a soft brush. Recondition in 4 or 7 buffer for 1 hour.
Grease & Oil	Warm water and household detergent	Soak or scrub with a soft brush for 10 minutes, maximum. Rinse thoroughly with DI water, recondition in 4 or 7 buffer for 1 hour.
Heavy grease & Oil	Alcohol	Maximum 5-minute soak, scrub with a soft brush. Rinse thoroughly with DI water, recondition in 4 or 7 buffer for 1 hour.
Lime and hydroxide coatings	10% acetic acid	Soak until coating dissolved, maximum of 5 minutes. Rinse thoroughly with DI water, recondition in 4 or 7 buffer for 1 hour.

Note: Since the EC500 does not have a refillable pH reference electrolyte chamber, it is important not to soak the electrode in the above solutions for more than the recommended time. Doing so may cause a reference potential shift, leading to degradation in electrode performance or failure.

Troubleshooting

Problem	*Possible Cause*	*Action*
Reading is frozen	Unit is in HOLD mode	Press HOLD to exit
BAT message	Batteries are low	Replace batteries
Unit will not calibrate in pH	Low pH slope	Replace electrode, see reorder information
Unit will not calibrate in pH	Clogged or contaminated reference junction	Clean junction (see cleaning instructions)
Unit will not calibrate in pH	Damaged or worn out sensing membrane	Replace electrode
Unit will not calibrate in pH	Contaminated pH buffers	Use fresh buffers
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 correct polarity
RENEW message	pH sensor needs recalibration	Recalibrate unit with fresh buffers
RENEW message	pH sensor slope has fallen below acceptable limits	Replace electrode
Unit will not respond to any key presses	Internal fault	Remove batteries, long press ON/OFF for 10 seconds, replace batteries

Specifications

Display	2000 count LCD with bar graph
pH range	0.00 to 14.00
pH accuracy	±0.01 pH typical
pH ATC range	32°F to 194°F (0°C to 90°C)
pH reference junction	Permanent gel, not refillable
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 auto
Conductivity ATC	2.0% per °C
Conductivity ATC range	32°F to 140°F (0°C to 60°C)
Temperature range	23°F to 194°F (-5°C to 90°C)
Temperature resolution	0.1 up to 99.9, 1 >100
Temperature accuracy	±1.8°F (1°C) from 23 to 122°F (5 to 50°C)
	±5.4°F (3°C) from 122 to 194°F (50 to 90°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 on the LCD
Power	Four (4) CR2032 lithium-ion batteries
Auto power off	After 10 minutes of inactivity (override available)
Operating conditions	23°F to 122°F (-5°C to 50°C)
Dimensions	1.6 x 7.9 x 1.6 in. (40 x 200 x 40 mm)
Weight	3.3 oz. (93 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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