

# User Manual

DOCUMENT #606042REF



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**EcoSense<sup>®</sup> EC300A**

**EcoSense<sup>®</sup> EC300M**

Portable Conductivity, Salinity and  
Temperature Instruments

USER MANUAL

English

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## WARRANTY

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The EcoSense® EC300A/EC300M Instrument is warranted for one year from date of purchase by the end user against defects in materials and workmanship. EC300A/EC300M probes and cables are warranted for one year from date of purchase by the end user against defects in material and workmanship. Within the warranty period, YSI will repair or replace, at its sole discretion, free of charge, any product that YSI determines to be covered by this warranty.

To exercise this warranty, write or call your local YSI representative, or contact YSI Customer Service in Yellow Springs, Ohio. Send the product and proof of purchase, transportation prepaid, to the Authorized Service Center selected by YSI. Repair or replacement will be made and the product returned, transportation prepaid. Repaired or replaced products are warranted for the balance of the original warranty period, or at least 90 days from date of repair or replacement.

### **Limitation of Warranty**

This Warranty does not apply to any YSI product damage or failure caused by: (i) failure to install, operate or use the product in accordance with YSI's written instructions; (ii) abuse or misuse of the product; (iii) failure to maintain the product in accordance with YSI's written instructions or standard industry procedure; (iv) any improper repairs to the product; (v) use by you of defective or improper components or parts in servicing or repairing the product; or (vi) modification of the product in any way not expressly authorized by YSI.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. YSI's LIABILITY UNDER THIS WARRANTY IS LIMITED TO REPAIR OR REPLACEMENT OF THE PRODUCT, AND THIS SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY DEFECTIVE PRODUCT COVERED BY THIS WARRANTY. IN NO EVENT SHALL YSI BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY DEFECTIVE PRODUCT COVERED BY THIS WARRANTY

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# SAFETY INFORMATION

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Please follow the guidelines below, and read this manual in its entirety to ensure safe operation of the unit.

## **Avoiding Damage to the Instrument - Precautions**

### **The Instrument Case**

Though the instrument is housed in a water-proof IP67 case, DO NOT use it underwater. The cable connector is not waterproof unless the cap is installed. In case of submersion without the cap connected, follow these steps immediately:

1. Remove the battery and reinstall the battery cover.
2. Dry the connector if necessary, and replace the conductivity probe. Rinse unit carefully with distilled water. After rinsing and drying, inspect and clean connectors to remove all contaminants that may affect probe connections.
3. Wait for unit and all connections to dry before reinstalling the battery and resuming operation.
4. If the unit does not function correctly after step 3, contact YSI for possible repair or replacement.

## **PACKAGE CONTENTS**

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<b>Item #</b>	<b>Contents</b>
606079	EC300A meter, manual, and 9V battery
606068	EC300A meter, manual, 9V battery, transport case, probe with 1 meter cable
606069	EC300A meter, manual, 9V battery, transport case, probe with 4 meter cable
606047	EC300A meter, manual, 9V battery, transport case, probe with 10 meter cable
601034	EC300M meter, manual, USB cable, and 9V battery
601035	EC300M meter, manual, USB cable, 9V battery, transport case, probe with 1 meter cable
601036	EC300M meter, manual, USB cable, 9V battery, transport case, probe with 4 meter cable

Item #	Contents
601037	EC300M meter, manual, USB cable, 9V battery, transport case, probe with 10 meter cable

## UNPACKING

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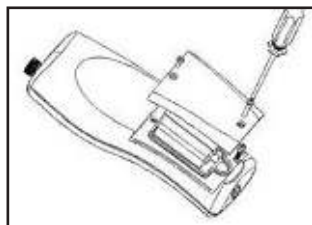
Carefully unpack the unit and accessories, and inspect for shipping damages. Compare received parts with materials listed in the [Package Contents](#) section. Notify YSI immediately of any damage or missing parts. Save all packing materials until satisfactory operation is confirmed.

## INSTALLATION

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### Battery Installation

An initial display of "BAT" on the LCD indicates approximately one hour of battery life for unit operation within specifications. Replace battery when "BAT" appears on the LCD.



*Figure 1*

To replace battery, remove the two battery cover screws and the battery cover and o-ring (Figure 1). Replace the 9V battery. Replace the battery cover and o-ring (be sure to align the o-ring correctly to prevent a bad seal) and fasten the two battery cover screws.

### Battery Disposal

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This instrument is powered by a 9 volt battery, which the user must remove and dispose of when the batteries no longer power the instrument. Disposal requirements vary by country and region, and users are expected to understand and follow the battery disposal requirements for their specific locale.

## INTENDED USE AND GENERAL OVERVIEW

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The YSI model EC300A/EC300M is a precise instrument that measures conductivity, salinity and temperature. A built-in microprocessor calculates and compensates for all parameters related to conductivity and temperature determinations.

This instrument is waterproof (IP67) when the connector cap is installed. The mechanical touch keys are highly reliable with tactile and audio feedback. This instrument uses one 9V battery. Recalibration is not required when power is restored.

The front of the instrument has a large LCD that displays temperature and either temperature compensated or non-temperature compensated conductivity, salinity or TDS simultaneously along with user prompts and mode indicators. The unit prompts users through calibration and measurement procedures.

The model EC300A/EC300M is available with a single four-electrode cell. Other features include automatic conductivity ranging, automatic temperature compensation, long battery life, and 50/60 Hz AC noise rejection. This meter is universal and user-friendly for field, industrial and laboratory applications.

Key differences between the YSI EC300A and EC300M include:

- EC300A can store 50 data sets, while the EC300M can store 250 data sets.
- A real-time clock is included on the EC300M for date/time stamp of saved data.
- The EC300M features a waterproof USB port with cover that will allow customers to download stored measurement data to a PC.
- A recal prompt on the EC300M allows users to select a recalibration interval.

# DISPLAY DESCRIPTION

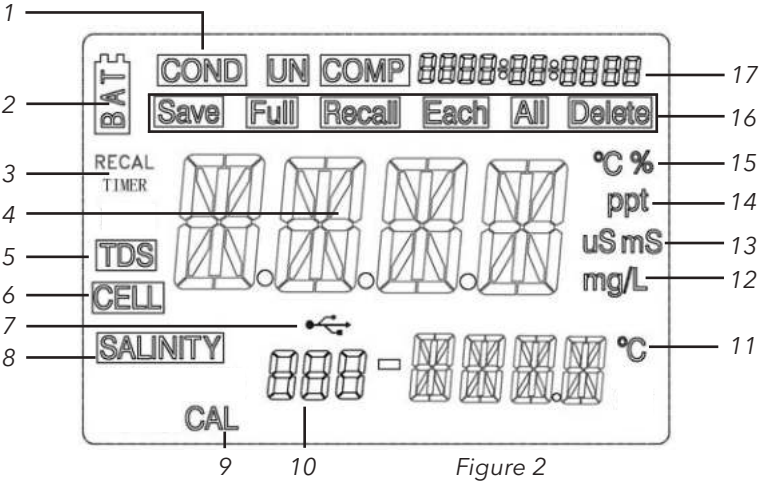


Figure 2

Number	Description
1	Displays when measuring conductivity.
2	Low battery indicator
3	Recal Timer indicator (EC300M only)
4	Main display for compensated and uncompensated conductivity, salinity and TDS values.
5	Displays when measuring total dissolved solids.
6	Indicates conductivity cell constant value.
7	USB/PC connection indicator (EC300M only)
8	Displays when measuring salinity.
9	Calibration mode indicator
10	Data set number
11	Temperature display
12	Indicates TDS measurement
13	Indicates conductivity measurement
14	Indicates salinity measurement
15	°C: Flashes during temperature compensated conductivity measurement. During calibration, indicates temperature reference unit.  %: Displays during calibration; indicates temperature coefficient unit.



<i>Number</i>	<i>Description</i>
16	Save, Full, Recall, Each, All, Delete: Instrument's data storage indicators.
17	Date/Time display (EC300M only)

## OPERATIONAL KEYS DESCRIPTION

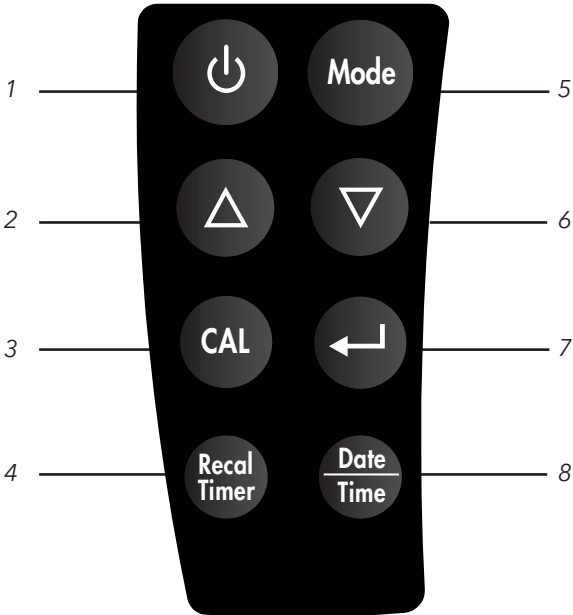




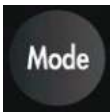




Figure 3

<i>Number</i>	<i>Key</i>	<i>Description</i>
1		<b>Power</b> key. Turns the unit on or off.
2, 6		<b>Up and down arrow</b> keys. Increases or decreases the display value as desired.
3		<b>Calibration</b> key. Press to enter the calibration mode.

4		<p><b>Recal Timer</b> key (EC300M only). Press to enter the Recal Timer input display.</p>
5		<p><b>Mode</b> key. Selects display mode. In Normal operation, press Mode to switch the display between uncompensated conductivity, temperature compensated conductivity, salinity, total dissolved solids (TDS), Recall and Delete. In calibration mode, this key exits the current calibration and displays the next calibration parameter.</p>
7		<p><b>Enter</b> key. Pressing Enter saves the current measurement into memory, confirms mode selection (rcl/delete), confirms calibration steps, and confirms data deletion. On the EC300M, this key confirms recal timer entry and date/time selections.</p>
8		<p><b>Date/Time</b> key (EC300M only). A short press (i.e. key is not held) of the Date/Time key changes the display in the upper right corner to be either Date or Time. Pressing and holding for 3 seconds will allow date and time information to be updated. Pressing and holding for 6 seconds will allow for the date (e.g. MM/DD/YYYY) and time format (12 or 24 hour) settings to be changed.</p>

## OPERATIONAL PROCEDURES

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### Measurement Modes

1. Temperature - Current solution temperature continually displays.
2. Temperature Compensated Conductivity - Measurement of conductivity, compensated to 25°C or another specified value between 15 and 25°C. Expressed as uS/cm or mS/cm with a flashing "°C".


3. Uncompensated Conductivity - Direct measurement of conductivity, not compensated to a specific temperature. Expressed as  $\mu\text{S}/\text{cm}$  or  $\text{mS}/\text{cm}$ .
4. Salinity - Measurement of salinity; expressed in parts per thousand (ppt).
5. TDS - Measurement of total dissolved solids (TDS); expressed in milligrams per liter (mg/L)

Carefully observe the units displayed at the far side of the LCD to determine the desired mode.


## Calibration

Calibration setup contains five sections: TDS, Cell, Temperature Coefficient, Temperature reference, and Conductivity Calibration. To access these sections:


1. Connect the conductivity probe and cable assembly to the unit and turn the unit on. The screen will display CELL and the cell constant of the conductivity probe.
2. Allow temperature readings to stabilize, then press **CAL** to enter the calibration mode; CAL appears on the LCD. Press **MODE** to sequentially display the following sections:


**Note:** Press **Enter**  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


TDS is determined by multiplying conductivity (mS) by a TDS factor. The default factor value is 0.65. To change the TDS factor, use the up and down keys to adjust the value between 0.30 and 1.00. Press **Enter**  to save the new value, or press **MODE** to cancel the change and display the CELL screen.

## CELL


The second screen will display CELL and the current cell value. The default cell value is 5.00 and is displayed in the lower right of the screen. The unit allows a variance of  $\pm 0.50$  before displaying an error message. The cell value cannot be adjusted at this screen; calibrating conductivity is the only way to adjust the cell constant. Press **Enter**  to reset the cell constant to 5.00 and display the Temperature Coefficient screen.

**Note:** Be certain to press **Enter**  to reset the cell constant to 5.00. If **MODE** is pressed, the unit retains the previous cell constant and calibrates from a value that is already offset.


## 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 and down keys to adjust the value between 0 and 4.00%. Press **Enter**  to save the new value, or press **MODE** to cancel the change and display the Temperature Reference screen.

## Temperature Reference

The unit uses the temperature reference value to calculate temperature compensated conductivity. The default value is 25°C. To change the temperature coefficient, use the up and down keys to adjust the value between 15 and 25°C. Press **Enter**  to save the new value, or press **MODE** to cancel the change and display the Conductivity Calibration screen.


## Conductivity Calibration


1. Immerse the probe in a standard of known conductivity, preferably a standard in the middle range of the solutions to be measured. Completely submerge the probe without touching the sides of the calibration container. Shake the probe lightly to remove any air bubbles trapped in the conductivity cell.
2. Allow temperature to stabilize. The message 'rAng' (range) may display briefly to indicate unit auto-ranging; this is normal. After temperature stabilization, use the up and down keys to adjust the conductivity value to that of the conductivity standard at 25°C. Press **Enter**  to calibrate. The unit beeps twice to indicate a successful calibration, then automatically switches to normal operation mode.



## Conductivity Measurements

1. Turn the unit on. Place the probe in the solution to be measured. Completely submerge the probe. Shake the probe lightly to remove any trapped air bubbles in the conductivity cell.
2. Press **MODE** to enter the desired measurement mode. The message 'rAng' (range) may appear briefly on the display indicate auto-ranging; this is normal. Allow temperature to stabilize before taking measurements.

## Saving, Viewing and Deleting Data

The EC300A can save 50 data records, while the EC300M can save 250 data records. When in measurement mode, press Enter  to save a record. The instrument will confirm saving the data by displaying "Save" and the data record number for one second. "Full" is displayed when trying to save data and memory is full.

To view saved data, press Mode until "Recall" is displayed and then press Enter . Use the Up or Down arrow keys to review different saved records. Press Mode to escape back to measurement mode.

To delete data records, press Mode while in measurement mode until "Delete" is displayed. Press Enter . "All" will be displayed and blinking. Press the Up or Down arrow key to switch between delete 'All' or 'Each' options. Select either 'All' or 'Each' by pressing Enter  while that option is displayed.

If 'All' is selected, all records will be deleted from memory and 'None' will be displayed. Press Mode twice to return to the measurement mode.

If 'Each' is selected, the Up and Down arrow keys will allow you to scroll through the saved data records. Press Enter to delete the selected record. All records after the deleted record will shift up to keep the records in sequential order. For example, if record 3 is deleted, record 4 will become record 3 and record 5 will become record 4. Press Mode twice to return to the measurement mode.

## Downloading Data to a Computer - EC300M Only

The EC300M features a micro USB connection that allows the instrument to be connected to a computer with Windows 7 or Windows 10 as the operating system. Once connected, data saved to the meter can be downloaded to the computer.

1. A USB cable is included with all EC300M instruments. Plug the micro USB connector into the EC300M instrument and the USB connector into a computer.
2. Turn the EC300M instrument on. A driver will install from the instrument to the computer.
3. Open Windows Explorer. The PC will recognize the instrument as a removable drive.



Windows Explorer Icon

4. Copy and paste the .csv file from the instrument to a location on the computer. This file can be opened in Excel®.


**Note:** The original .csv file should be left on the EC300M instrument. Do not try to modify this file.

**Note:** If the .csv file is opened with Excel® and the data is not formatted correctly (e.g. a temperature reading is interpreted as a date), please refer to the Troubleshooting section.

5. The instrument can be disconnected from the computer. The original .csv file should still be located on the EC300M instrument.

## Recal Timer - EC300M Only



The Recal Timer feature provides a reminder to recalibrate the DO probe. If enabled, 'Recal' will be displayed when the user-defined interval has elapsed.



After pressing the **Recal Timer** key, use the Up and Down arrow keys to adjust the value for the recal prompt in number of days. Press **Enter**  to confirm. The instrument will return to the run screen.

Any value between 0 and 60 days can be selected. Set the value to 0 to disable the Recal Timer.

## Date/Time Settings - EC300M Only

A short press (i.e. key is not held) of the **Date/Time** key changes the display in the upper right corner to be either Date or Time.

Press and hold the **Date/Time** key for 3 seconds to set date and time information. Use the up and down arrow keys to adjust Hour, Minute (Min) and Second (Sec). Press **Enter**  to confirm each selection. After adjusting time, adjust date information by using the up and down arrow key to adjust the MM (month), DD (Day) and YYYY (Year) information. Press **Enter**  to confirm each selection.

Press and hold the **Date/Time** key for 6 seconds to set the date/time format. Use the Up and Down arrow keys to display the desired Date format (MM/DD/YYYY, DD/MM/YYYY, or YYYY/MM/DD), followed by **Enter**  to confirm the selection. Next, use the Up and Down arrow keys to display the desired Time format (12-hour or 24-hour), followed by **Enter**  to confirm the selection.

# TROUBLESHOOTING

## Error Messages on Display

<i>Main Display</i>	<i>Problem</i>	<i>Possible Solution</i>
OvEr	<ul style="list-style-type: none"> <li>Conductivity is &gt;200.0 mS</li> <li>Salinity is &gt; 70.00 ppt</li> </ul>	<ul style="list-style-type: none"> <li>Completely submerge the probe.</li> <li>Allow sufficient time for the electrode and Temp probe stabilization.</li> <li>Recalibrate with correct value for the conductivity standard.</li> <li>Replace conductivity standard.</li> <li>Clean cell.</li> <li>Return for service.</li> </ul>
OvEr/Undr during calibration	<ul style="list-style-type: none"> <li>Cell Constant Calibration is out of range</li> </ul>	

<i>Main Display</i>	<i>Secondary Display</i>	<i>Problem</i>	<i>Possible Solution</i>
OvEr/Undr	OvEr	Temperature >90.0 °C	<ul style="list-style-type: none"> <li>Decrease/ Increase the sample temperature.</li> <li>Return for service.</li> </ul>
	Undr	Temperature < -10.0 °C	

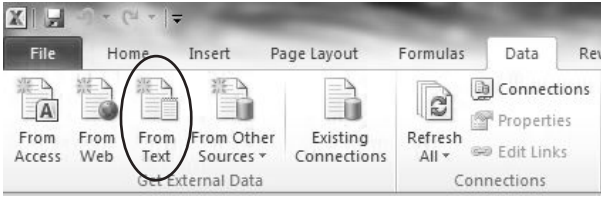
## Opening the Data File with Excel®

Depending on the region and language setting of your PC, measurement data might be formatted incorrectly by Excel® when the data file is opened.

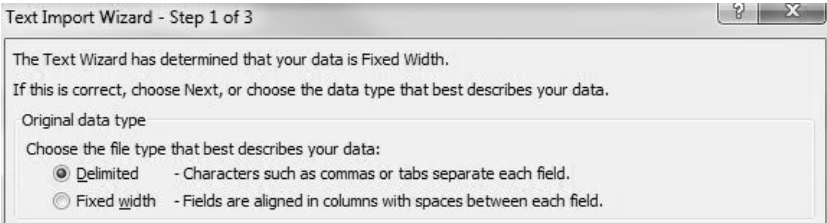
This is sometimes encountered with German set as the PC language, as a German date format typically utilizes a decimal (DD.MM.YYYY). The EC300M utilizes a decimal as the radix, so a temperature of **31.1** is sometimes interpreted by Excel® as **31. Jan** when German is set as the PC language.

If a data file is opened in Excel® and measurement data is incorrectly interpreted as something other than a number, please follow these steps:

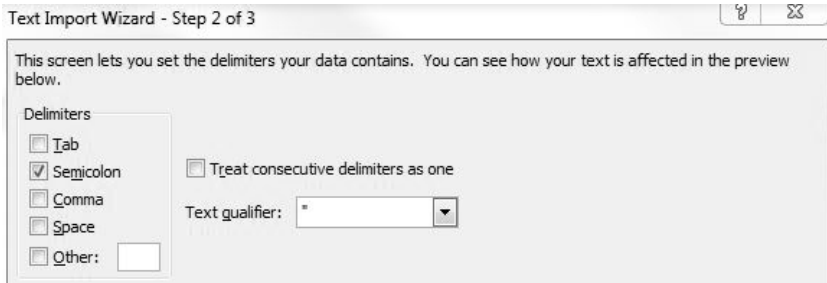
1. Open a blank Excel® spreadsheet.
2. Go to the **Data** tab and select **From Text**.



3. Choose to **Import** the data file you have copied to your PC. Don't select the original data file that is still on the instrument.
4. Under Step 1 of the Text Import Wizard, choose **Delimited**.

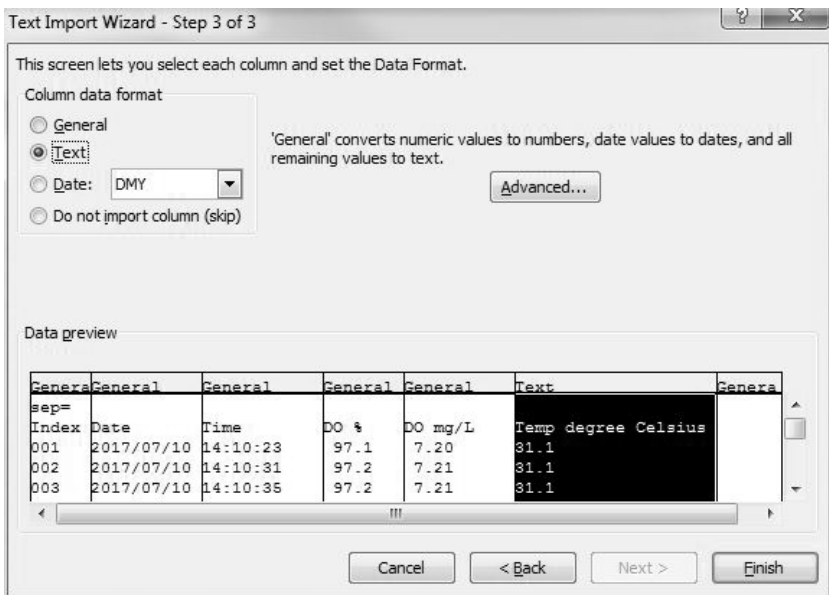


5. Under Step 2 of the Text Import Wizard, choose **Semicolon**.



6. Under Step 3, click on the column with the incorrectly formatted data. This column should be highlighted in black. Choose **Text** under **Column data format**. Do this for each column with incorrectly formatted data.





7. Select **Finish**, then choose where you want the data to be placed on your opened spreadsheet.

## MAINTENANCE

The most important requirement for accurate and reproducible conductivity measurements is a clean cell. A dirty cell changes the conductivity of a solution through contamination. Clean the cell thoroughly before storing it. To clean the conductivity cell:

1. Dip the cell in cleaning solution and agitate for two to three minutes. Any foaming acid tile cleaner, such as Dow Chemical Bathroom Cleaner, should clean adequately. For a stronger cleaner, use a solution of 1:1 isopropyl alcohol and 1 N HCl. Remove the cell from the cleaning solution.
2. Use the nylon brush (supplied) to dislodge any contaminants from inside the electrode chamber.
3. Repeat steps one and two until the cell is completely clean. Rinse the cell thoroughly in deionized, or clean tap water.



## ACCESSORIES / PART NUMBERS

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<i>Part Number</i>	<i>Description</i>
606044	1 meter probe and cable assembly
605395	4 meter probe and cable assembly
605396	10 meter probe and cable assembly
606043	Carrying case, hard sided
605139	Carrying case, soft sided

## TECHNICAL SERVICES

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Telephone: 800 897 4151 (USA)

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Internet: [ysi.com](http://ysi.com).

## SPECIFICATIONS

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These specifications represent typical performance and are subject to change without notice. For the latest product specification information, please visit YSI's website at [ysi.com](http://ysi.com) or contact YSI Tech Support.

<i>Parameter</i>	<i>Range</i>	<i>Resolution</i>	<i>Accuracy</i>
Temperature	-10 to +90 °C (14 to 194 °F)	0.1 °C	±0.2 °C or ±0.4%, whichever is greater
Conductivity	0 to 499.9 µS/cm	0.1 µS/cm	± 1% of reading + 2 µS/cm
	500 to 4999 µS/cm	1 µS/cm	± 1% of reading + 5 µS/cm
	5.0 to 49.99 mS/cm	0.01 mS/cm	± 1% of reading + 0.05 mS/cm
	50 to 200 mS/cm	0.1 mS/cm	± 2.5% of reading + 0.5 mS/cm
Salinity	Calculated; 0.0 to 70.0 ppt	0.1 ppt	±0.2% FS

Reference Temperature (Input during calibration)	15.0 to 25.0°C (59 to 77°F)
Temperature Coefficient (Input during calibration)	0.0% to 4.0%
TDS Constant (Input during calibration)	0.3 to 1.00
Cell Constant Range	4.50 to 5.50
ATC Probe	Thermistor, 10KΩ, at 25 °C
Calibration Backup	Yes
Audio Feedback	Yes, on all keys
Power Source	One 9V battery (included with meter)  Real time clock (RTC) on the EC300M also powered by CR2032 coin battery (3V)
Operating Range - Temperature	0 to 50 °C (32 to 122 °F)
Operating Range - Relative Humidity	Up to 95%
Instrument Casing	Waterproof IP-67 with cable connector cap installed
Weight (with battery)	272 grams (.6 lbs)
Dimensions (L x W x H)	18.7 cm x 7.6 cm x 3.8 cm (7.37 in x 3 in x 1.5 in)
Memory	50 data sets on the EC300A 250 data sets on the EC300M
Auto Shutoff	Automatically powers off after 30 minutes of inactivity
Recal Timer	EC300M only - Customer selects recalibration interval; from 0 to 60 days
Real-Time Clock (RTC) for Date/Time Stamp of Saved Data	EC300M only
Waterproof USB for Downloading Data to PC	EC300M only

Conforms to the following:	
Directives:	EMC 2014/30/EU RoHS 2011/65/EU WEEE 2012/19/EU
Harmonized Standards:	EN61326-1:2013 (IEC 61326-1:2012) IEC 61000-3-2:2005 IEC 61000-3-3:2008 IEC 61000-4-2:2008 IEC 61000-4-3:2006 IEC 61000-4-4:2004 IEC 61000-4-6:2008 IEC 61000-4-8:2009