User Manual
DOCUMENT #606030REF

EcoSense® **pH**100A
EcoSense® **pH**100M

pH, mV and Temperature Instrument

USER MANUAL
English

The EcoSense® pH100A/pH100M Instrument is warranted for one year from date of purchase by the end user against defects in materials and workmanship. pH100A/pH100M probes and cables are warranted for six months 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.

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SAFETY INFORMATION

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 electrode and temperature inputs are not waterproof unless their caps are installed. In case of submersion without these caps installed, follow these steps immediately:

1. Remove the battery and reinstall the battery cover.
2. 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.

The pH Electrode

The pH electrode should not be allowed to dry out. When the electrode is not in use, place a small amount of pH 4 buffer, potassium chloride (KCl) solution, or clean water in the storage bottle included with new electrodes. Install the storage bottle over the pH electrode. If desired, a beaker or another storage container can be used in lieu of the storage bottle.

Deionized (DI) water should *never* be used for storage, as it can permanently damage the pH electrode. DI water *can* be used for rinsing between measurements or calibration points.

PACKAGE CONTENTS

Item #	Contents
606075	pH100A meter, manual, and 9V battery
606067	pH100A meter, manual, 9V battery, transport case, and pH/Temp field probe with 1 meter cable
606033	pH100A meter, manual, 9V battery, transport case, and pH/Temp field probe with 4 meter cable
601031	pH100M meter, manual, USB cable, and 9V battery
601032	pH100M meter, manual, USB cable, 9V battery, transport case, and pH/Temp field probe with 1 meter cable
601033	pH100M meter, manual, USB cable, 9V battery, transport case, and pH/Temp field probe with 4 meter cable

UNPACKING

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.

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.

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 for the splash-resistant feature.

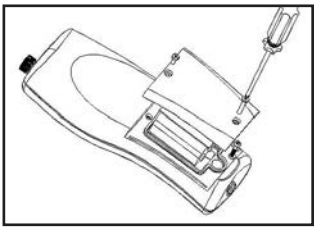


Figure 1

Battery Disposal

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

The YSI pH100A and YSI pH100M are precise water quality instruments that measure pH, mV, and temperature. A built-in microprocessor stores, calculates and compensates for all parameters related to pH determinations including pH electrode temperature characteristics, electrode slope deviations and buffer solutions.

The pH100A and pH100M have a waterproof IP67 case when the connector caps are installed. The 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 pH or mV and temperature simultaneously along with user prompts and mode indicators. The unit prompts the user through calibration and measurement procedures.

An AUTOLOCK feature for both pH and mV measurements enables the unit to automatically sense the end point and "lock" the display to indicate the end point value of a measurement. The pH100A and pH100M can also be used in non-AUTOLOCK mode. AUTOLOCK and user prompts help eliminate most errors in determining pH and mV values, resulting in precise, repeatable, error-free measurements.

The model pH100A/pH100M is available with pH, mV, ORP and ATC (Automatic Temperature Compensation) probes. Other features include electrode offset recognition, electrode slope recognition, electrode efficiency display, built-in buffer coefficients, automatic or manual temperature compensation, long battery life, and 50/60 Hz AC noise rejection. This meter is universal, user-friendly, for field, industrial and laboratory applications.

Key differences between the YSI pH100A and pH100M include:

- pH100A can store 50 data sets, while the pH100M can store 250 data sets.
- A real-time clock is included on the pH100M for date/time stamp of saved data.
- The pH100M features a waterproof USB port with cover that will allow customers to download stored measurement data to a PC.
- A recal prompt on the pH100M allows users to select a recalibration interval.

DISPLAY DESCRIPTION

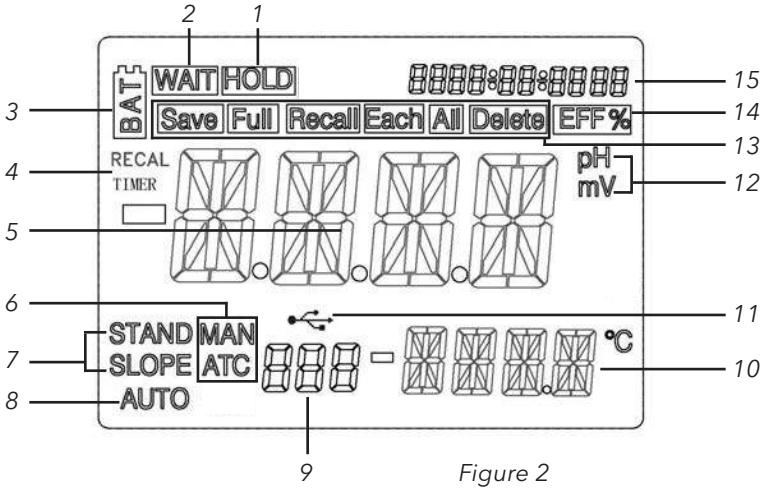


Figure 2

Number	*Description*
1	**HOLD**: Indicates a reading is frozen during Autolock mode.
2	**WAIT**: Displays while unit waits for a stable reading or end point sensing.
3	**BAT**: Low battery indicator.
4	Recal Timer indicator (pH100M only).
5	Main display for pH, mV and probe efficiency values.
6	**ATC/MAN**: "ATC" displays if an ATC probe is connected. Otherwise, "MAN" displays.
7	**STAND/SLOPE**: "STAND" or "SLOPE" remains steady if the parameter has been calibrated. If either one has not been calibrated, it flashes.
8	**AUTO**: Autolock mode indicator.
9	Data set number.
10	Temperature display.
11	USB/PC connection indicator (pH100M only).
12	**pH/mV**: Unit and mode indicators.
13	**Save**, **Full**, **Recall**, **Each**, **All**, **Delete**: Instrument's data storage indicators.
14	**EFF%**: Displays when the user views electrode efficiency. It is recommended to replace the electrode when efficiency is less than 75%.
15	Date/Time display (pH100M only).

OPERATIONAL KEYS DESCRIPTION

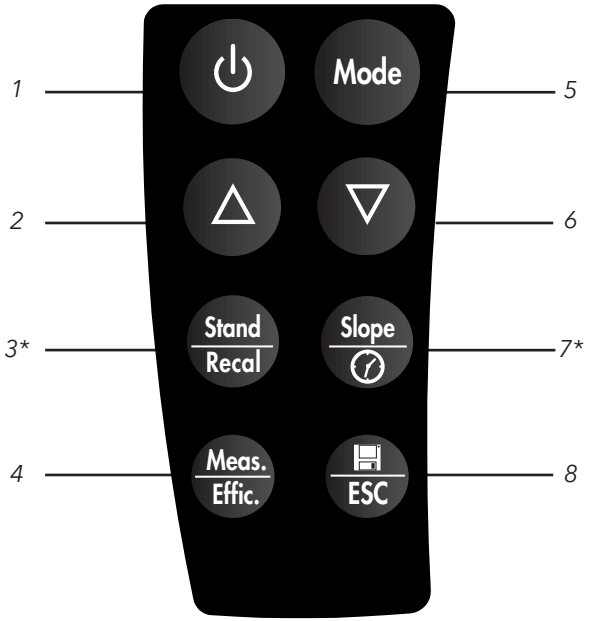
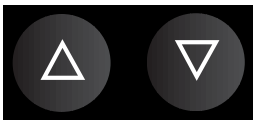


*Figure 3: pH100M Keypad**

The pH100A does not include "Recal" on the* ***Stand* *key or a*  *symbol on the* ***Slope*** *key.*

Number	*Key*	*Description*
1		**Power** key. Turns the unit on or off.
2, 6		**Up and down arrow** keys. Used to scroll through saved data in Recall mode, select the data deletion option in Delete mode, and enter temperature values in manual (MAN) mode. On the pH100M, these keys adjust recal time and select/adjust date time format and information.
3		Press and hold **Stand/Recal** while turning on the power to change the buffer set. Press and hold **Stand/Recal** for 2 seconds once the instrument is on to begin calibrating. Press and hold **Stand/Recal** for 6 seconds to access the Recal Timer input display (pH100M only).

4		Press **Meas./Effic.** to release the unit from AUTOLOCK status when operating in pH-AUTOLOCK or mV-AUTOLOCK mode. Press and hold for 5 seconds to display the electrode efficiency.
5		Press **Mode** to sequentially display pH-AUTOLOCK , mV-AUTOLOCK, pH, mV, Recall and Delete. Calibration values are not affected by changing display mode.
7		Press **Slope/** after calibrating to the first point to then calibrate to the second point. On the pH100M, a short press (i.e. key is not held) when not calibrating 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.
8		Pressing **/ESC** saves the current measurement into memory, confirms mode selection (recall/delete), and confirms data deletion. On the pH100M, this key confirms recal timer entry and date/time selections. Press and hold for 2 seconds to clear the unit when an error message appears. This will clear calibration from memory, so STAND will begin to flash indicating the unit needs to be recalibrated.

OPERATIONAL PROCEDURES

Buffer Set Selection

The pH100A and pH100M have two buffer sets: 7.00, 4.01, 10.01 pH (default) and 6.86, 4.00, 9.18 pH. To change the buffer set, turn off the unit, then press the **Stand/Recal** key while turning on the unit. If the unit is not calibrated and in pH mode, it displays “7.00” if the first set is active and “6.86” if the second set is active.

pH Calibration

The pH100A /pH100M uses a 2-point calibration. The first point must be a 6.86/7.00 buffer, and the second either a 4.00/4.01 or 9.18/10.01.

1. Turn the unit on. Connect the pH electrode to the BNC connector and the ATC/Temp probe to the ATC/Temp connector of the unit; "ATC" displays. Press **Mode** until "pH" displays. AUTOLOCK may be on or off as desired.
2. Place the pH and ATC/temp probes into the first buffer solution (either 7.00 or 6.86). Allow temperature readings to stabilize, then press and hold **Stand/Recal** for 3 seconds to calibrate. If AUTOLOCK is off, the first point has been calibrated. If AUTOLOCK is on, "WAIT" flashes until the unit detects a stable reading. Once the unit calibrates the first point "SLOPE" flashes.

   Note: If no temperature probe is connected, adjust the temperature reading to that of the first buffer using the up or down arrow keys (0.0 to 60 °C) BEFORE pressing **Stand/Recal**.
3. Rinse the pH and ATC/temp probes in distilled water, then place into the second buffer solution (either 4.01/4.00 or 10.01/9.18). Allow temperature readings to stabilize, then press **Slope/** to calibrate. If AUTOLOCK is off, the second point has been calibrated. If AUTOLOCK is on, "WAIT" flashes until the unit detects a stable reading. Once the unit calibrates the second point, the unit beeps once and both "STAND" and "SLOPE" display steadily.

   Note: If no temperature probe is connected, adjust the temperature reading to that of the second buffer using the up or down arrow keys (0.0 to 60 °C) BEFORE pressing **Slope/** .
4. The unit calculates and compensates for the pH electrode slope deviation corresponding to the values of the two calibration buffers. The unit is now dual-point calibrated and ready for measurements. After calibration, press and hold **Meas./Effic.** for about 5 seconds to display the new electrode efficiency.

Using the model pH160 Electrode Simulator

The model pH160 Electrode Simulator can be used to confirm proper instrument calibration. To use the simulator:

1. Install the 9V battery provided.
2. Attach the pH160 to the pH100A. Turn both units on. The pH160 has a small switch to the right of the pH buttons.
3. In pH measurement mode, press one of the pH buffer simulator buttons on the pH160. The corresponding pH value should appear on both screens.

Note: Calibration with the pH simulator calibrates only the instrument - NOT the instrument and probe. For best accuracy, calibrate the pH instrument and probe together using buffer solutions.

pH Measurements

To take pH measurements, "STAND" and "SLOPE" must display steadily, indicating the unit is dual-point calibrated and ready for measurements. If "STAND" and "SLOPE" are blinking, perform a pH calibration before taking measurements.

1. Press **Mode** to enter pH mode with AUTOLOCK on or off as desired. For inherently unstable samples, the unit will not AUTOLOCK. Turn AUTOLOCK off in this case.
2. Rinse the pH electrode and/or ATC/temp probe with distilled water and immerse in the sample to be measured. Remove any air bubbles trapped around the probe by shaking or stirring the probe. Allow the pH and/or temperature to stabilize. If no ATC/temp probe is connected, "MAN" displays, indicating manual temperature compensation. Set unit to display the sample temperature by pressing the up and down arrow keys (-10.0 to 120 °C). If an ATC/temp probe is connected "ATC" displays along with the sample temperature.
3. If AUTOLOCK is off, the pH value of the sample displays on the screen. If both pH and temperature readings are stable, take a reading. If AUTOLOCK is on, press **Meas./Effic.** "WAIT" flashes until the unit determines a stable pH reading.

Temperature Measurements

The model pH100A/pH100M can measure temperature independently with the ATC/Temp probe without using the pH electrode. Place the ATC/Temp probe in the media to be measured. The measured temperature displays.

mV Measurements

1. Connect the optional combination mV electrode to the unit. Press **Mode** to enter mV mode with AUTOLOCK on or off as desired. For inherently unstable samples, the unit will not AUTOLOCK. Use mV mode with AUTOLOCK off in this case.
2. Rinse electrode with distilled water and immerse it in sample to be measured. If AUTOLOCK is off, the mV value of the sample will be displayed on the screen. If AUTOLOCK is on, press **Meas./Effic.** "WAIT" flashes until the unit determines a stable mV reading.

Saving, Viewing and Deleting Data

The pH100A can save 50 data records, while the pH100M can save 250 data records. When in measurement mode, press **/ESC** 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 **/ESC**. 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 **/ESC**. "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 **/ESC** 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 **/ESC** 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 - pH100M Only

The pH100M 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 pH100M instruments. Plug the micro USB connector into the pH100M instrument and the USB connector into a computer.
2. Turn the pH100M 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.
4. Copy and paste the .csv file from the instrument to a location on the computer. This file can be opened in Excel®.

Windows Explorer Icon

Note: *The original .csv file should be left on the pH100M 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 pH100M instrument.

Recal Timer - pH100M Only

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

Press and hold **Stand/Recal** for 6 seconds to access the Recal Timer input display. Use the Up and Down arrow keys to adjust the value for the recal prompt in number of days. Press **/ESC** 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 - pH100M Only

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

Press and hold the **Slope/** 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 **/ESC** 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 **/ESC** to confirm each selection.

Press and hold the **Slope/** 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 **/ESC** 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 **/ESC** to confirm the selection.

TROUBLESHOOTING

Error Messages on Display

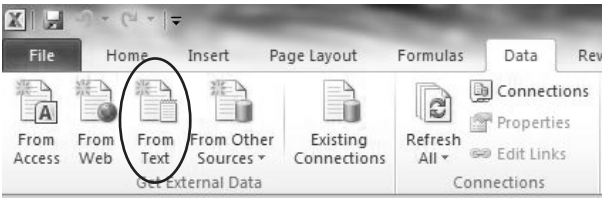
Error	*Possible Cause*	*Corrective Action*
Er 1	• pH electrode offset is greater/ less than +/-1.5 pH. • **Stand/Recal** was pressed before the electrode and ATC/Temp probe settle to within ±1.5 pH of the buffer value. • pH electrode is faulty.	• Replace the buffer and/or the pH electrode. Press ESC. • Allow sufficient time for the electrode and ATC/Temp • Return for service.
Er 2	• pH electrode slope is off by more than 30% of ideal slope. • Slope/ was pressed before the electrode and ATC/Temp probe settled to within 30% of the buffer value. • Buffer 4.00, 4.01, 9.18 or 10.01 is not correct.	• Check that the correct buffer is used and that the electrode slope is not off by more than 30% from the theoretical slope. • Allow sufficient time for the electrode and ATC/Temp probe to stabilize. • Replace the buffer and/or the pH electrode. Press /ESC. • Return for service.
Er 3	• Temperature is out of the 0.0 to 60.0 °C range.	• Bring the buffer temperature within range. • Return for service.
OvEr/ Undr	• Measured pH is out of the 16.00/-2.00 pH range. • Measured mV is out of the 1250/-2000 mV range. • Measured temperature is out of the -10/120 °C range.	• Bring the out of range unit into the correct measuring range. • If units are within proper range, return product for service.

Opening the Data File with Excel®

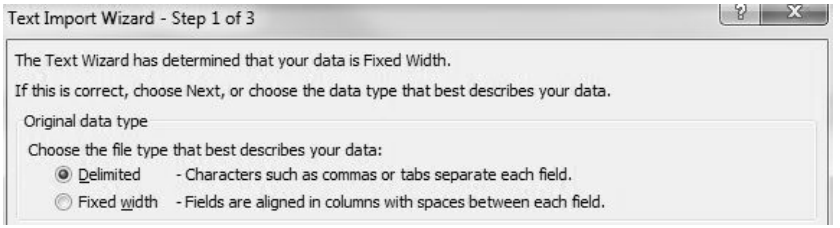
Depending on the region and language setting of your PC, measurement data might be formatted incorrectly by Excel® when the data file is opened.

This is sometimes encountered with German set as the PC language, as a German date format typically utilizes a decimal (DD.MM.YYYY). The pH100M 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:

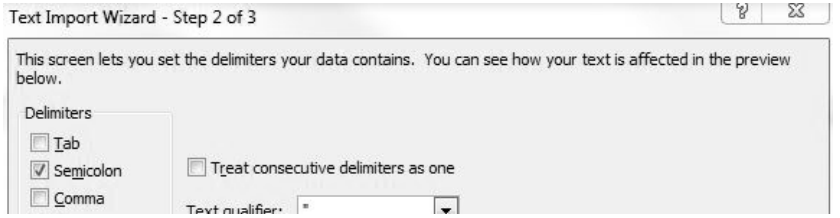
1. Open a blank Excel® spreadsheet.
2. Go to the **Data** tab and select **From Text**.



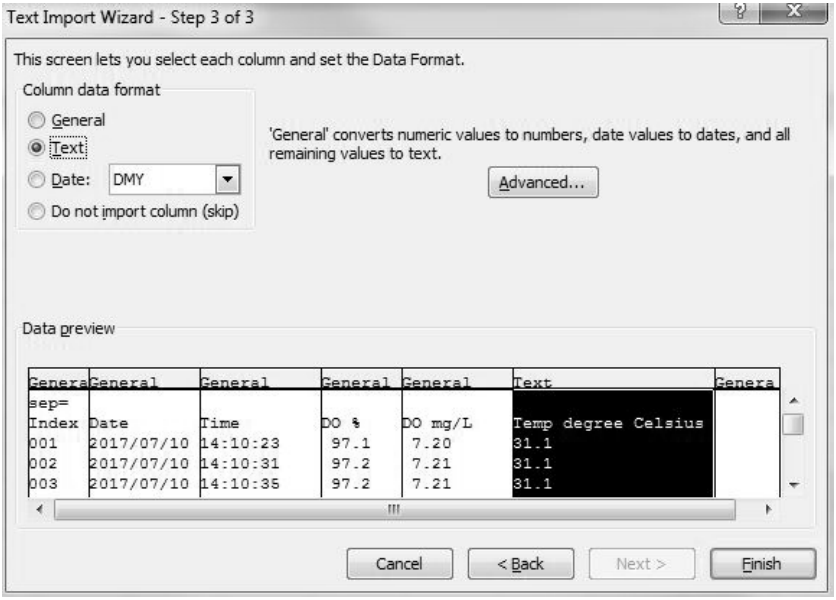
3. Choose to **Import** the data file you have copied to your PC. Don't select the original data file that is still on the instrument.
4. Under Step 1 of the Text Import Wizard, choose **Delimited**.



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.

ACCESSORIES / PART NUMBERS

Part Number	*Description*
605377	pH/Temp field probe with 1 meter cable
605378	pH/Temp field probe with 4 meter cable
605374	pH electrode; laboratory-grade; with 1 meter cable
605376	ORP electrode; laboratory-grade; with 1 meter cable
605375	Temperature probe with 1 meter cable
605380	pH electrode simulator
605409	Cable weight kit
606031	Carrying case, hard sided
605139	Carrying case, soft sided

TECHNICAL SUPPORT

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Email: info@ysi.com
Mail: YSI Incorporated 1725 Brannum Lane Yellow Springs, OH 45387 USA
Internet: ysi.com.

SPECIFICATIONS

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 or contact YSI Tech Support.

Instrument-Only Specifications

These specifications reflect the range and resolution that can be displayed on the instrument, as well as the accuracy of the instrument electronics.

Parameter	*Range*	*Resolution*	*Accuracy*
Temperature	-10.0 to 120 °C	0.1 °C	
pH	-2.00 to 16.00 pH	0.01 pH	±0.01% of full scale or ± 0.03 pH units
mV	-1999 to 1999 mV	1 mV	±0.1% ±1 digit

System Specifications

These specifications reflect the specifications of the entire system (instrument, cable, and sensor). Please visit YSI.com for the most updated system specifications.

Parameter	*Accuracy*
pH	±0.2 pH units
Temperature	±0.3 °C

General Specifications

pH Temp Compensation	AUTO/MANual -10.0 to 120.0 °C (14 to 248 °F)
pH Buffer Recognition	US (4.01, 7.00 & 10.01) or NIST (4.00, 6.86 & 9.18)

pH Buffer Calibration Temp. Range	0 to 60 °C
pH Electrode Offset Recognition	±90 mV at pH 7.00 or 6.86
pH Electrode Slope Recognition	±30% at pH 4.00, 4.01, 9.18 or 10.01
Power Source, Battery Life	One 9V battery (included with meter) Approximately 1000 hour (pH100A) or 150 hour (pH100M) battery life Real time clock (RTC) on the pH100M also powered by CR2032 coin battery (3V)
Instrument Casing	Waterproof, IP-67
Calibration Back-up	Yes
Audio Feedback	Yes, on all touch keys
AUTOLOCK Feature	Yes
Operating Range - Temperature	0 to 50 °C (32 to 122 °F)
Operating Range - Relative Humidity	up to 95%
ATC Probe	Thermistor, 10KΩ, at 25 °C
Dimensions (L x W x D)	18.9 cm x 7.9 cm x 3.8 cm (7.45 in x 3.10 in x 1.50 in)
Weight (with battery)	300 grams (.66 lbs)
Memory	50 data sets on the pH100A 250 data sets on the pH100M
Auto Shutoff	Automatically powers off after 30 minutes of inactivity
Recal Timer	pH100M only - Customer selects recalibration interval; from 0 to 60 days
Real-Time Clock (RTC) for Date/Time Stamp of Saved Data	pH100M only
Waterproof USB for Downloading Data to PC	pH100M 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