Operations Manual
EcoSense® pH100A

Portable pH, mV and Temperature Instrument

- English

CONTENTS

GENERAL INTRODUCTION 3
INITIAL INSPECTION 3
THE INSTRUMENT 3
BATTERY INSTALLATION 3
Battery Disposal 3
KEY FUNCTIONS OF THE MODEL pH100A 4
THE LCD DISPLAY 4
OPERATIONAL PROCEDURES 4
Buffer Set Selection 4
pH Calibration 5
Using the model pH160 Electrode Simulator 5
pH Measurements 5
Temperature Measurements 6
mV Measurements 6
Saving, Viewing and Deleting Data 6
TROUBLESHOOTING 7
SPECIFICATIONS 7

GENERAL INTRODUCTION

The model pH100A is one of three instruments in the EcoSense product line from YSI. The pH100A is a precision tool that measures 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.

This instrument is waterproof (IP67) when the connector cap is installed. The mechanical touch keys are highly reliable with tactile and audio feedback. This meter uses one 9V battery. Re-calibration is not required when power is restored.
The front of the meter 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 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 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, 50 data set memory and 50/60 Hz AC noise rejection. This meter is universal, user-friendly, for field, industrial and laboratory applications.

INITIAL INSPECTION

Carefully unpack the unit and accessories, and inspect for shipping damages. Compare received parts with materials listed on the packing list. Notify YSI immediately of any damage or missing parts. Save all packing materials until satisfactory operation is confirmed.

THE INSTRUMENT

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

1. Rinse unit carefully with distilled water. After rinsing and drying, inspect and clean connectors to remove all contaminants that may affect probe connections.
2. Wait for the unit and probe to dry completely before resuming operation.
3. If the unit does not function correctly after steps 1 and 2, call YSI for possible repair or replacement (see Warranty).

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. (See Figure 1.)
To replace battery, remove the two battery cover screws and battery cover and o-ring. Replace the 9V battery. Replace battery cover and o-ring (align the o-ring properly to insure a good seal) and fasten the two battery cover screws for the splash-resistant feature.

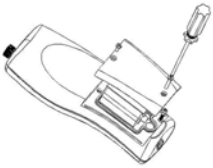

Figure 1.
Battery Installation

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.

KEY FUNCTIONS OF THE MODEL pH100A

1. ⏻ : Turns the unit ON or OFF. The pH calibration values are not erased when the unit is turned off. The unit powers up in the same status as when it was turned off. When the unit is not in use, turn it off to save battery life. The instrument has a 30 minute auto shut off feature when not in use. For long term storage, remove the batteries.
2. MODE: Selects display mode. Press MODE to sequentially display pH-AUTOLOCK , mV-AUTOLOCK , pH, mV, Recall and Delete. Calibration values are not affected by changing display mode.
3. STAND and SLOPE Keys: Used for dual-point pH calibration of the unit. Press and hold STAND while turning on the power to change buffer sets.
4. Δ and ∇ Keys: Press to enter temperature values in manual (MAN) mode. These keys are inoperative when operating in ATC mode.
5. MEA./EFF.: Press 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.
6. 🖫ESC: Press once to store data. Press and hold for 2 seconds to clear the unit when an error message appears; it clears all calibration values stored in internal memory. When ESC is pressed for 2 seconds, all LCD elements light. After about 2 seconds, the unit enters pH-AUTOLOCK mode. "AUTOLOCK" displays and "STAND" begins to flash indicating the need for calibration.

THE LCD DISPLAY

1. WAIT: Displays while unit waits for a stable reading or end point sensing.
2. BAT: Low battery indicator.
3. ATC/MAN: "ATC" displays if an ATC probe is connected. Otherwise, "MAN" displays.
4. STAND/SLOPE: "STAND" or "SLOPE" remains steady if the parameter has been calibrated. If either one has not been calibrated, it flashes.

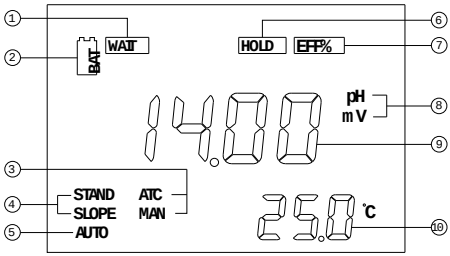

Figure 1. LCD Display

5. AUTO: Autolock mode indicator.
6. HOLD: Indicates a reading is frozen during Autolock mode.
7. EFF%: Displays when the user views electrode efficiency. It is recommended to replace the electrode when efficiency is less than 75%.
8. pH/mV : Unit and mode indicators.
9. Main display for pH, mV and probe efficiency values.
10. °C: Temperature display.

OPERATIONAL PROCEDURES

Buffer Set Selection

The pH100A has two buffer sets: 7.00, 4.01, 10.01 pH and 6.86, 4.00, 9.18 pH. The factory default is buffer set 7.00, 4.01, and 10.01. To change the buffer set, turn off the unit and place the sensor in buffer 7.0. Next, turn the unit on while pressing and holding the STAND key. Continue pressing the STAND key until the unit beeps. If the unit is uncalibrated 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 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. These buffers can be purchased from a YSI representative.

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" 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 **Δ** or **∇** keys (0.0 to 60°C) **BEFORE** pressing "STAND".
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 twice and both "STAND" and "SLOPE" display steadily. **NOTE:** If no temperature probe is connected, adjust the temperature reading to that of the first buffer using the **Δ** or **∇** 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 **MEA. /EFF.** 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 **Δ** and **∇** 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 **MEA./EFF.** "WAIT" flashes until the unit determines a stable pH reading.

Temperature Measurements

The model pH100A 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 **MEA./EFF.** "WAIT" flashes until the unit determines a stable mV reading.

Saving, Viewing and Deleting Data

The pH100A can save 50 data records. When in measurement mode, press **🖫ESC** to save a record. The instrument will confirm the saved data by displaying SAVE and the record number for one second. "Full" is displayed when trying to save data and the 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.

TROUBLESHOOTING

MAIN DISPLAY	POSSIBLE CAUSE	CORRECTIVE ACTION
Er 1	• pH electrode offset is greater/less than +/-1.5 pH. • **STAND** 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 probe to stabilize. • 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.

SPECIFICATIONS

Display	Range	Accuracy	Resolution
pH	-2.00 to 16.00 pH	±0.1%, ±2 lsd	0.01 pH
mV	-1999 to 1999 mV	±0.1%, ±1 lsd	1 mV
Temperature °C	-10.0 to 120 °C	±0.5 °C	0.1 °C

pH Temp Compensation	AUTO/MANual -10.0 to 120.0 °C
pH Buffer Recognition	(4.01, 7.00 & 10.01) or (4.00, 6.86 & 9.18)
pH Buffer Calibration Temp. Range	0 to 60 °C
pH Electrode Offset Recognition	±90mV at pH 7.00 or 6.86
pH Electrode Slope Recognition	±30% at pH 4.00, 4.01, 9.18 or 10.01
Power	One 9V battery/ Approximately 1000 hours
Instrument Casing	Waterproof IP 67
Calibration Back-up	Yes
Audio Feedback	Yes, on all touch keys
Autolock Feature	Yes
Operating Temp. Range	0 to 50 °C
Operating Relative Humidity Range	up to 95%
ATC Probe	Thermistor, 10kΩ / 25 °C
Dimensions (L x W x D)	18.7 cm x 7.6 cm x 3.8 cm (7.37 in x 3 in x 1.5 in)
Weight (batteries included)	270 grams (.6 lb)