Instruction Manual
pH 300/310
Waterproof Hand-held pH / mV / Temperature Meter

ENGLISH

EUTECH INSTRUMENTS
Technology Made Easy ...

OAKTON®

VERSION 1.1ML

CE

ISO 9001 CERTIFIED

Oakton Instruments
P.O Box 5136,
Vernon Hills, IL 60061,
USA
Tel: (1) 888-462-5866
Fax: (1) 847-247-2984
info@4oakton.com
www.4oakton.com
www.oaktoninstruments.com

Eutech Instruments Pte Ltd.
Blk 55, Ayer Rajah Crescent,
#04-16/24 Singapore 139949
Singapore
Tel: (65) 6778 6876
Fax: (65) 6773 0836
marketing@eutechinst.com
www.eutechinst.com

Eutech Instruments Europe bv
Wallerstraat 125k
3862 CN Nijkerk
The Netherlands
Tel: (31) 33 2463887
Fax: (31) 33 2460832
info@eutech.nl
www.eutech.nl

1 INTRODUCTION

This manual contains the operating features of this meter. At some points this manual will refer to our website www.eutechinst.com,for further explanation and background information, it will be indicated with this symbol:

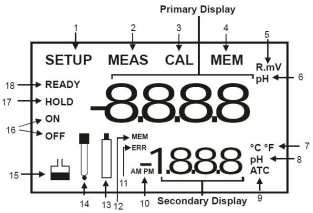
On this website you can also find additional information regarding applications, measuring theories and hints & tips.
At the final page of this manual you can find information about the specifications of this meter, warranty issues and how to return your product to us.

2 DISPLAY AND KEYPAD FUNCTIONS

2.1 Display

The LCD has a primary and secondary display.
• The primary display shows the pH, mV or Relative mV values.
• The secondary display shows the measured temperature.
The display also shows error messages, keypad functions and program functions. It has the following indicators:

1. **SETUP** - Setup mode
2. **MEAS** – Measurement mode
3. **CAL** - Calibration mode
4. **MEM** - Memory mode
5. **R.mV** – Relative mV
6. **pH** – pH mode
7. **°C°F** – Temperature
8. **pH** – pH mode
9. **ATC** – Automatic Temperature Compensation
10. **AM/PM** Clock
11. **ERR** Error
12. **MEM** Memory location
13. Low battery



14. Probe indicator
15. Buffer indication
16. **ON/OFF** indicator
17. **HOLD** – Hold
18. **READY** – Ready

2.2 Keypad

Some button has several functions depending on its mode of operation.

KEY	Function
ON / OFF	ON/OFF - Powers on and shuts off the meter. The meter will start in the measurement mode it was in when last switched off.
CAL / MEAS	Toggles between Calibration and Measurement mode. **NOTE**: Temperature calibration is available from pH calibration mode.
HOLD	HOLD - Activates/Deactivates freezing of the reading while in measurement mode.
MI/▲ MR/▼	**In Measurement mode:** Press MI/▲ to store values with its corresponding temperature values in the memory. Press MR/▼ to retrieve data from memory. **In Calibration mode:** Press to scroll calibration values. **In SETUP mode:** Press to scroll setup subgroup.
SETUP	SETUP mode. For customizing the meter preference and defaults, and view calibration and electrode offset data.
MODE	MODE – Auswahl zur Messung im pH, Relative mV or mV.
ENTER	Press to confirm values in Calibration mode and selections in SETUP mode.

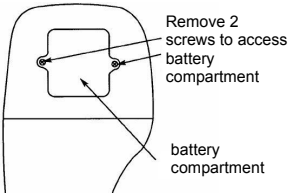
3 PREPARATION

3.1 Inserting the Batteries

This meter is packaged with 4 “AAA” alkaline batteries required for its operation. To insert the batteries into the meter, follow the procedure outlined below.

1. Open the battery compartment by unscrewing the two screws of the battery cover.
2. Insert the batteries correctly according to the marked polarity of the battery compartment.
3. Close the battery cover by replacing the cover and screws.

Your hand held meter is now ready for operation.



3.2 Connecting the Electrode and Temperature Probe

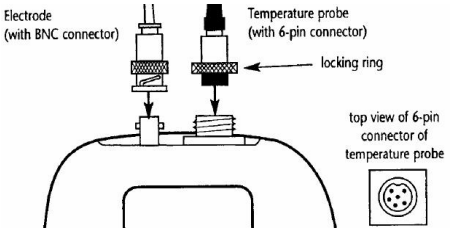
The meter uses any standard pH, ORP, or ISE electrode with BNC connector. For Automatic Temperature Compensation (ATC), the meter requires a temperature probe with a special 6-pin connector. Use either:

• Electrode with BNC connector and separate temperature probe with 6-pin connector (EC-PHWPTEM-01W/ 35618-05).

• A "3-in-1" combination pH electrode with temperature probe designed specifically for pH 300 and pH 310 meters.

3.2.1 Connecting pH, ORP or ISE electrode

1. Slide the probe's BNC connector over the meter's BNC connector socket.
2. Rotate and push the connector clockwise until it locks.
3. To remove electrode, push and rotate the connector counter-clockwise and pull it away from the meter.



3.2.2 Connecting temperature probe

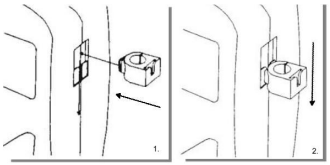
1. Insert the 6 pin female connector of the electrode to the 6 pins male connector on the meter. Rotate the locking ring clockwise until it locks.
2. To remove the electrode, simply rotate the connector's locking ring counter-clockwise and pull away gently for a complete removal.

CAUTION: Do not pull on the electrode cord to avoid internal wire breakages.

3.3 Attaching the Electrode Holder to the Meter

Two electrode holders are provided.

1. Locate the slot on the right-hand side of the meter.
2. Slide the flange of the holder into the slot.



3.4 To attach a second electrode holder:

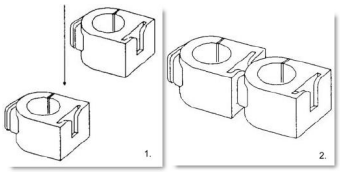
One holder can be attached onto another.

1. Align the flange of the second holder with the slot of the first holder

2. Slide the flange of the second holder into the slot of the first holder.

NOTE: Holder are designed for probes 12mm in diameter.

NOTE: Forcing the electrode into the opening may damage the holder or your electrode.



4 CALIBRATION

4.1 Important Information on Meter Calibration

When re-calibrating, old pH, Rel mV and mV calibration points are replaced on a point by point basis. **Example:** if previous calibration was at pH 4.01, 7.00, and 10.01, and you re-calibrated pH 7.00 only, the old calibration data at pH 4.01 and pH 10.01 will be retained. See Program P2.0 in the SETUP to view current calibration points.

To completely re-calibrate, or after replacing the probe, it is best to reset the meter to factory defaults and re-calibrate at all points.

4.2 Preparing the Meter for Calibration

Before starting calibration, make sure you are in the correct measurement mode.

4.3 Temperature Calibration

The temperature sensor is factory calibrated. Calibrate your sensor only if you suspect temperature errors may have occurred over a long period of time or if you have a replacement probe.

1. Connect the temperature sensor.

2. Switch the meter on. ATC will appear at the bottom right-hand corner of the LCD.
3. Press MODE to select pH mode.
4. Press CAL/MEAS. The CAL indicator appears.
5. Press MODE to enter temperature calibration mode.
6. Dip the electrode into a solution of known temperature (i.e. a temperature bath). Allow time for the built-in temperature sensor to stabilize.
7. Scroll with MI/▲ or MR/▼ to set the correct temperature value (i.e. the temperature of the temperature bath).
8. Press ENTER to confirm. The meter will be calibrated and return to the measurement mode.

Note: To exit without confirming the temperature calibration value, press CAL/MEAS.
Note: If the ATC does not light up, see SETUP menu Program P1.3 to switch it on.
Note: The maximum temperature offset is ±5°C from original reading.

4.4 Selecting buffer sets and number of pH calibration points

The pH 300 can be calibrated up to 5 points with USA buffers only. The pH 310 can be calibrated up to 6 points with three standard buffer sets (USA, NIST, DIN). The meter automatically recognizes and calibrates to the standard buffer values.
The buffers have the following values:

- USA pH 1.68, 4.01, 7.00, 10.01, and 12.45.
- NIST pH 1.68, 4.01, 6.86, 9.18, and 12.45.
- DIN pH 1.09, 3.06, 4.65, 6.79, 9.23, and 12.75.

4.4.1 Selecting number of pH calibration points (P4.2)

pH Calibration can be preformed at: 2, 3, 4, or 5 (6 pH 310) points. It lets the meter scroll through the calibration points more quickly if you regularly calibrate at less than 5 points.

1. Press SETUP.
2. Press MI/▲ or MR/▼ until you view P4.0.
3. Press ENTER 2x until you view P4.2.
4. Press MI/▲ or MR/▼ to select 2, 3, 4, or 5 point (up to 6 for DIN with pH 310).
5. Press ENTER to confirm.
6. Press CAL/MEAS to return to measurement mode.

4.4.2 Selecting buffer sets (P4.3) (pH310 only)

1. Press SETUP.
2. Press MI/▲ or MR/▼ until you view P4.0.
3. Press ENTER 3x until you view P4.3.
4. Press MI/▲ or MR/▼ to select USA, NIST or DIN buffers.
5. Press ENTER to confirm.
6. Press CAL/MEAS to return to measurement mode.

4.5 pH Calibration

Note: Perform at least a 2-point calibration using standard buffers that bracket (one above, one below) the sample range. A 1-point calibration can be performed, but make sure that the buffer is close to the measured sample value.

1. Press MODE to select pH mode.
2. Rinse the probe with de-ionized water or a rinse solution. Do not wipe the probe; this causes an electrostatic charge on the glass surface.
3. Dip the probe into the calibration buffer. Stir the probe gently to create a homogeneous sample.
4. Press CAL/MEAS. The CAL indicator will appear.
5. Wait for the measured pH value to stabilize.
6. Press ENTER to confirm.

Note: To exit calibration without confirming, press CAL/MEAS instead of ENTER (step 6).

7. Rinse the probe with de-ionized water or a rinse solution.
8. Dip it in the next pH buffer.
9. Repeat steps 7 and 8 for additional calibration points.
10. After all points are done, the meter returns to measurement mode automatically.

Note: Press CAL/MEAS to exit the calibration without completing all points as set in **3.4.1.**
Note: If the buffer value is not within ±1.0 pH from the measured pH value: the electrode and buffer

icon blink and the ERR annunciator appears.

4.6 Relative mV Calibration

1. Press MODE to select mV mode.
2. Press CAL/MEAS. The CAL indicator will appear. The primary display shows the relative mV, the secondary display the absolute mV.

Note: If relative mV has never been calibrated or if the meter was reset, the value shown in the primary display is the same as the absolute mV value.
Note: "R." will appear once calibration is performed.

3. Press MI/▲ or MR/▼to enter the relative mV value that matches the desired reading.
4. Press ENTER key to confirm and to return to the measurement mode.

Note: To view the mV offset, use the SETUP mode Program P3.1.
Note: Reset all calibration and offset values by resetting to factory default settings.

5 MEASUREMENT

Measurements can be taken with automatic (ATC) or manual (MTC) temperature compensation. If there is no temperature sensor attached the default MTC setting is 25 °C. You can manually set the temperature.

5.1 Automatic Temperature Compensation (ATC)

Plug the temperature probe into the meter. The ATC indicator will light up on the LCD.
Note: The probe must be submersed in the measuring liquid.

5.2 Manual Temperature Compensation (MTC)

IMPORTANT: For manual compensation, you must disconnect the temperature probe.

1. Switch the meter on.
2. Press MODE to select pH mode.
3. Press CAL/MEAS. The CAL indicator will appear
4. Press MODE. The primary display shows the current setting, the secondary display shows 25 °C (77 °F) or its last set value.
5. Press MI/▲ or MR/▼ to offset the temperature to your preferred settings.
6. Press ENTER to confirm and to return to measurement mode.

Note: Press CAL/MEAS at step 6 to exit without confirming.

5.3 Taking Measurements

1. Rinse the probe with de-ionized or distilled water. If the pH electrode has dehydrated, soak it for 30 minutes in electrode storage solution or 2M – 4M KCl solution.
2. Switch the meter on.
3. Dip the probe into the sample. The sensor or the glass bulb of the electrode must be completely immersed. Stir the probe gently to create a homogeneous sample.
4. Allow time for the reading to stabilize.
5. Press MODE to toggle between pH and mV (or Rel mV)

5.4 HOLD Function

Lets you freeze the display and hold the measured value.

1. Press HOLD to hold a measurement. "HOLD" will appear on the display.
2. Press HOLD again to release the held value.

Note: If the meter is shut off the HOLD value will be lost. For longer storage, use the memory functions.
Note: The pH 310 has an auto hold feature. If this feature on, and a reading is stable for more than 5 seconds, the reading will "HOLD", press HOLD to release.

5.5 Selection of READY and Auto Hold (pH310 only) function (P4.1)

The "READY" display indicates the measurement stability during a measuring process.
The Auto HOLD function lets the meter to "hold" your measurement when it is stable for more than 5 seconds. Press the HOLD key to release the display and access other functions. Default is

READY on and AUTO HOLD off.

1. Press SETUP.
2. Press MI/▲ or MR/▼, go to P4.0.
3. Press ENTER to enter P4.1.
4. Press MI/▲ or MR/▼ to select the configuration you require (left display).
    a. "ON" activates the READY function.
    b. "OFF" deactivates the READY function.
    c. "ON" and "HOLD" activates the Auto HOLD function (pH 310 only)
5. Press ENTER to confirm.
6. Press CAL/MEAS to return to measurement mode.

6 MEMORY FUNCTION

The pH300 stores up to 16 datasets, the pH310 up to 50 datasets. Sets include pH or mV and temperature. The pH310 also records the time and date.

6.1 Memory Input

1. Press MI/▲ during measurement to input data into the memory. MEM, "StO" and memory number will appear for a moment.
2. If necessary, measure the next sample solution and press MI/▲ key to input the next data into the memory.

Note: If the memory is full, the first value stored will be overwritten.

6.2 Memory Recall

1. Press MR/▼ once to retrieve the last reading stored.
2. Press ENTER to recall the reading
3. Press ENTER to view date and time (pH310 only)
4. Press ENTER to return. The display automatically moves to the next memory location.
5. Press MI/▲ or MR/▼ to scroll to next or ENTER to the previous memory location.
6. Press MEAS to exit Memory Recall.

Note: Readings stored in memory are retained even if the unit is turned off.

6.3 Memory Clear (P1.0)

1. Press SETUP.
2. Press MI/▲ or MR/▼ until P1.0.
3. Press ENTER.
4. Press MI/▲ or MR/▼ to toggle between NO and YES. "NO" retains current memory, "YES" clears **all** memory.
5. Press ENTER to confirm selection
6. Press CAL/MEAS to return to measurement mode.

7 OTHER FUNCTIONS

7.1 Selection of °C or °F (P4.4) (pH310 only)

1. Press SETUP.
2. Press MI/▲ or MR/▼ until you view P 4.0.
3. Press ENTER (4x), P4.4.
4. Press MI/▲ or MR/▼ to select between °C and °F.
5. Press ENTER to confirm
6. Press CAL/MEAS to return to measurement mode.

7.2 Viewing calibration data (P2.0)

1. Press SETUP.
2. Press MI/▲ or MR/▼ until you view P2.0 .
3. Press HOLD/ENTER repeatedly to view the previous calibration data.
4. After scrollign through all calibration data, the meter will return to the subgroup menu.
5. Press CAL/MEAS key to return to the measurement mode.

Note: If there is no calibration data at a particular point, the primary display will show "----".

7.3 Viewing Electrode Data (P3.1 & P3.2)

From pH mode the electrode's offset and slope can be viewed, from mV mode the electrode's relative mV offset can be viewed.

1. Press MODE to select pH or mV mode
2. Press SETUP.
3. Press MI/▲ or MR/▼ until you view P3.0.
4. Press ENTER until you view P3.1.
    - **From pH Mode:** The display shows the electrode mV offset at pH 7.00. If no calibration has been performed, the display shows 0.0 mV.
    - **From mV Mode:** The display shows the electrode relative mV offset. If no mV calibration has been performed the display shows 0.00 mV.
5. Press ENTER (P3.2) to view the slope (only from pH mode). It is displayed in percentage, it is the average slope based on the pH calibrations. Default is 100.0.
6. Press CAL/MEAS to return to measurement mode.

7.4 Reset to factory defaults (P5.0, pH300 / P6.0, pH310)

Resets all settings to the factory default, except. • Temperature unit (°C or °F) (*pH 310 only)* • The temperature offset calibration value. • Clock function (*pH 310only).*

1. Press SETUP.
2. Press MI/▲ or MR/▼ until you view P5.0 (pH300) or P6.0 (pH310).
3. Press ENTER.
4. Press MI/▲ or MR/▼ to select: NO retains current settings **or** YES clears all calibrations and its data.
5. Press ENTER to confirm and return to subgroup menu.
6. Press CAL/MEAS to return to measurement mode.

The following settings will remain as you have set them:

7.5 Setting the real-time clock (P5.0) (pH310 only)

The meter features a real-time calendar and clock. This helps you to meet the Good Laboratory Practice (GLP) standards.

1. Press SETUP.
2. Press MI/▲ or MR/▼until you view P5.0.
3. Press ENTER.
4. Press MI/▲ or MR/▼ to select century: "19—" or "20—". The century digits will flash.
5. Press ENTER to confirm and move to "year" selection.
6. Press MI/▲ or MR/▼to select year. The "year" digits will flash.
7. Press ENTER to confirm and move to "month" selection.
8. Press MI/▲ or MR/▼to select month. The "month" digits will flash.
9. Press the ENTER to confirm and move to "date" selection.
10. Press MI/▲ or MR/▼to select date. The "date" digits will flash.
11. Press ENTER to confirm and move to "hour" selection.
12. Press MI/▲ or MR/▼ to select hour. Note the "AM" / "PM" indicator in the display. The "hour" digits will flash.
13. Press ENTER to confirm and move to "minute" selection.
14. Press MI/▲ or MR/▼ to select minutes. The "minute" digits will flash.
15. Press ENTER to confirm and move to "second" selection.
16. Press MI/▲ or MR/▼ to select seconds. The "second" digits will flash.
17. Press ENTER to confirm and return to "century" selection.
18. Press CAL/MEAS to return to the subgroup menu.
19. Press the CAL/MEAS key again to return to measurement mode.

Note: Press CAL/MEAS at any point to return to the subgroup menu.

8 PROBE CARE AND MAINTENANCE

Clean the electrode every 1 to 3 months depending on the extent and condition of use.

Note: For specialty electrode care, consult the instruction manual of the electrode.

8.1 pH electrode storage

Always keep the pH bulb wet. For storage use the electrode storage bottle or rubber cap filled with electrode storage solution. You can store in a pH 4 buffer with 1/100 part of saturated KCl. Other pH buffers are OK, but NEVER use distilled water.

8.2 After measuring

1. Rinse the electrode in de-ionized water.
2. Store it as recommended above or as recommended by the manufacturer.
3. Rinse prior to use with de-ionized water and tap dry – never wipe electrode.

8.3 pH electrode cleaning

• **Salt deposits**: can be removed by immersing the electrode in tap water for 10 to 15 minutes.
• **Oil/Grease film**: wash electrode pH bulb gently in some detergent and water.
• **Protein deposits**: Prepare a 1% pepsin solution in 0.1 M of HCl. Set the electrode in the solution for five to ten minutes.

9 TROUBLE SHOOTING GUIDE

Error message	Indicates	Possible cause	Corrective action
ERR.	Wrong keypad input	Wrong input in selected mode	Release key. Select valid operations depending on mode
CAL & Err annunciators on / Buffer and electrode indicators blink	Calibration error	Wrong value input at calibration. Dirty probe	Check your input value, clean probe. See Calibration sections
Err 1 (in primary display)	Memory write error.	Hardware failure.	Turn meter on and off. If message persists, return unit.
Err. 2 (in primary display)	Memory checksum error.	Hardware failure.	
Err. 3 (in primary display)	A/D converter error.	Hardware failure.	
Err. 4 (in primary display)	Keypad error.	One or more keys on the keypad are stuck or fault in keypad.	
Battery icon lights up	Low battery	Battery power is low	Replace batteries

10 ERROR MESSAGES

Problem	Possible cause	Solution
No display when 'ON' key is pressed	a) Batteries not in place b) Batteries not in correct polarity (+ and – position) c) Weak batteries	a) Check that batteries are in place and making good contact b) Re-insert batteries with correct polarity c) Replace batteries
Unstable readings	a) Air bubbles in electrode. b) Dirty electrode c) Electrode not deep enough in sample d) External noise pickup or induction caused by nearby electric motor e) Broken electrode	a) Tap electrode to remove bubbles, move electrode away from bubbles present in sample b) Clean electrode, recalibrate c) Make sure sample entirely covers the electrode sensors d) Move or switch off interfering motor. e) Attach electrode guard
Slow response	a) Dirty / Oily electrode	a) Clean electrode