User's Guide
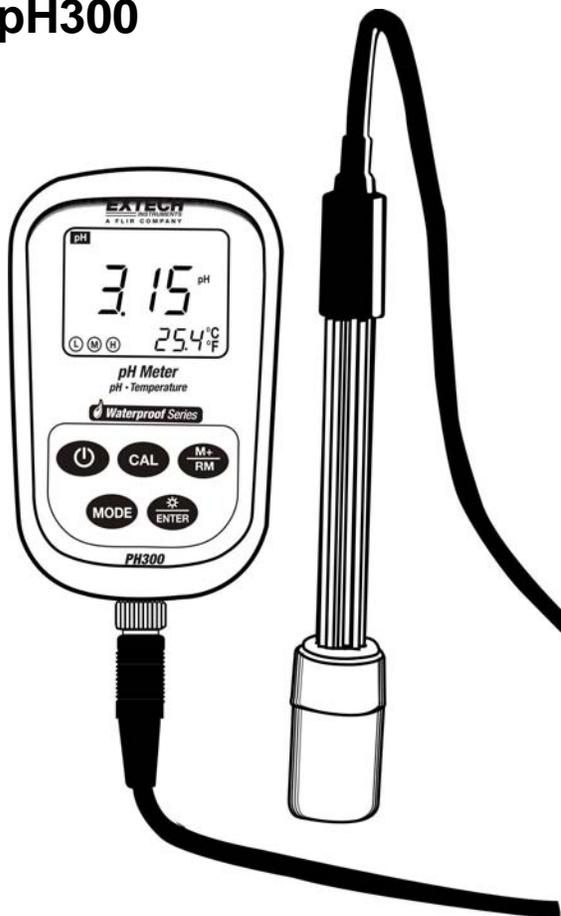
EXTECH®
INSTRUMENTS
A FLIR COMPANY

Digital pH Meter

Model pH300

Introduction

Congratulations on your purchase of the Extech pH meter. For best results, please read the entire manual before use.

The pH300 meter measures pH, mV, and temperature parameters. The built-in microprocessor provides automatic calibration, automatic temperature compensation, data storage, and self-diagnostics. The meter can recognize up to 13 types of pH standard buffer solutions.

The meter's digital filter improves measurement speed and accuracy.

Two special modes (ammonia and purified water) are provided.

The meter offers a backlit LCD display and is dust-proof and water-proof, meeting the IP57 rating

This meter is shipped fully tested and calibrated and, with proper use, will provide years of reliable service.

Supplied Equipment List

- pH300 Meter

- pH / ATC (Automatic Temperature Compensation) Electrode

- Standard buffer solutions (4.00pH, 7.00pH, and 10.01pH) / 50ml

- Screwdriver (for removing battery compartment)

- Batteries (2 x 'AA' 1.5V)

- User's Guide

- Carrying Case

Meter Description

1. LCD Display (detailed in section below)
2. Rubber protective jacket (remove to access the rear battery compartment)
3. Keypad (detailed in section below)
4. Electrode connection jack
5. Electrode plug
6. Electrode measuring bulb
7. Electrode body
8. Electrode cable

Display Description

1. Parameter Mode icon
2. Measurement reading
3. **888** (Stored data serial number), **M+** (measurement to be stored icon), **RM** (reading to be recalled icon)
4. Unit of measure
5. Temperature reading
6. Stable measurement icon
7. Calibration icons
8. Low battery icon

pH300 V1.0   7/09

Keypad Description

The meter has five (5) front panel function keys:

ON/OFF Power Key

Calibration Key:
a) When taking a measurement, press this key to enter the calibration mode
b) When in the programming mode, press this key to change the displayed number or the ON/OFF state

Function Key
a) Press momentarily (< 1.5 seconds) to toggle between the two measurement parameters pH and mV
b) Press and hold for at least 2 seconds to enter the P1 programming parameter. Subsequent presses will scroll through the remaining parameters P2, P3…

Backlight and ENTER Key
a) In the measurement mode, momentary presses toggle the backlight on and off
b) When in the programming or calibration mode, press to ENTER data

MEMORY STORE and RECALL Key
a) In the measurement mode, momentary presses store the displayed readings. Press and hold for at least 2 seconds to recall a saved reading
b) In the programming mode, press to change the displayed number or the ON/OFF state

Store, Recall, and Clear Datalogger Memory

STORE Readings

The meter can store up to 100 pH and 100 mV readings for a total of 200 data points. To store a reading, wait until the reading stabilizes (the smiling face icon ☺ appears when the reading stabilizes). Press the **M+/RM** key momentarily to store a reading. The **M+** icon appears and the data point serial number increments.

RECALL Readings

In the measurement mode, press the **M+/RM** key to recall the most recently stored reading. **RM** and the data point serial number for the displayed reading will appear on the LCD. The measurement information will appear on the lower right hand side of the LCD. Use the **CAL** or **M+/RM** buttons to scroll the remaining stored readings. Press the **ENTER** key to return to the normal measurement mode.

CLEAR Readings

From the RECALL mode, press and hold the **ENTER** key for at least five (5) seconds. The LCD display will show 'CLR' indicating that all of the stored readings have been erased. The unit will automatically return to the normal measurement mode after approximately 2 seconds.

pH300 V1.0 7/09

pH Measurement Mode

Preparation for Measurement

1. Turn the meter ON using the power key

2. Press the MODE key momentarily to switch to the pH mode, if necessary

3. Unscrew the protective cap on the probe jack located on the bottom of the meter (store the protective cap in the carrying case for later use)

4. Carefully connect the pH probe to the meter's probe jack. The probe can only be inserted in one orientation. Once it is firmly connected, screw the probe collar onto the meter to secure the probe.

3-Point Calibration (7.00pH, 4.00pH and 10.01pH)

Note: Calibrate the unit once per day for best results.

1. Press the **CAL** key to enter the Calibration mode. The meter's display will show a blinking '**Cl**'

2. Rinse the probe in distilled water, allow it to dry, and submerge it into a pH 7.00 buffer solution. Stir the solution briefly and allow it to stay in the buffer solution until a stable reading is reached

3. Press **CAL** again and the display will show a blinking '**7.00**'

4. This portion of the calibration procedure is complete when the display stops blinking and shows the '**C2**' icon. The unit will automatically switch to the second point of the calibration

5. Rinse the probe in distilled water again, allow it to dry, and submerge it into a pH 4.00 buffer solution. Stir the solution briefly and allow it to stay in the buffer solution until a stable reading is reached

6. Press **CAL** again and the display will show a blinking '**4.00**'

7. This portion of the calibration procedure is complete when the display stops blinking and shows the '**C3**' icon. The unit will automatically switch to the third point of the calibration

8. Rinse the probe in distilled water again, allow it to dry, and submerge it into a pH 10.01 buffer solution. Stir the solution briefly and allow it to stay in the buffer solution until a stable reading is reached

9. Press **CAL** again and the display will show a blinking '**10.01**'

10. After the display stabilizes the 3-point calibration icon will appear Ⓛ Ⓜ Ⓗ

1-Point and 2-Point Calibration

Note that the user can calibrate one or two points only, if the expected measurement is known.

For example, if the expeced pH is 4pH, it is acceptable to perform only a 1-Point Calibration (4pH). If the expected measurement is between 4.00pH and 7.00pH, the user can perform a 2-Point Calibration (4.00 and 7.00pH), and so on.

For a 4pH calibration, only the circled **L** will appear on the LCD. For a 7.00pH, only the circled **M** will appear on the LCD. For a 10.01pH Calibration, only the circled **H** will appear (**L**ow, **M**edium, and **H**igh).

For all other applications, a 3-Point Calibration is recommended. Always perform a 3-Point Calibration on new probes and probes that have been in use for long periods. This maximizes measurement slope linearity.

Testing the pH of a Sample

1. Perform the pH Calibratoin as described above
2. Rinse and dry the pH Probe and submerge it in a sample liquid
3. Stir the solution briefly with the probe and allow it to stand until the display stabilizes
4. Note that the closer the temperature of the sample solution to the calibration solution, the more accurate readings

Programming pH Parameters

The Table below shows the available programming menu items P1 ~ P7. Each parameter is explained in detail in the subsequent sections.

	Parameters	Code	Selections
P1	pH buffer solution series selection	SOL	USA (Europe & U.S.A) NIS (NIST) CH (China)
P2	Distilled water pH temperature compensation setting (see note below this table)	PU 1	OFF / ON
P3	Distilled water with Ammonia pH temperature compensation setting (see note below this table)	PU 2	OFF / ON
P4	Temperature unit setting		℃ / ℉
P5	Back light display time setting	bL	0-1-3-6min
P6	Auto power off setting	AC	0-10-20min
P7	Restore to default factory settings		OFF / ON

Notes on P2 and P3 Parameters: Measurements of distilled water and distilled water mixed with ammonia affect the temperature compensation and the slope linearity of the pH probe. Such measurements are sometimes used in the electrical power and petrochemical industries. Set these parameters to ON only if necessary, otherwise leave these parameters in the OFF state.

Parameter P1 (pH Buffer Solution Setting)

1. From the pH measurement mode, press and hold **MODE** for at least 2 seconds and then release, the '**P1**' icon appears on the LCD

2. Use the **CAL** or the **M+/RM** keys to toggle through the three (3) selections: USA (for use in the USA or Europe, NIS (for NIST calibration purposes), and CH (for use in China)

3. Momentarily press **MODE** to move to the next parameter (P2), or press **ENTER** to return to the normal measurement mode

Parameter P2 (Distilled Water Temperature Compensation Setting)

1. From the P2 menu, use the **CAL** or the **M+/RM** keys to turn this feature ON or OFF

2. Momentarily press **MODE** to move to the next parameter (P3), or press **ENTER** to return to the normal measurement mode

3. See the Note below the Table in the previous section for more details on parameter P2

Parameter P3 (Distilled Water with Ammonia Temperature Compensation Setting)

1. From the P3 menu, use the **CAL** or the **M+/RM** keys to turn this feature ON or OFF

2. Momentarily press **MODE** to move to the next parameter (P4) or press **ENTER** to return to the normal measurement mode

3. See the Note below the Table in the previous section for more details on parameter P3

Parameter P4 (Temperature Measurement Units Setting)

1. From the P4 menu, use the **CAL** or the **M+/RM** keys to turn this feature ON or OFF

2. Momentarily press **MODE** to move to the next parameter (P5) or press **ENTER** to return to the normal measurement mode

Parameter P5 (Display Backlight Setting)

1. From the P5 menu, use the **CAL** or the **M+/RM** keys to select 0, 1, 3, or 6 minute default backlighting time

2. Momentarily press **MODE** to move to the next parameter (P6) or press **ENTER** to return to the normal measurement mode

Parameter P6 (Automatic Power OFF Setting)

1. From the P6 menu, use the **CAL** or the **M+/RM** keys to select a 0, 10, or 20 minute Auto Power OFF time

2. Momentarily press **MODE** to move to the next parameter (P7) or press **ENTER** to return to the normal measurement mode

Parameter P7 (Restore Factory Default Settings)

1. From the P7 menu, use the **CAL** or the **M+/RM** keys to select ON (reset the factory default settings) or OFF (cancel edit)

2. Momentarily press **MODE** to move to the first parameter (P1) or press **ENTER** to return to the normal measurement mode

pH Measurement, Calibration, and Electrode Considerations

- **Error messages** ERR-1: Electrode zero potential error and ERR-2: Electrode slope error; For either error, check the following:

  1. Air bubbles in the electrode bulb. Shake rigorously to remove air bubbles
  2. Accuracy of the pH buffers used in calibration. Replace buffers if necessary
  3. Set meter to its factory default state in Parameter P7 (previous section of manual)

- Calibration intervals depend on the sample, the electrode performance, and the required accuracy. For high accuracy measurements (≤ ±0.02pH), the meter should be calibrated immediately before taking a measurement. For general accuracy (≥±0.1pH), the meter can be calibrated and used for approximately one week before the next calibration.

- The meter must be recalibrated in the following situations:

  1. New probe, or probe that is unused for a long period of time
  2. After measuring acids (pH<2) or alkaline solutions (pH>12)
  3. After measuring a solution that contains fluoride or a concentrated organic solution
  4. If the solution's temperature differs widely from the calibration solution temperature

- The soaking solution contained in the supplied protective bottle is used to maintain activation in the glass bulb and junction. Loosen the capsule, remove the electrode and rinse in purified water before taking a measurement. Insert the electrode and tighten the capsule after measurements to prevent the solution from leaking. If the soak solution is turbid or moldy, replace the solution.

- To prepare a soak solution: Use 25g pure KCL dissolved with purified water and diluted to 100mL. The electrode should not be soaked in a purified water protein solution or an acid fluoride solution for long periods of time. In addition, do not soak the electrode in organic silicon lipids.

- For calibration accuracy, the pH of the standard buffer solution must be reliable. The buffer solution should be refreshed often, especially after heavy use.

- For best accuracy, always keep the meter clean and dry, especially the meter's electrode and electrode jack. Clean with medical cotton and alcohol if necessary.

- The sensitive glass bulb at the front of the combination electrode should not come in contact with hard surfaces. Scratches or cracks on the electrode will cause inaccurate readings. Before and after each measurement, the electrode should be washed with purified water and dried. Do not clean the glass bulb with a tissue for it will affect the stability of the electrode potential and increase the response time. The electrode should be thoroughly cleaned if a sample sticks to the electrode. Use a solvent if the solution does not appear clean after washing.

- Electrodes that have been used over a long period of time, used in a strong solution that has damaged the sensitive bulb, or used with a substance resulting in a jam at the junction will be become passivated; the sensitivity will decrease, its response will slow, and the readings will be inaccurate. Replace the electrode as soon as possible in these cases.

- For abnormal readings, try calibrating again; if the problem persists replace the Electrode. The user can also try resetting the meter to factory default conditions per Parameter P7 (detailed in an earlier section). Electrode life can be shortened by heavy use, extreme conditions, and improper maintenance.

Measuring the millivolt value for a sample solution

1. Turn the meter ON using the power key
2. Momentarily press MODE to switch to the mV mode, if necessary
3. Connect the electrode to the meter
4. Immerse the electrode in the sample solution, slowly stir the solution with the electrode and then allow it to rest in the solution
5. When the smile face icon appears on the LCD, the reading has stabilized

mV Programming Parameters

Prompt	Parameters	Code	Settings
P1	Back light display time	*bL*	0 -1-3-6 min
P2	Auto power off time	*AC*	0 -10-20 min

Parameter P1 (Display Backlight Setting)

1. Press MODE to access the P1 Parameter
2. Use the **CAL** or the **M+/RM** keys to select 0, 1, 3, or 6 minute default backlighting time
3. Momentarily press **MODE** to move to the next parameter (P2) or press **ENTER** to return to the normal measurement mode

Parameter P2 (Automatic Power OFF Setting)

1. From the P2 menu, use the **CAL** or the **M+/RM** keys to select a 0, 10, or 20 minute Auto Power OFF time
2. Momentarily press **MODE** to move back to Parameter P1, or press **ENTER** to return to the normal measurement mode

Specifications

pH Specifications

Measuring range	-2.00 to 19.99 pH
Resolution	0.1/0.01 pH
Accuracy	Meter: ±0.01pH; Complete Kit: ±0.02pH
Input current	$\leq 2\times10^{-12}$ A
Input impedance	$\geq 1\times10^{12}$ Ω
Stability	±0.01 pH/3h
Temp. Compensation range	32 to 212 ^{o}F (0 to 100 ℃) (automatic)

mV Specifications

Measuring range (mV/E_H)	-1999 mV to 0 to 1999mV
Resolution	1mV
Accuracy	Meter: ±0.1% FS

Other Technical Parameters

Data storage	200 data groups
Storage content	Data serial number, measurement value, unit of measure
Power	Two AA batteries (1.5V x 2)
Size and weight	Meter: 2.6 x 4.7 x 1.2" (65 × 120 × 31mm) / 6.3 oz (180g) Case: 10 x 8.3 x 2" (255 x 210 x 50mm) / 1.7 lbs (790g)
Quality / Safety certification	ISO9001, CE and CMC

Working Conditions

Environment temperature	41 to 95 ^{o}F (5 to 35 ℃)
Environmental humidity	≤ 85%
IP rating	IP57 Dustproof and waterproof

pH300 V1.0 7/09

Warranty

Calibration and Repair Services

Extech offers repair and calibration services for the products we sell. Extech also provides NIST certification for most products. Call the Customer Care Department for information on calibration services available for this product. Extech recommends that annual calibrations be performed to verify meter performance and accuracy.

☎ 🖥

Support line (781) 890-7440
Technical Support: Extension 200; E-mail: support@extech.com
Repair & Returns: Extension 210; E-mail: repair@extech.com
Product specifications subject to change without notice
For the latest version of this User Guide, Software updates, and other
up-to-the-minute product information, visit our website: www.extech.com
Extech Instruments Corporation, 285 Bear Hill Road, Waltham, MA 02451
ISO9001 Certified

pH300 V1.0 7/09

airconcern

more infor for Extech PH300

Phone: 01235 838 555
Email: cs@airconcern.co.uk
Web. www.airconcern.co.uk

Air Concern Ltd, Building 173 Curie Avenue Harvell Didcot, Oxfordshire