

## BUFFER SOLUTIONS TEMPERATURE COEFFICIENTS

| TEMPERATURE | 4.01pH | 7.00pH | 10.01pH |
|-------------|--------|--------|---------|
| 0           | 4.01   | 7.12   | 10.32   |
| 5           | 4.01   | 7.09   | 10.25   |
| 10          | 4.01   | 7.06   | 10.18   |
| 15          | 4.00   | 7.04   | 10.12   |
| 20          | 4.00   | 7.02   | 10.06   |
| 25          | 4.01   | 7.00   | 10.01   |
| 30          | 4.01   | 6.99   | 9.97    |
| 35          | 4.02   | 6.98   | 9.93    |
| 40          | 4.03   | 6.97   | 9.89    |
| 45          | 4.04   | 6.97   | 9.86    |
| 50          | 4.06   | 6.97   | 9.83    |
| 55          | 4.08   | 6.97   | 9.81    |
| 60          | 4.10   | 6.98   | 9.79    |
| 65          | 4.11   | 6.98   | 9.77    |
| 70          | 4.12   | 6.99   | 9.76    |
| 75          | 4.14   | 6.99   | 9.75    |
| 80          | 4.16   | 7.00   | 9.74    |
| 85          | 4.18   | 7.01   | 9.73    |
| 90          | 4.02   | 7.02   | 9.73    |
| 95          | 4.21   | 7.03   | 9.73    |
| 100         | 4.23   | 7.03   | 9.72    |

## ACCESSORIES

### Cleaning Solution

816-040 pH electrode cleaning solution 480 ml

### Storage Solution

816-041 pH electrode storage solution - 500 ml

### Buffer Solutions

816-050 4.01 pH buffer solution pink - 100 ml

816-051 7.00 pH buffer solution yellow - 100 ml

816-052 10.01 pH buffer solution blue - 100 ml

### Buffer Capsules

816-004 4 pH buffer capsules - pack of 10

816-007 7 pH buffer capsules - pack of 10

816-009 9 pH buffer capsules - pack of 10

### pH Electrodes

823-501 Combination pH electrode - 0 to 80 °C

823-502 12 mm Spear Combination pH electrode

823-503 6 mm Spear Combination pH electrode

823-510 pH meat knife probe

**WARNING: IPA and other solvents may cause damage to the case and screen of this instrument.**

For further information on our full range of thermistor temperature probes, please visit our website [etilt.com](http://etilt.com)



## 8100 PLUS pH METER



Manufactured by  
Electronic Temperature Instruments Ltd

Operating Instructions

## GETTING STARTED

To begin taking measurements, connect the probe/s to the socket/s on the instrument and remove the cap or bottle covering the electrode. **Please note:** a small amount of soaking solution is within the cap/bottle to ensure the electrode remains in good moist condition when in storage. White crystals may form on or around the electrode, but this is normal and can be removed with a clean damp cloth. Calibrate the unit as per instructions in the Calibration section. Switch the unit on and place the electrode into the solution to be measured. Stir the solution and wait for the measurement to stabilise. Rinse with de-ionised/distilled water in-between measurements from different samples. The 8100 Plus with the temperature probe disconnected will display MANUAL above the temperature display. With the probe plugged in the 8100 plus meter will display the temperature continuously. To prolong the life of the electrode, please read the Care & Maintenance and Storage & Cleaning sections.

**CALIBRATION (STANDARDISATION)** - It is recommended that you calibrate the unit daily to achieve consistent and accurate results. This unit must be used in conjunction with the 823-501 to maintain accurate readings.

**If you are measuring approx. 5 pH then calibrate using 7.00 & 4.01 pH buffer solutions.**

**If you are measuring approx. 8pH then calibrate using 7.00 & 10.01 pH buffer solutions.**

Turn the meter on and place the electrode and thermometer/probe into 7.00 pH buffer solution, stir the solution if required to remove air bubbles. If using the manual temperature adjustment, first measure the solution with a thermometer and adjust the instrument accordingly, as per the Temperature adjustment (manual) section. With the electrode in the 7.00 pH solution allow the reading to stabilise. Press and hold down the 'CAL' button for 3 seconds, 'Auto-Cal' will flash up on the display and then the current reading will be displayed. **Please note:** The unit will auto detect the buffer solution, if you know the exact solution value at a given temperature (temperature coefficient) you can change the offset BS (buffer solution 7.00 pH) and slope BS (buffer solution 4.01 or 10.01) by using the (up▲) or (down▼) buttons. ETI's buffer solution temperature coefficient can be found in the table provided and the instrument has been set up using these defaults. Please refer to your calibration solutions/capsules temperature coefficients before any alterations are carried out. Press the 'CAL' button once the reading has stabilized, rinse with de-ionised/distilled water, and place the electrode into 4.01 pH or 10.01 pH solution and allow the reading to stabilise, stirring the solution if required to remove air bubbles. To finish press the 'CAL' button and it



will confirm 'calibrated OK' and the display will show the solution value that it is currently in. Your instrument is now in measurement mode and you can proceed to take your sample readings. To abort calibration at any point press the 'ON/OFF' button - the meter will revert back to any previous calibration values.

## INSTRUMENT FUNCTIONS

**MODE** - pressing the MODE button gives the option to display and measure pH, mV or temperature.

**AUTO-OFF** - The instrument will switch off automatically after 10 minutes. To disable the auto-off function press and hold the '▲' button whilst switching on the unit - 'auto-off disable' will be displayed on screen to confirm this. **Please note:** when the unit is turned off the 'auto-off' function will be re-enabled.

**°C/°F SELECTION** - Press and hold the 'MODE' button for 3 seconds to switch the units between °C and °F.

**BACKLIGHT** - With the instrument switched on, press the  button. The backlight will automatically turn off after 10 seconds. **Please note:** the backlight will not illuminate if the power is low, as per the battery icon  or during calibration.

**MV MEASUREMENT** - Once selected it will read the voltage generated by a pH, redox or ion type electrode within the range of ±1000 mV. If you get an error during a correctly performed pH calibration you can use the mV reading from the pH electrode to determine its condition. The following needs to be carried out at 25 °C with a clean/conditioned pH electrode: With the instrument in mV mode place your pH electrode and temperature probe (to check optimum conditions) into 7.00 pH solution and leave for 30 seconds to stabilise. Record the mV reading (Asymmetry Potential). Rinse the electrode in distilled or de-ionised water, blot and repeat the process in 4.01 pH. Record the mV reading and calculate the difference between the two to obtain the span.

### EXAMPLE:

Reading from 7.00 pH: 4 mV

Reading from 4.01 pH: 178 mV

Span = 178 mV – 4 mV =174 mV

In order to calculate the slope percentage (Condition), divide the calculated span by the theoretical span and times it by 100. The theoretical span between 7.00 pH and 4.01 pH is 176.9 mV

### EXAMPLE:

Slope % =  $\frac{174 \text{ mV}}{176.9 \text{ mV}} \times 100 = 98 \%$

If your results are below 85 % or your mV reading exceeds ±30 mV at 7 pH, then you will need to replace the probe.

**TEMPERATURE ADJUSTMENT (MANUAL)** - To manually adjust the temperature press or hold the '▲' or '▼' button to adjust the temperature in whole degrees.

**Please note:** Manual temperature adjustment on 8100 Plus requires the temperature probe to not be plugged in.

**TEMPERATURE ADJUSTMENT (ATC ONLY)** - When the temperature probe is connected to the 8100 Plus meter it will automatically be detected and on connection the temperature is displayed continuously. Please note that with the probe attached, the meter can measure from 0 to 100 °C (32 to 212 °F). If the probe is removed from the meter, 'MANUAL' is shown above the temperature - this reading must be adjusted to the known temperature of the solution being measured to ensure accurate measurement. If the temperature probe is not used with the meter please refer to the manual temperature adjustment.

## ERRORS

**CALIBRATION** - 'FAIL' will be shown if you do not calibrate at 7.00 pH first. If the probe & buffer solution's combined error is greater than 0.5 pH or 30 mV then 'Error I/P >30 mV - FAIL' will be displayed.

If the probe and buffer solution's combined slope error (4.01 or 10.01) is greater than 0.5 pH or 15 %, 'Slope error >15 % - FAIL' will be displayed.

**PH ELECTRODE** - The pH electrode is connected via the BNC connector; if this is not connected the readings displayed are meaningless. 'Over Range pH Err' will be displayed if the readings are higher than 16 pH and 'Under Range pH Err' if the readings are below -2 pH.

**TEMPERATURE PROBE (ATC ONLY)** - 'Hi Temp Err' is displayed if the readings are above 100 °C (212 °F) and 'Lo Temp Err' is displayed if readings are below 0 °C (32 °F).

**NO PROBE ERR** - will be shown if you are in temperature mode only, without a probe fitted. **Please note:** ATC only works between 0 °C (32 °F) and 100 °C (212 °F)

**MV MEASUREMENT** - 'Over/under range mV err' is shown if the unit readings are greater than 1000 mV or lower than -1000 mV. If no electrode is attached the screen will give a meaningless positive or negative amount.

## CARE & MAINTENANCE


This pH meter and electrode, if maintained correctly, should give years of service. Over time the electrode sensor will degrade, but regular calibrating, cleaning and the correct storage of the unit will prolong its life. If the electrode readings are slow or erratic, place the sensor into cleaning solution or 7.00 pH solution for at least half to one hour before testing again. The temperature and pH probes are not waterproof and cannot be fully immersed in water.

## ELECTRODE STORAGE & CLEANING

Ensure that the electrode glass bulb is kept wet by replacing the storage cap after each use. Storage solution can be used in the cap/bottle.

Always rinse the pH electrode with cleaning solution or de-ionised/distilled water before next use. If this is not available tap water can be used. Do not touch/rub the glass bulb or clean with harsh materials.

## BATTERY REPLACEMENT

Replace the battery when battery icon is low . This meter will continue to measure accurately but after further usage the meter will display 'FLAt bAT' and shutdown. Unscrew the screws on the back of the meter and replace with three AAA batteries, ensuring the polarities are correct.