MODEL 3150 WATERPROOF
pH METER
OPERATING MANUAL

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3150/REV A/04-95

MODEL 3150 pH METER
OPERATING MANUAL

INTRODUCTION

The Model 3150 is ruggedly designed and constructed to resist the harshest of field, industrial and laboratory environments.
The instrument is supplied with a fully integrated pH/Temperature probe.

SPECIFICATION

pH	(1 or 2 point cal)
Range:	-2 to 16.00pH
Resolution:	0.01pH
Accuracy:	±0.02pH
mV	(Absolute or Relative)
Range:	-1999 to +1999mV
Resolution:	1mV
Accuracy:	±1mV
Temperature Measuring	
Ranges:	-10 to +105°C
	14 to 220°F
Resolution:	0.1°C 1°F
Accuracy:	±0.5°C ±1°F
ATC Range:	0 to 100°C
Auto Buffer	
Recognition:	4.00, 7.00, 10.05
	(manual override)
Calibration:	User selectable 1 or 2 pt
Power:	3 AA cells
Size:	200(l)x80(w)x60(d)
Weight:	370g

INSTALLATION

Unpack the instrument and ensure the following items are present:

1. Model 3150 pH Meter (538 001)
2. pH/Temperature Electrode (027 227)
3. pH4 & pH7 buffer capsules (025 001/025 002)
4. 2 x 100ml bottles (024 014)
5. 3 x AA alkaline batteries (021 007)

Optional accessories which may have been ordered:

1. Carrying Case (033 162)
2. Steel protected spear pH probe (924 034)
3. Temperature probe (027 228)
4. Reference electrode with ATC (027 229)
5. Adapter lead (538 014)

SW1 and LCD contrast set pots are accessible with the battery compartment cover removed.

SW1 - the factory default setting is switches 1, 2 and 3 set to the "on" position, switch 4 to "off".

NOTE: The instrument must be switched off prior to adjustment.

INSTALLATION (continued)

SW1

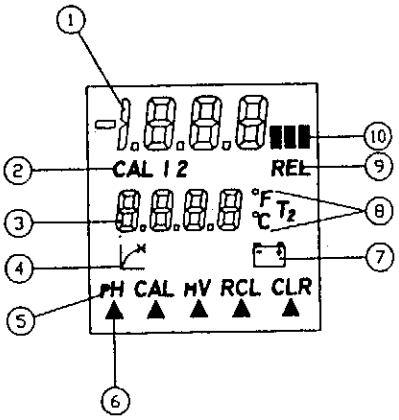
1	°C or °F	on = °C
2	Auto shut off	on = enabled
3	Manual pH cal	on = enabled
4	Not used	off

The switches are only read at power on.

Remove the battery compartment cover and fit the batteries, taking care to observe the correct polarity, as indicated on the moulding.

To adjust the display contrast, switch the instrument on and adjust the contrast using the LCD contrast set pot, (located above the dip switch), using a small screwdriver.

DISPLAYS



1. Main display - provides direct readout of samples and standards. Will also indicate Sto when the instrument is in recall mode.
   The display will also show Underrange (-1) and Overrange (1) symbols if the instrument is reading outside the ranges as shown below:
   pH -2.00 to 16.00
   mV -1999 to +1999
   Temp -10 to 105°C
   14 to 220°F

2. CAL 1 2 - indicates 1 or 2 point calibration.

DISPLAYS (continued)

3. Temperature display - provides direct readout of temperature in °C or °F. This display will also show stored reading index number.

4. Endpoint Detection symbol - this is displayed once a stable reading is detected, and is maintained until the input changes.

5. Selected mode indicator.

6. Cursor - used to select/indicate required measurement mode.

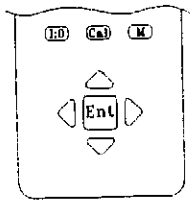
7. Low battery indicator - this will be displayed when a maximum of 5 hours battery life remains.

8. Selected temperature measurement unit - °C or °F.

9. REL - relative mV indicator. This is displayed when the instrument is operating in this mode.

10. Measurement unit which is being used, pH, mV.

CONTROLS



I:O Switches the instrument on and off.

CAL This key is mode dependent. It is used to select and perform calibration in the pH mode. In the mV mode pressing the CAL key will enable the user to toggle between Absolute and Relative millivolts. The CAL key is non-functional in any other mode.

M The Memory Store key is used to store the displayed readings in any measurement mode. When the M key is pressed the display will read Sto and give the next available index number. If the ENT is pressed at this point the reading will be displayed and stored in this location, and the instrument will return to the previous display. If no key is pressed within 5 seconds the reading

CONTROLS (continued)

will be stored in the specified location. The location (0 to 99) can be changed via the ▲▼ keys. If the key is pressed and held the timer is disabled until the key is released. At this stage the 5 second timer is re-initialised.

If all 100 locations already have stored readings then the instrument displays FULL. Pressing the ENT key aborts storage of the reading. The ▲▼ keys can be used to over write an existing location.

▲ ▼ These keys are used to change a parameter.
1. Used when storing a reading to change the store location index.
2. In recall (RCL) mode, these keys are used to change the displayed stored location.
3. The keys are used in pH CAL mode to change the calibration value. (Manual calibration must be enabled).
4. To change the manual temperature compensation value when using alternative electrodes and no temperature sensor is fitted.

◄► These keys are used to move the cursor between the menu options.

CONTROLS (continued)

ENT The ENT (Enter) key is used to select the displayed menu option. It also places stored values in the selected location(s).

INPUTS

PL3 pH ELECT SOCKET
Connection socket for pH/Temperature electrode supplied with the instrument or alternative electrode.

OPERATION

Switch the instrument on by using the I/O key. The display will either power up in the mV mode or the pH mode dependent on previous usage. This will be indicated by the displayed measurement unit. The display cursor will also indicate the mode selected. To change mode, move the cursor beneath the required menu option, using the ◂▸ keys, and then press the ENT key.

pH CALIBRATION

Auto buffer recognition operates over the range of 0 to 100°C, and will recognise 4.00, 7.00 and 10.05pH.
NOTE: Rinse electrode(s) in deionised water between measurements.

Calibration is performed by moving the cursor to the CAL menu option by using the ◂ or ▸ keys, and then pressing the ENT key to select. The readout will then display CAL 1.
The electrode(s) should be placed into the required buffer and the reading allowed to stabilise (the endpoint symbol will be displayed) prior to pressing the ENT or CAL key. The display will then update to the standard buffer value, corrected for temperature (actual temperature will be displayed). The display will then indicate CAL 2.

If a one point calibration only is required, move the cursor beneath the pH menu option using the ◂ key and then press the ENT key. The instrument will return to the pH mode.

If a two point calibration is required, the electrode(s) should be rinsed and then placed into the second buffer solution. Allow the reading to stabilise (the endpoint symbol will be displayed) prior to pressing the ENT or CAL key. The display will update to this calibration value and then return to the pH mode.

MANUAL pH CALIBRATION

NOTE: Rinse the electrode(s) in deionised water between measurements.

Select the pH menu and then CAL by moving the cursor to the CAL menu option by using the ◂ or ▸ keys, and then pressing the ENT key to select, or by pressing the CAL key. The readout will then display CAL 1.
The electrode(s) should be placed into the required buffer and the reading allowed to stabilise (the endpoint symbol will be displayed). Set the display to the required buffer value using the ▴▾ keys. Press the ENT key or press the CAL key to calibrate the instrument to that value.

The display will then update to the set buffer value, corrected for temperature (actual temperature will be displayed). The display will then indicate CAL 2.

If a one point calibration only is required, move the cursor beneath the pH menu option using the ◂ key and then press the ENT key. The instrument will return to the pH mode.

If a two point calibration is required, the electrode(s) should be rinsed and then placed into the second buffer solution. Allow the reading to stabilise (the endpoint symbol will be displayed). Set the display to the required buffer value using the ▴▾ keys.

Press the ENT key or press the CAL key to calibrate the instrument to that value. The display will then update to that calibration value and return to the pH mode.

ERROR CODES

If a problem is detected during calibration the following error codes will be displayed:

Err — This indicates that the instrument has not recognised the buffer. The displayed reading must be within 0.5pH of the calibration buffer value. The error code will be displayed for 3 seconds and will then reset the calibration data back to the ideal Nernst response.

Err 2 — This indicates that the slope value is out of range. The error code will be displayed for 3 seconds and will then reset the calibration data back to the ideal Nernst response.

mV MODE

Move the cursor beneath the mV menu option and press the ENT key. The instrument can toggle between Absolute and Relative mV by pressing the CAL key. Relative mV mode is indicated by REL appearing on the display.

MANUAL TEMPERATURE COMPENSATION

NOTE: This is only operational in "pH MODE".

When using an alternative electrode without ATC, the displayed temperature reading can be adjusted to the correct value using the ▲▼ keys. The instrument will default to this mode if a temperature sensing element is not detected by the electronics.

AUTO SHUT OFF

Switch off the instrument before resetting this switch. This will occur after 30 minutes if no key is pressed, unless disabled. This can be achieved by resetting SW1, switch 2 to the "off" position.

STORING RESULTS

The M key (Memory Store) is used to store the displayed readings in any measurement mode. When the M key is pressed Sto will be shown on the main display, and the next available index number will appear on the auxiliary display.
To store the displayed reading the ENT key should be pressed. The instrument will then return to the previous display.

STORING RESULTS (continued)

If no key is pressed within 5 seconds the reading will be stored in the specified location. The required location (between 0 to 99) can be changed via the ▲▼ keys. If the key is pressed and held the timer is disabled until the key is released. At this stage the 5 second timer is re-initialised.

If all 100 locations already have stored readings the instrument will display FULL. Pressing the ENT key aborts the storage of the reading. The ▲▼ keys can be used to overwrite an existing location.

RECALLING STORED READINGS

To recall a stored reading move the cursor to the RCL menu option by using the ◄ or ► keys, and then pressing the ENT key to select. The main display will update to the stored reading, and the auxiliary display will flash the stored reading number and then update to the temperature display.
If no stored reading is present, the main display will read Clr and the auxiliary display will read the stored location index number.

To scroll through the index, press and hold either the ▲ or ▼ key.

To exit the recall mode press ENT. The display will return to the previous display.

CLEARING STORED READINGS

To clear all stored readings from the instrument memory:

Select the RCL menu option by moving the cursor to the RCL menu option by using the ◂▸ keys, and then press the ENT key to select. Select CLR by using the ▸ key. The ENT key should now be pressed for > 2 seconds. The stored readings will be cleared and Clr will be shown on the display to confirm this.

GOOD PRACTICE GUIDELINES

The types of pH electrodes are many and various. For the majority of tests carried out on aqueous solutions; with a reasonable ionic strength, at ambient temperatures and with limited use in strongly acidic solutions, the epoxy bodied combination electrode supplied is ideal.

For other applications a more suitable pH/reference electrode pair may be required. Details or advice supplied on request.

GOOD PRACTICE GUIDELINES (cont)

The following general guidelines indicate the care and maintenance required:

1. **After Use**
   Rinse thoroughly with distilled water.

   Short Term Storage
   Immerse in pH 4 buffer

   Long Term Storage
   Fit wetting cap filled with pH7 buffer (Combination)
   Fit wetting cap filled with pH4 buffer (pH/Reference)

2. Electrodes should be stored:
   a) away from direct sunlight
   b) in a vertical position
   c) within their specified temperature range

3. Always ensure the electrode is used within its specified temperature range of 0 to 80°C. Ageing of electrodes used above their specified temperature is rapid and irreversible.

4. **DO NOT** touch the sensitive glass pH membrane or reference junction during use.

Excess droplets of solution may be removed by gently blotting with filter paper or tissue.
DO NOT rub the electrode as this may induce an electrostatic charge.

5. During use ensure the electrode is rinsed between each measurement to eliminate the contamination of solutions.

MAINTENANCE

CLEANING/RE-CONDITIONING OF GLASS ELECTRODES

For general purpose use, combination electrodes can be cleaned with a mild detergent solution or a commercial glass cleaning solution (provided these are not strongly acidic). The electrode surface should be wiped with a clean cloth soaked in the cleaning agent, and/or allow the membrane to stand in the solution until clean. Rinse and repeat as necessary.

TABLE FOR CLEANING OF GLASS ELECTRODES

NOTE: The epoxy bodied electrode supplied with the instrument should not be cleaned with aggressive solvents.

Deposit	Cleaning agents
General deposits	Mild detergent solution
Inorganic coatings	Commercial glass cleaning solution (not strongly acidic)
Metal compounds	Acid solution, not stronger than 1M
Oil/Grease	Complexing agent (EDTA) or suitable solvent
Resins/Lignins	Acetone, alcohol or detergent (not strongly alkaline)
Proteins (blood, etc)	Enzyme solutions e.g. Pepsin in 0.1M HCl
Stubborn deposits	Weak hydrogen peroxide solution, Sodium Hypochlorite solution or domestic bleach.

MAINTENANCE (continued)

Electrodes which have been allowed to dry out, (often indicated by a hard, dry deposit of KCl crystals on the electrode body), should be rehabilitated by soaking overnight in warm distilled water.

BATTERY REPLACEMENT

The battery symbol will be displayed to the right hand side of the display to indicate a maximum of 5 hours battery life remains.

To fit new batteries; remove the battery compartment cover, remove and carefully discard the used batteries. Fit the new batteries, type R6, AA or AM3, ensuring the correct polarities are observed, as indicated on the moulding. Refit the battery compartment cover, ensuring that the fixings are secured into place, but are not overtightened.

ELECTRODE REPLACEMENT

To replace the electrode switch the model 3150 off and disconnect the faulty electrode by carefully unscrewing the locking ring counter-clockwise and withdrawing the connector from the receptacle.

ELECTRODE REPLACEMENT (cont)

Fit the new electrode by reversing the above method, ensuring that the polarising keyway is correctly aligned and the locking ring is tightened to prevent the ingress of moisture.

OPTIONAL ACCESSORIES

The following list of items are available for use with the Model 3150:

033 162	Carrying Case
924 034	Steel protected Spear pH Probe
027 228	Temperature probe
027 229	Reference electrode with in-built ATC
538 014	Adapter Lead

SPARES

027 227	pH/Temperature Electrode

HEALTH & SAFETY

PRODUCT: Buffer Capsules

PHYSICAL DATA

Description: White powder
Solubility in water: Soluble

HEALTH HAZARD - Harmful if ingested in quantity. May be irritating or cause physical damage in contact with eyes.
Toxicity data: No data
Carcinogenicity: No evidence of carcinogenic properties
Mutagenicity/Teratogenicity: No evidence of mutagenic or teratogenic effects
Exposure Limits: Not assigned (Long Term 8 hour TWA)

FIRST AID

Eyes	Irrigate thoroughly with water. If discomfort persists **OBTAIN MEDICAL ATTENTION.**
Lungs	Remove from exposure.
Skin	Wash off thoroughly with soap and water.
Mouth	Wash out mouth thoroughly with water. In severe cases **OBTAIN MEDICAL ATTENTION.**

STORAGE AND HANDLING

Special requirements - none

EC Declaration of Conformity

JENWAY Model 3150 pH Meter complies with the following European Standards:

EN 50081-1:1992 Electromagnetic compatibility - Generic emission standard

EN 50082-1:1992 Electromagnetic compatibility - Generic immunity standard (Performance criterion B)

EN 61010-1:1993 Safety requirements for electrical equipment for measurement, control and laboratory use

Following the provision of:

EMC Directive - 89/336/EEC and
Low Voltage Directive - 73/23/EEC

Thank you for reading this data sheet.

For pricing or for further information, please contact us at our UK Office, using the details below.

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