

**MODEL 3320 pH METER
OPERATING MANUAL**

SAFETY

Please read this information carefully prior to installing or using this equipment.

1. The units described in this manual are designed to be operated only by trained personnel. Any adjustments, maintenance and repair must be carried out as defined in this manual, by a person qualified to be aware of the hazards involved.
2. References should always be made to the Health & Safety data supplied with any chemicals used. Generally accepted laboratory procedures for safe handling of chemicals should be employed.
3. If it is suspected that safety protection has been impaired in any way, the unit must be made inoperative and secured against any intended operation. The fault condition should immediately be reported to the appropriate servicing authority.

MODEL 3320 pH METER OPERATING MANUAL

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SECTION 1

INTRODUCTION

1.1 INSTRUMENT DESCRIPTION

The Model 3320 pH Meter is a laboratory unit which incorporates many sophisticated features but also offers simplicity of operation.

The graphics mode liquid crystal display incorporated into this meter enables a menu based approach to each analysis and allows the user to very easily select the relevant operating mode. Calibration routines are simplified by the automatic buffer recognition feature and the 1, 2 or 3 point calibration capability ensures optimum accuracy when measuring over a wide pH range.

The meter incorporates both analogue and digital interfacing capability along with high and low alarm set points. An internal data logging facility enables 100 results to be stored in non-volatile memory for either recall onto the display or downloading via the RS232 port. A Karl Fischer output is also provided.

The Model 3320 is configured to ensure full compliance with Good Laboratory Practice (GLP). A real time clock is incorporated into the meter which, as well as continuously displaying time, date stamps all calibration activities, datalogged and downloaded results. The clock also enables timed printouts.

1.2 SPECIFICATION

pH (1, 2 or 3 point cal)

Range: -2 to 16.00pH

Resolution: 0.01pH

Accuracy: ± 0.02 pH

mV (Absolute or Relative)

Range: -1999 to +1999mV

Resolution: 1mV

Accuracy: ± 1 mV

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: 2.00, 4.00, 7.00, 9.22, 10.05 (manual override)

Calibration: User selectable 1, 2 or 3 point

Outputs: Analogue 1mV per digit

Bi-directional RS232

Hi/Lo alarm outputs open collector 0.5A 50V max.

Datalogger: 100 result memory non-volatile

Clock: 24 hour, hours/mn/sec or day of month, month and year,

leap year corrected

Alarm points: -2 to 16.00pH / -1999 to +1999mV

G.L.P. Calibration reminder with an interval of 1-999 hours from last calibration

Timed printout with an interval from 1 second to 1 day

Display: LCD Graphics

Power: Power supply 9Vac

Size: 275(l)x240(w)x150(d)mm

Weight: 1.2 Kgs

SECTION 2

INSTALLATION

2.1 UNPACKING

Remove the Model 3320 from the packaging and ensure the items within the package are as ordered.

Any shortages or damage should be reported immediately to the Manufacturer or your local Distributor.

NOTE: Power Supply 021 033 is supplied with a moulded European plug. If this is not correct for your local supply it should be cut off and a suitable local connector fitted noting the colours of the internal conductors as follows: Brown - Live Blue - Neutral

2.2 INSTALLATION

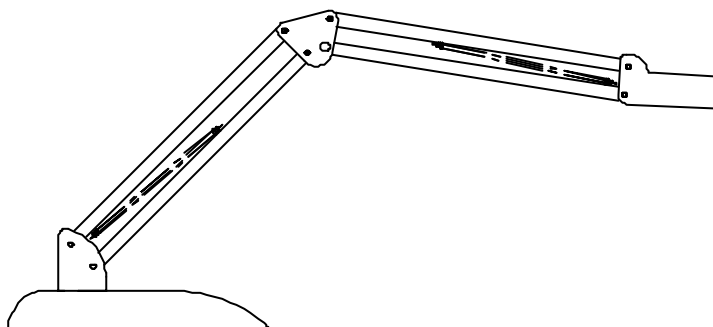
LCD CONTRAST

The LCD contrast can be set at any time. The LCD contrast potentiometer is accessible through the rear panel adjacent to the power socket.

This adjustment should only need to be made on receipt of the instrument. After initial adjustment the instrument will automatically adjust the contrast depending on the temperature of the glass.

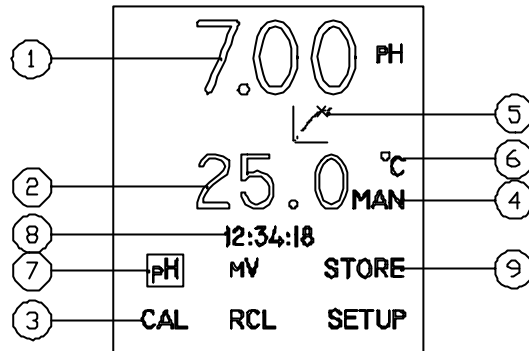
For instruments supplied with the swing arm electrode holder the following assembly instructions should be carried out:

1. Unpack the assembly and ensure the following items are present:
 - a) base block and b) swing arm. Assemble as illustrated. The moulded pivot is a tight push onto the pin.



2. Fit the pH electrode into the cut-out in the support block. The optional temperature probe, if supplied, should be placed into the small hole in the centre of the block. The cable(s) should be passed through the retaining clip on the holder and connected to the respective socket on the rear panel.

2.3 DISPLAYS



1. Primary display - provides direct readout of pH and millivolt samples.
 If the primary reading is over range this display will indicate "1" with all other digits blanked and the error message **OVERRANGE**.
 If the primary reading is under range this display will indicate "-1" with all other digits blanked and the error message **UNDERRANGE**.

Primary Ranges:

pH: -2.00 to 16.00
 mV: -1999 to +1999

2. Auxiliary display - provides direct readout of temperature in °C or °F.
 If the auxiliary reading is over range this display will indicate "1" with all other digits blanked.
 If the auxiliary reading is under range this display will indicate "-1" with all other digits blanked.

Auxiliary Ranges:

Temperature -10 to +105°C
 +14 to +220°F


3. CAL 1, 2 or 3 indicates a 1, 2 or 3 point calibration. Displayed in pH mode when a CAL is selected.





REL or ABS will be displayed when the mV mode is selected. Toggle between REL/ABS.

4. MAN - used to indicate manual temperature.
5. Endpoint detection symbol - this is displayed once a stable reading is detected and is maintained until the input changes.
6. Selected temperature measurement unit - °C or °F.

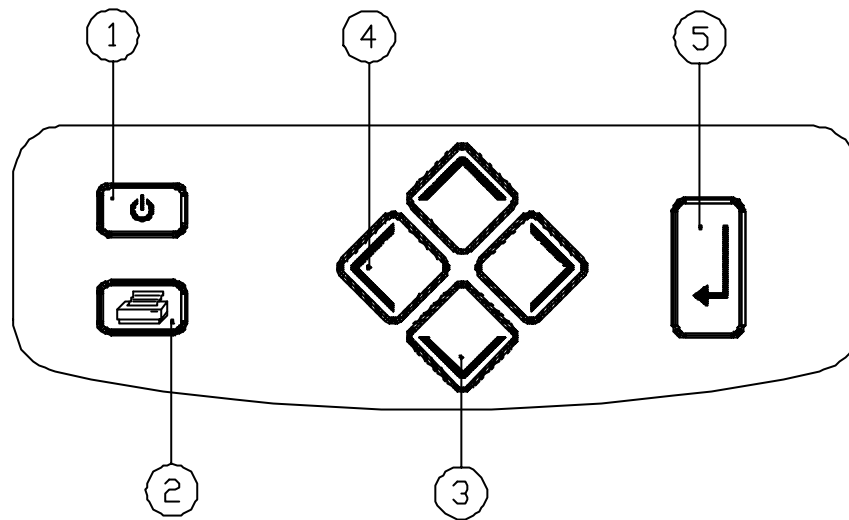
2.3 DISPLAYS (continued)

7. Measurement unit which is being used - pH or mV.
8. Real time clock - giving continuous display of hours, minutes and seconds or day, month and year. All logged results are automatically time stamped. Error messages CAL OUT OF RANGE, SLOPE OUT OF RANGE, CALIBRATION DUE and OVER / UNDER RANGE messages will appear in this position on the display.
9. Menu - used for selection of modes of operation. The selected mode is reverse highlighted. To select, highlight the appropriate mode of operation using the arrow keys, then press .

NOTE: The menu wraps around.

To enter another mode, highlight the required mode using the arrow keys and press . To escape from a measurement sequence/mode move to the EXIT option and press . This will return the instrument to the start of the previously selected menu.

2.4 CONTROLS



Switches the instrument on and to standby.



Print key. Provides a printout of the current reading with an incremental sample number. When pressed for the first time after a calibration, the print out will give calibration information. The incremental sample number will be reset after a calibration. Prints stored readings when the instrument is in Recall (RCL) mode.



These keys are used to change a parameter.

1. Used when storing a reading to change the stored location index.
2. In recall (RCL) mode these keys are used to change the displayed stored location.
3. The keys are used to move vertically between menu options.
4. In Set-Up mode these keys are used to modify the set up parameters.

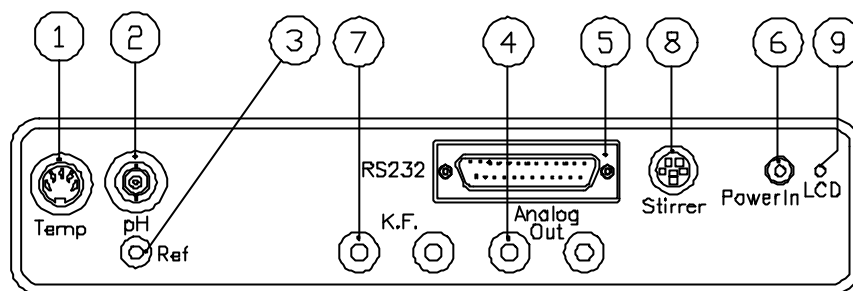


1. These keys are used to move horizontally between menu options.
2. In Set-Up these keys are used to select the part of the parameter required for modification.



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


2.5 INPUTS/OUTPUTS



- | | | |
|----|----------------------|---|
| 1. | TEMP SOCKET | 5 pin DIN socket for the automatic temperature compensation (ATC) probe |
| 2. | pH SOCKET | BNC socket. Connection socket for pH and Redox electrodes |
| 3. | REF SOCKET | 2mm pin socket. Connection socket for separate reference electrode |
| 4. | ANALOG OUT | 2 x 4mm sockets. Analogue output 1mV per digit |
| 5. | OUTPUT SOCKET | 25 way D socket for RS232 and Alarm connections |
| 6. | POWER IN | 2.1 x 5.5mm socket allowing the power supply to be connected to the unit |
| 7. | KARL FISCHER | Polarised output. Karl Fischer titrations are enabled by the provision of a 10 μ A polarising current output. |
| 8. | STIRRER | Connection socket for optional stirrer. |
| 9. | LCD | LCD contrast potentiometer. |

SECTION 3

OPERATION

Connect the power supply appropriate to the supply being used to the instrument via the rear panel power socket. Connect the electrode(s) to the appropriate rear panel sockets. When power is applied to the instrument the screen will show the mode last used prior to switch off. The measurement mode will be indicated by displayed units. To change the mode or exit, move to the required mode by using the arrow keys and then press the  key.

3.1 MENU OPTIONS

pH	mV	STORE
CAL	RCL	SETUP

pH	pH mode
mV	millivolt mode
STORE	used to store the displayed reading in pH or mV mode
CAL	pH calibration mode
RCL	recall mode for stored readings
SETUP	used to set up mode specific parameters, instrument and clock set up and access G.L.P. features

pH	mV	STORE
REL	RCL	SETUP

pH	pH mode
mV	millivolt mode
STORE	used to store the displayed reading in pH or mV mode
REL	toggles between Relative (REL) and Absolute (ABS) mV modes
RCL	recall mode for stored readings
SETUP	used to set up mode specific parameters, instrument and clock set up and access G.L.P. features

3.2 SET UP OPTIONS

3.2.1. pH SET UP MENU

EXIT	
CAL1	4.00
CAL2	7.00
CAL3	10.00
SLOPE	59.16
MAN TEMP	25.0°C
INSTRUMENT	SETUP

EXIT	menu escape key
CAL 1	calibration buffer value
CAL 2	calibration buffer value
CAL 3	calibration buffer value
SLOPE	electrode slope value between CAL1 and CAL 2
MAN TEMP	used to set manual temperature value in pH mode. For use when no temperature probe is connected or the TC is non-functional
INSTRUMENT SETUP	used to select the next set up menu for instrument parameters

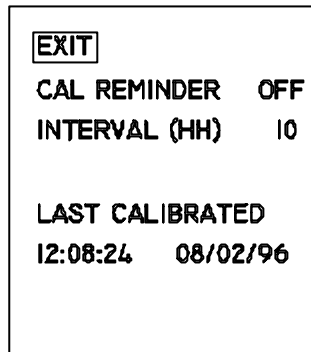
3.2.2. INSTRUMENT SET UP MENU

EXIT	
LANGUAGE	ENGLISH
TEMPERATURE	°C
STIRRER O/P	0%
G.L.P.	
ALARM POINTS	
PRINTOUT TIMER	
CLOCK SETUP	

EXIT	menu escape key
LANGUAGE	used to set preferred language option
TEMPERATURE	used for selection of measurement in °F or °C
STIRRER O/P	used to set stirrer speed
G.L.P.	used to select the G.L.P. menu (refer sub menu)
ALARM POINTS	used to select alarm set up menu (refer sub menu)
TIMED PRINTOUT	used to set timed printout (refer sub menu)
CLOCK SETUP	used to select clock set up menu

3.2 SET UP OPTIONS (continued)

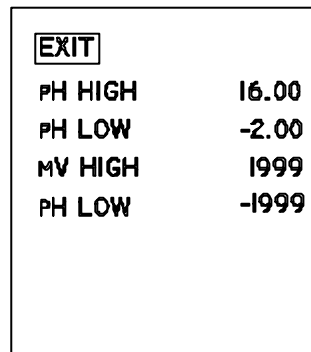
3.2.3 G.L.P. SUB-MENU



EXIT	menu escape key
CAL REMINDER	setting to ON will prompt re-calibration setting to OFF will suppress the message
INTERVAL (HH)	allows interval to be set between 1 and 999 hours from the last calibration to prompt
LAST CALIBRATED	indicates when the instrument was last calibrated

These products support Good Laboratory Practice (G.L.P.) by displaying a CALIBRATION DUE message in measurement modes when the time elapsed from the last calibration exceeds the interval set in the G.L.P. menu. The interval can be set from 1-999 hours from the last calibration by moving the cursor to the INTERVAL (HH) menu option and pressing the enter key and then adjusting the interval with the arrow keys. The CALIBRATION DUE message can be suppressed by setting the CAL REMINDER menu option to OFF. The G.L.P. menu displays the time and date of the last calibration.

3.2.4 ALARM SUB MENU



EXIT	menu escape key
pH HIGH	if pH reading exceeds this value an alarm warning will appear on the display and the high output alarm will become active
pH LOW	if pH reading falls below this value an alarm warning will appear on the display and the low output alarm will become active
mV HIGH	if mV reading exceeds this value an alarm warning will appear on the display and the high output alarm will become active
mV LOW	if mV reading falls below this value an alarm warning will appear on the display and the low output alarm will become active

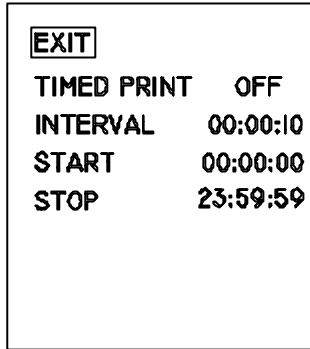
The ALARM POINTS menu displays the high and low alarm thresholds for all measurement modes. These can be set by moving the cursor to the required menu alarm point option, pressing the enter key and then adjusting the alarm point with the arrow keys.

3.2 SET UP OPTIONS (continued)

If a measured value exceeds the high alarm setting, then a warning message is displayed and the high alarm signal is activated. Similarly, if a measured value falls below a low alarm setting, then a warning message is displayed and the low alarm signal activated.

When setting the alarm points, the high alarm must be higher than the low alarm point. If this condition is not met, then the instrument will reset the last alarm point adjusted to the upper or lower measurement range as required.

3.2.5 TIMED PRINTOUT SUB MENU

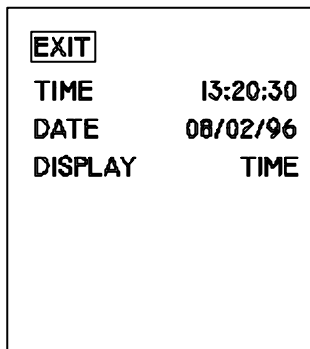


EXIT	menu escape key
TIMED PRINT	turns this function on or off
INTERVAL	can be set for hours, minutes and seconds. A printout will be initiated at that interval
START	start time set
STOP	stop time set

These units can be set to print out displayed readings at a preset interval between any two times each day. This is analogous to pressing the print key at the preset interval, and thus will only printout in a measurement mode. This feature can be disabled by setting the TIMED PRINT menu option OFF.

The interval is set in hours:minutes:seconds. The START time sets the time at which the timed printout will begin printing. The STOP time sets the time after which the timed printout will stop printing. It will resume printing on the next day when the time reaches the start time.

3.2.6 CLOCK SET UP MENU



EXIT	menu escape key
TIME	real time clock set up
DATE	date set up
DISPLAY	used to select display of time, date or none


pH MODE

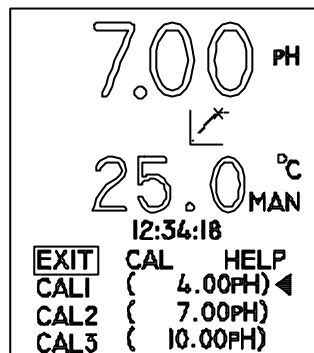
3.3 pH CALIBRATION - AUTOMATIC




Auto buffer recognition operates over the range of 0 to 100°C and will recognise 2.00, 4.00, 7.00, 9.22 and 10.05pH.


If calibration values other than 2.00, 4.00, 7.00, 9.22 and 10.00 are set the instrument will consider this to be a manual buffer value.




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


Calibration is performed by moving the cursor to the CAL menu option and then pressing the  key. The instrument display will then show:







The pointer will indicate the stage of calibration and buffer value. This value can be changed by either entering the SET UP menu or by moving the cursor to the calibration value to be changed using the arrow keys. The first part of the parameter is highlighted and can be adjusted to the required value using the  keys. If further precision adjustment is required move the highlighted cursor to the next adjustable position using the  key and adjust as required. Continue moving across the parameter until full adjustment has been made. To confirm set value press  .

The CAL menu option should be selected using the arrow keys. The electrode(s) should be placed into the first buffer solution and the reading allowed to stabilise (the endpoint symbol will be displayed) prior to pressing the  key. The display will then update to the standard buffer value, corrected for temperature (actual temperature will be displayed). The pointer will then move to the CAL 2 position.

If a one point calibration only is required select the EXIT option by using the   keys and pressing  . 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  key. The display will then update to the standard buffer value, corrected for temperature (actual temperature will be displayed). The pointer will then move to the CAL 3 position.


If a two point calibration only is required select the EXIT option by using the   keys and pressing . The instrument will return to the start of the pH mode.




If a three point calibration is required the electrode(s) should be rinsed and then placed into the third buffer solution. Allow the reading to stabilise (the endpoint symbol will be displayed) prior to pressing . The display will then update to the standard buffer value, corrected for temperature (actual temperature will be displayed). The instrument will then return to the main pH display.


3.4 pH CALIBRATION - MANUAL




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


Select the pH menu. If the manual buffer values require adjustment before calibration by either entering the SET UP menu or by moving the cursor to the calibration value to be changed using the arrow keys. The first part of the parameter is highlighted and can be adjusted to the required value using the   keys. If further precision adjustment is required move the highlighted cursor to the next adjustable position using the  key and adjust as required. Continue moving across the parameter until full adjustment has been made. To confirm set value press . When all parameters have been set move the cursor to the CAL option and press . The pointer will be on the CAL 1 position to indicate the start of the calibration sequence.

The electrode(s) should be placed into the first buffer and the reading allowed to stabilise (the endpoint symbol will be displayed). Press the  key to calibrate the instrument to the set value. The display will then update to the set buffer value. The pointer will then move to the CAL 2 position.

If a one point calibration only is required select the EXIT option by using the   keys and pressing  .
The instrument will return to the start of 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  key. The display will then update to the set buffer value. The pointer will then move to the CAL 3 position.

If a two point calibration only is required select the EXIT option by using the   keys and pressing  .
The instrument will return to the start of the pH mode.





If a three point calibration is required the electrode(s) should be rinsed and then placed into the third buffer solution. Allow the reading to stabilise (the endpoint symbol will be displayed) prior to pressing the  key.
The display will then update to the set buffer value. The instrument will then return to the main pH display.

3.5 ERROR CODES

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





CAL OUT OF RANGE

This indicates that the instrument has calculated an electrode offset at pH 7 outside the -30 to +30mV limits. The error code will be displayed for 3 seconds and will then reset the calibration data back to the ideal Nernst response (0mV @ pH 7, 59.16mV/pH @ 25°C).



To obtain information from the HELP menu move the cursor to the HELP menu option using the  key and press  . To move to the next/previous information screen use the   keys to select PgDn or PgUp.
Select EXIT to return to the main CAL display.

SLOPE OUT OF RANGE

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 (0mV @ pH 7, 59.16mV/pH @ 25°C). The allowable range for slope is 75 to 125% of the ideal Nernst figure.

To obtain information from the HELP menu move the cursor to the HELP menu option using the  key and press  . To move to the next/previous information screen use the   keys to select PgDn or PgUp.
Select EXIT to return to the main CAL display.

3.6 mV MODE


Select the mV mode by using the arrow keys and then pressing . The instrument can toggle between Absolute and Relative millivolts by using the  key with REL or ABS menu option highlighted. Relative mV is indicated by REL appearing on the display.



3.7 MANUAL TEMPERATURE COMPENSATION




NOTE: This is only operational in pH mode.

When using an alternative electrode without ATC, or if the ATC is non-functional, the displayed temperature reading can be adjusted to the required value in the SET UP menu. The instrument will default to this value if a temperature sensing element is not connected to the instrument.

3.8 STORING RESULTS

The STORE menu is used to store the displayed readings in any measurement mode. Select the STORE menu by using the arrow keys and pressing . When the STORE key is pressed the display will show the main and auxiliary readings, the previous menu options will be replaced by a new set containing the menu option ABORT NN (NN is the first available free location for the displayed reading).

To store the displayed reading at the current index number the  key should be pressed. If no key is pressed within 5 seconds the reading will be automatically stored in this location. The instrument will then return to the previously selected mode. If the reading is not to be stored, moving to the ABORT option using the arrow keys and pressing  will return the instrument to the previously selected mode without storing the reading.


To store a reading in a specific location use the   keys to select the required location and then press . If no other key is pressed within 5 seconds the reading will be automatically stored in this location. The instrument will then return to the previously selected mode.

NOTE: Automatic storage after 5 seconds is only instigated after the last key press. If a key is pressed and held down the timer is disabled until the key is released. At this stage the 5 second timer is re-initialised.





The non-volatile storage area has the facility to store 100 readings. If, however, an attempt is made to store a reading with all locations full, the highlighted message MEMORY FULL will be displayed for approximately 2 seconds, returning the highlighting to the ABORT option. If it is necessary to store the reading the location will have to be selected within the index option using the arrow keys.

NOTE: Storing a reading when the memory is full will overwrite any previous data stored in the selected location.






3.9 RECALLING STORED READINGS


To recall a stored reading select the RCL menu option by using the arrow keys and then pressing . The display will update to the stored reading and the stored index number will be shown at the bottom of the display.


If no stored reading is present the display will give the message NO RECORD STORED.


To select a specific stored reading, select the INDEX: option using the arrow keys and press . To select the required location use the   keys. The display will update to the selected reading. To exit the RCL mode select the EXIT option and press . The instrument will return to the previous display.

3.10 CLEARING STORED READINGS


To clear an individual stored reading select the RCL mode using the arrow keys and press . Select INDEX: by using the arrow keys and then press . Select the specific location to be deleted by using the   keys. Move to the DELETE menu option by using the arrow keys and press . The display will clear and update to show the message NO RECORD STORED, returning the highlighting to the location number.

Selecting the EXIT option and pressing  will return the instrument to the previous display.



To clear all stored readings select the CLR/ALL menu option using the arrow keys and then press . The display will momentarily display the message DELETING... The display will then update to show the message ALL RECORDS DELETED.







Selecting the EXIT option and pressing  will return the instrument to the previous display.

3.11 DOWNLOADING STORED READINGS

To download or print stored readings press the  key from within RCL mode.

3.12 REAL TIME CLOCK SET UP

Real time clock set up is performed by entering into the INSTRUMENT SET UP mode, selecting CLOCK SET UP using the  keys and pressing the  key.

Select the real time clock parameter to be changed using the  keys. Once highlighted adjustment of the parameter proceeds by pressing . The first part of the parameter is highlighted and can be adjusted to the required value by using the  keys. If further adjustment is required move the highlighted cursor to the next adjustable position using the  key and adjust as required. Continue moving across the parameter until full adjustment has been made. To confirm new time or date press  or press  key until the selected parameter is re-highlighted.

3.13 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 is ideal.

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

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 pH 7 buffer (combination)
 Fit wetting cap filled with pH 4 buffer (reference/pH)

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 membrane 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.

SECTION 4

MAINTENANCE

4.1 GENERAL

The Model 3320 is designed to give optimum performance with minimum maintenance. It is only necessary to keep the external surfaces clean and free from dust. To give added protection when the unit is not in use the unit should be disconnected from the mains supply and covered with the optional dust cover (544 008). For longer term storage or re-shipment it is recommended that the unit be returned to the original packing case.

4.2 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: Epoxy bodied electrodes should not be cleaned with aggressive solvents.

DEPOSIT	CLEANING AGENT
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

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.

SECTION 5

OPTIONAL ACCESSORIES

The following list of items are available for use with the Model 3320:

pH Electrodes

924 001	General purpose, epoxy bodied combination, 12mm diameter. For liquids.
924 003	Redox, platinum type combination, 12mm diameter.
924 004	Micro 4.5mm diameter glass combination. For liquids.
924 005	General purpose, glass bodied combination, 12mm diameter. For liquids.
924 010	Spear type 6mm diameter stem, glass combination. For semi-solids.
924 011	Spear type 4mm diameter stem, glass combination. For semi-solids.
924 015	Glass pH electrode.
924 030	Tris Buffer. 12mm diameter. For biological fluids.
924 047	3 in 1 pH electrode

Reference Electrodes

924 016	Sealed cap calomel reference.
924 036	Double junction calomel reference.

Buffer Solutions

025 163	2.00 pH Buffer (500ml)
025 037	4.00 pH Buffer (500ml)
025 038	7.00 pH Buffer (500ml)
025 162	9.22 pH Buffer (500ml)
025 039	10.05 pH Buffer (500ml)

Redox Standards

025 157	200mV @ 25°C (500ml)
025 158	300mV @ 25°C (500ml)
025 159	465mV @ 25°C (500ml)

025 160	3M KCl Electrode Fill Solution (100ml)
025 161	Electrode Cleaning Solution (500ml)

543 001	40 Column Printer
060 287	Paper Roll
060 288	Printer Ribbon
050 002	Jensoft Software 3½" disk
050 001	Jensoft Software 5¼" disk
542 009	Interface Cable Kit

Stirrers

555 001	Bench Stirrer
556 001	Overhead Stirrer

SECTION 6

ADDITIONAL FUNCTIONS

6.1 mV RANGES

Absolute Millivolts

When this mode is selected the instrument will display the actual voltage developed by the electrode when it is immersed in a solution containing ions to which the electrode is sensitive.

The electrode may be a combination type or a suitable sensing/reference pair, depending on the specific test being carried out.

pH, Redox and Ion Selective electrodes can all be used in this mode. Most of these determinations will require the preparation of calibration curves or other analytical methods to enable the mV reading to be converted to a concentration unit. For further information on these determinations refer to the electrode instructions, which will normally give details of calibration solutions, interferences and the limits of the methodology.

A very useful application of the Absolute mV range is for monitoring the performance of standard pH electrodes. Using accurate and fresh buffers at a constant temperature, the millivolt output of the electrode should be noted and compared to the theoretical ideal. As the electrode ages, becomes contaminated or dirty these values will drift, indicating that corrective action should be taken.

Recording these values as part of a routine Quality Control program can give a good indication of the condition of the electrode.

Relative Millivolts

This mode is also suitable for determination using Redox and Ion Selective electrodes and has the additional benefit of being able to zero any offset voltage developed by the electrode in a blank solution, i.e. a solution that has none of the ions to be measured, but has all the other characteristics of the unknown samples. A blank solution would normally have its ionic strength and pH adjusted as required for the electrode in use.

As the display is zeroed automatically when the Relative millivolt mode is selected, it is necessary to immerse the electrode in the blank solution with the Absolute mV mode selected. When the reading has stabilised the Relative mV mode should then be selected. The display will be set to zero, thereby removing any offset voltage.

Sample measurement is then carried out by using a variety of well tried analytical methods; from simple calibration curves through titrations, to single and multiple addition methods.

SECTION 7

INTERFACING

Analogue

All units are provided with 2 x 4mm sockets, marked as ANALOG OUT, on the rear panel. An analogue output voltage of 1mV per least significant digit is available from these sockets.

Karl Fischer

A polarised Karl Fischer output is provided. Karl Fischer titrations are enabled by the provision of a 10 μ A polarising current output.

RS232

The Bi-directional RS232 interface is available on the rear panel 25 way D type connector.

The connections are as follows:

TXD 2	- INPUT TO 3320
RXD 3	- OUTPUT FROM 3320
RTS 4	- LINKED TO CTS
CTS 5	- LINKED TO RTS
DSR 6	- OUTPUT FROM 3320
DCD 8	- OUTPUT FROM 3320
DTR 20	- INPUT TO 3320 (must be active)
GND 7	

Suggested interconnections are detailed below:

3320		IBM PC XT (25 way "D")
TXD 2	_____	2 TXD (From PC)
RXD 3	_____	3 RXD (To PC)
RTS 4	_____	4 RTS (From PC)
CTS 5	_____	5 CTS (To PC)
DSR 6	_____	6 DSR (To PC)
DCD 8	_____	8 DCD (To PC)
DTR 20	_____	20 DTR (From PC)
GND 7	_____	7 GND

3320		IBM PC XT (9 way "D")
TXD 2	_____	3 TXD (From PC)
RXD 3	_____	2 RXD (To PC)
RTS 4	_____	7 RTS (From PC)
CTS 5	_____	8 CTS (To PC)
DSR 6	_____	6 DSR (To PC)
DCD 8	_____	1 DCD (To PC)
DTR 20	_____	4 DTR (From PC)
GND 7	_____	5 GND

The RS232 communications parameters on the computer or printer need to be set to match those of the Model 3320, as detailed below:

1200 Baud
7 Data Bits
Odd Parity
1 Stop Bit

The Model 3320 supports both hardware (DTR/DSR) flow control and software XON/XOFF flow control.

Pressing the PRINT key outputs from the RS232 interface (as shown in the printout below).

Sending an ASCII "D" to the 3320 causes a printout of the current displayed reading plus sample number.

Sending an ASCII "C" causes a printout of the last calibration parameters (same as printout after performing a calibration).

Sending an ASCII "P" causes downloading of stored readings.

ALARM CONNECTIONS

Open collector alarm outputs capable of linking up to 0.5A are available on the 25 way D connector.

High Alarm	-	pin 12
Low Alarm	-	pin 13

Both outputs will link current to the common line (pin 7) i.e. the emitters of both alarm transistors are connected to pin 7.

NOTE: The open circuit voltage on pin 12 or pin 13 must not exceed 50V d.c. with respect to pin 7.

3320 Sample Printout:

```
=====
3320          16:34:59 14/02/96

OPERATOR      .....
CAL1  7.00pH   0mV  25.0°C
CAL2  4.01pH  180mV  25.0°C
CAL3 10.00pH -180mV  25.0°C
SLOPE EFFICIENCY 102.0%
Eo           1mV
LAST CALIBRATED    16:34:51 14/02/96
=====
 1 10.00pH 25.0°C 16:34:59 14/02/96
 2  4.01pH 25.0°C 16:35:17 14/02/96
 3  7.01pH 25.0°C 16:35:24 14/02/96
```

HEALTH & SAFETY

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.

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 3320 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

Martyn J. Fall
Managing Director, Jenway Limited
Gransmore Green, Felsted, Dunmow,
Essex, CM6 3LB, England