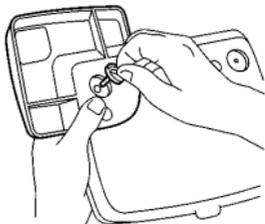
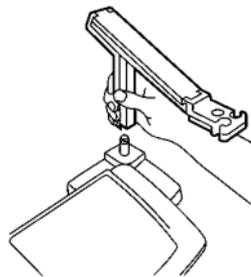


Installation

1. Unpack the meter, power supply, electrode, electrode arm, buffer sachets, Guide Book and calibration certificate. Keep the calibration certificate in a safe place.
2. Check the power supply unit is the correct voltage for your local supply. If it is not, contact your distributor.
3. Attach the electrode arm to the left or righthand side of the meter:
 - a. Turn the meter upside down and seat the dome of the electrode arm base into the left or righthand meter recess.

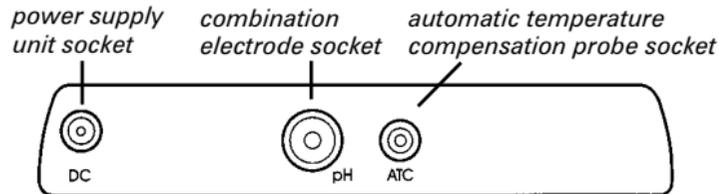


- b. Insert and tighten the fixing screw.
- c. Turn the meter and base the right way up and locate the electrode arm onto the base fixing post. Press down to snap into place.



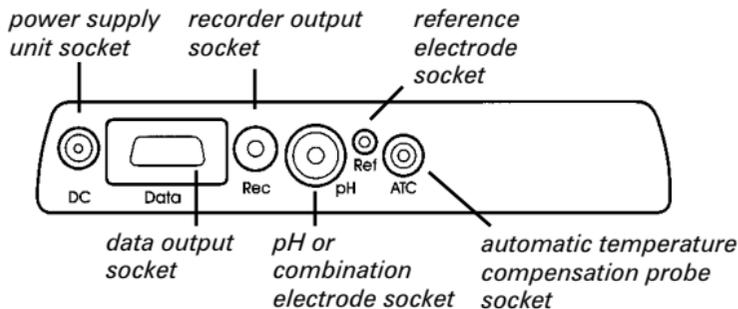
Input and Output Connections

MP220 Rear Panel



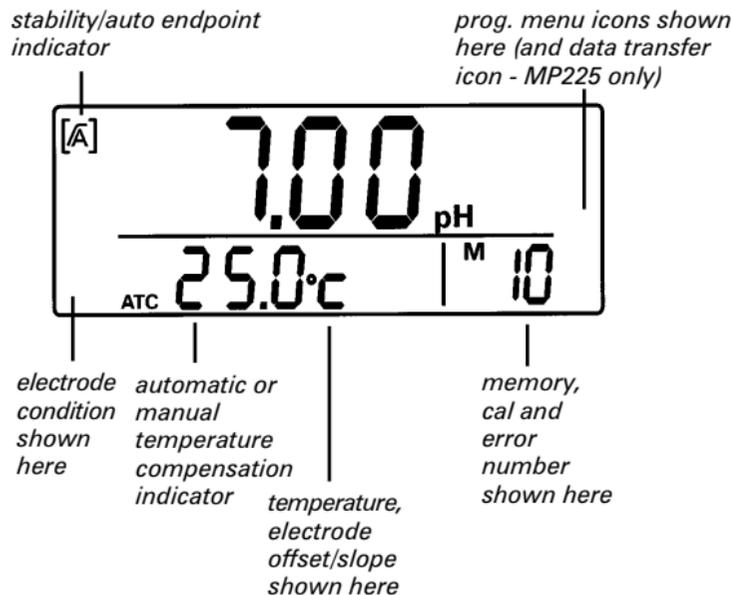
Input and Output Connections (continued)

MP225 Rear Panel



1. Disconnect the shorting clip from the **pH** socket and retain it by clipping it over the socket.
2. Connect the electrode to the **pH** socket. If you are using an electrode incorporating ATC connect the other lead to the **ATC** socket.
3. If you are using a separate ATC probe connect it to the **ATC** socket.
4. Connect the power supply unit to the **DC** socket.

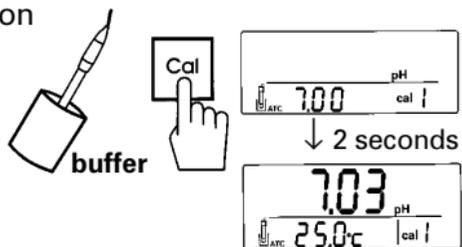
Display



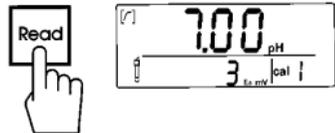
Calibrating

1. 1-point calibration

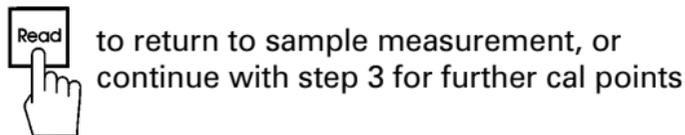
Example



Use auto endpoint [A] or to freeze the reading.



2. Rinse the electrode and blot dry



- Repeat steps 1 and 2 using other buffers for a 2 point (or 3 point - MP225 only) calibration.

Electrode Condition Indicator



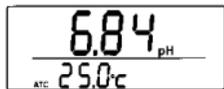
- When you press **Cal** the pH buffer you selected for cal 1 (Program Menu) is displayed for 2 seconds, and then the meter starts measuring. If you want to use another pH buffer (choice of 3) press **Cal** again. Press **Cal** repeatedly to exit the calibration routine.
- The decimal point flashes during calibration measurement. When the electrode output has stabilized the stability indicator appears.  **Manual endpoint** - press Read to endpoint. **Auto endpoint** - the meter automatically endpoints.
- When a calibration has endpointed you can press **Mode** to display the absolute mV value and temperature of the buffer. The display reverts to the buffer and E_0 values, or buffer and slope values for a 2 point (or 3 point - MP225 only) calibration after 2 seconds.

Measuring Samples

1. Select pH or mV mode



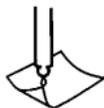
2. Measure sample



Use auto endpoint [A] or
to freeze the reading.



3. Rinse, blot and store the electrode.



- n If you press **Mode** to select pH or mV mode the meter begins measuring immediately. You will not need to press **Read** to start the reading.
- n The decimal point flashes during sample measurement. When the electrode output has stabilized the stability indicator appears. 
- Manual endpoint** - press **Read** to endpoint.
- Auto endpoint** - the meter automatically endpoints.
- n If you have the RS232 cable connected to the **Data** socket (MP225 only), sample data is transmitted at endpoint.

Operating Hints

- n Remove the wetting cap from the end of the electrode and the rubber cap from the fill hole (if fitted) before using the electrode.
- n Calibrate using buffers with values that bracket that of the sample. With a new pH electrode, or after maintenance, we recommend you use a buffer close to pH 7 for the first calibration point.
- n For greatest accuracy, buffers and samples should be at the same temperature.
- n Do not use solutions after the expiry date.
- n When transferring the electrode from one solution to another, rinse it with distilled water and blot dry with tissue paper - do not wipe the electrode as this may cause polarization and slow response.
- n When you select the calibration buffers (Program Menu), set the buffer you will use most frequently for 1-point calibrations as cal 1 and the one you will use most frequently for the second calibration point as cal 2, and for the MP225, the one you will use most frequently for the third calibration point as cal 3.

Using Auto Endpoint



The auto read feature can be used in pH and mV mode to automatically determine a stable endpoint during calibrations and sample measurements.

Press \sqrt{A} . The display shows the auto endpoint indicator [A]. The display will freeze automatically when a stable endpoint is reached. To manually freeze the display press **Read**. To turn auto endpoint off press \sqrt{A} again.

Using the Memory

Entering a Reading into Memory

The MP220 can store 10 endpointed results and the MP225 can store 20.

Press \hat{M} when the measurement has endpointed. M 1 is displayed (or M 2 to M 20 if readings have already been stored).

M $\overline{10}$ (MP220) or M $\overline{20}$ (MP225) indicates the memory is full.

Recalling Memory

You can only recall stored memories if the current measurement has endpointed.

Press \mathcal{R} - the last stored memory is displayed.

Press \hat{M} or \mathcal{R} to scroll through memories. RM 1 to RM 20 indicates which memory is being displayed.

M $\overline{0}$ indicates no memories stored.

Clearing the Memories

Press \hat{M} then press \hat{M} or \mathcal{R} until M C is displayed.

Press **Mode** to clear the memories, M $\overline{0}$ indicates the memories have been cleared. (Press **Read** to exit without clearing the memories).

Using Continuous Data Transfer Mode (MP225 only)



In continuous data transfer mode readings are sent to the data output approximately every second. If the measurement endpoints (manually, or using auto endpoint) data transfer stops. If you recall memories all stored readings are output, (from the first to the last stored).

To select continuous data transfer mode press and hold **R** for 2 seconds.

- n To maintain continuity of sample readings calibration data is only output at endpoint.

Resetting Sample ID (MP225 only)



The sample identity number is sent to the serial output and increments 1 every time a sample measurement endpoints.

To reset the sample ID number to 1, press and hold **Read** for 2 seconds. The sample ID icon flashes three times to show the number has been reset.

Recalling Calibration Data (MP225 only)

You can only recall calibration data if the current measurement has endpointed - press **Read** if necessary.

Press and hold **Cal** for 2 seconds. The display shows the date and time of the last calibration, the buffer value, the mV offset (E_0) for 1-point calibrations, and the slope value (%) for 2 (3) point calibrations.

Program Menu

The Program Menu allows you to set manual temperature compensation, pH calibration buffers and, for the MP225 only, calibration reminder and date and time.

You can only enter the Program Menu if the current measurement has endpointed - press **Read** if necessary.

Press and hold the **Mode** key for 2 seconds to access the Program Menu - $\rho r o g$ appears.

Press **Mode** to scroll through the options and press \hat{M} and $\downarrow R$ to change the value. Press **Read** to exit the Program Menu at any time. If you press **Read** when a value is flashing that value will not be entered.



Calibration Reminder (MP225 only)

The calibration reminder interval can be set, in hours, between 0 and 4 (where 0 = no reminder). When the selected time has elapsed the calibration reminder symbol will appear.



Time and Date (MP225 only)

Time and date are displayed during calibration recall, and will be sent to the serial output. Time is shown on the main display, the date is shown on the lower part of the display. Set the time and date using \hat{M} and $\downarrow R$. Press **Mode** to enter the value and move on.

MTC

Manual Temperature Compensation (MP220 and MP225)

You can enter temperature manually between -5.0 and 105.0°C . (An ATC probe will override manual compensation.) The meters have a preset temperature of 25°C . Use \hat{M} and $\downarrow R$ to change temperature. Press **Mode** to enter the value and move on.

Program Menu (continued)



pH Buffer Selection (MP220 and MP225)

The buffers are grouped in sets (b = 1, b = 2, b = 3); select your required set first using \hat{M} and \check{R} :

set 1 = 7.00, 4.00, 10.01, 1.68

set 2 = 7.00, 4.01, 9.21, 2.00, 11.00

set 3 = 6.87, 4.01, 9.18, 1.68

Press **Mode** to enter the set and move on.

NOTE: Check buffer set 2 is selected to use the buffers supplied



cal 1
cal 2
cal 3

Choose three buffers (cal 1, cal 2, cal 3) from the set for calibration. For ease of use, set the buffers in the order that you will use them.

For example: Set 2 (factory settings)

cal 1 = 7.00, cal 2 = 4.01, cal 3 = 9.21
(2.00 and 11.00 not selected).

These can be rearranged in any order using \hat{M} and \check{R} . Press **Mode** to enter the value and move on.

Press **Read** to exit the Program Menu.

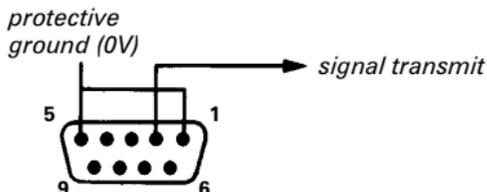
Interfacing (MP225 only)

Serial Output

The MP225 can interface with computers, printers (GA42), Acquire Data Acquisition software and other RS232 compatible devices via the RS232 cable. The maximum source or sink current available is $\pm 10\text{mA}$.

Pin	Signal	Pin	Signal
1	device enable (link to pin 5)	6	not used
2	RS232 Tx (signal transmit)	7	not used
3	not used	8	not used
4	not used	9	not used
5	protective ground (0V)		

Data Socket



Type of communication - uni directional, baud rate 2400,
data format - 7 data bits : 1 stop bit : even parity

- n Data is sent to the **Data** socket at measurement endpoint (manual or automatic), calibration recall and memory recall.
- n To use the output to monitor continually, you need to select continuous data transfer mode.

Recorder Output

An output is available for both modes. The polarity of the output is the same as the polarity of the input signal.

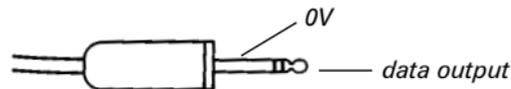
Approximate Recorder Outputs

pH - Output follows display and provides approximately 60 mV output/pH unit. This value varies with changes in electrode slope and temperature.

mV - Output follows display, i.e. output varies from -1999 to 1999 mV.

Recorder output is not available for temperature.

Rec Socket Polarity



Problem Solving

Err 1 - offset value (E_0) out of range

Check correct buffer is used.

Check mV reading for pH 7 buffer is 0 ± 30 mV. If it is not, clean or replace the electrode.

Err 2 - slope out of range



Slope less than 85%, or not calculable.
Electrode needs cleaning, conditioning or replacing. Check correct buffers are used.



Slope more than 105.0%.
Check calibration buffers.

NOTE: Where 0 mV/pH unit = 0%, and
59.16 mV/pH unit = 100% (at 25°C)

Err 3 - pH buffer outside temperature limits

pH buffers must be between 5°C and 50°C for accurate calibration.

— —.— — — Displayed (out of range)

Check electrode is connected and immersed in sample. Check wetting cap is removed.

Data Entry Errors

Date flashes and reverts to previous setting - invalid date entered.

Entered temperature value changes to -5.0 or 105.0 - the meter will not accept values outside this range.

Dashes displayed instead of buffer value during calibration buffer set up - that buffer has already been selected for a cal point. Cal points must have different values.

Maintenance

There are no user replaceable parts in the meters or power supply unit. Do not remove the covers.

The meters require very little maintenance.

Occasionally wipe the meter with a damp cloth. The casework is made of ABS/PC which is known to be affected by some organic solvents, including toluene, xylene and methyl-ethyl-ketone. It is good practice to wipe away any spillages as soon as they occur.

Electrode Maintenance

Refer to the electrode product insert for full details on maintaining your electrode.

Spares and Accessories

52000100	InLab 413 '3 in 1' pH Electrode
52000118	InLab 410 pH Electrode
51300164	30K Ω NTC Probe
51302118	Electrode Arm and Base
51302152	Recorder Cable (MP225 only)
51302125	RS232 Cable (MP225 only)
00229170	GA42 Printer (MP225 only)
00229119	LC - P45 GLP Printer (MP225 only)
51300047	Guide to pH Measurement
51302069	pH 4.01 Buffer Sachets, 30/pack
51302047	pH 7.00 Buffer Sachets, 30/pack
51302070	pH 9.21 Buffer Sachets, 30/pack
51302068	Rainbow Pack Buffer Sachets (10 each of pH 4.01, 7.00 and 9.21)
51340058	pH 4.01 Buffer Solution, 250 mL x 6
51340060	pH 7.00 Buffer Solution, 250 mL x 6
51300194	pH 9.21 Buffer Solution, 250 mL x 6

Buffer Tables

The MP220 and MP225 automatically correct pH buffers for temperature using the values shown in the table.

	1.68	2.00	4.00	4.01	6.87	7.00	9.18	9.21	10.01	11.00
5°C	1.67	2.02	4.00	4.01	6.95	7.09	9.39	9.45	10.25	11.72
10°C	1.67	2.01	4.00	4.00	6.92	7.06	9.33	9.38	10.18	11.54
15°C	1.67	2.00	4.00	4.00	6.90	7.04	9.28	9.32	10.12	11.36
20°C	1.68	2.00	4.00	4.00	6.88	7.02	9.22	9.26	10.06	11.18
25°C	1.68	2.00	4.00	4.01	6.87	7.00	9.18	9.21	10.01	11.00
30°C	1.68	1.99	4.01	4.01	6.85	6.99	9.14	9.16	9.97	10.82
35°C	1.69	1.99	4.02	4.02	6.84	6.98	9.10	9.11	9.93	10.64
40°C	1.69	1.98	4.03	4.03	6.84	6.98	9.07	9.06	9.89	10.46
45°C	1.70	1.98	4.04	4.04	6.83	6.97	9.04	9.03	9.86	10.28
50°C	1.71	1.98	4.06	4.06	6.83	6.97	9.01	8.99	9.83	10.10

Specifications

		MP220	MP225
Measurement Ranges	pH	0.00 to 14.00	-2.00 to 16.00
	mV	± 1999 mV	± 1999 mV
	Temp.	-5.0 to 105.0°C	-5.0 to 105.0°C
Calibration Points		2 of 3 selectable	3 of 3 selectable
Resolution	pH	0.01	0.01
	mV	1	1
	Temp.	0.1	0.1
Relative Accuracy*	pH	± 0.01	± 0.01
	mV	± 1 mV	± 1 mV
	Temp.	± 0.5°C	± 0.2°C
Isopotential Point	pH	7.00	7.00
Outputs		—	Recorder
		—	Serial

* ± 1 least significant digit

		MP220	MP225
Memory		10 memories	20 memories
Temp. Compensation		-5.0 to 105.0°C auto/manual	-5.0 to 105.0°C auto/manual
Display		LCD	LCD
Input Conditions		Impedance > 10 ¹² ohms	Impedance > 10 ¹² ohms
Operating Conditions	Temperature	5 to 40°C	5 to 40°C
	Humidity at 35°C (non condensing)	max. 85%	max. 85%
	Installation Category	2	2
	Pollution Category	Degree 2	Degree 2
Size	inches	10 1/2 x 7 1/2 x 2 1/2	10 1/2 x 7 1/2 x 2 1/2
	mm	265 x 190 x 65	265 x 190 x 65
Weight	lb	1 3/4	1 3/4
	kg	0.8	0.8

Specifications (continued)

Power Requirements

The MP220 and MP225 are supplied with an appropriate power supply unit.

USA/Japan 100 - 120V, 50/60Hz, 0.85VA

Europe 230V, 50Hz, 1.1VA

Output from PSU: 9V DC

Meter Power Rating: 0.3VA

NOTE: The meters should only be used with the power supply unit supplied.