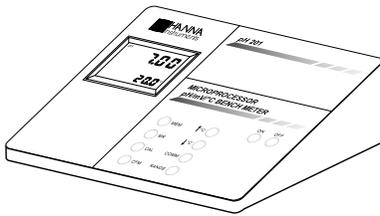


Instruction Manual

pH 200

pH 201

**Microprocessor-based
Bench pH Meters**



This Instrument is in Compliance with the CE Directives



Dear Customer,

Thank you for choosing a Hanna Product. It is recommended that you read this instruction manual carefully before using the instrument.

This manual will provide you with the necessary information for the correct use of the instrument, as well as a more precise idea of its versatility in a wide range of applications.

This instrument is in compliance with the CSA, UL and **CE** (EN 50081-1 and EN 50082-1) Directives.

TABLE OF CONTENTS

Preliminary Examination 3
 General Description 3
 Functional Description 4
 Specifications 5
 Functional Description LCD 6
 Operational Guide 7
 pH Calibration 10
 pH Values at Various Temperature 14
 Taking REDOX Measurements 15
 Temperature and mv Calibration 15
 Interface with PC 16
 Troubleshooting Guide 17
 Electrode Conditioning and Maintenance ... 18
 Temperature-Resistance Correlation
 for HANNA pH Sensitive Glass 22
 Additional Calibration Procedures
 and Information 24
 Accessories 29
 Electrode Application Guide 36
 Warranty 37
 CE Declaration of Conformity 39



3

PRELIMINARY EXAMINATION

Remove the instrument from the packing material and examine it to make sure that no damage has occurred during shipping. If there is any damage, notify your Dealer.

Each meter comes supplied complete with:

- **HI 1131B** glass-body combination pH Electrode with 1 m (3.3') cable
- 12VDC Transformer (**HI 710005** or **HI 710006**)

Note: Save all packing material until you are sure that the instrument functions correctly. All defective items must be returned in the original packing with the supplied accessories.

GENERAL DESCRIPTION

pH 200 and **pH 201** are microprocessor-based bench pH meters. pH measurements are compensated for the temperature effect automatically with the optional HI 7669/2W temperature probe or manually.

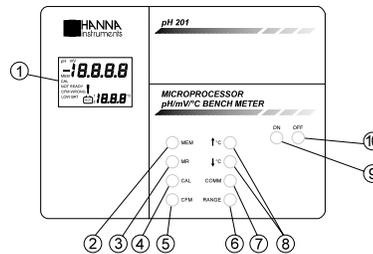
The meters come equipped with a large LCD which shows the pH (or mV) and temperature simultaneously together with graphic symbols.

Through the RS 232C serial port you can transfer sample measurements to a PC.

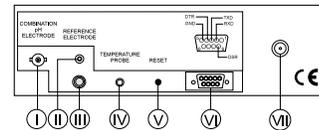
3

4

FUNCTIONAL DESCRIPTION



1. Liquid Crystal Display
2. **MEM** memorizes a value
3. **MR** recalls the memorized value
4. **CAL** enters or exits the calibration mode
5. **CFM** confirms calibration values
6. **RANGE** selects the measurement range
7. **COMM** sets the baud rate
8. **↑ °C** and **↓ °C** manually set temperature and select pH buffer values
9. **ON** turns the meter on
10. **OFF** turns the meter off



- I. BNC Socket
- II. Reference Electrode Socket
- III. Reference Electrode Socket
- IV. Temperature Probe Socket
- V. Reset Button
- VI. RS 232C Socket
- VII. DC Power Socket (for HI 710005 or HI 710006)

4

5

SPECIFICATIONS

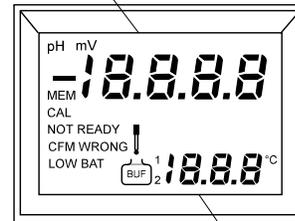
Range	pH mV °C	0.00 to 14.00 / 0.000 to 14.000 ±999.9 (pH 201 only) 0.0 to 100.0
Resolution	pH mV °C	0.01 / 0.001 0.1 (pH 201 only) 0.1
Accuracy (@20°C/68°F)	pH mV °C	±0.002 / ±0.01 ±0.05% F.S. (pH 201 only) ±0.5
Typical EMC Deviation	pH mV °C	±0.01 ±0.6 (pH 201 only) ±0.5
pH Calibration		Automatic 1 or 2 points with 5 memorized buffers (4.01, 6.86, 7.01, 9.18, 10.01)
Temperature Compensation		From 0 to 100°C (32 to 212°F) manual or automatic with HI 7669/2W probe (optional)
Electrode		HI1131B glass body combination refillable pH electrode (included)
Temperature probe		HI 7669/2W (optional)
Input impedance		10 ¹² Ω
Computer Interface		Opto-isolated RS 232C (included)
Power supply		12 VDC (CSA, UL & CE approved)
Environment		32 to 122°F (0 to 50°C); 95% RH
Dimensions		9.1x6.7x2.7" (230x170x70 mm)
Weight		4.4 lb. (2 kg)

5

6

FUNCTIONAL DESCRIPTION LCD

Primary Display



Secondary Display

6

OPERATIONAL GUIDE

ELECTRODE AND PROBE CONNECTIONS

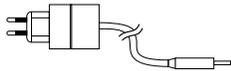
For combination **pH** or **ORP** electrodes (**pH 201**) plug the electrode's BNC to the socket provided (page 4, # I).

For electrode with separate reference, connect the measuring electrode's BNC to the BNC socket (page 4, # I) and the reference electrode's plug to the socket provided (page 4, # II or III).

For **temperature** measurements and automatic temperature compensation connect the temperature probe to the appropriate socket (page 4, # IV).

POWER CONNECTION

Plug the 12VDC transformer (**HI 710005** or **HI 710006**) into the DC socket (page 4, # VII). Plug the transformer to the mains.

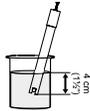


Note: Make sure the main line is protected by a fuse.

pH 200 and **pH 201** use an EEPROM to retain the pH calibration as well as the serial communication setting. The instrument will retain the data after a calibration or serial communication setting, even when it is unplugged.

pH MEASUREMENTS

To take a pH measurement simply submerge the tip (bottom 4 cm/ 1½") of the electrode into the sample to be tested.



Turn the instrument on.



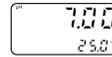
In order to compensate for the temperature variance, immerse the temperature probe in the same solution or set the temperature manually by pressing the $\uparrow^{\circ}\text{C}$ or $\downarrow^{\circ}\text{C}$.



The meter automatically defaults to the pH measurement mode.

Allow 1 or 2 minutes for the electrode to stabilize.

pH is displayed on the primary display and temperature on the secondary one.



In order to take accurate pH measurements, make sure that the instrument has been calibrated before use (see page 10).

For more accurate results, it is recommended that the electrode is rinsed thoroughly with a liberal amount of the sample to be measured.

If measurements are taken in different samples successively, it is recommended that the electrode (and the temperature probe) be rinsed thoroughly with deionized, distilled or in the absence of both, tap water and then blot dried between each measurement.

ORP MEASUREMENTS (pH 201 only)

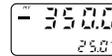
Press RANGE.



Submerge the ORP or ISE electrode tip (bottom 4 cm/1½") into the sample.



Allow a few minutes for the reading to stabilize.



If reading is out of range "---" will appear on the LCD display.



See also "Taking REDOX Measurements" section at page 15.

TEMPERATURE MEASUREMENTS

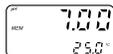
Taking a temperature measurement is very easy. Connect the **HI 7669/2W** temperature probe (optional) to the instrument and turn the instrument ON.

Dip the liquid/general purpose **HI 7669/2W** probe into the sample and allow the reading on the secondary display to stabilize (1 or 2 minutes).

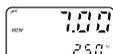


HOLD FUNCTION

Press and hold MEM. The last reading will be frozen on the display until MEM is released. During this operation, the MEM indicator is shown on the LCD.



Press MR and the previously memorized reading will be displayed with the MEM indicator on the LCD.



RESET BUTTON

The RESET button (see page 4, # V) is used when the instrument displays erroneous messages due to strong electrical interference or when the instrument's power supply was disconnected before the meter was switched off.

It is recommended to recalibrate the unit before proceeding.

pH CALIBRATION

Calibrate the instrument often, especially if high accuracy is required.

The instrument should be re-calibrated for pH:

- a) Whenever the pH electrode is replaced.
- b) At least once a week.
- c) After testing aggressive chemicals.
- d) If higher accuracy is required.
- e) After pressing RESET.

PREPARATION

Pour small quantities of the buffer solutions into clean beakers.



For accurate calibration and to minimize cross contamination use two beakers for each buffer solution, one for rinsing the electrode and a second for calibration.

To obtain accurate readings, use pH 7.01 and pH 4.01 if you are going to measure acidic samples or pH 7.01 and pH 10.01 for alkaline measurements.

RINSE

CALIBRATION



PROCEDURE

Calibration has a choice of 5 memorized buffers: 4.01, 6.86, 7.01, 9.18 and 10.01 pH.

It is always recommended to perform a two-point calibration, first in an offset buffer (pH 6.86 or pH 7.01) and then a slope value (pH 4.01, pH 9.18 or pH 10.01).

The pH 200 and pH 201 instruments however also provide for one-point calibration, as described below.

ONE-POINT CALIBRATION

- Immerse the pH electrode approximately 4 cm (1½") into a buffer solution of your choice (pH 4.01, 6.86, 7.01, 9.18 or 10.01) and stir gently.



The temperature of the solution can be set manually on the meter. Alternatively attach the optional HI 7669/2W probe and immerse the probe too in the buffer solution.



- Press CAL. The "CAL" and "pH" indicators will be displayed. The secondary LCD will display "7.01".



- Press ↑°C or ↓°C until the secondary display shows the same value as the buffer solution.



- If the pH electrode has not completely adjusted to the buffer value the LCD will blink "NOT READY".

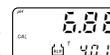


Only when the reading has stabilized, "READY" and "CFM" will blink.



- Press CFM to confirm the calibration.

If the value measured by the meter is not close to the selected buffer, "WRONG" and "WRONG !" will blink alternately (check the buffers to ensure the correct one has been used. If necessary change the buffer or even the electrode). If the reading is close to the selected buffer, the meter stores the reading. The buffer value is then displayed on the primary LCD and the secondary LCD will display "4.01".



- Press CAL and the meter exits the calibration mode.



TWO-POINT CALIBRATION

With pH 200 and pH 201 any two buffer solutions that are more than 1 pH apart can be used. However, it is recommended that pH 6.86 or 7.01 is chosen as the offset point and pH 4.01 (acidic) or pH 9.18/10.01 (alkaline) for the second (slope) calibration.

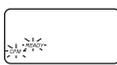
- Proceed as described in "One-point calibration" above but do not quit the calibration by pressing CAL at the end.
- After the first calibration point is confirmed, immerse the pH electrode approximately 4 cm (1½") into the second buffer solution and stir gently.



- Select the second buffer value on the secondary display by pressing ↑°C or ↓°C.



- When the “READY” and “CFM” symbols blink on the display the reading is stable and the calibration can be confirmed.



- Press CFM.

If the value measured by the meter is not close to the selected buffer solution, “WRONG 2” and “WRONG 1” will blink alternately (check the buffers to ensure the correct one has been used. If necessary change the buffer or even the electrode). If the reading is close to the selected buffer, the slope and the offset will be calibrated. The values will be stored in memory and the meter will return to the operating mode.



Note: The meter will automatically skip the buffer that was used for the first calibration. pH 6.86 and pH 7.01 as well as 9.18 and 10.01 pairs of buffer solutions are also considered too close to allow an adequate calibration. Consequently, after calibrating in one of the pair, the meter will also skip the other buffer.

Note: During calibration, the secondary LCD displays the selected buffer value. Press RANGE and the temperature of the buffer will be displayed during calibration.



pH VALUES AT VARIOUS TEMPERATURE

Temperature has an effect on pH. The calibration buffer solutions are effected by temperature changes to a lesser degree than normal solutions.

During calibration the meter will automatically calibrate to the pH value corresponding to the measured or set temperature.

TEMP		pH VALUES				
°C	°F	4.01	6.86	7.01	9.18	10.01
0	32	4.01	6.98	7.13	9.46	10.32
5	41	4.00	6.95	7.10	9.39	10.24
10	50	4.00	6.92	7.07	9.33	10.18
15	59	4.00	6.90	7.04	9.27	10.12
20	68	4.00	6.88	7.03	9.22	10.06
25	77	4.01	6.86	7.01	9.18	10.01
30	86	4.02	6.85	7.00	9.14	9.96
35	95	4.03	6.84	6.99	9.10	9.92
40	104	4.04	6.84	6.98	9.07	9.88
45	113	4.05	6.83	6.98	9.04	9.85
50	122	4.06	6.83	6.98	9.01	9.82
55	131	4.07	6.84	6.98	8.99	9.79
60	140	4.09	6.84	6.98	8.97	9.77
65	149	4.11	6.85	6.99	8.95	9.76
70	158	4.12	6.85	6.99	8.93	9.75

For instance, if the buffer's temperature is 25°C, the display will show pH 4.01 or 7.01 or 10.01.

If the buffer's temperature is 20°C, the display will show pH 4.00/7.03/10.06.

If the buffer's temperature is 50°C, the display will show pH 4.06/6.98/9.82.

TAKING REDOX MEASUREMENTS

pH 201 has the capability to take ORP measurements. An optional ORP electrode must be used to perform these measurements (see page 35).

Oxidation-reduction potential (REDOX) measurements provide the quantification of the oxidizing or reducing power of the sample tested.

To correctly perform a redox measurement, the surface of the ORP electrode must be clean and smooth.

When not in use, the tip of the electrode should be kept moist and safe from any mechanical stress which might cause damage to the glass/platinum sensing element.

TEMPERATURE AND mV CALIBRATION

pH 200 and **pH 201** are factory calibrated for temperature and mV.

The temperature probes and ORP electrodes are interchangeable and no temperature or mV calibration is needed when they are replaced.

If, for any reason, the temperature or the mV measurements are inaccurate, temperature or mV recalibration should be carried out (see pages 24 and 25).

For an accurate recalibration, contact your nearest Hanna Service Center.

INTERFACE WITH PC

Data transmission from the instrument to the PC is now much easier with the new **HI 92000** Windows[®] compatible application software (optional). **HI 92000** offers an on-line help feature.

Simply run your desired spread sheet and open the file downloaded by **HI 92000**. Data can be further elaborated with graphics, statistical analysis, etc. using the most diffused spread sheet programs (e.g. Excel[®], Lotus 1-2-3[®]).

To install **HI 92000** you need a 3.5" drive and a few minutes to follow the instructions printed on the disk's label.

In your copy of **HI 92000** you will also find a set of configuration files for your Windows Terminal[®] program to send commands directly from the PC keyboard (see appendix for commands description and usage).

To connect your **pH 200** or **pH 201** to the PC use **HI 920010**, available through your Hanna Dealer. Make sure that your meter is switched off and plug the connectors, one into the meter RS232C socket, the other into the serial port of your PC.

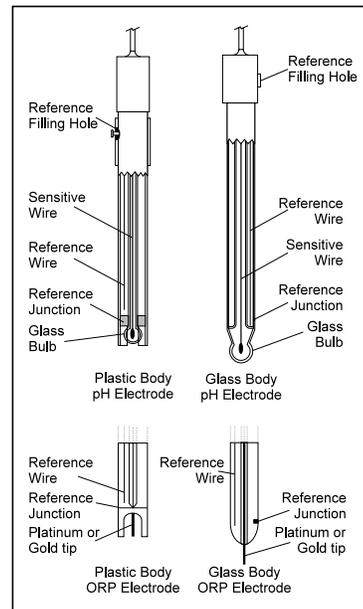
Note: Cables other than **HI 920010** may use a different configuration, in which case, communication between the meter and the PC might not be possible.

Excel[®] Copyright of "Microsoft Co."
Lotus 1-2-3[®] Copyright of "Lotus Co."
Windows[®] and Windows Terminal[®] are registered Trademark of "Microsoft Co."

TROUBLESHOOTING GUIDE

Symptoms	Problem	Solution
The meter is slow in responding or gives faulty readings	The electrode is not working or the reference junction is clogged	Leave the electrode in a storage solution after cleaning the junction. If problem persists, replace the electrode
The meter does not accept the 2 nd buffer solution for calibration	Defective pH electrode	Follow the cleaning procedure. If this doesn't work replace the electrode
The reading drifts	Defective pH electrode	Replace the electrode
Display shows: 	Out of range pH scale	a) Recalibrate b) Make sure the pH sample is in the 0 to 14 range c) Check the electrolyte level and the general state of the pH electrode
Display shows: 	Out of range temperature scale	Make sure the temperature is in the 0 to 100°C range and the temperature probe is plugged in
Display shows: 	Out of range mV scale	Electrode not connected
Display shows: "WRONG " and "WRONG "	Erroneous buffer solution used for offset calibration	Make sure the buffer setting is correct and the solution is fresh. Replace the buffer if necessary
	Defective electrode	Replace the electrode
Display shows: "WRONG " and "WRONG "	Erroneous buffer solution used for slope calibration	Make sure the buffer setting is correct and the solution is fresh. Replace the buffer if necessary
	Defective electrode	Replace the electrode
The meter does not work with the temperature probe	Defective temperature probe	Replace the probe
The meter fails to calibrate or gives faulty readings	Defective pH electrode	Replace the electrode

ELECTRODE CONDITIONING AND MAINTENANCE



PREPARATION

Remove the protective cap.

DO NOT BE ALARMED IF ANY SALT DEPOSITS ARE PRESENT.

This is normal with electrodes and they will disappear when rinsed with water.

During transport tiny bubbles of air may form inside the glass bulb affecting proper functioning of the electrode. These bubbles can

be removed by "shaking down" the electrode as you would do with a glass thermometer.

If the bulb and/or junction is dry, soak the electrode in **HI 70300** or **HI 80300** Storage Solution for at least one hour.

For refillable electrodes:

If the filling solution (electrolyte) is more than 2½ cm below the fill hole, add **HI 7071** or **HI 8071 3.5M KCl+AgCl Electrolyte Solution** for single junction electrodes (use **HI 7082** or **HI 8082 3.5M KCl Electrolyte Solution** for double junction references).

For a faster response, unscrew the fill hole screw during measurements.

For Amphel electrodes:

If the electrode does not respond to pH changes, the battery is run down and the electrode should be replaced.

MEASUREMENT

Rinse the electrode tip with distilled water. Immerse the tip (bottom 4 cm/1½") in the sample and stir gently for a few seconds.

For a faster response and to avoid cross contamination of the samples, rinse the electrode tip with a few drops of the solution to be tested, before taking measurements.

STORAGE

To minimize clogging and assure a quick response time, the glass bulb and the junction should be kept moist and not allowed to dry out.

Replace the solution in the protective cap with a few drops of **HI 70300** or **HI 80300** Storage Solution or, in its absence, Filling Solution (**HI 7071** or **HI 8071** for single junction or **HI 7082** or **HI 8082** for double junction electrodes). Follow the Preparation Procedure above before taking measurements.

Note: NEVER STORE THE ELECTRODE IN DISTILLED OR DEIONIZED WATER.

PERIODIC MAINTENANCE

Inspect the electrode and the cable. The cable used for connection to the meter must be intact and there must be no points of broken insulation on the cable or cracks on the electrode stem or bulb. Connectors must be perfectly clean and dry.

If any scratches or cracks are present, replace the electrode.

Rinse off any salt deposits with water.

For refillable electrodes:

Refill the reference chamber with fresh electrolyte (**HI7071** or **HI8071** for single junction or **HI7082** or **HI8082** for double junction electrodes). Allow the electrode to stand upright for 1 hour.

Follow the Storage Procedure above.

CLEANING PROCEDURE

General Soak in Hanna **HI7061** or **HI8061** General Cleaning Solution for approximately ½ hour.

Removal of films, dirt or deposits on the membrane/junction:

- *Protein* Soak in Hanna **HI7073** or **HI8073** Protein Cleaning Solution for 15 minutes.

- *Inorganic* Soak in Hanna **HI7074** or **HI8074** Inorganic Cleaning Solution for 15 minutes.

- *Oil/grease* Rinse with Hanna **HI7077** or **HI8077** Oil and Fat Cleaning Solution.

IMPORTANT: After performing any of the cleaning procedures rinse the electrode thoroughly with distilled water, refill the reference chamber with fresh electrolyte, (not neces-

sary for gel-filled electrodes) and soak the electrode in **HI70300** or **HI80300** Storage Solution for at least 1 hour before taking measurements.

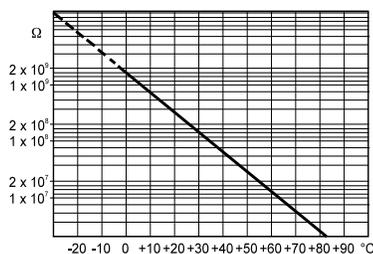
TROUBLESHOOTING

Evaluate your electrode performance based on the following.

- **Noise** (Readings fluctuate up and down) could be due to:
 - **Clogged/Dirty Junction:** Refer to the Cleaning Procedure above.
 - **Loss of shielding** due to low electrolyte level (in refillable electrodes only): refill with fresh **HI7071** or **HI8071** for single junction or **HI7082** or **HI8082** for double junction electrodes.
- **Dry Membrane/Junction:** Soak in **HI70300** or **HI80300** Storage Solution for at least 1 hour.
- **Drifting:** Soak the electrode tip in warm (approx. 50-60°C) **HI7082** or **HI8082** solutions for one hour and rinse the tip with distilled water. Refill with fresh **HI7071** or **HI8071** for single junction electrodes and **HI7082** or **HI8082** for double junction electrodes (refillable electrodes only).
- **Low Slope:** Refer to the cleaning procedure above.
- **No Slope:** Check the electrode for cracks in glass stem or bulb and replace the electrode.
- **Slow Response/Excessive Drift:** Soak the tip in **HI7061** or **HI8061** solutions for 30 minutes, rinse thoroughly in distilled water and then follow the Cleaning Procedure above.

Temperature-Resistance Correlation for HANNA pH Sensitive Glass

The resistance of glass electrodes partially depends on the temperature. The lower the temperature, the higher the resistance. It takes longer for the reading to stabilize if the resistance is higher. In addition, the response time will suffer to a greater degree at temperatures below 10°C.



Since the resistance of the pH electrode is in the 200 Mohm range, the current across the membrane is in the pico Ampere range. Large currents can disturb the calibration of the electrode for many hours.

For these reasons **high humidity environments, short circuits and static discharges** are detrimental for a stable pH reading.

The life of a conventional glass-body pH electrode also depends on the temperature. If constantly used at high temperatures, the electrode life is drastically reduced.

Typical Electrode Life

Ambient Temperature	1- 3 years
80-90 °C	Less than 4 months
100-120°C	Less than 1 month

High concentrations of sodium ions interfere with readings in alkaline solutions. The pH at which the interference starts to be significant depends upon the composition of the glass. This interference is the alkaline error and causes the pH to be underestimated. Hanna's glass formulations have the indicated characteristics.

Alkaline Error

Sodium Ion Correction for the Glass at 20-25°C		
Concentration	pH	Error
0.1 Mol L ⁻¹ Na ⁺	13.00	0.10
	13.50	0.14
	14.00	0.20
1.0 Mol L ⁻¹ Na ⁺	12.50	0.10
	13.00	0.18
	13.50	0.29
	14.00	0.40

ADDITIONAL CALIBRATION PROCEDURES & INFORMATION (for technical personnel only)

TEMPERATURE CALIBRATION

Initial Preparation

- Prepare a vessel containing ice and water and another one containing hot water (at a temperature of at least 50°C). Place insulation material around the container to minimize temperature changes.
- Use a **ChecktempC** or a calibrated thermometer with a resolution of 0.1 °C as a reference thermometer.

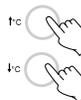


Procedure

- With the instrument off, press both CAL and ON keys simultaneously. The "CAL" indicator will be lit and the secondary LCD section will show 0.0°C.



- Immerse the temperature probe (optional) in the vessel with ice and water as near to the **ChecktempC** (or reference thermometer) as possible.
- Wait for temperature reading to stabilize.
- Use the ↑°C or ↓°C keys to set the reading on the secondary LCD to that of ice and water.
- Press CFM. The secondary LCD will show 50.0°C.



- Immerse the temperature probe in the vessel with hot water.
- When the temperature reading has stabilized, use the ↑°C or ↓°C keys to set the reading on the secondary LCD to that of the reference thermometer.
- Press CFM. The primary LCD section will show "380.0 mV".



- Complete your temperature calibration by pressing CAL if you do not want to perform mV calibration (pH 201 only).



mV CALIBRATION (pH 201 only)

- Use a mV simulator with a range of ±500.0 mV and an accuracy of ±0.1 mV.
- Continuing from the temperature calibration, the primary LCD will show "380.0 mV".
- Select 380.0 mV on the simulator.
- Wait for 3 sec., press CFM. The primary LCD will display the next reading to be selected on the simulator.
- Repeat previous two steps for -380.0, 500.0 and -500.0 mV.
- At the end of the mV calibration, the meter will automatically return to the pH measurement mode.



INTERFACE WITH PC

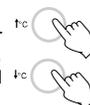
If you are not using Hanna Instruments HI92000 application software, please find below some additional information to help you link-up to your PC.

Setting the Baud Rate and the Command Prefix

The transmission speed (baud rate) of your pH 200 and pH 201 and that of the external device must be the same. To set the baud rate of the meter press COMM, the primary LCD shows the current **baud rate**.



The following baud rate can be selected with ↑°C and ↓°C: 150, 300, 600, 1200 (factory setting) and 2400.

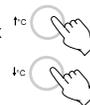


Press CFM to confirm the setting and the primary LCD shows the current **command prefix** (factory setting is 16).



Note: the Command Prefix must not be changed when using HI 92000 Hanna Software.

Select a different command prefix (between 0 and 47) by pressing ↑°C and ↓°C.



Press CFM to confirm the setting.



Sending Commands from PC

With terminal programs such as, for example, Telix®, Windows Terminal®, it is possible to remotely control your Hanna pH meter. Use HI920010 cable to connect the meter to the PC, start the terminal program and set the

Windows Terminal® are registered Trademark of "Microsoft Co."
TELIX® is registered Trademark of "Deltacom"

communication options as follows: 8, N, 1, no flow control.

Command Types

To send a command to the pH meter the scheme is: <DLE> <command> <CR>

This line makes the computer send a Data Link Escape character, the command expressed as a number (or a 3-character sequence) and a CR character.

Note: Windows Terminal® and all the other terminal programs that support the ANSI escape sequence, represent the DLE character by the string '^P' and the CR character by the string '^M'. E.g. the line '^PPHR^M' sets the range to pH.

Commands not requiring an answer from the pH meter:

- PHR** sets the range to pH
- MVR** sets the range to mV
- CAL** is equivalent to pressing the CAL key
- CFM** is equivalent to pressing the CFM key
- UPC** is equivalent to pressing the ↑°C key
- DWC** is equivalent to pressing the ↓°C key
- MEM** is equivalent to pressing the MEM key
- MRR** is equivalent to pressing the MR key
- COM** is equivalent to pressing the COMM key
- OFF** is equivalent to pressing the OFF key

Commands requiring an answer:

- pH?** Causes the meter to send the pH value. If the reading is out of range "Err 1" is sent. If the range is set to mV, "Err 6" is sent.
- MV?** Causes the meter to send the mV value. If the reading is out of range "Err 2" is sent. If the range is set to pH, "Err 6" is sent.
- TM?** Causes the meter to send the temperature value. If the reading is out of range "Err 3" is sent.

Windows Terminal® are registered Trademark of "Microsoft Co."

These commands may be sent with either capital or small letters. Invalid commands will be ignored. The characters sent by **pH 200** or **pH 201** are always capital letters. When the meter receives an unknown or a corrupted command, it will send a character CAN (ASCII Code 24).

ACCESSORIES

pH CALIBRATION SOLUTIONS

- HI 70004P** pH 4.01 Buffer Sachets, 20 mL, 25 pcs
- HI 70007P** pH 7.01 Buffer Sachets, 20 mL, 25 pcs
- HI 70010P** pH 10.01 Buffer Sachets, 20 mL, 25 pcs
- HI 7004L** pH 4.01 Buffer Solution, 460 mL
- HI 7006L** pH 6.86 Buffer Solution, 460 mL
- HI 7007L** pH 7.01 Buffer Solution, 460 mL
- HI 7009L** pH 9.18 Buffer Solution, 460 mL
- HI 7010L** pH 10.01 Buffer Sol., 460 mL

pH CALIBRATION SOLUTIONS IN FDA APPROVED BOTTLES

- HI 8004L** pH 4.01 Buffer Solution, 460 mL
- HI 8006L** pH 6.86 Buffer Solution, 460 mL
- HI 8007L** pH 7.01 Buffer Solution, 460 mL
- HI 8009L** pH 9.18 Buffer Solution, 460 mL
- HI 8010L** pH 10.01 Buffer Solution, 460 mL

ELECTRODE STORAGE SOLUTIONS

- HI 70300L** Storage Solution, 460 mL

ELECTRODE STORAGE SOLUTIONS IN FDA APPROVED BOTTLES

- HI 80300L** Storage Solution, 460 mL

ELECTRODE CLEANING SOLUTIONS

- HI 70000P** Electrode Cleaning Sachets, 20 mL, 25 pcs
- HI 7061L** General Cleaning Sol., 460 mL
- HI 7073L** Protein Cleaning Sol., 460 mL
- HI 7074L** Inorganic Cleaning Sol., 460 mL
- HI 7077L** Oil & Fat Cleaning Sol., 460 mL

ELECTRODE CLEANING SOLUTIONS IN FDA APPROVED BOTTLES

- HI 8061L** General Cleaning Solution, 460 mL
- HI 8073L** Protein Cleaning Solution, 460 mL
- HI 8077L** Oil & Fat Cleaning Solution, 460 mL

REFILL ELECTROLYTE SOLUTIONS

- HI 7071** 3.5M KCl + AgCl Electrolyte, 4x50 mL, for single junction electrodes
- HI 7072** 1M KNO₃ Electrolyte, 4x50 mL
- HI 7082** 3.5M KCl Electrolyte, 4x50 mL, for double junction electrodes

REFILL ELECTROLYTE SOLUTIONS IN FDA APPROVED BOTTLE

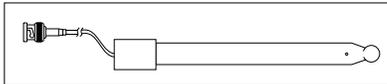
- HI 8071** 3.5M KCl + AgCl Electrolyte, 4x50 mL, for single junction electrodes
- HI 8072** 1M KNO₃ Electrolyte, 4x50 mL
- HI 8082** 3.5M KCl Electrolyte, 4x50 mL, for double junction electrodes

ORP PRETREATMENT SOLUTIONS

- HI 7091L** Reducing Pretreatment Solution, 460 mL
- HI 7092L** Oxidizing Pretreatment Solution, 460 mL

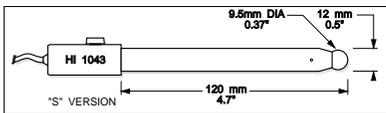
pH & ORP ELECTRODES

All electrodes part numbers ending in B are supplied with a BNC connector and 1 m (3.3') cable.



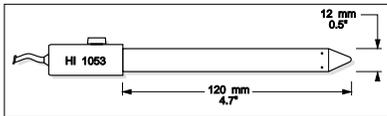
HI 1043B

Glass-body, double junction, refillable, combination pH electrode. Use: strong acid/alkali.



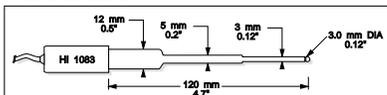
HI 1053B

Glass-body, triple ceramic, conic shape, refillable, combination pH electrode. Use: emulsions.



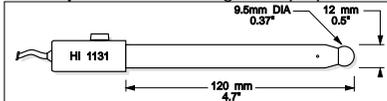
HI 1083B

Glass-body, micro, Viscolene, non-refillable, combination pH electrode. Use: biotechnology, micro titration.



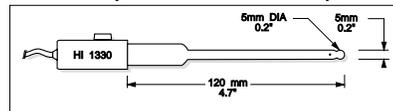
HI 1131B

Glass-body, single junction, refillable, combination pH electrode. Use: general purpose.



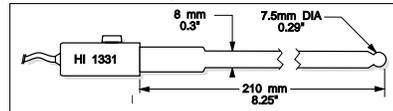
HI 1330B

Glass-body, semimicro, single junction, refillable, combination pH electrode. Use: laboratory, vials.



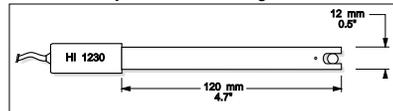
HI 1331B

Glass-body, semimicro, single junction, refillable, combination pH electrode. Use: flasks.



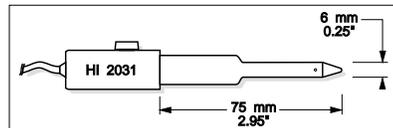
HI 1230B

Plastic-body (Ultem®), double junction, gel-filled, combination pH electrode. Use: general field.



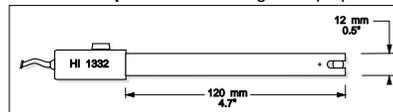
HI 2031B

Glass-body, semimicro, conic, refillable, combination pH electrode. Use: semisolid products.



HI 1332B

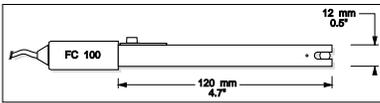
Plastic-body (Ultem®), double junction, refillable, combination pH electrode. Use: general purpose.



Ultem® is registered Trademark of "General Electrics Co."

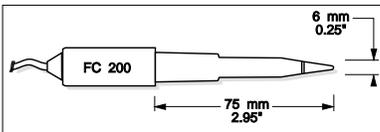
FC100B

Plastic-body (Kynar®), double junction, refillable, combination pH electrode. Use: general purpose for food industry.



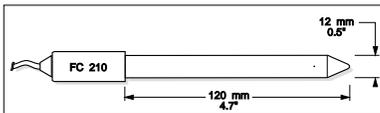
FC 200B

Plastic-body (Kynar®), open junction, conic, Viscolene, non-refillable, combination pH electrode. Use: meat & cheese.



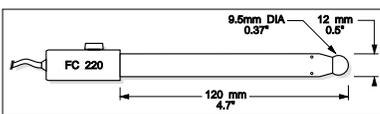
FC 210B

Glass-body, double junction, conic, Viscolene, non-refillable, combination pH electrode. Use: milk, yogurt.



FC 220B

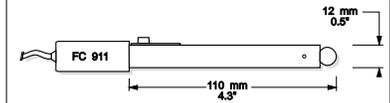
Glass-body, single junction, refillable, combination pH electrode. Use: food processing.



Kynar® is registered Trademark of "Penwalt Corp."

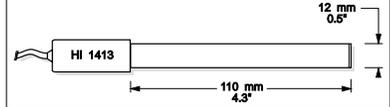
FC911B

Plastic-body (Kynar®), double junction, refillable with built-in amplifier, combination pH electrode. Use: very high humidity.



HI 1413B

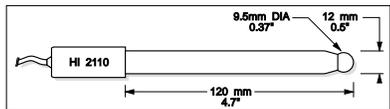
Glass-body, single junction, flat tip, Viscolene, combination pH electrode. Use: surface measurement.



Half-cell electrodes:

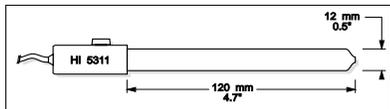
HI 2110B

Glass-body, single half-cell pH electrode. Use: general purpose.



HI 5311

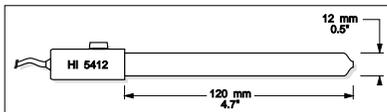
Glass-body, Ag/AgCl reference half-cell electrode, double junction, refillable with 4mm plug with 1m (3.3') cable. Use: general purpose with wide temperature range.



Kynar® is registered Trademark of "Penwalt Corp."

HI5412

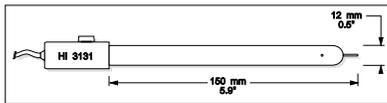
Glass-body, single Calomel reference half-cell electrode, refillable with 4mm plug with 1 m (3.3') cable. Use: general purpose with constant temperature range.



ORP electrodes (pH 201 only):

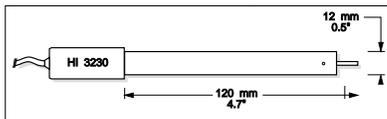
HI3131B

Glass-body, refillable, combination platinum ORP electrode. Use: titration.



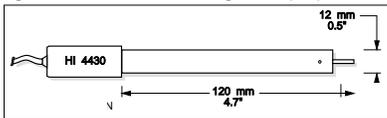
HI3230B

Plastic-body (Ultem®), gel-filled, combination platinum ORP electrode. Use: general purpose.



HI4430B

Plastic-body (Ultem®), gel-filled, combination gold ORP electrode. Use: general purpose.



Ultem® is registered Trademark of *General Electrics Co.*

ACCESSORIES

- HI710005** Transformer 110VAC to 12VDC
- HI710006** Transformer 220VAC to 12VDC
- ChecktempC** Pocket-size thermometer with 0.1°C resolution (range -50.0 to 150.0°C)
- HI76405** Electrode holder
- HI7669/2W** Temp. probe with 1 m (3.3') cable
- HI 92000** Windows® compatible software
- HI 920010** 9 to 25-pin RS232 cable
- HI 920010/9** 9 to 9-pin RS232 cable

Windows® is registered Trademark of *Microsoft Co.*

ELECTRODE APPLICATION GUIDE

Application	Electrodes
Aquarium	HI 1332B, HI 1911B
Bath-water	HI 1910B, HI 1130B
Beer	HI 1131B
Bread	HI 2031B, FC 200B
Cheese	FC 200B
Dairy products	FC 911B, FC 100B
Dirty water	HI 1910B, HI 1912B
Emulsions	HI 1053B
Environment	HI 1230B
Flasks	HI 1331B
Food industry	FC 911B, FC 100B
Fruit	FC 200B, FC 220B
Fruit juices, organic	FC 210B
Galvanizing waste	HI 1130B, HI 1912B
Heavy-duty	HI 1135B
High purity water	HI 1053B
Horticulture	HI 1053B, FC 200B
In-line applications	HI 1134B, HI 1135B, HI 2114B, HI 2910B
Laboratory general use	HI 1131B, HI 1230B, HI 1332B, HI 1330B
Leather	HI 1413B
Lemon juice	FC 100B
Meat	FC 200B, HI 2031B
Micro plates	HI 1043B
Milk and Yogurt	FC 210B
Paints	HI 1053B
Paper	HI 1413B
Photographic	HI 1230B
Quality control	HI 1332B
Sausages	FC 200B, HI 2031B
Semisolid products	HI 2031B
Skin	HI 1413B
Soil samples	HI 1230B
Solvents	HI 1043B
Strong acid	HI 1043B
Submersion	HI 1130B
Surface	HI 1413B
Swimming pool	HI 1130B, HI 2114B, HI 2910B
Titration	HI 1131B
Very high humidity	FC 911B, HI 1912B, HI 1911B
Vials and test tubes	HI 1330B
Wine processing	FC 220B

WARRANTY

The Hanna **pH 200** and **pH 201 meters** are **warranted for two years** against defects in workmanship and materials when used for their intended purpose and maintained according to the instructions.

The probes and the electrodes are warranted for a period of six months.

Damages due to accident, misuse, tampering or lack of prescribed maintenance are not covered. This warranty is limited to free of charge repair or replacement of the meter only, if any malfunctioning is due to manufacturing defects.

If service is required, contact the dealer from whom you purchased the instrument. If under warranty, report the model number, date of purchase, serial number and the nature of the failure. If the repair is not covered by the warranty, you will be notified of the charges for repair or replacement. If the instrument is to be returned to Hanna Instruments, obtain a Return Goods Authorization from the Customer Service Department first and then send it with shipment cost prepaid. When shipping any instrument, make sure it is properly packaged for complete protection.

To validate your warranty, fill out and return the Hanna warranty card within 14 days of purchase date.

All rights are reserved. Reproduction in whole or part is prohibited without the written consent of the copyright owner.

Hanna Instruments reserves the right to modify the design, construction and appearance of its products without advance notice.

CE DECLARATION OF CONFORMITY



CE

DECLARATION OF CONFORMITY

We
 Hanna Instruments Srl
 Via delle Industrie 12
 35010 Ronchi di Villafranca (PD)
 ITALY

herewith certify that the bench pH meter
pH 200 and pH 201

has been tested and found to be in compliance with the following regulations:

IEC 801-2	Electromagnetic Discharge
IEC 801-3	RF Radiated
IEC 801-4	Fast Transient
EN 55022	Radiated, Class B

Date of Issue: 11-04-1996


 D. Volpato - Engineering Manager
 On behalf of
 Hanna Instruments S.r.l.

Recommendations for Users

Before using this product, make sure that it is entirely suitable for the environment in which it is to be used.

Operation of this instrument in residential areas could cause unacceptable interferences to radio and TV equipment, requiring the operator to take all necessary steps to correct interferences.

The glass bulb at the end of the pH electrode is sensitive to electrostatic discharges. Avoid touching this glass bulb at all times.

During operation, ESD wrist straps should be worn to avoid possible damage to the electrode by electrostatic discharges.

Any variation introduced by the user to the supplied equipment may degrade the instrument's EMC performance.

To avoid electrical shock, do not use this instrument when voltages at the measurement surface exceed 24VAC or 60VDC.

To avoid damages or burns, do not perform any measurement in microwave ovens.

PRINTED IN ITALY

MANP-H200R1
02-97


<http://www.hannainst.com>