



Your PDF Guides

You can read the recommendations in the user guide, the technical guide or the installation guide for HANNA INSTRUMENTS HI 2221. You'll find the answers to all your questions on the HANNA INSTRUMENTS HI 2221 in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

User manual HANNA INSTRUMENTS HI 2221
User guide HANNA INSTRUMENTS HI 2221
Operating instructions HANNA INSTRUMENTS HI 2221
Instructions for use HANNA INSTRUMENTS HI 2221
Instruction manual HANNA INSTRUMENTS HI 2221

Instruction Manual

HI 2221 HI 2223

**pH/mV/°C
Bench Meters
with Calibration
Check**



HANNA
instruments
www.hannainst.com



[You're reading an excerpt. Click here to read official HANNA INSTRUMENTS HI 2221 user guide](http://yourpdfguides.com/dref/2718669)
<http://yourpdfguides.com/dref/2718669>

Manual abstract:

@@@@@If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com. WARRANTY HI 2221 and HI 2223 are guaranteed for two years against defects in workmanship and materials when used for their intended purpose and maintained according to instructions. The electrodes and the probes are guaranteed for a period of six months. This warranty is limited to repair or replacement free of charge. Damage due to accidents, misuse, tampering or lack of prescribed maintenance are not covered. 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 problem. If the repair is not covered by the warranty, you will be notified of the charges incurred. If the instrument is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization number from the Technical Service department and then send it with shipping costs prepaid.

When shipping any instrument, make sure it is properly packaged for complete protection. TABLE OF CONTENTS WARRANTY

.....
.....

.....
.....
.....

.....
.....
.....

.... 2 PRELIMINARY EXAMINATION .

.....
.....

.....
.....
.....

.....
.....

.... 3 GENERAL DESCRIPTION

.....
.....
.....

.....
.....
.....

3 FUNCTIONAL DESCRIPTION

.....
.....

.....
.....
.....

.....
.....

.. 4 HI 2221 SPECIFICATIONS

.....
.....
.....

.....
.....
.....
.....

.... 5 HI 2223 SPECIFICATIONS

.....
.....
.....

.....
.....
.....
.....

.....
.....

. 6 OPERATIONAL GUIDE

.....
.....
.....
.....

.....
.....
.....
.....

..... 7 pH CALIBRATION

.....
.....
.....

.....
.....
.....

.....
.....
.....
.....

.. 9 ENHANCED CALIBRATION MESSAGES

.....
.....
.....

.....
.....
.....

..... 14 ELECTRODE CONDITION & ELECTRODE RESPONSE TIME ..

.....
.....
.....

..... 16 pH BUFFER TEMPERATURE DEPENDENCE

.....
.....
.....
.....
.....

.....
17 GOOD LABORATORY PRACTICE (GLP)

.....

.....

.....

.....

.....

.....
. 18 LOGGING

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....
21 SETUP

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

... 24 TEMPERATURE CALIBRATION (for technical personnel only)

.....

.....

.... 27 mV CALIBRATION (for technical personnel only) .

.....

.....

.....

.....

.....

. 29 PC INTERFACE

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... 30 ELECTRODE CONDITIONING & MAINTENANCE ..

.....
.....
.....

... 34 TROUBLESHOOTING GUIDE ..

.....
.....
.....
.....

.. 37 TEMPERATURE CORRELATION FOR pH SENSITIVE GLASS

.....
.....

. 38 ACCESSORIES

.....
.....
.....
.....
.....
.....

.... 39 RECOMMENDATIONS FOR USERS .

.....
.....
.....
.....
.....
.....

43 2 PRELIMINARY EXAMINATION Remove the instrument from the packing material and examine it carefully to make sure that no damage has occurred during shipping. If there is any damage, notify your Dealer or the nearest Hanna Customer Service Center. Each instrument is supplied complete with: · HI 1131P Glass-body Combination pH Electrode with 1 m (3.3 ") cable · HI 7662 Temperature Probe · HI 76404N Electrode Holder · pH 4.01 & 7.01 Buffer Solutions (20 mL each) · HI 7071 Electrolyte Solution · 12 VDC Power Adapter · Instruction Manual 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 HI 2221 and HI 2223 are logging microprocessor-based pH/ORP/ temperature bench meters with Calibration Check. Calibration Check performs a set of diagnostic tests during calibration using the history of electrode slope and offset to detect problems that can cause loss of accuracy. Calibration Check Features are: · Enhanced Calibration Messages During calibration the user is warned if one or more parameters are not suitable to perform an accurate calibration.

· Electrode Condition on LCD Display Determined from the electrode offset and slope. · Electrode response time on LCD Display Determined from electrode performance during calibration. Other features include: up to five pH point calibration with seven memorized buffers (1.68, 4.01, 6.86, 7.01, 9.18, 10.01 and 12.45 pH), logging up to 100 samples (for HI 2221) and 500 samples (for HI 2223), GLP, calibration due alarm, pH reading with manual or automatic temperature compensation and PC software interface.

3 FUNCTIONAL DESCRIPTION Front Panel Rear Panel 1) Liquid Crystal Display (LCD). 2) CAL key, to enter and exit calibration mode. 3) CFM/GLP key, to confirm calibration, different values or to display Good Laboratory Practice information. 4) °C key, to manually increase temperature value or other parameters. 5) °C key, to manually decrease temperature value or other parameters.

6) SETUP key, to enter/exit SETUP mode. 7) RANGE key, to select measurement range, switch to focused data in SETUP or to toggle between buffer value and temperature during calibration. 8) LOG/CLR key, to store a value into memory, to clear pH calibration, or to delete log records. 9) RCL key, memory recall. 10) ON/OFF switch.

11) Power supply socket. 12) USB connector. 13) BNC electrode connector. 14) Temperature probe socket. 15) Electrode reference socket. 4 HI 2221 SPECIFICATIONS 2.00 to 16.00 pH Range ± 699.9 mV ± 2000 mV 20.0 to 120.

0 °C 0.01 pH Resolution 0.1 mV (± 699.9 mV) 1 mV (± 2000 mV) 0.1 °C ± 0.01 pH Accuracy @ 20 °C/68 °F ± 0.2 mV (± 699.9 mV) ± 1 mV (± 2000 mV) ± 0.2 °C excluding probe error Yes Opto-isolated USB Up to 5 points, 7 buffers available (1.68, 4.01, 6.86, 7.01, 9.18, 10.01, 12.

45) 100 points Manual or Automatic from: 20.0 to 120.0 °C (4.0 to 248.0 °F) HI 1131P glass body, single junction refillable cell, BNC + pin (included) HI 7662 stainless steel probe (included) 1012 ohm 12 VDC adapter (included) 235 x 222 x 109 mm (9.

2 x 8.7 x 4.3") 1.3 Kg (2.9 lb); kit with holder 2.1 Kg (4.6 lb) 0 50 °C (32 - 122 °F) max RH 95 % non condensing 2 years Calibration Check Computer Interface pH Calibration Logging Temperature Compensation pH Electrode Temperature Probe Input Impedance Power Supply Dimensions Weight Environment Warranty 5 HI 2223 SPECIFICATIONS 2.00 to 16.00 pH 2.000 to 16.

000 pH Range ± 999.9 mV ± 2000 mV 20.0 to 120.0 °C 0.01 pH 0.001 pH Resolution 0.1 mV (± 999.9 mV) 1 mV (± 2000 mV) 0.1 °C ± 0.01 pH ± 0.002 pH Accuracy @ 20 °C/68 °F ± 0.2 mV (± 999.9 mV) ± 1 mV (± 2000 mV) ± 0.2 °C excluding probe error Calibration Check Computer Interface pH Calibration Logging Temperature Compensation pH Electrode Temperature Probe Input Impedance Power Supply Dimensions Weight Environment Warranty Yes Opto-Isolated USB Up to 5 points, 7 buffers available (1.68, 4.

01, 6.86, 7.01, 9.18, 10.01, 12.

45) 500 points Manual or Automatic from: 20.0 to 120.0 °C (4.0 to 248.0 °F) HI 1131P glass body, single junction refillable cell, BNC + pin (included) HI 7662 stainless steel probe (included) 1012 ohm 12 VDC adapter 235 x 222 x 109 mm (9.2 x 8.7 x 4.3") 1.3 Kg (2.9 lb); kit with holder 2.

1 Kg (4.6 lb) 0 50 °C (32 - 122 °F) max RH 95 % non condensing 2 years 6 OPERATIONAL GUIDE POWER CONNECTION Plug the 12 VDC adapter into the power supply socket. Notes: · These instruments use non volatile memory to retain the pH, mV, temperature calibrations and all other settings, even when unplugged. · Make sure a fuse protects the mains line. ELECTRODE AND PROBE CONNECTIONS For HANNA P Type pH or ORP electrodes (with internal reference) connect the electrode's BNC to the socket on the back of the instrument and the pin to the reference socket. Note: Electrode condition and response information is displayed on the bar graph gauges during the day the calibration is performed, only if HANNA P type (PIN) electrodes are used.



[You're reading an excerpt. Click here to read official HANNA INSTRUMENTS HI 2221 user guide](http://yourpdfguides.com/dref/2718669)
<http://yourpdfguides.com/dref/2718669>

If the electrode is not recognized as a HANNA P type electrode, the bar graph gauges will blink (25 seconds OFF, 4 seconds ON, full bar graph). For temperature measurement and automatic temperature compensation connect the temperature probe to the appropriate socket. START ART-UP INSTRUMENT START-UP · Turn the instrument on by pressing the ON/OFF switch located on the rear panel. · All LCD tags are displayed and a beep is sounded while the instrument performs a self test.

· The instrument will display "LoAD" message and " " blinking until initialization is complete. · The "Unscrew electrode refilling cap" message reminds the user to loosen or remove the electrode refilling cap to improve the electrode's response time. · The instrument automatically defaults to pH measurement mode unless a HANNA P type ORP electrode is detected. pH MEASUREMENT Make sure the instrument has been calibrated before taking pH measurements. · Submerge the tip of a properly conditioned 3 cm electrode (see page 34) and the temperature (1¼") 7 probe approximately 3 cm (1¼") into the sample to be tested and stir gently.

Allow time for the electrode to stabilize. · The pH is displayed on the primary LCD and the temperature on the secondary LCD. · The pH reading is out of range, the closest full-scale value will be displayed blinking on the primary LCD. · It is also possible to view the mV reading by pressing the RANGE key. mV POOR GOOD SLOW FAST C If measurements are taken successively in different samples, it is recommended to rinse the electrode thoroughly with deionized water or tap water and then with some of the next sample to prevent cross-contamination.

The pH reading is affected by temperature. In order to measure the pH accurately, this temperature effect must be compensated for. To use the Automatic Temperature Compensation feature, connect and submerge the HI 7662 temperature probe into the sample as close to the electrode as possible and wait for a few minutes. If the temperature of the sample is known, manual compensation can be performed by disconnecting the temperature probe. The display will show the last recorded temperature reading with the "°C" symbol blinking. The temperature can now be adjusted with the ARROW keys (from -20.0 °C to 120.0 °C). ATC C MTC C ORP MEASUREMENTS An optional ORP electrode must be used to perform ORP measurements (see Accessories). Oxidation-Reduction Potential (REDOX) measurements provide the quantification of the oxidizing or reducing power of the tested sample.

The surface of the ORP electrode must be clean and smooth in order to obtain an accurate measurement. 8 Pretreatment solutions are available to condition the electrode and speed up the response time. · The instrument automatically defaults to the 3 cm mV measurement mode if HANNA P type ORP (1¼") electrode is detected. · Submerge the ORP electrode tip (3 cm/1¼") into the sample. Allow a few minutes for the reading to stabilize. · The instrument displays the mV reading on the primary LCD. · If the reading is out of range, the closest full-scale value will be displayed blinking on the primary LCD. TAKING TEMPERATURE MEASUREMENTS Connect the HI 7662 temperature probe and turn the instrument on. Dip the temperature probe into the sample and allow the reading on the secondary LCD to stabilize. pH CALIBRATION Calibrate the instrument frequently, especially if high accuracy is required.

For best results and constant display of electrode condition and electrode response on the bar graph gauges, daily calibration is recommended. The instrument should be recalibrated: · Whenever the pH electrode necessary, press the ARROW keys to select a different buffer value. · The " " tag will blink on the LCD until the reading is stable. · When the reading is stable and close to the selected buffer the "CFM" tag will blink. · Press CFM to confirm calibration.

11 · After the third calibration point is confirmed, submerge the pH electrode and the temperature probe approximately 3 cm (1¼") into the next buffer solution and stir gently. The temperature probe should be close to the pH electrode. · If necessary, press the ARROW keys to select a different buffer value. ·

The " " tag will blink on the LCD until the reading is stable. · When the reading is stable and close to the selected buffer the "CFM" tag will blink. · Press CFM to confirm calibration. · After the fourth calibration point is confirmed, submerge the pH electrode and the temperature probe approximately 3 cm (1¼") into the next buffer solution and stir gently. The temperature probe should be close to the pH electrode. · If necessary, press the ARROW keys to select a different buffer value. · The " " tag will blink on the LCD until the reading is stable. · When the reading is stable and close to the selected buffer the "CFM" tag will blink. · Press CFM to confirm calibration. · The instrument stores the calibration value and returns to normal measurement mode. FOUR, THREE OR TWO-POINT CALIBRATION · Proceed as described in "FIVE-POINT CALIBRATION" section. · Press CAL after the fourth, third or second calibration point was confirmed.

The instrument will memorize the calibration data and return to measurement mode. ONE-POINT CALIBRATION Two SETUP selectable options are available: "Pnt" and "OFFS". If the "Pnt" option is selected, the new calibration point overrides an existing one. The adjacent slopes will be reevaluated. If the "OFFS" option is selected, an electrode offset correction is performed. The adjacent slopes will remain unchanged. · Proceed as described in "FOUR, THREE or TWO-POINT CALIBRATION" section. · Press CAL after the first calibration point was confirmed. The instrument will memorize the one-point calibration data and return to measurement mode. 12 Notes: · To clear calibration parameters for all uncalibrated buffers starting with current buffer, press CLR.

The calibration will continue from the current point. If this procedure is performed while calibrating in the first calibration point, the instrument returns to measurement mode. · Press RANGE to toggle between pH buffer, calibration buffer number and temperature reading. 13 ENHANCED CALIBRATION MESSAGES The stored calibration history is used to issue error and warning messages during calibration to help ensure the highest accuracy. As electrode aging is normally a slow process, substantial changes from previous calibrations are likely due to a temporary problem with the electrode or buffers.

ERROR MESSAGES Error messages appear if one or all of the calibration parameters are out of accepted windows.



[You're reading an excerpt. Click here to read official HANNA INSTRUMENTS HI 2221 user guide](http://yourpdfguides.com/dref/2718669)
<http://yourpdfguides.com/dref/2718669>

Calibration can not continue when these errors are displayed. **WRONG BUFFER** This message appears when the difference between the pH reading and the value of the selected buffer is too big. If this error message is displayed, check if you have selected the proper calibration buffer. **CLEAN ELECTRODE** This error message indicates a bad electrode condition (offset out of accepted window, or slope under the accepted lower limit).

Clean the electrode according to the Cleaning Procedure on page 36 to improve its condition and repeat the calibration. This ensures the removal of film, dirt or deposits on the glass bulb and reference junction. **CHECK ELECTRODE** alternating with **CHECK BUFFER** This error message appears when electrode slope exceeds the highest accepted slope limit. You should check your electrode and use fresh buffer. **ELECTRODE** This message appears if the cleaning procedure performed as a result of the above two messages is found by the instrument to be unsuccessful. 14 **Replace the electrode. BUFFER TEMPERATURE** This message appears if the temperature of the buffer is outside the defined buffer temperature range. **WARNING MESSAGES** During calibration, the Calibration Check feature analyzes the electrode calibration history and warns the user when problems have been detected. It is possible to over ride the warning messages and confirm the calibration but it is not recommended. **CLEAN ELECTRODE** This warning appears during Calibration Check for the second calibration buffer when the instrument has detected a small variation of offset or both offset and slope parameters.

This variation may result from dirt on the electrode. Refer to the electrode cleaning procedure. This ensures the removal of film, dirt or deposits on the glass bulb and reference junction. **CLEAN ELECTRODE** alternating with **CHECK BUFFER** This warning appears during Calibration Check in the first calibration buffer as a result of unacceptable offset variation or in the second calibration buffer as a result of unacceptable slope variation. This variation may result from dirt on the electrode or contaminated buffer. Refer to the electrode cleaning procedure or use fresh buffer. **CONTAMINATED BUFFER** This warning message appears in order to alert that the buffer could be contaminated. Refresh your buffer and continue the calibration procedure. 15 **ELECTRODE CONDITION & ELECTRODE RESPONSE TIME** When using an appropriate HANNA P Type BNC electrode with pin, HI 2221 and HI 2223 will assess electrode condition and response time during each calibration, the calibration status is displayed for the rest of the day. **POOR GOOD SLOW FAST** The response gauge is a function of the stabilization time between the first and second calibration buffers.

These gauges reflect electrode performance and should be expected to slowly decrease over the life of the electrode. The condition gauge show the electrode's condition at the time of calibration. For a continuous display of electrode condition and response, daily calibration is necessary. This information can also be viewed in the GLP data. If the instrument is not calibrated, the calibration history was deleted, or it has been calibrated only at one point, the electrode condition and the electrode response gauges will be empty.

POOR GOOD SLOW FAST When the instrument cannot evaluate the electrode response, the response gauge will be empty (pH 1.68 or pH 12.45 were used).

If the electrode is in a very poor condition the first condition segment will blink. If electrode response is very slow the first response segment will blink. 16 **pH BUFFER TEMPERATURE DEPENDENCE** The temperature has an effect on pH. The calibration buffer solutions are affected by temperature changes to a lesser degree than normal solutions. During calibration the instrument will automatically calibrate to the pH value corresponding to the measured or set temperature. **TEMP °C** 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 °F 32 41 50 59 68 77 86 95 104 113 122 131 140 149 158 167 176 185
194 203 1. 68 1.67 1.67 1.67 1.67 1.68 1.

68 1.68 1.69 1.69 1.70 1.71 1.72 1.72 1.73 1.74 1.
76 1.77 1.78 1.79 1.81 pH BUFFERS 4.

01 6. 86 4.01 4.00 4.00 4.
00 4.00 4.01 4.02 4.03 4.04 4.05 4.06 4.08 4.09 4.

11 4.12 4.14 4.16 4.17 4.19 4.20 6.98 6.95 6.92 6.
90 6.88 6.86 6.85 6.84 6.
84 6.83 6.83 6.84 6.84 6.

84 6.85 6.86 6.87 6.87 6.88 6.89 7. 01 9. 18 7.13 7.

10 7.07 7.05 7.03 7.01 7.00 6.99 6.98 6.98 6.98 6.
98 6.98 6.99 6.99 7.00 7.
01 7.02 7.03 7.04 9.46 9.

39 9.33 9.27 9.22 9.18 9.14 9.11 9.07 9.04 9.01 8.

99 8.97 8.95 8.93 8.91 8.89 8.87 8.85 8.83 10. 01 12.
45 10.32 10.24 10.18 10.12 10.
06 10.01 9.96 9.92 9.88 9.

85 9.82 9.79 9.77 9.76 9.75 9.74 9.74 9.74 9.75 9.

73 13.38 13.18 12.99 12.80 12.62 12.45 12.29 12.13 11.98 11.
83 11.70 11.57 11.44 11.32 11.
21 11.10 11.00 10.91 10.82 10.

73 During calibration the instrument will display the pH buffer value at 25 °C. 17 **GOOD LABORATORY PRACTICE (GLP)** GLP is a set of functions that allows the storage and retrieval of data regarding the maintenance and status of the electrode. All data regarding the last calibration is stored for the user to review when necessary. **EXPIRED CALIBRATION** These instruments allow the user to set the number of days before the next required calibration. This value can be set from 1 to 7 days. The default setting is OFF (disabled). The "CAL DUE" tags will blink to warn the user that the instrument should be recalibrated.

For example, if a 4 days time out has been selected, the instrument will issue the alarm exactly 4 days after the last calibration. If the expiration value is changed (e.g.

@@@ This feature helps ensure use of a calibrated instrument. @@@ The instrument will display the time of the last calibration. @@@@ If a HANNA P Type ORP electrode is used pH information is not stored. @@@@ To delete records press CLR key. @@@@ You can skip this message by selecting an undeleted record using the ARROW keys. The instrument optimizes the usage of the memory when it returns to measurement mode after a deleting operation is performed. This will change the record numbers of logged data. During this operation the " " tag will blink. If all the records are deleted the instrument returns to the measuring mode. After the LOG key is pressed or "dEL" is confirmed the instrument will display the amount of free log space for about one second (example: 25 records free).

LOG 23 SETUP Setup mode allows viewing and modification of the following parameters: · Calibration Expiration Alarm · One-point Calibration Behavior · pH Resolution (HI 2223 only) · Current Time (hour & minute) · Current Date (year, month & day) · Beep Status · Instrument ID · Temperature Unit To enter the Setup mode press the SETUP key while the instrument is in measuring mode. Press SETUP key to exit SETUP mode. Select a parameter with the ARROW keys. Press the CAL key to change a parameter value. The selected parameter will start blinking.
Press the RANGE key to toggle between the displayed parameters.



[You're reading an excerpt. Click here to read official HANNA INSTRUMENTS HI 2221 user guide](http://yourpdfguides.com/dref/2718669)
<http://yourpdfguides.com/dref/2718669>

Press the ARROW keys to increase or decrease the displayed value. Press the CFM key to save the modified value or the CAL key to escape without saving. Press the ARROW keys to select the next/previous parameter. CALIBRATION EXPIRATION ALARM Press the CAL key when the calibration expiration is displayed.

Calibration time out ("OFF" or "1" to "7" days) will begin blinking. Press the ARROW keys to change the calibration expiration value. Press the CFM key to save the modified calibration expiration value or press the CAL key to cancel without saving the calibration expiration. ONE-POINT CALIBRATION BEHAVIOR Press CAL when "1 Pnt" message is displayed on the secondary LCD. One of the two options ("Pnt" or "OFFS") will start blinking (see pH CALIBRATION, ONE-POINT CALIBRATION for details, page 12). Press the ARROW keys to toggle between "Pnt" and "OFFS" options. 24 Press CFM to save the behavior for one-point calibration. Press CAL to escape without saving. pH RESOLUTION (HI 2223 only) Press CAL when "rESo" message is displayed on the secondary LCD. The set resolution ("0.

01" or "0.001") will start blinking. Press the ARROW keys to toggle between 0.01 and 0.001 options. Press CFM to save the modified value. Press CAL to escape without saving. CURRENT TIME Press the CAL key when the current time is displayed. The hour will start blinking. Press the ARROW keys to change the hour.

Press the RANGE key. The minutes will start blinking. Press the ARROW keys to change the displayed value. Press the CFM key to save the modified value or press the CAL key to escape without saving. CURRENT DATE Press the CAL key when the current date is displayed.

The year will start blinking. Press the ARROW keys to change the year. Press the RANGE key. The month will start blinking. Press the ARROW keys to change the month.

25 Press the RANGE key. The day will start blinking. Press the ARROW keys to change the day. Press the CFM key to save the modified value or press the CAL key to escape without saving. BEEP STATUS Press CAL when the beep status is displayed. Beep status ("On" or "OFF") will start blinking. Press the ARROW keys to change the beep status (On or OFF). Press CFM to save the modified beep status. Press CAL to escape without saving. When enable, beep sounds as a short beep every time a key is pressed or when the calibration can be confirmed.

A long beep alert that the pressed key is not active or a wrong condition is detected while in calibration. INSTRUMENT ID Press the CAL key when "InId" is displayed. The instrument ID ("0000" to "9999") will begin blinking. Press the ARROW keys to change the instrument ID value. Press the CFM key to save the modified instrument ID value or press the CAL key to cancel without saving the instrument ID. Note: The instrument ID is downloaded to a PC as part of a logged data set to identify its origin. TEMPERATURE UNIT Press CAL when "tenP" is displayed. The temperature unit will start blinking. Press the ARROW keys to change the option. Press CFM to save the modified temperature unit.

Press CAL to escape without saving. 26 TEMPERATURE CALIBRATION (for technical personnel only) All the instruments are factory calibrated for temperature. Hanna's temperature probes are interchangeable and no temperature calibration is needed when they are replaced. If the temperature measurements are inaccurate, temperature recalibration should be performed. For an accurate recalibration, contact your dealer or the nearest Hanna Customer Service Center, or follow the instructions below.

· Prepare a vessel containing ice and water and another one containing hot water (around 50 °C). Place insulation material around the vessels to minimize temperature changes. · Use a calibrated thermometer with a resolution of 0.1 °C as a reference thermometer. · With the instrument off, press and hold down the CFM & SETUP keys, then power on the instrument.

The "CAL" tag will appear and the secondary LCD will show "0.0 °C". · Submerge the temperature probe in the vessel with ice and water as near as possible to the reference thermometer. Allow a few seconds for the probe to stabilize. · Use the ARROW keys to set the reading on the secondary LCD to that of ice and water, measured by the reference thermometer. When the reading is stable and close to the selected calibration point, "READY" tag will appear and "CFM" tag will blink. · Press CFM to confirm. The secondary LCD will show "50.0 °C". · Submerge the temperature probe in the second vessel as near as possible to the reference thermometer.

Allow a few seconds for the probe to stabilize. · Use the ARROW keys to set the reading on the secondary LCD to that of the hot water. 27 · When the reading is stable and close to the selected calibration point, "READY" tag will appear and "CFM" tag will blink. · Press CFM to confirm. The instrument returns to measurement mode. Note: If the reading is not close to the selected calibration point, "WRONG" tag will blink. Change the temperature probe and restart calibration. 28 mV CALIBRATION (for technical personnel only) All the instruments are factory calibrated for mV. Hanna's ORP electrodes are interchangeable and no mV calibration is needed when they are replaced. If the mV measurements are inaccurate, mV recalibration should be performed. For an accurate recalibration, contact your dealer or the nearest Hanna Customer Service Center, or follow the instructions below. A two-point calibration can be performed at 0.0 mV and 1800.0 mV. · Attach to the BNC connector a mV simulator with an accuracy of ±0.

1 mV. · With the instrument off, press and hold down the CAL & °C keys, then power on the instrument. The "CAL" tag will appear and the secondary LCD will show "0.0 mV". · Set 0.

0 mV on the simulator. When the reading is stable and close to the selected calibration point, "READY" tag will appear and "CFM" tag will blink. · Press CFM to confirm. The secondary LCD will display "1800 mV". · Set 1800.0 mV on the simulator. When the reading is stable and close to the selected calibration point, "READY" tag will appear and "CFM" tag will blink. · Press CFM to confirm. The instrument returns to measurement mode. Note: If the reading is not close to the selected calibration point, "WRONG" tag will blink.

Verify calibration condition or contact your vendor if you can not calibrate. 29 PC INTERFACE Data transmission from the instrument to the PC can be done with the HI 92000 Windows® compatible software (optional). HI 92000 also offers graphing and on-line help feature.



[You're reading an excerpt. Click here to read official HANNA INSTRUMENTS HI 2221 user guide](http://yourpdfguides.com/dref/2718669)
<http://yourpdfguides.com/dref/2718669>

Data can be exported to the most popular spreadsheet programs for further analysis. To connect your instrument to a PC, use a standard USB cable connector. Make sure that your instrument is switched off and plug one connector to the instrument USB socket and the other to the USB port of your PC. Note: If you are not using Hanna Instruments HI 92000 software, please see the following instructions. SENDING COMMANDS FROM PC It is also possible to remotely control the instrument with any terminal program. Use a standard USB cable to connect the instrument to a PC, start the terminal program and set the communication options as follows: 8, N, 1, no flow control, 9600 baud rate. COMMAND TYPES To send a command to the instrument follow the next scheme: <command prefix> <command> <CR> where: <command prefix> is a 16 ASCII character <command> is the command code.

Note: Either small or capital letters can be used. SIMPLE COMMANDS RNG CAL CFM UPC DWC LOG RCL SET CHR xx Is equivalent to pressing RANGE Is equivalent to pressing CAL Is equivalent to pressing CFM Is equivalent to pressing the UP arrow key Is equivalent to pressing the DOWN arrow key Is equivalent to pressing LOG Is equivalent to pressing RCL Is equivalent to pressing SETUP Change the instrument range according with the parameter value (xx): ·xx=00 pH value/0.001 resolution (HI 2223 only) ·xx=01 pH range/0.01 resolution ·xx=03 mV range 30 The instrument will answer for these commands with: <STX> <answer> <ETX> where: <STX> is 02 ASCII code character (start of text) <ETX> is 03 ASCII code character (end of text) <answer>: <ACK> is 06 ASCII code character (recognized command) <NAK> is 21 ASCII code character (unrecognized command) <CAN> is 24 ASCII code character (corrupted command) COMMANDS REQUIRING AN ANSWER The instrument will answer for these commands with: <STX> <answer> <checksum> <ETX> where the checksum is the bytes sum of the answer string sent as 2 ASCII characters. All the answer messages are with ASCII characters.

RAS Causes the instrument to send a complete set of readings in according with the current range: ·pH, temperature and mV reading on pH range. ·mV and temperature reading on mV range The answer string contains: ·Meter mode (2 chars): ·00 - pH value (0.001 resolution) ·01 - pH range (0.01 resolution) ·03 - mV range ·Meter status (2 chars of status byte): represents a 8 bit hexadecimal encoding. ·0x10 - temperature probe is connected ·0x01 - new GLP data available ·0x02 - new SETUP parameter ·Reading status (2 chars): R - in range, O - over range, U - under range.

First character corresponds to the pH range reading. (Not for HANNA ORP electrodes with pin.) Second character corresponds to mV reading. ·pH reading on pH range only - 7 ASCII chars, including sign and decimal point. (Not for HANNA ORP electrodes with pin.) ·mV reading - 7 ASCII chars, including sign and decimal point. 31 MDR GLP PAR ·Temperature reading - 8 ASCII chars, with sign and two decimal points, always in °C. Requests the instrument model name and firmware code (16 ASCII chars). Requests the calibration data record. The answer string contains: ·GLP status (1 char): represents a 4 bit hexadecimal encoding.

·0x01 - pH calibration available ·pH calibration data (if available), which contains: ·the number of calibrated buffers (1 char) ·the offset, with sign and decimal point (7 chars) ·the average of slopes, with sign and decimal point (7 chars) ·the calibration time, yymmddhhmmss (12 chars) ·buffers information (for each buffer) ·type (1 char): 0 - standard (always 0) ·status (1 char): N (new) - calibrated in last calibration; O (old) - from an old calibration. ·warnings during calibration (2 chars): ·00 - no warnings ·01 - clean electrode ·04 - clean electrode and check buffer ·05 - contaminated buffer. ·buffer value, with sign and decimal point (7 chars). ·calibration time, yymmddhhmmss (12 chars). ·electrode condition, with sign (3 chars). The "-01" code means not calculated. ·electrode response with sign (3 chars). The "-01" code means not calculated. Requests the setup parameters setting. The answer string contains: Instrument ID (4 chars) ·Calibration alarm time out (2 chars) ·SETUP information (2 chars): 8 bit hexadecimal encoding.

·0x01 - beep ON (else OFF) ·0x04 - degrees Celsius (else degrees Fahrenheit) ·0x08 - Offset calibration (else Point calibration) 32 NSL Requests the number of logged samples (4 chars). LODxxx Requests the xxxth record logged data. LODALL Requests all Log on demand data. The answer string contains: ·pH resolution (2 chars): 00 - pH 0.001 resolution, 01 - pH 0.

01 resolution ·pH reading status (1 char): R - in range, O - over range, U under range ·pH reading with sign and decimal point (7 chars) ·Temperature reading sign and decimal point in °C (7 chars) ·mV reading status (1 char - R, O, U) ·mV reading with sign and decimal point (7 chars) ·the logged time, yymmddhhmmss (12 chars) ·the calibration offset with sign and decimal point (7 chars) ·the average of slopes with sign and decimal point (7 chars) ·temperature probe presence (1 char) Errors: ······ "Err3" is sent if the Log on demand is empty. "Err4" is sent if the requested set parameter is not available. "Err5" is sent if an argument of the command is not correct. "Err6" is sent if the requested range is not available. "Err7" is sent if the instrument is in logging mode.

"Err8" is sent if the instrument is not in measurement mode. Invalid commands will be ignored. 33 ELECTRODE CONDITIONING & MAINTENANCE PREPARATION PROCEDURE Remove the protective cap of the pH electrode. DO NOT BE ALARMED IF SALT DEPOSITS ARE PRESENT. This is normal with electrodes. 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. 34 For refillable electrodes: If the filling solution (electrolyte) is more than 2½ cm (1") below the fill hole, add HI 7082 or HI 8082 3.

5M KCl Electrolyte Solution for double junction or HI 7071 or HI 8071 3.5M KCl+AgCl Electrolyte Solution for single junction electrodes.



[You're reading an excerpt. Click here to read official HANNA INSTRUMENTS HI 2221 user guide](http://yourpdfguides.com/dref/2718669)
<http://yourpdfguides.com/dref/2718669>

For 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. Submerge the tip (3 cm /1¼") 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 PROCEDURE 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 and HI 7082 or HI 8082 for double junction electrodes). Follow the Preparation Procedure 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 instrument 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 (HI 7071 or HI 8071 for single junction and HI 7082 or HI 8082 for double junction electrodes). Allow the electrode to stand upright for 1 hour. Follow the Storage Procedure above. 35 CLEANING PROCEDURE · General Soak in Hanna HI 7061 or HI 8061 General Cleaning Solution for approximately ½ hour.

· Protein Soak in Hanna HI 7073 or HI 8073 Protein Cleaning Solution for 15 minutes. · Inorganic Soak in Hanna HI 7074 Inorganic Cleaning Solution for 15 minutes. · Oil/grease Rinse with Hanna HI 7077 or HI 8077 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 necessary for gel-filled electrodes) and soak the electrode in HI 70300 or HI 80300 Storage Solution for at least 1 hour before taking measurements. 36 TROUBLESHOOTING GUIDE SYMPTOMS PROBLEM SOLUTION Clean the electrode and then soak the tip in HI 7061 or HI 8061 for 30 minutes. Clean the electrode. Refill with fresh solution (for refillable electrodes only). Check cable and connectors. Follow the cleaning procedure. If still no results, replace the electrode.

Replace buffer. Slow response/excessive Dirty pH electrode. drift. Readings fluctuate up Clogged/dirty junction. and down (noise). Low electrolyte level (refillable electrodes only). The meter does not accept the buffer solution for calibration. Dirty electrode or contaminated buffer. If the display shows: Out of range in the pH a) Verify that the electrode "pH" and "-2.00" or scale.

is connected. "16.00" blinking. b) Verify that the shipping cap has been removed. c) Recalibrate the meter.

d) Make sure the pH sample is in the specified range. e) Check electrolyte level and general state of the electrode. If the display shows: Out of range in the "mV" and "-2000" or mV scale. "2000" blinking The meter does not work with the temperature probe. The meter fails to calibrate or gives faulty readings.

Verify that the electrode is connected. Broken temperature probe. Replace the temperature Wrong temperature probe. probe used. Broken pH electrode. Replace the electrode. At startup the meter One of the keys is displays all LCD tags stuck. permanently. "Err xx" error message displayed. Internal error.

Check the keyboard or contact the vendor. Power off the meter and then power it on. If the error persists, contact the vendor. 37 The resistance of glass electrodes partially depends on the temperature. The lower the temperature, the higher the resistance. It takes more time for the reading to stabilize if the resistance is higher. @@@@The pH electrode's life also depends on the temperature. @@Typical Electrode Life Ambient Temperature 1 3 years 90 °C Less than 4 months 120 °C Less than 1 month Alkaline Error 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 called alkaline error and causes the pH to be underestimated.

Hanna's glass formulations have the indicated characteristics. Sodium Ion Correction for the Glass at 20-25 °C Concentration pH Error 13.00 0.10 0.1 Mol L-1 Na+ 13.

50 0.14 0.20 14.00 12.50 0.

10 13.00 0.18 1.0 Mol L-1 Na+ 0.29 13.50 14.00 0.40 38 ACCESSORIES pH BUFFER 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 7001L pH 1.68 Buffer Solution, 500 mL HI 7004L pH 4.01 Buffer Solution, 500 mL HI 7006L pH 6.86 Buffer Solution, 500 mL HI 7007L pH 7.01 Buffer Solution, 500 mL HI 7009L pH 9.18 Buffer Solution, 500 mL HI 7010L pH 10.01 Buffer Solution, 500 mL HI 8004L pH 4.01 Buffer Solution in FDA approved bottle, 500 mL HI 8006L pH 6.86 Buffer Solution in FDA approved bottle, 500 mL HI 8007L pH 7.01 Buffer Solution in FDA approved bottle, 500 mL HI 8009L pH 9.

18 Buffer Solution in FDA approved bottle, 500 mL HI 8010L pH 10.01 Buffer Solution in FDA approved bottle, 500 mL ELECTRODE STORAGE SOLUTIONS HI 70300L Storage Solution, 500 mL HI 80300L Storage Solution in FDA approved bottle, 500 mL ELECTRODE CLEANING SOLUTIONS HI 70000P Electrode Rinse Sachets, 20 mL, 25 pcs HI 7061L General Cleaning Solution, 500 mL HI 7073L Protein Cleaning Solution, 500 mL HI 7074L Inorganic Cleaning Solution, 500 mL HI 7077L Oil & Fat Cleaning Solution, 500 mL HI 8061L General Cleaning Solution in FDA approved bottle, 500 mL HI 8073L Protein Cleaning Solution in FDA approved bottle, 500 mL HI 8077L Oil & Fat Cleaning Solution in FDA approved bottle, 500 mL ELECTRODE REFILL ELECTROLYTE SOLUTIONS HI 7071 3.5M KCl + AgCl Electrolyte, 4x30 mL, for single junction electrodes HI 7072 1M KNO3 Electrolyte, 4x30 mL HI 7082 3.5M KCl Electrolyte, 4x30 mL, for double junction electrodes HI 8071 3.5M KCl + AgCl Electrolyte in FDA approved bottle, 4x30 mL, for single junction electrodes HI 8072 1M KNO3 Electrolyte in FDA approved bottle, 4x30 mL HI 8082 3.

5M KCl Electrolyte in FDA approved bottle, 4x30 mL, for double junction electrodes. 39 ORP PRETREATMENT SOLUTIONS HI 7091L Reducing Pretreatment Solution, 500 mL HI 7092L Oxidizing Pretreatment Solution, 500 mL pH ELECTRODES All electrodes with part numbers ending in P are supplied with a BNC and pin connector and 1 m (3.3') cable, as shown below. HI 1043P; Use: strong acid/alkali.



[You're reading an excerpt. Click here to read official HANNA INSTRUMENTS HI 2221 user guide](http://yourpdfguides.com/dref/2718669)
<http://yourpdfguides.com/dref/2718669>

Glass-body, double junction, refillable, combination pH electrode.

9.5mm DIA 0.37" 12 mm 0.5" HI 1043 120 mm 4.7" "S" VERSION HI 1053P; Use: emulsions. Glass-body, triple ceramic, conic shape, refillable, combination pH electrode. 12 mm 0.5" HI 1053 120 mm 4.7" "S" VERSION HI 1131P; Use: general purpose. Glass-body, single junction, refillable, combination pH electrode.

9.5mm DIA 0.37" 12 mm 0.5" HI 1131 120 mm 4.7" "S" VERSION HI 1083P; Use: biotechnology, micro titration. Glass-body, micro, Viscolene, nonrefillable, combination pH electrode. 12 mm 0.5" 5 mm 0.2" 3 mm 0.12" 3.

0 mm DIA 0.12" HI 1083 120 mm 4.7" 40 ORP ELECTRODES HI 3131P; Use: titration. Glass-body, refillable, combination platinum ORP electrode. 12 mm

0.

5" HI 3131 150 mm 5.9" "S" VERSION Consult the Hanna General Catalog for more electrodes with BNC and pin connectors. EXTENSION CABLE FOR SCREW-TYPE ELECTRODES (SCREW TO BNC ADAPTER) HI 7855/1 Extension cable 1 m (3.3') long HI 7855/3 Extension cable 3 m (9.9') long 41 OTHER ACCESSORIES HI 710005 HI 710006 HI 710012 HI 710013 HI 710014 HI 76404N Voltage adapter from 115 VAC to 12 VDC (USA plug) Voltage adapter from 230 VAC to 12 VDC (European plug) Voltage adapter from 240 VAC to 12 VDC (UK plug) Voltage adapter from 230 VAC to 12 VDC (South Africa plug) Voltage adapter from 230 VAC to 12 VDC (Australia plug) Electrode holder HI 8427 HI 931001 HI 7662 HI 92000 pH and ORP electrode simulator with 1 m (3.

3') coaxial cable ending in female BNC connectors pH and ORP electrode simulator with LCD and 1 m (3.3') coaxial cable ending in female BNC connectors Temperature probe with 1 m (3.3') cable Windows® compatible software. Windows® is registered Trademark of "Microsoft Co." 42 RECOMMENDATIONS FOR USERS Before using these products, make sure they are entirely suitable for the environment in which they are used. Operation of these instruments in residential areas could cause unacceptable interferences to radio and TV equipment, requiring the operator to follow 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 instruments' EMC performance.

To avoid electrical shock, do not use these instruments when voltages at the measurement surface exceed 24 VAC or 60 VDC. To avoid damage or burns, do not perform any measurement in microwave ovens. Hanna Instruments reserves the right to modify the design, construction and appearance of its products without advance notice. 43 Hanna Instruments Inc. Highland Industrial Park 584 Park East Drive Woonsocket RI 028985 USA Local Sales and Customer Service office Hanna Instruments United States Inc. Highland Industrial Park 584 Park East Drive Woonsocket RI 028985 USA Tel. (800) 426 6287 Fax (401) 765 7575 www.hannainst.com/usa Technical Support for customers Telephone (800) 426 6287 Fax (401) 765 7575 E-mail tech@hannainst.com Printed in Romania, EU MAN2223 04/09 44 .



[You're reading an excerpt. Click here to read official HANNA INSTRUMENTS HI 2221 user guide](http://yourpdfguides.com/dref/2718669)
<http://yourpdfguides.com/dref/2718669>