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You can read the recommendations in the user guide, the technical guide or the installation guide for HANNA INSTRUMENTS HI 2550. You'll find the answers to all your questions on the HANNA INSTRUMENTS HI 2550 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 2550
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Instruction Manual

HI 2550

Multiparameter
pH/ORP/°C
EC/TDS/NaCl
Bench Meter

HANNA instruments
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Manual abstract:

@@@@@If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com. WARRANTY HI 2550 is guaranteed for two years against defects in workmanship and materials when used for their intended purpose and maintained according to instructions. Electrodes and probes are guaranteed for six months. This warranty is limited to repair or replacement free of charge. Damage due to accidents, misuse, tampering or lack of prescribed maintenance is 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 packed for complete protection. TABLE OF CONTENTS WARRANTY ....

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56 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 with: · HI 1131B Glass-body Combination pH Electrode with 1 m (3.3') Cable · HI 76310 Conductivity / TDS probe · HI 7662 Temperature Probe · HI 76404N Electrode Holder · pH 4.01 & 7.
01 Buffer Solutions (20 mL each) · HI 7071 Electrolyte Solution · 12VDC 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 The HI 2550 is a microprocessor based pH, ORP, Conductivity (EC), TDS, NaCl, and Temperature Bench Meter. Relative mV feature is also provided. pH measurements are compensated for temperature effect manually or automatically with the HI 7662 temperature probe.
Up to a five-point pH calibration can be performed using seven standard buffers and two custom buffers. A calibration due alarm can be set to alert the user that too much time has elapsed since the last pH calibration. Conductivity and TDS features auto-ranging, which automatically selects the scale with the highest resolution. Conductivity measurements are compensated for temperature manually or automatically with a temperature sensor located inside the probe. The temperature coefficient is user selectable. Temperature compensation can be disabled to measure actual conductivity. The GLP feature provides data consistency. Data can be stored in the meters memory for later retrieval. The meters memory can hold 200 manually logged points and 500 lot logging points. An USB connection ensures communication with a PC.

3 FUNCTIONAL DESCRIPTION Front Panel Rear Panel 1) Liquid Crystal Display (LCD). 2) CAL key, to enter and exit calibration mode. RCL key (alternate function), to enter and exit memory recall. 3) CFM/GLP key, to confirm calibration selection, different setup values or to display Good Laboratory Practice information. 4) ºC key, to manually increase temperature value or other parameters. TC key (alternate function), to view temperature coefficient value. ºC key, to manually decrease temperature value or other parameters. 5) ATC key (alternate function), to select EC temperature compensation mode. 6) SETUP key, to enter/exit SETUP mode. LOCK key (alternate function), to freeze current EC range on the LCD.
7) RANGE key, to select measurement range (pH, mV, EC), switch to focused data in SETUP or toggle between buffer value and temperature during calibration. MODE key (alternate function) to select mV or Rel mV on mV range or EC, TDS, NaCl on EC range. 8) LOG/CLR key, to store a value into memory, to clear pH calibration, or to select to delete log records or lots. 9) ALT key, to select alternate function. 10) ON/OFF switch.
11) Power supply socket. 12) USB connector. 13) EC electrode connector. 14) BNC electrode connector. 15) Temperature probe socket.
16) Electrode reference socket. 4 SPECIFICATIONS 2.0 to 16.0 p H 2.00 to 16.00 p H 2.000 to 16.000 p H ±999.9 mV (ISE & ORP) ±2000 mV (ISE & ORP) 0.00 to 29.

99 S/cm 30.0 to 299.9 S/cm 300 to 2999 S/cm 3.00 to 29.99 mS/cm 30.0 to 200.0 mS/cm u p to 500.0 mS/cm u ncomp ensa ted (*) cond u ctivity 0.00 to 14.99 p p m 15.
0 to 149.9 p p m 150 to 1499 p p m 1.50 to 14.99 g /l 15.0 to 100.
0 g /l up to 400.0 g/l u ncomp ensa ted (*) TD S (with 0.80 fa ctor) 0.0 to 400.0% Na Cl 20.
0 to 120.0 ºC (p H, E C ra ng e) 0.1 p H 0.01 p H 0.001 p H 0.1 mV (±1000.0 mV) 1 mV (±2000 mV) 0.01 S/cm 0.1 S/cm 1 S/cm 0.01 mS/cm 0.

1 mS/cm 0.01 p p m 0.1 p p m 1 ppm 0.01 g /l 0.1 g /l 0.1% Na Cl 0.1 ºC ±0.01 p H ±0.002 p H ±0.2 mV (±999.
9 mV) ±1 mV (±2000 mV) ACCURACY @ 20°C / 68°F ±1 % rea d ing (±0.05 S/cm or 1 d ig it, whichever g rea ter) ±1 % of rea d i n g (±0.03 p p m or 1 d ig it, whichever g rea ter) ±1% of rea d ing ±0.4 ºC (exclu d ing p rob e error) RANGE RE SOL UTION (*) Uncompensated conductivity (or TDS) is the

conductivity (or TDS) value without temperature compensation. 5 Rel mV offset range ±2000 mV 1, 2, 3, 4 or 5 point calibration, 7 standard buffers available (1.
68, 4.01, 6.86, 7.01, 9.18, 10.
01, 12.45), pH Calibration and 2 custom buffers 1 point slope calibration; 6 buffers available: 84.0, 1413 S/cm 5.00, 12.88, 80.0, 111.8 mS/cm 1 point offset: 0.00 S/cm 1 point with HI 7037L buffer (optional) Manual or Automatic from: 20.0 to 120.0 ºC (pH RANGE) 20.

0 to 120.0 ºC (E C RANGE) (can be disabled on conductivity range to measure actual conductivity 0.00 to 6.00 %/ºC (for E C and TD S only) default value is 1.90 %/ºC 0.40 to 0.80 (default value is 0.50) HI 1131B HI 76310 HI 7662 1012 ohms 200 records 500 records Stability logging ("StAb"), 5, 10, 30 sec 1, 2, 5, 10, 15, 30, 60, 120, 180 min Optoisolated USB 12 VD C 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 ºC (32 122 ºF) max.

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95% RH non-condensing 2 years E C Calibration NaCl Calibration Temperature compensation Conductivity temperature coefficient TD S factor pH E lectrode E C Probe Temperature probe Input impedance (BNC input) L og on demand feature L og Interval feature PC communication Power supply D imensions Weight E nvironment Warranty 6 OPERATIONAL GUIDE POWER CONNECTION Plug the 12 VDC adapter into the power supply socket. Notes: · This instrument uses non volatile memory to retain the calibration parameters and all other settings, even when unplugged. · Make sure a fuse protects the main line. ELECTRODE AND PROBE CONNECTIONS For pH or ORP measurements connect an electrode with internal reference to the BNC connector on the back of the instrument. For electrodes with a separate reference connect the electrode's BNC to the BNC connector and the reference electrode plug to the reference socket.

For temperature measurements and automatic temperature compensation connect the temperature probe to the appropriate socket. For EC/TDS measurements connect the probe to the 7-pin connector. Make sure the probe sleeve is properly inserted. 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 instruments perform a self test. · The instrument will display "LoAd" message and " " blinking until initialization is complete. Notes: · The instrument starts in the same range and mode as it was at power off. · The ALT&MODE keys change the measuring modes: - mV or Rel mV - EC or TDS or NaCl · The RANGE key toggles between measurement ranges: - pH, mV or Rel mV, EC or TDS or NaCl. pH MEASUREMENTS Make sure the instrument has been calibrated before taking pH measurements. · Submerse the electrode tip and the temperature 3 cm probe approximately 3 cm (1¼") into the sample (1¼") to be tested and stir gently.

Allow time for the electrode to stabilize. 7 · The pH is displayed on the primary LCD and the temperature on the secondary LCD. pH · If the reading is out of range, the closest full-scale value will be displayed blinking on the primary LCD. pH 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, the temperature effect must be compensated for. To use the Automatic Temperature Compensation feature, connect and submerse the HI 7662 temperature probe into the sample as close as possible to the electrode and wait for a few seconds. If the temperature of the sample is known, manual temperature compensation can be used by disconnecting the temperature probe. The display will show the last temperature reading with the "ºC" tag blinking. The temperature can now be adjusted with the ARROW keys (from 20.

0 ºC to 120.0 ºC). mV/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.

· Press RANGE to enter mV range. · Submerse the tip of the ORP electrode (3 cm/1¼") into the sample to be tested and allow ascale value (400.0%) will be displayed blinking. TEMPERATURE MEASUREMENTS In pH and ORP mode, connect the HI 7662 temperature probe to the appropriate socket. Submerse the temperature probe into the sample and allow the reading on the secondary LCD to stabilize.

In EC/TDS/NaCl range, the HI 76310 probe has a built-in temperature sensor. 11 AUTO-RANGING The EC and TDS scales are auto-ranging. The meter automatically sets the scale with the highest possible resolution. By pressing ALT&LOCK, the auto-ranging feature is disabled and the current range is frozen on the LCD. The "Auto" "Off" (auto-ranging disabled) tags will be displayed on the LCD for a few seconds. To restore the auto-ranging option, press ALT&LOCK again. The "Auto" "On" (auto-ranging enabled) tags will be displayed on the LCD for a few seconds. Note: Auto-ranging is automatically restored if the range is changed, if the setup or calibration modes are entered and if the meter is turned off and back on again. 12 p H CALIBRATION Calibrate the instrument frequently, especially if high accuracy is required. The instrument should be recalibrated: · Whenever the pH electrode is replaced.

· At least once a day. · After testing aggressive chemicals. · If "CAL" "INTV" tags are blinking during measurement. Every time you calibrate the instrument use fresh buffers and perform an electrode Cleaning Procedure (see page 53). PREPARATION Pour small quantities of the buffer solutions into clean beakers. If possible, use plastic or glass beakers to minimize any EMC interferences. For accurate calibration and to minimize cross-contamination, use two beakers for each buffer solution. One for rinsing the electrode and one for calibration. If you are measuring in the acidic range, use pH 7.01 or 6.

86 as first buffer and pH 4.01 as second buffer. If you are measuring in the alkaline range, use pH 7.01 or 6.86 as first buffer and pH 10.

01 or 9.18 as second buffer. PROCEDURE Calibration can be performed at up to five-points. For accurate measurements, a three-point calibration is recommended. The calibration buffer can be selected from the calibration buffer list that includes the custom buffers and the memorized standard buffers: · pH 1.

68, 4.01, 6.86, 7.01, 9.18, 10.01 and 12.45 The custom buffers allow the user to calibrate in a buffer solution different from a standard one. Up to two custom buffers can be set in SETUP menu (see page 36). Each custom buffer value can be changed in a ±1.0 pH window around the set value, during calibration, when it is selected; the "BUFFER pH" tag will blink.

The instruments will automatically skip the buffer used during calibration and the buffers which are in a ±0.2 pH window, around one of the calibrated buffers. All new calibrations will override existing stored calibration data in a ±0.2 pH window. The slopes adjacent to the new points will be reevaluated. 13 FIVEFIVE - POINT CALIBRATION · Submerse the pH electrode and the temperature probe approximately 3 cm (1¼") into a buffer solution and stir gently. The temperature probe should be close to the pH electrode. · Press CAL. The "CAL" and " " tags will appear and the "7.01" buffer will be displayed on the secondary LCD.

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BUF 3 cm (1¼") · 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 "READY" tag will be displayed and the "CFM" tag will blink. · Press CFM to confirm calibration. · The calibrated value is then displayed on the primary LCD and the second expected buffer value on the secondary LCD.

· After the first calibration point is confirmed, submerse the pH electrode and the temperature probe approximately 3 cm (1¼") into the second 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 "READY" tag will be displayed and the "CFM" tag will blink.

· Press CFM to confirm calibration. · The calibrated value is then displayed on the primary LCD and the third expected buffer value on the secondary LCD. · After the second calibration point is confirmed, submerse the pH electrode and the temperature probe approximately 3 cm (1¼") into the third buffer solution and stir gently. The temperature probe should be close to the pH electrode. 14 · 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 "READY" tag will be displayed and the "CFM" tag will blink. · Press CFM to confirm calibration. · The calibrated value is then displayed on the primary LCD and the fourth expected buffer value on the secondary LCD. · After the third calibration point is confirmed, submerse the pH electrode and the temperature probe approximately 3 cm (1¼") into the fourth 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 "READY" tag will be displayed and the "CFM" tag will blink. · Press CFM to confirm calibration. · The calibrated value is then displayed on the primary LCD and the fifth expected buffer value on the secondary LCD. · After the fourth calibration point is confirmed, submerse the pH electrode and the temperature probe approximately 3 cm (1¼") into the fifth 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 "READY" tag will be displayed and the "CFM" tag will blink. · Press CFM to confirm the fifth calibration point. · 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 instruments will memorize the calibration data and return to measurement mode. 15 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 instruments will memorize the one-point calibration data and return to measurement mode. Notes: · If the value measured by the instrument is not close to the selected buffer, "WRONG" " " and "WRONG" " " tags will blink alternately. Check if the correct buffer has been used, or clean the electrode by following the Cleaning Procedure (see page 53). If necessary, change the buffer or the electrode. · When a custom buffer is displayed, the "BUFFER pH" tag blinks. To change the custom buffer value in accordance with the buffer temperature proceed as described in "WORKING WITH CUSTOM BUFFERS" (see page 17). · If the buffer temperature or the manual temperature exceeds the temperature limits of the buffer, "WRONG" tag and temperature reading will blink.

· If "WRONG", "BUFFER pH" tags and "OLD" message are displayed blinking on the secondary LCD line, an inconsistency between new and previous (old) calibration is detected. Clear calibration parameters and proceed with calibration from the current calibration point. The instrument will keep all confirmed values during current calibration. · 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. 16 · Each time a buffer is confirmed, the new calibration data replaces the old calibration data for the corresponding buffer. If current buffer has no previous data stored and the calibration is not full (five buffers), the current buffer is added to the existing calibration. If the existing calibration is full, the instrument asks which buffer to replace.

Press the ARROW keys to select another buffer to be replaced. Press CFM to confirm the buffer that will be replaced. Press CAL to leave calibration without replacing. Note: If the replaced buffer is outside the ±0.2 pH window, around each of the calibrated buffers, it is possible to select this buffer for next calibration during current calibration.

WORKING WITH CUSTOM BUFFERS If a custom buffer was set in SETUP menu, it can be selected during calibration by pressing the ARROW keys. The "BUFFER pH" tag will blink. Press SETUP if you want to adjust the buffer value. The buffer value will start blinking. Use the ARROW keys to change the buffer value.

After 5 seconds, the buffer value is updated. Press SETUP if you want to change it again. Note: Custom buffer value can be adjusted in a ±1.

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00 pH window, around the set value. 17 p H 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 ºC 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 ºF 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.
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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 9.76 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 ºC. 18 RELATIVE m V CALIBRATION · Press CAL when the instrument is in RELATIVE mV measurement mode. The "mV" and " " tags will be displayed. Absolute mV is displayed on the primary LCD and "AbS" message is displayed on the secondary LCD. · When the absolute reading is stable and in measurement range, the instrument asks for confirmation. · If the reading is out of range, "WRONG" tag will be displayed.

· Press CFM to confirm the absolute value. The instrument will display 0.0 mV on the primary LCD and "rEL" message on the secondary LCD. In this moment the relative mV offset is equal to absolute mV reading. · Use the ARROW keys if you want to change the displayed relative mV value. · Press CFM to confirm the relative mV value. The instrument returns to measurement mode. Note: The relative mV value can be changed only inside the relative mV offset window (± 2000 mV). EC/TDS CALIBRATION Selectable calibration points for conductivity are 0.00 S for offset and 84.
0 S, 1413 S, 5.00 mS, 12.88 mS, 80.0 mS, 111.8 mS for slope.
Rinse the probe with calibration solution or deionized water. Submerse the probe into the solution. The sleeve holes must be completely submersed. Tap the probe repeatedly to remove any air bubbles that may be trapped inside the sleeve. To enter EC calibration, select the EC range and press CAL.
The "BUF" and "CAL" tags are displayed. The primary LCD will display the EC reading. The secondary LCD will display the value. The " " and "~" tags will blink. Note: The TDS reading is automatically derived from the EC reading and no specific calibration for TDS is needed. Pressing CAL when TDS range is selected has no effect. For zero calibration, just leave the dry probe in the air. This calibration is performed in order to correct the reading at 0.00 S. The slope is evaluated when the calibration is performed at any other point.

19 CAL BUF S Select the desired value with the ARROW keys, if necessary. When the reading is stable, "READY" tag is displayed and "CFM" tag starts blinking on the LCD, asking for confirmation. CAL CFM READY BUF S Press CFM to confirm calibration. The instrument stores the calibration value and returns to measurement mode. Notes: · If the reading is too far from the expected value, the "WRONG" and " " tags will blink. Calibration can not be confirmed. In this case check if the calibration solution has been used or clean the probe by following the Cleaning Procedure (see page 53). · If the meter is in ATC mode and the buffer temperature is out of the 0.0 °C to 60.0 ºC interval, "WRONG" "ºC" tags and the temperature will blink.
CAL WRONG · For best results choose an EC buffer value close to the sample · to be measured. In order to minimize any EMC interference, use plastic or glass beakers. following the calibration procedure. To set the cell constant, enter SETUP mode and select "CEL" (see SETUP for details, page 36). · It is possible to set the cell constant value directly, without 20 CONDUCTIVITY VERSUS TEMPERATURE CHART The conductivity of an aqueous solution is a measure of its ability to carry an electrical current by means of ionic motion.
The conductivity invariably increases with increasing temperature. It is affected by the type and number of ions in the solutions and by the viscosity of the solution itself. Both parameters are temperature dependent. The dependency of conductivity on temperature is expressed as a relative change per Celsius degrees at a particular temperature, commonly as %/ºC. The following table lists the temperature dependence of HANNA EC calibration buffers.
ºC 0 5 10 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 ºF 32 41 50 59 60.8 62.6 64.4 66.2 68 69.8 71.6 73.4 75.2 77 78.8 80.

6 82.4 84.2 86 87.8 HI7030 HI8030 (S/cm) 7150 8220 9330 10480 10720 10950 11190 11430 11670 11910 12150 12390 12640 12880 13130 13370 13620 13870 14120 14370 HI7031 HI8031 (S/cm) 776 896 1020 1147 1173 1199 1225 1251 1278 1305 1332 1359 1386 1413 1440 1467 1494 1521 1548 1575 HI7033 HI8033 (S/cm) 64 65 67 68 70 71 73 74 76 78 79 81 82 84 86 87 89 90 92 94 HI7034 HI8034 (S/cm) 48300 53500 59600 65400 67200 68500 69800 71300 72400 74000 75200 76500 78300 80000 81300 83000 84900 86300 88200 90000 HI7035 HI8035 (S/cm) 65400 74100 83200 92500 94400 96300 98200 100200 102100 104000 105900 107900 109800 111800 113800 115700 117700 119700 121800 123900 HI7039 HI8039 (S/cm) 2760 3180 3615 4063 4155 4245 4337 4429 4523 4617 4711 4805 4902 5000 5096 5190 5286 5383 5479 5575 21 NaCl CALIBRATION NaCl calibration is a one-point calibration at 100.0% NaCl. Use the HI 7037L calibration solution (sea water solution) as a 100% NaCl calibration solution. Rinse the probe with some of the calibration solution or deionized water. Submerse the probe into HI 7037L solution. The sleeve holes must be completely submersed. Tap the probe repeatedly

to remove any air bubbles that may be trapped inside the sleeve.
To enter NaCl calibration select the NaCl range and press CAL. The "BUF" and "CAL" tags are displayed. The primary LCD will display the NaCl reading in percentage. The secondary LCD will display "100". CAL NaCl % BUF The " " and "~" tags will blink.
When the reading is stable, the "READY" tag will be displayed and the "CFM" tag starts blinking on the LCD, asking for confirmation. CAL NaCl CFM READY % BUF Press CFM to confirm calibration. The instrument stores the calibration value and returns to measurement mode.

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Notes: · If the reading is too far from the expected value, "WRONG" " " tags will blink. Calibration cannot be confirmed.
· If the temperature of the buffer is out of the 0.0 ºC to 60.0 ºC temperature interval, the "WRONG" and "ºC" tags and the temperature will blink. · If a new EC calibration is performed, the NaCl calibration is automatically cleared. A new NaCl calibration is required. 22 GOOD LABORATORY PRACTICE (GLP) GLP is a set of functions that allows storage and retrieval of data regarding the maintenance and status of the electrode. All data regarding pH, Rel mV, EC and NaCl calibration is stored for the user to review when necessary. EXPIRED CALIBRATION For pH calibration, this instrument allows the user to set the number of days before the next required pH calibration. This value can be set from 1 to 7 days. The default setting is OFF (disabled).

When calibration has expired the "CAL" and "INTV" 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. @@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@To select logging type enter SETUP menu. @@@@@@@@@@To start interval logging press LOG key while the instrument is in measurement mode. When the selected interval is reached or when the reading is stable (for log on stability), the instrument will display the current lot number on the primary LCD line, the record number on the secondary LCD line and the LOG tag (see example below: Lot 5 record 7) followed by the number of free records on the corresponding memory space. If stability logging is selected, a complete set of data is memorized every time the reading becomes stable after an unstable condition. To stop interval logging press LOG key again. The "LOG" tag will be cleared.
Note: When pressing any key that is not active, while lot logging is running, the following message is displayed for a few seconds. 29 VIEW LOGGED DATA Press the ALT&RCL keys while in measurement mode to retrieve the stored information. If no data was logged for the current selected measurement range and no lots are memorized, one of the next messages will be displayed: LOG No pH measurements records: LOG No Relative mV and mV records: LOG mV No EC records: LOG No TDS records: LOG No NaCl records: LOG Otherwise, the instrument will display the lot number on the primary LCD line, the number of records on the secondary, "LOG" tag and "CFM" blinking. If samples were logged on demand "MAn" will be displayed on the primary LCD and the number of samples logged on the secondary (see example below: manual log, 15 samples logged). Press ARROW keys to select different lot.
30 Press CFM to view record information. · If RCL was entered while in pH measurement range: LOG pH In Rel mV range: In EC measurement range: In TDS measurement range: In NaCl measurement range: Use the ARROW keys to scroll through the records. 31 Note: The instrument will automatically skip log records from other measurement ranges. To view additional information press RANGE: For pH · The mV value on the primary LCD and the temperature value on the secondary LCD. · The time on the primary LCD, along with "TIME" tag and the record number on the secondary LCD.
LOG TIME · The date on the primary LCD, along with "DATE" tag. · The calibration offset on the primary LCD and "OFS" message on the secondary LCD. LOG mV · The calibration slope on the primary LCD and "SLP" message on the secondary LCD. LOG % · The interval for lot logging. To delete manual logged records: press CFM while "MAn" is displayed to view manually logged records. Press the CLR key, "dEL" and the record number will be displayed. Press CFM to delete. Use the ARROW keys to change the record number. To delete a lot, use the ARROW keys to select the desired lot. Press CLR key, "dEL LOt" will appear on the display.

Press CFM key to delete. 32 The "dEL" message is displayed on the primary LCD and the selected record on the secondary LCD, along with "LOG" tag. · The ARROW keys can be used to change the record or lot number. · Press SETUP to delete all records/lots. The display will show "dEL" in the primary LCD and "ALL" in the secondary LCD. · Press CFM to confirm delete. While deleting the " " tag will blink. · Press CAL or RANGE or CLR to escape and return to the RCL screen. · If "del ALL" option was selected, all the log on demand records or lots are deleted. While deleting the " " tag is displayed blinking.
· Press ALT&RCL exit record information and enter lot information. · Press ALT&RCL again to return to measurement mode. · If one or more records/lots were deleted the " " tag blinks until the log memory space is reorganized. Note: If at least one record was deleted the log memory space will be recognized in about 4-5 seconds. During this period the " " will blink.
For Relative mV and mV Range · The temperature value, the mV absolute value, the time and the date as described above. · The Relative mV offset. LOG mV For EC Range · The time and date as described on pH Range. · The EC on primary LCD and temperature value on the secondary LCD. · The offset factor on the primary LCD and "OFS" message on the secondary LCD.
33 · The cell constant on the primary LCD and "CEL" message on the secondary LCD line. · The reference temperature on the primary LCD and "rEF" message on the secondary LCD. · The temperature coefficient on the primary LCD and "tc" message on the secondary LCD. · The temperature compensation mode. For TDS Range · The temperature reading as described in pH range. · The conductivity value on the primary LCD and the temperature value on the secondary LCD. · The time and the date as described in pH Range. · The TDS factor on the primary LCD and "cF" message on the secondary LCD. · The reference temperature, the temperature coefficient, the temperature compensation mode and the cell constant as described in EC Range. 34 For NaCl Range · The conductivity and temperature reading value as described in TDS Range.

· The time and date as described in pH Range. · The salinity factor on the primary LCD and "cF" message on the secondary LCD, with "LOG" and "NaCl" tags displayed. · The reference temperature, the temperature compensation mode and the cell constant message as described above.

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LOG NaCl Note: After LOG is pressed or "dEL" is confirmed, the instrument will display the amount of free log space for about one second (example 25 records free). Press the ALT&RCL keys to leave RECALL mode at any time. Note: When an information that does not display the record number is selected, pressing the SETUP key will display the record number on the secondary LCD line. 35 SETUP Setup mode allows viewing and modifying the following instrument parameters. In according with the selected range, SETUP menu allows the possibility to view and /or change specific range parameters and common parameters (for all the ranges). The common parameters are: · Log interval · Current Time (hour & minute) · Current Date (year, month & day) · Beep Status · Instrument Id · Temperature Unit The specific parameters are: In pH range · Expired Calibration Alarm · First Custom Buffer · Second Custom Buffer · One-point Calibration Behavior · pH Resolution In EC/TDS/NaCl range · Cell Constant · TDS Factor · Temperature Compensation Coefficient · Reference Temperature To enter SETUP mode press SETUP while the instrument is in measurement mode. Select a parameter with the ARROW keys. Press CAL to change a parameter value. The selected parameter will start blinking. Press RANGE to toggle between displayed parameters. Press the ARROW keys to increase or decrease the displayed value. Press CFM to save the modified value or CAL to escape without saving.

36 EXPIRED CALIBRATION ALARM Press CAL when the calibration time-out is displayed. Calibration time-out ("OFF" or "1" to "7" days) will start blinking. Press the ARROW keys to change the calibration time-out value. Press CFM to save the modified calibration time-out value. Press CAL to escape without saving.

LOG INTERVAL Press CAL when log interval is displayed. The log interval is selected blinking ("MAn" for log on demand, "StAb" log on stability, interval in seconds or minutes). Press the ARROW keys to change the custom buffer value. Press CFM to confirm the selection. Press CAL to escape without saving. FIRST CUSTOM BUFFER Press CAL when "cb1" is displayed. The custom buffer (disabled "no" or "0" to "16" pH) will start blinking. Press the ARROW keys to change the custom buffer value. Press CFM to save the modified custom buffer value. Press CAL to escape without saving.

SECOND CUSTOM BUFFER Press CAL when "cb2" is displayed. The custom buffer (disabled "no" or "0" to "16" pH) will start blinking. Press the ARROW keys to change the custom buffer value. Press CFM to save the modified custom buffer value. Press CAL to escape without saving. 37 Note: To remove a custom buffer from the calibration list enter custom buffer press CAL key then press CLR key. The "no" "cb1" or "cb2" message will be displayed and the instrument return for the SETUP parameter scroll mode. 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 PROCEDURE for details, page 13). Press the ARROW keys to toggle between "Pnt" and "OFFS" options.

Press CFM to save the behavior for one-point calibration. Press CAL to escape without saving. pH RESOLUTION Press CAL when "rES" message is displayed on the secondary LCD. The set resolution ("0.1", "0.

01" or "0.001") will start blinking. Press the ARROW keys to toggle between 0.1, 0.01 and 0.

001 options. Press CFM to save the modified value. Press CAL to escape without saving. CURRENT TIME Press CAL when the current time is displayed. The hour will start blinking. Press the ARROW keys to change the hour. Press RANGE. The minutes will start blinking. Press the ARROW keys to change the minutes. Press CFM to save the modified value.

Press CAL to escape without saving. 38 CURRENT DATE Press CAL when the current date is displayed. The year will start blinking. Press the ARROW keys to change the year. Press RANGE. The month will start blinking. Press the ARROW keys to change the month. Press RANGE. The day will start blinking. Press the ARROW keys to change the day.

Press CFM to save the modified value. Press CAL 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. 39 I NSTRUMENT ID Press CAL when "InId" is displayed.

The instrument ID ("0000" to "9999") will start blinking. Press the ARROW keys to change the instrument ID value. Press CFM to save the modified instrument ID value. Press CAL to escape without saving. 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 "tnP" 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.

CELL CONSTANT Press CAL when the cell constant is displayed. The cell constant will start blinking. Press the ARROW keys to change the cell constant (0.500 to 1.700). Press CFM to save the modified cell constant. Press CAL to escape without saving. 40 TDS FACTOR Press CAL when "tdS" is displayed. The TDS factor will start blinking. Press the ARROW keys to change the TDS factor (0.

40 to 0.80). Press CFM to save the modified TDS factor. Press CAL to escape without saving. TEMPERATURE COMPENSATION COEFFICIENT Press CAL when the temperature compensation coefficient is displayed.

The temperature compensation coefficient will start blinking. Press the ARROW keys to change the temperature compensation coefficient. (0.00 to 6.00 %/ºC). Press CFM to save the modified temperature compensation coefficient. Press CAL to escape without saving. REFERENCE TEMPERATURE Press CAL when the reference temperature is displayed. The reference temperature will start blinking. Press the ARROW keys to toggle between 20.0 ºC and 25.0 ºC reference temperature value. Press CFM to save the modified reference temperature value. Press CAL to escape without saving. 41 TEMPERATURE CALIBRATION (for technical personnel only) y) The instrument has two temperature channels: one that measures the temperature from the HI 7662 probe while the instrument is in pH/mV range and the other that measures temperature from the EC probe while the instrument is in EC/TDS/NaCl range.

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All the instruments are factory calibrated for temperature on both channels. 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 ºC). Place insulation material around the vessels to minimize temperature changes. · Use a calibrated thermometer with a resolution of 0.1 ºC as a reference thermometer. Connect the HI 7662 probe to the appropriate socket for the pH temperature channel or the HI 76310 probe for the EC temperature channel. · With the instrument off, press and hold down the CFM & SETUP keys, then power on the instrument to calibrate the pH temperature channel or &RANGE keys and then power on the instrument to calibrate the EC temperature channel.

The "CAL" tag will appear and the secondary LCD will show "0.0 ºC". CAL · Submerse the temperature probe (or EC probe) in the vessel with ice and water as near as possible to the calibrated 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 calibrated 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 ºC". CAL 42 · Submerse the temperature probe (or EC probe) in the second vessel as near as possible to the calibrated 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. · 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 memorize calibration and restart in measurement mode. Note: If the reading is not close to the selected calibration point, "WRONG" tag will blink. Change the temperature probe (or EC probe) and restart calibration. 43 m V CALIBRATION y) (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 & 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 memorize calibration and restart to measurement mode. Notes: · 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. · Pressing CAL key during calibration process the instrument quit calibration mode and restart to measurement mode without memorizing calibration. 44 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. 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 the scheme is: <command prefix> <command> <CR> where: <command prefix> is a selectable ASCII character between 0 and 47. <command> is the command code (3 characters). Note: Either small or capital letters can be used. SIMPLE COMMANDS RNG CAL CFM UPC DWC SET LOG MOD GLP CLR RCL 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 SETUP Is equivalent to pressing LOG Is equivalent to pressing MODE Is equivalent to pressing GLP Is equivalent to pressing CLR Is equivalent to pressing RCL 45 Change the instrument range according with the parameter value (xx): · xx=00 pH range/0.001 resolution · xx=01 pH range/0.01 resolution · xx=02 pH range/0.1 resolution · xx=03 mV range · xx=04 Relative mV range · xx=06 EC range · xx=07 TDS range · xx=08 NaCl range The instrument sends the "ACK" (6) character every time a command is recognized and a "NAK" (21) character for invalid commands. CHRxx COMMANDS REQUIRING AN ANSWER RAS Causes the instrument to send a complete set of readings in according with the current range: · pH, mV and temperature reading on pH range. · mV and temperature reading on mV range. · Rel mV, absolute mV and temperature reading on Rel mV range.

· Conductivity and temperature reading on EC range. · TDS and temperature reading on TDS range. · NaCl and temperature reading on NaCl range. The answer string contains: · Meter mode (2 chars): · 00 - pH range (0.001 resolution) · 01 - pH range (0.

01 resolution) · 02 - pH range (0.1 resolution) · 03 - mV range · 04 - Rel mV range · 06 - EC range · 07 - TDS range · 08 - NaCl 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 46 MDR GLP · Reading status (2 chars): R - in range, O - over range, U - under range.

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First character corresponds to the appropriate range reading. Second character corresponds to mV reading (if exist).
· Primary reading (corresponding to the selected range) - 7 ASCII chars, including sign and decimal point. · Secondary reading (only when primary reading is not mV, EC, NaCl, TDS) - 7 ASCII chars, including sign and decimal point. · Temperature reading - 8 ASCII chars, with sign and two decimal points, always in ºC. Requests the instrument model name and firmware code. Requests the calibration data record. The answer string contains: · GLP status (1 char): represents a 4 bit hexadecimal encoding. · 0x01 - pH calibration available · 0x02 - Rel mV calibration available · 0x04 - EC calibration available · 0x08 - NaCl 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, 1 - custom · status (1 char): N (new) - calibrated in last calibration; O (old) - from an old calibration. · warnings during calibration (2 chars): 00 - no warning, 04 - Clean Electrode warning. · buffer value, with sign and decimal point (7 chars). · the calibration time, yymmddhhmmss (12 chars).

· Rel mV calibration data (if available), which contains: · the calibration offset, with sign (7 chars) · the calibration time, yymmddhhmmss (12 chars). 47 · EC calibration data (if available), which contains: · the number of calibrated standards (1 char) · the offset factor, with sign and decimal point (7 chars) · the cell constant, with sign and decimal point (7 chars) · the calibration time, yymmddhhmmss (12 chars) · standards information (for each standard) · standard value, with sign and decimal point (7 chars). · buffer unit (2 chars; 00-S; 01-mS) · Reference Temperature with and decimal point (4 chars) · Temperature Compensation mode (2 chars) · 00 - no temperature compensation · 01 - automatic temperature compensation · 00 - manual temperature compensation · TC coeficient with sign and decimal point (4 chars) · calibration time, yymmddhhmmss (12 chars). · Na Cl Calibration data · the number of calibrated data (1 char) · salinity coeficient, with sign and decimal point (7 chars) · Cell constant, with sign and decimal point (2 chars) · the calibration time (2 chars) · buffer information, for each buffer: · Reference Temperature with and decimal point (4 chars) · Temperature Compensation mode (2 chars) · 00 - no temperature compensation · 01 - automatic temperature compensation · 00 - manual temperature compensation · TC coeficient with sign and decimal point (4 chars) · calibration time, yymmddhhmmss (12 chars). PAR Requests the setup parameters setting. The answer string contains: · Instrument ID (4 chars) 48 · Calibration alarm time out for pH range (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) · The number of custom buffers (1 char) · The custom buffer values, with sign and decimal point, for each defined custom buffer (7 chars) · Log type 2 chars 01 - manual log 02 - stability lot log 03 to 14 - the coresponding interval for lot log (5 s to 180 min) · cell constant, with sign and decimal point (6 chars) · TDS factor, with sign and decimal point (5 chars) · TC coef, with sign and decimal point (5 chars) · Reference Temperature, with sign and decimal point (5 chars) · Temperature Compensation mode (1 char) NSLx Requests the number of logged samples. x = P - request for pH range M - request for mV range E - request for EC range N - request for NaCl range T - request for TDS range LODxnnn: request the"nnn" record of the manual log on the "x" range LODxALLff: groups all Log On Demand Records in frames of 8 records each for the selected range Command Parameters: x - range (see Note) ALL - download all records for the selected range f - requested frame number - first frame is labeled 01 LLsxff: requests information about all lots on the specified range, it sends the information in frames of 10 lots each (a frame contains information about 10 lots) Command Parameters: x - range (see Note) f - requested frame number - first frame is labeled 01 49 GLDxxxff: Requests the records of the "xxx" lot number. The records are sent in frames of 10 records; "ff" is the frame number (01 first frame). (Example: Lot 13 has 53 records. The records will be sent in 6 frame, 5 with10 records and 1 with 3 records.) Command Parameters: xxx - Lot number (eq: for lot number 1 xxx = 001) ff - requested frame number - first frame is labeled 01 Errors:· · · · · · "Err3" log on demand empty. "Err4" requested set parameter is not available. "Err5" command argument is wrong. "Err6" requested range not available.
"Err7" meter in log mode. "Err8" is sent if instrument is not in measurement mode. "NAK" (21) character is sent when the instrument receives an unknown or a corrupted command. request for pH range. request for mV range.
request for EC range. request for TDS range. request for NaCl range. Note: P M E T N 50 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.

51 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. 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 pH electrode tip with distilled water.

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Submerse 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. Take care that the sleeve holes of the EC probe are completely submersed. Tap the probe repeatedly to remove air bubbles that may be trapped inside the sleeve.

STORAGE PROCEDURE To minimize clogging and assure a quick response time, the glass bulb and the junction of pH electrode 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 on page 53 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. pH Electrode Maintenance 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. 52 pH ELECTRODE CLEANING PROCEDURE 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. EC Probe Maintenance Rinse the probe with clean water after measurements. If a more thorough cleaning is required, remove the probe sleeve and clean the probe with a cloth or a nonabrasive detergent. Make sure to reinsert the sleeve onto the probe properly and in the right direction.

After cleaning the probe, recalibrate the instrument. · General The platinum rings support is made of glass. Take great care while handling the probe. 53 TROUBLESHOOTING GUIDE SYMP TOMS P ROBL E M SOL UTION S oa k th e el ectrod e ti p i n HI 7061 or HI 8061 for 30 minutes and then clean the electrode. Slow response/excessive drift D irty pH electrode. measuring pH. Readings fluctuate up and Clogged/dirty junction. Clean the electrode. down (noise). L o w e l e c t r o l y t e l e v e l Refill with fresh solution (for (r e f i l l a b l e p H e l e c t r o d e s refillable pH electrodes only).

I n s e r t t h e s l e e v e . Ta p t h e only). E C probe sleeve not properly probe to remove air bubbles. inserted; air bubbles inside sleeve. The meter does not accept O u t of ord er p H el ectrod e.

Follow the cleaning procedure. the calibration solution for D i r t y e l e c t r o d e o r If still no results replace the c on t a m i n a t e d c a l i b r a t i on electrode. calibration. solution. If the display shows: "pH" Out of range in the pH scale.

a) Recalibrate the meter. a n d "-2 . 0 0 " or "1 6 . 0 0 " b) Make sure the pH sample blinking. is in the specified range. c) Check the electrolyte level and the general state of the electrode. If the display shows: "mV" Out of range in the mV scale. E lectrode not connected. Verify a n d "-2 0 0 0 " or "2 0 0 0 " that the electrode is connect. blinking.

The display shows E C, TD S Out of range in E C, TD S or Reca lib ra te th e m eter. Ma ke or NaCl reading blinking. NaCl scale. sure the solution is in specified range. Make sure the LOCK key was not pressed. T h e m eter d oes n ot work Broken temperature probe or R e p l a c e t h e t e m p e r a t u r e with the temperature probe. w r on g t e m p e r a t u r e p r ob e probe. used. The meter fails to calibrate Broken electrode. or gives faulty readings.

The meter fails to calibrate Incorrect E C calibration. NaCl. A t s t a r t u p t h e m e t e r One of the keys is blocked. d i sp l a ys a l l L CD ta g s permanently. " E r r x x " e r r o r m e s s a g e Internal error.

displayed. Replace the electrode. Reca l i b ra te th e m eter i n E C range. Set cell constant to 1. Check the keyboard or contact the vendor.

Power off the meter and then p ower i t on . If th e error persists, contact the vendor. 54 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. In addition, the response time will suffer to a greater degree at temperatures below 25 ºC. TEMPERATURE CORRELATION FOR p H SENSITIVE GLASS Since the resistance of the pH electrode is in the range of 50 200 Mohm, 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 to a stable pH reading. The pH electrode's life 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 90 ºC Less than 4 months 120 ºC 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 ºC Concentration pH Error 13.00 0.10 0.1 Mol L-1 Na+ 13.50 0.

14 14.00 0.20 12.50 0.10 13.

00 0.18 1.0 Mol L-1 Na+ 13.50 0.29 14.

00 0.40 55 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.

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