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You can read the recommendations in the user guide, the technical guide or the installation guide for HANNA INSTRUMENTS HI 83200. You'll find the answers to all your questions on the HANNA INSTRUMENTS HI 83200 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 83200

User guide HANNA INSTRUMENTS HI 83200

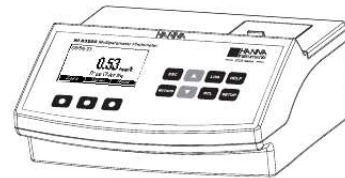
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Instruction Manual

HI 83200
Multiparameter Bench
Photometer
for Laboratories



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Manual abstract:

PRELIMINARY EXAMINATION Please examine this product carefully. Make sure that the instrument is not damaged. If any damage occurred during shipment, please notify your Dealer. Each Meter is supplied complete with: · Four Sample Cuvettes and Caps · Sample Preparation Kit (see page 17) · Cloth for wiping cuvettes (4 pcs) · Scissors · AC/DC Power Adapter · Instruction Manual Note: Save all packing material until you are sure that the instrument works correctly. Any defective item must be returned in its original packing with the supplied accessories. TABLE OF CONTENTS PRELIMINARY

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The functions are screen related. ESC Press to exit the current screen. Press to access the select method menu. Press to move up in a menu or a help screen, to increment a set value, to access second level functions. Press to move down in a menu or a help screen, to decrement a set value, to access second level functions.

Press to log the current reading. RCL Press to recall the log. Press to display the help screen. Press to access the setup screen. HELP SETUP NEED TO KNOW HI 83200 has a powerful interactive user support that assists the user during the analysis process.

Each step in the measurement process is help supported. A tutorial mode is available in the Setup Menu. 1) 2) 3) 4) 5) 6) Cuvette Lid Liquid Crystal Display (LCD). Splash proof keypad. ON/OFF power switch Power input connector USB connector 6 7 TIPS FOR AN ACCURATE MEASUREMENT The instructions listed below should be carefully followed during testing to ensure most accurate results.

· Color or suspended matter in large amounts may cause interference, they should be removed by treatment with active carbon and filtration. · Ensure the cuvette is filled correctly: the liquid in the cuvette forms a convexity on the top; the bottom of this convexity must 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 REAGENT BLANK CORRECTION · Some methods require a "reagent blank correction". The blank and the sample are prepared exactly in the same way, only the blank is deionized water instead of sample. A blank cuvette may be used more than once: stability and storing conditions are described for each method in the related chapter. INTERFERENCES · In the method measurement section the most common interferences that may be present in an average wastewater matrix have been reported. It may be that for a particular treatment process other compounds do interfere with the method of analysis. 10 Method description Magnesium Manganese HR Manganese LR Molybdenum Nickel HR Nickel LR Nitrate Nitrite HR Nitrite LR Dissolved Oxygen Ozone pH Phosphate HR Phosphate LR Phosphorus Potassium HR Potassium MR Potassium LR Silica Silver Sulfate Zinc Page 74 76 78 81 84 86 89 91 93 95 97 100 102 104 106 108 111 113 115 118 121 123 OPERATIONAL GUIDE POWER CONNECTION AND BATTERY MANAGEMENT The meter can be powered from an AC/DC adapter (included) or from the built-in rechargeable battery. Note: Always turn the meter off before unplugging it to ensure no data is lost. When the meter switches ON, it verifies if the power supply adapter is connected. The battery icon on the LCD will indicate the battery status: - battery is charging from external adapter - battery fully charged (meter connected to AC/DC adapter) · After the desired method was selected, follow the measurement described in the related section.

· Before performing a test you should read all the instructions carefully. DATA MANAGEMENT The instrument features a data log function to help you keep track of all your analysis. The data log can hold 200 individual measurements. Storing, viewing and deleting the data is possible using LOG and RCL keys. · Storing data: You can store only a valid measurement. Press LOG and the last valid measurement will be stored in a stack as a record with date and time stamps. - battery capacity (no external adapter) - battery Low (no external adapter) Viewing and deleting: You can view and delete the data log by pressing the RCL key. Deleting is based on the LIFO (last in, first out) scheme. Additionally, you can delete the data records all at once.

- battery Dead (no external adapter) CHEMICAL FORM Chemical form conversion factors are pre-programmed into the instrument and are method specific. In order to view the displayed result in the desired chemical form press the or to access to the second level of functions and then press the Chem Frm functional key to toggle between the existing chemical forms for the selected method. METHOD SELECTION · Turn ON the instrument via the ON/OFF power switch. · The meter will perform an autodiagnostic test. During this test, the Hanna Instrument logo will appear on the LCD.

After 5 seconds, if the test was successful, the last selected method will appear on the display. · In order to select the desired method press METHOD and a screen with the available methods will appear. · Press keys to highlight the desired method. Press Select. SPECIAL CONVERSIONS For Magnesium and Calcium Hardness, special conversion factors can be used to convert the readings from mg/L to French degrees (°f), German degrees (°dH) and English degrees (°E) of hardness.

This can be achieved by pressing the or to access the second level of functions and then press the Unit functional key to toggle between °f, °dH, °E and mg/L. 12 13 SETUP In the Setup mode the instrument's parameters can be changed. Some parameters affect the measuring sequence and others are general parameters that change the behavior or appearance of the instrument. Press SETUP to enter the setup mode. Press ESC or SETUP to return to the main screen. A list of setup parameters will be displayed with currently configured settings. Press HELP for additional information. Press the keys to select the parameter and select a new value as follows: Date / Time This option is used to set the instrument's date and time. Press Modify functional key to change the date/time. Press the functional keys to highlight the value to be modified (year, month, day, hour, minute or second).

Use the keys to change the value. Press Accept functional key to confirm or ESC to return to the setup without saving the new date or time. Time format Option: AM/PM or 24 hour. Press the functional key to select the desired time format. Backlight Values: 0 to 8. Press Modify functional key to access the backlight value. Use the functional keys or the keys to increase/ decrease the value. Press Accept functional key to confirm or ESC to return to the setup menu without saving the new value. Date format Press Modify functional key to change the Date Format. Use the keys to select the desired format.

Press Accept functional key to confirm or ESC to return to the setup menu without saving the new format. Contrast Values: 0 to 20. This option is used to set the display's contrast. Press Modify functional key to change the display's contrast. Use the functional keys or the keys to increase/ decrease the value.

Press Accept functional key to confirm the value or ESC to return to the setup menu without saving the new value. Language Press the corresponding functional key to change the option. If the new selected language cannot be loaded, the previously selected language will be reloaded. Tutorial Option: Enable or Disable. If enabled this option will provide the user short guides, related to the current screen.

Press the functional key to enable/disable the tutorial mode.



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Beeper Option: Enable or Disable. When enabled, a short beep is heard every time a key is pressed. A long beep alert sounds when the pressed key is not active or an error is detected. Press the functional key to enable/disable the beeper. 14 15 Instrument ID Option: 0 to 9999. This option is used to set the instrument's ID (identification number). The instrument ID is used while exchanging data with a PC. Press Modify functional key to access the instrument ID screen. Press the keys in order to set the desired value.

Press Accept functional key to confirm the value or ESC to return to the setup menu without saving the new value. SAMPLE PREPARATION LIST OF MATERIAL HI 83200 is supplied with the following accessories for sample preparation: · 4 cuvettes (10 mL) · 2 plastic beakers (100 and 170 mL) · 1 graduated cylinder (100 mL) · 1 syringe with screw rim (60 mL) · 1 syringe (5 mL) · 1 filter assembly · 25 filter discs · 1 spoon · 2 pipettes · Carbon powder packets (50 pcs) · 1 Demineralizer Bottle with filter cap for about 12 liters of deionized water (depending on the hardness level of water to be treated) Meter information Press "Select" functional key to view the Instrument model, firmware version, language version and instrument serial number. Press ESC to return to the Setup mode. SAMPLE PREPARATION PROCEDURE Note: If the water sample to be analyzed is very turbid, let it stand in a beaker for a while until most of the solid particles have settled. Then, use the pipette to transfer the supernatant solution to the other beaker and prepare the samples as described below. To prevent the displacement of the settled solids at the bottom of the beaker, do not induce air bubbles into the solution. IRRIGATION WATER (LR): · Measure 100 mL of sample with the graduated cylinder. H E L P MODEE HELP M O D HI 83200 offers an interactive contextual help mode that assists the user at any time. To access help screens press HELP. The instrument will display additional information related to the current screen. To read all available data, scroll the text using the keys. Press Support functional key to access a screen with Hanna service centers and their contact details. Press Accessories functional key to access a page with instrument accessories. To exit support or accessories screens press ESC and the instrument will return to the previous help screen. To exit help mode just press HELP or ESC key again and the meter will display the last screen the user was in before entering help mode.

· If the solution contains some turbidity or color, pour it in the large 170mL beaker and add a powder packet of active carbon. 16 17 · Mix well using the spoon and then wait for 5 minutes. · Remove the cap and fill the Demineralizer Bottle with tap water. filter disc · Unscrew the filter assembly, put a filter disc inside and close it. · Replace the cap and shake gently for at least 2 minutes. · Connect the filter assembly to the 60 mL syringe by the screw rim. · Remove the syringe plunger and fill the syringe with the sample to be filtered. Pour the sample gently, trying to avoid transferring of the activated carbon to the syringe. · Open the upper part of the Demineralizer Bottle cap and gently squirt the demineralized water into the cylinder, up to the 100 mL mark. Note: The ion exchange resin contained in the Demineralizer Bottle is provided with an indicator substance. The indicator will change from green to blue when the resin has been exhausted and needs to be replaced. · Pour the solution in the large 170mL beaker, replace the cap and invert several times to mix. · Reinsert the plunger and filter the solution into the 100mL beaker by pushing gently the syringe plunger. The sample is now ready. · If the solution contains some turbidity or color, add a powder packet of active carbon and follow the procedure described for Irrigation Water (LR).

NUTRIENTS SOLUTION (HR): · Add 10 mL of sample to the graduated cylinder using the 5 mL syringe (twice). Note: Filter at least 40 mL of solution if all the four methods will be tested. If the solution is still turbid or colored, treat it again with a packet of active carbon. After use, throw the filter disc away and wash the syringe and the filter assembly well. Always use a new disc for another sample. NUTRIENTS SOLUTION (MR): · Use the graduated cylinder to measure exactly 20 mL of sample. 18 19 Note: To measure exactly 5 mL of sample with the syringe, push the plunger completely into the syringe and insert the tip into the sample. Pull the plunger out until the lower edge of the seal is on the 5 mL mark of the syringe. ALUMINUM SPECIFICATIONS Range Resolution Accuracy Typical EMC Deviation Light Source Method 0.00 to 1. 00 mg/L 0.01 mg/L ±0.02 mg/L ±4% of reading ±0.01 mg/L Tungsten lamp with narrow band interference filter @ 525 nm Adaptation of the aluminon method. The reaction between aluminum and reagents causes a reddish tint in the sample.

Description Ascorbic acid Aluminon reagent Bleaching powder Quantity 1 packet 1 packet 1 packet probable level of liquid taken up by syringe REQUIRED REAGENTS Code HI 93712A-0 HI 93712B-0 HI 93712C-0 · Remove the cap and fill the Demineralizer Bottle with tap water. REAGENT SETS · Replace the cap and shake gently for at least 2 minutes. HI 93712-01 Reagents for 100 tests HI 93712-03 Reagents for 300 tests For other accessories see page 128. · Open the upper part of the Demineralizer Bottle cap and squirt gently the demineralized water into the cylinder, up to the 100 mL mark. · Pour the solution in the large 170mL beaker, replace the cap and invert several times to mix.

MEASUREMENT PROCEDURE · Select the Aluminum method using the procedure described in the Method Selection section (see page 12). · Fill a graduated beaker with 50 mL of sample. · Add the content of one packet of HI 93712A-0 Ascorbic acid and mix until completely dissolved. · If the solution contains some turbidity or color, add a powder packet of active carbon and follow the procedure described for Irrigation Water (LR). · Add the content of one packet of HI 93712B-0 Aluminon reagent and mix until completely dissolved. This is the sample. · Fill two cuvettes with 10 mL of sample each (up to the mark). 10 mL 10 mL #1 #2 Aluminum 20 21 · Add the content of one packet of HI 93712C-0 Bleaching powder to one of the two cuvettes. Replace the cap and shake vigorously until completely dissolved. This is the blank.

ALKALINITY #1 SPECIFICATIONS Range Resolution Precision Typical EMC Deviation Light Source Method 0 to 500 mg/L (as CaCO₃) 5 mg/L ±10 @ 100 mg/L ±5 mg/L Tungsten lamp with narrow band interference filter @ 575 nm Colorimetric Method.



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At different alkalinity levels a distinctive range of colors from yellow to green and greenish blue will develop. Description Alkalinity Indicator Reagent Quantity/test 1 packet · Place the blank into the holder and close the lid. · Press TIMER and the display will show the countdown prior to zeroing the blank. Alternatively wait for 15 minutes and then press ZERO. The display will show "-0.0-" when the meter is zeroed and ready for measurement. #1 REQUIRED REAGENTS Code HI 93755-0 REAGENT SETS #2 HI 93755-01 Reagents for 100 tests HI 93755-03 Reagents for 300 tests For other accessories see page 128. MEASUREMENT PROCEDURE · Remove the blank and insert the other cuvette into the instrument. · Press the READ key and the meter will perform the reading.

The instrument displays the results in mg/L of aluminum. · Select the Alkalinity method using the procedure described in the Method Selection section (see page 12). 10 mL · Fill the cuvette with 10 mL of unreacted sample, up to the mark, and replace the cap. · Place the cuvette into the holder and close the lid.

Press the or to access the second level of functions. · Press the Chem Frm functional key to convert the result in mg/L of Al₂O₃.

· Press ZERO key. The display will show "-0.0-" when the meter is zeroed and ready for measurement. · Press the or to go back to the measurement screen.

INTERFERENCES Interference may be caused by: Iron above 20 mg/L Alkalinity above 1000 mg/L Phosphate above 50 mg/L Fluoride must be absent Aluminum 22 23 Alkalinity · Remove the cuvette.

· Add carefully the content of one packet of HI 93755-0 Alkalinity Indicator Reagent. Replace the cap and shake vigorously for 30 seconds. Note: Pay attention not to spill reagent otherwise full color development may be inhibited. · Replace the cuvette into the holder and close the lid. · Press TIMER and the display will show the countdown prior to the measurement or, alternatively, wait for 2 minutes and press READ. When the timer ends the meter will perform the reading. AMMONIA MEDIUM RANGE SPECIFICATIONS Range Resolution Accuracy Typical EMC Deviation Light Source Method 0.00 to 10.00 mg/L 0.01 mg/L ±0.

05 mg/L ±5% of reading ±0.01 mg/L Tungsten lamp with narrow band interference filter @ 420 nm Adaptation of the ASTM Manual of Water and Environmental Technology, D1426-92, Nessler method. The reaction between ammonia and reagents causes a yellow tint in the sample. Description First Reagent Second Reagent Quantity 4 drops (6 drops for seawater) 4 drops (10 drops for seawater) REQUIRED REAGENTS Code HI 93715A-0 HI 93715B-0 REAGENT SETS · The instrument displays the results in mg/L of alkalinity (CaCO₃). HI 93715-01 Reagents for 100 tests HI 93715-03 Reagents for 300 tests

For other accessories see page 128. MEASUREMENT PROCEDURE · Select the Ammonia MR method using the procedure described in the Method Selection section (see page 12). @@ · Place the cuvette into the holder and close the lid. · Press ZERO key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.

Alkalinity 24 25 Ammonia MR · Remove the cuvette. AMMONIA LOW RANGE SPECIFICATIONS x4 · Add 4 drops of HI 93715A-0 First Reagent (6 drops for seawater analysis). Replace the cap and mix the solution. · Add 4 drops of HI 93715B-0 Second Reagent (10 drops for seawater analysis). Replace the cap and mix the solution.

x4 Range Resolution Accuracy Typical EMC Deviation Light Source Method 0.00 to 3.00 mg/L 0.01 mg/L ±0.04 mg/L ±4% of reading ±0.

01 mg/L Tungsten lamp with narrow band interference filter @ 420 nm Adaptation of the ASTM Manual of Water and Environmental Technology, D1426-92, Nessler method. The reaction between ammonia and reagents causes a yellow tint in the sample. Description First Reagent Second Reagent Quantity 4 drops (6 drops for seawater) 4 drops (10 drops for seawater) · Reinsert the cuvette into the instrument. REQUIRED REAGENTS Code HI 93700A-0 HI 93700B-0 · Press TIMER and the display will show the countdown prior to the measurement or, alternatively, wait for 3 minutes and 30 seconds and press READ. When the timer ends the meter will perform the reading. The instrument displays the results in mg/L of ammonia nitrogen (NH₃-N). REAGENT SETS HI 93700-01

Reagents for 100 tests HI 93700-03 Reagents for 300 tests For other accessories see page 128. MEASUREMENT PROCEDURE · Select the Ammonia LR method using the procedure described in the Method Selection section (see page 12). @@ · Place the cuvette into the holder and close the lid. · Press the or to access the second level of functions.

· Press the Chem Frm functional key to convert the result in mg/L of ammonia (NH₃) and ammonium (NH₄⁺). · Press ZERO key. The display will show "-0.0-" when the meter is zeroed and ready for measurement. · Press the or to go back to the measurement screen. INTERFERENCES Interference may be caused by: acetone, alcohols, aldehydes, glycine, hardness above 1 g/L, iron, organic chloramines, sulfide, various aliphatic and aromatic amines. Ammonia MR 26 27 Ammonia LR · Remove the cuvette. BROMINE SPECIFICATIONS x4 · Add 4 drops of HI 93700A-0 First Reagent (6 drops for seawater analysis).

Replace the cap and mix the solution. · Add 4 drops of HI 93700B-0 Second Reagent (10 drops for seawater analysis).

Replace the cap and mix the solution. Range Resolution Accuracy Typical EMC Deviation Light Source Method 0.00 to 8.00 mg/L 0.01 mg/L ±0. 08 mg/L ±3% of reading ±0.01 mg/L Tungsten lamp with narrow band interference filter @ 525 nm Adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, DPD method. The reaction between bromine and the reagent causes a pink tint in the sample. Description DPD Reagent Quantity 1 packet · Reinsert the cuvette into the instrument. x4 REQUIRED REAGENTS Code HI 93716-0 · Press TIMER and the display will show the countdown prior to the measurement or, alternatively, wait for 3 minutes and 30 seconds and press READ.

When the timer ends the meter will perform the reading. The instrument displays the results in mg/L of ammonia nitrogen (NH₃-N). REAGENT SETS HI 93716-01 Reagents for 100 tests HI 93716-03 Reagents for 300 tests For other accessories see page 128. MEASUREMENT PROCEDURE · Select the Bromine method using the procedure described in the Method Selection section (see page 12). 10 mL @@ · Place the cuvette into the holder and close the lid. · Press ZERO key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.



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· Press the **or** to access the second level of functions. · Press the **Chem Frm** functional key to convert the result in mg/L of ammonia (NH₃) and ammonium (NH₄⁺).

· Press the **or** to go back to the measurement screen. **INTERFERENCES** Interference may be caused by: acetone, alcohols, aldehydes, glycine, hardness above 1 g/L, iron, organic chloramines, sulfide, various aliphatic and aromatic amines. **Ammonia LR 28 29 Bromine** · Remove the cuvette and add the content of one packet of HI 93716-0 DPD reagent. Replace the cap and shake gently for about 20 seconds to dissolve most of the reagent. **CALCIUM SPECIFICATIONS** Range Resolution Accuracy Light Source Method Code HI 93752A-0 Ca B HI 93752B-0 Ca 0 to 400 mg/L 10 mg/L ±10 mg/L ±5% of reading Tungsten lamp with narrow band interference filter @ 466 nm Adaptation of the Oxalate method. Description Buffer Reagent Calcium Buffer Reagent Calcium Oxalate Reagent Quantity 4 drops 7 mL 1 mL · Reinsert the cuvette into the instrument. **REQUIRED REAGENTS** · Press **TIMER** and the display will show the countdown prior to the measurement or, alternatively, wait for 2 minutes and 30 seconds and press **READ**. When the timer ends the meter will perform the reading. **REAGENT SETS** HI 937521-01 Reagents for 50 tests HI 937521-03 Reagents for 150 tests For other accessories see page 128. **MEASUREMENT PROCEDURE** · The instrument displays the results in mg/L of bromine.

Note: for sample preparation follow the **IRRIGATION WATER (LR)** procedure at page 17. · Select the Calcium method using the procedure described in the **Method Selection** section (see page 12). · Using the 5 mL syringe add exactly 3.00 mL of sample to the cuvette. **INTERFERENCES** Interference may be caused by: Chlorine, Iodine, Ozone, Oxidized forms of Chromium and Manganese.

In case of water with hardness greater than 500 mg/L CaCO₃, shake the sample for approximately 2 minutes after adding the reagent. In case of water with alkalinity greater than 250 mg/L CaCO₃ or acidity greater than 150 mg/L CaCO₃, the color of the sample may develop only partially, or may rapidly fade. To resolve this, neutralize the sample with diluted HCl or NaOH. 3 mL of sample · Add 4 drops of Buffer Reagent. · Use the pipette to fill the cuvette up to the 10 mL mark with the HI 93752A-0 Calcium Buffer Reagent.

Bromine 30 31 Calcium · Replace the cap and invert several times to mix. · Place the cuvette into the holder and close the lid. · Press **ZERO** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement. **FREE CHLORINE FREE CHLORINE SPECIFICATIONS** Range Resolution Accuracy Typical EMC Deviation Light Source Method 0.00 to 2.50 mg/L 0.01 mg/L ±0.03 mg/L ±3% of reading ±0.

01 mg/L Tungsten lamp with narrow band interference filter @ 525 nm Adaptation of the EPA DPD method 330.5. The reaction between free chlorine and the DPD reagent causes a pink tint in the sample. · Remove the cuvette. · Using the 1 mL syringe, add exactly 1 mL of the HI 93752B-0 Calcium Oxalate Reagent. Replace the cap and invert the cuvette 10 times to mix. **REQUIRED REAGENTS POWDER:** Code HI 93701-0 **LIQUID:** Code HI 93701A-F HI 93701B-F Description DPD Description DPD1 Indicator DPD1 Buffer Quantity 1 packet Quantity 3 drops 3 drops · Press **TIMER** or wait for 5 minutes, then invert again the cuvette 10 times. Reinsert the cuvette into the instrument. · Press **READ** to start the reading. The instrument displays the results in mg/L of Calcium. **REAGENT SETS** HI 93701-F Reagents for 300 tests (liquid) HI 93701-01 Reagents for 100 tests (powder) HI 93701-03 Reagents for 300 tests (powder) For other accessories see page 128. **Note:** To ensure accurate results, perform the tests at room temperature, between 18°C and 28°C (65°F to 83°F).

MEASUREMENT PROCEDURE · Select the Free Chlorine method using the procedure described in the **Method Selection** section (see page 12). 10 mL **INTERFERENCES:** Interferences may be caused by: Acidity (as CaCO₃) above 1000 mg/L Alkalinity (as CaCO₃) above 1000 mg/L Magnesium (Mg²⁺) above 400 mg/L @ · Place the cuvette into the holder and close the lid. **Calcium 32 33 Free Chlorine** · Press **ZERO** key.

The meter will show "-0.0-" when the meter is zeroed and ready for measurement. · Reinsert the cuvette into the instrument. · Remove the cuvette. **Powder reagents procedure** · Add the content of one packet of HI 93701 DPD reagent.

Replace the cap and shake gently for 20 seconds (or 2 minutes for seawater analysis). · Press **READ** to start the reading. The instrument displays the results in mg/L of free chlorine. · Wait for a minute to allow the undissolved reagent to precipitate and reinsert the cuvette into the instrument. · Press **TIMER** and the display will show the countdown prior to the measurement or, alternatively, wait for 1 minute and press **READ**. When the timer ends the meter will perform the reading. The instrument displays the results in mg/L of free chlorine. **INTERFERENCES** Interference may be caused by: Bromine, Iodine, Ozone, Oxidized forms of Chromium and Manganese. In case of water with hardness greater than 500 mg/L CaCO₃, shake the sample for approximately 2 minutes after adding the powder reagent. In case of water with alkalinity greater than 250 mg/L CaCO₃ or acidity greater than 150 mg/L CaCO₃, the color of the sample may develop only partially, or may rapidly fade.

To resolve this, neutralize the sample with diluted HCl or NaOH. **Liquid reagents procedure** · To an empty cuvette add 3 drops of HI 93701A-F DPD1 indicator and 3 drops of HI 93701B-F DPD1 buffer. Swirl gently to mix, and immediately add 10 mL of unreacted sample. Replace the cap and shake gently again. x3 x3 **Free Chlorine 34 35 Free Chlorine TOTAL CHLORINE SPECIFICATIONS** Range Resolution Accuracy Typical EMC Deviation Light Source Method 0.00 to 3.50 mg/L 0.01 mg/L ±0.03 mg/L ±3% of reading ±0.01 mg/L Tungsten lamp with narrow band interference filter @ 525 nm Adaptation of the EPA DPD method 330.

5. The reaction between the chlorine and the DPD reagent causes a pink tint in the sample. · Press **ZERO** key. The meter will show "-0.0-" when the meter is zeroed and ready for measurement.

· Remove the cuvette. **Powder reagents procedure** · Add 1 packet of HI 93711 DPD reagent. Replace the cap and shake gently for 20 seconds (or 2 minutes for seawater analysis). · Reinsert the cuvette into the instrument. · Press **TIMER** and the display will show the countdown prior to the measurement or, alternatively, wait for 2 minutes and 30 seconds and press **READ**.

When the timer ends the meter will perform the reading. The instrument displays the results in mg/L of total chlorine.



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POWDER: Code HI 93711-0 **LIQUID:** Code HI 93701A-T HI 93701B-T HI 93701C **REQUIRED REAGENTS** Description DPD Description DPD1 indicator DPD1 buffer DPD3 solution Quantity 1 packet Quantity 3 drops 3 drops 1 drop **REAGENT SETS** HI 93701-T Reagents for 300 total chlorine tests (liquid) HI 93711-01 Reagents for 100 total chlorine tests (powder) HI 93711-03 Reagents for 300 total chlorine tests (powder) For other accessories see page 128. **MEASUREMENT PROCEDURE** · Select the Total Chlorine method using the procedure described in the Method Selection section (see page 12). @@ · Place the cuvette into the holder and close the lid. 10 mL Liquid reagents procedure · To an empty cuvette add 3 drops of HI 93701A-T DPD1 indicator, 3 drops of HI 93701B-T DPD1 buffer and 1 drop of HI 93701C DPD3 solution. Swirl gently to mix and immediately add 10 mL of unreacted sample. Replace the cap and shake gently again. x3 x3 x1 · Reinsert the cuvette into the instrument. Total Chlorine 36 37 Total Chlorine · Press **TIMER** and the display will show the countdown prior to the measurement or, alternatively, wait for 2 minutes and 30 seconds and press **READ**.

When the timer ends the meter will perform the reading. **CHLORINE DIOXIDE SPECIFICATIONS** Range Resolution Accuracy Typical EMC Deviation Light Source Method 0.00 to 2.00 mg/L 0.01 mg/L ± 0.10 mg/L $\pm 5\%$ of reading ± 0.01 mg/L Tungsten lamp with narrow band interference filter @ 575 nm Adaptation of the Chlorophenol Red method. The reaction between chlorine dioxide and reagents causes a colorless to purple tint in the sample. Description Reagent A Dechlorinating Reagent B Reagent C Reagent D Quantity 1 mL 1 packet 1 mL 1 mL · The instrument displays the results in mg/L of total chlorine.

Note: free and total chlorine have to be measured separately with fresh unreacted samples following the related procedure if both values are requested. **INTERFERENCES** Interference may be caused by: Bromine, Iodine, Ozone, Oxidized forms of Chromium and Manganese. In case of water with hardness greater than 500 mg/L CaCO₃, shake the sample for approximately 2 minutes after adding the powder reagent. In case of water with alkalinity greater than 250 mg/L CaCO₃ or acidity greater than 150 mg/L CaCO₃, the color of the sample may develop only partially, or may rapidly fade. To resolve this, neutralize the sample with diluted HCl or NaOH. Code HI 93738A-0 HI 93738B-0 HI 93738C-0 HI 93738D-0 **REQUIRED REAGENT REAGENT SETS** HI 93738-01 Reagents for 100 tests HI 93738-03 Reagents for 300 tests For other accessories see page 128.

MEASUREMENT PROCEDURE · Select the Chlorine Dioxide method using the procedure described in the Method Selection section (see page 12). · Fill two graduated mixing cylinders (#1 & #2) up to the 25 mL mark with the sample. · Add 0.5 mL of HI 93738A-0 Chlorine Dioxide Reagent to each cylinder (#1 & #2), close them and invert several times to mix. #1 25 ml #2 25 ml #1 & #2 #1 #2 Total Chlorine 38 39 Chlorine Dioxide · Add the content of one packet of HI 93738B-0 Dechlorinating Reagent to one of the two cylinders (#1), close and invert it several times until it is totally dissolved.

This is the blank. · Press **ZERO** key. The meter will show "-0.0-" when the meter is zeroed and ready for measurement. #1 · Add precisely 0.5 mL of HI 93738C-0 Chlorine Dioxide Reagent to each cylinder (#1 & #2), close them and invert several times to mix. · Fill another cuvette with 10 mL of the reacted sample (#2) up to the mark and replace the cap. #2 10 mL #1 & #2 · Insert the sample into the instrument. #2 #1 #2 · Press **READ** and the meter will perform the reading. The instrument displays the results in mg/L of chlorine dioxide.

· Add 0.5 mL of HI 93738D-0 Chlorine Dioxide Reagent to each cylinder (#1 & #2), close them and invert several times to mix. Cylinder #2 is the reacted sample. #1 & #2 **SAMPLING PROCEDURE** #1 #2 It is recommended to analyze chlorine dioxide samples immediately after collection. Chlorine dioxide samples must be stored in sealed dark glass bottle, with minimal head space. Excessive heat (above 25°C/78°F), agitation and exposure to light must be avoided. · Fill a cuvette with 10 mL of the blank (#1) up to the mark and replace the cap. 10 mL **INTERFERENCES** #1 Interferences may be caused by strong oxidants. · Place the blank (#1) into the holder and close the lid. #1 Chlorine Dioxide 40 41 Chlorine Dioxide **CHROMIUM VI HIGH RANGE**

SPECIFICATIONS Range Resolution Accuracy Typical EMC Deviation Light Source Method 0 to 1000 µg/L 1 µg/L ± 5 µg/L $\pm 4\%$ of reading ± 1 µg/L Tungsten lamp with narrow band interference filter @ 525 nm Adaptation of the ASTM Manual of Water and Environmental Technology, D1687-92, Diphenylcarbohydrazide method.

The reaction between chromium VI and the reagent causes a purple tint in the sample. Description Powder reagent Quantity 1 packet · Reinsert the cuvette into the instrument. · Press **TIMER** and the display will show the countdown prior to the measurement or, alternatively, wait for 6 minutes and press **READ**.

When the timer ends the meter will perform the reading. The instrument displays concentration in µg/L of chromium VI.

REQUIRED REAGENTS Code HI 93723-0 **REAGENT SETS** HI 93723-01 Reagents for 100 tests HI 93723-03 Reagents for 300 tests For other accessories see page 128. · Press the or to access the second level of functions. · Press the Chem Frm functional key to convert the result in µg/L of Chromate (CrO₄²⁻) and Dichromate (Cr₂O₇²⁻). **MEASUREMENT PROCEDURE** · Select the Chromium VI HR method using the procedure described in the Method Selection section (see page 12). · Fill the cuvette up to the mark with 10 mL of unreacted sample and replace the cap.

· Place the cuvette into the holder and close the lid. · Press **ZERO** key. The meter will show "-0.0-" when the meter is zeroed and ready for measurement. 10 mL · Press the or to go back to the measurement screen. **INTERFERENCES** Interference may be caused by: Vanadium above 1 ppm. However, waiting 10 minutes before reading, the interference is removed Iron above 1 ppm Mercurous and mercuric ions cause slight inhibition of the reaction. · Remove the cuvette and add the content of one packet of HI 93723-0 reagent. Replace the cap and shake vigorously for about 10 seconds. Chromium VI HR 42 43 Chromium VI HR **CHROMIUM VI LOW RANGE SPECIFICATIONS** Range Resolution Accuracy Typical EMC Deviation Light Source Method 0 to 300 µg/L 1 µg/L ± 1 µg/L $\pm 4\%$ of reading ± 1 µg/L Tungsten lamp with narrow band interference filter @ 525 nm Adaptation of the ASTM Manual of Water and Environmental Technology, D1687-92, Diphenylcarbohydrazide method.



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The reaction between chromium VI and the reagent causes a purple tint in the sample. Description Powder reagent Quantity 1 packet · Reinsert the cuvette into the instrument. · Press TIMER and the display will show the countdown prior to the measurement or, alternatively, wait for 6 minutes and press READ. When the timer ends the meter will perform the reading. The instrument displays concentration in µg/L of chromium VI. REQUIRED REAGENTS Code HI 93749-0 REAGENT SETS HI 93749-01 Reagents for 100 tests HI 93749-03 Reagents for 300 tests For other accessories see page 128. · Press the or to access the second level of functions. · Press the Chem Frm functional key to convert the result in µg/L of Chromate (CrO4²⁻) and Dichromate (Cr2O7²⁻). 10 mL MEASUREMENT PROCEDURE · Select the Chromium VI LR method using the procedure described in the Method Selection section (see page 12). · Fill the cuvette up to the mark with 10 mL of unreacted sample and replace the cap.

· Place the cuvette into the holder and close the lid. · Press ZERO key. The meter will show "-0.0-" when the meter is zeroed and ready for measurement. · Press the or to go back to the measurement screen.

INTERFERENCES Interference may be caused by: Vanadium above 1 ppm. However, waiting 10 minutes before reading, the interference is removed. Iron above 1 ppm Mercurous and mercuric ions cause slight inhibition of the reaction. · Remove the cuvette and add the content of one packet of HI 93749-0 reagent. Replace the cap and shake vigorously for about 10 seconds.

Chromium VI LR 44 45 Chromium VI LR COLOR OF WATER SPECIFICATIONS Range Resolution Accuracy Typical EMC Deviation Light Source Method 0 to 500 PCU (Platinum Cobalt Units) 1 PCU ±10 PCU ±5% of reading ± 1 PCU Tungsten lamp with narrow band interference filter @ 420 nm Adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Colorimetric Platinum Cobalt method. · Fill the second cuvette up to the mark with unfiltered sample and replace the cap. This is the apparent color. · Filter 10 mL of sample through a filter with a 0.45 µm membrane into the third cuvette, up to the 10 mL mark and replace the cap. This is the true color. 10 mL #2 #3 · Insert the apparent color cuvette (# 2) into the instrument and close the lid. · Press READ to start the reading. · The meter displays the value of apparent color in PCU. #2 REQUIRED ACCESSORIES 0.

45 µm membrane for true color measurement. For other accessories see page 128. MEASUREMENT PROCEDURE · Select the Color of Water method using the procedure described in the Method Selection section (see page 12). 10 mL · Fill one cuvette up to the mark with deionized water and replace the cap. This is the blank. · Place the blank (# 1) into the holder and close the lid. · Press ZERO key. The meter will show "-0.0-" when the meter is zeroed and ready for measurement. #1 #1 · Remove the cuvette, insert the true color cuvette (# 3) into the instrument and ensure that the notch on the cap is positioned securely into the groove.

#3 · Press READ to start the reading. The meter displays the value of true color in PCU. · Remove the blank. Color of Water 46 47 Color of Water COPPER HIGH RANGE SPECIFICATIONS Range Resolution Accuracy Typical EMC Deviation Light Source Method 0.00 to 5.

00 mg/L 0.01 mg/L ±0.02 mg/L ±4% of reading ±0.01 mg/L Tungsten lamp with narrow band interference filter @ 575 nm Adaptation of the EPA method. The reaction between copper and the bicinchoninate reagent causes a purple tint in the sample.

Description Bicinchoninate Quantity 1 packet · Remove the cuvette. · Add the content of one packet of HI 93702-0 Bicinchoninate. Replace the cap and shake gently for about 15 seconds. · Reinsert the cuvette into the instrument. REQUIRED REAGENTS Code HI 93702-0 · Press TIMER and the display will show the countdown prior to the measurement or, alternatively, wait for 45 seconds and press READ. When the timer ends the meter will perform the reading.

REAGENT SETS HI 93702-01 Reagents for 100 tests HI 93702-03 Reagents for 300 tests For other accessories see page 128. MEASUREMENT PROCEDURE · Select the Copper HR method using the procedure described in the Method Selection section (see page 12). @ · Place the cuvette into the holder and close the lid. · Press ZERO key.

The meter will show "-0.0-" when the meter is zeroed and ready for measurement. 10 ml · The instrument displays the results in mg/L of copper.

INTERFERENCES Interference may be caused by: Silver Cyanide For samples overcoming buffering capacity of reagent (around pH 6.8), pH should be adjusted between 6 and 8. Copper HR 48 49 Copper HR COPPER LOW RANGE SPECIFICATIONS Range Resolution Accuracy Typical EMC Deviation Light Source Method 0 to 1000 g/L 1 g/L ±10 g/L ±5% of reading ±1 g/L Tungsten lamp with narrow band interference filter @ 575 nm Adaptation of the EPA method. The reaction between copper and the bicinchoninate reagent causes a purple tint in the sample. Description Bicinchoninate Quantity 1 packet · Remove the cuvette. · Add the content of one packet of HI 93747-0 Bicinchoninate. Replace the cap and shake gently for about 15 seconds.

· Reinsert the cuvette into the instrument. · Press TIMER and the display will show the countdown prior to the measurement or, alternatively, wait for 45 seconds and press READ. When the timer ends the meter will perform the reading. REQUIRED REAGENTS Code HI 93747-0 REAGENT SETS HI 93747-01 Reagents for 100 tests HI 93747-03 Reagents for 300 tests For other accessories see page 128. · The instrument displays the results in mg/L of copper.

MEASUREMENT PROCEDURE · Select the Copper LR method using the procedure described in the Method Selection section (see page 12). @ · Place the cuvette into the holder and close the lid. · Press ZERO key. The meter will show "-0.0-" when the meter is zeroed and ready for measurement.

10 ml INTERFERENCES Interference may be caused by: Silver Cyanide For samples overcoming buffering capacity of reagent (around pH 6.8), pH should be adjusted between 6 and 8. Copper LR 50 51 Copper LR CYANIDE SPECIFICATIONS Range Resolution Accuracy Typical EMC Dev. Light Source Method 0.000 to 0.200 mg/L 0.001 mg/L ±0.005 mg/L ±3% of reading ±0.001 mg/L Tungsten lamp with narrow band interference filter @ 610 nm Adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Pyridine-Pyrazolone method. The reaction between cyanide and reagents causes a blue tint in the sample.



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Description Reagent A Reagent B Reagent C Quantity 1 spoon 1 packet 1 packet Note: Pay attention to the way the spoon is filled: - do not press the powder; - do not overfill it. · Place the HDPE plastic stopper and cap immediately, to prevent the escape of chlorine gas which is developed during the reaction, and shake gently for 30 seconds. REQUIRED REAGENTS Code HI 93714A-0 HI 93714B-0 HI 93714C-0 · Wait for 30 seconds leaving the cuvette tightly capped and undisturbed, then add the content of one packet of HI 93714B-0 reagent and shake gently for 10 seconds. REAGENT SETS HI 93714-01 Reagents for 100 tests HI 93714-03 Reagents for 300 tests For other accessories see page 128. · Immediately add the content of one packet of HI 93714C-0 reagent, replace the cap and shake vigorously for 20 seconds. MEASUREMENT PROCEDURE · Select the Cyanide method using the procedure described in the Method Selection section (see page 12). @@ · Place the cuvette into the holder and close the lid. · Press ZERO key. The meter will show "-0.0-" when the meter is zeroed and ready for measurement.

10 mL · Reinsert the cuvette into the instrument. · Press TIMER and the display will show the countdown prior to the measurement or, alternatively, wait for 25 minutes and press READ. When the timer ends the meter will perform the reading. Note: Gently shake the cuvette 4 or 5 times during the first 20 minutes of the countdown prior to the measurement. Accuracy is not affected by undissolved reagent powder.

· The instrument displays the results in mg/L of cyanide. · Remove the cuvette and add 1 level spoon of HI 93714A-0 Cyanide Reagent. Remember to close the reagent bottle immediately after use. Cyanide 52 53 Cyanide · Press the or to access the second level of functions. · Press the Chem Frm functional key to convert the result in mg/L of Potassium Cyanide (KCN).

CYANURIC ACID SPECIFICATIONS Range Resolution Accuracy Typical EMC Deviation Light Source Method 0 to 80 mg/L 1 mg/L ± 1 mg/L $\pm 15\%$ of reading ± 1 mg/L Tungsten lamp with narrow band interference filter @ 525 nm Adaptation of the turbidimetric method. The reaction between cyanuric acid and the reagent causes a white suspension in the sample. Description Powder reagent Quantity 1 packet · Press the or to go back to the measurement screen. Note: for most accurate results perform the test at 20-25 °C. INTERFERENCES Interference may be caused by large amounts of turbidity that will cause high readings. Oxidizing (such as chlorine) or reducing agents (such as sulfide or sulfur dioxide) are known to interfere with the measurement. Distillation will remove these. Samples with high pH values should be adjusted to approximately pH 7 before testing. @@@@ · Place the cuvette into the holder and close the lid. · Press ZERO key.

@@@@@@@@@@@@@@@@@@@@ · Press READ to start reading. @@@@@@@@@@@@@@@@@@ · Press ZERO key. @@@@ Note: For better accuracy wash glassware with HCl 6N. SAMPLE DILUTION This meter is designed to determine low levels of hardness, typically found in water purification systems. When testing some other sources of water, it is not uncommon to come across levels of hardness that are greater than the range of this meter. This problem can be overcome through dilution. Dilutions must be performed with hardness-free water or the readings will be erroneous. A dilution to reduce the level of hardness by a factor of one hundred is performed as follows: · Fill a 1 mL syringe with the sample. · Place the syringe in a 50 mL beaker, making sure that the beaker is clean and empty, and inject 0.5 mL into the beaker.

· Fill the beaker up to the 50 mL mark with hardness-free water. · Remove the blank and insert the second cuvette (# 2) into the instrument. · Press READ to start the reading. The instrument displays concentration in mg/L of calcium hardness, as CaCO₃. #2 INTERFERENCES Interference may be caused by excessive amounts of heavy metals.

· Press the or to access the second level of functions. · Press the Chem Frm functional key to convert the result in mg/L of Calcium (Ca). Hardness Ca 60 61 Hardness Ca MAGNESIUM HARDNESS SPECIFICATIONS Range Resolution Accuracy Typical EMC Deviation Light Source Method 0.00 to 2.00 mg/L 0.01 mg/L ± 0.11 mg/L $\pm 5\%$ of reading ± 0.02 mg/L Tungsten lamp with narrow band interference filter @ 525 nm Adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, EDTA colorimetric method. The reaction between magnesium and reagents causes a reddish-violet tint in the sample. Description Mg indicator Alkali solution EDTA solution EGTA solution Quantity 0.5 mL 0.5 mL 1 drop 1 drop 10 mL 10 mL · Fill both cuvettes up to the 10 mL mark. #1 #2 · Add 1 drop of HI 93719C-0 EDTA solution to one cuvette (# 1), replace the cap and invert the cuvette several times to mix. This is the blank. #1 REQUIRED REAGENTS Code HI 93719A-0 HI 93719B-0 HI 93719C-0 HI 93719D-0 · Add 1 drop of HI 93719D-0 EGTA solution to the second cuvette (# 2), replace the cap and invert the cuvette several times to mix.

This is the sample. #2 #1 · Place the blank (# 1) into the holder and close the lid. REAGENT SETS HI 93719-01 Reagents for 100 tests HI 93719-03 Reagents for 300 tests For other accessories see page 128. · Press ZERO key. The meter will show "-0.0-" when the meter is zeroed and ready for measurement. MEASUREMENT PROCEDURE · Select the Magnesium Hardness method using the procedure described in the Method Selection section (see page 12). · Rinse a graduated beaker several times with unreacted sample, before filling it to the 50 mL mark with the sample. · Remove the blank (# 1), insert the sample (# 2) into the instrument, and close the lid. · Press READ to start the reading.

The instrument displays concentration in mg/L of magnesium hardness, as CaCO₃. #2 · Add 0.5 mL of HI 93719A-0 Magnesium indicator solution, then swirl to mix. · Add 0.5 mL of HI 93719B-0 Alkali solution and swirl to mix.

Use this solution to rinse 2 cuvettes. Hardness Mg 62 63 Hardness Mg · Press the or to access the second level of functions. · Press the Chem Frm functional key to convert the result in mg/L of Magnesium (Mg). HYDRAZINE SPECIFICATIONS Range Resolution Accuracy Typical EMC Deviation Light Source Method 0 to 400 µg/L 1 µg/L $\pm 4\%$ of full scale ± 2 µg/L Tungsten lamp with narrow band interference filter @ 420 nm Adaptation of the ASTM Manual of Water and Environmental Technology, method D1385-88, p-Dimethylaminobenzaldehyde method. The reaction between hydrazine and the liquid reagent causes a yellow tint in the sample.



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Description Liquid Reagent Quantity 24 drops · Press the Unit functional key to change the current measurement unit. REQUIRED REAGENT · Press the or to go back to the measurement screen. Code HI 93704-0 Note: This test will detect any magnesium contamination in the beakers, measuring syringes or sample cells. REAGENT SETS HI 93704-01 Reagents for 100 tests HI 93704-03 Reagents for 300 tests For other accessories see page 128. SAMPLE DILUTION This meter is designed to determine hardness typically found in water purification systems. In order to measure samples with high hardness, follow dilution procedure explained on page 61 (Ca Hardness). MEASUREMENT PROCEDURE · Select the Hydrazine method using the procedure described in the Method Selection section (see page 12). · Fill one cuvette up to the mark with 10 mL of distilled water. 10 mL #1 INTERFERENCES Interference may be caused by excessive amounts of heavy metals. · Place the cap, insert the cuvette # 1 into the holder and close the lid.

· Press the Blank function key to start adjusting the light level. The display will show "Blank Done" when the meter is ready to take a zero measurement. #1 · Fill a second cuvette with 10 mL of unreacted sample (up to the mark) and replace the cap. Hardness Mg 10 mL #2 64 65 Hydrazine IODINE SPECIFICATIONS · Add 12 drops of the HI 93704-0 reagent to each cuvette. Replace the caps and shake gently to mix. x 12 x 12 #1 #2 Range Resolution Accuracy Typical EMC Deviation Light Source Method 0.0 to 12.5 mg/L 0.1 mg/L ±0.1 mg/L ±5% of reading ±0.1 mg/L Tungsten lamp with narrow band interference filter @ 525 nm Adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, DPD method. The reaction between iodine and the reagent causes a pink tint in the sample. Description DPD Reagent Quantity 1 packet · Place the blank (#1) into the holder and close the lid. #1 REQUIRED REAGENTS Code HI 93718-0 · Press TIMER and the display will show the countdown prior to zeroing the blank. The display will show "-0."

0." when the meter is zeroed and ready for measurement. REAGENT SETS HI 93718-01 Reagents for 100 tests HI 93718-03 Reagents for 300 tests For other accessories see page 128. MEASUREMENT PROCEDURE · Select the Iodine method using the procedure described in the Method Selection section (see page 12). @@ · Place the cuvette into the holder and close the lid. · Press ZERO key.

The display will show "-0.0-" when the meter is zeroed and ready for measurement. 10 mL · Remove the blank. · Insert the cuvette with the reacted sample (# 2) into the instrument and close the lid. · Press READ to start the reading. The instrument displays concentration in µg/L of hydrazine. #2 INTERFERENCES Interference may be caused by: Highly colored samples Highly turbid samples Aromatic amines Hydrazine · Remove the cap and add the content of one packet of HI 93718-0 DPD reagent. Replace the cap and shake gently for about 30 seconds to dissolve most of the reagent. 66 67 Iodine · Reinsert the cuvette into the instrument. IRON HIGH RANGE SPECIFICATIONS Range Resolution Accuracy Typical EMC Deviation Light Source Method 0.

00 to 5.00 mg/L 0.01 mg/L ±0.04 mg/L ±2% of reading ±0.01 mg/L Tungsten lamp with narrow band interference filter @ 525 nm Adaptation of the EPA Phenantroline method 315B, for natural and treated waters. The reaction between iron and reagents causes an orange tint in the sample. Description Powder Reagent Quantity 1 packet · Press TIMER and the display will show the countdown prior to the measurement or, alternatively, wait for 2 minutes and 30 seconds and press READ. When the timer ends the meter will perform the reading. REQUIRED REAGENTS · The instrument displays concentration in mg/L of iodine. Code HI 93721-0 REAGENT SETS HI 93721-01 Reagents for 100 tests HI 93721-03 Reagents for 300 tests For other accessories see page 128.

INTERFERENCES Interference may be caused by: Bromine, Chlorine, Ozone, Oxidized forms of Chromium and Manganese. In case of water with hardness greater than 500 mg/L CaCO₃, shake the sample for approximately 2 minutes after adding the reagent. In case of water with alkalinity greater than 250 mg/L CaCO₃ or acidity greater than 150 mg/L CaCO₃, the color of the sample may develop only partially, or may rapidly fade. To resolve this, neutralize the sample with diluted HCl or NaOH. MEASUREMENT PROCEDURE · Select the Iron HR method using the procedure described in the Method Selection section (see page 12).

@@ · Place the cuvette into the holder and close the lid. · Press ZERO key. The display will show "-0.0-" the meter is zeroed and ready for measurement. 10 mL · Remove the cuvette and add the content of one packet of HI 93721-0 reagent.

Replace the cap and shake until dissolution is complete. Iodine 68 69 Iron HR · Reinsert the cuvette into the instrument. IRON LOW RANGE SPECIFICATIONS Range Resolution Accuracy Typical EMC Deviation Light Source Method 0 to 400 µg/L 1 µg/L ±10 µg/L ±8% of reading ±1 µg/L Tungsten lamp with narrow band interference filter @ 575 nm Adaptation of the TPTZ Method. The reaction between iron and the reagent causes a violet tint in the sample. Description TPTZ Reagent Quantity 2 packets · Press TIMER and the display will show the countdown prior to the measurement or, alternatively, wait for 3 minutes and press READ. When the timer ends the meter will perform the reading. REQUIRED REAGENTS · The instrument displays concentration in mg/L of iron. Code HI 93746-0 REAGENT SETS HI 93746-01 Reagents for 50 tests HI 93746-03 Reagents for 150 tests For other accessories see page 128. INTERFERENCES Interference may be caused by: Molybdate Molybdenum above 50 ppm Calcium above 10000 ppm (as CaCO₃) Magnesium above 100000 ppm (as CaCO₃) Chloride above 185000 ppm. MEASUREMENT PROCEDURE · Select the Iron LR method using the procedure described in the Method Selection section (see page 12).

· Fill one graduated mixing cylinder up to the 25 mL mark with deionized water. 25 ml 30" 3 6 12 9 · Add the content of one packet of HI 93746-0 TPTZ reagent, close the cylinder and shake vigorously for 30 seconds. This is the blank. · Fill a cuvette with 10 mL of the blank up to the mark and replace the cap. · Place the cuvette into the holder and close the lid. 10 mL Iron HR 70 71 Iron LR · Press ZERO key. The display will show "-0.0-" when the meter is zeroed and ready for measurement. INTERFERENCES · Remove the cuvette.



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