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You can read the recommendations in the user guide, the technical guide or the installation guide for HANNA INSTRUMENTS HI 96728C. You'll find the answers to all your questions on the HANNA INSTRUMENTS HI 96728C 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 96728C
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Instruction Manual

HI 96728C
Nitrate ISM



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23 All rights are reserved. Reproduction in whole or in part is prohibited without the written consent of the copyright owner, Hanna Instruments Inc., Woonsocket, Rhode Island, 02895, USA. 2 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 HI 96728 Ion Selective Meter is supplied complete with: · Two Sample Cuvettes and Caps · CAL CHECK standard cuvettes · 9V Battery · Cloth for wiping cuvettes · Instrument quality certificate · Instruction Manual · Rigid carrying case Note: Save all packing material until you are sure that the instrument works correctly. Any defective item must be returned in its original packing. 3 GENERAL DESCRIPTION The HI 96728 is an auto diagnostic portable microprocessor meter that benefits from Hanna's years of experience as a manufacturer of analytical instruments. It has the advanced optical system based on a special Tungsten Lamp and a narrow band interference filter that allows most accurate and repeatable readings. All instruments are factory calibrated and the electronic and optical design minimizes the need of frequent calibration. With the powerful CAL CHECK™ validation function, you are able to validate good performance of your instrument at any time. The validation procedure is extremely user friendly. Just use the exclusive HANNA ready-made, NIST traceable standards to verify the performance of the instrument and recalibrate if necessary. All instruments are splash waterproof and the lamp and filter units are protected from dust or dirt by a transparent cup.

This makes the instruments fulfill field applications. Display messages aid the user in routine operation. The meter has an auto-shut off feature that will turn off the instrument after 10 minutes of non use in measurement mode or after 1 hour if left in calibration mode. The meter uses an exclusive positive-locking system to ensure that the cuvette is in the same position every time it is placed into the measurement cell. It is designed to fit a cuvette with a larger neck making it easier to add both sample and reagents. The cuvette is made from special optical glass to obtain best results. The HI 96728 meter measures the nitrate-nitrogen content in water samples in the 0.0 to 30.0 mg/L (ppm) range. The method is an adaptation of the cadmium reduction method.

The reagent is in powder form and is supplied in packets. The amount of reagent is precisely dosed to ensure the maximum repeatability. ABBREVIATIONS °C: °F: mg/L: mL: mV: degree Celsius degree Fahrenheit micrograms per liter. mg/L is equivalent to ppm (parts per million) milliliter millivolts 4 SPECIFICATIONS Range Resolution Accuracy Typical EMC Deviation Light Source Light Detector Method Battery Type Auto-Shut off 0.0 to 30.0 mg/L 0.1 mg/L ±0.5 mg/L ±10% of reading @ 25°C ±0.1 mg/L Tungsten lamp Silicon Photocell with narrow band interference filter @ 525 nm Adaptation of the cadmium reduction method. The reaction between nitrate-nitrogen and the reagent causes an amber tint in the sample.

1 x 9 volt After 10' of non-use in measurement mode; after 1 hour of non-use in calibration mode; with last reading reminder. 192 x 104 x 69 mm (7.6 x 4.1 x 2.7 ") Dimensions Weight REQUIRED REAGENTS Code HI 93728-0 360 g (12.7 oz.). Description Powder Reagent Quantity/test 1 packet PRECISION AND ACCURACY Precision is how closely repeated measurements agree with each other. Precision is usually expressed as standard deviation (SD). Accuracy is defined as the nearness of a test result to the true value.

Although good precision suggests good accuracy, precise results can be inaccurate. The figure explains these definitions. In a laboratory using a standard solution of 10.0 mg/L nitrate and a representative lot of reagent, an operator obtained with a single instrument a standard deviation of 0.3 mg/L. 5

PRINCIPLE OF OPERATION Absorption of Light is a typical phenomenon of interaction between electromagnetic radiation and matter. When a light beam crosses a substance, some of the radiation may be absorbed by atoms, molecules or crystal lattices. If pure absorption occurs, the fraction of light absorbed depends both on the optical path length through the matter and on the physical-chemical characteristics of the substance according to the Lambert-Beer Law: $-\log I/I_0 = c d$ or $A = c d$ Where: $-\log I/I_0$ I_0 I c d = = = = = Absorbance (A) intensity of incident light beam intensity of light beam after absorption molar extinction coefficient at wavelength molar concentration of the substance optical path through the substance Therefore, the concentration "c" can be calculated from the absorbance of the substance as the other factors are known. Photometric chemical analysis is based on the possibility to develop an absorbing compound from a specific chemical reaction between sample and reagents. Given that the absorption of a compound strictly depends on the wavelength of the incident light beam, a narrow spectral bandwidth should be selected as well as a proper central wavelength to optimize measurements. The optical system of Hanna's HI 96 colorimeter is based on special tungsten lamp and narrow-band interference filters to guarantee both high performance and reliable results. HI 96 block diagram (optical layout) 6 A microprocessor controlled special tungsten lamp emits radiation which is first optically conditioned and beamed to the sample contained in the cuvette. The optical path is fixed by the diameter of the cuvette. Then the light is spectrally filtered to a narrow spectral bandwidth, to obtain a light beam of intensity I_0 or I . The photoelectric cell collects the radiation I that is not absorbed by the sample and converts it into an electric current, producing a potential in the mV range.

The microprocessor uses this potential to convert the incoming value into the desired measuring unit and to display it on the LCD. The measurement process is carried out in two phases: first the meter is zeroed and then the actual measurement is performed. The cuvette has a very important role because it is an optical element and thus requires particular attention. It is important that both, the measurement and the calibration (zeroing) cuvettes, are optically identical to provide the same measurement conditions. Whenever possible use the same cuvette for both.

It is necessary that the surface of the cuvette is clean and not scratched. This to avoid measurement interference due to unwanted reflection and absorption of light.



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It is recommended not to touch the cuvette walls with hands. Furthermore, in order to maintain the same conditions during the zeroing and the measuring phases, it is necessary to close the cuvette to prevent any contamination. FUNCTIONAL DESCRIPTION INSTRUMENT DESCRIPTION 1) 2) 3) 4) 5) 6) 7) 8) GLP/ key CAL CHECK key ZERO/CFM key READ/ /TIMER key ON/OFF key Liquid Crystal Display (LCD) Cuvette alignment indicator Cuvette holder 7 KEYPAD DESCRIPTION · ON/OFF: to turn the meter on and off. · ZERO/CFM: this is a bi-functional key. Just press to zero the meter prior to measurement, or confirm edited values. In calibration mode press to confirm factory calibration restore. · READ/ /TIMER: this is a multi-functional key. @@ In GLP mode press to view the next screen.

· CAL CHECK: this is a bi-functional key. @@ · GLP/ : this is a bi-functional key. Just press to enter GLP mode. In calibration mode press to edit the date and time. @@@@ @@@@ The beeper is playing a beep on errors. @@@@ @@@@ @@@@ @@@@ @@@@ @@@@ c) during calibration procedure Standard Low: The standard reading is less than expected. Standard High: The standard reading is higher than iddot; Replace the cap and immediately shake vigorously for exactly 10 seconds by moving the cuvette up and down. @@ A deposit could remain but it dose not affect the measurement. Time and way of shaking could sensitively affect the measurement. @@ · Press and hold READ/ /TIMER for three seconds.

The display will show the countdown prior to measurement. @@@@ @@@@ Chloride above 100 mg/L (negative interference). Chlorine above 2 mg/L (positive interference). Copper (it must be absent). Iron (III) (positive interference).

Strong oxidizing and reducing substances. Sulfide (it must be absent). @@@@ Therefore sample should be adequately treated before performing the test. 14 VALIDATION PROCEDURE Use the validation procedure to ensure that the instrument is properly calibrated. Warning: Do not validate the instrument with any standard solutions other than the HANNA CAL CHECK™ Standards, otherwise erroneous results will be obtained.

· Turn the meter on by pressing ON/OFF. · When the beeper sounds briefly and the LCD displays dashes, the meter is ready. The blinking "ZERO" indicates that the instrument needs to be zeroed first. · Place the CAL CHECK™ Standard HI 96728-11 Cuvette A into the cuvette holder and ensure that the notch on the cap is positioned securely into the groove. · Press ZERO/CFM and the lamp, cuvette and detector icons will appear on the display, depending on the measurement phase. · After a few seconds, the display will show "-0.0-". The meter is now zeroed and ready for validation. · Remove the cuvette. · Place the CAL CHECK™ Standard HI 96728-11 Cuvette B into the cuvette holder and ensure that the notch on the cap is positioned securely into the groove.

15 · Press CAL CHECK and the lamp, cuvette and detector icons together with "CAL CHECK" will appear on the display, depending on the measurement phase. · At the end of the measurement the display will show the validation standard value. The reading should be within specifications as reported in the CAL CHECK™ Standard Certificate. If the value is found out of the specifications, please check that the cuvettes are free of fingerprints, oil or dirt and repeat validation. If results are still found out of specifications, then recalibrate the instrument. 16 CALIBRATION PROCEDURE Note: It is possible to interrupt calibration procedure at any time by pressing CAL CHECK or ON/OFF keys. Warning: Do not calibrate the instrument with standard solutions other than the HANNA CAL CHECK™ Standards, otherwise erroneous results will be obtained. · Turn the meter on by pressing ON/OFF. · When the beeper sounds briefly and the LCD displays dashes, the meter is ready. · Press and hold CAL CHECK for three seconds to enter calibration mode.

The display will show "CAL" during calibration procedure. The blinking "ZERO" asks for instrument zeroing. · Place the CAL CHECK™ Standard HI 96728-11 Cuvette A into the cuvette holder and ensure that the notch on the cap is positioned securely into the groove. · Press ZERO/CFM and the lamp, cuvette and detector icons will appear on the display, depending on the measurement phase. 17 · After a few seconds the display will show "-0.0-". The meter is now zeroed and ready for calibration. The blinking "READ" asks for reading calibration standard. · Remove the cuvette. · Place the CAL CHECK™ Standard HI 96728-11 Cuvette B into the cuvette holder and ensure that the notch on the cap is positioned securely into the groove. · Press READ/ /TIMER and the lamp, cuvette and detector icons will appear on the display, depending on the measurement phase. · After measurement the instrument will show for three seconds the CAL CHECK™ Standard value. Note: If the display shows "STD HIGH", the standard value was too high. If the display shows "STD LOW", the standard value was too low. Verify that both CAL CHECK™ Standards HI 96728-11 Cuvettes, A and B are free from fingerprints or dirt and that they are inserted correctly. · Then the date of the last calibration (e.g.: "01.08.2009") appears on the display, or "01.

01.2009" if the factory calibration was selected before. In both cases the year number is blinking, ready for date input. 18 DATE INPUT · Press GLP/ to edit the desired year (2009-2099). If the key is kept pressed, the year number is automatically increased. or · When the correct year has been set, press ZERO/CFM or READ/ /TIMER to confirm. Now the display will show the month blinking. · Press GLP/ to edit the desired month (01-12). If the key is kept pressed, the month number is automatically increased. or · When the correct month has been set, press ZERO/CFM or READ/ /TIMER to confirm. Now the display will show the day blinking. · Press GLP/ to edit the desired day (01-31). If the key is kept pressed, the day number is automatically increased.

Note: It is possible to change the editing from day to year and to month by pressing READ/ /TIMER. · Press ZERO/CFM to save the calibration date. · The instrument displays "Stor" for one second and the calibration is saved. 19 · The instrument will return automatically to measurement mode by displaying dashes on the LCD. GLP In GLP mode, the last calibration date can be verified and the factory calibration can be restored. LAST CALIBRATION DATE To display the calibration date: · Press GLP/ to enter GLP mode. The calibration month and day will appear on the main display and the year on the secondary display.

· If no calibration was performed, the factory calibration message, "F.



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CAL" will appear on the main display and the instrument returns to measurement mode after three seconds. **FACTORY CALIBRATION RESTORE** It is possible to delete the calibration and restore factory calibration. · Press GLP/ to enter GLP mode. 20 · Press READ/ /TIMER to enter in the factory calibration restore screen. The instrument asks for confirmation of user calibration delete. @@@@ One fresh battery lasts for around 750 measurements, depending on the light level. The remaining battery capacity is evaluated at the instrument startup and after each measurement. The instrument displays a battery indicator with three levels as follows: · 3 lines for 100 % capacity · 2 lines for 66 % capacity · 1 line for 33 % capacity · Battery icon blinking if the capacity is under 10 %. If the battery is empty and accurate measurements can't be taken anymore, the instrument shows "dEAd bAtt" and turns off.

To restart the instrument, the battery must be replaced with a fresh one. **21 BATTERY REPLACEMENT** To replace the instrument's battery, follow the steps: · Turn the instrument off by pressing ON/OFF. · Turn the instrument upside down and remove the battery cover by turning it counterclockwise. · Extract the battery from its location and replace it with a fresh one. · Insert back the battery cover and turn it clockwise to close. **ACCESORIES REAGENT SET HI 93728-01 HI 93728-03 Reagents for 100 tests Reagents for 300 tests OTHER ACCESORIES HI 96728-11 CAL CHECKTM Standard Cuvettes (1 set) HI 721310 9V battery (10 pcs.) HI 731318 Cloth for wiping cuvettes (4 pcs.) HI 731331 Glass cuvettes (4 pcs.) HI 731335 Caps for cuvettes (4 pcs.) HI 93703-50 Cuvette cleaning solution (230 mL) HI 741218 Carrying case** **22 WARRANTY HI 96728** is warranted for two years against defects in workmanship and materials when used for its intended purpose and maintained according to the instructions.

This warranty is limited to repair or replacement free of charge. Damages due to accident, misuse, tampering or lack of prescribed maintenance are not covered. If service is required, contact your dealer. If under warranty, report the model number, date of purchase, serial number and the nature of the failure.

If the repair is not covered by the warranty, you will be notified of the charges incurred.

If the instrument is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization Number from the Customer Service Department and then send it with shipment costs prepaid. When shipping any instrument, make sure it is properly packaged for complete protection. To validate your warranty, fill out and return the enclosed warranty card within 14 days from the date of purchase. *Recommendations for Users Before using these products, make sure that they are entirely suitable for your specific application and for the environment in which they are used. Operation of these instruments may cause unacceptable interferences to other electronic equipments, this requiring the operator to take all necessary steps to correct interferences.*

Any variation introduced by the user to the supplied equipment may degrade the instruments' EMC performance. To avoid damages or burns, do not put the instrument in microwave oven. For yours and the instrument safety do not use or store the instrument in hazardous environments. Hanna Instruments reserves the right to modify the design, construction and appearance of its products without advance notice. **23 Hanna Instruments Inc. Highland Industrial Park 584 Park East Drive Woonsocket, RI 02895 USA Technical Support for Customers Tel. (800) 426 6287 Fax (401) 765 7575 E-mail tech@hannainst.com www.hannainst.com Local Sales and Customer Service Office Printed in EUROPE (ROMANIA) MAN96728 01/11 24 .**



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