#### **INSTRUCTION MANUAL**

HI 96701

## **Free Chlorine ISM**

HANNA° instruments

Dear Customer

Thank you for choosing a Hanna product. This manual will provide you with the necessary information for the correct use of the instrument. Please read it carefully before using the meter. If you need additional technical information do not bestitute to e-mail us at

information, do not hesitate to e-mail us at • at • O at ] | at å{ ^{ a' a' } ^• È8[ {

#### **Preliminary examination:**

Please examine this product carefully. Make sure that the instrument is not damaged. If any damage occured during shipment, please notify your Dealer.

Each HI 96701 Ion Selective Meter is supplied complete with:

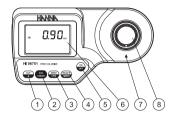
- Two Sample Cuvettes and Caps
- 9V Battery
- Instruction Manual

<u>Note</u>: save all packing material until you are sure that the instrument works correctly. Any defective item must be returned in its original packing.

# For more details about spare parts and accessories

Technical specifications:	
Range	0.00 to 5.00 mg/L of Free Cl <sub>2</sub>
Resolution	0.01 mg/L (0.00-3.50 mg/L); 0.10 mg/L (above 3.50 mg/L)
Accuracy	$\pm 0.03$ mg/L $\pm 3\%$ of reading at 25°C
Typical EMC Dev.	±0.01 mg/L
Light Source	Tungsten lamp
Light Detector	Silicon Photocell with narrow band interference filter @ 525 nm
Method	Adaptation of USEPA method 330.5 and Standard Method 4500-Cl G.
Environment	0 to 50°C (32 to 122°F); max 95% RH non-condensing
Battery Type	1 x 9 volt
Auto-Shut off	After 10' of non-use in measurement mode; after 1 hour of non-use in calibration mode; with last reading reminder.
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")
Weight	360 g (12.7 oz.).

#### Functional description:



- GLP/
   key: press to enter GLP mode. In calibration mode press to
   edit the date and time.
- CAL CHECK key: press to perform the validation of the meter, or press and hold for three seconds to enter calibration mode.
- ZERO/CFM key: press to zero the meter prior to measurement, to confirm edited values or to confirm factory calibration restore.
- READ/►/TIMER key: In measurement mode, press to make a
  measurement, or press and hold for three seconds to start a
  pre-programmed countdown prior to measurement. In GLP
  mode press to view the next screen.
- 5. ON/OFF key: to turn the meter on and off.
- 6. Liquid Crystal Display (LCD)
- 7. Cuvette alignment indicator
- 8 Cuvette holder

#### DISPLAY ELEMENTS DESCRIPTION:



- The measuring scheme (lamp, cuvette, detector), appears during different phases of zero or reading measurement
- 2. Error messages and warnings
- 3. The battery icon indicates the charge state of the battery
- 4. The hourglass appears when an internal check is in progress
- 5. Status messages
- 6. The chronometer appears when the reaction timer is running
- 7. The month, day and date icons appear when a date is displayed
- 8. Four digit main display
- 9. Measuring units
- 10. Four digit secondary display

#### **Errors and warnings:**

#### ON ZERO READING:



**Light High:** There is too much light to perform a measurement. Please check the preparation of the zero cuvette.



**Light Low:** There is not enough light to perform a measurement. Please check the preparation of the zero cuvette.



No Light: The instrument cannot adjust the light level. Please check that the sample does not contain any debris.

#### ON SAMPLE READING:



**Inverted cuvettes:** The sample and the zero cuvette are inverted.



**Zero:** A zero reading was not taken. Follow the instructions of the measurement procedure for zeroing the meter.



Under range: A blinking "0.00" indicates that the sample absorbs less light than the zero reference. Check the procedure and make sure you use the same cuvette for reference (zero) and measurement



Over Range: A flashing value of the maximum concentration indicates an over range condition. The concentration of the sample is beyond the programmed range: dilute the sample and re-run the test.

#### DURING CALIBRATION PROCEDURE:



**Standard Low:** The standard reading is less than expected.



**Standard High:** The standard reading is higher than expected.

#### OTHER ERRORS AND WARNINGS:



Cap error: Appears when external light enters in the analysis cell. Assure that the cuvette cap is present.



Cooling lamp: The instrument waits for the lamp to cool down.



**Battery low:** The battery must be replaced soon.



Dead battery: This indicates that the battery is dead and must be replaced. Once this indication is displayed, normal operation of the instrument will be interrupted. Change the battery and restart the meter.

#### Measurement procedure:

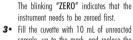
Measurement **▼** 



. -00-

. 00:59

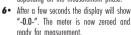
1 • Turn the meter on by pressing ON/OFF.
2 • When the beeper sounds briefly and the LCD displays dashes, the meter is ready.



sample, up to the mark, and replace the cap.

4. Place the cuvette into the holder and ensure that the notch on the cap is positioned securely into the groove.





7• Remove the cuvette.

8 • Add the content of one packet of HI 93701-0 Free Chlorine reagent.

9 • Replace the cap and shake gently for 20 seconds (or 2 minutes in case of seawater analysis).

10 • Replace the cuvette into the holder and ensure that the notch on the cap is positioned securely into the groove.

11 • Press and hold READ/ TIMER for three seconds. The display will show the countdown prior to measurement. The beeper is playing a beep at the end of countdown period.

Alternatively, wait for 1 minute and just press READ/ /TIMER.

In both cases, the lamp, cuvette and detector icons will appear on the display, depending on the measurement phase.

12 • The instrument directly displays concentration in mg/L of free chlorine on the Liquid Crystal Display.



#### INTERFERENCES:

- · Positive error: Bromine. Oxidized Managnese and Chromium. Chlorine dioxide. Ozone and
- Alkalinity above 250 ma/L CaCO or acidity above 150 ma/L CaCO will not reliably develop the full amount of color or it may rapidly fade. To resolve this, neutralize the sample with diluted HCl or NaOH.
- In case of water with hardness greater than 500 ma/L CaCO<sub>a</sub>, shake the sample for approximately 2 minutes after adding the powder reagent.



Validation w

- 0.0 -





#### Validation and Calibration procedures

Warning: do not validate or calibrate the instrument with standard solutions other than the Hanna CAL CHECK™ Standards, otherwise erroneous results will be obtained

For accurate validation and calibration results, please perform tests at room temperature (18 to 25°C: 64.5 to 77.0°F).

*i* Use the Hanna CAL CHECK™ cuvettes (see "Accessories") to validate or calibrate instruments.

#### VALIDATION

- 1 Turn the meter on by pressing ON/OFF.
- 2. When the beeper sounds briefly and the LCD displays dashes, the meter is ready.
- 3. Place the CAL CHECK™ Standard HI 96701-11 Cuvette A into the holder and ensure that the notch on the cap is positioned securely into the groove.
- 4. Press ZERO/CFM and the lamp, cuvette and detector icons will appear on the 4-5 display, depending on the measurement
- 5. After a few seconds the display will show "-0 0-" The meter is now zeroed and ready for validation.
- 6. Remove the cuvette.
- 7. Place the CAL CHECK™ Standard HI 96701-11 Cuvette B into the holder and ensure that the notch on the cap is positioned securely into the groove.
- 8. Press CAL CHECK key and the lamp. cuvette and detector icons together with "CAL CHECK" will appear on the display. depending on the measurement phase.
- 9. At the end of the measurement the display will show the validation standard value. The reading should be within specifications as reported on the CAL CHECK™ Standard Certificate. If the value is found

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out of 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

#### CALIBRATION

Note: It is possible to interrupt the calibration procedure at any time by pressing CAL CHECK or ON/OFF keys.

- 1 Turn the meter on by pressing ON/OFF.
- 2. When the beeper sounds briefly and the LCD displays dashes, the meter is ready.
- 3. Press and hold CAI CHECK for three seconds to enter calibration mode. The display will show "CAL" during calibration 3 procedure. The blinking "ZERO" asks for instrument zeroina.
- 4. Place the CAL CHECK™ Standard HI 96701-11 Cuvette A into the cuvette holder and ensure that the notch on the cap is positioned securely into the groove.
- 5. Press ZERO/CFM and the lamp, cuvette and detector icons will appear on the display. depending on the measurement phase.
- 6. 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.
- 7. Remove the cuvette.
- 8. Place the CAI CHECK™ Standard HI 96701-11 Cuvette B into the holder and ensure that the notch on the cap is positioned securely into the groove.
- 9. Press READ/>/TIMER and the lamp. cuvette and detector icons will appear on the display, depending on the measurement
- 10 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™ Standard HI 96701-11 Cuvettes. A and B are free from fingerprints or dirt and that they are inserted correctly.
- 11 Then the date of 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.



**Calibration ▼** 

- 13. When the correct year has been set, press ZERO/CFM or READ/►/TIMER to confirm. Now the display will show the month hlinkina
- 14 Press GLP/▲ to edit the desired month (01-12). If the key is kept pressed, the month number is automatically increased
- 15. When the correct month has been set. press ZERO/CFM or READ/>/TIMER to confirm. Now the display will show the day blinking.
- 16 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 RFAD/►/TIMFR
- 17. Press ZERO/CFM to save the calibration
- 18. The instrument displays "Stor" for one second and the calibration is saved
- 19. The instrument will return automatically to *measurement mode* by displaying dashes











GLP









100.

In GLP mode, the last calibration date can be verified and the factory calibration can be restored.

### LAST CALIBRATION DATE

- 1 Press GLP/▲ to enter GLP mode. The calibration month and day will appear on the main display and the year on the secondary display.
- 2. If no calibration was performed, the factory calibration message, "F.CAL" will appear on the main display and the instrument returns to measurement mode after three seronds



Last

Date w

**Calibration** 

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#### FACTORY CALIBRATION RESTORE

It is possible to delete the calibration and restore factory calibration.

- 1 Press GLP/▲ to enter GLP mode.
- 2. Press READ/>/TIMER to enter in the factory calibration restore screen. The instrument asks for confirmation of user calibration delete
- 3. Press ZERO/CFM to restore the factory 3-4 calibration or press GLP/A again to abort factory calibration restore.
- 4. The instrument briefly indicates "donE" upon restoration of factory calibration prior to returning to measurement mode.

If a valid measurement was displayed before

auto-shut off, the value is displayed when the

instrument is switched on. The blinking "ZERO"

means that a new zero has to be performed.

and after each measurement.

• 3 lines for 100 % capacity

• 2 lines for 66 % capacity

• 1 line for 33 % capacity

To save the battery, the instrument shuts down after 10 minutes of non-use

in measurement mode and after 1 hour of non-use in calibration mode.

One fresh battery lasts for arround 750 measurements, depending on the

The remaining battery capacity is evaluated at the instrument startup

The instrument displays a battery indicator with three levels as follows:

If the battery is empty and accurate measurements can't be taken any

To restart the instrument, the battery must be replaced with a fresh one.

· Turn the instrument upside down and remove the battery cover by

• Battery icon blinking if the capacity is under 10 %.

more, the instrument shows "dEAd bAtt" and turns off.

To replace the instrument's battery, follow the steps:

• Turn the instrument off by pressing ON/OFF.

turning it counterclockwise.

**Battery management** 





donE

150mm



HI 731318 HI 731331

HI 731335 Caps for cuvettes (4 pcs) HI 93703-50 Cuvette cleaning solution (230 mL).

9V battery (10 pcs)

Glass cuvettes (4 pcs)

### Warranty

**Accessories:** 

REAGENT SETS

HI 93701-01

HI 93701-03

HI 96701-11

HI 721310

OTHER ACCESSORIES

HI 96701 is warranted for two years against defects in workmanship and materials when used for its intended purpose and maintained according to the instructions

Reagents for 100 Free Chlorine tests

Reggents for 300 Free Chlorine tests

Cloth for wiping cuvettes (4 pcs)

CAL CHECK™ Standard Cuvettes (1 set)

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.

Before using these products, make sure that they are entirely suitable for your specific application and for the environment in which they are used

Oneration of these instruments may cause unacceptable interferences to other electronic equipments, this requiring the operator to take all peressary steps to correct interferences

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

To avoid damages or burns, do not out 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.



 Extract the battery from its location and replace it with a fresh one. · Insert back the battery cover and turn it clockwise to close.

