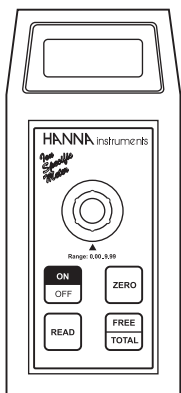


## Instruction Manual

# HI 93711 Free & Total Chlorine ISM



Dear Customer,

Thank you for choosing a Hanna product. This manual will provide you with the necessary information for the correct operation of the meter. Please read it carefully before using the meter. If you need additional technical information, do not hesitate to e-mail us at techserv@hannacan.com.

This instrument is in compliance with CE directives EN 50081-1 and EN 50082-1.

## PRELIMINARY EXAMINATION

Remove the instrument from the packing material and examine it carefully to make sure that no damage has occurred during shipment. If there is any damage, notify your Dealer.

Each Ion Specific Meter is supplied complete with

- 9V Battery
- Two Sample Cuvets and Caps
- One Transport Cap

**Note:** Conserve all packing material until the instrument has been observed to function correctly. Any defective item must be returned in its original packing.

## GENERAL DESCRIPTION

The HI 93711 meter measures the free and total chlorine (Cl<sub>2</sub>) content in water and wastewater.

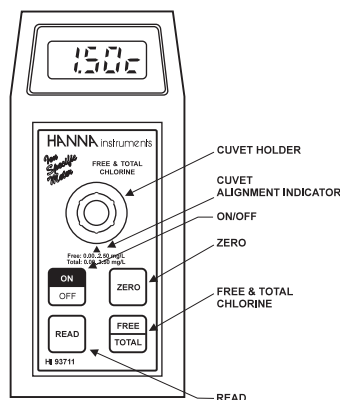
The meter uses an exclusive positive-locking system to ensure that the cuvet is in the same place every time it is placed into the measurement cell.

The reagents are in liquid and powder form and are supplied in bottles and in packets. The amount of reagent is precisely dosed to ensure maximum repeatability.

Display codes aid the user in routine operations.

The meters have an auto-shut off feature that will turn the instrument off after 10 minutes of non-use.

## SPECIFICATIONS



### SPECIFICATIONS

Range	Free Cl <sub>2</sub> 0.00 to 2.50 mg/L Total Cl <sub>2</sub> 0.00 to 3.50 mg/L
Resolution	0.01 mg/L
Accuracy	±0.03 mg/L ±3% of reading
Typical EMC Deviation	±0.01 mg/L
Light Source	Light Emitting Diode @ 555 nm
Method	Adaptation of the EPA recommended DPD method 330.5. The reaction between the chlorine and the DPD reagent causes a pink tint in the sample
Light Detector	Silicon Photocell
Environment	0 to 50°C (32 to 122°F); max 95% RH non-condensing
Battery Type/Life	1 x 9 volt/40 hours
Auto-Shut off	After 10' of non-use
Dimensions	180 x 83 x 46 mm (7.1 x 3.3 x 1.8")
Weight	290 g (10 oz.).

### REQUIRED REAGENTS

#### POWDER:

Code	Unit	Description	Quantity
HI 93701-0	Free Cl <sub>2</sub>	DPD	1 packet
HI 93711-0	Total Cl <sub>2</sub>	DPD	1 packet

#### LIQUID:

Code	Unit	Description	Quantity
HI 93701A-T	Free and Total Cl <sub>2</sub>	DPD1 indicator	3 drops
HI 93701B-T	Free and Total Cl <sub>2</sub>	DPD1 buffer	3 drops
HI 93701C	Total Cl <sub>2</sub> only	DPD3 solution	1 drop

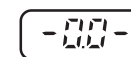
## DISPLAY CODE GUIDE



This indicates that the meter is in a ready state and zeroing can be performed.



Sampling in Progress. This prompt appears each time the meter is performing a measurement.



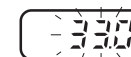
This indicates that the meter is in a zeroed state and measurement can be performed.



A zero reading was not taken. Insert a sample before adding reagent and press ZERO.



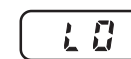
Under range. A blinking "0.00" indicates that the sample absorbs less light than the zero reference. Check the procedure and make sure you use the same cuvet for reference (zero) and measurement.



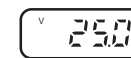
Over range. A flashing value higher than the maximum concentration readable (see specifications) indicates that the sample absorbs too much light, meaning that the concentration is too high. Dilute the sample.



Light over range. The cuvet is not inserted correctly and an excess ambient light is reaching the detector. If the cover is properly installed, then contact your dealer or the nearest Hanna Customer Service Center.



Light under range. The zero sample is too dark for proper zeroing. If this is not the case, contact your dealer or the nearest Hanna Customer Service Center.



The "V" indicates that the battery voltage is getting low and the battery needs to be replaced.



This indicates that the battery is dead and must be replaced.

**Note:** once this indication is displayed, the meter will lockup. Change the battery to restart.

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**CE**  
This Instrument is in  
Compliance with the CE  
Directives

## WARRANTY

HI 93711 is warranted for two years against defects in workmanship and materials when used for its intended purpose and maintained according to 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 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 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.

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Hanna Instruments reserves the right to modify the design, construction and appearance of its products without advance notice.

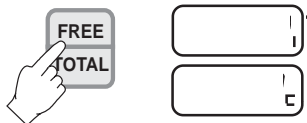
# OPERATIONAL GUIDE

## MEASUREMENT PROCEDURE

- Turn the meter on by pressing ON/OFF.

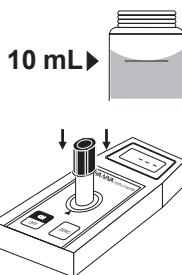


- When the LCD displays "- - -", it is ready.
- Select free or total Chlorine by pressing FREE/TOTAL. An "I" or a "C" will appear on the right corner to indicate free or total chlorine, respectively.
- Fill the cuvet with 10 mL of unreacted sample,

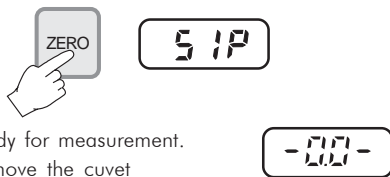


up to the mark, and replace the cap.

- Place the cuvet into the holder and ensure that the notch on the cap is positioned securely into the groove.



- Press ZERO and "SIP" will appear on the display.
- Wait for a few seconds and the display will show "0.0-". Now the meter is zeroed and



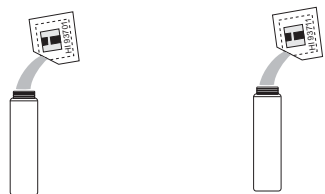
ready for measurement.

- Remove the cuvet

### Powder reagents procedure

- Add the specific test reagent:  
Free Chlorine: 1 packet of Total Chlorine: 1 packet of DPD Free Chlorine reagentDPD Total Chlorine reagent.

- Replace the cap and shake gently.

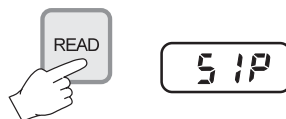


- Wait for a few seconds, until all the air bubbles have completely dissolved and reinsert the cuvet into the instrument.

- Press READ and the display will show "SIP" during measurement.

**Note:** For total chlorine measurements wait for 2 minutes and 30 seconds before pressing the READ key.

- The instrument directly displays concentration

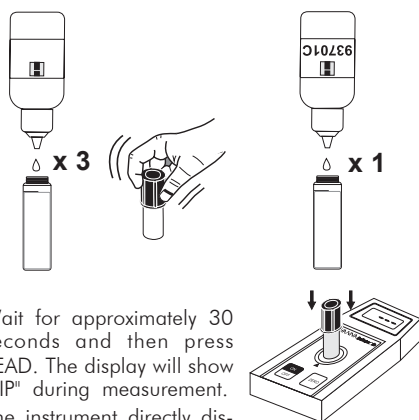


in mg/L of free or total chlorine on the Liquid Crystal Display.

### Liquid reagents procedure

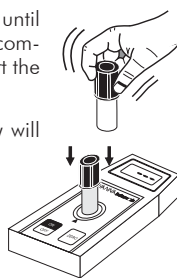
- To measure Free Chlorine, add 3 drops of HI 93701A-T DPD1 indicator and 3 drops of HI 93701B-T DPD1 buffer to the cuvet. To measure Total Chlorine, also add 1 drop of HI 93701C. Shake gently before adding 10 mL of unreacted sample. Replace the cap and shake gently again.

- Reinsert the cuvet into the instrument.



- Wait for approximately 30 seconds and then press READ. The display will show "SIP" during measurement.
- The instrument directly displays concentration in mg/L of free or total chlorine on the Liquid Crystal Display.

**Note:** Free and total chlorine have to be measured separately with fresh unreacted samples following the above procedure if both values



are requested.

### INTERFERENCES

Interference may be caused by:

- Bromine
- Fluorine
- Iodine
- Ozone

Oxidized manganese and Chromium Alkalinity above 250 mg/L or acidity above 150 mg/L 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 mg/L CaCO<sub>3</sub>, shake the sample for approximately 1 minute after adding the reagent.

## TIPS FOR AN ACCURATE MEASUREMENT

The instruction listed below should be carefully followed during testing to ensure best accuracy.

- Do not touch the cuvet walls with hands.
- In order to maintain the same conditions during the zeroing and the measuring phases, it is necessary to close the cuvet to prevent any contamination.
- Do not let the test sample stand too long after reagent is added or accuracy will be lost.
- Whenever the cuvet is placed into the measurement cell, it must be completely free of fingerprints, oil or dirt. Wipe it thoroughly with HI 731318 or a lint-free cloth prior to insertion.
- It is important that the sample does not contain any debris. This would corrupt the readings.
- It is possible to take multiple readings in a row, but it is recommended that a zero reading be taken for each sample and that the same cuvet is used for zeroing and measurement.
- It is important to discard the sample immediately after the reading is taken because the glass might become permanently stained.
- Shaking the cuvet can generate bubbles in the sample, causing higher readings. To obtain accurate measurements, remove such bubbles by swirling or by gently tapping the vial.
- All the reaction times reported in this manual are referred to 20°C (68°F). As a general rule of thumb, they should be doubled at 10°C (50°F) and halved at 30°C (86°F).

## ACCESSORIES

### REAGENT SETS

- HI 93701-01 Reagents for 100 free chlorine tests (powder)
- HI 93701-03 Reagents for 300 free chlorine tests (powder)
- HI 93711-01 Reagents for 100 total chlorine tests (powder)
- HI 93711-03 Reagents for 300 total chlorine tests (powder)
- HI 93701-T Reagents for 300 chlorine tests (liquid)

### OTHER ACCESSORIES

- HI 710009 Blue rubber boot
- HI 710010 Orange rubber boot
- HI 721310 9V battery (10 pcs)
- HI 731318 Tissue for wiping cuvetts (4 pcs)
- HI 731321 Glass cuvetts (4 pcs)
- HI 731325 Caps for cuvetts (4 pcs)
- HI 93703-50 Cuvets cleaning solution (230 mL).

## CE DECLARATION OF CONFORMITY



DECLARATION OF CONFORMITY

We

Hanna Instruments Italia Srl  
via E. Fermi, 10  
35030 Sarmeola di Rubano - PD  
ITALY

herewith certify that the meter:

HI 93711

has been tested and found to be in compliance with the following regulations:

IEC 801-2 Electrostatic Discharge  
IEC 801-3 RF Radiated  
EN 55022 Radiated, Class B  
EN 61010-1 User Safety Requirement

Date of Issue: 19-02-1997

D. Volpato - Engineering Manager  
On behalf of  
Hanna Instruments Italia S.r.l.

### Recommendations for Users

Before using these products, make sure that they are entirely suitable for the environment in which they are used. Operation of these instruments in residential area could cause unacceptable interferences to radio and TV equipments, 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 perform any measurement in microwave ovens.