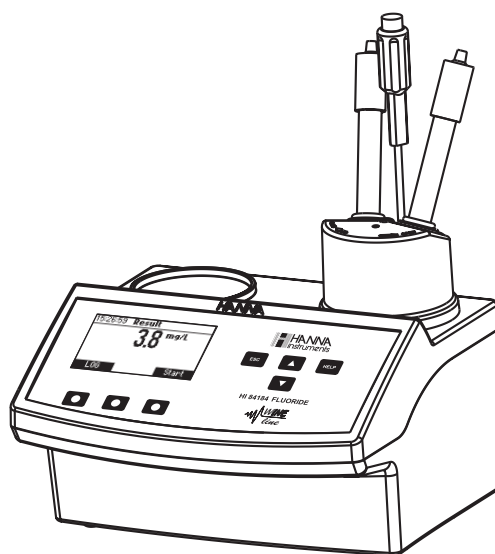


Instruction Manual

HI 84184 ISE Fluoride Meter



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 hesitate to e-mail us at tech@hannainst.com.

This instrument is in compliance with **CE** directives.

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MODEL IDENTIFICATION

Two models are available:

HI 84184-01 - 115 Vac power supply

HI 84184-02 - 230 Vac power supply

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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 84184** instrument is supplied complete with:

- Reagents set for 20 tests
- One 1000 μL automatic pipette
- Four plastic tips for the 1000 μL automatic pipette
- Two 50 mL beakers
- Two 20 mL beakers
- **HI 61010** Fluoride half cell
- **HI 5315** Reference half cell
- **HI 7662-T** Temperature probe
- Stir bar (2 pcs.)
- Power cable
- **HI 7075** Refilling solution (4×30 mL)
- One 1 mL syringe
- One 1 mL pipette
- Instruction sheet
- 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.

GENERAL DESCRIPTION

The **HI 84184** is a low cost, easy to use, fluoride ISE instrument that performs automatic analysis with all the necessary calculations assuring to the user a simple and effective interface.

The instrument comes with a powerful and effective built-in algorithm to analyse the shape of the ISE electrode response and to determine the reaction completion.

By simply pressing the **Start** key, the instrument performs automatic analysis, all the necessary calculations and verifications. The result is immediately displayed in convenient units, then the instrument is ready for another measurement.

SIGNIFICANCE OF USE

Fluoride ion (F^-) comes from grapes used for wine and its usual concentration value varies between 0.1 and 2 mg/L. Higher levels of fluoride content in wine can derive from cryolite used by farmers as an insecticide in the vine.

The **HI 84184** ISE Fluoride meter measures the fluoride content in wine using an ion selective electrode. The used method is double standard addition, and the result is readily displayed in F^- mg/L (ppm).

SPECIFICATIONS

Range	0.0 to 5.0 mg/L (ppm) F ⁻
Resolution	0.1 mg/L (ppm) F ⁻
Accuracy	± 5% of reading (see note)
Sample volume	50 mL
Temperature Compensation	Automatic from 0 to 80 °C
Electrodes	HI 61010 Fluoride half cell HI 5315 Reference half cell
Temperature Probe	HI 7662-T (included)
LOG feature	50 samples
Stirring speed	500 rpm
Environment	0 to 50 °C (32 to 122 °F); max 95% RH non-condensing
Power supply	220V/50Hz; 10VA
Dimensions	208 x 214 x 163 mm (8.2 x 8.4 x 6.4") (with beaker)
Weight	2200 g (77.6 oz.)

Note: Above 3 mg/L the instrument process information about the approximate fluoride content.

REQUIRED REAGENTS

Code	Description	Quantity/Test
HI 84184-0	TISAB W/5	10 mL
HI 84184-1	Standard 1	1 mL
HI 84184-2	Standard 2	1 mL

PRINCIPLE OF OPERATION

The determination of fluoride concentration is made according to double standard addition method. This technique enables an unknown concentration and the electrode's slope factor to be determined simultaneously.

The Automatic Temperature compensation is available using HI 7662-T temperature probe. By setting the electrode isopotential point and enabling temperature compensation option in **Setup** menu, the obtained concentration is temperature compensated.

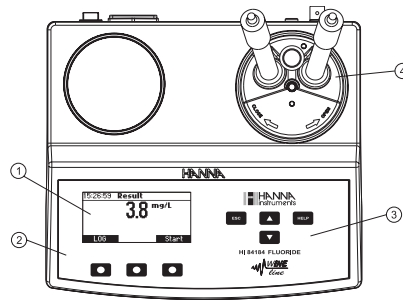
The accuracy of the obtained result depends on the stability of the mV reading in every step of the measurement.

Three selectable stability criteria can be selected in **Setup** menu. Select **Medium** or **Accurate** criteria in order to have accurate analysis.

FUNCTIONAL DESCRIPTION

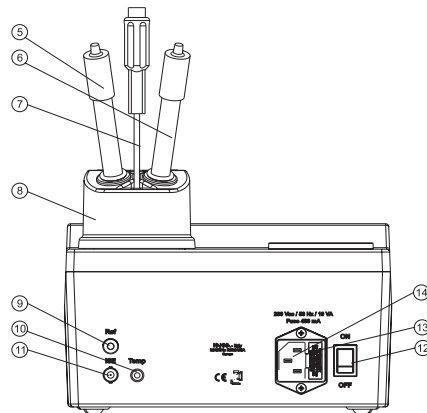
INSTRUMENT DESCRIPTION

FRONT PANEL



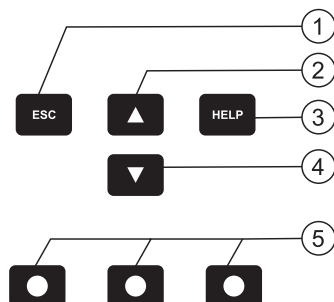
- 1) Graphic LCD
- 2) Functional keys
- 3) Keypad
- 4) Electrode holder

REAR PANEL



- | | |
|------------------------|------------------------------|
| 5) Fluoride half cell | 10) Temperature probe socket |
| 6) Reference half cell | 11) BNC electrode connector |
| 7) Temperature probe | 12) Power switch |
| 8) Electrode holder | 13) Fuse |
| 9) Reference socket | 14) Power cable connector |

KEYPAD DESCRIPTION



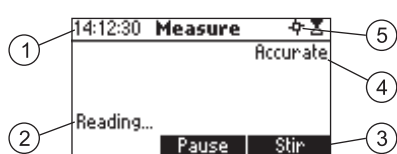
- 1) **ESC** - to leave the current screen and to return either to the previous screen or to the main screen. In the setup parameter modifying mode by pressing **ESC** the value is not modified.
- 2) **▲** - to modify a parameter value, to scroll the information from the instrument's setup
- 3) **HELP** - to access/leave the instrument's contextual help
- 4) **▼** - to modify a parameter value, to scroll the information from the instrument's setup
- 5) Functional Keys

START UP

- Place the instrument on a flat table. Do not place the instrument in direct sunlight.
- Connect the instrument to mains socket with ground connection and the correct voltage and frequency. See the label on the instrument rear for this.
- Connect the **HI 61010** fluoride half cell, the **HI 5315** reference half cell and the **HI 7662-T** temperature probe.
- Turn the instrument ON using the power switch from the rear panel of the instrument and wait until main screen is displayed.

GUIDE TO DISPLAY CODES

During the instrument's operation a series of information is displayed on the LCD.



- 1) current time information area
- 2) instrument status area
- 3) functional keys area
- 4) stability criteria
- 5) stirrer and reading status area

Icons from the stirrer and reading status area



When the input reading is unstable.

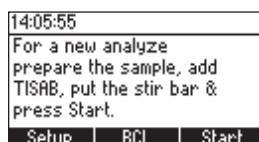


When the stirrer is on.



Temperature warning (only if the “Temperature compensation” is disabled). The warning symbol will be displayed if the temperature difference between the temperature of the sample confirmed at the first step and the subsequent readings is greater than 3 °C.

Measure screens



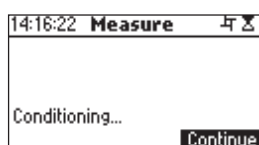
Main screen display

Press **Setup** to access the instrument's setup.

Press **RCL** to view logged data.

Press **Start** to begin a new measurement cycle.

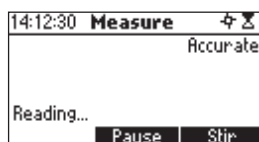
Press **HELP** at any moment to view the contextual help.



Conditioning screen

A two minutes conditioning period is initiated.

Press **Continue** to stop this conditioning period and skip the message.

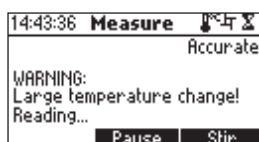


Measure screen

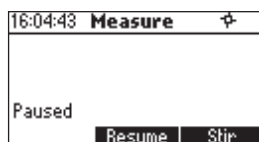
Press **ESC** at any moment during the measurement cycle and the instrument will return to the main screen.

Press **Pause** to pause the measurement process.

Press **Stir** to start/stop the stirrer.



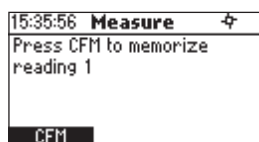
If the difference between the temperature of the sample confirmed at the first step and the subsequent readings is greater than 3°C and the temperature compensation feature is disabled in **Setup**, the temperature warning icon will blink and the message “WARNING: Large temperature change!” will be displayed.



Pause screen

Press **Resume** to continue the measurement process.

Press **Stir** to start/stop the stirrer.



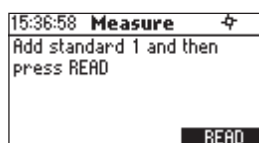
Sample reading confirm screen (only if this feature is enabled in setup)
Press **CFM** to memorize the reading.



Wrong input error screen
This screen is displayed if the current reading is out of $\pm 2000\text{mV}$ range.



Wrong standard error screen
This screen is displayed if step 2 and 3 of the current reading is out of $\pm 2000\text{mV}$ range or if the difference between the stable readings from the current and the previous step is too small ($\pm 3\text{mV}$) or, if in auto confirm mode, the standard addition is not detected.



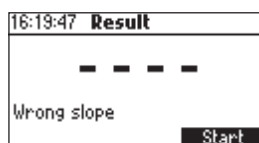
Add standard screen
Add the corresponding standard. Press **READ** to start the next step analysis if “**Reading confirm**” option is enabled in the **Setup** menu. If “**Reading confirm**” option is disabled, the instrument will start with the next step analysis.



Result screen
The ion concentration is displayed in mg/L (ppm) F . If the concentration is out of range, the instrument displays the upper range limit blinking.



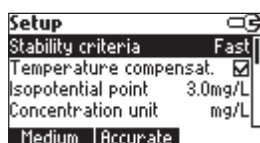
Press **LOG** to save the measured concentration. A message indicating the free log space will be displayed for a few seconds. If the free log space is under 10% this message will be permanently displayed.
Press **Start** to begin a new measurement cycle.



Wrong slope screen
This screen appears if the computed slope is not in the acceptable range. The acceptable range is 30% to 140% default slope (56 mV/decade)
Press **Start** to begin a new measurement cycle.

Setup screens

While in the **Setup** menu it is possible to modify the instrument parameters. By pressing the **▲/▼** keys it is possible to move between the **Setup** options. Each menu option displays the current option. Press **HELP** to view the contextual help.



Stability criteria

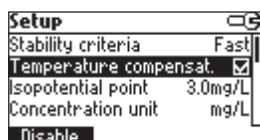
Options: **Accurate**, **Medium**, **Fast**.

Press the corresponding functional key to select the desired option.

Select **Accurate** for accurate measurements; long duration.

Select **Medium** for normal measurements.

Select **Fast** only for quick estimations; low accuracy in short time.



Temperature compensation

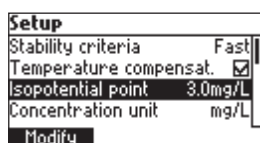
Options: **Enable**, **Disable**.

Enable this feature only if **HI 7662-T** temperature probe is connected and electrode isopotential point is known.

If enabled, the meter will take into account the temperature of the readings when evaluating the final result.

If disabled, the computed concentration will not be temperature compensated.

Press the functional key to select the desired option.



Isopotential point

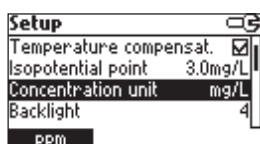
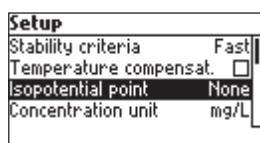
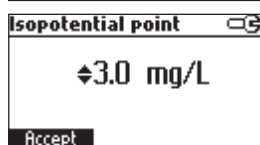
Options: **1.0 to 50.0 mg/L (ppm)**.

Press **Modify** to access the isopotential point concentration modify screen.

Press **▲/▼** to increase/decrease the isopotential point concentration.

Press **Accept** to confirm the value or **ESC** to return to the **Setup** menu without saving.

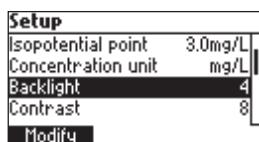
If the temperature compensation feature is disabled the meter will display "**None**" for the isopotential point, and the isopotential point modify screen cannot be accessed.



Concentration unit

Options: **mg/L**, **ppm**

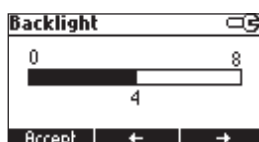
Press the corresponding functional key to select the desired concentration unit to be used in displaying measurement results.



Backlight

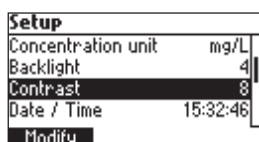
Options: **On-Off, 1 to 8 levels.**

Press **Modify** to access the backlight modify screen.



Press **▲/▼** or **←/→** in order to increase/decrease the display's backlight intensity.

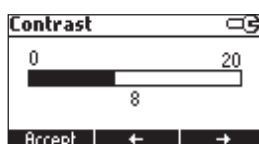
Press **Accept** to confirm the value or **ESC** to return to the **Setup** menu without saving.



Contrast

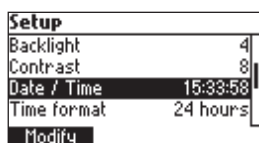
Options: **0 to 20.**

Press **Modify** to access the contrast value modify screen.



Press **▲/▼** or **←/→** in order to increase/decrease the display's contrast.

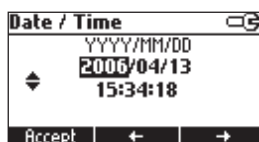
Press **Accept** to confirm the value or **ESC** to return to **Setup** menu without saving.



Date/Time

This option is used to set the instrument's date and time.

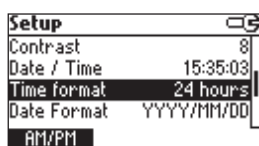
Press **Modify** to access the date/time modify screen.



Date/Time modify screen

Press **← / →** to select the value to be modified (year, month, day, hour, minute or second) and then press **▲/▼** in order to increase/decrease the value.

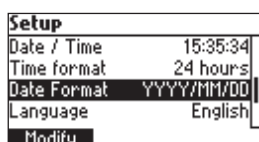
Press **Accept** to confirm the new values or **ESC** to return to **Setup** menu without saving.



Time format

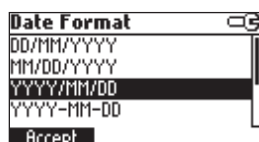
Options: **AM/PM or 24 hours.**

Press the functional key in order to change the time format.

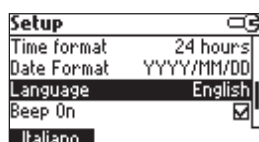


Date format

Press **Modify** to access the date format modify screen.



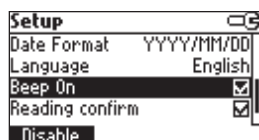
Press ▲/▼ or in order to select the desired format.
Press **Accept** to confirm the desired date format or **ESC** to return to the **Setup** menu without saving.



Language

Options: **Up to four available languages.**

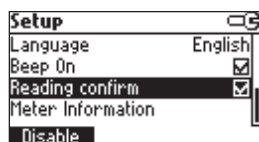
This option is used to change the instrument's display language. Press the corresponding functional key in order to select the new option. If the new selected language cannot be loaded, the previously selected language will be kept. The **HELP** information is not available if no language file can be loaded.



Beep status

Options: **Enable, Disable**

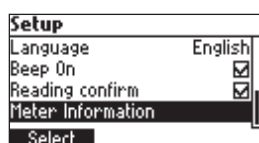
This option enables/disables the beep feature. Press the functional key in order to select the new option. When enabled, beep sounds as a short beep every time a key is pressed or when the reading must be confirmed. In auto confirm mode the instrument will beep until the standard addition is detected. A long beep alerts that the pressed key is not active.



Reading confirm

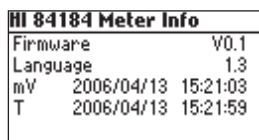
Options: **Enable, Disable**

Enable this feature to manually confirm a stable reading. If disabled, the instrument will automatically store a reading when it becomes stable, and move to the next step of the measurement cycle. Press the functional key in order to select the new option.



Meter information

Press **Select** to view the firmware version, language version, mV factory calibration date and time and temperature factory calibration date and time.



Recall screens

	Conc	Unit	Date
2	2.0	mg/L	2006/04/13
3	1.0	mg/L	2006/04/13
4	1.1	mg/L	2006/04/13
5	2.8	mg/L	2006/04/13
Delete All Delete More			

Displays the list of all the memorised results. This list includes the record's number, the concentration value, the concentration unit and the date.

Press ▲/▼ to toggle between the stored records.

Record number: 5
Date: 2006/04/13
Time: 16:06:24
Conc: 2.8mg/L
Stability criteria: Accurate
Reading confirm: User

Press **More** to view a complete set of data corresponding to the selected record. To return to the previous screen press **ESC**.

Press ▲/▼ to toggle between complete record information screens.

Delete Record?
2 2.0 mg/L 2006/04/13
3 1.0 mg/L 2006/04/13
4 1.1 mg/L 2006/04/13
5 2.8 mg/L 2006/04/13
CFM

Press **Delete** to erase the currently selected record from the instrument's memory. After pressing **Delete** the instrument will ask for confirmation. Press **CFM** to delete the record or **ESC** to return to the previous screen without deleting.

Deleting a record will reorganise the list of records.

Delete all records?
2 2.0 mg/L 2006/04/13
3 1.0 mg/L 2006/04/13
4 1.1 mg/L 2006/04/13
5 2.8 mg/L 2006/04/13
CFM

Press **Delete All** to erase all the stored records. After pressing **Delete All** the instrument will ask for confirmation. Press **CFM** to delete all the records or **ESC** to return to the previous screen without deleting.

Results
No Records!

If the log is empty the message **"No Records!"** will be displayed.

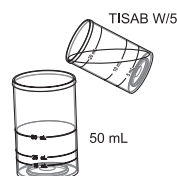
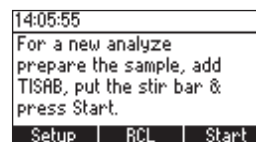
TIPS FOR AN ACCURATE MEASUREMENT

The instructions listed below should be carefully followed during analysis to ensure best accuracy.

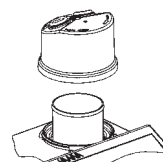
- Rinse the electrode pair with distilled or deionised water between samples, and blot dry with a lab wipe or other soft disposable absorbent toweling.
- Select the adequate stability criteria.
- Analyse the wine sample at room temperature.

MEASUREMENT PROCEDURE

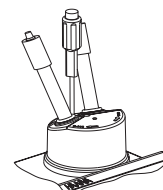
- Fill the beaker up to the 50 mL mark with sample; add 10 mL of **HI 84184-0 TISAB W/5**, place the stir bar into the beaker and then place the beaker in the appropriate place on the instrument top.



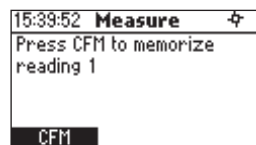
- Place the electrode holder on the top of the beaker and secure it by turning clockwise.



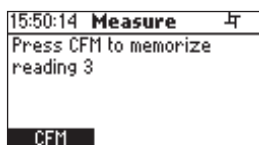
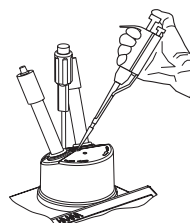
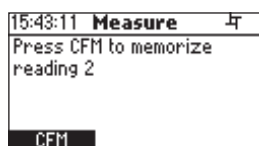
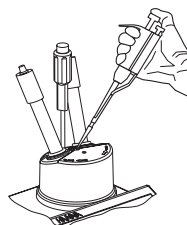
- Immerse **HI 61010** fluoride electrode, **HI 5315** reference and the **HI 7662-T** temperature probe approximately 2 cm (0.8") into the sample to be tested paying attention to not touch the stir bar, and press **Start**.



- Wait until the reading is stable, **CFM** key displayed, if the "Reading confirm" option is selected, and then press **CFM**. If the "Reading confirm" option is disabled the instrument automatically memorizes the reading when this is stable and waits to add standard. Until the standard addition is detected the instrument will beep if beeper is enabled in **Setup**.

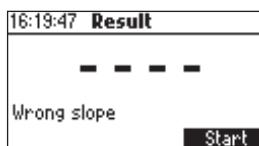


- Use the 1000 μL automatic pipette to add exactly 1 mL of **HI 84184-1** Standard when the meter asks for it. If the instrument is not in auto confirm mode, press **READ** to start next measurement step.
- Wait until the reading is stable, **CFM** key displayed, if the **"Reading confirm"** option is selected, and then press **CFM**. If the **"Reading confirm"** option is disabled the instrument automatically memorizes the reading when this is stable and waits to add standard. Until the standard addition is detected the instrument will beep if beeper is enabled in **Setup**.
- Use the 1000 μL automatic pipette to add exactly 1 mL of **HI 84184-2** Standard when the meter asks for it. If the instrument is not in auto confirm mode, press **READ** to start next measurement step.
- Wait until the reading is stable, **CFM** key displayed, if the **"Reading confirm"** option is selected, and then press **CFM**. If the **"Reading confirm"** option is disabled the instrument automatically memorizes the reading when this is stable and computes result.
- At the end of the measurement procedure the result is displayed as mg/L (ppm) F.



Notes:

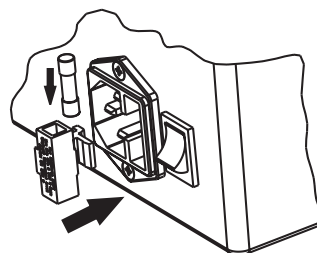
- If the reading is out of range, the upper range value is displayed blinking.
- If the evaluated slope is out of 30-140% range the instrument displays "----" and **"Wrong slope"** message.
- If auto confirm mode is selected and beep feature is enabled, the instrument will beep after reading is confirmed until the addition of the standard is detected. If the addition of the standard is not detected after a period of time between 10 to 20 minutes, according with the stability criteria, **"Wrong standard"** message will be displayed.



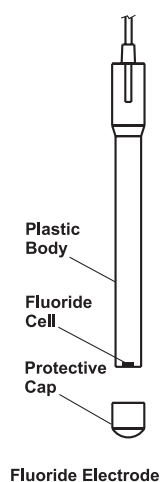
FUSE REPLACEMENT

To change the fuse follow next steps:

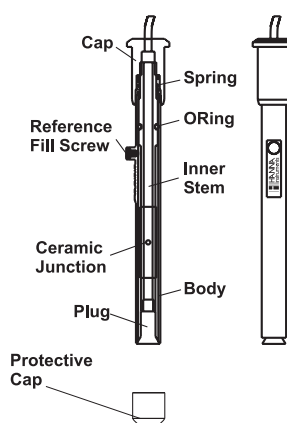
- Disconnect the power cord from the rear panel of the instrument.
- Pull out the fuse holder located near the power cord connector.
- Replace the fuse with a similar one.
- Push the fuse holder with the fuse in the appropriate place.



ELECTRODE CONDITIONING & MAINTENANCE



Fluoride Electrode



Reference Electrode

PREPARATION PROCEDURE

Preparation of fluoride electrode:

- Remove the protective cap from the HI 61010 fluoride sensor's tip.
- Screw the fluoride cell into the electrode body.
- Soak in fluoride standard.

Preparation of reference electrode:

- Unwrap Parafilm™ seal found over ceramic junction on inner stem of the reference electrode and discard. This is only used for shipping.
- Rinse inner stem with deionized water making certain to wet o-ring found on the inner stem.

- Reassemble reference electrode by gently pushing the inner assembly into the outer body, sliding spring down cable, and screwing cap into place.
- Remove fill hole cover and o-ring or fill hole spout.
- Using the dropper pipette provided, add a few drops of **HI 7075** filling solution to the reference electrode, wetting the o-ring and rinsing out the fill solution chamber.
- Holding the body of the electrode depress the black cap with your thumb. This permits the fill solution to drain out of the body. Verify if the electrode returns to its original position. (You may need to gently assist for this to occur).
- Tighten the electrode cap onto the body and fill electrode body with **HI 7075** filling solution until fill solution volume is just below fill hole.
- Place sensor and reference electrode into electrode holder and connect the Cable Connectors to the instrument.

Note: During measurement always operate reference electrode with the fill hole open.

CLEANING PROCEDURE

- Rinse the fluoride electrode with deionised water. Check to see if the small scratches have been eliminated.
- Soak the fluoride electrode in a standard for one hour.
- Rinse with deionised water and blot dry.

REFERENCE ELECTRODE CLEANING

- Drain the old filling solution, rinse with an adequate **HI 7075** solution, drain, then refill with **HI 7075** solution.
- Do not use an electrode if cristalised salts are visible inside the electrode. Drain electrode, disassemble and rinse internal body with deionised water. Reassemble and refill with fresh refill solution.
- The internal chamber of this electrode is gell filled. If the electrode has been left dry for long periods of time the gell may be dehydrated and stable measurements may not be obtainable. Disassemble electrode and soak internal assembly in **HI 7075** filling solution. Verify the ceramic is wetted by the fill solution. Warming the solution slightly (50 °C) before soaking will hasten this process. Permit the electrode to cool completely while immersed in this solution.

QUICK CHECK OF THE ELECTRODE SLOPE

- Connect the electrode and the reference electrode to the instrument.
- Press and hold down **ESC**, **▲** and **HELP** keys simultaneously and power on the meter. Wait until the instrument enters in the reading check mode.
- Place 50 mL of deionized water into the beaker with a stir bar.
- Add 1 mL of **HI 84184-1** Standard. Record the mV value when stable.
- Add an additional 10 mL of **HI 84184-1** Standard to the solution. Wait for the reading to stabilize and record the mV value.

- The difference between the two recorded mV values gives the slope of the electrode. An acceptable value for this slope is $56 \pm 4\text{mV}$.
- Press **ESC** to leave the reading check mode.

PERIODIC MAINTENANCE

Inspect the electrode and the cable. The cable used for connection to the instrument must be intact and there must be no points of broken insulation on the cable, or cracks on the electrode stem or bulb. Connectors must be perfectly clean and dry. If any scratches or cracks are present, replace the electrode. Rinse off any salt deposits with deionized water.

Add filling solution dosing to maintain a good head pressure. For optimal electrode response this level should be maintained and not be allowed to drop more than 2-3 cm (1 inch below fill hole).

STORAGE PROCEDURE

The **HI 61010** sensor can be stored in standards for short periods of time and should be stored dry with the protective cap on, when not in use, for long periods of time.

The **HI 5315** reference electrode may be stored in air or aqueous solutions between sample measurements.

If the electrode will be used frequently and needs to be ready for use, take measures to prevent evaporation of fill solution. Top off fill solution, replace o-ring, fill hole cover on the fill hole opening, and place protective cap over junction tip. Store the electrode upright. Before using, flush junction once and top off fill solution.

For long term storage, disassemble electrode and wash all salts from assembly with deionized water. Wrap ceramic junction on inner stem in Parafilm™ or other sealing film. Store dry and disassembled.

MALFUNCTIONING

Reading fluctuates or drifts:

Could be due to dirty or blocked reference electrode junction: follow the cleaning procedure above. Repeat the measurement with a fresh potassium electrode.

ACCESSORIES

REAGENTS

HI 7075	Electrode filling solution
HI 84184-20	Reagent set
HI 84184-0	TISAB W/5 for Fluoride electrode (5×100 mL)
HI 84184-1	Standard 1 for Fluoride electrode (500 mL)
HI 84184-2	Standard 2 for Fluoride electrode (500 mL)

OTHER ACCESSORIES

HI 731316	Stir bar (5 pcs.)
HI 731341	Automatic pipette 1000 µL
HI 731351	Tips for 1000 µL automatic pipette (25 pcs.)
HI 731355P	Capillary pipette (20 pcs.)
HI 740036P	50 mL plastic beaker (10 pcs.)
HI 740037P	20 mL plastic beaker (10 pcs.)
HI 740143	Syringe 1mL (6 pcs.)
HI 740144	Syringe tip (6 pcs.)
HI 7662-T	Temperature probe
HI 61010	Fluoride half cell
HI 5315	Reference half cell

Recommendations for Users

Before using this product, make sure that it is entirely suitable for your specific application and for the environment in which it is used.

Operation of this instrument 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 instrument EMC performance.

To avoid damages or burns, do not put the instrument in microwave ovens. For yours and the instrument's 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.

WARRANTY

HI 84184 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.

Damage due to accident, misuse, tampering or lack of prescribed maintenance is 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.

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www.hannainst.com.*

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