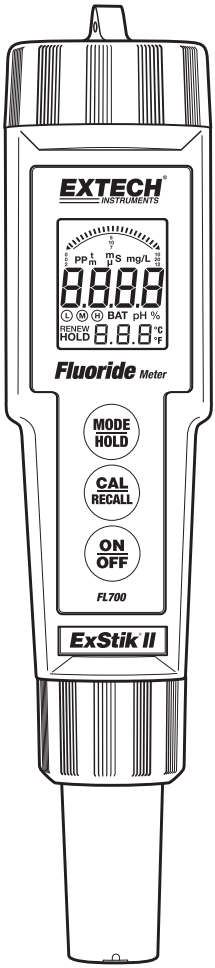
User Guide

EXTECH INSTRUMENTS

ExStik® FL700

Fluoride Meter



Introduction

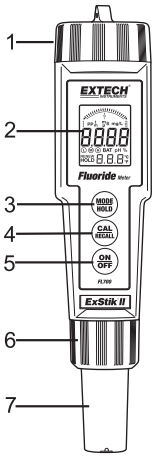
The model FL700 is a system specifically designed for the quick and accurate measurement of fluoride ions in drinking water and other aqueous samples. Unlike other electrode based systems the FL700 consists of the sensing electrode, measuring electronics, and the display in one convenient package. This meter is shipped fully tested; with proper use, this instrument will provide years of reliable service.

Features

- Automatic temperature compensation (±10^{o}C of calibration temperature)
- Automatic calibration
- Stability sensing to optimize accuracy
- Internal Datalogger for storing up to 25 readings
- Direct reading of ppm units
- Direct reading of relative mV units
- Automatic shut down after 12 minutes to preserve battery life
- Internal error detection

Description

Meter Description



1. Battery compartment cover
2. LCD Display
3. **MODE/HOLD** button
4. **CAL/RECALL** button
5. **ON/OFF** button
6. Electrode Retaining Collar (ring)
7. Electrode Sensor

   (Note: The Electrode storage cap is not shown this diagram)

Electrode Sensor Description

The sensing electrode is a europium doped lanthanum fluoride single crystal that has been incorporated into a removable sensing module that houses a reference electrode and temperature measurement system. The high resistance electrode signals are impedance converted to a low resistance output in the sensing module to ensure stable and noise free performance.

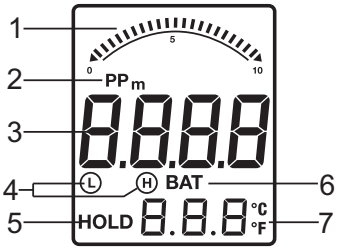
Reagent Tablets

The FL700 allows the users to follow the ASTM and EPA standard methodology using any of the TISAB reagents and standards already in use. Also, Extech has developed tablet-form TISAB which contains all of the essential and approved chemicals that are found in the usual TISAB reagents.

The “dry” reagent does not contribute to sample dilution. The benefits of this method are:

1. No volumetric errors
2. Independent of sample size (± 20% of nominal sample volume)
3. Easy to use in the field or laboratory
4. Can be shipped more easily than liquid reagents
5. Lower cost per test

LCD Display



1. Bargraph display
2. Measurement units
3. Main display
4. Low (L) and High (H) Calibration icons
5. Data HOLD indicator
6. Low Battery indicator
7. Temperature display

Quick Start

The following procedure describes a quick-start for the FL700 using the standard TISAB chemistry. Detailed operating instructions can be found on the pages that follow.

Preparation

1. Remove the FL700, electrode module and sample cup from its box. Remove caps from module.
2. Fit the electrode module onto the end of the meter body, making sure that the slots line up correctly, and tightly turn the module retaining ring to secure the assembly.
3. Wipe the fluoride crystal and reference junction with a damp tissue

Calibration

1. Prepare a 1 ppm fluoride standard and TISAB reagent, or use pre made mixed TISAB and 1 ppm standard
2. Pour 15 – 20 mls of this standard solution into the sample cup
3. Rinse the end of the FL700 module in TISAB solution and wipe thoroughly with paper tissue
4. Place the FL700 into the 1 ppm standard
5. Switch the instrument on using the **ON/OFF** key. The instrument will now go through its internal calibration
6. 1.0 ppm reading will stabilizes in ~35 seconds and the instrument will enter HOLD mode
7. When in HOLD mode press the **CAL** key and hold until 1.0 ppm and CAL appear in the display. Release the **CAL** key
8. Wait until the display stops blinking; the instrument will enter the HOLD mode
9. The instrument is now calibrated and ready for use

Measurement

1. Prepare unknown solution by adding TISAB reagent to the sample. Thoroughly wipe the end of the FL700
2. Place the FL700 into the prepared unknown sample
3. If the display is indicating HOLD press the **HOLD** key to enter the Measure mode (the HOLD display will switch off)
4. After ~ 35 seconds the instrument will display the value of the unknown concentration
5. The readings can be stored in memory by pressing the **MODE/HOLD** key for ~ 3 seconds

Storage and maintenance

1. After use, store the electrode in an analyzed sample
2. Thoroughly wipe the sensor with paper tissue. The flat ended sensors can be wiped vigorously
3. The fluoride module can be replaced once the automatic calibration no longer sufficiently calibrates the instrument
4. Other maintenance information is provided in a later section of this guide

Operation

Preparation for use

1. Remove the FL700, electrode module and sample cup from its box. Remove caps from module
2. Fit the electrode module onto the end of the meter body, making sure that the slots line up correctly, and tightly turn the module retaining ring to secure the assembly
3. Wipe the fluoride crystal and reference junction with a damp tissue (cleaning techniques are addressed later in this guide)

Powering the FL700

The FL700 uses four (4) CR2032 lithium ion batteries. Press the **ON/OFF** button to turn the meter on or off. If the batteries are weak, the 'BAT' indicator appears on the LCD. The auto power off feature shuts the meter off automatically after approximately 12 minutes of inactivity. The auto power off feature may be temporarily disabled for convenience or for extended polarization time.

Power-On Diagnostics

1. When the meter is switched ON the LCD displays "SELF" and "CAL" while the meter runs a diagnostic routine
2. During this time the meter is recalling the user calibration data, performing self diagnostics & initializing the circuitry
3. When completed, the meter proceeds to the normal measurement mode

Calibration

The FL700 can be calibrated between 1.0 ppm and 10 ppm or between 0.5 and 5.0 ppm Fluoride ion. The following calibration procedure assumes the normal 1.0 to 10 ppm range has been chosen.

1. Prepare a 1 ppm fluoride standard and TISAB reagent, or use pre made mixed TISAB and 1 ppm standard
2. Pour 15 – 20 mls of this standard solution into the sample cup
3. Rinse the end of the FL700 module in TISAB solution and **wipe thoroughly** with paper tissue
4. Place the FL700 in the 1 ppm standard and switch the instrument ON using the **ON/OFF** key. The instrument will now run its self-calibration
5. The instrument will enter the **HOLD** mode when stabilized in the 1 ppm solution
6. Press the **CAL** key; **CAL** will appear in the display followed by 0.5ppm and 5.0 ppm. Continue holding until **1.0** ppm is shown. Release the **CAL** key. After the display stops blinking the instrument will enter the **HOLD** mode
7. The instrument is now calibrated and ready for use. The circled L and H icons on the display indicate that the low range (L) and high range (H) calibrations have been completed

Calibration frequency

Calibrate the FL700 prior to each new measurement batch or if more than 12 hours has elapsed since the last calibration.

Slope Adjustment

1. Slope adjustment although not a frequent requirement can be carried out by following the instructions in Calibration steps above except for the fact that a 10 ppm standard is used after calibrating with the 1 ppm standard
2. Press the Cal button until 10 ppm appears. Slope adjustment is then complete

Other standards

As mentioned the FL700 can also be calibrated between 0.5 and 5.0 ppm F. Follow the calibration instructions above but substitute 0.5 ppm for 1.0 ppm and 5.0 ppm for 10 ppm.

Measurements

1. Prepare an unknown solution by adding TISAB reagent to the sample in the same dilution ratio as for the calibration procedure. Mix thoroughly
2. Rinse the end of the FL700
3. Place the FL700 into the prepared unknown sample. If the instrument is in the HOLD mode, press **MODE/HOLD** to unlock HOLD
4. After 25 seconds, the instrument will display the value of the unknown concentration and will then enter the HOLD mode

Note: The readings can be stored in the memory by pressing the **MODE/HOLD** key for ~ 3 seconds as explained in a subsequent section of this user guide.

Temperature Units (ºF / ºC)

1. With the unit OFF, press and hold the **CAL/RECALL** button
2. With the **CAL/RECALL** button depressed, momentarily press the **ON/OFF** button to turn the unit ON
3. The **CAL/RECALL** button can be released when 'Self Cal' is shown in the display
4. To switch back to the previous unit of measure, repeat steps 1 through 3.

Auto-Power OFF Feature

The auto power off feature automatically shuts the meter off 12 minutes after the most recent button press.

Disabling the Auto-Power OFF Feature

With the unit ON, momentarily press the **CAL/RECALL** button, then quickly press and hold both the **MODE/HOLD** and **ON/OFF** buttons until 'oFF' is displayed. To restore the Auto Power Off Feature (auto power OFF enable) simply turn the meter off and on again using the **ON/OFF** button.

Low Battery Indication

When the battery voltage falls below the operating threshold, 'BAT' will appear on the display. Refer to the Maintenance section for battery replacement information.

Storing Readings

Up to 25 readings can be stored in memory for later recall.

1. With the meter in the HOLD mode, press and hold the **MODE/HOLD** button for three (3) seconds to store a reading. Release the button when the memory location number appears on the lower display.
2. After approx. 30 seconds (measurement duration) the meter will return to the HOLD mode and another reading can then be stored.
3. If more than 25 readings are stored, previously stored readings (starting with reading number 1) are overwritten.

Recalling Stored Readings

1. Momentarily press the **CAL/RECALL** button and then within 4 seconds momentarily press the **MODE/HOLD**. The last stored data point location will be displayed (1 to 25). Each time the **MODE/HOLD** button is momentarily pressed the next most recently stored data point will be displayed.
2. After the last data point is displayed, pressing the **MODE/HOLD** button again returns the display to the beginning of the list.
3. Pressing the **CAL/RECALL** button at anytime stops the data retrieval process and returns the meter to the normal measurement mode.

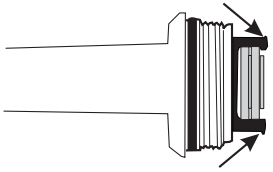
Clearing Stored Readings

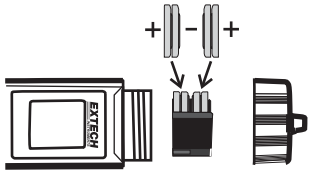
1. With the unit ON press and hold the **ON/OFF** button for 4 seconds
2. When “clr” is shown in the main display the memory is cleared.

Maintenance

Battery Replacement

1. Twist off the battery compartment cover
2. Holding the battery housing in place with a finger, pull out the battery carrier using the two small tabs
3. Replace the four (4) CR2032 batteries observing proper polarity
4. Replace the battery carrier, reattach the battery compartment cap and tighten securely





Electrode Replacement

1. To remove the electrode, first turn the instrument OFF and then unscrew and remove the electrode retaining collar. (turn the collar counter-clockwise to remove)
2. Gently rock the electrode from side to side, pulling it away from the meter until it disconnects
3. To attach an electrode, align the positioning “keys” on the electrode and the main body housing and then carefully push the electrode into the meter socket until it is fully seated
4. Tighten the electrode retaining collar firmly enough to seal the electrode with the meter

Electrode Storage

1. The module and can be stored wet or dry. If stored dry it will be necessary to allow approximately 15 minutes of soaking in a fluoride solution before the specified performance can be achieved. It is recommended that the electrode be stored wet in the last test solution used by the instrument (fluoride ion plus TISAB reagent).
2. The instrument will give an error code when the electrode can no longer be calibrated
3. If the instrument will not calibrate, clean the fluoride electrode surface with the Extech cleaning paste and recalibrate the instrument. If the meter still does not calibrate, replace the electrode.

Extech cleaning paste

Extech offers a unique cleaning procedure for the lanthanum fluoride crystal that removes any coating from the surface of the crystal and dramatically increases response time. This is available from Extech and a sample of this paste is shipped with the product**.**

Specifications

Range	0.10 to 9.99ppm (mg/l)
Accuracy	± 3% of reading or ± 0.1ppm (whichever is greater)
Resolution	0.1ppm
Display	2000 count, Dual function 3 ½ digit LCD with Bargraph, Display size: 24 mm x 20 mm
Electrode	Europium doped lanthanum fluoride single crystal
Electrode life	6 months minimum
Response Time	90% of change in less than 30 seconds (typical)
Operating Temp. Range	32 to 140°F (0 to 60°C)
ATC Range	32 to 140°F (0 to 60°C)
Measurement Storage	25 tagged (numbered) data sets with recall
Battery Power	Four (4) CR2032 button batteries
Low Battery Indication	'BAT' appears on the LCD
Auto Power Off	After 12 minutes of inactivity
Dimensions/Weight	1.4 x 6.8 x 1.6" (36 x 173 x 41mm); 7.4 oz (210g)

Warranty

EXTECH INSTRUMENTS CORPORATION *warrants this instrument to be free of defects in parts and workmanship for* ***one year*** *from date of shipment (a six month limited warranty applies to sensors and cables). If it should become necessary to return the instrument for service during or beyond the warranty period, contact the Customer Service Department at (781) 890-7440 ext. 210 for authorization or visit our website www.extech.com for contact information. A Return Authorization (RA) number must be issued before any product is returned to Extech. The sender is responsible for shipping charges, freight, insurance and proper packaging to prevent damage in transit. This warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification. Extech specifically disclaims any implied warranties or merchantability or fitness for a specific purpose and will not be liable for any direct, indirect, incidental or consequential damages. Extech's total liability is limited to repair or replacement of the product. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.*

Calibration and Repair Services

Extech offers repair and calibration services for the products we sell. Extech also provides NIST certification for most products. Call the Customer Care Department for information on calibration services available for this product. Extech recommends that annual calibrations be performed to verify meter performance and accuracy.

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Support line (781) 890-7440

Technical support: Extension 200; E-mail: support@extech.com

Repair & Returns: Extension 210; E-mail: repair@extech.com

Product specifications subject to change without notice

For the latest version of this User's Guide, Software updates, and other up-to-the-minute product information, visit our website: www.extech.com

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