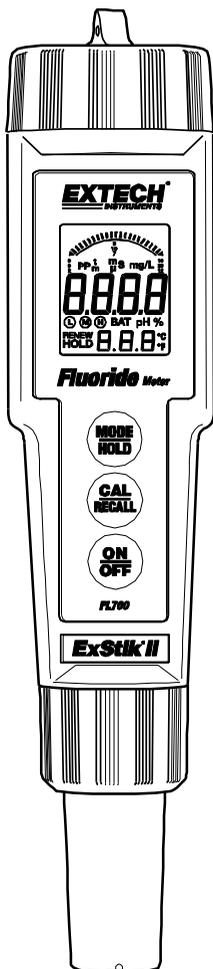


EXTECH[®]

User Manual

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.

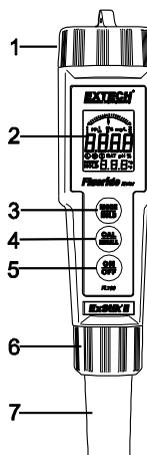
Features

- Automatic temperature compensation ($\pm 10^{\circ}\text{C}$ of calibration temperature)
- Automatic calibration
- Stability sensing to optimize accuracy
- Internal Datalogger for storing up to 25 readings
- Direct reading of ppm, mV, or mg/l units
- Automatic power off after 10 minutes to preserve battery life
- Internal error detection
- Four separate calibration points available (0.5, 1.0, 5.0 and 10.0ppm)

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

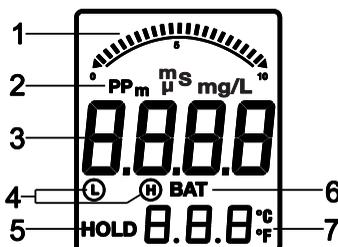
The FL700 allows the users to follow the ASTM and EPA standard methodology using any of the TISAB reagents and standards already in use. Also, Extech has developed tablet-form TISAB which contains all of the essential and approved chemicals that are found in the usual TISAB reagents. A **total ionic strength adjustment buffer (TISAB)** is a buffer solution which increases the ionic strength of a solution to a relatively high level.

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

1. No volumetric errors
2. Independent of sample size ($\pm 20\%$ 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



Operation

Preparation for Use

1. Remove the FL700, electrode module and sample cup from its box. Remove caps from module
2. If not already done, fit the electrode module onto the end of the meter body, making sure that the slots line up correctly, and turn the module retaining ring to secure the assembly.

Powering the FL700

Press the **ON/OFF** button to turn the meter on or off. If the batteries are weak, the 'BAT' indicator appears on the LCD.

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 requires calibration for accuracy)

The FL700 can be calibrated at 4 different calibration points. 0.5,1.0, 5.0 or 10 ppm Fluoride ion. The following calibration procedure provides the 1.0 ppm calibration point procedure.

1. Set the Mode to ppm and turn off the FL700 meter
2. Prepare a 1 ppm fluoride standard solution by placing one TISAB tablet into a sample cup and add 20 mls of the 1ppm Fluoride standard into the sample cup.

Note: if your 1ppm Fluoride standard already contains TISAB do not use a TISAB tablet.

3. Create a rinse solution that can be used between sample measurements buy dissolving 1 TISAB tablet in 20ml of Distilled water. The rinse solution promotes faster response times.
4. Rinse the end of the FL700 module in this Rinse solution and then **wipe thoroughly** with a paper tissue.
5. Place the FL700 into the prepared 1 ppm standard and switch the instrument ON using the **ON/OFF** button. The instrument will now go through its self-calibration.
6. The instrument will enter HOLD mode in about 35 seconds when stabilized in the 1.0 ppm standard solution.
7. Press and **HOLD** the **CAL** key, CAL will appear in the display followed by 0.5ppm and then 5.0ppm. Continue holding the CAL button 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 normal measurement mode.
9. The instrument is now calibrated and ready for use.
10. The circled L on the display indicates that the low range (L) calibration has been completed.
11. If you want to calibrate the High range, obtain a 10ppm Fluoride standard and repeat the above calibration procedure setting the calibration point to the correct ppm setting (10.0ppm) at step 6.
12. See **Reset Calibration Data** to clear all calibration data from the meter.

Calibration Frequency

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

Other Standards

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.

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.

Measurement Mode

1. Prepare 20ml of test solution by adding one TISAB reagent to the unknown sample. Thoroughly wipe the end of the FL700. Wait for the tablet to dissolve and then mix thoroughly before proceeding.
2. Rinse the end of the FL700 in your rinse solution or in distilled water, wipe dry.
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 ~35 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.

Reset Calibration Data

Follow this procedure to clear all calibration data from the meter. Resetting the calibration data may be necessary when new calibration solutions are used or accuracy of measurements is in question.

1. Turn off the meter.
2. Press and Hold the Cal/Recall and Mode/Hold buttons.
3. Momentarily press the On/Off button, as soon as the display comes on, release all 3 buttons.
4. The display will show “**dFLt rSt**” (default reset) and all of the calibration data will be erased. If “**dFLt rSt**” does not appear, retry the procedure.

Proceed to the calibration routine for Fluoride.

Electrode Storage

1. 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 module and can be stored 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. The instrument will give an error code when the electrode can no longer be calibrated.

Temperature Units (°F / °C)

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.

Units of Measure

The FL700 has 3 different units of measure. (ppm, mV, and mg/l).

To change the units of measure, follow these steps:

1. Turn on the meter.
2. Press and Hold the **MODE/HOLD** button and it will cycle through the 3 different units of measure (ppm, mV, mg/L).
3. Release the Mode/Hold button when the preferred unit is selected.

Auto-Power OFF Feature

The auto power off feature automatically shuts the meter off 10 minutes after the most recent button press.

Auto-Power OFF Disable

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.

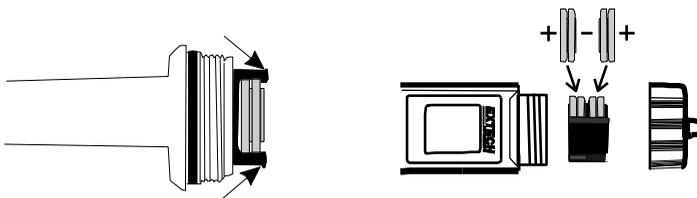
Clearing Stored Readings

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. 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 module and can be stored 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. The instrument will give an error code when the electrode can no longer be calibrated

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 |
| Measurement method | In compliance with EPA Method 340.2 (Potentiometric Ion Selective Electrode) |
| 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 memory | 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 10 minutes of inactivity |
| Dimensions/Weight | 1.4 x 6.8 x 1.6” (36 x 173 x 41mm); 7.4 oz (210g) |

Two-year Warranty

Teledyne FLIR warrants this Extech brand instrument to be free of defects in parts and workmanship for **two years from date of shipment (a six-month limited warranty applies to sensors and cables). To view the full warranty text please visit:**

<https://www.flir.com/support-center/warranty/instruments/extech-product-warranty/>.

Calibration and Repair Services

Teledyne FLIR offers calibration and repair services for the Extech brand products we sell. We offer NIST traceable calibration for most of our products. Contact us for information on calibration and repair availability, refer to the contact information below. Annual calibrations should be performed to verify meter performance and accuracy. Product specifications are subject to change without notice. Please visit our website for the most up-to-date product information:

www.flir.com/landing/extech/.

Contact Customer Support

Customer Support - Local Telephone List: <https://support.flir.com/contact>

Obtain a Return Material Authorization (RMA): <https://customer.flir.com/Home>

Contact Customer Service: <https://support.flir.com/ContactService>

Technical Support Center: <https://support.flir.com>

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