

### Some More Hints .

Ensure that the temperature of all standards and samples are the same to reduce errors.

Using a magnetic stirrer for laboratory analysis is recommended but not essential. It is however important to have the stirrer set on a low constant speed which must be reproducible for all measurements.

Prior to sample measurement ensure that the electrode is thoroughly rinsed with deionised water. It is worth performing this rinse twice given the possibility of carryover being greatest in high concentration solutions.

Prepare standards by serial dilution.

Make sure your electrode is conditioned by leaving the tip in the lowest concentration standard for 1 hour prior to analysis.

### Methods of Analysis.

Direct Potentiometry is described above. This method is simplified by using a direct reading ion meter. There are several other methods, which are useful.

**Known Addition:** An incremental technique where the potential of the sample solution is measured followed by addition of a small volume of a higher concentration standard solution.

**Sample Addition:** An incremental technique where the potential of a dilute standard solution is measured followed by the addition of a small volume of more concentrated sample. .

**End Point Titration:** ISE's are ideal end point indicators and will produce a significant potential change at the equivalence point. The Ion in question must be contained in the titrand or the titrant and must therefore be in excess or absence at the end point.

## 5221 - Fluoride Flow Plus ISE

Overall length	155 mm
Body Diameter	12 mm
Cap Diameter	16mm
Connector	BNC
Cable length	1000 mm
Resistance at 25°C	< 2.5 Meg Ohm
Concentration Range	0.02 to 1,900 ppm
Slope	-54 to -59 mV/decade
Potential Drift	2 mV per day
Operating pH range	2 to 8
Temperature range	5 to 50°C
Endpoint time	Typically 10 to 30 seconds
Interferences: Ions with coefficients above 0.001.	Hydroxide (OH <sup>-</sup> )

The Old Silo Store, St. Radigund's  
Abbey, Dover, Kent CT15 7DL  
Phone: +44 (0) 1304 829960  
E-mail: [info@edt.co.uk](mailto:info@edt.co.uk)



Excellence & Innovation  
in Electrochemistry



Instruction Manual

## 5221 - Fluoride Flow Plus ISE

The EDT directION Flow plus range incorporates two solid state ISE's in one 12 mm Epoxy body. One acts as the Sensor whilst the other is incorporated into the reference system.

Flow plus combination ISE's do not require a separate reference electrode, making it convenient to use with small sample volumes. The sensor and reference are solid state which ensures a longer shelf life than any other type of ISE.

The reference half-cell has a free-flowing liquid junction which will reduce drift and provide more stable readings than conventional ISE's. Flow plus electrodes are ideal for measuring awkward or dirty samples, which would clog conventional reference electrodes. Flow plus ISEs require a filling solution. Approximate capacity of the reference chamber is 3ml.

The Flow plus reference system has a liquid junction provided by a conical plug which is opened or closed by rotation of the electrode cap. The wider the opening between body and plug the faster the electrolyte flows. Low ionic strength samples and samples with high viscosity or particulates are examples of media that require this increased flow.

Flow plus ISEs are ideal in situations where drift, slow response times and reduced electrode lifetimes are a problem.

### Flow Plus ISE Set up.

Before use, the Flow Plus ISE outer chamber has to be filled with filling solution via the side filling hole.

1. Screw the cap fully clockwise
2. Using the dispensing bottle fill the outer chamber up to the fill-hole level with solution.
3. Turn the cap half a turn counter clockwise.
4. Press the top of the cap firmly down and release to open the conical junction temporarily. A small amount of solution may drip out. This is normal and desirable.
5. Wipe excess solution from the tip.

## Cleaning the Flow plus ISE

Flow plus ISEs are unique in that they can be dis-assembled for cleaning or storage. Turn the cap 1 turn counter clockwise and press and hold the cap down.

The filling solution (harmless salt solution) will empty at the bottom of the tip. Turn the cap fully counter clockwise and pull the cap and spring away from the body. Now lift the body of ISE away from the sensor core and rinse with Deionised water and wipe with a lint free tissue/cloth. The Flow plus ISE is now ready for reassembly of storage.

The ISE is now ready for use. Pre-soaking for 5 minutes in a 100ppm Fluoride solution is recommended to condition the ISE. The ionic strength and pH of samples and standards should be equalised by the addition of a suitable TISAB (Total Ionic Strength Adjustment Buffer). Typical addition is 10ml to 100ml of standard or sample. This will be application dependent.

Automatic temperature Compensation (ATC) is not possible so standards and samples should be at the same temperature. Begin calibration from the lowest concentration standard to avoid contamination. A two or three point calibration is recommended and should span the expected sample concentration range.

Rinse the tip with deionised water between measurements.

### Tips For Successful Analysis.

EDT directION ISE's can be used with any pH/mV meter or Ion meter. Meters with a 0.1 mV resolution are recommended whilst dedicated Ion meters will provide direct concentration readouts saving time and effort in constructing calibration curves and performing calculations.

Magnetic stirrer/stirrer bars are recommended for laboratory analysis. Please operate at the lowest constant speed available.

## Operation

- 1 Connect the electrode to the meter being used for analysis.
- 2 Prepare a series (at least 2) of standards that bracket the expected sample concentration. This is best done by serial dilution of the stock solution. Ideally standards should be a decade in concentration apart e.g. 1, 10, and 100 ppm.
- 3 Dispense 50 ml of each standard into analytically clean beakers. (100 to 150 ml size is perfect)
- 4 Add ISAB in the appropriate ratio. As a guide with sample concentrations in the 1 to 1000 ppm range 1ml of a 2 Molar ISAB to 50 ml sample is satisfactory.
- 5 Rinse the electrode with deionised water and blot dry with a lint free cloth and place in the lowest standard. When the reading is stable record the mV value.
- 6 Repeat step 5 for all subsequent standards proceeding from lowest to highest.
- 7 Plot a calibration curve on semi log paper using mV values on the linear Axis and concentration on the log scale.
- 8 Rinse the electrode in deionised water and blot dry. Place the electrode in the sample and record the stable mV value.
- 9 Using the calibration curve determine the unknown sample concentration.

### Required Solutions.

Distilled or deionised water will be required to prepare Standards, ISABs and to rinse the electrode between measurements.

1000 ppm Stock Standard solution. Used for preparation of Standards. (Prepared by customer)