



## FX-300-F Online Fluoride Ion Analyzer / Controller for Drinking Water

Many drinking water facilities are devoting more money, effort and maintenance than necessary to measure and control fluoride levels.

Sample conditioning analyzers are often overkill for the typical process conditions in most municipal drinking water treatment facilities.

The Model FX-300-F Fluoride ion analyzer reduces the cost of ownership and simplifies continuous monitoring and feed control of free fluoride in high pH drinking water systems and wastewater treatment. The system is not designed for reporting.

### FEATURES & BENEFITS

- **Requires No Reagents or Sensor Service of Any Kind.** No electrolyte replacement, solid state sensor construction contributes to minimal recalibration frequency and stability.
- **Typical 4-Year Sensor Life** – experienced by our municipal drinking water treatment customers
- **No Maintenance** – Other than offset calibration and possible cleaning. Eliminate the cost of reagents, sensor service and tip replacement. It's perfect for limited staff facilities, those who operate multiple water plants, or those who just want to save time and money.
- **Simplified Operation** – Operates using 3 buttons without menus to navigate. Easy 1-point offset calibration synchronizes the instrument with your grab sample results used for reporting **WITHOUT** removing the sensor from service. *Offset calibration using a portable photometer or lab instrument is required.*
- **Flexibility** – The modular base system includes measurement module with 3-digit display, 4-20mA output, 4.33" wide IP65/NEMA 4X polycarbonate enclosures with tinted transparent lift up lids, and twist lock combination sensor. Options include: alarm contacts & control functions, pH compensation, RS485 Modbus output, data logging or temperature output using the optional 7.17" or 10" wide enclosures. Multi-channel configurations available or add additional measurement modules such as pH, ORP, conductivity or another ISE sensor to create a multi-parameter analyzer.
- **Systems Are Pre-Assembled, Preconfigured** – Ready to place into service and use after the sensor acclimates and you perform the required 1-point offset calibration with a separate instrument.



Industrial duty, chemical resistant Radel® body, double junction combination sensor with solid state fluoride mono-crystal, porous ceramic junction, solid state non-porous polymer secondary junction with excess KCl assuring saturation at all temps for stability & long sensor life.

Standard sensor shown with our Fast Temp feature: the temperature element is placed closer to the sensor surface and tip. This provides quicker response and acclimation to temperature fluctuations, resulting in more stable readings.

To measure Fluoride in acidic wastewater please refer to the FX-300 F/AS literature or contact us for more information.



## SPECIFICATIONS: FX-300-F Fluoride Ion Analyzer / Process Controller

<b>Measurement Type and Purpose:</b>	Ion Selective Electrode (ISE) to monitor fluoride ion activity for process control
<b>Application Range (Sensor SF-8T-UL):</b>	Fluoride ion concentration in drinking water through wastewater, pH range 5.5 – 9.5 continuous. Processes with pH below this range requires a different sensor and pH compensation
<b>Parameters Displayed &amp; Operating Range:</b>	Free Fluoride 0-999 ppm and Temperature in °C, field selectable either parameter at any time Output Range Full Scale: High 0-999, Mid 0-100.0, Low 0-10.00.
<b>Sensor Linear Measurement Range:</b>	0.019 to 19,000 ppm (1X10 <sup>-6</sup> to 1.0 Molar), 0.001 ppm (5X10 <sup>-8</sup> Molar) minimum detection, 0.01 ppm lowest displayed value
<b>Transmitter accuracy:</b>	+/- 0.2%
<b>Sample pH Range:</b>	5.5 to 9.5 pH continuous (Max 10.5pH); Low pH service version available for 0-6 pH range up to 158 °C
<b>Sample Temperature Range per Sensor:</b>	Standard RADEL +5 to 50°C; (Optional PVC/CPVC: +5 to 60°C; Ultem™: -5 to + 105°C; PEEK: -30 to +150°C)
<b>Pressure Range:</b>	Maximum 20 psig
<b>Sensor Mounting:</b>	Inline (slipstream) in 1" PVC pipe tee with twist lock fitting or submersible using 1"MNPT rear threads
<b>Sample Flow Requirements:</b>	Continuous flow, 3-5 GPH
<b>Ion Sensor Specifications:</b>	Double junction solid state selective fluoride sensitive membrane, combination sensor completely sealed both ends
<b>Sensor Body:</b>	RADEL ®R-5000 NT (Poly-Phenyl-Sulfone, PPSU) Standard, Rytan®, PEEK optional
<b>Reference Half Cell:</b>	Ag/AgCl, Saturated KCl, in excess to assure saturation at all temperatures & extend sensor life
<b>Reference System: Primary Junction:</b>	Porous Ceramic, Saturated KCl in cross linked polymer, interfaced to secondary junction
<b>Secondary Junction:</b>	Solid-State Non-Porous Cross-Linked Conductive Polymer embedded in HDPE/Kynar support matrix, excess saturated KCl salt system in cross linked polymer, resistant to heat, solvents & most chemicals
<b>Display:</b>	3-digit, 5/16" high red LED display, visible in sunlight
<b>Electric Power:</b>	Operating power 24VDC +/- 10%, CSA/UL/CE approved universal 115/230 VAC input, consumption 60mA max.
<b>Power Entry:</b>	6 Amp fused power entry module, IEC #320-C14 socket, 2-meter IEC power cord with IEC #C13 & NEMA 5-15P connectors
<b>Signal Output:</b>	Selectable 0-20mA or 4-20 mA DC 250 Ω max, scalable to 20% of full scale range with arbitrary set points for 4mA & 20mA; RS-485 Modbus digital output optionally
<b>Instrument Mounting &amp; Dimensions:</b>	Wall Mount IP65/NEMA 4X polycarbonate enclosure, 180mm H x 110D x 110, 182 or 254mm wide. 1/2" x 12" x 24" PVC mounting panel, (4) 5/16" dia. holes for 1/4" screws, 0-25PSI pressure reducer, 0-5 GPH flow rotometer with stainless steel valve, brass barbed connectors for 3/8" OD x 1/4"ID hose, 1/2" sched. 80 PVC piping arranged to keep sensor tip wet, 1" schedule 80 PVC pipe tee with twist lock sensor receptacle, inlet and backp ressure PVC ball valves; (2) 3-ft long 1/4"ID x 3/8"OD flexible PVC sample and discharge hoses

### Module Description & Options:

**Transmitter Modules:** All analog outputs have built-in trim calibration support, including both offset and span adjustments. Galvanic isolation between sensor input, power & analog output (3000V rating). 4-20mA can support remote external secondary displays. 35mm Din rail mounting. Calibration of temperature element is available for all measurement modules. Temperature output transmission requires separate module or Modbus output.

**External Preamplifier Support:** Unlike many low cost systems, the FX-300 series supports optional external preamplifiers for electrically noisy environments. Permanent wiring from preamplifier to monitor allows the use of short sensor cables to minimize sensor replacement cost, and avoids the need to open the monitor enclosure for sensor service.

**FX-REL Option:** Alarm relay and controller module provides (2) each 5 Amp dry contact relays and (2) independent limits. (1) required for each measurement module. Controller is fully configurable for control mode and variables for each control algorithm. Control modes include: 1) Alarm functions only; 2) On/Off control with a user-configurable dead band; 3) Time proportional control; 4) Proportional frequency control (variable pulse controller). Hold function to disable relays during calibration. Includes start timer to avoid alarms during startup and reaction timers for each limit to avoid nuisance alarming if limits are momentarily exceeded. Relay rating 5A / 250VAC.

**Data Logging Option:** Removable USB data logger records up to 32,000 readings over a 4-20mA DC range or by separate FX-300-DAT data logging module with onboard 8MB serial flash memory and data download via RS232 or USB with included Windows software.

**FX-TOT Option:** pH compensation module computes total unbound fluoride (Fluoride + HF) in fluids 5.5pH or less, using the free ion activity, pH, and temperature. Includes a scalable 4-20mA output for total unbound fluoride and RS485 Modbus communications for all inputs and outputs. By using the bridged output for totalizing, you retain the use of pH, ion, and temperature outputs. THIS MODULE IS REQUIRED IN FLUIDS WITH 5.5 pH or less.

**Modbus Option:** Available with initial order to include RS485 Modbus or by adding the separate FX-TOT module.



**FOXCROFT EQUIPMENT AND SERVICE COMPANY, INC.**  
**FX-300 Integrated Fluoride Ion Selective Sensor Specifications**  
**For High pH Service Applications, Twist Lock Mounting**

**Part Number:** SF-8T-UL-FT-10

1" MNPT Twist Lock Immersion Integrated, Fluoride Ion Selective Sensor for use in high pH Applications

**Recommended Applications:** Fluoride ion concentration in aqueous solution from drinking water through waste water. Not suitable for use in etching solutions.

**Special Features:** Crosslinked polymer in the reference system is resistant to heat, solvents and to most chemicals. Sensor holds an excess of KCl, assuring saturation at all temperatures and extending the life of the sensor.

The construction of the sensor permits easy access to the sensing and reference surfaces for cleaning or inspection.

**General Specifications:**

Concentration Range: 1 to  $10^{-6}$  Molar, 19,000 to 0.019 ppm  
Lowest Limit of Detection:  $5 \times 10^{-8}$  Molar, .001 ppm  
pH Range: 5.5 to 9.5 pH (continuous), intermittent up to 11 pH with crystal degradation  
Temperature Range: 5 to 50 °C  
Temperature Compensation: Fast Temp PT1000 for variable temperature conditions  
Pressure Range: 1 to 20 psig (6.9 to 138 kPag)  
Body Material: RADEL ®R-5000 NT (Poly-Phenyl-Sulfone, PPSU)  
Junction Material: Kynar (Poly-Vinylidene-Fluoride)  
Cable: RG 174/U Coaxial (without preamplifier)  
Connector: BNC (unless otherwise specified)

**Ion Sensor Specifications:**

Measuring Membrane: Selective Fluoride Sensitive Membrane (solid state)  
Dimensions: 0.310", (7.8 mm) DIA  
Initial Impedance: Less than 100 M Ohms @ 25 °C

Interfering Ions in Ratios of Permissible Excess:

Interfering Ion / Measured Ion (in Molarity): OH- above 12.0 pH

**Reference System Specifications:**

Type: Double Junction  
Reference Half Cell: Ag/AgCl, Saturated KCl  
Primary Junction: Porous Ceramic, Saturated KCl in cross linked polymer, interfaced to secondary junction  
Secondary Junction: Solid-State Non-Porous Cross-Linked Conductive Polymer embedded in HDPE/Kynar support matrix, excess saturated KCl salt system in cross linked polymer  
Surface Area: 366,000 mil<sup>2</sup>, (236 mm<sup>2</sup>)

Storage and Shelf Life: 1 year from date of manufacture at room temperature with protective cap on

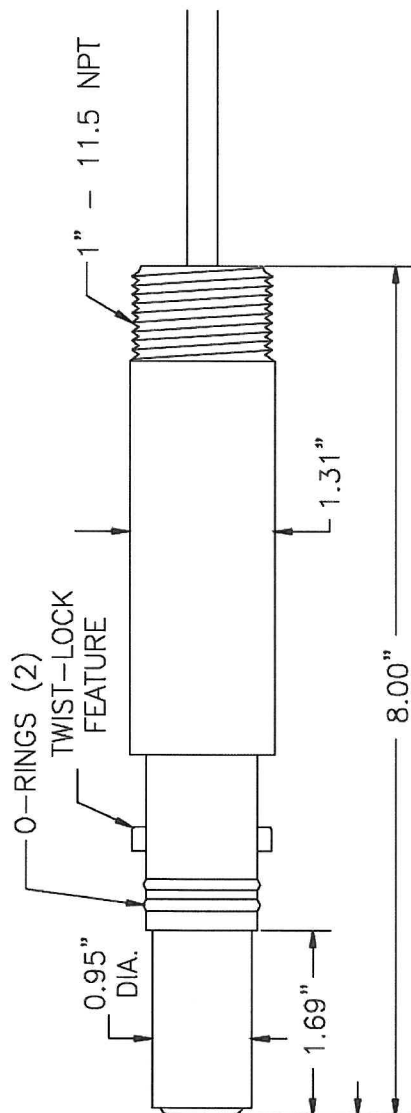
Standard Hook-Up Options:

No Preamp - BNC Connector + TC lead wires  
With Preamp – Multiconductor Lead Wires – See Hook Up Schematics

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FX-300 Integrated Fluoride Ion Selective Sensor Specifications  
For High pH Service Applications, Twist Lock Mounting



SF-8T-UL-10 Twist Lock Integrated Fluoride Sensor