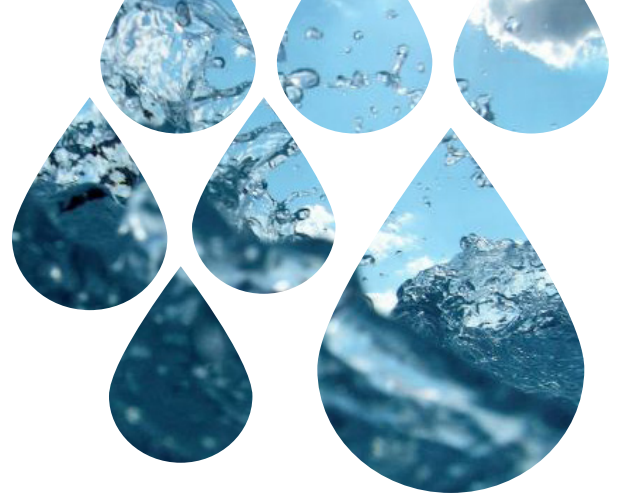


Fluoride Monitor

Model Q46F



Fluoride is widely added to drinking water systems to help prevent tooth decay. It is normally added in the form of liquid hydrofluorosilicic acid, which can be easily handled and applied using standard metering pumps. While control of the fluoridation process is easily handled by simple flow proportional feed, monitoring of final fluoride concentrations is useful in providing an alarm in the case of overfeed problems. Optimum fluoride levels of around 1 PPM are safe, but control system problems resulting in concentrations above 2 PPM are considered excessive and need to be detected as early as possible. Loss of chemical feed can also be detected quickly and reliably with on-line fluoride monitoring.

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Fast, Reliable Fluoride Monitoring!

The Q46F provides continuous measurement of free fluoride concentration in potable water. The system employs a fluoride sensitive ion selective electrode (ISE) which provides reliable measurement down to 0.1 PPM and as high as 1000 PPM. A chemistry module provides sample conditioning for the sensor and the measured fluoride concentration is displayed on a separate electronics module that also provides alarm and analog output functions.



APPLICATIONS



- **Potable Water Systems**



- **Semi-Conductor Wastewater Systems**

FEATURES

Analog Output Options. Two isolated 4-20 mA outputs are standard. Default setting provides analog outputs for fluoride and temperature.

PID Output. Standard PID control function assignable to one analog output.

Digital Communications. Communication Options for Profibus-DP, Modbus-RTU, or Ethernet-IP.

Sensor Preamp. A sensor preamplifier module in the Auto-Chem enclosure allows separation between the monitor and chemistry unit by up to 300 feet.

Relay Outputs. Three SPDT relays are standard, with relay functions programmable for alarm, control, or trouble indication.

Flexible Mounting. NEMA 4X (IP-66) enclosure is suitable for wall, pipe, or panel mounting.

Clear Display. Back-lit large LCD display provides clear visibility in any lighting condition. A scrolling second line on the display provides additional information and programming prompts.

OPERATION

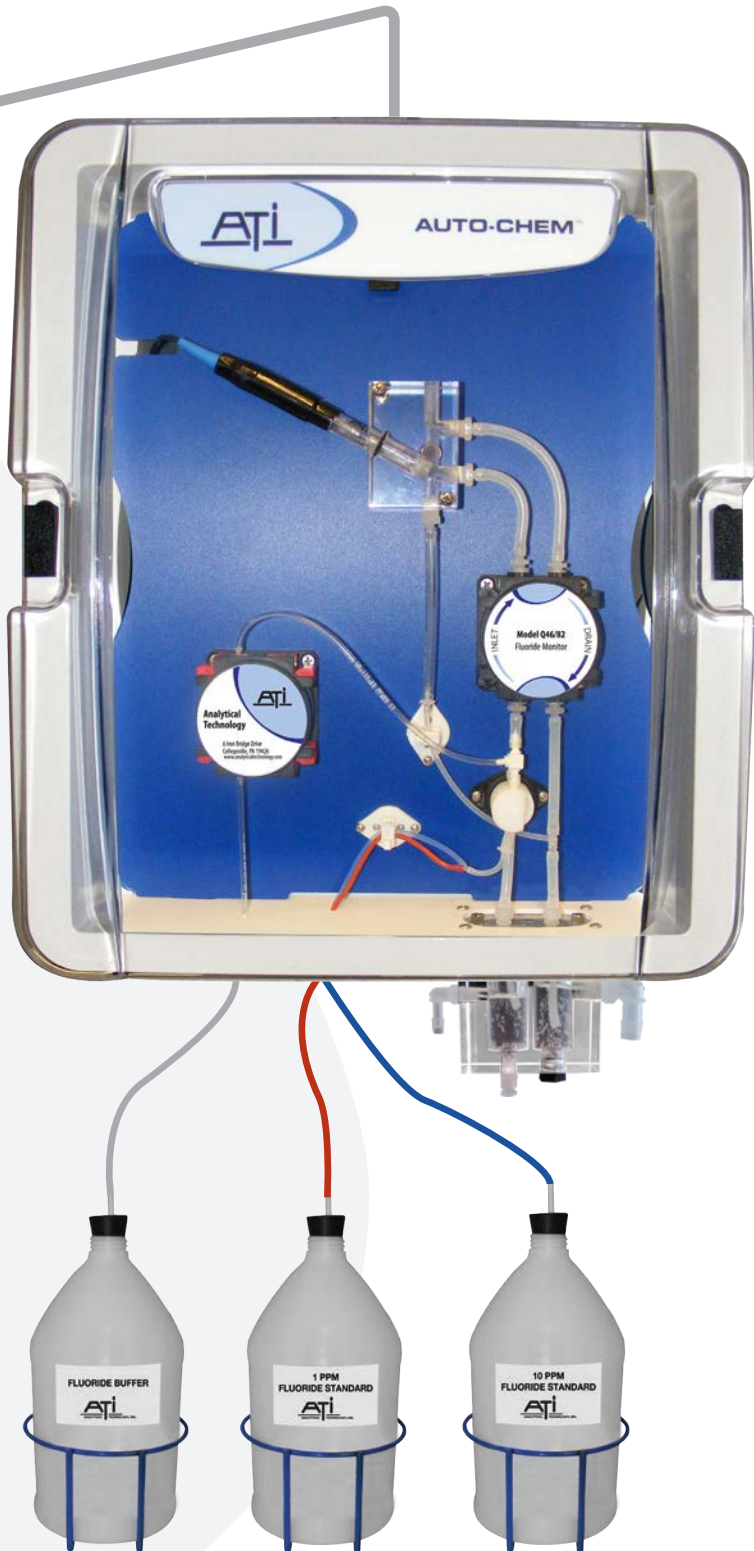
Fluoride ISE sensors measure F^- ion in solution the same way that a pH sensor measures hydrogen ions. A lanthanum fluoride crystal on the tip of the sensor develops a voltage that is proportional to fluoride ion activity. A reference electrode, which is part of the fluoride sensor, provides the other half of the sensing system, with the measurement made at a differential input amplifier. Since the activity of fluoride ions in solution are a function of pH and ionic strength, a small amount of buffer solution is added to the measured sample. This creates a stable condition in which the concentration of fluoride ion and the activity of fluoride ion are directly proportional.

In operation, a small amount of sample is pumped into the system and mixed with the buffer solution. The treated sample then flows to a chamber where the combination fluoride ISE and reference electrode is mounted. The fluoride ion concentration is measured in this chamber with changes in fluoride immediately reflected at the monitor. The treated sample is pumped back out of the measuring cell and into the drain side of the inlet overflow chamber.

Fluoride monitors require very little maintenance. One gallon of buffer will operate the system for 25 days and sensor fill solution level should be checked weekly.

AUTOMATIC CALIBRATION

Ion selective electrodes are subject to small changes in offset voltage, which can be reflected as a slow measurement drift. The Q46F provides an automatic calibration function that can be used to maintain long term accuracy without the need for manual adjustments. The Auto-Cal function can be programmed for either a single point or a two-point calibration. Fluoride ISE sensor slope changes relatively slowly, so a single point Auto-Cal is often sufficient, but a 2-point auto-cal provides optimum long-term accuracy.



CALIBRATION SEQUENCE

The Auto-Cal system will periodically stop normal sample flow and open the inlet for calibration standards, normally 1 and 10 PPM fluoride. After the first standard has been read, and the mV value stored, the calibration standard valve switches to the second standard solution. Once the two standards have been read, the monitor automatically adjusts the zero offset and slope in the monitor and normal measurement resumes. During the calibration cycle of about 5 minutes, the 4-20 mA output is held at the value measured just before starting the cycle. At the end of the cycle, the output will hold for a short period to allow sample to stabilize again and then the output is released to update.

The frequency of the Auto-Cal cycle is user programmable, from every 24 hours to every 999 hours. Every 1-3 days is normally sufficient to maintain good measurement accuracy. Each cycle uses about 30 cc of calibration standard so 1 liter of standard generally will provide about 33 calibrations.

COMMUNICATION OPTIONS

Q46F Monitors allow for interface to digital communication systems. Monitors currently provide for Profibus-DP, Modbus-RTU, or an Ethernet-IP interface. Communication cards plug in to the main power supply assembly and can be added at a later date if user requirements change.

Q46F SPECIFICATIONS

ELECTRONIC MONITOR

Display Range	0-20.00, 0-200.0, 0-2000 PPM
Accuracy	1.0% of selected range or 0.10 PPM
Repeatability	0.5% of selected range or 0.05 PPM
Non-Linearity	0.5% of selected range
Temperature Drift	0.01% of span/°C
Power	100-240 VAC +/- 10%, 50/60 Hz, 10 VA max.
Analog Outputs	Two isolated 4-20 mA, 500 Ω load max.
Temperature Compensation	Automatic 0-40°C
Relays	Three SPDT, 6A @250 VAC, 5A @24 VDC
Display	4 digit, 0.75" numeric LCD with 12 character second line, LED back light.
Enclosure	NEMA 4X (IP-66) Polycarbonate, V-0 flammability
Operating Temperature	-20 to 60°C (-4 to 140°F)
Weight	2.5 lbs. (1.1 Kg)
Operating Conditions	0 to 50°C
Automatic Calibration	Programmable every 24-999 hours

ORDERING INFORMATION

Model Q46F-A-B Fluoride Monitor

Suffix A - Power

- 1 - 100-240 VAC, +/-10%, 50/60 Hz
- 2 - 12-24 VDC

Suffix B - Digital Output

- 1 - None
- 2 - Profibus-DP
- 3 - Modbus-RTU
- 4 - Ethernet-IP

ACCESSORIES

- 09-0066** Fluoride Standard, 100mg/l, 120ml.
- 09-0067** Fluoride Standard, 1000mg/l, 120ml.
- 09-0028** Q46F Fluoride Buffer, one gallon bottle (powder only)
- 05-0108** Fluoride Standards Dilution Kit
- 63-0108** Fluoride Sensor (spare)
- 05-0094** Panel Mount Bracket Kit for Q46F Electronics

CHEMISTRY MODULE

Fluoride Sensor	Combination Fluoride ISE Sensor
Sensor Cable	10 ft standard, 300 ft max.
Response Time	T ₉₀ = 50 seconds
Sample Pump	Internal Tubing Pump, 15 cc/min
Buffer Pump	Internal Tubing Pump, 0.1 cc/min
Measurement Chamber	Cast Acrylic
Temperature Limits	2-40°C
Inlet Sample Flow Rate	5-20 GPH at Inlet Overflow Assembly
Sample Inlet	1/4" I.D. Hose Barb
Sample Drain	1/2" I.D. Hose Barb
Power	115 or 230 VAC, 50/60 Hz
Weight	15lbs (6.8 Kg)
Enclosure	Kydex with acrylic cover, V-0 Flammability

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- Residual Sulfite
- Dissolved Sulfide
- Ammonia
- Turbidity
- Potassium Permanganate



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