

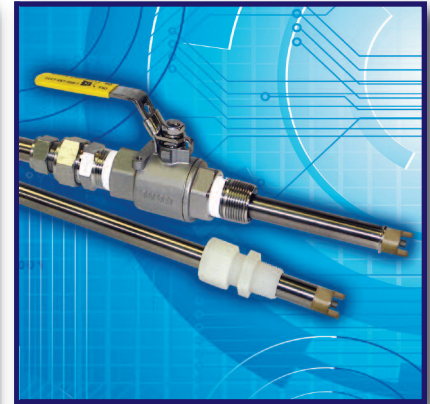


### Features

- MVS10 or MVS17 Style Sensors
- Multiple materials of construction
- Integral Signal Conditioner
- Replaceable Electrode Cartridge
- Available with pH compensation

### Benefits

- Insertion, Immersion or Valve Retractable Service
- 316 Stainless Steel, Titanium, Hastelloy
- Noise free transmission
- Simple and Economical Service
- Wide range of service from 2 pH to 8 pH



Model MVS10/MVS17  
*Fluoride Ion Sensors*

### Description

The MVS10 and MVS17 sensors provide a stable and economical platform for the in line measurement of pH, ORP, Specific Ion, Dissolved Oxygen, Conductivity or Resistivity. The MVS10 is an insertion or immersion style sensor for use in pipe Tees or on the end of a Stand Pipe for immersion into a tank or pond. The MVS17 is a valve retractable design allowing insertion or removal of the sensor into a pipe without interrupting the process flow. Both sensor designs use easily replaceable electrode cartridges. ECD offers several ion selective electrode cartridges suitable for continuous online measurement.

The Fluoride Ion Selective Electrode cartridge develops a millivolt potential proportional to the concentration of free fluoride ions in the measured solution. The Fluoride Ion sensors can be used with either the T23 4-20 mA Transmitter or the C22 Controller with its dual channel or pH compensation capabilities. These analyzers will measure free fluoride ions from 0.02 ppm to 2,000 ppm in the optimum pH range of 5-8 pH. Outside this pH range, large errors will occur in the acid

range and small errors will occur in the alkaline pH ranges.

In acidic solutions fluoride ions react to form hydrofluoric acid, HF,  $pK_a = 3.2$ , at 3.2 pH half of the available fluoride ions are HF and half are the measurable  $F^-$ . This characteristic can be compensated for by adding a pH sensor into the measurement loop. The C22 analyzer will report the total Fluoride ion concentration by measuring the available free fluoride and adjusting the value in accordance with the measured pH value. Hydroxide ions,  $OH^-$ , interfere with the fluoride measurement, 10 hydroxide ions generate the same signal as 1 fluoride ion. This accounts for an error of 1.7 ppb at pH 8, 17 ppb at pH 9 and 0.17 ppm at pH 10.

Fluoride ions will complex with aluminum, silicon, iron (+3), and other polyvalent cations as well as hydrogen and these fluoride ion complexes will not be "seen" by the sensor. If any of these chemicals are present in the measured solution the analyzer will report a lower concentration than the true value.

The sensor is calibrated in two standard solutions differing in concentration by a factor of 10, i.e. 10 ppm and 100 ppm. This calibration sets the slope of the electrode, mV/decade and a zero potential for the sensor. In many cases the process solution's ionic strength and pH value differ widely from the calibration solutions characteristics. This will affect the zero potential of the fluoride sensor but not the slope causing an offset in the measurement. The offset is eliminated by performing a process standardization. When the sensor has stabilized in the process solution take a grab sample of the process and determine the fluoride ion concentration and the adjust the analyzer to read this laboratory determined value.



Model T23 Transmitter



Model C22 Analyzer

# Fluoride Ion Sensors

## Specifications

### MVS10 and MVS17 Sensors

Combination electrode cartridge with a Lanthanum Fluoride measurement cell and a single junction, KCl/AgCl, reference electrode

### Electrode Slope

54 ± 5 mV per decade of concentration change

### Measurement Range

Fluoride: 0.02 to 2,000 ppm

pH: 2 to 8 pH

### Temperature Range

0° C to 80° C (32° F to 176° F)

### Pressure Range

0 - 50 psig (0 - 3.5 bar)

### Response Time

T90 in 10 seconds

### Electrode Life

6 to 12 months

### Interfering ions

Hydroxide, 0.1 selectivity (10 OH<sup>-</sup> = 1 F<sup>-</sup>)

### Wetted Materials

PEEK, epoxy, LaF crystal, PTFE, 316 SS, Viton O-Ring

### Process Connections

MVS10 ¾" MNPT compression fitting

MVS17 1" MNPT Ball Valve

### T23 Transmitter

General purpose, ½ DIN, NEMA 4X, 24 VDC 4-20 mA loop powered Transmitter, CE Marking, Auto ranging display, ppb → ppm → ppthousand

### C22 Analyzer/Controller

General purpose, ½ DIN, NEMA 4X, 110/220 VAC, CE Marking, single or dual channel, with or without pH compensation, (1) 4-20 mA output and (2) Alarm Relays per channel, Auto ranging display, ppb → ppm → ppthousand

Part No.	Model and Product Description
1418060.3000.F	MVS10-C22-CBL-EG-2005063.VIT, F <sup>-</sup> ISE sensor, 316 SS body, ¾" Diameter. x 10" length, 10 ft cable
1414060.3000.F	MVS10-T23-CBL-EG-2005063.VIT, F <sup>-</sup> ISE sensor, 316 SS body, ¾" Diameter. x 10" length, 10 ft cable
1419060.3000.F	MVS17-C22-CBL-EG-2005063.VIT, F <sup>-</sup> ISE sensor, 316 SS body, ¾" Diameter. x 17" length, 10 ft cable
1415060.3000.F	MVS17-T23-CBL-EG-2005063.VIT, F <sup>-</sup> ISE sensor, 316 SS body, ¾" Diameter. x 17" length, 10 ft cable
1900101.2501	Model T23 Fluoride Ion transmitter, 24VDC loop powered, Universal Mounting Bracket (UMB)
16B01221.E000	Model C22 Fluoride Ion Analyzer, 110/220 VAC, (1) 4-20 mA output, (2) Alarm Relays, UMB
16BB2421.EE00	Model C22 Dual Channel Fluoride Analyzer, 110/220 VAC, (2) 4-20 mA outputs, (4) Alarm Relays, UMB
16BA2421.E1C0	Model C22 pH & Fluoride Ion Analyzer, 110/220 VAC, (2) 4-20 mA outputs, (4) Alarm Relays, UMB

Part No.	Spare Parts and Accessories Description
2005063.VIT	Fluoride Ion Electrode, PEEK body, dbl junction Teflon Ref, 0.02-2,000 ppm, 0°-80°C
2010400	Fluoride Ion Calibration Solution, 50% TISAB II, 1.0 ppm
2010401	Fluoride Ion Calibration Solution, 50% TISAB II, 10.0 ppm
2010431	Fluoride Ion Calibration Solution, 50% TISAB II, 100 ppm
2000250-1	Polishing Strip Kit, abrasive cleaning strips for Ion electrodes
3600064	MVS10 Compression Gland Fitting, all polypropylene, ¾" MNPT to ¾" tube fitting
2000072	MVS10 Compression Gland Fitting, 316 SS with Teflon ferrule, ¾" MNPT to ¾" tube fitting
2000264	MVS10 Immersion Assembly, 5 ft. x 1" stand pipe, ¾" FNPT fitting and T handle, requires 3600064
2000743	MVS17 Valve Retraction Assembly, polypropylene, 1" ball valve, 1" x ¾" tube fitting and safety lanyard.
2000745	MVS17 Valve Retraction Assembly, 316 SS, 1" ball valve, 1" x ¾" tube fitting and safety lanyard.

Specifications subject to change without notice.

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