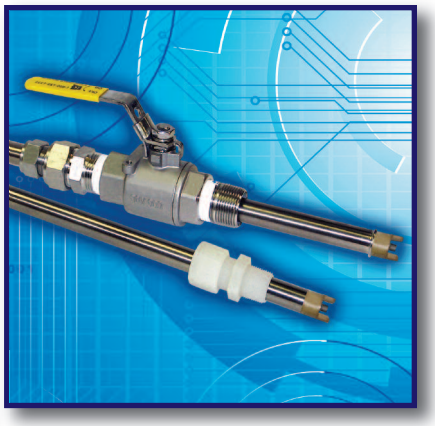
Cupric (Copper) Ion Sensors

ELECTRO-CHEMICAL DEVICES

Features	Benefits
• Model S80 Universal Style Sensors	• Insertion, Immersion or Valve Retractable Service
• Multiple materials of construction	• 316 Stainless Steel, Titanium, Hastelloy
• Integral Signal Conditioner	• Noise free transmission
• Replaceable Electrode Cartridge	• Simple and Economical Service
• Dual Channel Analyzers, pH/pION, pION/pION	• Mix and Match your choice of measurements



Model S80 sensors
Cupric Ion Sensors

Description

The Model S80 universal sensors provide a stable and economical platform for the in line measurement of pH, ORP, Specific Ion, Dissolved Oxygen, Conductivity or Resistivity. The Model S80 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 Model S80 is also available as 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 Cupric Ion Electrode is a combination electrode with a copper sulfide (CuS) solid state pressed crystal sensing element and a double junction reference electrode. The Cupric Ion Selective Electrode cartridge develops a millivolt potential proportional to the concentration of free cupric ions, Cu^{+2} not Cu^{+}, in the measured solution. The typical output is 25mV to 30mV per decade of change in concentration. The speed of response varies from a few seconds in concentrated solutions up to a few minutes in the lower ppm ranges. The Cupric Ion sensors are used with the Model T80 Transmitter with its dual channel mix and match capabilities. This analyzer will measure copper ions from 1.0 ppb to 6,300 ppm autoranging the display between the ppb, ppm and ppt (parts per thousand) scales.

The copper ion electrode is poisoned by silver and mercury ions in solution. Silver and mercury must be absent from the measured solution. Chloride and Bromide ions will also react with the membrane if present in high enough concentrations. Polishing the sensor with the supplied polishing strips will restore the function if a mercury amalgam or silver layer forms on the electrode. In basic solutions, copper reacts with hydroxide and precipitates as $Cu(OH)_2$, cupric hydroxide. This can be avoided by keeping the solutions acidic, pH 6 or lower. The sensor is calibrated using two standard solutions differing in concentration by a factor of 10, i.e. 10 ppm and 100 ppm. The calibration sets the slope of the electrode, mV/decade, and the zero potential for the sensor.

In many cases the process solution's ionic strength, temperature and pH value will differ widely from the calibration solution. These factors will affect the zero potential of the cupric sensor causing an offset, but they will typically not affect the slope. To eliminate the offset perform a standardization, a single point in-line calibration. Once the sensor has stabilized in the process solution take a grab sample from the process and determine the cupric ion concentration. Adjust the analyzer to read this laboratory determined value. It is recommended to verify the readings on a weekly basis.

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Specifications

Model S80 Cupric Sensors
Combination electrode cartridge with a copper sulfide measurement cell and a double junction, KNO_3/KCl /AgCl, reference electrode, signal conditioner, ATC

Electrode Slope
27 ± 3 mV per decade of concentration change

Measurement Range
Cupric ion: 1.0 ppb to 6,300 ppm (2-6 pH)
10^{-8} molar to 0.1 molar

Temperature Range
0° C to 80° C (32° F to 176° F)

Pressure Range
0 - 50 psig (0 - 3.5 barg)

Response Time
T90 in 10 seconds

Electrode Life
6 to 12 months

Interfering ions
Silver, Mercury must be absent, Chloride and Bromide

Wetted Materials
Radel, epoxy, CuS, PTFE, 316 SS, Viton O-Ring

Process Connections
S80 Insertion: ¾" MNPT compression fitting
S80 Valve Retractable: 1" MNPT Ball Valve

Model T80 Transmitter
General purpose, ½ DIN, NEMA 4X, 110/220 VAC, 24 VDC or 4-20 mA loop powered, CE Marking, single or dual channel, (1) or (2) 4-20 mA outputs, optional (3) Alarm Relays 250 VAC 3 amp, MODBUS RTU (standard) or HART 7, Auto ranging display, ppb → ppm → ppthousand

Part No.	Model and Product Description
S80-00-0002-0100-076	S80 Cupric, Cu^{+2} insertion style sensor with ¾" 316 SS compression fitting, 316 SS body, ¾" Diameter. x 10" length, 10 ft cable
S80-00-0002-0300-076	S80 Cupric, Cu^{+2} insertion style sensor with ¾" 316 SS compression fitting, 316 SS body, ¾" Diameter. x 10" length, 30 ft cable
S80-01-0131-0110-076	S80 Cupric, Cu^{+2} Valve Retractable Style with 1" Ball Valve Assembly, 316 SS body, ¾" Diameter x 17" length, 10 ft cable
S80-01-0131-0310-076	S80 Cupric, Cu^{+2} Valve Retractable Style with 1" Ball Valve Assembly, 316 SS body, ¾" Diameter x 17" length, 30 ft cable
T80-10-21-00-1	Model T80 Single Channel Transmitterr, 110/220 VAC, (1) 4-20 mA outputs, (3) Alarm Relays, UM
T80-11-21-20-1	Model T80 Dual Channel Transmitterr, 110/220 VAC, (2) 4-20 mA outputs, (3) Alarm Relays, UM

Part No.	Spare Parts and Accessories Description
2005058.VIT	Cupric Ion Electrode, Radel body, double junction Teflon Ref, 1.0 ppb -6,300 ppm, 0°-80°C
2010463	Cupric Ion Calibration Solution, 10 ppm, 500 ml
2010464	Cupric Ion Calibration Solution, 100 ppm, 500 ml
2000250-1	Polishing Strip Kit, abrasive cleaning strips for Ion electrodes

Specifications subject to change without notice.

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CERTIFIED ISO9001 QUALITY SYSTEM