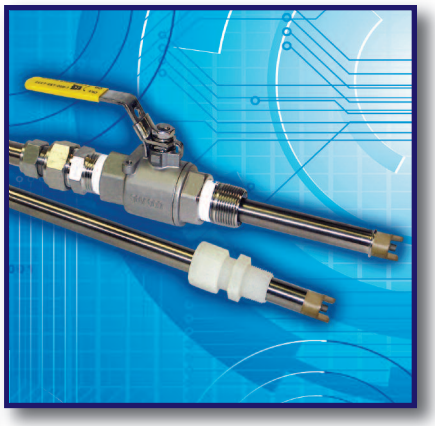
Calcium Ion Sensors

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
Calcium 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 Calcium Ion Electrode is a combination electrode with a sensing element made of a PVC membrane containing an ion exchanger and a double junction reference electrode. The Calcium Ion Selective Electrode cartridge develops a millivolt potential proportional to the concentration of calcium ions in the measured solution. The typical output is 25mV to 30 mV 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 Calcium Ion sensors are used with the Model T80 Transmitter with its dual channel mix and match capabilities. This analyzer will measure calcium from 20 ppb to 40,000 ppm autoranging the display between the ppb, ppm and ppt (parts per thousand) scales.

The calcium ion electrode is an ion exchange sensor that is selective for calcium ions but many anions also interact with the sensing membrane. Lead ions strongly interfere with the measurement, 2 Lead ions = 1 Calcium ion. Mercury, iron (II), Copper (II), nickel (II) and ammonium interfere at 1000 - 3000:1. The pH also interferes with low level measurements, keep the pH >4 for concentrations < 1ppm Ca^{++}. Hydroxide, carbonates, fluorides, phosphates, sulfates all complex with calcium ions. Adjusting the pH <7 eliminates carbonate and hydroxide issues. 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 calcium 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 calcium 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 Sensors
Combination electrode cartridge with a PVC / ion exchange membrane and a double junction, KNO_3/KCl /AgCl, reference electrode, signal conditioner, ATC

Electrode Slope
26 ± 3 mV per decade of concentration change

Measurement Range
Calcium: 20 ppb to 40,000 ppm (3-11 pH)
5×10^{-7} molar to 1.0 molar

Temperature Range
0° C to 40° C (32° F to 104° F)

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

Response Time
T90 in 10 seconds

Electrode Life
6 to 12 months

Interfering ions
Lead (II), Mercury (II), Iron (II), Ammonium

Wetted Materials
Radel, epoxy, PVC, 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
S80-00-0002-0100-074	S80 Calcium, Ca^{+2} insertion style sensor with ¾" 316 SS compression fitting, 316 SS body, ¾" Diameter. x 10" length, 10 ft cable
S80-00-0002-0300-074	S80 Calcium, Ca^{+2} insertion style sensor with ¾" 316 SS compression fitting, 316 SS body, ¾" Diameter. x 10" length, 30 ft cable
S80-01-0131-0110-074	S80 Calcium, Ca^{+2} Valve Retractable Style with 1" Ball Valve Assembly, 316 SS body, ¾" Diameter x 17" length, 10 ft cable
S80-01-0131-0310-074	S80 Calcium, Ca^{+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
2005143.VIT	Calcium Ion Electrode, Radel body, double junction Teflon Ref, 20 ppb -40,000 ppm, 0°-40°C
2010408	Calcium Ion Calibration Solution, 1 ppm
2010407	Calcium Ion Calibration Solution, 10 ppm
2010421	Calcium Ion Calibration Solution, 100 ppm

Specifications subject to change without notice.

Represented by:

RealTech Controls, LLC
5444 Sepulveda Blvd, #216
Sherman Oaks, CA 91411
(818) 606-0562
sales@realtechcontrols.com
www.realtechcontrols.com

Electro-Chemical Devices
1500 North Kellogg Dr.
Anaheim, California, USA 92807
Phone: +1-714-695-0051
+1-800-729-1333
Fax: +1-714-695-0057
email: sales@ecdi.com
web: www.ecdi.com

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