



# Ammonium Ion Sensors



**ELECTRO-CHEMICAL DEVICES**

## Features

- Model S80 Universal 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 10pH



Model S80 Sensors  
*Ammonium 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 Ammonium Ion Selective Electrode cartridge develops a millivolt potential proportional to the concentration of ammonium ions in the measured solution. The S80 Ammonium Ion sensors can be used with the Model T80 Transmitter with its dual channel and pH compensation capabilities. The T80 Transmitter will measure ammonium from 0.1 ppm to 14,000 ppm in the optimum pH range of 2-7 pH. Outside this pH range large errors can occur, in the alkaline pH ranges  $\text{NH}_4^+$  gives up a hydrogen ion to form ammonia,  $\text{NH}_3$  which is not measured, a small amount of ammonium is measured and a large compensation factor is applied.

Ammonium,  $\text{NH}_4^+$ , is a conjugate acid with the  $\text{pKa} = 9.2$ , at 9.2 pH half of the available ammonia is the measureable  $\text{NH}_4^+$  and half is  $\text{NH}_3$ . This generates a 50% error in the ammonium

measurement at 9.2 pH and a 10 % error at 8.2 pH. This error can be compensated for by adding a pH sensor into the measurement loop. The T80 Transmitter will report the total ammonium/ammonia concentration by measuring the available ammonium and adjusting the value in accordance with the  $\text{pKa}$  and measured pH value.

Potassium ions, sodium ions, magnesium ions, hydrogen ions, all interfere with the ammonium measurement. Potassium is the worst with 8 potassium ions generating the same signal as 1 ammonium ion, sodium and magnesium are 800:1 If the potassium ion concentration is changing then  $\text{K}^+$  compensation can be accomplished in the T80 by adding an S80 potassium ion sensor.

The sensor is calibrated using 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, temperature and pH value differ widely from the calibration solutions characteristics. This will affect the zero potential of the ammonium sensor, an offset, but not affect the slope. Eliminate the offset by performing a process standardization. When the sensor has stabilized in the process solution take a grab sample of the process and determine the ammonium concentration and the adjust the analyzer to read this laboratory determined value.

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## Specifications

### Model S80 Sensors

Combination electrode cartridge with a PVC membrane measurement cell and a single junction, KCl/AgCl, reference electrode, signal conditioner, ATC

### Electrode Slope

54 ± 5 mV per decade of concentration change

### Measurement Range

Ammonium: 0.1 to 14,000 ppm

pH: 2 to 8 pH, 2 to 10.5 pH with pH compensation

### 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

Potassium, 8:1, Sodium 800:1, Magnesium 800:1

### 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
S80-00-0002-0100-071	S80 Ammonium, NH <sub>4</sub> <sup>+</sup> insertion style sensor with ¾" 316 SS compression fitting, 316 SS body, ¾" Diameter. x 10" length, 10 ft cable
S80-00-0002-0300-071	S80 Ammonium, NH <sub>4</sub> <sup>+</sup> insertion style sensor with ¾" 316 SS compression fitting, 316 SS body, ¾" Diameter. x 10" length, 30 ft cable
S80-01-0131-0110-071	S80 Ammonium, NH <sub>4</sub> <sup>+</sup> Valve Retractable Style with 1" Ball Valve Assembly, 316 SS body, ¾" Diameter x 17" length, 10 ft cable
S80-01-0131-0310-071	S80 Ammonium, NH <sub>4</sub> <sup>+</sup> 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 Transmitter, 110/220 VAC, (1) 4-20 mA outputs, (3) Alarm Relays, UM
T80-11-21-20-1	Model T80 Dual Channel Transmitter, 110/220 VAC, (2) 4-20 mA outputs, (3) Alarm Relays, UM

Part No.	Spare Parts and Accessories Description
2005083.VIT	Ammonium Ion Electrode, Radel body, double junction Teflon Ref, 0.1-14,000 ppm, 0°-40°C
2010449	Ammonium Ion Calibration Solution, 10 ppm
2010446	Ammonium Ion Calibration Solution, 100 ppm
S80-00-0002-0100-001	S80 pH, insertion style sensor with ¾" 316 SS compression fitting, 316 SS body, ¾" Diameter. x 10" length, 10 ft cable with General Purpose pH electrode (for pH compensated measurement)
S80-00-0002-0100-082	S80 Potassium, K <sup>+</sup> insertion style sensor with ¾" 316 SS compression fitting, 316 SS body, ¾" Diameter. x 10" length, 10 ft cable with Potassium electrode (for Potassium Ion compensated measurement)
2005034.VIT	Potassium Ion Electrode, Radel body, double junction Teflon Ref, 0.1-39,000 ppm, 0°-40°C
2005145.VIT	General Purpose pH electrode cartridge, double junction reference, 0-14 pH, 0°-100°C

Specifications subject to change without notice.

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