

# pH-independent Free Chlorine Sensor

For additional information, please refer to the Instruction Manuals CD shipped with this product, or visit our website at [www.emersonprocess.com/raihome/liquid/](http://www.emersonprocess.com/raihome/liquid/).

## SPECIFICATIONS - SENSOR

**Pressure:** Sensor must be installed in a flow cell that drains to open atmosphere.

**Temperature:** 0-122°F (0-50°C)

**Process connection:** Sensor is intended for use in flow cell, PN 24091-01 only.

**Wetted materials:** PVC, polyethersulfone, polyester, Viton<sup>1</sup>, silicone, copper

**Cathode:** gold mesh

<sup>1</sup> Viton is a registered trademark of DuPont Performance Elastomers.

## SPECIFICATIONS - FLOW CELL

**Inlet pressure:** 65 psig (549 kPa abs) maximum

**Temperature:** 122°F (50°C) maximum

**Process connection:** Compression fitting for 1/4 inch OD tubing

**Wetted materials:** polycarbonate, polyester, silicone, 316 stainless steel



### **CAUTION**

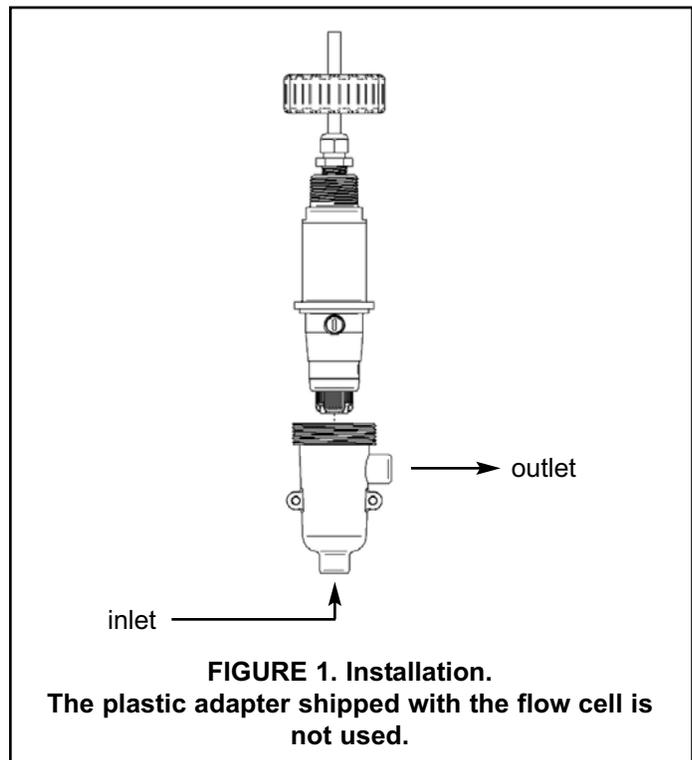
#### **SENSOR/PROCESS APPLICATION COMPATIBILITY**

The wetted sensor materials may not be compatible with process composition and operating conditions. Application compatibility is entirely the responsibility of the user.

## INSTALLATION

The sensor leaves the factory with a shipping membrane in place. **DO NOT REMOVE THE SHIPPING MEMBRANE UNTIL READY TO PUT THE SENSOR IN SERVICE.**

1. Remove the red protective cap from the sensor.
2. Holding the membrane end pointing up (cable end pointing down), unscrew the retainer cap and remove the shipping membrane. See Figure 6. It is not necessary to remove the O-ring. Save the shipping membrane. It should be reinstalled when the sensor is not in use.
3. Still holding the membrane end pointing up, install the chlorine membrane. The chlorine membrane is in the plastic bag attached to the sensor. Screw the retainer back in place.
4. Place the sensor in the flow cell and **start the flow. Do not store or operate the sensor for more than about 45 minutes in a non-flowing sample.** Sensor must drain to open atmosphere. No back pressure. Do not leave the sensor in air.



Keep sample flow constant and between 1 and 2 gph (60-120 mL/min).

WIRING

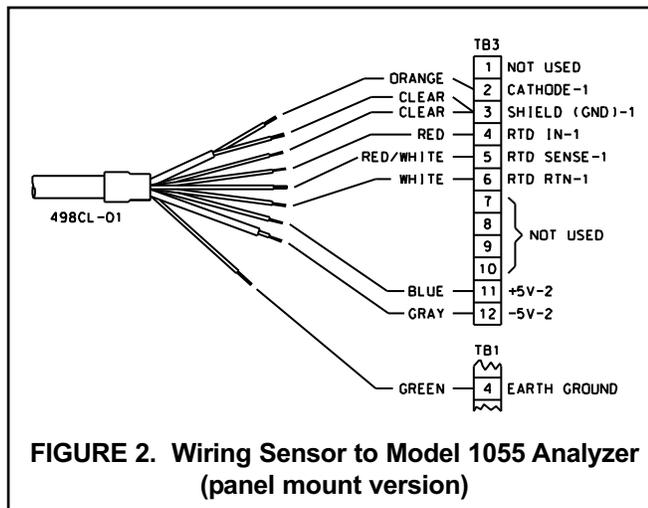


FIGURE 2. Wiring Sensor to Model 1055 Analyzer (panel mount version)

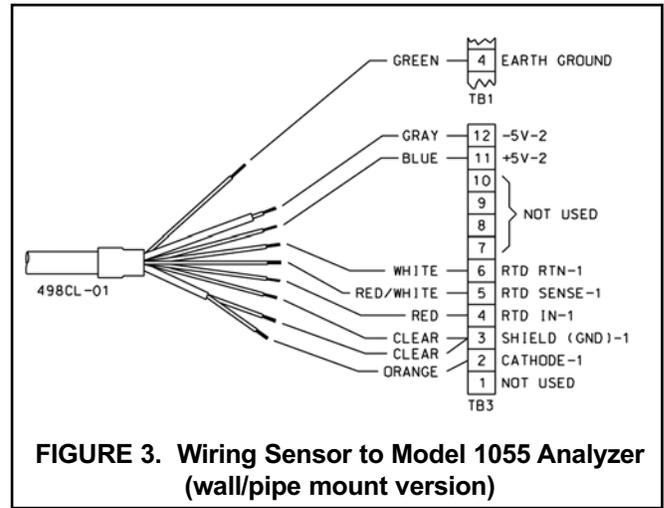


FIGURE 3. Wiring Sensor to Model 1055 Analyzer (wall/pipe mount version)

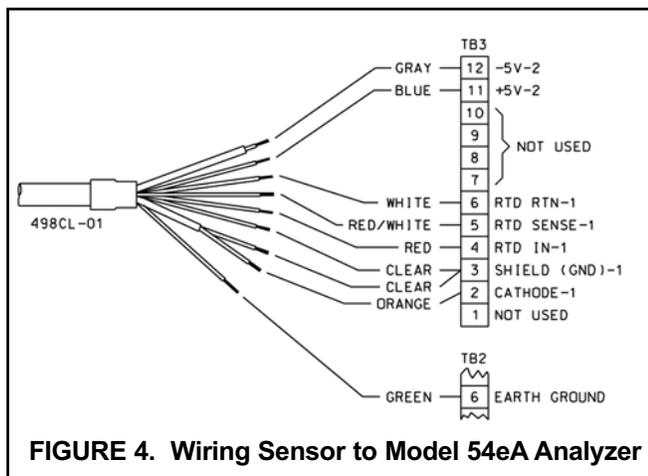


FIGURE 4. Wiring Sensor to Model 54eA Analyzer

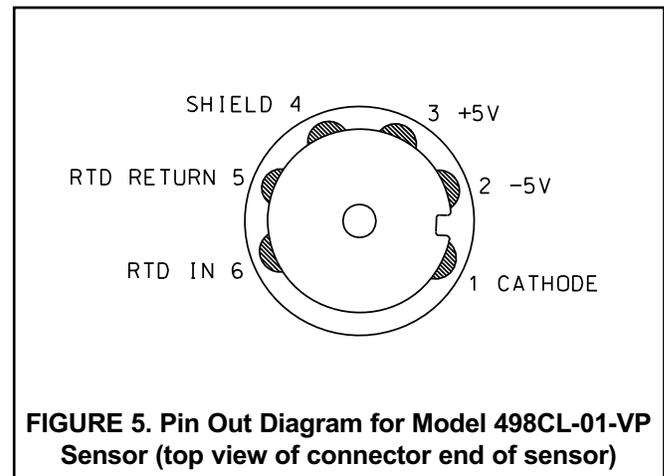


FIGURE 5. Pin Out Diagram for Model 498CL-01-VP Sensor (top view of connector end of sensor)

MAINTENANCE

The sensor requires routine maintenance, which includes cleaning the membrane as well as periodically replacing the membrane and fill slurry. The fill slurry and membrane should be replaced at approximately three-month intervals. The frequency of cleaning can be determined only by experience.

CLEANING THE MEMBRANE

Keep the membrane clean and free from dirt and algae. Clean the membrane with water sprayed from a wash bottle. Do not use tissues to clean the membrane. Touching the membrane may bend the mesh cathode and permanently damage the sensor.

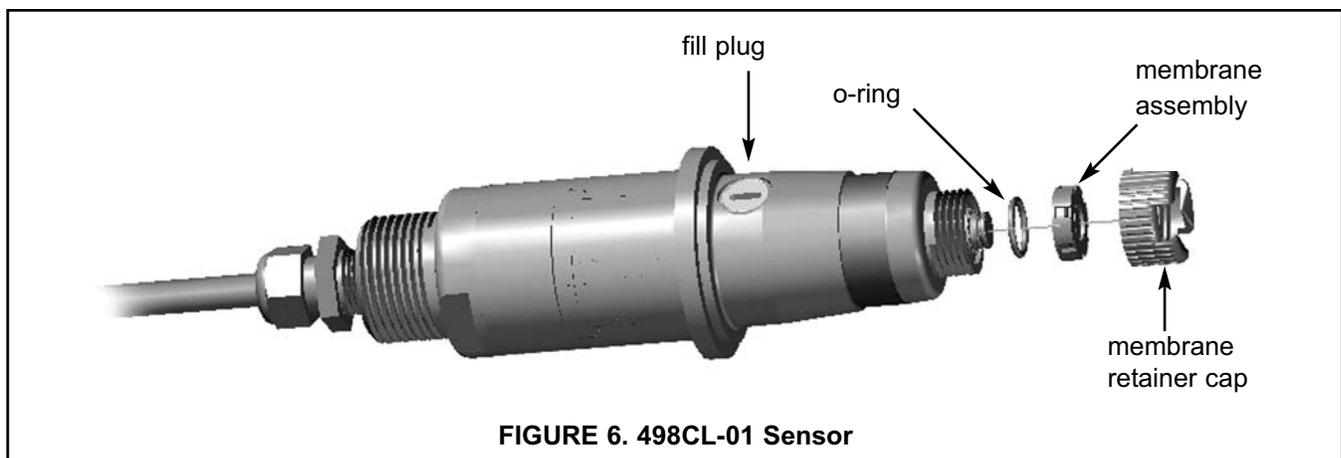
REPLACING THE ELECTROLYTE SLURRY AND MEMBRANE

**CAUTION:**

**Fill solution and solid may cause irritation. Avoid contact with skin and eyes. May be harmful if swallowed. Read and follow manual.**

1. Unscrew the membrane retainer and remove the membrane assembly and O-ring. See Figure 6.
2. Remove the fill plug.

3. Empty all remaining fill slurry from the sensor. Rinse with deionized water until there is no significant amount of solid left in the sensor.
4. Place a few drops of water in the replacement membrane assembly and place it on the mesh cathode. **DO NOT TOUCH THE MESH CATHODE.** Doing so may bend the mesh and permanently damage the sensor. Screw the membrane retainer into place.
5. Obtain one bottle of saturated succinic acid (PN 9210381, 40 mL) and one bottle of succinic acid crystals (PN 9210379, 40 g) from the electrolyte kit. Remove the red cap from the fill spout on each bottle.
6. Using a razor blade or scissors, cut the fill spout on the bottle of dry succinic acid just below the line on the spout.
7. Hold the sensor with the membrane end pointed slightly upward. Insert the spout of the bottle of succinic acid solution into the fill port. Squeeze the bottle until half of the solution has been transferred to the electrolyte chamber.
8. Pour the solid succinic acid crystals into the fill port. If the crystals accumulate in the fill hole, shake or tap the sensor gently to unblock the port.
9. Use the remainder of the succinic acid solution to rinse crystals adhering to the threads into the sensor. Keep adding solution until it overflows the fill port. Tap the sensor a few times to be sure no air bubbles are trapped in the sensor.
10. Screw the fill plug back into place until it is flush with the body.
11. Hold the sensor with the membrane end pointing down and give it a few shakes as though shaking down a fever thermometer. Shaking helps clear bubbles that might have become trapped behind the mesh cathode.
12. The sensor may require several hours operating at the polarizing voltage to equilibrate after the electrolyte has been replaced. **Be sure to place the sensor in flowing, chlorinated water for equilibration.**



## STORAGE

**The sensor must be stored in a flowing sample.** Minimum sample flow is 0.5 gph (30 mL/min).

**Do not let the membrane dry out.**

**If the sensor cannot be stored in a flowing sample...**

1. Turn off power to the analyzer.
2. Remove the sensor from the flow cell.
3. Replace the membrane with the shipping membrane provided with the sensor. For a replacement shipping membrane order PN 23501-00.
4. To protect the sensor from physical damage, store it in the **dry** flow cell.

## REJUVENATING A SENSOR FOLLOWING IMPROPER STORAGE

If the sensor is stored in a stagnant sample for more than a day or two, it can become contaminated with copper. Corrosion of the external copper electrode produces copper ions, which diffuse through the membrane into the sensor. If the sensor was powered up during storage, copper will plate out on the cathode. If the sensor was not powered up, the copper will start plating out as soon as the polarizing voltage is applied. Once copper has coated the cathode, the sensor zero current will become very high, and the sensor will be unusable until the cathode has been cleaned.

1. If the sensor was not powered up during storage, **DO NOT APPLY POWER**. Empty the fill slurry and thoroughly rinse the sensor with deionized water. Refill the sensor with fresh fill slurry. Let the sensor run in **flowing** chlorinated water overnight. Zero and calibrate the sensor. See the analyzer instruction manual for details. The zero current should be less than about 100 nA.
2. If the sensor was powered up during storage, the cathode is probably coated with metallic copper. **Disconnect the sensor from the analyzer**. Remove the membrane and clean out the fill slurry. Immerse the mesh cathode in 10% nitric acid solution (10 mL of concentrated nitric acid in 90 mL of water) for about five minutes. Rinse thoroughly with deionized water. Refill the sensor with fresh slurry and install a new membrane. Let the sensor run overnight in **flowing** chlorinated water. Zero and calibrate the sensor. The zero current should be less than about 100 nA.

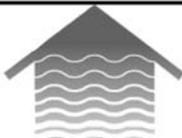
## SPARE PARTS

33970-00	Fill Plug
33521-03	Membrane retainer cap
23501-10	pH-independent free chlorine membrane assembly, includes one membrane assembly and O-ring
23502-10	pH-independent free chlorine membrane assembly, includes three membrane assemblies and O-rings
24146-00	pH-independent free chlorine sensor electrolyte kit, includes three bottles of saturated succinic acid solution and three bottles of succinic acid crystals



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