

# Ag/AgCl

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Orion 90-01

## Orion Single Junction Reference Electrode

INSTRUCTION MANUAL



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ROSS Ultra electrodes have patents pending.

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This publication supersedes all previous publications on this subject.

# GENERAL INFORMATION

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## Introduction

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The Orion 90-01 Single Junction Reference Electrode is a sleeve-type Ag/AgCl reference electrode designed for precision measurements with ion-selective electrodes. When filled with Orion 900001 Filling Solution, the Orion 90-01 matches the potential characteristics of a conventional KCl saturated calomel electrode.

Reference electrode Orion 90-01 is recommended for all pH and ion-selective measurements except for those:

1. In dilute solutions where the ion to be measured is contained in the filling solution of the Orion 90-01.
2. In solutions where an ion in the filling solution would introduce an electrode interference.
3. In solutions where a species is present which forms a precipitate with an ion contained in the filling solution of the Orion 90-01.

For these samples, the Double Junction Reference Electrode, Orion 90-02, with an appropriate intermediate filling solution, is recommended.

## Required Solutions

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### Filling Solutions

Supplied with the Orion 90-01 is an equitransferent filling solution (Orion 900001) containing  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{NO}_3^-$ , and  $\text{Cl}^-$  ions, that is saturated with AgCl. It is recommended for most measurements in dilute samples (below 0.2 M in total ionic strength), and it is effective at temperatures down to 10 °C. If measurements are to be made in concentrated solutions, or at temperatures below 10 °C, the recommended filling solution is 4 M KCl (saturated with AgCl), Orion 900011.

For complete details regarding the proper choice of reference electrode filling solution, refer to the instruction manual for the ion-selective electrode to be used.

# USING THE ELECTRODE

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## Set Up

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### Filling Instructions

The Orion 90-01 Single Junction Reference Electrode is shipped dry and must be filled before use. Select an appropriate filling solution.

To fill from the flip-spout bottle:

1. Lift the spout to a vertical position.
2. Insert the spout into the fill hole in the outer sleeve and add a small amount of filling solution to the chamber. Tip the electrode to moisten the O-ring at the top and return electrode to a vertical position.
3. Holding the electrode by the barrel with one hand, use the thumb to push down on the electrode cap, allowing a few drops of filling solution to drain and wet the inner cone.
4. Release sleeve. If sleeve does not return to its original position immediately, check to see if the O-ring is moist enough and repeat steps 2 – 4 until the sleeve has returned to the original position. Add filling solution up to the fill hole.

To change from one kind of filling solution to another: Drain the first filling solution from the electrode, rinse once with the second filling solution, and refill with second solution.

## Electrode Storage

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The Orion 90-01 Reference Electrode may be stored in air between sample measurements (up to 1 hour).

For short periods of time (up to 1 week), the Orion 90-01 may be stored in its filling solution. Distilled water is also an acceptable storage solution. The solutions inside the reference electrode should not be allowed to evaporate and crystallize.

For long periods of time (over 1 week), drain the Orion 90-01 Reference Electrode completely, rinse with distilled water, and store dry.

## Maintenance

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Add filling solution each day before use. The level of electrode solution must always be at least one inch above the level of the sample solution in the beaker to maintain a proper flow-rate and to avoid back-diffusion of sample ions into the filling solution.

*If the area between the sleeve and inner cone becomes clogged, flush the electrode with filling solution.*

Tip the electrode to moisten the O-ring on the electrode body. Holding the electrode by the cap with one hand, push the outer sleeve up into the cap with the other hand, allowing the filling solution to drain from the chamber. Release the sleeve and refill the electrode.

## Disassembly - Reassembly

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***Disassembly is not normally required or recommended.*** However, if dirt or viscous samples clog the area between the sleeve and the electrode body, the electrode can be disassembled easily. ***Do not touch the inner cone or the inside of the sleeve with your fingers.*** Protect the cone with an absorbent tissue during handling. Fingerprints can be wiped off with methanol.

1. Rinse the outer body under warm running water.
2. Hold the electrode body by the cap with one hand and push the outer sleeve of the electrode up into the cap to drain the chamber.
3. Unscrew the cap, slide the cap and epoxy-coated spring up along the cable.
4. Hold the outer sleeve with one hand and firmly push down on the threaded portion with the thumb and forefinger to separate the inner body from the sleeve.
5. Grasp the cone with a clean tissue and withdraw the body from the sleeve with a gentle twisting motion.

***NOTE:*** *Do not touch the AgCl pellet above the cone as it may cause damage to the pellet.*

6. Rinse the outside of the electrode body and the entire sleeve with distilled water. Allow to air dry.

### Reassembly

1. Moisten the O-ring on the electrode body with a drop of filling solution. Insert screw-thread end of the electrode body into the tapered, ground end of sleeve.
2. Push body into sleeve with a gentle twisting motion until bottom surface of inner cone is flush with the tapered end of the sleeve.
3. Place the spring on the electrode body and screw on the cap. Refill with filling solution. The electrode is now ready for use.

# SPECIFICATIONS

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## Construction

Break-resistant epoxy, resistant to acids, bases, and inorganic solvents. Cannot be used in polar organic solvents.

## Size

Electrode length: 110 mm (excluding cap)  
Cap diameter: 16 mm  
Body diameter: 13 mm  
Cable length: 100 cm

## Connector

Standard pin-tip jack

## Filling Solutions

Orion 900001:  
matches potential characteristics of KCl saturated calomel electrode.

Orion 900011:  
4 M KCl (saturated with AgCl).  
Matches potential characteristics of Ag/AgCl reference electrode.

## Temperature Range

10 to 100 °C using Orion 900001 Filling Solution  
-5 to 100 °C using Orion 900011 Filling Solution

## Refill Package

Orion 900001:  
Bottle of equitransferent filling solution. Box of five 50 mL bottles with flip-spout cap. Generally used for low ionic strength samples.

Orion 900011:  
Bottle of filling solution. Box of five 50 mL bottles with flip-spout cap. Generally used for high ionic strength samples.

Specifications subject to change without notice.

## **Environmental Instruments**

Water Analysis

### **North America**

166 Cummings Center  
Beverly, MA 01915 USA  
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