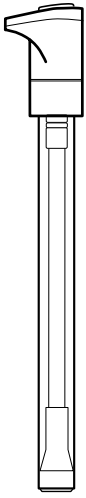
User Guide

Double Junction
Reference
Electrode



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Introduction

This user guide contains information on the preparation, operation and maintenance of the Thermo Scientific Orion double junction reference electrode, Cat. No. 900200.

The 900200 reference electrode is a sleeve-type refillable Ag/AgCl (silver/silver chloride) reference electrode with an outer chamber that isolates the inner reference element and filling solution from the sample. This electrode is designed for precision measurements with ion selective half-cell electrodes and pH half-cell electrodes.

Required Solutions

Filling Solutions

Two different filling solutions are supplied with the 900200 electrode. The inner chamber filling solution, Cat. No. 900002, is a green colored solution that is saturated with AgCl. The outer chamber filling solution, Cat. No. 900003, consists of 10% KNO_3 and may be used whenever potassium and nitrate pose no problems.

The reference electrode filling solutions that are best suited for use with Thermo Scientific Orion sensing half-cell electrodes are specified in the sensing electrode user guides. In preparing other outer chamber filling solutions, the following points should be kept in mind:

1. Components of the filling solution should not interfere with the electrode response to the ion being measured.

2. The outer chamber filling solution should contain no species, such as sulfide or iodide, that reacts with the potassium, sodium, nitrate, chloride or silver ions in the inner chamber filling solution.

3. The outer chamber filling solution should have an ionic strength as high as possible, and the ionic mobilities of the anions and cations should be approximately equal (the solution should be equitransferent). Examples of equitransferent solutions are KCl, KNO_3, NH_4NO_3 (below pH 8), the filling solutions should match the background of the sample as closely as possible.

Note: *For samples with a pH above 10, adjust the filling solution pH with NaOH to match the sample pH. For samples with a pH below 2, adjust filling solution pH with HNO_3 to match the sample pH.*

Electrode Setup

Filling Instructions

The 900200 double junction reference electrode is shipped dry and must be filled before use. Select an appropriate outer chamber filling solution for the application.

To fill from the flip-spout bottle, lift the spout to the vertical position, place the spout in the electrode fill hole, and firmly squeeze the bottle.

Inner Chamber – Use Cat. No. 900002 inner chamber filling solution only. Unscrew the electrode cap and move the cap and spring up the cable. Push down on the top of the inner chamber until the cone at bottom end can be grasped using a lint-free tissue. Grasp the cone and pull the inner chamber free of the outer body. Slide the rubber sleeve at the top of the inner chamber down to uncover the fill hole. Using the flip-spout bottle, fill the inner chamber up to the fill hole and slide the rubber sleeve back up. If you have trouble filling the inner chamber, add some solution, shake the electrode down like a clinical thermometer, and repeat until the electrode is filled. Wipe excess filling solution off the inner chamber surfaces and slide the inner chamber completely up into the outer body. Place the spring back on the inner chamber and screw the cap on finger-tight.

Outer Chamber – Select an appropriate outer chamber filling solution. Using a flip-spout bottle or pipette, add a small amount of filling solution through the fill hole in the outer body. Tip the electrode to moisten the O-ring on the electrode body. Hold the electrode by the outer body and push down on the cap to allow the filling solution to wet the inner cone. Release the cap and check to see that the end of the outer body is flush with the bottom surface of the cone. Fill the outer chamber up to the filling hole with the filling solution. If the outer body does not return to the correct position, push it gently down into place.

Storage

The 900200 double junction reference electrode may be stored in distilled water or a standard solution between sample measurements and up to 1 hour.

For short periods of time, up to 1 week, the 900200 electrode may be stored in its filling solution. Distilled water is also an acceptable storage solution. The solution inside the reference electrode should not be allowed to evaporate and crystallize.

For long periods of time, over 1 week, drain the 900200 electrode completely, rinse it with distilled water, and store the electrode dry.

Maintenance

Add filling solution to the electrode each day before use. The level of outer chamber filling 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 outer chamber filling solution.

If the area between the sleeve and inner cone becomes clogged, flush the electrode with warm distilled water and then filling solution. Tip the electrode to moisten the O-ring on the electrode body. Holding the electrode body with one hand, push down on the electrode cap to allow the filling solution to drain from the chamber. Release the cap to reset the sleeve and then refill the electrode.

To change the outer chamber filling solution, drain the first filling solution from the outer chamber, rinse and drain the outer chamber using distilled water and then the second filling solution, and refill the outer chamber with the second solution up to the fill hole.

Drain the inner chamber each week and fill it with fresh inner chamber filling solution Cat. No. 900002. Follow the instructions in the **Filling Instructions** section to access the inner chamber. Tilt the inner chamber upside down and squeeze air from an empty wash bottle into the fill hole while pointing the vent hole away from you. Solution will empty through small vent hole. Fill the inner chamber according to the instructions in the **Filling Instructions** section.

Disassembly

Do not touch the bottom of the electrode body or the inside of the sleeve with your fingers. Protect these areas with an absorbent tissue during handling.

Drain the outer filling solution. Tip the electrode so that the filling solution moistens the O-ring on the electrode body. Hold the electrode by the outer body and push down on the cap to allow the filling solution to drain out.

Remove the outer body. Unscrew the cap and slide the cap and spring up the cable. Push down on the top of electrode body with the thumb until the inner cone is released from the outer body. Grasp the cone using a lint-free tissue and withdraw the inner chamber from the outer body using a gently twisting motion. Rinse the inner chamber and outer body distilled water.

Reassembly

Reassemble the electrode. Moisten the O-ring with a drop of outer chamber filling solution. Insert the threaded end of the inner chamber into the ground tapered end of the pouter body. Push the inner chamber slowly up into the outer body using a gentle twisting motion until the bottom surface of the inner cone is flush with the end of the outer body. Place the spring on top of the electrode body, screw the cap on finger-tight and refill the outer chamber with filling solution.

Specifications

Construction

Break-resistant epoxy body that is resistant to acids, bases, and inorganic solvents. The epoxy body cannot be used in polar organic solvents.

Size

Electrode length:	110 mm (excluding cap)
Cap diameter:	16 mm
Body diameter:	13 mm
Cable length:	1 meter

Connector

Standard pin-tip jack

Filling Solutions

Cat. No. 900002 – Inner chamber filling solution

Cat. No. 900003 – Outer chamber filling solution

Note: *The outer chamber can be filled with other solutions as needed. Refer to the sensing half-cell user guide for details.*

Temperature Range

10 to 100 °C

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