

pH

Model 91-05; Model 91-06
Model 91-15; Model 91-16
Model 91-25; Model 91-26
Model 91-35; Model 91-36

GEL-FILLED COMBINATION pH ELECTRODE

INSTRUCTION MANUAL

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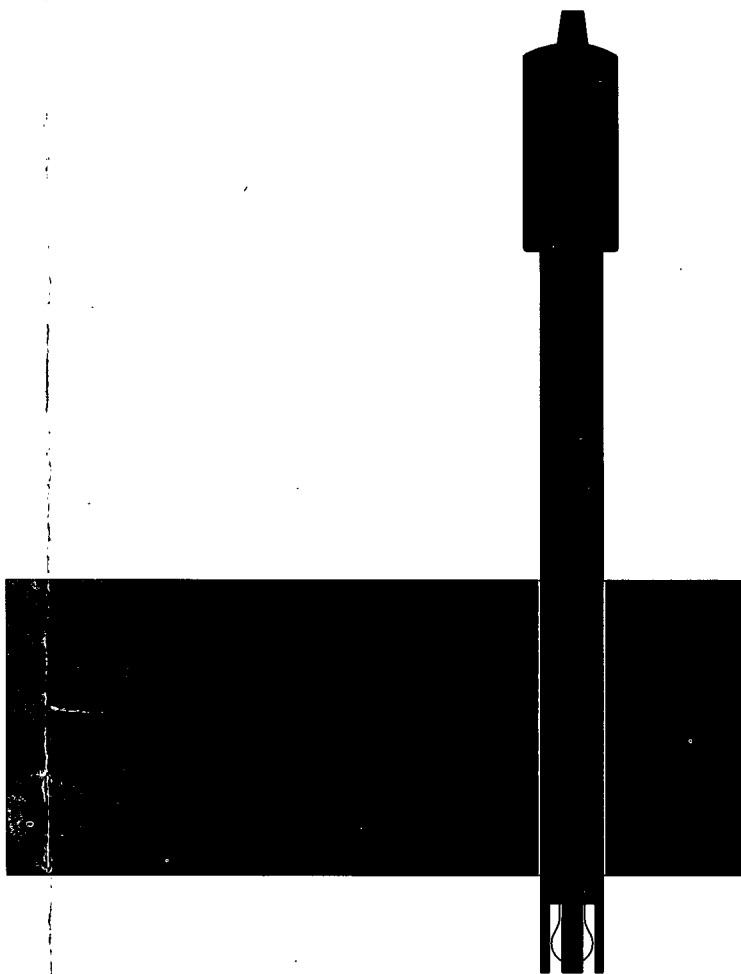
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TABLE OF CONTENTS

GENERAL INFORMATION	1
Introduction	1
Required Equipment	1
Required Solutions	1
USING THE ELECTRODE	3
Set Up	3
Electrode Preparation	3
pH Calibration & Measurement	3
Single-Buffer Calibration	3
Two-Buffer Calibration	4
Measuring Hints	5
Electrode Storage	5
Short-term Storage	5
Long-term Storage	5
Electrode Maintenance	6
Cleaning Electrode	6
Removal of Deposits	6
Electrode Warranty	7
Accessories	11
Specifications	13

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ORION Series A meters and 900A printer are protected by U.S. patents 5,108,578, 5,198,093, D334,208 and D346,753.

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ionplus electrodes and Optimum Results solutions have patents pending.

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The specifications, descriptions, drawings, ordering information and part numbers within this document are subject to change without notice.

This publication supersedes all previous publications on this subject.

GENERAL INFORMATION

Introduction

The ORION Gel-Filled Combination Electrode is designed for routine pH measurements under rugged conditions. The unbreakable body extends beyond the pH sensing glass bulb for protection. The sealed reference section, permanently filled with a KCl gel, never needs refilling. The electrodes are:

Model No.	Description
91-05, 91-06	Conventional Electrode for general purpose measurement
91-15, 91-16	Semi-micro Electrode for pH measurement in test tubes. Provided with each electrode is an adaptor which allows the use of the ORION Universal Electrode Holder (Orion Cat. NO. 910002)
91-25, 91-26	Flask Electrode for pH measurement in a tall-necked flask
91-35, 91-36	Flat-Surface Electrode for pH measurement on solids or semi-solid substances

Required Equipment

pH Meter — Any ORION meter or other meter with appropriate input jacks can be used. The following electrode connector configurations are available:

- 91-05, 91-15, 91-25, and 91-35 have U.S. Standard connectors
- 91-06, 91-16, 91-26, and 91-36 have BNC connectors

Required Solutions

Buffers — Two are recommended for precise measurement. The first, near the electrode isopotential point (pH 7), and the second near the expected sample pH (e.g., pH 4 or 10).

Storage Solution — Orion Cat. No. 910001.

USING THE ELECTRODE

Set Up

Electrode Preparation

1. The electrode tip is covered by a cap which protects the electrode and keeps it from drying out. Pull the cap off and save for storage.
2. If bubbles are seen in the bulb area of the electrode, shake the electrode downward (like a fever thermometer). This action will help eliminate bubbles that may have been generated during shipment.
3. Connect electrode to meter.

pH Calibration & Measurement

Single-Buffer Calibration

This procedure is for routine measurements. Electrode slope should be checked periodically with a two-buffer calibration.

1. Choose a buffer which is near the expected sample pH.
2. Buffer should be at room temperature. If samples are at varying temperatures, temperature compensation is recommended. (See meter instruction manual).
3. Set the slope to 100% or to the percent slope determined in a two-buffer calibration. Set the temperature to the temperature of the buffer.
4. Rinse electrode with distilled water and shake off excess water.
5. Place the electrode in the buffer. Wait for a stable display. Set the meter to the pH value of the buffer at its measured temperature. (A table of pH values at various temperatures is supplied with the buffer.)
6. Rinse electrode with distilled water and shake off excess water.
7. Place the electrode in the sample. When display is stable, record pH.

Two-Buffer Calibration

This procedure is recommended for precise measurement.

1. Choose two buffers which bracket the expected sample pH. The first should be pH 7 and the second near the expected sample pH (e.g., pH 4 or 10).
2. Ensure that buffers are at room temperature. If samples are at varying temperatures, temperature compensation is recommended. (See meter instruction manual).
3. Rinse electrode with distilled water and shake off excess water.
4. Place electrode in the pH 7 buffer. Wait for a stable display. Set the meter to the pH value of the buffer at its measured temperature. (A table of pH values at various temperatures is supplied with the buffer.)
5. Rinse electrode with distilled water and shake off excess water.
6. Place electrode in the second buffer. When display is stable, set meter to the actual pH value of the buffer as described in meter instruction manual.
7. Rinse electrode with distilled water and shake off excess water.
8. Place electrode in the sample. When display is stable, record pH.

Measuring Hints

- Rinse electrode with distilled water between measurements.
- Shake off excess drops of solution to prevent solution carryover of one solution to another.
- Keep buffers and samples at approximately the same temperature. If samples are at different temperatures, perform temperature compensation, as described in the meter instruction manual.
- Check electrode operation periodically with a two-buffer standardization. If readings in the buffer drift or its slope is below 92%, follow Cleaning Procedure.
- Between measurements (up to one hour) leave the electrode in the open-air laboratory environment, not in distilled water.

Electrode Storage

Between Measurements (up to one hour)

Leave the electrode in the open-air laboratory environment, not in distilled water.

Short-term Storage (up to one week)

Soak electrode tip in ORION pH Electrode Storage Solution, Cat. No. 910001. If unavailable, 200 mL pH 7 buffer with 1 g KCl added may be used. Do not allow the solution to evaporate and crystallize on the electrode. Do not store in distilled water, as this will shorten electrode life.

Long-term Storage (over one week)

Cover the electrode tip with the protective cap used for shipment.

Electrode Maintenance

Cleaning Procedure

General - Soak electrode in 0.1M HCl or 0.1M HNO₃ for 15 minutes, followed by soaking in ORION pH Electrode Storage Solution for 30 minutes.

Removal of Deposits

Protein — Digest with 1% pepsin in 0.1M HCl. *

Inorganic — Rinse with 0.1M tetrasodium EDTA solution. *

Grease and Oil — Rinse with mild detergent or methanol solution*.

* After any of these cleaning procedures, soak electrode in ORION pH Electrode Storage Solution for 30 minutes.

ELECTRODE WARRANTY

The ORION® warranty covers failures due to manufacturer's workmanship or material defects from the date of purchase by the user. User should return the warranty card to Orion and retain proof of purchase. Warranty is void if product has been abused, misused, or repairs attempted by unauthorized persons.

Warranties herein are for product sold/installed by ORION or its authorized dealers.

Any product sold by a U.S. or Canadian distributor must be returned to ORION for any warranty work. A Return Authorization Number must be obtained from ORION laboratory technical service before returning any product for in-warranty repair or replacement.

In the event of failure within the warranty period, ORION will at ORION's option, repair or replace product not conforming to this warranty. There may be additional charges, including freight, for warranty service performed in some countries. For service, call ORION (or its authorized dealer outside the United States and Canada). ORION reserves the right to ask for proof of purchase, such as the original invoice or packing slip.

Laboratory pH Meters, SensorLink®, pH/ISE Meters, PerpHecT® pH/ISE Meters, Sage™ Pumps, Cahn® Balances, 930 Ionalyzer™, 950 ROSS™ FAST QC™ Titrator, 960 Titrator PLUS®, Karl Fischer Titrators, pHuture™ Conversion Box, Wine Master™, 607 Switchbox, rf link™, Vacuum degasser, Flowmeter are warranted to be free from defects in material and workmanship for a period of twelve (12) months from the date of purchase by the user or eighteen (18) months from date of shipment from ORION, whichever is earlier, provided use is in accordance with the operating limitations and maintenance procedures in the instruction manual and when not having been subjected to accident, alteration, misuse, or abuse.

The warranty period for 960 Titrator PLUS, 950 Fast QC Titrator, Wine Master and 930 Ionalyzer pumps is three (3) months from date of purchase.

ThermaSense™ Dataloggers are warranted for a period of twelve (12) months from date of purchase.

Economy Line Electrodes, Models 91-05, 91-06, 91-15, 91-16, 91-25, 91-26, 91-35, 91-36 and 92-06, are warranted to be free from defects in material and workmanship for a period of three (3) months from date of purchase by customer or six (6) months from date of shipment from ORION, whichever is earlier. Warranty also includes failure for any reason (excluding breakage), except abuse, provided

the electrode is not used in solutions containing silver, sulfide, perchlorate, or hydrofluoric acid; or in solutions more than one (1) molar in strong acid or base at temperatures above 50°C.

Ion Selective Electrodes, ionplus® Electrodes, ROSS Electrodes, Sure-Flow® Electrodes, PerpHecT Electrodes, Standard Line pH Electrodes, Tris pH Electrodes, pHuture pH probes (Cat. Nos. 615900 and 616500), Series 100 Conventional Conductivity Cells, temperature probes and compensators (except those models noted) are warranted to be free from defects in material and workmanship for a period of twelve (12) months from the date of purchase by the customer or eighteen (18) months from date of shipment from ORION, whichever is earlier, except for abuse or breakage of electrodes. 93 and 97 ionplus Series sensing modules are warranted to give six (6) months of operation if placed in service before the date indicated on the package, except 93-07 and 97-07 Nitrate modules are warranted to give ninety (90) days of operation if placed in service before the date indicated on the package.

ORION pHuture probes (Cat. Nos. 615700, 615800 and 617500), Low Maintenance Triode™ (Cat. No. 9107BN), and PerpHecT Low Maintenance Triode (Cat. No. 9207BN), Waterproof Triode (Cat. Nos. 9107WP, 9107WL, 9109WL and 9109WP), QuiKcheK™ Meters, and Micro Electrodes are warranted to be free from defects in material and workmanship for a period of six (6) months from date of purchase by the customer or twelve (12) months from date of shipment from ORION, whichever is earlier when used in accordance with the operating limitations and maintenance procedure in the instruction manual and when not having been subjected to accident, alteration, misuse or abuse.

Series 100 Conductivity Meters (Models 105, 115, 125, 145 and 150), Series 100 DuraProbe™ Conductivity Cells and Series 800 Dissolved Oxygen Meters (Models 810 and 850) and probes are warranted to be free from defects in material and workmanship for a period of twenty-four (24) months from the date of purchase by the user or thirty (30) months from the date of shipment from ORION, whichever is earlier, provided use is in accordance with the operating limitations and maintenance procedures in the instruction manual and when not having been subjected to accident, alteration, misuse, or abuse.

Waterproof meters (Models 830, 830A, 835, 835A, 260, 260A, 261/S, 265, 265A, 266/S, 128, 130, 130A, 131/S, 135, 135A, 136/S, 1230, 142 and 842), Conductivity meters (Models 162 and 162A),

ACCESSORIES

pH/Conductivity meters (Models 545, 550 and 550A), and Dissolved Oxygen meters (Models 862 and 862A) are warranted to be free from defects in material and workmanship for a period of thirty-six (36) months from the date of purchase by the user or forty-two (42) months from date of shipment from ORION, whichever is earlier, provided use is in accordance with the operating limitations and maintenance procedures in the instruction manual and when not having been subjected to accident, alteration, misuse or abuse.

ORION Meter, Electrode, Analytical System Accessories, Solutions, Series 800 Dissolved Oxygen Probe Membranes and Cahn Balance Accessories such as cables, printers, and line adapters carry an "out-of-box" warranty. Should they fail to work when first used, contact ORION immediately for replacement. Should ORION Solutions or Buffers be unusable when first "out-of-box," contact ORION immediately for replacement.

THE WARRANTIES DESCRIBED ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER STATUTORY, EXPRESS OR IMPLIED INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND ALL WARRANTIES ARISING FROM THE COURSE OF DEALING OR USAGE OF TRADE. THE BUYER'S SOLE AND EXCLUSIVE REMEDY IS FOR REPAIR OR REPLACEMENT OF THE NON-CONFORMING PRODUCT OR PART THEREOF, OR REFUND OF THE PURCHASE PRICE, BUT IN NO EVENT SHALL ORION (ITS CONTRACTORS AND SUPPLIERS OF ANY TIER) BE LIABLE TO THE BUYER OR ANY PERSON FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES WHETHER THE CLAIMS ARE BASED IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE), OR OTHERWISE WITH RESPECT TO OR ARISING OUT OF THE PRODUCT FURNISHED HEREUNDER.

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Note: For in- or out-of-warranty repair or service, contact ORION technical service (or its authorized dealer outside the United States and Canada). Technical service will issue a Return Authorization (RA) for all repair services. You must have an ORION RA prior to returning/forwarding any product to ORION.

Orion Cat. No.	Description
910001	pH Electrode Storage Solution, 475 mL
910104	pH 4.01 Buffer, 475 mL
910107	pH 7.00 Buffer, 475 mL
910110	pH 10.01 Buffer, 475 mL

SPECIFICATIONS

Models 91-05, 91-06

pH

0-14

Temperature Range

0-80 °C

Isopotential Point

pH 7

Length (cap included)

150 mm

Body Diameter

12 mm

Cap Diameter

16 mm

Cable Length

100 cm

Models 91-15, 91-16

pH

0-12

Temperature Range

0-80 °C

Isopotential Point

pH 7

Length (cap included)

180 mm

Body Diameter

6 mm

Cap Diameter

10 mm

Cable Length

100 cm

Models 91-25, 91-26

pH

0-12

Temperature Range

0-80 °C

Isopotential Point

pH 7

Length (cap included)

335 mm

Body Diameter

8 mm

Cap Diameter

16 mm

Cable Length

100 cm

Models 91-35, 91-36

pH

0-12

Temperature Range

0-80 °C

Isopotential Point

pH 7

Length (cap included)

140 mm

Body Diameter

12 mm

Cap Diameter

16 mm

Cable Length

100 cm