

# Instruction Manual

## EC620130 Series Combination pH Electrodes



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Eutech Instruments Pte Ltd

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## PRODUCT SPECIFICATIONS

### EC620130 Series Combination pH Electrodes

Catalog No.	Description	Length/Diameter (mm)	Connector	Refilling Solution
<b>EC- 620-130</b>	Glass body, refillable	160/12	BNC	EC-636-430
<b>EC- 620-131</b>	Glass body, gel-filled	130/12	BNC	N/A
<b>EC- 620-132</b>	Plastic body, gel-filled	120/12	BNC	N/A
<b>EC- 620-133</b>	Glass body, gel-filled, spear tip	70 mm overall length, 25/6 mm insertion	BNC	N/A

## PERFORMANCE SPECIFICATIONS

Specification / Model	EC-620-130	EC-620-131	EC-620-132	EC-620-133
Body Material	Glass		Plastic	Glass
pH Range	0 to 14 pH			2 to 14 pH
Temperature range	0 to 80 °C		0 to 60 °C	0 to 50 °C
Slope (out of Box)	59 +/- 3 mV/pH at 25°C (95 to 105% slope)			
Zero point	pH 7			
Offset (asymmetry potential)	0 mV +/- 25 mV			
Reference Junction	Double Junction			
Junction Type	Open pore			Double Pore
Membrane Shape	Cylindrical			Spear Tip

### **Improved junction and reference design for precise, reliable, FAST readings**

**Better junction.** EC620130 series electrodes use a single-pore capillary reference junction—about 200 times larger than typical ceramic junctions—that makes the electrodes almost impossible to clog, even in difficult samples. The unique junction design provides increased electrolyte flow, resulting in greater contact between sample and reference, and ensuring fast, stable readings.

**Better reference design.** Along with the capillary junction, our electrodes feature double junction design for enhanced performance. A diffusion barrier separates the silver chloride reservoir from the reference electrolyte, permitting use of silver-free electrolytes and preventing silver chloride loss from temperature induced variations. End result: an extremely stable reference potential, providing long electrode life.

**EC-620-130** Unique fluid-gel electrolyte and innovative junction design produces a high flowrate and improved contact between reference electrolyte and sample. The result is faster response time and very accurate readings. The double-liquid-junction system further extends the diffusion barrier, greatly increasing electrode life in aggressive samples. It also performs well in liquids with low ion concentration and in partly aqueous samples.

**EC-620-131, -132, -133** Solid polymer-gel electrolyte offers the advantages of the EC620130 series system in a maintenance-free version. Polymer gel provides a more stable matrix than other gelled electrode reference systems, providing reliable results in very dirty, ion-weak or protein samples—even

at low pH or in the presence of organic solvents. -133 offers a rugged spear tip is ideal for semi-solids or soft foods.

## GETTING STARTED

Each electrode has a unique serial number and is quality checked before it leaves the factory.

Electrodes are shipped with an electrode storage bottle containing electrode storage solution. This storage solution will occasionally creep out and appear as dry white crystal residue on the electrode. However, this will have no long-term effect on the electrode and can be simply rinsed off with clean water.

Proper removal and insertion of the storage bottle is very important. Improper use can result in a pressure build up either inside the electrode or the bottle resulting in electrolyte leakage through the fill hole or the cap of the storage bottle. Proper use of the electrode storage bottle is shown in Figure 1.

EC-620-130 is a refillable electrode and will include a bottle of Skylite electrolyte solution along with a separate syringe and nozzle for electrolyte refilling process. New electrodes are shipped filled with their filling holes closed, so electrolyte refilling of a new electrode is generally not required. It is recommended that the Skylite electrolyte (EC-636-430) be added using the syringe and nozzle provided when the electrolyte level in the reference cavity (outer annular space) is lower than ¼ inch below the cap. Simply open the fill hole at the top of the electrode by rotating the cap ring. Mount the nozzle to the syringe and fill it with the Skylite electrolyte solution (The tip hole of the Skylite bottle can be enlarged by trimming the tip so as to accommodate the diameter size of the nozzle during electrolyte collection into the syringe). Insert the syringe's nozzle into the fill hole of the electrode and gently inject the electrolyte into the electrode. If the electrolyte level is not visible, the electrode may be filled to a capacity just beneath the fill hole.

*NOTE: EC-620-130 has a faster electrolyte flow rate as compared to other conventional refillable electrodes. Therefore a fast drop in the level of its electrolyte will be observed and this should not be construed as a sign of an electrode problem.*

Mount the EC620130 series open-pore electrodes onto a suitable electrode holder and connect the electrode to the meter. For EC-620-130 refillable electrodes, the fill hole should be in the open position when in use. If necessary, rotate the cap ring to open the fill hole.

Immerse the electrode in pH 4 or pH 7 buffer for 5 to 10 minutes to condition the glass pH bulb.

## ELECTRODE OPERATION

- 1) The level of electrolyte in the outer cavity should be kept above the level of the solution being measured to prevent reverse electrolyte flow. The electrode needs only be immersed far enough to cover both the glass pH sensing bulb and reference junction to obtain accurate readings.
- 2) If the electrode has not been hydrated (placed in solution for more than one hour), allow the electrode to soak in a buffer (preferably pH 4) as needed prior to standardization or measurement. This will help to optimize and re-establish the thin hydration layer on the sensing bulb that is critical to accurate pH measurement.
- 3) Rinse the electrode with deionized or distilled water between samples. Note: wiping the sensing bulb is not recommended as the thin hydration layer of the sensing bulb could be affected and electrical charges may be produced.
- 4) Moving or touching the electrode cable may result in unstable readings due to the high impedance (resistance) of the pH glass membrane.

5) To eliminate temperature errors associated with the electrode, manual or automatic temperature compensation (ATC) should be used for best accuracy. Since pH changes with temperature, the sample temperature should always be noted with pH readings, for example, "pH 8.43 @ 23.2 °C".

## CALIBRATION/STANDARDIZATION

New EC620130 series pH electrodes are factory-tested to have an efficiency or "slope" of > 95%. The theoretical pH response is 100% (59.16 mV/pH unit) and therefore the millivolt difference between pH 4.00 and pH 7.00 certified calibration standards at 25°C should be 177.48 mV. A 95% slope means that a new accumet electrode will have a response of at least 168.61 mV between these values. As electrodes naturally age, this efficiency deteriorates. Periodic calibration against known standards is necessary to ensure the electrode's efficiency. Most pH meters have features to display the current electrode slope, protection that warn users of a low slope (usually 90%) and/or features that prevents erroneous calibrations.

After completing calibration with the meter, the measured pH reading of each calibration buffer can be compared to the pH value indicated for each buffer at the actual temperature. A chart with pH at various temperatures is usually found on the calibration standard packaging or label. Using one-point standardization, proper response is indicated if the reading is within  $\pm 0.05$  pH units from the standardization point within 30 seconds when using certified pH buffers. Multiple-point standardization is recommended for more precise measurements. To provide a linear response in the area of interest, use two calibration standards that bracket the expected sample pH.

## STORAGE

Storing electrodes in distilled or deionized water is NOT recommended as it will deplete the hydration layer of refillable electrodes, and decrease the life of non-refillable electrodes. The electrode storage bottle containing storage solution can be used for short or long term storage. For refillable electrodes, the electrolyte level in the outer cavity should be kept above the level of the solution being measured. Ensure that the fill hole is closed when not in use.

## TROUBLESHOOTING

### SYMPTOM / CAUSE (REMEDY)

- **No response, all buffers or samples read the same pH—usually pH 7.00 or 0 mV** / Broken sensing bulb or wiring problem (replace electrode), probe not connected to input (verify correct channel selection when using multiple-channel meters), probe is not in contact with sample (remove electrode storage bottle or rubber bulb guard), meter automatically has frozen reading (verify that the 'Hold' feature or 'Auto Read' feature is set to 'Off' when using meters with this feature).
- **Slow response with excessive crystallization inside probe** / electrolyte flow clogged from supersaturated electrolyte ("flush & fill" by remove the filling solution through the fill hole with a syringe or by shaking it upside down. Repeatedly flush and rinse the reference cavity with clean, 60-80°C water to dissolve crystals until removed. Replace filling solution and re-hydrate electrode in storage solution or pH 4 buffer, (ensure fill hole is in open position). To prevent this in the future, ensure that the fill hole is closed when electrode is not in use.
- **Dried salt deposits present** / electrolyte residue deposited on electrode surface –often with new electrodes or periods of non-use. Simply dissolve the deposits in warm tap water followed by a brief soak in pH 4 buffer.
- **Slow Response, Noisy, unstable, or erratic readings** / sensing bulb dry or dirty (clean electrode with mild detergent & warm water and re-hydrate electrode), temperature may be changing rapidly or electrode may be thermally shocked (allow electrode to reach sample temperature), sample may be non-aqueous (take 30 second readings and soak in pH buffer for one minute between measurements)

**REPLACEMENTS & ACCESSORIES**

Catalog No.	Description
EC-BU-1BT	pH 1.68 Buffer Solution, 480 mL
EC-BU-4BT	pH 4.01 Buffer Solution, 480 mL
EC-BU-7BT	pH 7.00 Buffer Solution, 480 mL
EC-BU-9BT	pH 9.00 Buffer Solution, 480 mL
EC-BU-10BT	pH 10.01 Buffer Solution, 480 mL
EC-BU-12BT	pH 12.45 Buffer Solution, 480 mL
EC-DPC-BT	Protein Cleaning Solution for pH electrode
ECRE006	Storage Solution for pH electrode
EC-BU-4BTC1LIT	pH 4.01 Buffer Solution (Red), 1 L
EC-BU-7BTC1LIT	pH 7.00 Buffer Solution (Yellow), 1 L
EC-BU-10BTC1LIT	pH 10.01 Buffer Solution (Blue), 1 L
EC-BU-4BS	pH 4.01 Buffer Sachets, (NIST traceable)
EC-BU-7BS	pH 7.00 Buffer Sachets, (NIST traceable)
EC-BU-10BS	pH 10.01 Buffer Sachets, (NIST traceable)
EC-RIN-WT	pH Deionized Water Rinse Sachets (NIST traceable)

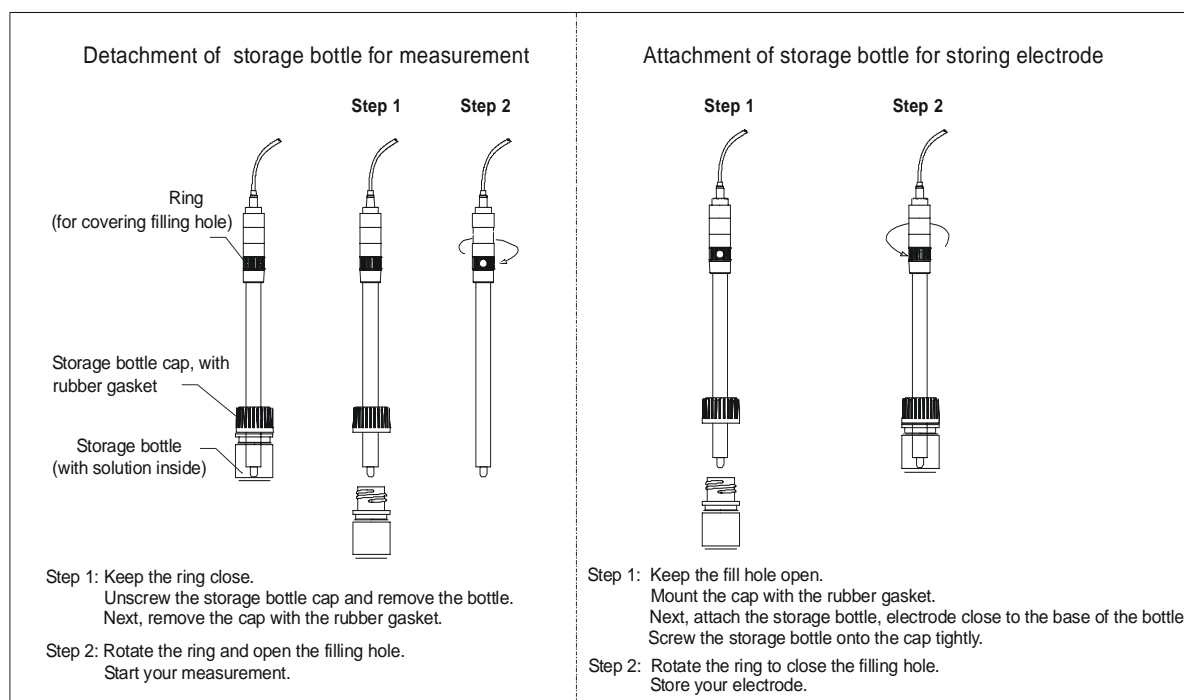


Figure 1: Proper attachment and detachment of storage bottle to prevent electrolyte leakage

**WARRANTY**

This electrode is supplied with a six-month warranty against significant deviations in material and workmanship.

**Exclusions**

The warranty on your instrument shall not apply to defects resulting from:

- Improper or inadequate maintenance by customer
- Unauthorised modification or misuse
- Operation outside of the environment specifications of the products

## **RETURN POLICY**

Please obtain authorisation from our Customer Service Department or authorised distributor before returning items for any reason. A "Return Goods Authorisation" (RGA) form is available through our authorised distributor. Please include data regarding the reason the items are to be returned. Items must be carefully packed to prevent damage in shipment and insured against possible damage or loss. Eutech Instruments/ Oakton Instruments will not be held responsible for damage resulting from careless or insufficient packing. A restocking charge will be made on all unauthorised returns.

NOTE: Eutech Instruments Pte Ltd reserves the right to make improvements in design, construction, and appearance of products without notice.

As of the date of preparation of this document, the foregoing information is believed to be accurate. However, no warranty or representation with respect to such information is intended or given.