

## Reference Electrode



**KRE03**

### Saturated Calomel Reference Electrode

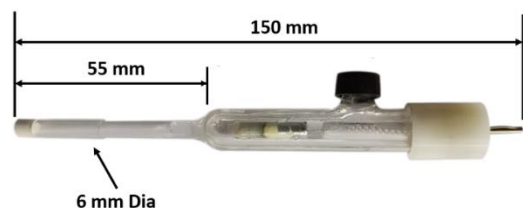
This is a single compartment Hg/Hg<sub>2</sub>Cl<sub>2</sub> (saturated KCl) reference electrode. This electrode is supplied with electrolyte filling and the electrolyte can be refilled easily.

### Technical Specification

<b>Reference system</b>	Hg/Hg <sub>2</sub> Cl <sub>2</sub> /Cl <sup>-</sup>
<b>Purpose</b>	For aqueous medium
<b>Chemical reaction</b>	Hg <sub>2</sub> Cl <sub>2(s)</sub> + 2e <sup>-</sup> ⇌ 2Hg <sub>(l)</sub> + 2Cl <sup>-</sup>
<b>E°</b>	241mV vs. NHE (at 25°C)
<b>Typical variance</b>	±10mV
<b>Refilling electrolyte</b>	Saturated KCl solution
<b>Outer Diaphragm</b>	Porous frit
<b>Electrode Pin</b>	Compatible with KLyte Alligator clip
<b>Temperature range (°C)</b>	10-60 (Approx.)
<b>Shaft material</b>	Borosilicate Glass
<b>Shaft diameter (Top)*</b>	12mm
<b>Shaft diameter (Bottom)*</b>	6mm
<b>Length*</b>	150mm
<b>Immersion length*</b>	>12mm; <60mm

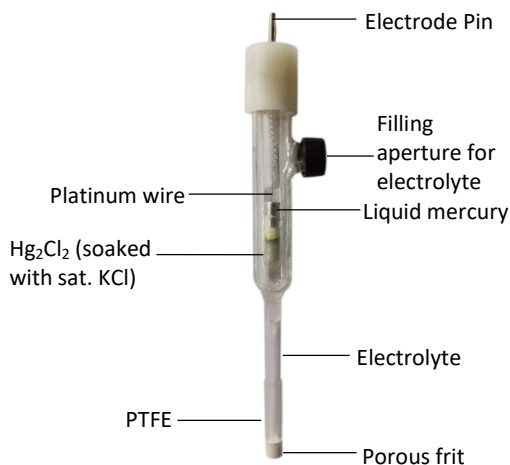
\*Please refer to the image of electrode dimensions

### Electrode dimensions



## Maintenance and Handling

The reference electrodes are highly sophisticated as well as delicate accessories. A small perturbation in an external parameter can change the performance of the electrode. Therefore, it must be handled carefully. Proper maintenance and careful handling ensure good reproducibility and longer life-time for the reference electrode.



### Saturated Calomel (SCE) reference electrode with Hg/Hg<sub>2</sub>Cl<sub>2</sub>/Cl<sup>-</sup> reference system

➤ **Conditioning:** Before using the electrode, first, the user needs to make sure to remove the protection cap at the end of the electrode tubing and rinse the electrode body with double-distilled water. The cap should be removed as gently as possible so that the bottom frit does not come out and damage the electrode. The reference electrode then must be conditioned by dipping in KCl solution (slightly less than saturated) for two days at room temperature. Keeping the solution just below saturation allows enough ionic transport to prevent formation of salt crystals in the glass pores and also the impedance of the electrode remains low.

➤ **Storing the electrode:** This is an electrode with a sintered glass frit that separates the Hg/Hg<sub>2</sub>Cl<sub>2</sub> mixture from the bridging electrolyte. The porous frit at the tip of the electrode allows ionic transport into the electrode. Hence, the frit must always be kept

wet with electrolyte and should be stored in KCl solution. Otherwise, the solution inside the pores will dry out, causing high resistance, an increase in noise, or even potential out of control. In this case the electrode can be restored by refilling it with only deionized water and kept immersed in deionized water overnight. Afterwards, refilling it with saturated KCl solution and keeping it dipped in the KCl solution overnight.

➤ **Electrolyte refilling procedure:** To refill the electrode with saturated KCl solution, carefully remove the black rubber cap from the filling aperture by holding the glass tube. Use a syringe to refill. The solution level should be full, and there should not be any air bubble trapped inside. The refilling solution should be inserted slowly to avoid generating much pressure. Pressure may cause the diaphragms (porous silica-based tip) to be popped out or damaged.

➤ **Using in high-temperature measurement:** The temperature range of the KLyte Hg/Hg<sub>2</sub>Cl<sub>2</sub> (saturated KCl) reference electrode is approximately 10°C to 60°C. This electrode is unstable at higher temperature as Hg<sub>2</sub>Cl<sub>2</sub> disproportionate to liquid Hg and HgCl<sub>2</sub>. It is advisable to conduct high-temperature measurement by isolating the reference electrode with a salt-bridge and keeping the reference electrode at room temperature.

➤ **Precautions:** This electrode contains liquid mercury and its salt which are hazardous material. Hence this electrode should be handled carefully.

The electrode should be kept upright within the storage bottle and never in direct sunlight.

This electrode is used in acid solution. It should not be used in a strong alkaline medium ([base] > 0.1M OH<sup>-</sup>) or in a solution containing cations that may form an insoluble precipitate of hydroxides.

This electrode cannot be used in non-aqueous/organic solvents, NH<sub>3</sub> buffers and sulfides.

The impedance of the reference electrode should be low (less than 10kΩ). The common cause for high impedance is the blockage of the junction frits. Adsorption of organic materials or precipitation of insoluble salts in the junction can both cause clogging and hence results in high impedance (more than

1M $\Omega$ ). It is advisable to use salt-bridge to prevent the electrode frits from clogging.

### Optional Parts:



**KEC10A**  
Banana Cable Set

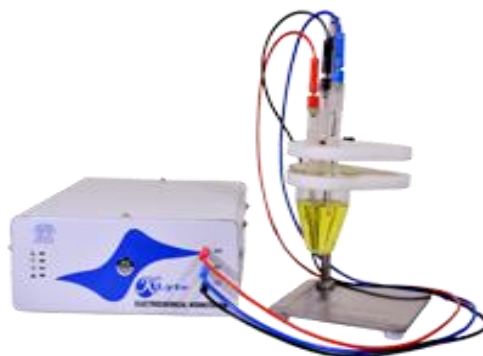


**KEC10B**  
Banana Connector Pin



**KA01 (Red), KA02 (Black)**  
Alligator Clip

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### Product Information Leaflet



**Saturated Calomel Reference Electrode**  
Product ID: KRE03

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