

Usage

The electrode type RL-100 is an AgCl reference electrode, designed for pH and other potentiometric measurements. As a reference system it includes an Ag/AgCl half cell. The reference half cell is shielded by outer chamber filled with protective electrolyte, which is in contact with the measured sample by porous diaphragm (junction). Thanks to easiness in replacing the protective electrolyte the RL-100 electrode is very useful in laboratory conditions. In case of pH measurements the outer (protective) solution with correctly chosen composition, quite effectively protects the junction against contamination and destroying the half cell by the substances from the sample. The most dangerous substances are those which in contact with the electrolyte ions may create heavily soluble sediments. (ex. ions S^{2-} , J^- , Br^- , Ag^+ , Hg_2^{2+} , Pb^{2+} , Cu^+ , ClO_4^-) strongly oxidising substances (ex. Cl_2 , MnO_4^-), strongly reducing (ex. SO_2), silver ions strongly complexing substances like amines ammonia etc. or substances which may block the electrolytic junction like blood, milk, cheese. The recommended protective solutions were given below:

Interfering substances	Protective solution
Ag^+ , Hg_2^{2+} , Pb^{2+} , Cu^+ , ClO_4^-	2M KNO_3 (202 g/l) 3M $NaCl$ (175 g/l)
S^{2-} , J^- , Br^- , CN^- , SO_2 , Cl_2 , NH_3 , amines	3M KCl (224 g/l) 1M KNO_3 (101 g/l)
Proteins (blood, etc.)	0,9% $NaCl$

The RL-100 reference electrode may also be used when ions from the reference electrode may contaminate the measured sample what results in increasing the measurement error. A typical example may be measuring chlorides concentration using a chloride ion selective electrode. Right choice of the protective solution enables omitting this kind of interference. Sample kinds of protective solutions are given below:

Protective solutions used when co-operating with ion selective electrodes.

Measured Ion	Protective solution
Cl^- , J^- , Br^- , CN^- , F^- , S^{2-}	1M KNO_3
Ag^+ , Cu^{2+} , Pb^{2+} , Ca^{2+} , NH_3	1M KNO_3
Na^+ , K^+ , Li^+ , Ba^{2+}	1M NH_4NO_3
NO_3^-	0.5M K_2SO_4

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The composition of the protective solutions used in ion selective measurements, usually are given by the manufacturers of this electrodes and depend the kind of measured ion and characteristic of the ion selective membrane.

Preparing and using the electrode

1. Before starting the measurements take off the rubber protective cup, which protects the electrode against loosing the protective electrolyte. To remove maintaining agent wash the electrode in water and next dry the electrolytic junction and the electrode body with soft cloth or tissue.
2. Check whether the protective electrolyte delivered with the electrode (4M KCl) is adequate for the planned measurement. If required prepare the right solution. If changing the electrolyte is not necessary skip the point 3.
3. In case of necessity of replacing the electrolyte, screw out the outer chamber of the electrode, holding the two parts of the socket. Pour out the liquid and next accurately wash inside and outside with distilled water. It is also necessary to wash the inner chamber which includes the reference half cell. Next fill in the outer chamber with the new electrolyte leaving about 1cm³ of air. Next screw together both parts of the electrode leaving small lea which enables flow of the protective electrolyte.
4. Check and bring the measured and sample solutions to this same temperature. This enables omitting the problem of unstable result due to temperature changes.
5. Connect the measuring and reference electrodes to the right connectors in the meter. Place the electrodes in the measured, or sample solution. The solution must be on level which covers the whole membrane of the measuring electrode and the junction in reference electrode, but it can't exceed the protective electrolyte level in the electrode.
6. When moving the electrode from one solution to another it is necessary to wash it with distilled water before immersing, this will prevent from carrying the contamination.
7. To avoid excessive contaminating of the protective electrolyte it is necessary to replace it from time to time.
8. In case of unstable reacting of the electrode, caused by blocking the electrolytic junction it is necessary to remove the contaminants. The way of regenerating the electrode depends on the kind of clogging precipitate.

Storing the electrode

During short breaks between the measurement (ex. night) the reference electrode RL-100 may be stored in vessel with the protective solution.

During longer breaks (ex. few days) it is recommended to place the inner chamber in 4M KCl solution and the outer chamber in the protective electrolyte. In case of using a 4M KCl solution as the protective electrolyte it is not necessary to store the parts separately.

In case of long breaks between measurements the outer chamber should be filled with 4M KCl solution and screwed together tightly and the junction should be protected with the rubber ring and place it in the box.

Technical Data

Reference half cell	AG/AgCl/ stur. With KCl
Protective solution	4M KCl
Half cell potential with diffusion potential at 25°C	+197 mV
Temperature range	0 ÷ 80°C
Electrolytic junction	ceramic
Dimensions	
- Diameter	12 mm
- Length	120 mm
Cable length	approx. 1 m
Connector	WB-13