



REFEX™ Non-Porous Reference Electrodes for pH Measurement in Brine for Chlorine Gas Production

Chlorine gas is produced in a membrane cell chlor-alkali process. Saturated brine is introduced into a high voltage electrolysis cell where chloride ions are oxidized to chlorine gas at the anode. To optimise yield while minimising corrosion damage to the expensive electrolysis membrane cell, brine pH must be carefully controlled between pH 2.00 and pH 4.00 by the addition of HCl.

Depleted brine from the cell is re-saturated with salt in a recirculation system for reuse over and over again. After leaving the electrolysis cell, the pH of the brine is adjusted to between 10 and 12 so that impurities in the brine (such as metals and sulphates) can be removed by precipitation. pH measurement and control by the addition of Hydrochloric Acid (HCl) and Sodium Hydroxide (NaOH) is critical throughout the entire process.

The challenges of reliably measuring pH in brine applications are severe. KCl is typically used in pH probe reference junctions because the equivalent conductance of a Potassium ion (K⁺) and a Chloride ion (Cl⁻) are almost the same. The equivalent conductance of a Sodium ion is much less, a Hydronium ion much higher, causing significant asymmetry potentials in the electronic circuit. This leads to measurement error and accelerated KCl diffusion across the electrode junction. Chlorinated brine pH is measured close to the electrolysis cell electrodes where very high electrical currents are present. These currents cause ground loops in the pH measurement circuit, creating offsets and shortening electrode life. In short, pH measurement in the process using traditional electrodes quickly becomes sluggish and inaccurate, causing waste of pH correction chemicals and impacting plant performance and yield.

The solution to these problems is a pH probe using a REFEX solid state non-porous reference interface - an electrochemically active, ionically conductive interface that forms an impenetrable barrier between the process brine and the Ag/AgCl reference electrode in 2.8 mol /l KCl electrolyte. Non-porous REFEX electrodes are immune to KCl loss/diffusion, ground-Loop currents (a liquid Earth should always be used), fouling and poisoning.

REFEX pH and REFEX ORP combined electrodes are the only ones that can withstand all chlor-alkali application challenges. The patented REFEX non-porous reference interface has solved many of the measurement problems of the past.





REFEX non-porous reference technology provides end users with enhanced measurement capabilities and extended life through utilization of the unique REFEX reference cell interface. Available in a range of sizes and connection styles, REFEX pH sensors dramatically outlast conventional sensors in aggressive applications while providing superior measurement performance. REFEX sensors work with all major brands of pH transmitter.



EC-1"-CA-2001-Pt1000-LE	EC-3/4"-CA-2001-Pt1000-LE	S8-CA-2001-120mm	YG-CA-2001-120mm	EC-FT-CA-2001-Pt1000 - 120mm EC-FT-CA-2001-Pt1000 - 225mm
1" NPT mount insertion/submersion sensor with fixed cable (1, 3, 5, 10m)	3/4" NPT mount insertion/submersion sensor with fixed cable (1, 3, 5, 10m)	Ø12mm, Pg13.5 mount sensor with S8 connector	Ø12mm Yokogawa Y-cap connection Sensor	Ø12mm, Pg13.5 mount sensor with fixed cable (1, 3, 5, 10m)

Other styles/lengths/connection types are available. Please contact us with your specific requirements.

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