APERA® INSTRUMENTS

pH & ORP Electrodes for Pools and Spas

V2.1

APERA INSTRUMENTS

About Us

Apera Instruments has been focused on the development and manufacture of electrochemical instruments and sensors since 1991, delivering measurement solutions for pH, ORP, conductivity, TDS, salinity, resistivity, dissolved oxygen, turbidity, and a variety of other ions with our industry-leading technologies, quality control system, and customer service. Millions of Apera products are being used by customers in over 60 countries. All the products are CE and RoHS certified and are manufactured in our ISO 9001:2015 certified factory.

For over 35 years, we strive to empower individuals, organizations, and communities to better understand and manage water quality by providing innovative and user-friendly electrochemical instruments and sensors that meet the needs of all users, from scientists and researchers to students, business owners, and hobbyists. Through our work, we aim to create a more sustainable future for our planet where everyone has access to accurate and reliable water quality testing technology.

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Electrode Technologies

Fast response

95% of reading in 10 seconds @ 25 ℃ (77 ℉)

High accuracy

pH electrode factory slope are ≥ 97%

Low drift

pH electrode long-term stability <10mV (equivalent to 0.15pH)

A electrode is composed of a glass membrane, a junction, an inner reference electrolyte, a reference electrode, and an outer reference electrolyte. Apera has designed the electrodes specifically for pool and spa water, utilizing proper electrode structures and technologies, so you can be confident in your water quality.

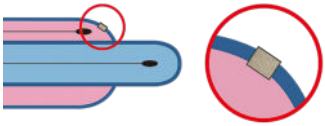
Robust Glass Membrane

10 Times

stronger than traditional glass membranes

The glass membrane is the sensitive membrane that the electrode senses the hydrogen ion (H^+) activity of water, and it is the core technology of electrodes. The glass membrane of Apera's pool electrodes has low impedance, high robustness, and great stability, making it suitable for long-term water quality monitoring in pools and spas.

Electrode Junction

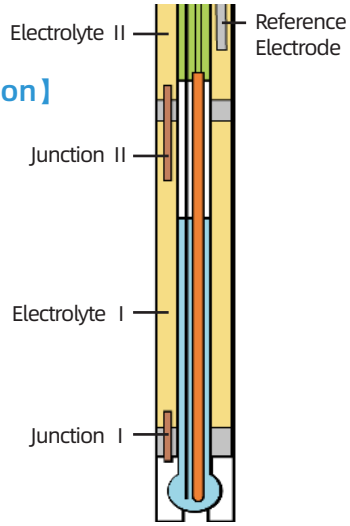


【Ceramic】

Made with porous ceramic material, slow and steady electrolyte outflow, vulnerable to contamination and clogging.

【Double junction】

Pool electrodes mostly adopt double liquid complex structure, which can effectively reduce the probability of liquid complex being contaminated and clogged.



Reference system

Long-life Reference System

To ensure the long-term stability of the reference electrode, the reference electrolyte does not contain silver ions, which prevents the reaction with sulfides or proteins in sample solutions that clog the junction.

Electrode Technologies

ORP Sensor Shape

Gold Pin | Platinum Pin | Gold Membrane | Platinum Membrane

Gold ring | Platinum ring

Type of ORP Membrane

Type	Shape	ORP Range	Temperature Range	Application
Platinum	Pin/Membrane/ Ring	±2000mV	-10~135℃	Chromate reduction, nitrite oxidation, swimming pool and drinking water disinfection
Gold	Pin/Membrane/ Ring	±2000mV	-10~135℃	Cyanide oxidation, water disinfection

ORP measurement pain points and solutions

Difficulties in ORP measurement	Solution
Platinum/gold electrodes can develop a very thin oxide layer or become contaminated during storage and use, altering the electrode's measurement interface; in reducing solutions, platinum/gold electrodes adsorb hydrogen, which slows down the electrode's response time, with readings equilibrating over hours or even days.	By refining the platinum or gold surface with a **macromolecule coating**, the electrode surface is isolated from the environment and always kept in perfect condition, which makes the electrode response speed up significantly, and the readings are basically balanced in about 2 minutes; and the consistency of the measurement values of different ORP electrodes is greatly improved.
Each platinum/gold electrode has different oxidation and contamination conditions, causing it to behave differently in low ionic strength samples and high ionic strength standard solutions. Measurements are usually accurate in calibration solutions, while differ by tens or even a hundred millivolts in water samples.	
Platinum/gold electrodes have large errors when measuring at high temperatures.	Adopting a high-temperature-resistant reference system.

How Apera macromolecule coatings improve the performance of ORP electrodes

Apera macromolecule membranes are selectively permeable, allowing hydrogen ions to pass through after absorbing water.

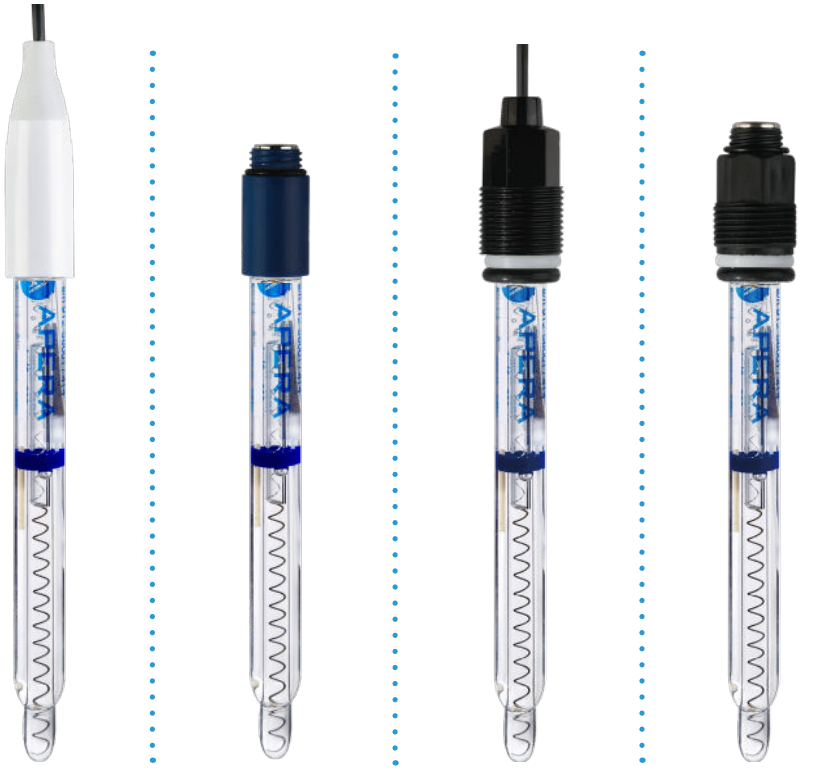
- The macromolecule coatings are **extremely resistant to chemical attack**. This means that Macromolecule membranes do not release debris or degradation products into the surrounding medium.
- The macromolecule coatings have relatively high operating temperatures, and can **be used in applications with temperatures up to 190° C.**.
- The macromolecule coatings **have high ionic conductivity**.
- The macromolecule coating **is an ultra-strong acid catalyst** with an extremely strong proton exchange function.
- The macromolecule membranes **are highly permeable to water**, so they are very effective at absorbing moisture.

201DJ/203DJ Series pH Electrodes

201DJ-C	201DJ-CBS	201DJ-S7	203DJ-C	203DJ-F
BNC	BNC	S7	BNC	BNC+RCA
Φ12x120mm	Φ12x83mm	Φ12x120mm	Φ12x120mm	Φ12x120mm

	201DJ Series	203DJ Series
Measuring Range	0~14 pH	0~14 pH
Temperature	0~80°C	0~80°C
Housing Material	PC (Polycarbonate)	PC (Polycarbonate)
Junction	Double junction: Ceramic/Sponge plastic	Double junction: Ceramic/Ceramic
Reference	Ag/AgCl	Long life reference
Electrolyte	Gel Ⅰ: without AgCl; Gel Ⅱ: saturated with AgCl	Gel Ⅰ & Gel Ⅱ: without AgCl
Temperature Sensor	/	203DJ-C: /; 203DJ-F: Options

IndSen 710 Series pH Electrodes



IndSen 711	IndSen 712	IndSen 714	IndSen 716
BNC	S7	PG13.5/BNC	S8
Φ12x120mm	Φ12x120mm	Φ12x120mm	Φ12x120mm

	IndSen 711	IndSen 712	IndSen 714	IndSen 716
Measuring Range	0~14 pH			
Temperature	0~100°C			
Housing Material	Lead-free glass			
Junction	Double junction: Ceramic/ Ceramic			
Reference	Long life reference			
Electrolyte	Gel Ⅰ & Gel Ⅱ : without AgCl			
Temperature Sensor	Options	/	Options	/

301DJ/303DJ Series ORP Electrodes

301DJ-C

BNC
Φ12x120mm
Platinum needle

301DJ-CS

BNC
Φ12x83mm
Platinum needle

303DJ-C

BNC
Φ12x120mm
Platinum film

303DJ-C-G

BNC
Φ12x120mm
Gold film

306DJ-C-G

BNC
Φ12x120mm
Gold ring

	301DJ Series	303DJ Series	306DJ Series
Measuring Range	±2000mV	±2000mV	
Temperature	0~80°C	0~80°C	
Housing Material	PC (Polycarbonate)	PC (Polycarbonate)	
Junction	Double junction: Ceramic/Sponge plastic	Double junction: Ceramic/Ceramic	
Reference	Ag/AgCl	Long life reference	
Electrolyte	Gel Ⅰ : without AgCl; Gel Ⅱ : saturated with AgCl	Gel Ⅰ & Gel Ⅱ : without AgCl	
Measuring Sensor	Platinum needle or Gold needle	Platinum film or Gold film	Platinum ring or Gold ring

IndSen 3710 Series ORP Electrodes

IndSen 3711

BNC

Φ12x120mm

IndSen 3712

S7

Φ12x120mm

IndSen 3714

PG13.5/BNC

Φ12x120mm

IndSen 3716

S8

Φ12x120mm

	IndSen 3711	IndSen 3712	IndSen 3714	IndSen 3716
Measuring Range	±2000mV			
Temperature	0~100°C			
Housing Material	Lead-free glass			
Junction	Double junction: Ceramic/ Ceramic			
Reference	Long life reference			
Electrolyte	Gel Ⅰ & Gel Ⅱ : without AgCl			
Measuring Sensor	Platinum ring or Gold ring			

Solutions and Connectors

pH Calibration Buffer Solutions		
	Description	Volume
	pH4.00 Calibration Buffer Solution	8oz 16oz
	pH7.00 Calibration Buffer Solution	8oz 16oz
	pH10.01 Calibration Buffer Solution	8oz 16oz

ORP Standard Solutions		
	Description	Volume
	222mV ORP Standard Solution	8oz 16oz
	470mV ORP Standard Solution	8oz 16oz
	650mV ORP Standard Solution	8oz 16oz

Soaking Solutions		
	Description	Volume
	3M KCL Soaking Solution for pH/ORP Electrode	4 oz

Connector	Picture	Connector	Picture
BNC		BNC+RCA	
S7		PG13.5/BNC	
S7-BNC Cable		S8	

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