Encapsulated Differential pH and ORP Sensors

Differential Electrode Measurement Technique

This field-proven technique uses three electrodes instead of the two normally used in conventional pH sensors. Process and reference electrodes measure the pH differentially with respect to a third ground electrode. The end result is unsurpassed measurement accuracy, reduced reference junction potential, and elimination of sensor ground loops. These sensors provide greater reliability, resulting in less downtime and maintenance.

Complete Encapsulation

Complete encapsulated construction protects the sensor's built-in electronics from moisture and humidity problems, extending the working life of the sensor.

Encapsulated (LCP) Sensor

- Low drift sensor configuration for reliable readings
- Stable reference method for superior stability of the reference electrode

Longer Calibration Stability

- Larger surface area electrode
- Larger volume buffer capacity

Improved Measurement Accuracy

With the reduction in common interferences. Ground loop, electrical noise in readings.

Learn More

Low Maintenance and Long Sensor Life

Rebuildable sensor and variety of electrodes/ materials available for multiple applications.

Technical Data*

	Cleaning Systems for Encapsulated Differential Sensors	
Wetted Materials	**LCP Sensor:** LCP (liquid crystal polymer) body and salt bridge with PVDF (or ceramic) junction, glass process electrode, titanium ground electrode, and FKM/FPM O-ring process seals. Union-mount style sensor also has LCP adapter. pH sensor with optional antimony process electrode has stainless steel ground electrode. **PPS Sensor:** PPS body and salt bridge with PVDF (or ceramic) junction, glass process electrode, titanium ground electrode, and FKM/FPM O-ring process seals. Union-mount style sensor also has PPS adapter. pH sensor with optional antimony process electrode has stainless steel ground electrode.	**LCP Sensor:** LCP (liquid crystal polymer) body and salt bridge with PVDF (or ceramic) junction, glass and platinum (or glass and gold) process electrode, titanium ground electrode, and RTV sealant. Union-mount style sensor also has LCP adapter and FKM/FPM O-ring process seals. **PPS Sensor:** PPS body and salt bridge with PVDF (or ceramic) junction, glass and platinum (or glass and gold) process electrode, titanium ground electrode, and RTV sealant. Union-mount style sensor also has PPS adapter and FKM/FPM O-ring process seals.
Range	LCP and PPS Sensors 0 - 14 pH (See Note 1.)	-2000 - +2000 mV (See Note 2.)
Sensitivity	Less than 0.005 pH	Less than 0.5 mV
Drift	0.03 pH per 24 hours, non-cumulative	2 mV per 24 hours, non-cumulative
Output Span	Only with 2-wire transmitter: 0.95 mA per pH unit	Only with 2-wire transmitter: 16 mA per 1000 mV
Outputs	Offset (only with 2-wire transmitter): 12 mA occurs at 7.0 pH, ±0.88 pH (See Note 3.)	Offset (only with 2-wire transmitter): -500 to 500 mV range: 12 mA occurs at 0 mV, ±40 mV 0 to 1000 mV range: 12 mA occurs at 500 mV, ±40 mV
Pressure Range	**Temperature Limit:** Sensor Only (no hardware): LCP Sensor -5 to 95 °C (23 to 203 °F) PPS Sensor -5 to 95 °C (23 to 203 °F) *NOTE: An LCP or PPS sensor that is mounted in a plastic flow-through tee has a higher pressure rating at maximum temperature than when it is mounted in a union tee. The temperature rating is increased to 95 °C (203 °F) at 100 psig when the sensor is mounted in a stainless steel flow-through or union tee, or a stainless steel cross.*	
Flow Rate	3 m/s (10 ft./s) maximum	
Load	At 20 mA (only with 2-wire transmitter): 450 ohms	
Transmission Distance	Sensor with Preamplifier: 914 m (3000 ft.) Sensor with 2-wire Transmitter: Limited only by wire resistance and power supply voltage	
Sensor Cable	Sensor with Preamplifier: 5 conductor (plus shield); 3 m (10 ft.) long Sensor with 2-wire Transmitter: 2 conductor (twisted pair); 3 m (10 ft.) long	

**Subject to change without notice.*

1. Most pH applications fall in the 2.5 to 12.5 pH range. General purpose pH glass electrodes perform well in this range. For pH applications below 4 or above 10 pH, GLI recommends using an LCP-bodied pH sensor. Some industrial applications require accurate measurement and control below 2 or above 12 pH. In these cases, please contact Hach for further details. Repeatability and speed of response of a pH sensor with an optional antimony process electrode is not as good as a sensor with a glass process electrode. Antimony electrodes are only linear between 3 and 8 pH, and should only be ordered when process conditions, such as the presence of hydrofluoric acid, dictate their use.

2. For ORP applications where zinc, cyanide, cadmium, or nickel are present, specify the optional gold electrode instead of the standard platinum electrode.

3. A pH sensor with a built-in two-wire transmitter provides a non-isolated and uncalibrated 4-20 mA output. The indicating instrument of the measuring system must be able to provide 24 VDC to power this sensor, and have adjustment means to calibrate for zero offset and span.

Encapsulated Differential pH and ORP Sensors Configurator

Product Number	X	X	X	X
Type of Measurement				
ORP, 5-wire (with built-in preamplifier)	20			
ORP, 2-wire (with built-in two-wire transmitter providing 4-20 mA output)	24			
pH, 5-wire (with built-in preamplifier)	60			
pH, 2-wire (with built-in two-wire transmitter providing 4-20 mA output)	64			
Mounting Style (each style has integral 3 m/10 ft. long cable)				
Convertible (immersion or flow-through mount, see note A below)		2		
Union-mount (includes adapter, but requires special 2-inch threaded tee)		5		
Body Material				
PPS (for elevated temperatures in high pH applications)			2	
LCP (liquid crystal polymer)			8	
Electrode Material				
Glass (only for pH - general purpose)				P0
Antimony (only for pH - only for LCP and PPS sensors)				P1
Platinum (only for ORP - see note B below)				R0
Gold (only for ORP - see note B below)				R1

A. When immersion mounting a convertible style sensor, it is recommended to order a protector of the same material as the sensor body (LCP protector P/N 60A2F1278 or PPS protector P/N 60A2F1278-300). The protector threads onto the end of the sensor.

B. Specify the gold electrode material for processes containing zinc, cyanide, cadmium, or nickel which poison a platinum electrode.