

# Signet 2764-2767 Differential DryLoc® pH/ORP Electrodes



Flat  
Glass

Protected  
Bulb

The Signet 2764-2767 Differential pH & ORP electrodes are built with the DryLoc® connector, a Ryton® body, and PTFE reference junction to handle the most extreme and harshest of chemical applications.

These differential electrodes use a field-proven 3-electrode differential technique: the pH and reference electrodes are measured against a ground electrode, ensuring a steady and stable signal. A key feature is the reference electrode, which is housed in a glass half-cell embedded in the reference chamber and is protected from compounds that may contain sulfides ( $S^{2-}$ ) and metals. To ensure long service life, the reference features a refillable electrolyte chamber and a replaceable equitransferant salt bridge, both easily serviced in the field. The patented porous PTFE reference junction resists fouling, clogging and chemical attack.

Other elements of the design are the solution ground, the pH/ORP electrodes, and the temperature element. The solution ground eliminates noisy measurements by draining electrical current away from the reference electrode. The pH/ORP electrodes are designed with a flat or bulb surface, and a temperature device positioned at the tip of the measurement surface for a quick temperature response. Various temperature devices offered include 3 K $\Omega$ , 300  $\Omega$ , or PT1000 RTD.

The electrodes are used with the Signet 2750 Sensor Electronics, which provide a blind 4 to 20 mA output or use the digital (S<sup>3</sup>L) output to connect the Signet 8900 or 9900 instruments, and the Profibus Concentrator. The electrodes can also be used with the Model 2760 preamplifier to connect to the Signet 8750.

## Features

- **Differential design for stable measurements in the most aggressive applications**
- **Long service life even in severe or difficult chemical applications**
- **Water-tight DryLoc® connector with foul-proof gold contacts\***
- **Porous PTFE reference junction**
- **Rebuildable reference electrode**
- **Solution ground**
- **Temperature sensor (pH)**
- **Easy sensor replacement using DryLoc electrode connector**
- **Quick temperature response**
- **Compatible with all Signet instruments and other suppliers' pH/ORP instruments**

## Applications

- **Water and Wastewater Treatment**
- **Coagulation and Flocculation**
- **Plant Effluent**
- **Plating Baths**
- **Scrubbers**
- **Textile Dye Process**
- **Harsh Chemical Applications**
- **Heavy Metal Removal and Recovery**
- **Toxics Destruction**
- **Surface Finishing**

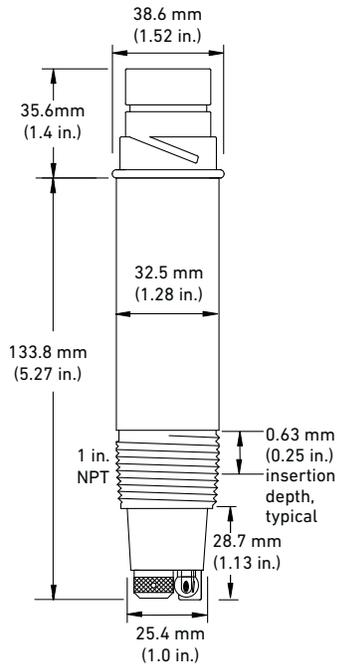
See Technical Reference section for assistance in choosing the correct sensor.

\*U.S. Patent No.: 6,666,701

# Specifications

General		
Compatibility	Signet 2750 and 2760	
Operating Range	2764/2766	0 to 14 pH
	2765/2767	±1500 mV (ORP)
Process Connection	1 in., for use in reducing tees up to 4 in.	
Wetted Materials		
Body	Ryton®	
Reference Junctions	PTFE	
Sensing Surface	pH	Glass membrane
	ORP	Platinum
O-rings	FKM	
Solution Ground	Carbon graphite	
Max. Temperature/Pressure Rating		
Operating Temperature	0 °C to 95 °C	32 °F to 203 °F
Max. Operating Pressure	6.89 bar @ 95 °C	100 psi @ 203 °F
Recommended Storage Temperature		
	0 °C to 50 °C	32 °F to 122 °F
The electrode glass will shatter if shipped or stored at temperature below 0 °C (32 °F).		
The performance life of the electrode will shorten if stored at temperatures above 50 °C (122 °F).		
Mounting		
In-line/Vertical Mounting	Use sensor 1 inch threads. Sensor must be mounted at least 15 degrees above the horizontal axis.	
Submersible Mounting	Use threads on Model 2750 or 2760; requires ¾ inch NPT or ISO 7/1-R 3/4 inch male threaded extension.	
Reference	Electrolyte	Buffered equi-transferant salt solution gel
	Element	pH half-cell
Temperature Sensor	pH	3 KΩ, PT1000 RTD, or 300 Ω
	ORP	10K ID Resistor
Shipping Weight		
	0.25 kg	0.55 lb
Standards & Approvals		
	Manufactured under ISO 9001 for Quality	

# Dimensions



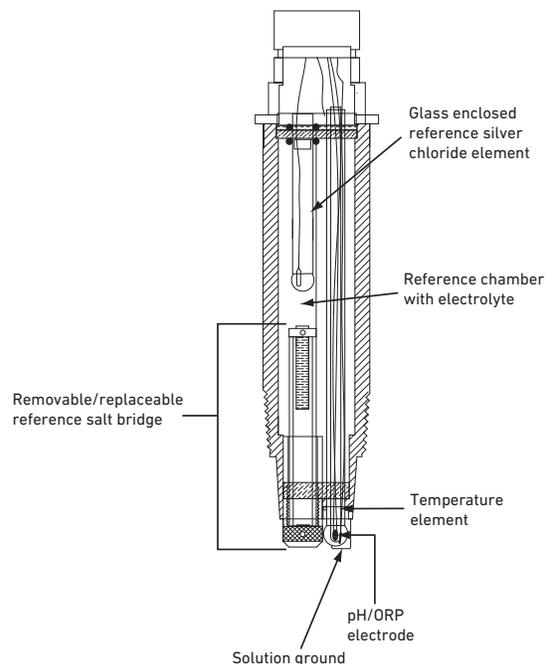
Flat and Bulb versions have the same dimensions

System Overview	<b>Panel Mount</b>	<b>Pipe, Tank, Wall Mount</b>	<b>4 to 20 mA Output</b>	<b>Automation System</b>
	Signet Instruments 8750 with 2760 Preamplifier 8900 9900 with 2750 Electronics 	Signet Instruments 9900 with 2750 Electronics and Rear Enclosure 	2750 Sensor Electronics and Customer Supplied Chart Recorder Programmable Logic Controller or Programmable Automation Controller 	2750 Sensor Electronics with 0486 Profibus Concentrator and Customer Supplied Programmable Logic Controller or Programmable Automation Controller 
	Signet 2764-2767 DryLoc <sup>®</sup> pH/ORP Electrodes 			
In-Line Installation - Threaded fittings only 		Submersible Installation - Customer supplied pipe extension or conduit with 3/4 in. NPT or ISO 7/1-R 3/4 threads* 		

\*Refer to the Signet Submersion Kit brochure (3-0000.707) located on our website for installation suggestions and options.

## Electrode Key Features and Benefits

- Glass encased reference electrode protects the Ag/AgCl (silver/silver chloride) element from reacting with certain chemical compounds that typically leach into the reference chambers. Keeps the pH/ORP reading stable.
- Large volume reference electrolyte chamber resists dilution over time for a long service life. Chamber is refillable. Holds approximately 30 ml of electrolyte
- Salt Bridge serves as a double reference junction and is the first line of defense to keep out process chemicals from the reference electrolyte chamber. It is built with a porous PTFE reference junction which is highly compatible to chemicals, resists fouling and build-up of dirt.
- Ryton® body for chemical compatibility to most harsh chemicals. Also able to withstand high temperatures.
- DryLoc connector with corrosion resistant gold pins for quick and easy sensor removal.
- Capillary TC (temperature sensor) embedded in tip of pH/ORP electrode for quick temperature response.



Electrode Cut-Away View

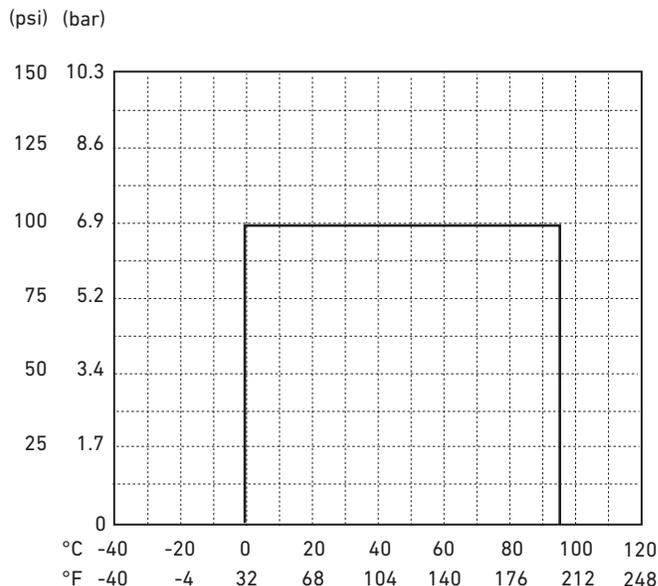
A Differential Electrode solves many common problems typically experienced by standard pH/ORP electrodes at troublesome measuring points. See the table below to find the common problem, cause and effect, and the Differential pH/ORP Electrode solution.

If the standard (Signet Models 272X or 277X) pH/ORP electrode experiences the following:	The cause and effect of the problem may be:	Use a Differential Electrode to solve the problem because:
<ul style="list-style-type: none"> <li>• Reading slowly drifts over time</li> <li>• Sensor responds slowly</li> </ul>	<ul style="list-style-type: none"> <li>• Chemical attack from Hg<sup>++</sup>, Cu<sup>+</sup>, Pb<sup>++</sup>, ClO<sub>4</sub><sup>-</sup> or other compounds which react with or dilute the KCl reference electrolyte.</li> <li>• Reference junction gets clogged from oils, grease, or dirt from the process.</li> </ul>	<ul style="list-style-type: none"> <li>• Salt bridge will slow or stop attack. If attacking ions penetrate the salt bridge and affect the reference, simply refill reference solution</li> <li>• Readings do not drift due to stable differential reference design, however may require cleaning or replacement of the salt bridge if electrode gets too dirty.</li> </ul>
<ul style="list-style-type: none"> <li>• Reading slowly drifts over time</li> <li>• Sensor reading becomes erratic</li> </ul>	<ul style="list-style-type: none"> <li>• Chemical attack of the Ag<sup>+</sup> reference billet from Br<sup>-</sup>, I<sup>-</sup>, CN<sup>-</sup>, and S<sub>2</sub><sup>-</sup> compounds.</li> <li>• Clogged reference and slowed reading from silver compounds forming on the inside of the reference electrode from Ag<sup>+</sup> of reference element reacting and precipitating Ag<sub>2</sub>S, AgBr, AgI, AgCN, or other silver compounds.</li> </ul>	<ul style="list-style-type: none"> <li>• Will not affect electrode due to Ag<sup>+</sup> element protected in glass encased reference electrode.</li> <li>• Will not affect electrode due to Ag<sup>+</sup> element protected in glass encased reference electrode</li> </ul>
<ul style="list-style-type: none"> <li>• Reading suddenly jumps to a new value</li> <li>• Reading unexpectedly changes</li> </ul>	<ul style="list-style-type: none"> <li>• Stray electrical currents in the process liquid; Ag<sup>+</sup> reference element picks up current and shifts reference reading, resulting in shifted pH reading. The Ag<sup>+</sup> element will eventually become totally stripped. Process must be properly grounded or place metal rod close to electrode.</li> </ul>	<ul style="list-style-type: none"> <li>• Will not affect electrode due to Ag<sup>+</sup> element protected in glass encased reference electrode; also, electrode has a built in solution ground, so if there is a stray current, it will not be seen by the electrode</li> </ul>

## Temperature/Pressure Graph

### Note:

The pressure/temperature graphs are specifically for the Signet sensor. During system design the specifications of all components must be considered. In the case of a metal piping system, a plastic sensor will reduce the system specification.



Ion	Ion name	Ion	Ion name	Compound	Compound name
Br <sup>-</sup>	Bromide	Hg <sup>++</sup>	Mercury	KCl	Potassium chloride
Cu <sup>+</sup>	Copper iron	ClO <sub>4</sub> <sup>-</sup>	Perchlorate	Ag <sub>2</sub> S	Silver sulfide
CN <sup>-</sup>	Cyanide	Ag <sup>+</sup>	Silver	AgBr	Silver bromide
I <sup>-</sup>	Iodide	S <sup>2-</sup>	Sulfide	AgI	Silver iodide
Pb <sup>++</sup>	Lead			AgCN	Silver cyanide

### Model 2764-2767

#### Ordering Notes

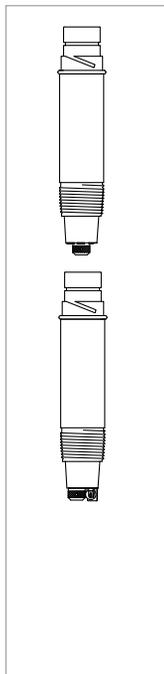
- 1) pH and ORP electrodes require connection to model 2750 or 2760.
- 2) Conduit and mounting brackets for submersible installations must always be used (customer supplied).
- 3) Adapters from 1 - 1½ in. are available.
- 4) Use sensor threads for in-line mounting; Model 2750 or 2760 threads for submersible mounting.
- 5) Reference electrode can be rebuilt with replacement electrolyte and salt bridge.

#### Application Tips

- Use the flat glass electrodes when a self-cleaning feature is desired; especially useful in applications with abrasive chemicals.
- Use bulb protected electrodes for general purpose applications.
- ORP electrodes are generally used for chemical reaction monitoring, not control.
- Ensure that sensor materials are chemically compatible with the process liquid.
- Keep electrode tip wet, avoid air pockets and sediment.

Please refer to Wiring, Installation, and Accessories sections for more information.

## Ordering Information



Mfr. Part No.	Code	Tip Design	Temperature Element
pH Differential Electrode			
3-2764-1	<b>159 000 943</b>	Flat	3 KΩ Balco <sup>1,2</sup>
3-2764-2	<b>159 000 944</b>	Flat	PT1000 <sup>1</sup>
3-2764-3	<b>159 000 945</b>	Flat	300 Ω Balco <sup>3</sup>
3-2766-1	<b>159 000 949</b>	Bulb with protection	3 KΩ Balco <sup>1,2</sup>
3-2766-2	<b>159 000 950</b>	Bulb with protection	PT1000 RTD <sup>1</sup>
3-2766-3	<b>159 000 951</b>	Bulb with protection	300 Ω Balco <sup>3</sup>
ORP Differential Electrode			
3-2765-1	<b>159 000 946</b>	Flat	10 KΩ ID <sup>1,2</sup>
3-2765-2	<b>159 000 947</b>	Flat	PT1000 <sup>3</sup>
3-2765-3	<b>159 000 948</b>	Flat	300 Ω Balco <sup>3</sup>
3-2767-1	<b>159 000 952</b>	Bulb with protection	10 KΩ ID <sup>1,2</sup>
3-2767-2	<b>159 000 953</b>	Bulb with protection	PT1000 <sup>3</sup>
3-2767-3	<b>159 000 954</b>	Bulb with protection	300 Ω Balco <sup>3</sup>

<sup>1</sup> For use with the Multi-Parameter instruments, and Profibus Concentrator when used with the 2750 sensor electronics. The 2750 sensor electronics has a digital (S<sup>3</sup>L) output which is used with the Multi-Parameter instruments. It also has a 4 to 20 mA output for connections to PLC's, data recorders, etc.

<sup>2</sup> The 2760 preamplifier is used for connection directly to 8750 transmitter.

<sup>3</sup> Use with third party controls or amplifiers, requires the 2760 preamplifier or connector.

## Accessories and Replacement Parts

Mfr. Part No.	Code	Description
1220-0021	<b>198 801 000</b>	O-ring, FKM (2 required per sensor)
3-2700.395	<b>159 001 605</b>	Calibration kit: includes 3 polypropylene cups, box used as cup stand, 1 pint pH 4.01, 1 pint pH 7.00
3822-7115	<b>159 001 606</b>	20 gm bottle quinhydrone for ORP calibration (must use pH 4.01 and/or pH 7.00 buffer solutions)
3864-0001	<b>159 001 007</b>	Replacement salt bridge
3864-0002	<b>159 001 008</b>	Replacement reference electrolyte solution, 500 mls
2120-0015	<b>159 001 009</b>	CPVC adapter: 1.5 in. MNPT to 1 in. FNPT
2122-0015	<b>159 001 010</b>	PVDF adapter: 1.5 in. MNPT to 1 in. FNPT
3-0700.390	<b>198 864 403</b>	pH buffer kit (1 each 4, 7, 10 pH buffer in powder form, makes 50 ml of each)
3822-7004	<b>159 001 581</b>	pH 4 buffer solution, 1 pint (473 ml) bottle
3822-7007	<b>159 001 582</b>	pH 7 buffer solution, 1 pint (473 ml) bottle
3822-7010	<b>159 001 583</b>	pH 10 buffer solution, 1 pint (473 ml) bottle
3-2759	<b>159 000 762</b>	pH/ORP system tester
3-2759.391	<b>159 000 764</b>	Adapter cable for use with 2750/2760

3-2764.099 Rev E (04/17)

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