

# pH/ORP Sensors



## WEL Series

Walchem's WEL Series electrodes are cost-effective differential pH and ORP electrodes for industrial applications. They are modular in design with a rugged CPVC housing that contains the electronics. pH and ORP cartridges can easily be connected or replaced in minutes without tools. The cartridges feature a unique threaded interlock connection and a double o-ring seal, ensuring a watertight fit and secure seating at all times.



The optional differential preamplifier or 4 to 20 mA transmitter, and temperature compensation element are in the housing, and are not thrown away when the electrode needs replacement. The electrode is powered by the controller it is connected to, so the signal is always preamplified and there are no batteries to go dead.

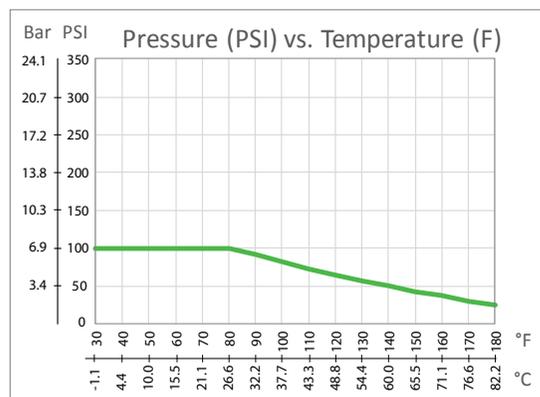
A titanium solution ground rod integral to the housing enables the differential measuring technique. This results in prolonged electrode life and reliable measurement, resistance to stray voltages and currents or ground loop problems.

### SPECIFICATIONS

HOUSING CODE	1, 7, A	2, 8, B	3	4	C, E	D, F
Input Range	± 1999 mVDC				± 500 mVDC	-500 to 1000 mVDC
Output Range	± 1999 mVDC				Isolated 4 to 20 mADC	
Input Impedance	1 x 10 <sup>13</sup> ohms					
Output Impedance	100 ohms			N/A		
Power	± 5 VDC (± 10%) 3 mA maximum		N/A		12 to 30 VDC, 21 mA maximum	
Temperature Range	32 to 158 °F (0 to 70 °C)		32 to 212 °F (0 to 100 °C)		32 to 160 °F (0 to 70 °C)	
Pressure	0 to 100 psi (0 to 6.9 Bar) See graph for Pressure versus Temperature					
Maximum cable length	1000 feet (305 meter)		20 feet (6 meters)		4000 feet (1219 m) at 24 VDC power, 24 AWG cable	

CARTRIDGE CODE	PHH	PHB	PHF	PHLI	MVF	MVR
Range	0 to 14 pH Standard Units				± 2000 mV	
Response	90% in less than 5 seconds					
Temperature Range	32 to 122 °F (0 to 50 °C)	32 to 212 °F (0 to 100 °C)	50 to 212 °F (10 to 100 °C)			

NOTE: Electrode life is drastically reduced when used above 122 °F (50 °C)



### Wetted Materials of Construction

- |                              |                                       |
|------------------------------|---------------------------------------|
| Cartridge and Housing        | CPVC                                  |
| Cartridge Reference Junction | HDPE                                  |
| O-Rings                      | FKM                                   |
| Housing Ground Rod           | Titanium                              |
| Cartridge Electrode          | Glass (pH) or Platinum (ORP)          |
| Inline nut, tee and adapters | Glass Filled Reinforced Polypropylene |

### HOUSING

- 1 = Housing with preamplifier and Pt 1000 ATC, 20 ft. cable
- 2 = Housing with preamplifier, 20 ft. cable
- 3 = Housing with Pt 1000 ATC, 20 ft. coaxial cable with BNC Connector
- 4 = Housing, 20 ft. coaxial cable with BNC Connector
- 7 = Housing with preamplifier for W100/W600/W900 Pt1000, 20 ft cable with tinned leads
- 8 = Housing with preamplifier for W100/W600/W900 20 ft cable with tinned leads
- A = Housing with preamplifier for W100/600/900, Pt 1000, 3 ft. cable with tinned leads
- B = Housing with preamplifier for W100/600/900, 3 ft. cable with tinned leads
- C = Housing with pH range 4-20 mA transmitter, internal Pt 1000, 20 ft. 2-conductor cable with tinned leads
- D = Housing with ORP range 4-20 mA transmitter, 20 ft. 2-conductor cable with tinned leads
- E = Housing with pH range 4-20 mA transmitter, internal Pt 1000, 3 ft. 2-conductor cable with tinned leads
- F = Housing with ORP range 4-20 mA transmitter, 3 ft. 2-conductor cable with tinned leads

### ORDER INFORMATION



### CARTRIDGE

- PHF = Flat surface pH
- PHB = Bulb pH
- PHH = HF resistant pH
- MVF = Flat surface ORP
- MVR = Rod style ORP
- PHLI = Flat pH, if sample is between 10 and 100µS/cm

### MOUNTING STYLE

- 1 = Submersion Mounting, 1" NPTM thread on housing
- 2 = In-line mounting (3/4" NPTF tee)
- 3 = Metric in-line mounting (1 1/4" BSPT)
- 4 = In-line mounting (1 1/4" NPT male adapter)

# WDS Series

Walchem's WDS Series differential pH and ORP sensors will provide long-lasting and reliable performance in industrial and municipal applications.

The differential measurement technique uses two electrodes, one for the process measurement and the other for the reference measurement. Each electrode is measured differentially with respect to a third metal electrode. The reference electrode is constructed from pH glass and is embedded in pH 7 buffer within the sensor behind a porous, replaceable salt bridge. If the reference solution becomes contaminated, or the salt bridge becomes clogged, it is easily replaced. The glass electrode is not prone to chemical attack like a silver/silver chloride reference can be, adding to the reliability of the sensor.



## Summary of Key Benefits

- Replaceable salt bridge for long life
- Field proven differential design
- Transmits signal 3,000 feet (915 meters)
- Walchem preamplifier models are compatible with Walchem controllers
- Conventional preamplifier models are compatible with GLI and Aquamatrix (Lisle Metrix) controllers
- Resistant to ground loop problems

## SPECIFICATIONS

### Measurement Performance

Range: 0 to 14 pH, -2000 to 2000 mV (ORP)

Sensitivity: 0.001 pH, 0.1 mV

Stability: 0.03 pH per day, non-cumulative, 2 mV per day, non-cumulative

Temperature: -5 to 95°C (23 to 203°F)

Automatic Temperature Compensation: None

### Mechanical

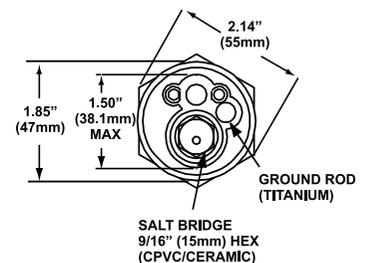
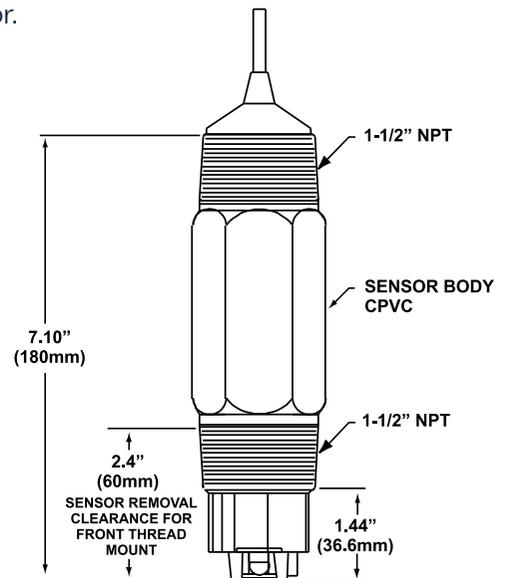
Wetted Materials:

CPVC, Ceramic, Glass, EPDM, Platinum (ORP only) and Titanium Palladium alloy

Cable (Walchem preamp)	3 twisted pair shielded
Cable (Conv. preamp)	5 conductor shielded
Cable length	4.6 meters (15 ft)
Maximum cable length	900 meters (1,000 ft)

Temperature Limit	-5 to 95°C (23 to 203°F)
Pressure Limit	0.7 MPa (100 PSI) @65°C (149°F)

The WDS Series (model numbers WDS-\*\*W, Walchem preamplifier only) sensors are in compliance with CE EMC EN 61326-1 standards.



## ORDERING INFORMATION

WDS	—	<input type="checkbox"/>	<input type="checkbox"/>
		sensor	preamp
		type	type

### SENSOR TYPE

PH = pH sensor

MV = ORP sensor

### PREAMPLIFIER TYPE

W = Walchem preamplifier

C = Conventional preamplifier

## High Pressure & High Temperature pH & ORP Electrodes

The 102029 pH electrode and 102963 ORP electrode are designed to function where other electrodes cannot. In room temperature water, they can handle up to 500 psi. In low pressure installations, they can handle up to 275°F (135°C) without melting.

In all cases, pH/ORP electrode life will be maximized by operating at room temperature, and the expected life span at temperatures above 140°F (60°C) will be short. But if low temperature operation is impossible, these electrodes will fit the bill.



### Summary of Key Benefits

- Higher temperature rating
- Steam sterilizable
- High operating pressure
- Booted BNC, waterproof cable

### ORDERING INFORMATION

102027	Mounting Gland, SS, 3/4" NPT, High Temperature/Submersion (pH/ORP)
102028	Mounting Gland, SS, 3/4" NPT, High Temperature/In-line (pH/ORP)
102029	Electrode, pH, High Temperature, 10 ft. cable
102963	Electrode, ORP, High Temperature, 10 ft. cable

### SPECIFICATIONS

Reference cell	Double junction, Na <sub>2</sub> SO <sub>4</sub> + KCl, Ag/AgCl
Cable lead	10 ft. (3.05 m) length with BNC connector
Membrane impedance (pH)	150 megaohms at 77°F (25°C)
Zero potential (pH)	0 mV ±12 @ pH 7
Operating Temperature	23° to 275°F (-5° to 135°C) @ 200 PSI (1.38 MPa)
Operating Pressure	500 PSI (3.45 MPa) @ 77°F (25°C)
Range	0 to 14 pH, -1000 to 1000 mV
Output voltage (pH)	58.7 ±0.3 mV per pH unit
Drift	Less than 2 mV per week
Sodium error (pH)	Less than 0.5 pH unit typical in 0.1 Na+ @ 12.8 pH

#### Dimensions

5" (127 mm) length x 0.47" (12 mm) diameter  
Gland thread size 3/4" NPTM

#### Materials of Construction

PFA junction  
Glass membrane (pH and ORP)  
Platinum (ORP)  
Polymer body  
SS mounting gland

# Preamplifiers

Walchem preamplifiers offer a way to use any standard non-amplified pH/ORP/ISE electrode with our controllers. Once amplified, the signal may be extended up to 1000 feet (305 meters) using 22 AWG cable.

For long cable runs, the external preamplifier comes packaged in a NEMA 4X wall mount enclosure that can withstand the elements. The electrode connects to this using a short coax cable, and once amplified the signal goes to the controller. For cable runs less than 20 feet (6 meters) total, the internal preamplifier may be mounted inside the controller's enclosure and the electrode cable attaches directly to it.



## Summary of Key Benefits

- Boosts signal for reliable transmission up to 1,000 ft (305 m) via 22 AWG wire
- No temperature simulation resistor required when used with Walchem controllers

## SPECIFICATIONS

	191949 External Preamplifier	191938 Internal Preamplifier (terminal)	191936 Internal Preamplifier (BNC)
Power	± 5 VDC (± 10%) 3 mA maximum		
Input Impedance	1 x 10 <sup>13</sup> ohms		
pH/ORP/ISE Input Connections	BNC	Two position terminal block	BNC
Temperature Input Connections	Three position terminal block	Not Applicable	
Output Connections	Six position terminal block	Four position connector, prewired with 5" cable	
Enclosure	NEMA 4X/IP 65 glass reinforced polyamide wall mount with PG11 cable glands	Non-NEMA rated UV cured resin – needs to be installed inside the controller. For 191936, use a booted BNC on the sensor to prevent short circuit damage to the controller.	
Dimensions	4.5"L x 3.3"W x 1.3" H 115 mm x 84 mm x 34 mm	2.0"L, 0.79"W, 0.64"H 51 mm x 20 mm x 16 mm	2.0"L, 0.79"W, 1.01"H 51 mm x 20 mm x 26 mm

## ORDER INFORMATION

191949	External pH/ORP/ISE Preamplifier
191938	Internal pH/ORP/ISE Preamplifier, Terminal Block Input
191936	Internal pH/ORP/ISE Preamplifier, BNC Input
100084	Cable, 4-conductor, for 191949 without temperature compensation
102535	Cable, 6-conductor, for 191949 with temperature compensation

## ABOUT US

Walchem integrates its advanced sensing, instrumentation, fluid pumping and communications technologies to deliver reliable and innovative solutions to the global water treatment market. Our in-house engineering is driven by quality, technology and innovation. For more information on the entire Walchem product line, visit: [www.walchem.com](http://www.walchem.com).

