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)** using 22 AWG wire
- **No temperature simulation resistor** required when used with Walchem controllers

### Walchem’s 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 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

**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

**ORDER STYLE**
- **WEL** cartridge housing mounting style
- **PHF** = Flat surface pH
- **PHB** = Bulb pH
- **PHH** = HF-resistant pH
- **MVF** = Flat surface ORP
- **MVR** = Rod style ORP
- **PHII** = Flat pH, if sample is between 10 and 100µS/cm

**Housing Types**
- **PHH** Flat surface pH
- **PHB** Bulb pH
- **PHH** HF-resistant pH
- **MVF** Flat surface ORP
- **MVR** Rod style ORP
- **PHII** Flat pH, if sample is between 10 and 100µS/cm

**Mounting Style**
- **In-line mounting** (5/8” NPTP) tee
- **In-line mounting** (1½” BSPT) tee

### Wetted Materials of Construction

**Cartridge and Housing**
- CPVC
- Titanium
- Glass (pH) or Platinum (ORP)

**Inline nut, tee and adapters**
- Glass Filled Reinforced Polypropylene

### specifications

**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 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.
**WDS Series pH/ORP Electrodes**

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 Aquametrix (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)
- Maximum pressure: @65°C (149°F)

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>SENSOR TYPE</th>
<th>PH = pH sensor</th>
<th>MV = ORP sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>W = Walchem preamplifier</td>
<td>W = Walchem preamplifier</td>
<td></td>
</tr>
<tr>
<td>C = Conventional preamplifier</td>
<td>C = Conventional preamplifier</td>
<td></td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>ORDERING INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>102027</td>
</tr>
<tr>
<td>Mounting Gland, SS, 3/4” NPT, High Temperature/Submersion (pH/ORP)</td>
</tr>
<tr>
<td>102028</td>
</tr>
<tr>
<td>Mounting Gland, SS, 3/4” NPT, High Temperature/In-line (pH/ORP)</td>
</tr>
<tr>
<td>102029</td>
</tr>
<tr>
<td>Electrode, pH, High Temperature, 10 ft. cable</td>
</tr>
<tr>
<td>102963</td>
</tr>
<tr>
<td>Electrode, ORP, High Temperature, 10 ft. cable</td>
</tr>
</tbody>
</table>

**SPECIFICATIONS**

- Reference cell: Double junction, Na2SO4 + 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°F to 275°F (-5° to 135°C) @ 200 PSI (1.38 MPa)
- Operating Pressure: 500 PSI (3.46 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

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

- 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 Aquametrix (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**

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<th>SENSE TYPE</th>
<th>PREAMPLIFIER TYPE</th>
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<td>MV = ORP sensor</td>
<td>W = Walchem preamplifier</td>
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<td></td>
</tr>
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</table>

**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 Aquametrix (Lisle Metrix) controllers
- Resistant to ground loop problems

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<td>C = Conventional preamplifier</td>
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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.

**SPECIFICATIONS**

- Reference cell: Double junction, Na2SO4 + KCl, Ag/AgCl
- Cable lead: 10 ft. (3.05 m) length with BNC connector
- Membrane impedance (pH): 150 megohms 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
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 1,000 feet (305 meters) using 22 AWG wire. 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**

<table>
<thead>
<tr>
<th>191949 External Preamplifier</th>
<th>191936 Internal Preamp (terminal)</th>
<th>191936 Internal Preamp (BNC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>± 5 VDC (± 10%) 3 mA maximum</td>
<td></td>
</tr>
<tr>
<td>Input Impedance</td>
<td>1 x 10¹² ohms</td>
<td></td>
</tr>
<tr>
<td>pH/ORP/ISE Input</td>
<td>RNC</td>
<td>BNC</td>
</tr>
<tr>
<td>Temperature Connections</td>
<td>Three position terminal block</td>
<td>Two position terminal block</td>
</tr>
<tr>
<td>Enclosure</td>
<td>NEMA 8g/9g glass reinforced polyamide wall mount with P111 cable stands</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>4.5” x 3.8” x 1.3” H 115 mm x 84 mm x 34 mm</td>
<td>2.0”L x 0.79”W, 0.64”H</td>
</tr>
<tr>
<td></td>
<td>51 mm x 20 mm x 16 mm</td>
<td>51 mm x 20 mm x 26 mm</td>
</tr>
</tbody>
</table>

**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.

**Walchem’s 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.

**WEL Series**

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>HOUSING CODE</th>
<th>1. T. A</th>
<th>2. R. S</th>
<th>3</th>
<th>4</th>
<th>C. E</th>
<th>D. F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Range</td>
<td>+1000 mVDC</td>
<td>+500 mVDC</td>
<td>-500 to 1000 mVDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Range</td>
<td>+1900 mVDC</td>
<td>isolated 4 to 20 mA DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Impedance</td>
<td>1 x 10¹² ohms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Impedance</td>
<td>100 ohms</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td>± 5 VDC (± 10%) 3 mA maximum</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature Range</td>
<td>32 to 158°F (0 to 70°C)</td>
<td>32 to 212°F (0 to 100°C)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum cable length</td>
<td>1000 feet (305 meters)</td>
<td>20 feet (6 meters)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4000 feet (1219 meters) at 24 VDC power, 24 AWG cable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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

**ORDER INFORMATION**

- PHH: Flat surface pH
- PBB: Bulb pH
- PHF: H₂S抵抗 pH
- MFR: Flat surface ORP
- MYFR: Rod style ORP
- PHF: Flat pH, if sample is between 10 and 100µS/cm

**MOUNTING STYLE**

1 = Sub-merging Mounting, 1” NPTM thread on housing
2 = Inline mounting (3/4” NPTF tap)
3 = Metric-in-line mounting (1½” BSPF)
4 = Inline mounting (1½” NPT male adapter)