

# *Sealed Reference System for Longer Sensor Life*



*Model Q45PR*

pH/ORP Monitor



# Superior Sensor Technology For Advanced Process Measurement



*Sensor Mounting Configurations*



*ORP Monitor*

## The "Differential" Difference

ATI's versatile Q45P/R pH/ORP system is designed for use in all industrial and municipal applications. The sensors are engineered to function normally in applications where conventional sensors quickly fail.

Conventional pH/ORP sensors have an "open reference system," which means the reference element and electrolyte are in contact with the process. This allows chemicals to diffuse into the reference chamber and alter the reference system. As the reference junction becomes contaminated, the reference potential shifts. As chemicals attack the silver reference wire, the reference potential shifts and the sensor no longer functions. When any of these problems occur, cleaning and calibration cycles increase and the sensors fail much faster, all of which costs you time and money.

The differential pH/ORP sensors utilize a "sealed reference system," where the sensors are constructed with a second glass pH electrode as the reference element. The glass reference system protects the sensor from chemical poisons (sulfide, cyanide, chlorine, bisulfite, etc.) that destroy conventional pH sensors.

A large volume, dual junction saltbridge is used to maximize the in-service time of the sensor. The annular junction provides a large surface area to minimize the chance of fouling. Large electrolyte volume and dual junctions minimize contamination of

the reference solution. The replaceable saltbridge allows for easy and inexpensive sensor regeneration.

An integral preamplifier is encapsulated in the body of the sensor. This creates a low impedance signal output which ensures stable readings in harsh environments, and maximizes the distance between sensor and analyzer. Sensor diagnostics are used to alarm the user in the event of electrode breakage, loss of sensor seal integrity, or integral temperature sensor failure.

Sensor electrodes can be user-specified to ensure measurement reliability and maximum sensor lifetime. The type of glass used in the pH electrodes can be selected for optimal performance. The metal electrode used for ORP measurement can be platinum or gold, depending on the chemical makeup of the process solution.

All sensors are available in several mounting configurations. The 1" NPT convertible-style sensor is constructed of PEEK®, a high performance thermoplastic that provides outstanding mechanical strength and chemical resistance. An insertion-style sensor is available in 316SS for hot tap applications. The mounting hardware for the insertion sensor is either CPVC or 316SS, and is mounted using a 1-1/4" NPT full-ported ball valve. The sensors are also available with 1-1/2" or 2" sanitary-style fittings.

## Sensor Specifications

Measuring Range:	0 to 14 pH, -1000 to +2000 mV	Sensor Cable:	6 conductor plus 2 shields, HDPE jacket
Sensitivity:	0.002 pH; 0.2 mV	Temperature Range:	-5 to 95°C (23 to 203°F).
Stability:	0.02 pH; 2 mV (per 24 hours, non-cumulative)	Pressure Range:	0 to 100 psig
Wetted Materials:	PEEK®, ceramic, titanium, glass, Viton®, EPDM Platinum or gold (ORP only) 316 Stainless Steel with sanitary or insertion body styles	Max. Flow Rate:	10 feet (3 meters) per second
Temperature Compensation:	Pt1000 RTD	Max. Sensor to Analyzer Distance:	3,000 feet (914 meters)
		Sensor Body Options:	1" NPT Convertible 1-1/4" Insertion 1-1/2" or 2" sanitary-style

## Monitor Specifications

Display Parameters:		Display:	Large, high-contrast, LCD with LCD backlight 4-digit main display with sign, 0.75" (19.1 mm) seven-segment characters; 12-digit alpha-numeric second line display, 0.3" (7.6 mm) 5 x 7 dot matrix characters
Main input:	[pH] 0 to 14 [ORP] -1000 to +2000 mV	Ambient Temperature:	
Sensor voltage:	[pH] ±500 mV	Service:	-20 to 60°C (-4 to 140 °F)
Loop current:	4.00 to 20.00 mA	Storage:	-30 to 70°C (-22 to 158 °F)
Sensor temperature:	-10 to 110°C (14 to 230°F)	Ambient Humidity:	0 to 95%, non-condensing
Main Parameter Range:	0.00 to 14.00 pH, -1000 to +2000 mV	Location:	Designed for non-hazardous areas
Input Impedance:	>10 <sup>13</sup> Ohms	EMI/RFI Influence:	Designed to EN 61326-1
Repeatability:	0.1% of span or better	Output Isolation:	600 V galvanic isolation
Sensitivity:	0.05% of span	Filter:	Adjustable, 0-9.9 minutes additional damping to 90% step input
Non-linearity:	0.1% of span	Temperature Input:	Selectable Pt1000 or Pt100 RTD with automatic compensation
Stability:	0.05% of span per 24 hours	Power:	16-35 VDC for loop-powered unit; 115/230 VAC, 50/60 Hz., 10 VA Uses two AA batteries for battery operated portable
Temperature Drift:	Span or zero, 0.02% of span/°C	Control Relays:	Two SPDT relays, 6A @ 250 VAC, 5A @ 24 VDC, resistive
Warm-Up Time:	7 seconds to rated performance	Relay Mode:	Programmable for control, alarm, or timer function
Response Time:	6 seconds to 90% of step input at lowest setting	Analog Outputs:	Isolated 4-20 mA, 550 ohm max. load. Two assignable 4-20 mA outputs, 550 ohm max. (AC only)
Max. Sensor to Analyzer Distance:	3000 feet (914 meters) w/preamp 25 feet (7.6 meters) w/o preamp	Data Logger:	Battery version only, stores 32,000 data points
Sensor Types:	Q-Series pH or ORP with preamp, 5-wire input; combination-style pH or ORP with temperature compensation		
Enclosure:	NEMA 4X, IP66, polycarbonate, weatherproof and corrosion resistant, (HWD): 4.9" (124 mm) x 4.9" (124 mm) x 5.5" (140 mm)		
Mounting Options:	Wall, panel, pipe/handrail		
Conduit Openings:	Three M16 threaded entries, 3 cord-grips and 2 conduit adapters included		
Weight:	2-wire or battery units: 1 lb. (.45 Kg) AC power units: 2 lbs. (.9 Kg) Auto-Clean units: 15 lbs. (6.8 Kg.)		



## Auto-Clean Option

The Q45P/R Auto-Clean System is designed to extend sensor cleaning intervals on pH and ORP sensors that are mounted in applications containing high levels of solids contamination. The Auto-Clean System uses high pressure air to remove contaminants from the face of the sensor automatically.

Our Auto-Clean System utilizes a self contained compressor and air cylinder to generate a series of high pressure air blasts. Each cleaning cycle lasts approximately 2 minutes, during which the monitor outputs are placed in a HOLD condition to prevent false readings or alarms.

The concentration of solids in the process will determine the cleaning frequency of the system. The user can vary the cleaning cycle frequency from as often as once every two hours to as little as once a day.

Although the Q45A Auto-Clean System can greatly extend sensor cleaning intervals, the user must still clean and calibrate the sensor at some interval. For a typical pH or ORP measurement in wastewater treatment, the system can extend weekly cleaning intervals to once every three months. Cleaning systems are not suitable for removing hard scale such as that caused by lime.

## Standard Sensor Compatibility

The Q45P/R monitors can be easily configured to accept the input from a traditional combination sensor. For applications where a specialty sensor is required, ATI offers a line of standard sensors to meet your needs.

The unique "Lock-N-Load" system is pipe mounted and provides quick and easy isolation of the sensor from a flowing stream. The self-sealing sensor holder allows the sensor to be removed for maintenance without shutting down the process stream.

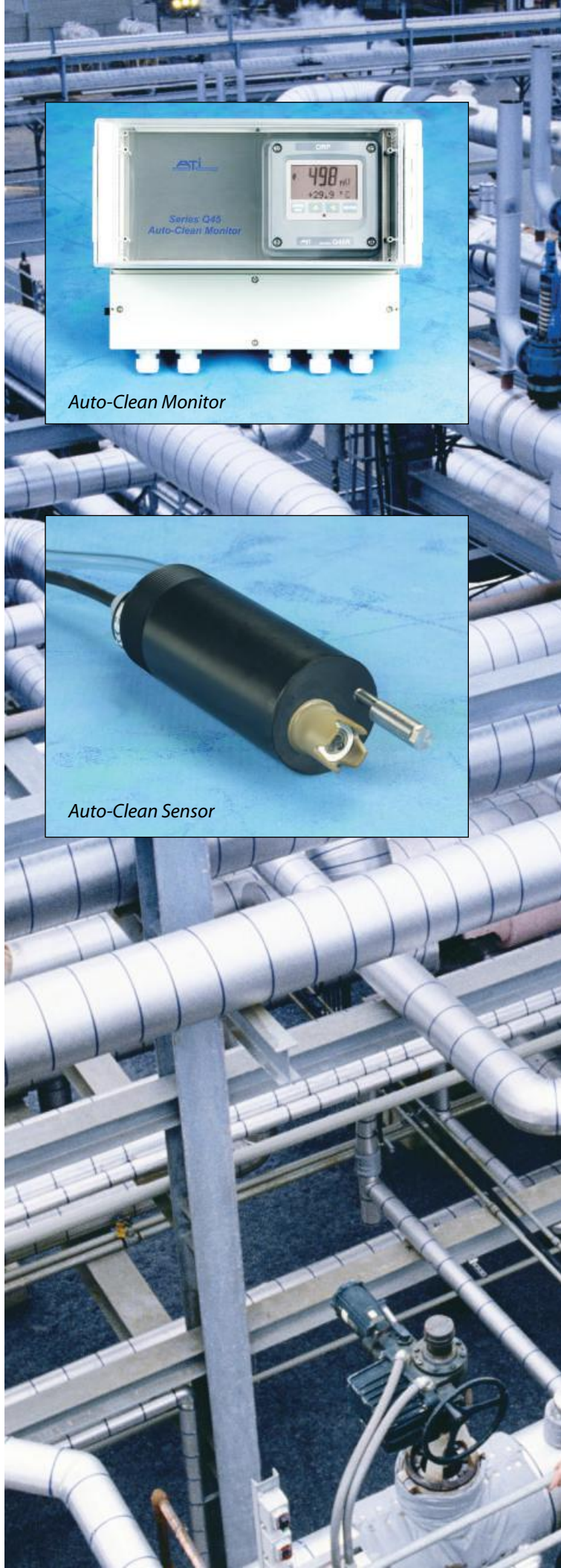
For high purity water (conductivity below 20 microSiemens), a special sensor is used in conjunction with a stainless steel flow assembly. This system is designed to minimize interference (noise, streaming potentials, CO<sub>2</sub>, etc.) and provide a stable pH measurement.



Auto-Clean Monitor



Auto-Clean Sensor



## Sensor Features

**Differential-Style Sensor:** The reference element is a second glass pH electrode immersed in a reference buffer solution. This glass reference system allows the sensor to be used in applications that poison conventional pH sensors.

**PEEK® Sensor Body Construction:** All structural components are made of PEEK®, a high performance thermoplastic that provides outstanding mechanical strength and chemical resistance.

**Replaceable Sensor Saltbridge:** A large volume, dual junction saltbridge is used to maximize the in-service time of the sensor. The replaceable saltbridge allows for easy and inexpensive sensor regeneration.

**Sensor Diagnostics:** Sensor diagnostics are used to alarm the user in the event of electrode breakage, loss of sensor seal integrity, or integral temperature sensor failure.

**Multiple Sealing Materials:** Multiple sealing materials are used to preserve sensor integrity over a wide range of chemical processes and varying temperatures.

**Integral Preamplifier:** The integral preamplifier is encapsulated in the body of the sensor. This creates a low impedance signal output which ensures stable readings in harsh environments, and maximizes the distance between sensor and analyzer.

## Monitor Features

**Loop-powered, AC, or Battery Versions:** This line of microprocessor based instrumentation allows for easy implementation of loop-powered, line-powered, or battery-powered capability within the same instrument. It can be rapidly converted between any of these versions with no requirement for software change

- Loop-powered (16-35 VDC) transmitter, 4-20 mA output
- Line-powered (115/230 VAC) analyzer, dual relays, dual 4-20 mA outputs
- Battery-powered (2 AA) monitor/data logger, dual 0-2.5 VDC outputs

**Sensor Compatibility:** Q45 Monitors can accept standard pH sensor inputs, allowing easy upgrade for existing installations.

**Dual Alarm Relays/Analog Outputs:** AC operated systems provide two relays that are configurable for control, alarm or timer mode of operation.

**Diagnostic Messaging:** Diagnostic messages provide a clear description of system condition, which eliminates confusing error codes that are difficult to decipher.

**Flexible Calibration:** Two-point and sample calibration options include auto-buffer recognition for 13 built-in buffer tables. Manual override of the automatic buffer values allows for user to customize values. All calibration methods include stability monitors to check temperature and main parameter stability before accepting data.

**Standard PID Output:** A PID control output is standard in every Q45 pH or ORP monitor, with control parameters easily user configurable.



## Ordering Information: Model Q25-A-B-C Differential Sensor

### Suffix A - Electrode Type

- P1 - pH: industrial glass
- P2 - pH: municipal glass
- P3 - pH: antimony metal (HF applications only)
- R1 - ORP: platinum metal
- R2 - ORP: gold metal

### Suffix B - Sensor Style

- 1 - 1" NPT convertible-style, PEEK
- 2 - Insertion-style, 316SS
- 3 - 1-1/2" sanitary-style, 316SS
- 4 - 2" sanitary-style, 316SS
- 5 - Auto-Clean
- 6 - 1" NPT convertible-style, PEEK, w/ connector

### Suffix C - Sensor Cable Length

- 1 - 15 feet
- 2 - 30 feet
- 9 - Special

### ACCESSORIES:

- 05-0057 P1/P3/ORP sensor regeneration kit
- 05-0060 P1/P3/ORP saltbridge only
- 05-0067 P2 sensor regeneration kit
- 09-0033 Fill solution
- 09-0034 pH 4.00 buffer, 1,000 mL
- 09-0035 pH 7.00 buffer, 1,000 mL
- 09-0036 pH 10.00 buffer, 1,000 mL
- 09-0045 pH 6.87 buffer, 500 mL
- 09-0037 pH 9.18 buffer, 500 mL
- 09-0042 200 mV solution, 500 mL
- 09-0043 600 mV solution, 500 mL
- 05-0056 Quinhydrone powder, 5 grams

### SENSOR MOUNTING OPTIONS

- 00-0628 Sensor Hand Rail Mounting Hardware, Standard
- 00-0624 Auto-Clean Sensor Hand Rail Mounting Hardware
- 07-0209 1" NPT Tee, CPVC
- 07-0221 1-1/2" NPT Union/Tee Mount, CPVC  
(uses existing 1-1/2" tee)
- 44-0219 1-1/2" NPT Tee, Schedule 80, CPVC
- 07-0210 2" NPT Union/Tee Mount, CPVC (uses existing 2" tee)
- 44-0233 2" NPT Tee, Schedule 80, CPVC
- 07-0203 Insertion Assembly without Assist, 1-1/4" NPT, 316 SS
- 07-0228 Insertion Assembly with Assist, 1-1/4" NPT, 316 SS
- 07-0224 Insertion Assembly without Ball Valve, 1-1/4" NPT, 316 SS
- 07-0223 Insertion Assembly without Assist, 1-1/4" NPT, CPVC

## Ordering Information: Model Q45-A-B-C-D pH/ORP Monitor

### Suffix A - Measurement Type

- P - pH
- R - ORP

### Suffix B - Power

- 1 - 24 VDC, 2-wire (single output only)
- 2 - 115 VAC with 2 relays
- 3 - 230 VAC with 2 relays
- 4 - Battery operated with two 0-2.5 VDC outputs
- 5 - Battery operated with internal data-logger
- 6 - Auto-Clean, 115 VAC
- 7 - Auto-Clean, 230 VAC

### Suffix C - Heater (for Auto-Clean only)

- 1 - None
- 2 - Heater/thermostat

### Suffix d - Heater Fail Alarm (for Auto-Clean only)

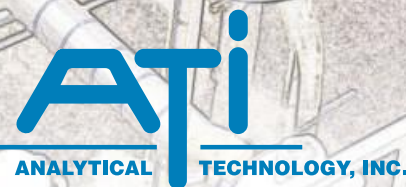
- 1 - None
- 2 - with cleaner fail alarm system

### Options:

- 07-0100 Junction box
- 31-0057 Sensor interconnect cable
- 47-0005 2" U-bolt, 304SS
- 05-0068 Panel mount bracket kit

### Notes

1. All sensor cable lengths greater than 30 feet requires a junction box (07-0100) and sensor interconnect cable (31-0057)
2. PEEK sensor body is only available in convertible style.
3. Pipe mount requires two 2" U-bolts (47-0005).
4. Panel mount requires bracket (05-0068).



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