



CAPITAL CONTROLS

Series 9410 is a microprocessor-based instrument designed for continuous measurement and retransmission of pH or ORP (oxidation reduction potential). Digital electronics provide unequaled accuracy and reliability combined with user friendly operation.

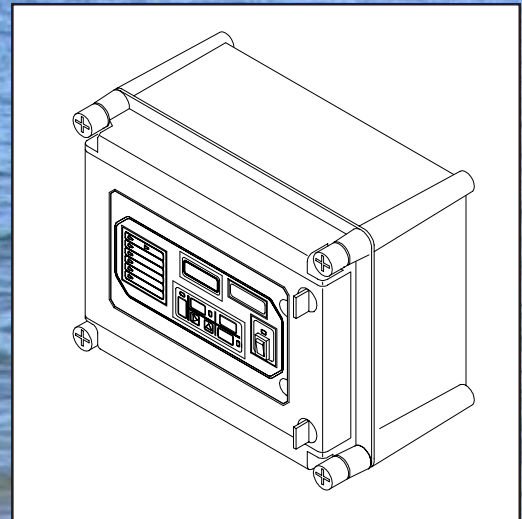
A large, easy-to-read, 4-digit LED display indicates the pH or ORP level. Dual set point contacts, programmable to warn of high or low pH/ORP, are a standard feature of the Series 9410. Also standard is an auxiliary contact which can be used as either an instrument malfunction contact or a high/low band control contact output (i.e. for on/off control to a valve or pump).

A data logging system stores the highest and lowest pH or ORP measured. It also logs the average value of the pH or ORP over the previous 24 hours. This information can be recalled at any time.

For ease of use, all set up, alarm and control functions are accessible on the front panel. Calibration is easily accomplished by simply immersing the electrode in known solutions and adjusting the signal conditioning module.

The standard probe is a glass pH or ORP electrode. The electrode is connected to a signal conditioning module by a 15 foot (5 meter) cable. The signal conditioning module conditions and pre-amplifies the probe signal for retransmission to the receiver. This pre-amplified signal is highly immune to interference and noise which allows cable distances of up to 1000 feet (305 meters) between the conditioning module and the receiver/retransmitter.

pH/ORP Indicator and Transmitter Series 9410



- ◆ Unique data logging
- ◆ Self-diagnostics
- ◆ Microprocessor-based
- ◆ Weatherproof NEMA 4X enclosure
- ◆ Wall or handrail mounting

Applications pH

- ◆ Drinking water
- ◆ Wastewater
- ◆ Cooling water
- ◆ Pulp and paper debleaching
- ◆ Boiler water
- ◆ Industrial wastewater
- ◆ Industrial water treatment
- ◆ Beverage
- ◆ Food
- ◆ Power/steam generation
- ◆ Aquaculture
- ◆ General Process water

ORP

- ◆ Cyanide elimination
- ◆ Chromium reduction

Design Features

◆ Signal Conditioning

Module: Allows cable distances of up to 1000 feet (305 meters) from receiver

◆ **Calibration:** Calibrated from known solutions or by electronics on the signal conditioning module circuit board

◆ **Error Codes:** Provide operator with useful troubleshooting codes

◆ **Alarms:** Relays will trip for high/low, high/high, low/low, or manual or automatic latch control

◆ **Accuracy:** The 0.1 pH/1.0 mV accuracy is ideal for the applications listed

◆ **Temperature Compensation:** Automatic or manual compensation is provided via a solid-state device on some probes

◆ **Probes:** Supplied as either double or single junction

◆ **Probe Installation:** Either submersion, insertion or flow-thru probes available in pH or ORP

◆ **Data Logging:** Stores maximum, minimum and 24-hour average

Principle of Operation pH

pH is a measurement of the hydrogen ion activity of a solution

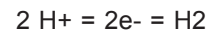
$$\text{pH} = -\log [\text{H}^+]$$

Most pH sensors use a glass membrane electrode which develops an electrical potential. This potential varies in proportion to the hydrogen ion activity. The glass membrane is sensitive only to hydrogen ions.

A reference electrode completes the circuit between the glass electrode and the solution being measured. It measures the electrical potential generated across the glass electrode and transmits the electrical potential to the monitor. In the monitor, this potential is amplified by the signal conditioning module. The potential of the sensor varies between sensors and changes with age. This is why periodic calibration is necessary. The calibration of a pH monitor is also dependent on temperature. For this reason, most pH sensors include automatic temperature compensation.

ORP

ORP is a determination of the oxidizing or reducing properties of a solution. ORP probes are measure against the oxidation reduction potential of hydrogen.



The potential of solutions is expressed by the Nernst equation:

at 25°C.

Eh is the voltage difference between the ORP electrode and the normal hydrogen electron.

E° is the constant characteristic of the system in question.

n is the number of electrons reacting.

The ORP probe is similar to pH in that the reference electrodes can be identical but a noble-metal electrode replaces the glass pH electrode.

Technical Data

Ranges: 0.0 to 14.0 pH or -1000 to +1000 mV (ORP)

Accuracy: ± 0.1 pH/ ± 1.0 mV

Repeatability: ± 0.05 pH/ ± 1.0 mV

Stability: $\pm 0.1\%$ /24 hours

Display: 4-digit LED

Analog Output: Isolated 4-20 mA_{dc} into 1000 Ohms maximum

Set Point Contacts:

Set Point 1 and Set Point 2: DPDT 5 amps @ 240 Vac - fully adjustable over the instrument range.

Configurable to energize or de-energize when the set point is exceeded. Manual reset or automatic reset is user-selectable.

Error or Control Output

Contact: DPDT 5 amps @ 240 Vac -for error/instrument malfunction or configurable high/low band control output

Temperature

Compensation: Automatic or manual

Sensor: Up to 1000 Megohms with 15 feet (5 meters) of cable, insertion, submersion, or flow-thru

Power Requirements:

120 Vac or 240 Vac, 50/60 Hz, single phase

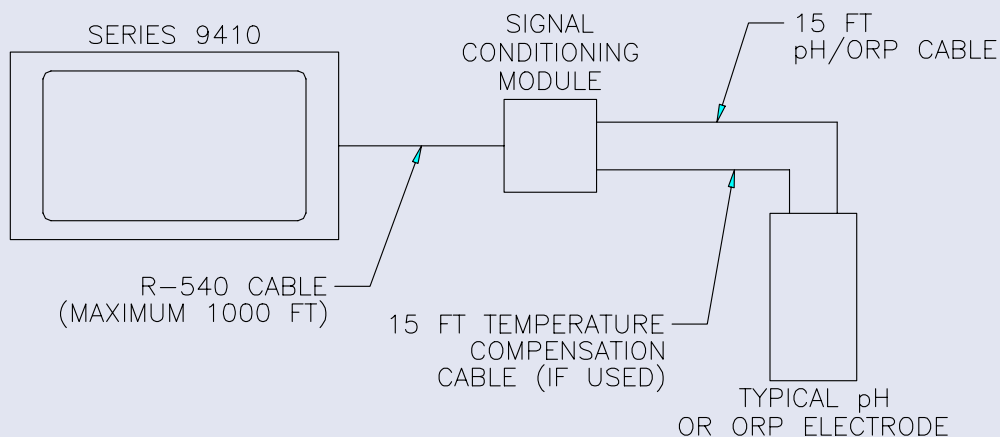
Ambient Temperature: -30° to 70° C (-20° to 160° F)

Weight: 6 lbs. (3 kgs.)

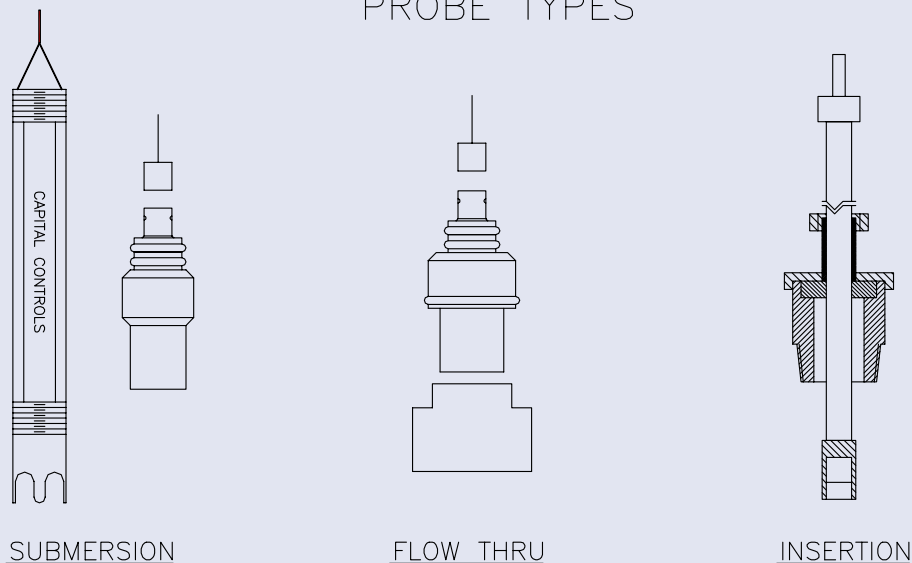
Enclosure: NEMA 4X (IP66)

Signal Conditioning Module: NEMA 4X (IP66)

9410 COMPLETE SYSTEM



PROBE TYPES



Warranty and Capability

Capital Controls offers a one (1) year limited warranty on all pH and ORP indicators and transmitters.

Capital Controls is 9001 certified to provide quality and precision materials, and specializes in disinfection technologies, water quality monitors and instrumentation for water and wastewater. Over 35 years of industrial and municipal application experience in the water and wastewater industries is incorporated into the equipment design to provide the highest quality comprehensive solutions for the global market.

Model 9 4 1 0

01 - Basic
02 - Special

Voltage

01 - 120 Vac
02 - 240 Vac

Electrode *

Standard Ryton
01 - pH, ATC, single
02 - pH, Single
03 - pH, ATC, double
04 - pH, double
05 - ORP, single
06 - ORP, double
CPVC Flowcell
07 - pH, ATC, double
08 - pH, double
09 - ORP, double
CPVC Submersion
10 - pH, ATC, double
11 - pH, double
12 - ORP, double
CPVC Insertion
13 - pH, ATC, double, 12"
14 - pH, double, 12"
15 - pH, double, 18"
16 - pH, double, 24"
17 - ORP, double 12"
18 - ORP, double, 18"
19 - ORP, double, 24"

*

ATC = Automatic
Temperature Compensation
Single = Single Junction
Double = Double Junction

Brief Specification

The instrument shall be microprocessor-based. The face of the unit shall contain the display, function switches, status indicators and power switch. The unit shall have the capability of storing the minimum and maximum measured (pH) (ORP) since the last reset. It shall calculate and store the average measured (pH) (ORP) over the previous 24-hours. The information shall be accessible from the front panel of the instrument. The unit shall be capable of either manual or automatic temperature compensation.

The enclosure shall be NEMA 4X suitable for wall or handrail mounting. The 4-20 mAdc shall be isolated and proportional to the measured (pH) (ORP) and shall be calibrated between (0- 14 pH) (-1000 to +1000 mV). Two fully adjustable set point contacts shall be provided and shall be DPDT, rated 5 amps @ 240 Vac. A malfunction contact shall also be provided.

The (pH) (ORP) electrode shall be supplied complete with 15 feet (30 meters) of cable with additional cable length between the signal conditioning module and receiver of 1000 feet (305 meters) maximum. The electrode shall be accurate (temperature) (non-temperature) compensated and shall be of the (submersion) (insertion) (flow-thru) type. The accuracy shall be (± 1 pH) (± 1.0 mV).

Power shall be 120/240 Vac, 50/60 Hz, single phase

Design improvements may be made without notice.

Represented by:



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