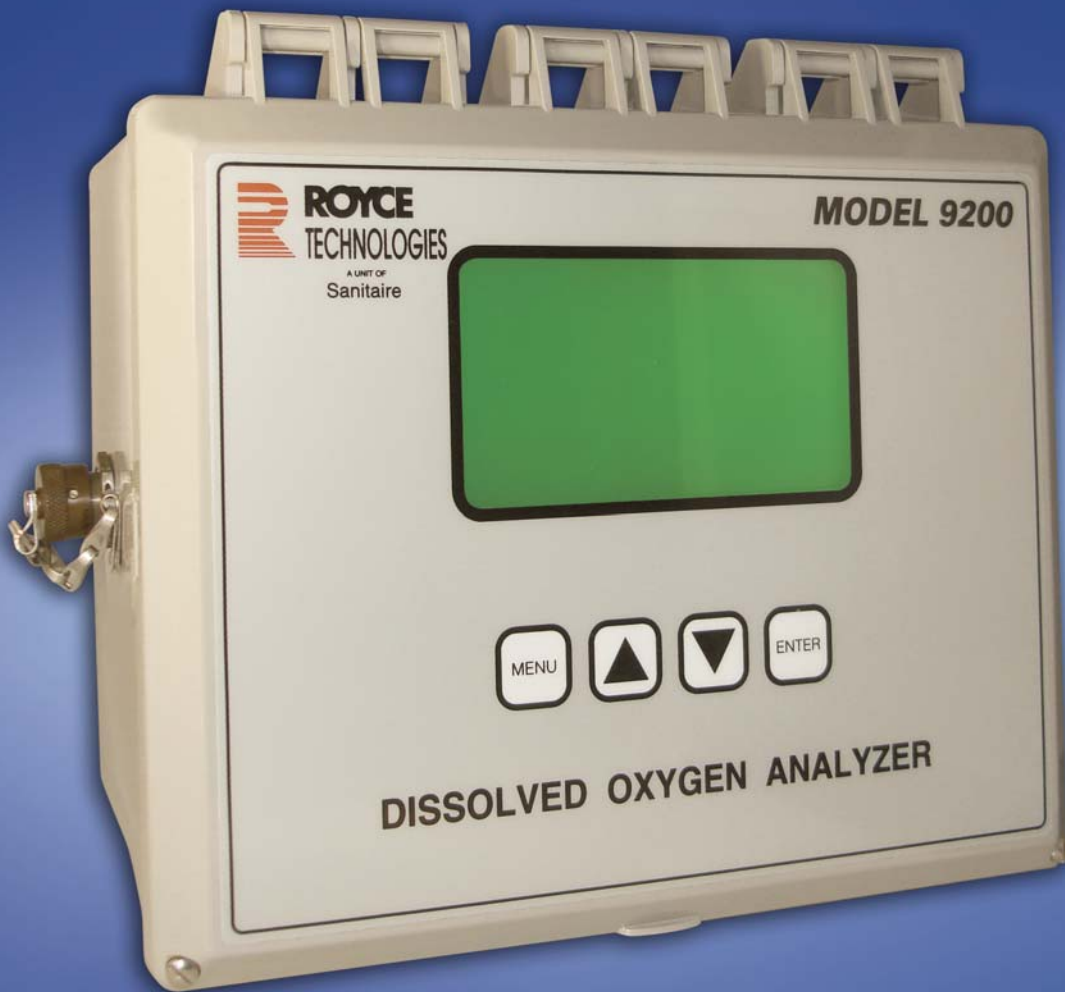




ITT

Water & Wastewater

Royce Parts Per Million Dissolved Oxygen Systems



Engineered for life

Maintenance Free Dissolved Oxygen Control System



MODEL 9110/9120/9210/9220 ANALYZER



MODEL 9200 ANALYZER



MODEL 9300 ANALYZER AND BOUY

The Royce line of PPM level dissolved oxygen (DO) analyzers is the largest, most varied line in the world. Features like microprocessor-based intelligent electronics, with a choice of rugged, patented self-cleaning sensors, or maintenance free disposable cartridge sensors, make the totally waterproof Royce line of PPM DO analyzers the best available – anywhere.

The Royce Models 9110 & 9120 are designed to offer the latest Royce Dissolved Oxygen design technology in an affordable package. They also have the capacity to provide advanced features found in other Royce Models and incorporate the latest Modbus communications (Profibus DP is optional). The 9110 is Single Channel and the 9120 is Dual Channel. Both can use the Royce Model 99 (Standard) cartridge DO sensor and the Model 95 rechargeable DO sensor. Air and water jet cleaning are optionally available.

The Royce Models 9210 & 9220 analyzers incorporate the same technological advances as the Models 9110 and 9120. They also have the capacity to provide the advanced features found in other Royce Models and incorporate the latest Modbus communications (Profibus DP is optional). The 9210 is Single Channel & the 9220 is Dual Channel. Both use the exclusive Royce Model 96 Electro-Chemical Self-Cleaning sensor. Air and water jet cleaning are optionally available.

The Model 9200 Continuous DO analyzer provides the ultimate level of monitoring accuracy and aeration control available anywhere in the world. The analyzer is provided standard with everything available on the Model 9210/9220. It also offers menu directing setup and trend graphing on the display, simultaneous DO and temperature readout on the display, standard automatic sensor membrane self-cleaning, digital AND analog outputs, a sensor output voltage mode, and four programmable setpoint relays. Used with the Model 96A DO sensor, the Model 9200 has become the benchmark analyzer for the DO monitoring & blower control market in the 21st century.

The Model 9300 Sensor Buoy System is designed for large pond or lagoon aeration systems where dissolved oxygen monitoring and control is required but the sensor cannot be readily reached for maintenance. With features like programmable totally hands free automatic recalibration and long-term sensor self-cleaning, normal maintenance time for this system is around one year. There are almost 3000 of these systems in use around the world.

The Model 9200/96A system, completed the 2002 Instrument Testing Association's (ITA) comparative DO test with outstanding results. Test results are available. Contact Royce Technologies for more information.

MODEL 9110/9120 ANALYZER SPECIFICATIONS

Channels:

9110 is Single Channel
9120 is Dual Channel

Sensor Type:

Model 95 or Model 99 Sensors

Dissolved Oxygen:

Ranges, 0 – 99 mg/l
Resolution, 0.01 mg/l from 0 – 9.99
0.1 mg/l from 10.0 – 99.0
Accuracy, +/- 0.1 mg/l

Temperature:

0 – 50°C x 0.1°C or
32 – 122°F x 1°F
Accuracy +/- 1% of reading

Stability:

.1 mg/l

Input Power:

80 – 260 VAC, 50 – 60 Hz or 12 VDC

Outputs:

Two Per Channel Isolated 4 – 20 mA for D.O. & Temp.
600 ohms maximum
Two Relays Per Channel with programmable hysteresis
10A resistive @ 250VAC
RS – 485 & Modbus (Standard)
Profibus DP (Optional)

Readout Device:

Harsh environment, 4 line, 20 Character, LCD digital display
Backlit

Display:

DO and Temperature (Each Channel)

Calibration:

Automatic, calibrates for DO, altitude, salinity

Enclosure:

NEMA 4X (IP65)

Weight:

5.5 lbs., 2.5 kg

MODEL 9210/9220 ANALYZER SPECIFICATIONS

Channels:

9210 is Single Channel
9220 is Dual Channel

Sensor Type:

Model 96 Patented Electrochemical Self Cleaning Sensor

Dissolved Oxygen:

Ranges, 0 – 99 mg/l
Resolution, 0.01 mg/l from 0 – 9.99
0.1 mg/l from 10.0 – 99.0
Accuracy +/- 0.1 mg/l

Temperature:

0 – 50°C x 0.1°C or
32 – 122°F x 1°F
Accuracy +/- 1% of reading

Stability:

.1 mg/l

Input Power:

80 – 260 VAC, 50 – 60 Hz or 12 VDC

Outputs:

Two Per Channel Isolated 4 – 20 mA for D.O. & Temp.
600 ohms maximum
Two Relays Per Channel with programmable hysteresis
10A resistive @ 250VAC
RS – 485 & Modbus (Standard)
Profibus DP (Optional)

Readout Device:

Harsh environment, 4 line, 20 Character, LCD digital display
Backlit

Display:

DO and Temperature (Each Channel)

Calibration:

Automatic, calibrates for DO, altitude, salinity

Enclosure:

NEMA 4X (IP65)

Weight:

5.5 lbs., 2.5 kg

MODEL 9200 ANALYZER

FEATURES

- Microprocessor based electronics
- Range 0 – 99.9 PPM and % Saturation 0 – 99.9%
- Simple calibration with “help screen” prompts
- Automatic temperature, altitude, salinity compensation
- Individual DO and temperature outputs
- 4 programmable relays
- One step, push button calibration
- Electronic self diagnostics for sensor and analyzer
- Electrochemical self cleaning sensor (Standard)
- Standard 24 hour trend graph
- Backlit display



MODEL 9200 ANALYZER

SPECIFICATIONS

Dissolved oxygen:

Ranges, 0 – 99.9 mg/l (PPM)
0 – 100% Saturation
Resolution, 0.01 mg/l
1% Saturation
Accuracy, ± 0.1 mg/l or 1% Saturation

Temperature - selectable:

0 – 50°C x .1°C or
23 – 122°F x 1°F Accuracy
+/- 0.2° C Compensation
 $\pm 1\%$ of reading

Stability:

.1 mg/l

Input Power:

Switch Selectable 115/230 VAC, 50/60 Hz

Readout Device:

Harsh environment, 2.5" x 4.5" graphical LCD digital display

Outputs:

One Isolated 4 – 20 mA Output for DO
One Isolated 4 – 20 mA Output for Temperature
One RS-485 digital, isolated
4 Standard setpoint relays with programmable hysteresis
All relays are Form C rated 250 VAC at 6 Amps resistive

Display:

DO, temperature, relay status, trend graph and programming menus

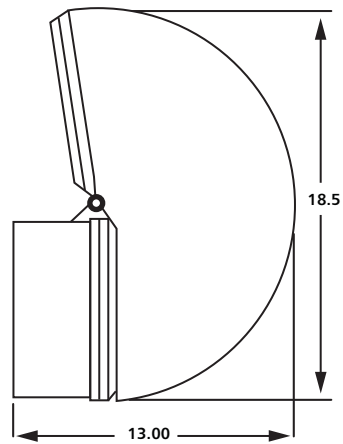
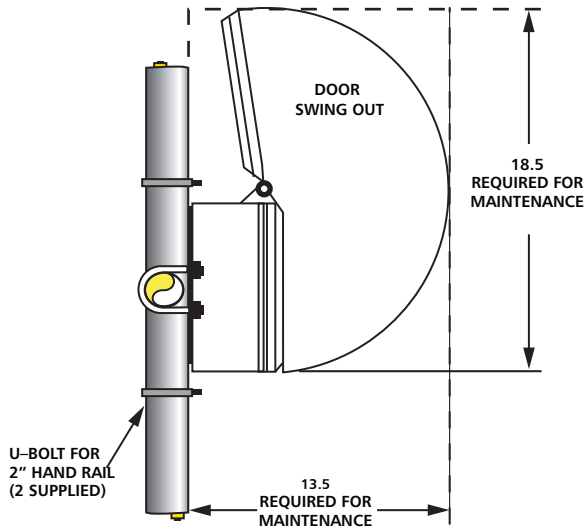
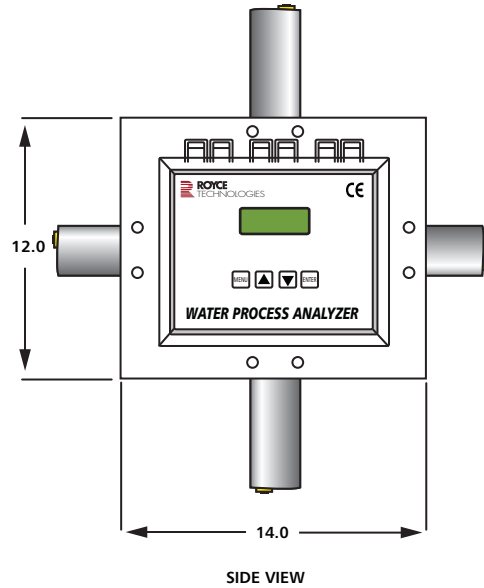
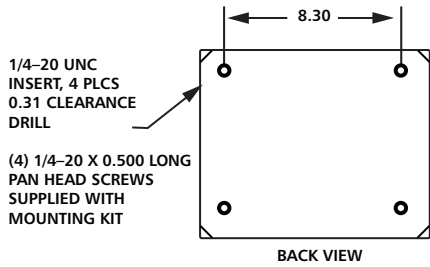
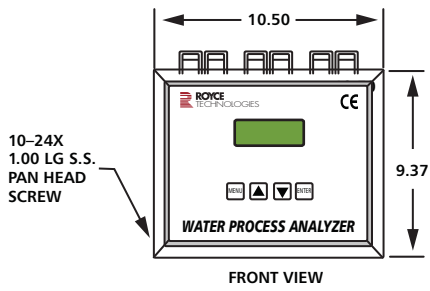
Calibration:

Automatic, one step push button calibrates for DO, altitude, salinity

Enclosure: NEMA 4X (IP65)

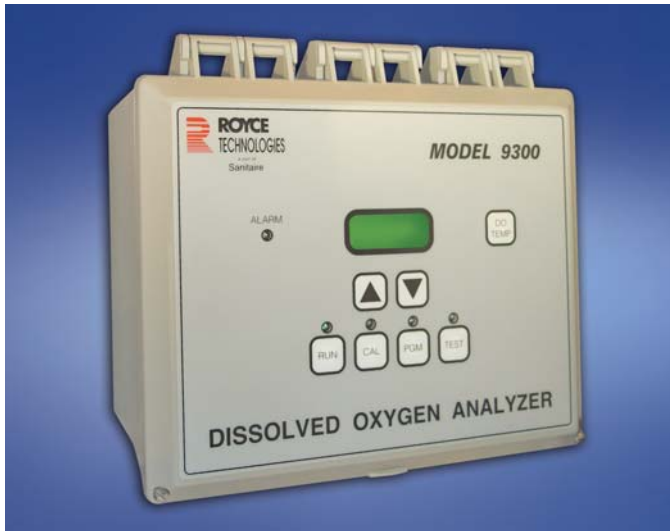
Weight: 8.7 lbs., 3.95 kgm

MODEL 9110/9120/9210/9220 AND 9200 MOUNTING INFORMATION



- NOTES:**
1. CONSTRUCTION POLYCARBONATE NEMA 4X ENCLOSURE
 2. APPROXIMATE WEIGHT: 6 LBS.

MODEL 9300 SENSOR BUOY SYSTEM – MAINTENANCE FREE DISSOLVED OXYGEN CONTROL SYSTEM



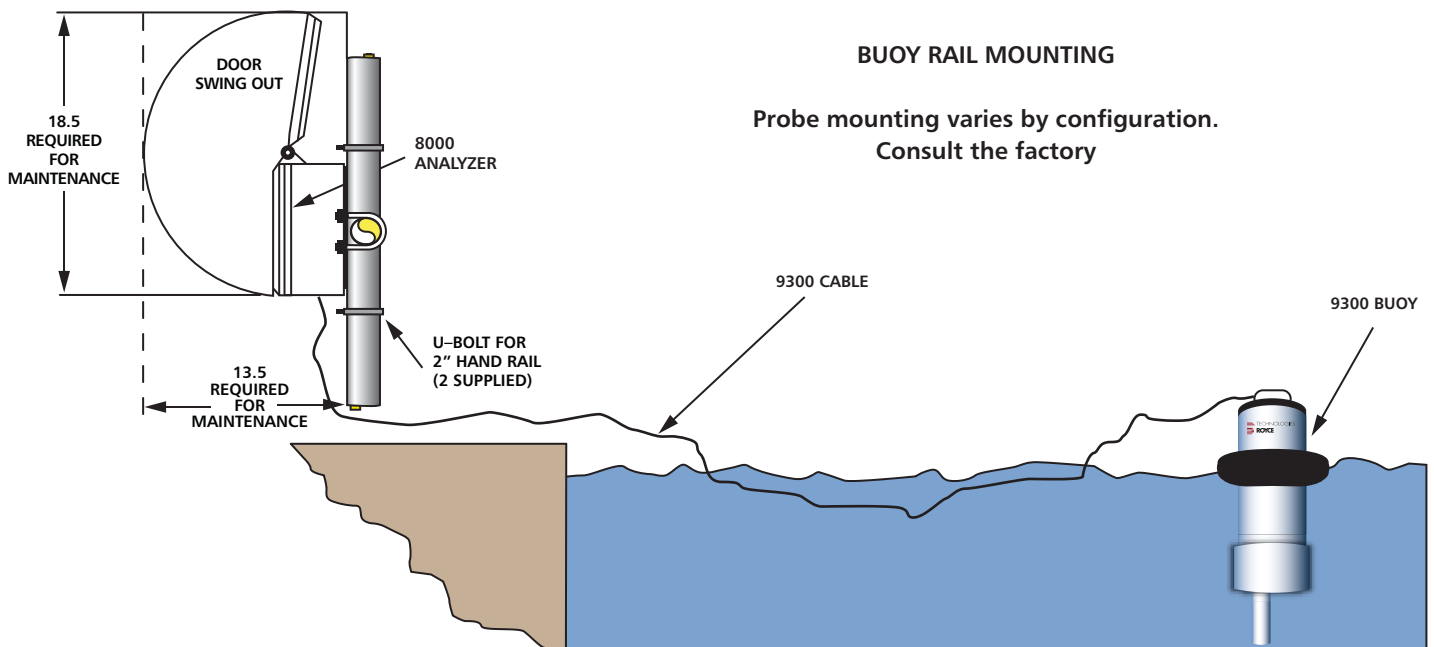
Over 8 years of research in the field led to the development of the Royce Sensor Buoy System. Originally designed for large wastewater and fish growing lagoons where DO sensing devices could not be easily reached for maintenance. In use since 1992, there are now over 3000 of these systems operating throughout the world.

The system is made up of the Model 9300 Buoy Control Monitor and the Sensing Buoy that incorporates the proven Royce Model 95A galvanic DO sensor. Automatic sensor cleaning is a chemical process that occurs once every 12 minutes, all controlled from the Model 9300 Controller, which is mounted on the lagoon or aeration basin handrail. Automatic sensor recalibration occurs once per day, at a time that is programmed into the controller by the user.

The System's Sensing Buoy is made from rugged schedule 80 PVC and can be either floated away from a lagoon bank or hard mounted from the handrails of an aeration basin. The only moving parts inside the buoy are two small DC powered pumps that move water through a unique polymer manifold during the sampling and calibration processes. Service of the buoy system is minimal, usually required only once per year.

FEATURES

- Sensor cleaned automatically for up to 12 months
- Sensor automatically calibrated daily
- Automatic control of aerators, alarms and other devices – Up to four outputs
- A backlit display provides both DO and temperature readings
- Self-diagnosing electronics with automatic built in buoy test protocols
- 16 day data logging
- Sensing buoy utilizes only 2 moving parts which are completely sealed
- Buoy utilizes a unique guard system against the intake of solids



SERIES 90 DO SENSORS



The Royce Models 95A and 96A Sensors are the latest sensor developments in the field of continuous DO monitoring and control. The small silhouette, and rugged construction of the Models 95A/96A create a unique sensor for the rough applications found in the wastewater treatment, ground water, aquaculture, and oceanographic industries. Both sensors contain precision internal circuitry and use the proven galvanic method of measurement.

The Model 96A Sensor is unique in that it incorporates a dual cathode, dual anode system which gives it the ability to perform the Royce patented electrochemical self-cleaning function when used in conjunction with the Model 9200/9210/9220 Analyzers.

The Model 95A is a rugged rechargeable sensor that comes supplied with membranes and KCL gel solution with a system purchase that should last for five years with normal use. The Model 99 offers the convenience of a maintenance-free disposable sensor cartridge.

The Model 95A and 99A Sensors were specifically developed for the Model 9110/9120 continuous monitoring analyzer.

The trim, reliable mounting bracket assembly employed with the Royce line of Series 90 DO Sensors is simple to install and allows for easy access to the sensor for quick maintenance. A narrow profile sensor/collar arrangement allows for a standard PVC pipe installation from any standard rail. This configuration dramatically reduces the potential of rag fouling.

FEATURES

- Platinum cathode, lead anode
- Automatic temperature compensating
- Can be easily rebuilt in the field
- No special tools required
- Patented electrochemical self-cleaning available (Model 96A only)
- Jet-cleaning available

SPECIFICATIONS

Measuring principal:

Galvanic

Cathode/Anode material:

Platinum/Coiled Pure Lead

Electrolyte:

Potassium Chloride gel

Repeatability:

$\pm 1\%$ (at constant temperature)

Response time:

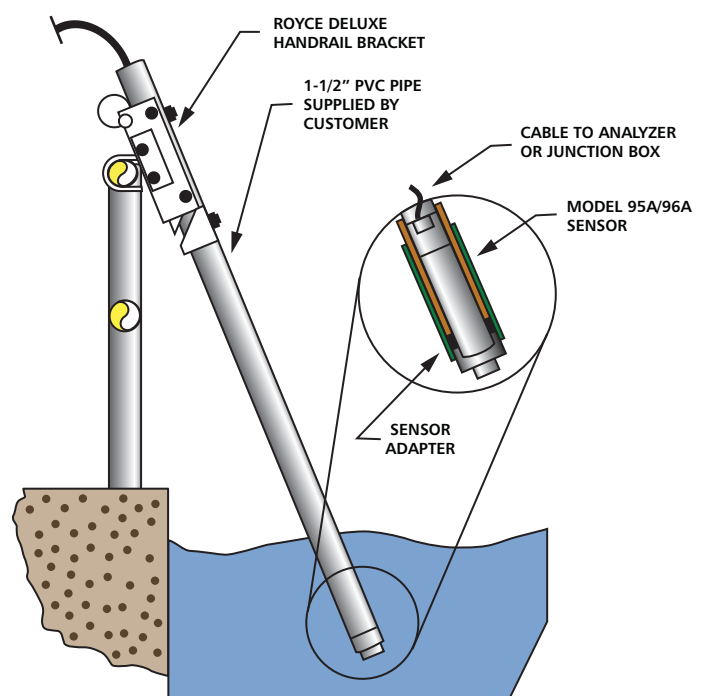
Using 1 mil membrane - PPM 99% of actual,
from air calibration < 30 seconds

Temperature accuracy:

$\pm .2^{\circ}\text{C}$

Sample flow requirements:

0.4 feet per second with 1 mil membrane

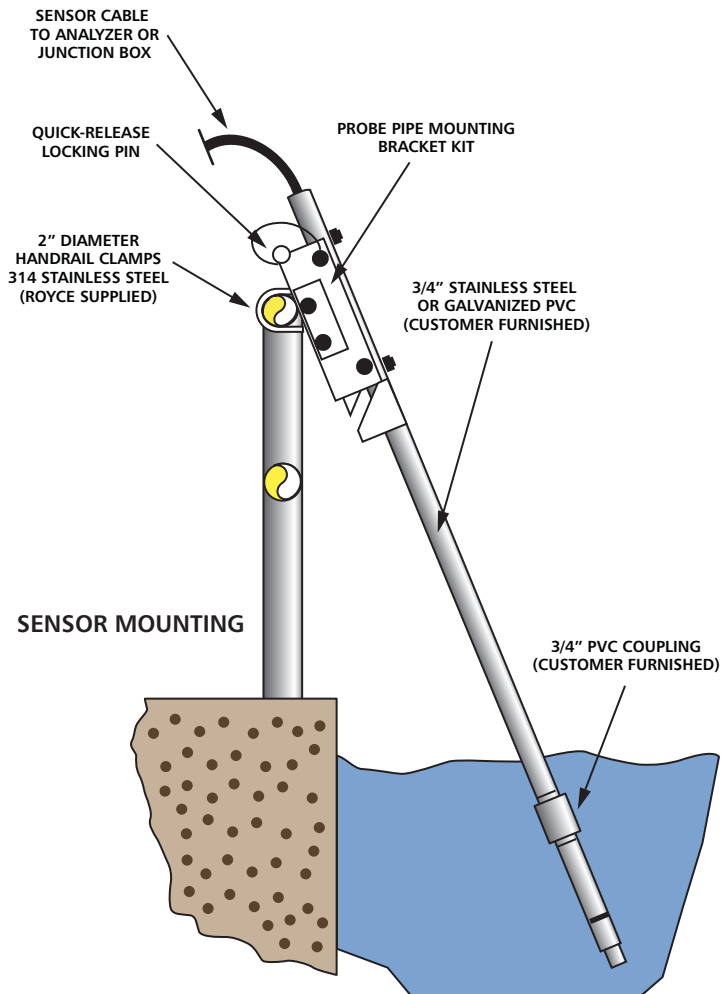


MODEL 99 REPLACEABLE CARTRIDGE DO SENSOR

The Model 99 replaceable Dissolved Oxygen Cartridge was specifically designed to answer the needs of plants that did not want to recharge sensors. It utilizes the same proven technology and basic design criteria found in all the Royce sensors. Rugged, easy to use, quick changing and with all the accuracy and reliability users have come to trust in Royce Technologies.



MODEL 99 CARTRIDGE DISSOLVED OXYGEN SENSOR



FEATURES

- Economical initial price
- Rugged Noncorrosive construction
- Long lived cartridge
- Galvanic in operation
- Temperature compensated
- 1 or 2 mil membranes available
- Jet-cleaning available

SENSOR SPECIFICATIONS

Cathode type and material:

Galvanic – Platinum

Anode material:

Coiled lead wire

Electrolyte:

Potassium Chloride gel

Repeatability:

$\pm 1\%$ (at constant temperature)

Response time:

Using 1 mil membrane – PPM 99% of actual, from air calibration in 60 seconds

Temperature accuracy:

$\pm .2^{\circ}\text{C}$

Sample flow requirements:

0.4 feet per second with 1 mil membrane

Dimensions:

1.2" Dia. x 5.8" long

Weight:

(w/25 cable) .5 lbs., 22 kgm

JB-91 JUNCTION BOX



Construction:

Polystyrene NEMA 4X
(IP65)

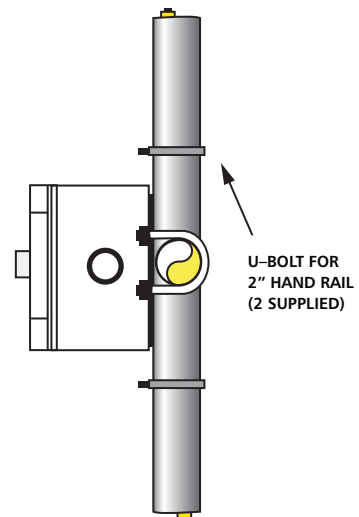
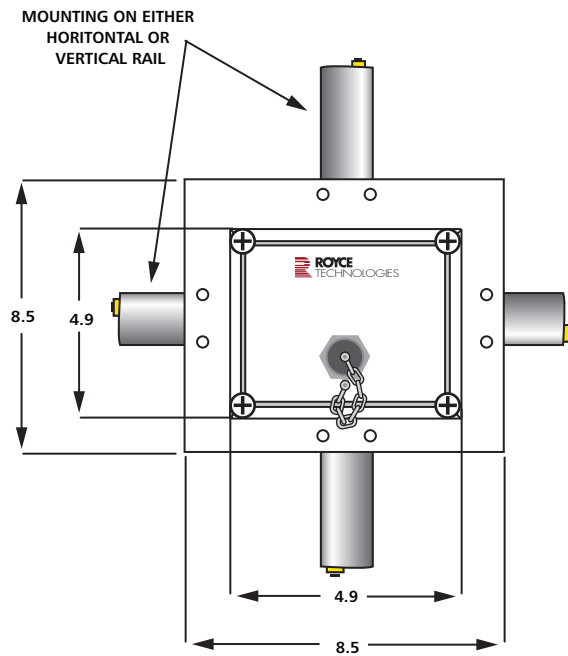
Options:

Rail Mounting Kit

Weight:

JB-91: 2 Lbs
With rail mount kit: .5 Lbs

RAIL KIT OUTLINE AND MOUNTING



"JET CLEAN" SENSOR MEMBRANE CLEANING SYSTEM



COMPRESSOR SPECIFICATIONS

Type:

Air Compressor, Light, Noncontinuous duty

Pressure supplied:

40 to 60 PSIG

Temperature limits:

0 to 50°C

Enclosure:

NEMA 4X, 14"W x 12"H x 6"D

Input power:

115/230 VAC, 60/50 Hz

Weight:

23 pounds (10,4 kgms)

26 pounds (11.8 kgms) with rail kit

Options:

Heater (Recommended for -10°C)

Rail Mounting Kit

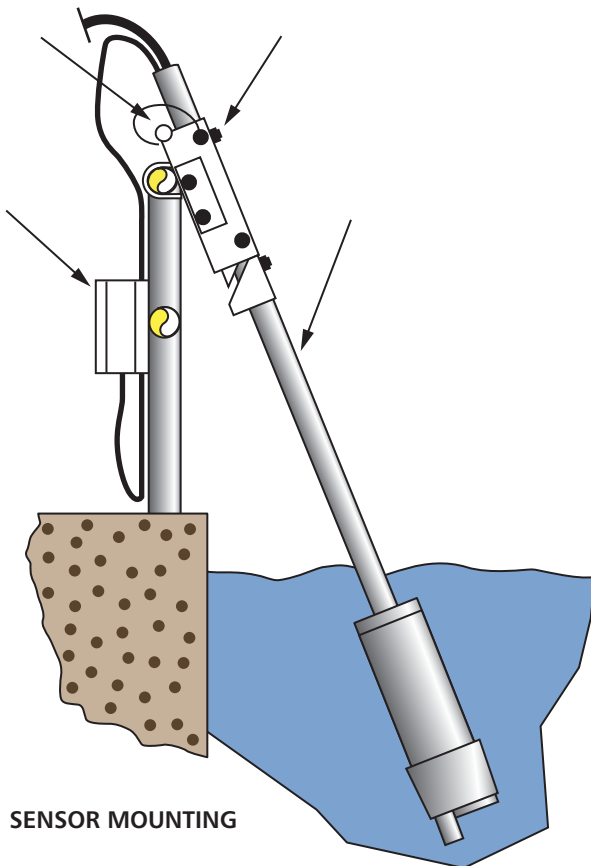
ADDITIONAL FEATURES AND OPTIONS

ROYCE Electrochemical Sensor Cleaning

A unique Royce patent used for the automatic self cleaning of the DO sensor membrane. On a timed basis, programmed into the Model 9200 analyzer by the operator, the sensor membrane, discouraging growth on the membrane. This process will allow for up to six months, depending upon the sensor's environment, of maintenance free operation. This is a standard feature of the Model 9200 analyzer. The Model 96A sensor is required.

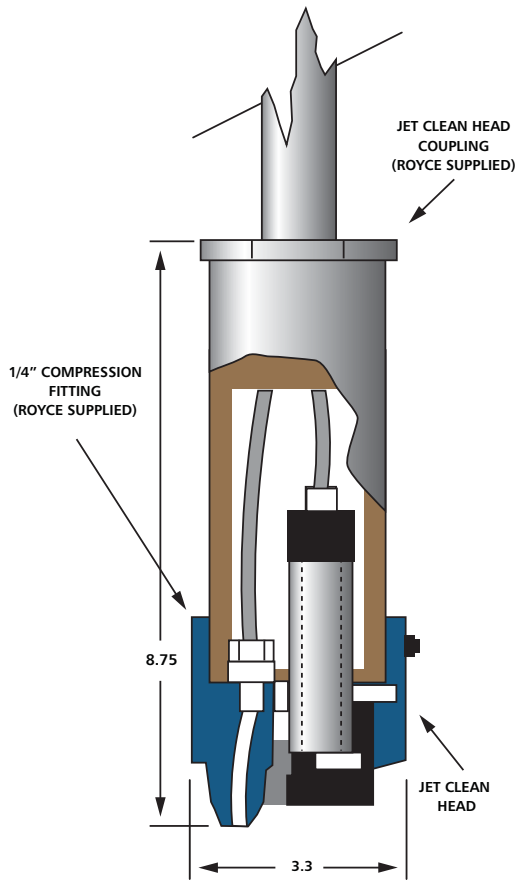
Time Delay Control

In applications where the simple set point relay method of aeration control is inappropriate, the Model 9200 analyzer relays may be programmed to pulse at predetermined intervals when setpoints are exceeded. This is often used with positional control systems for weirs, gates, etc. It is a standard feature on the Model 9200 analyzer.



SENSOR MOUNTING

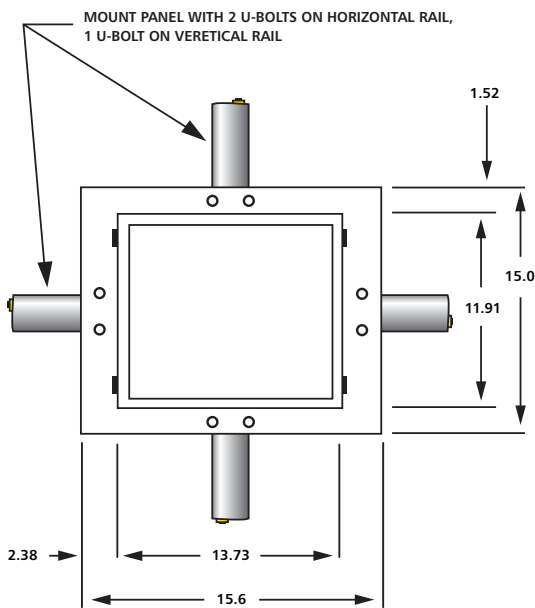
JET HEAD SENSOR ASSEMBLY



The Royce Jet-Clean sensor Cleaning System is designed for the purpose of cleaning the DO membrane which may be soiled by organic, inorganic, or biological debris. The system can be configured in two ways:

1. For plants with house air or water (minimum pressure must be 30 psi), a simple solenoid can be used to supply a periodic high pressure wash stream across the electrode measuring surface;
2. A miniature industrial, rail mounted, compressor system can be supplied that will periodically supply 65 psi of air across the membrane surface. No matter which method of cleaning is used all Royce DO analyzers are programmed to allow the user to adjust their preferred cleaning cycle time. The DO sensor is mounted in a molded epoxy "jet head" which is contoured in order not to collect rags or other debris.

COMPRESSOR OUTLINE & MOUNTING





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What can ITT Water & Wastewater do for you?

Integrated solutions for fluid handling are offered by ITT Water & Wastewater as a world leader in transport and treatment of wastewater. We provide a complete range of water, wastewater and drainage pumps, equipment for monitoring and control units for primary and secondary biological treatment, products for filtration and disinfection, and related services. ITT Water & Wastewater, headquartered in Sweden, operates in some 140 countries across the world, with plants in Europe, China and North and South America. The company is wholly owned by the ITT Corporation of White Plains, New York, supplier of advanced technology products and services.

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