Q46D Dissolved Oxygen Monitoring System

On-line Monitors shall be provided to continuously measure dissolved oxygen concentrations at the _____(Specify Locations)_____. Each Dissolved Oxygen Monitor shall consist of an oxygen sensor, an electronic monitor housed in a NEMA 4X enclosure suitable for wall, pipe, or panel mounting, and accessory mounting hardware as described below.

Dissolved oxygen sensors shall be either optical type or membraned type. (Specify one of the following 2 sensor types)

1. Optical sensors shall use a fluorescent material that is susceptible to non-radiative quenching by interaction with dissolved oxygen. A light source of a given wavelenght inside the sensor shall illuminate the fluorescent material, which absorbs the energy from the light source and reaches an excited state. The material then emits light at a differenent wavelength, which is sensed by a photodetector inside the sensor. Dissolved oxygen that diffuses into the fluorescent material "quenches" the reaction. The degree of quenching that occurs is directly proportional to dissolved oxygen concentration.

2. Membraned type D.O. sensors shall be of the galvanic type with platinum and lead electrodes. Sensors shall use a durable 5 mil membrane to isolate the electrodes from the measured solution, and the sensor shall be designed so that the lead electrode may be easily replaced when necessary. The sensor assembly shall also contain a precision RTD temperature sensor to continuously measure sample temperature to allow temperature compensation of the measured oxygen value. The D.O. sensor shall be a 2 part construction, allowing the entire sensing module to be quickly and easily removed for service, and interchangeable spare sensing modules shall be available for quick exchange. Sensing modules shall be designed so that membranes and electrolyte can be easily changed, and each sensor shall be supplied complete with at least 10 spare membranes, electrolyte, and a spare parts kit that includes all o-rings and special hardware. All metallic components used as part of the sensor assembly shall be constructed of either type 316 stainless steel or titanium

The sensor assembly shall also contain a precision RTD temperature sensor to continuously measure sample temperature to allow temperature compensation of the measured oxygen value.

The D.O. sensor shall be supplied with an integral system for automatically cleaning the sensor while still immersed in the aeration tank. The frequency of cleaning shall be programmable in the electronic monitor from once every hour up to once every 24 hours. The system shall perform automatic sensor cleaning using a high pressure air jet to scour the sensor face of accumulated deposits, with the analog and digital outputs unaffected by the cleaning process. The air cleaning nozzle assembly shall not protrude outside the overall sensor diameter so that fibrous material will not snag on the cleaning assembly, and all air tubing shall run inside the mounting pipe to further avoid fouling problems. Sensors with tubing and cable running up the outside of the mounting pipe are not acceptable as "equal" to the specified equipment. The cleaning procedure shall not require an operator to activate, but shall be designed so that an operator can manually start the cleaning sequence if desired.

Monitors shall be powered by either 100-240 VAC (±10%) single-phase line power, or 12-24 VDC . Either version of the monitor shall provide two isolated 4-20 mA outputs as standard. Outputs shall be configurable for dissolved oxygen, temperature, or PID control. Analog outputs shall be both ground isolated and isolated from each other.

For alarm purposes, monitors shall contain three SPDT relays. Relay functions shall be programmable for control, alarm, or fail functions, and may be designated for either normal or failsafe operation. For monitors supplied with only 2 analog outputs, monitors shall have the option of an additional 3 low-power relays to allow for additional external alarm functions.

Typical Specification *TS/Q46D (10/12)*

The dissolved oxygen monitor electronic assembly shall provide a variety of functions as follows.

1. Provide user selectable display of PPM dissolved oxygen, process temperature % , or PID % output on the main display. Main display variable shall be indicated with a minimum character height of 0.75” to allow easy readability up to 20 feet away.

2. Allow selection of operating ranges of 0-20 PPM or 0-40 PPM. Display ranges shall be configurable by operators, or the monitor may be configured for Auto-Ranging. The auto-ranging function shall automatically switch to the display range that provides the best resolution for any given operating level.

3. Provide the ability to use the 4-20 mA output for PID control. Proportional, Integral, and Derivative functions shall be user adjustable, and also provide for output hold when needed.

4. Provide two isolated 4-20 mA outputs, with output spans programmable by the user for any segment of a display range.

5. Provide output hold and output simulate functions to allow for testing or remote receiving devices or to allow maintenance without disturbing control systems.

6. Provide three 6 amp SPDT relay outputs in standard unit. Software settings for relay control include setpoint, deadband, phase, delay, and failsafe. Provide an optional 3-relay card, for 0-30 V signals, to bring the total to 6 relays. Relays shall be programmable for either control or alarm function, or relays may be assigned to diagnostic functions for use in indicating trouble conditions at a remote location.

7. Provide option for digital communications. These options shall include Profibus-DP, Modbus, or Ethernet.

8. Diagnostic functions shall be incorporated into the transmitter. The 4-20 mA output shall be capable of being assigned to safely rise to 20 mA, fall to 4 mA, or be left alone, during diagnostic failures. Diagnostic error messages shall be displayed in clear language; no confusing error codes shall be displayed.

For each D.O. monitor supplied, a mounting kit shall be provided. Mounting assemblies shall attach to standard handrails and shall support the D.O. monitor above the handrail so that the LCD display is 4-5 feet off the grade level. Mounting supports shall be aluminum and all hardware to fasten the supports to the handrail and to fasten the monitor to the supports shall be supplied with the kit. All hardware shall be stainless steel.

Mounting bracket assemblies shall be supplied to securely mount D.O. sensors to handrail as shown in the drawings. Mounting assemblies shall be aluminum with stainless steel hardware with sensors mounted directly to 1" aluminum or PVC pipe supplied by the contractor. Mounting assemblies shall be of a simple drop-on design to allow sensors to be lifted from the tank without the use of tools.

AUTO-CLEAN OPTION: A complete high pressure air supply system shall be integrated into the D.O. monitor enclosure. The air supply shall include as a minimum a compressor, check valve, air accumulator, and solenoid valve. Units with separate compressor systems shall be supplied with the air supply and D.O. monitor mounted in one enclosure to reduce installation costs, with all interconnecting wiring completed at the factory so that only power and sensor connections are required by the installer. Systems that do not include an air accumulator to insure adequate pressure bursts are not considered “equal” to the specified unit. The cleaning function shall operate automatically at the interval determined by the operator. In addition, the cleaner may be energized at any time using the switches on the front of the monitor. In operation, the cleaner system shall deliver short, high pressure bursts of air directly across the face of the sensor.

The complete Dissolved Oxygen Monitor shall be Series Q46D as manufactured by Analytical Technology, Inc. or approved equal.