**SECTION 40 75 43**

**Fluorescent Dissolved Oxygen Measuring System**

1. **General**
   1. **SUMMARY**
      1. Requirements for a high-performance, digital fluorescence sensor for measurement of dissolved oxygen in liquid. The sensor will offer fast, accurate and drift-free measurement. The sensor will support low maintenance, with high availability and easy handling. The sensor's long-term stable fluorescence layer will be exclusively oxygen-selective (interference-free), ensuring consistently reliable measurement. The sensor will use Memosens® digital technology to provide maximum process and data integrity, and facilitate simple lab calibration.
      2. Related Sections:
         1. Control and Information System Scope and General Requirements.
         2. Powered Instruments, General.
   2. **SUBMITTALS**
      1. Furnish complete Product Data, Shop Drawings, Test Reports, Operating Manuals, Record Drawings, Manufacturer’s certifications, Manufacturer’s Field Reports.
      2. Product Data:
         1. Dimensional Drawings.
         2. Materials of Construction.
         3. Measurement accuracy.
         4. Range and range ability.
         5. Enclosure Rating.
         6. Classification Rating.
         7. Power.
         8. Output options.
   3. **QUALITY ASSURANCE**
      1. Manufacturing facilities certified to the quality standards of ISO Standard 9001 - Quality Systems - Model for Quality Assurance in Design/Development, Production, Installation, and Servicing.
   4. **DELIVERY, STORAGE, AND HANDLING**
      1. Store all instruments in a dedicated structure with space conditioning to meet the recommended storage requirements provided by the manufacturer.
      2. Any instruments that are not stored in strict conformance with the manufacturer’s recommendation shall be replaced.
   5. **PROJECT OR SITE CONDITIONS**
      1. Provide instruments suitable for the installed site conditions including but not limited to material compatibility, site altitude, process and ambient temperature, and humidity conditions.
   6. **CALIBRATION AND WARRANTY**
      1. The sensor shall have standard one year warranty from date of shipment and if the measuring system is commissioned by a factory certified technician, the warranty is extended to three years from the date of shipment.
      2. The manufacturer’s warranty does not cover normal wear and tear, damage to the sensor due to improper storage or handling, or any other mode of failure or reduced sensor life that is not a direct consequence of a manufacturing defect.
   7. **MAINTENANCE**
      1. Provide all parts, necessary for maintenance and calibration purposes throughout the warranty period. Deliver all of these supplies before project substantial completion.
   8. **LIFECYCLE MANAGEMENT**
      1. Instrument documentation, like original calibration certificates, manuals and product status information shall be accessed via a web enabled system with a license. The instrument-specific information shall be accessed via its serial number. When services are provided by an authorized service provider the services information like subsequent field calibrations shall be archived and accessible via this web enabled system.
2. **Products**
   1. **SYSTEMS/ASSEMBLIES**
      1. Manufacturer
         1. Endress+Hauser Oxymax COS61D digital oxygen sensor with Liquiline CM44x or CM44xR transmitter.
      2. Performance Criteria
         1. Measurement Range: 0-20 mg/l, 0-200 %SAT, 0-400 hPa
         2. Repeatability: ±0.5% of measuring range end
         3. Max Measured Error: 0.01 mg/l or ±1 % of measured value (< 12 mg/l) ±2 % of measured value (from 12 to 20 mg/l)
         4. Response time (t90): 60 sec.
         5. Sensor cap lifetime: >2 years (under reference operating conditions, protected against direct sunlight)
         6. Temperature Sensor: NTC temperature sensor, 0-50°C (32-122°F)
      3. Certifications
         1. CE marked.
         2. Interference emission and interference immunity with EN 61326; 2005, Namur NE 21:2007.
         3. Hazardous area classification: CSA US NI, Class I, Div. 2 Group A-D T6.
      4. Environmental
         1. Process Temperature: -5 to 55 °C (23 to 131°F)
         2. Process Pressure: max 10 bar (145 psi)
         3. Ambient Temperature: -20 to 60°C (0 to 140°C)
         4. Ingress Protection: IP68
   2. **MANUFACTURED UNITS**
      1. Transmitter
         1. Shall be a multi-parameter controller with up to eight measuring channels based on digital Memosens technology.
         2. Programmed computations and features resident in nonvolatile memory.
         3. Transmitter firmware shall be upgradable in the field by the user or a factory technician, without removing the transmitter from service.
         4. Transmitter shall be available in a Nema 4X field housing with integral display or a DIN rail-mount version for cabinet mounting with remote display.
         5. Digital communications provides for plug and play for all sensor configurations.
         6. Shall be capable of modification for new or extended functions by use of modular components that are easily retrofitted in the field without the aid of tools, and without the need to power down the transmitter or re-boot the system.
         7. Simple wiring for all types of digital Memosens sensors plus an option for a M12 sensor connector.
         8. Digital communications protocols available shall include the following without using an external converter. Digital communication shall be available as a native output from the sampler. Use of an external third-party signal converter is not acceptable.
            1. 4-20mA, HART.
            2. Profibus RS485 with webserver.
            3. Modbus RS485 with webserver.
            4. Modbus TCP with webserver.
            5. EtherNet/IP with webserver.

EtherNet/IP communication shall be supported with the Electronic Data Sheet (EDS) file available for download directly from the sampler. The Add-On Profile (AOP) for integration shall be a Level 3 profile to simplify control system integration.

The EtherNet/IP communications shall also be supported with Add-on Instructions (AOI) files and pre-configured faceplates for ease of control system integration.

* + - 1. Transmitter shall have an option for relay outputs, analog inputs, and discrete input/outputs.
      2. Option for integral web-server for remote operation, diagnostics and configuration.
    1. Sensor
       1. Optical fluorescence technology with minimum maintenance and maximum availability.
       2. Shall incorporate digital Memosens technology with calibration saved in sensor and a high degree of EMC protection.
       3. Simple single-point calibration in air, air-saturated water or in medium shall be possible.
       4. Extended maintenance intervals and a high degree of long-term stability; intelligent self-monitoring shall guarantee reliable measure values.
       5. Fixed, waterproof cable connection at the sensor with up to 330 feet (100 meters) length between the sensor and transmitter.
  1. **ACCESSORIES**
     1. Assemblies
        1. Sensor mounting hardware shall be available in a modular assembly system to secure sensors in open basins, channels and tanks. Versions in stainless steel or PVC shall be available for immersion in open basins. The mounting hardware shall be applicable for nearly any type of fixing - fixing on the floor, wall or directly on a rail.
        2. A flow cell assembly shall be available for installation in a pipe line. The flow assembly shall be available in plastic construction.
        3. A retractable assemby shall be available, constructed in stainless steel and ball valve, to allow for retraction of the sensor from the process without shutting down the process.
     2. Interconnecting cable
        1. The sensor cable shall be available in length up to 330 feet (100 m)with a choice of direct wire to the transmitter or connection using M12 quick connections.
  2. **SOURCE QUALITY CONTROL & CALIBRATION**
     1. Reagents, standards and cleaning solutions for the analyzer will be supplied with MSDS data sheets.
  3. **SAFETY**
     1. All devices shall be suitable for operation in a Class I, Div. 2 Group A-D T6 hazardous area, when hardwired to the transmitter. (M12 style connection not allowed under approval guidelines for sensor to transmitter connection.)
     2. Device failure modes, self-monitoring characteristics and diagnosis shall follow NAMUR standard NE 43.

1. **Execution**
   1. **EXAMINATION**
      1. Examine the complete set of plans, the process fluids, pressures, and temperatures and furnish instruments that are compatible with installed process condition.
      2. Examine the installation location for the instrument and verify that the instrument will work properly when installed.
   2. **INSTALLATION**
      1. As shown on installation details and mechanical Drawings.
      2. When installed in a Class I, Div. 2 Group A-D T6 hazardous area the sensor must be hard-wired to the transmitter following approval guidelines.
      3. Installation will occur in strict accordance with the manufacturer’s instructions and recommendation.
      4. Coordinate the installation with all trades to ensure that the mechanical system has all necessary appurtenances including weld-o-lets, valves, etc. for proper installation of instruments.
         1. General contractor.
         2. Electrical or Instrumentation contractor.
         3. Endress+Hauser factory trained authorized service provider or representative.
         4. Site (owner/operator) personnel.
         5. Engineer.
   3. **Field Quality Control**
      1. Each instrument shall be tested before commissioning and the ENGINEER shall witness the interface capability in the PLC control system and associated registers.
         1. Each instrument shall provide direct programming capability through the PLC.
         2. Each instrument shall be supported with a device profile permitting direct integration in the PLC.
      2. The ENGINEER shall witness all instrument verifications in the field.
      3. Manufacturers Field Services are available for start-up and commissioning by a manufacturer’s authorized service provider (ASP) – the warranty against manufacturing defects is three years.
         1. Manufacturer representative shall verify installation of all installed flow tubes and transmitters.
         2. Manufacturer representative shall notify the ENGINEER in writing of any problems or discrepancies and proposed solutions.
         3. Manufacturer representative shall perform field verification at the time of installation for long-term analysis of device linearity, repeatability and electronics health. A comparative report shall be generated for each meter tested.
         4. Manufacturer representative shall generate a configuration report for each meter.
   4. **ADJUSTING**
      1. Verify factory calibration of all instruments in accordance with the Manufacturer’s instructions.
   5. **PROTECTION**
      1. All instruments shall be fully protected after installation and before commissioning. Replace any instruments damaged before commissioning.
         1. The ENGINEER shall be the sole party responsible for determining the corrective measures.