

SECTION 40 72 00
INSTRUMENTATION FOR PROCESS SYSTEMS: LEVEL MEASUREMENT

PART 1 – GENERAL.

1.01 SUMMARY

- A. Section Includes
 - 1. Submersible Pressure Transducer Level Monitor
 - 2. Level Switches

1.02 SYSTEM DESCRIPTION

- A. Instrumentation shall work fundamentally with the Control System to operate pumps.

1.03 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.
- B. Product Data
 - 1. Catalog Cutsheets
 - 2. Engineering data defining materials of construction and suitable applications
- C. Shop Drawings
 - 1. Dimensional Drawings, including cable diameter
 - 2. Field Wiring Diagrams
- D. Quality Assurance/Control Submittals
 - 1. Factor calibration report including calibration data, date of calibration and accuracy.
 - 2. Each instrument shall be fully factory inspected and tested for function, operation and continuity of circuits.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Packing, Shipping, Handling, and Unloading
 - 1. In accordance with manufacturer's recommendations.
- B. Storage and Protection
 - 1. Store and protect in accordance with manufacturer's recommendations.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Level Switch
 - 1. Flygt or equal.
- B. Submersible Pressure Transducer Level Monitor
 - 1. Motor Protection Electronics, Inc. or equal.

2.02 LEVEL SWITCH

- A. General
 - 1. Contact System shall be a Microswitch
 - 2. Output shall be dry contact with max load rating of (AC: 250V @16A or DC:220V@.5A or 24V@16A)
 - 3. The operating temperature shall be between 0 to 60 °C
 - 4. The cable shall be sheathed with a highly flexible oil resistant material having adequate tensile strength.
 - 5. The float housing material shall be made of Polypropylene
 - 6. All floats shall be provided with counter weights

2.03 SUBMERSIBLE PRESSURE TRANSDUCER LEVEL MONITOR

- A. Materials:
 - 1. Sensor wetted parts: 316 Stainless Steel.
 - 2. Cable: polyurethane waterproof assembly.
- B. Design and fabrication:
 - 1. Sensor:
 - a. A stainless steel diaphragm and silicon oil fill shall be provided to isolate and protect the sensor from the liquid being measured.
 - b. Sensor shall be rated for pressure ranges based on overflow levels or full containment levels.
 - c. Cable strength shall be ample to support the weight of the sensor. Sensor shall be of adequate weight to reduce movement in a moving liquid.
 - d. Sensor shall be fitted with an anti-clog attachment.
 - e. Provide manufacturer's cable of sufficient length to reach junction box at easily accessible location without splicing.

2. Operating Voltage: 13-29 VDC
3. Output Signal: 4-20 mA, two wire
4. Operating temperature: 32 to 140 °F.
5. Long term stability: +0.1 percent.
6. Temperature Effects: +0.3 percent of full scale.
7. Accuracy: +/- 0.5% full scale
8. Intrinsic Safety: Certified for use with IS Barriers.

2.04 ACCESSORIES

- A. Level Measurement Instrumentation Bracket
 1. Float switches and pressure transducer shall hang from 3/16 diameter hooks welded to a mounting bracket constructed entirely of 304 Stainless Steel. One hook shall be provided for each instrument. Bracket dimensions shall be designed based on wet well dimensions.
 2. A cable grip shall be used per instrument for hanging. Cable grips shall be constructed of 304 stainless steel and shall be of adequate strength to support the weight of the instrument.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Mounting
 1. Mount instrumentation bracket to concrete wet well top slab using 316 stainless steel hardware.
 2. Mount instrumentation in a location such that it will be readily accessible for operation and maintenance.
 3. Mount instrumentation in a location such that it is not impacted by wet well turbulence or subject to interference with other equipment or cables.
 4. If wet well turbulence results in appreciable movement of the transducer, provide a fixed mounting apparatus (i.e. stilling well or solid pipe conduit)
- B. Interface with Other Work
 1. Coordinate routing and installation of power/control cables with the Electrical Work.

3.02 FIELD QUALITY CONTROL

- A. Site Tests
 - 1. Conduct field measurement tests to demonstrate in-field accuracy of transducer at various wet well depths (low, operational levels, high). Provide written test reports.
 - 2. Manually manipulate float switches to demonstrate pump operation.

- B. Manufacturers' Field Services
 - 1. Installation Assistance
 - a. Provide the services of a qualified factory engineer to supervise the installation, to test and make any adjustments required, and to place the completed system in operation.
 - 2. System Operation Training
 - a. The Contractor shall have the instrumentation supplier provide a factory trained engineer to instruct the Authority's operating personnel in the use, operation, care, and maintenance of the process control instrumentation.
 - b. The training shall be conducted on-site and be presented in a manner to impart thorough understanding of the systems and equipment provided.
 - c. The training shall be given to the personnel designated by the Authority who will be responsible for the operation during each work shift. The personnel shall sign a certificate presented by the Contractor that they have been trained on the plant equipment and they thoroughly understand the operation, care and maintenance of the equipment.
 - d. When the Authority is ready to have his personnel trained, the Contractor will be so notified by the Authority. The Contractor will then ensure that the manufacturer's representatives are available on-site to conduct the required training.
 - i. Provide for one (1) eight (8) hour working day total to instruct Operators for the equipment supplied. The Authority will require the Contractor to integrate such training with overall training for the work.

3.03 ELECTRICAL WORK

- A. Signal wiring shall be carried in raceways or conduit provided in accordance with other sections of the Specifications.
 - 1. Shielded twisted pairs carrying 4-20 mA_{dc} and other low level signals shall be run in conduits or raceways separate from all other control and power wiring.
 - a. All analog circuits shall be run as twisted pairs or triads.

- b. In no case shall a circuit be made up using conductors from different pairs or triads.
 - c. Triads shall be used wherever three (3) wire circuits are required.
 - d. Triads shall not be formed by using two (2) pairs.
- 2. Terminal blocks shall be provided at all instrument cable junctions, and all circuits shall be identified at such junctions.
- 3. Signal circuits shall, in general, be run without splices between instruments, terminal boxes or panels.
- B. Shields shall, in general, be bonded to the ground bus at the control panel and isolated at all other locations.
 - 1. Terminal blocks shall be provided for interconnecting shield drain wires at all junction boxes.
- C. Alternating current power supply connections for panel mounted equipment shall be by cord and plug (where practicable).
 - 1. Field mounted units shall be wired in solid and provided with a power disconnect switch either internally or adjacent to the unit.
 - 2. Where multiple field mounted units are fed from a single circuit breaker, each field mounted unit shall be protected by individual draw-out fuses.

3.04 ADJUSTING

- A. Adjust instrumentation elevations as necessary to properly control the pumps.

END OF SECTION