**SECTION 40 75 00**

**REFRIGERATED AUTOMATIC SAMPLER**

1. General
   1. SUMMARY
2. Requirements for a refrigerated sampler for the representative collection and storage of liquid water samples. Samplers may take inputs from other process liquid analytical or flow devices and may be used to collect samples and/or monitor influent and effluent waters from municipal and industrial NPDES facilities. These requirements define samplers suitable for indoor and/or outdoor use.
3. Related Sections.
   * + 1. Control and Information Systems Scope and General Requirements.
       2. Power Instruments, General.
   1. 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 rangeability.
         5. Enclosure Rating.
         6. Classification Rating.
         7. Power.
         8. Output options.
   2. 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.
   3. 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.
   4. 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.
   5. CALIBRATION AND WARRANTY
      1. The sampler shall have standard one year warranty from date of shipment and if the sampler is commissioned by a factory certified technician, the warranty is extended to three years from the date of shipment.
   6. MAINTENANCE
      1. Provide all parts, materials, etc. necessary for maintenance and calibration purposes throughout the warranty period. Deliver all of these supplies before project substantial completion.
      2. Scheduled maintenance:
         1. On a monthly basis the sampler shall require no more than a visual inspection, if necessary, cleaning.
      3. Unscheduled maintenance:
         1. Pump tube replacement (peristaltic pump only).
         2. Dosing chamber cleaning (vacuum only).
         3. Rotor removal and cleaning.
         4. Clean distributor arm.
   7. LIFECYCLE MANAGEMENT
      1. Instrument documentation, 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.
4. Products
   1. SYSTEMS/ASSEMBLIES
      1. Manufacturer
         1. Endress+Hauser Model Liquistation CSF48 with options as outlined below.
      2. Performance criteria
         1. Sample cooling: Maintain sample liquid at 4°C (39°F) in ambient temperature -15 (5°F) to 40°C (104°F) maximum.\
         2. Sampling methods:
            1. Vacuum pump/peristaltic pump include event, single and multiple samples and use of the sampling table.
            2. Vacuum pump additionally includes time proportion and volume proportion sampling.
            3. Peristaltic pump additionally includes time, volume and flow proportion sampling.
         3. Sample volume shall be variable based on sample pumping technology:
            1. When peristaltic pumping is employed it shall be programmable in 10 mL increments from 10 to 10,000 mL.
            2. When vacuum pumping is employed is shall be programmable in 10 mL increments from 20 to 350 mL.
         4. Sample volume repeatability (peristaltic or vacuum): ± 5ml (0.17oz) or 5% of the set volume.
         5. Peristaltic pump vertical lift: maximum transport velocity 0.6 m/s (>1.9 ft/s), 8.0 m (26 ft.) suction head using 30 ft. of 3/8” PVC or EPDM intake tubing.
         6. Vacuum pump sample transport velocity: 0.6 m/s (1.9 ft/s) at 30m (98 ft. of 3/8”PVC or EPDM intake tubing).
      3. Certifications
         1. AC power supply: CSA (“C” and “USA”), UL (UL 60950-1) (“C: and “US”), and UL (UL508).
      4. Environment
         1. Medium temperature range: 2 to 50 °C (36 to 122 °F).
         2. Storage temperature: -20 to 60 °C (0 to 140 °F).
         3. Relative humidity: 10 to 95%, non-condensing.
         4. Ambient temperature range: -30 to 50 °C (-20 to 120 °F).
         5. Ingress protection: NEMA 4X.
         6. Electromagnetic compatibility: Interference emission and interference immunity as per EN 61326-1:2006, Class A for industry.
   2. MANUFACTURED UNITS
      1. The sampler shall be an all in one unit with controller and sampling in separate compartments.
         1. The sampler housing shall be all-weather ASA-PC high-impact plastic with the option for a stainless steel shell and shall have the option for refrigeration components and copper plumbing corrosion protected with conformal polyurethane coating. The refrigerated cabinet shall be insulated with 2-inch rigid foam insulation on the walls and bottom and 5 inches on top. The refrigeration system shall be located in a separate, upper compartment from the sample compartment and cool the sample compartment through forced air convection. For areas with sub-zero temperatures, the standard refrigeration unit shall also contain a compartment heater.
         2. An air sensing thermostat is capable of maintaining the sample enclosure within specified limits that will be set through the HMI. Samplers whose temperature control is not set via HMI to measure the sampling chamber are not acceptable.
         3. Samplers that cannot measure the sample temperature are not acceptable.
      2. The controller shall be rated NEMA 4X and enclosed in a housing that is watertight, dust-tight, corrosion and ice resistant with the sampler doors in the closed position.
         1. The sampler will be designed for indoor and outdoor use.
         2. The sampler shall have a 9 line high contrast backlit HMI display making the measurements visible in direct sunlight. The user interface is self-prompting/menu driven program using four function keys, and navigator dial. Samplers that are not configured with the HMI are not acceptable.
         3. The sampler memory shall store up to 8 data logbooks with each 150,000 measured values and dates/times, the stored data can the visualized on the sampler display as a graph or table. All other sampling activities including events and sampling statistics shall be stored in program and event logbooks.
      3. The sampler shall store up to 100 sampling program entries while the main program shall run up to 24 sub-programs simultaneously.
      4. Sample pacing modes shall include composite and discrete with multiple bottle time, multiple bottle flow, single bottle time, single bottle flow, flow with time over ride, variable interval, user start/stop, and external set point.
         1. Manual grab sample can be made to deliver a grab sample to a specific bottle location.
         2. The intake air purge shall be performed automatically before and after each sample, allowing for complete drainage of the intake line to prevent cross-contamination between samples. The duration shall automatically compensate for varying intake line lengths.
         3. The sample collection cycle shall be repeated from one to three times if a sample is not obtained on the initial attempt.
      5. The sampler shall have a choice of 17 bottle configurations.
      6. The refrigerated sampler shall be available in one of two sample collection options.
         1. High-speed peristaltic pump for collection of the liquid sample.
         2. High-speed vacuum pump for collection of the liquid sample.
         3. Samplers that cannot be interchanged between high speed vacuum and high-speed peristaltic pumps are not acceptable.
      7. The method of sample detection shall be conductive or capacitive (vacuum pump) or pressure (peristaltic pump).
      8. Power supply: 100-120/200-240 VAC +/- 10%, 50/60 Hz, or 24 VDC +15/-9%.
      9. An internal real time clock will be maintained for a minimum of five years.
      10. The basic unit shall include two galvanically isolated analog and two galvanically isolated binary inputs, with options to include up to 4 Memosens® sensors.
          1. Samplers that cannot be upgraded to incorporate Memosens® protocol sensors will not be accepted.
      11. The basic unit shall include two galvanically isolated binary outputs with additional optional outputs:
          1. Up to six current outputs shall be available as an option.
          2. Up to two change-over contact relays.
      12. 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.
             1. 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.
             2. The EtherNet/IP communications shall also be supported with Add-on Instructions (AOI) files and pre-configured faceplates for ease of control system integration.
      13. Suction lines; choice of internal diameter (3/8”, 1/2”, 5/8” or ¾”) and material (PVC or EPDM) in 33 ft. lengths with stainless steel strainers.
      14. Device configuration and logbooks can be saved or restored.
          1. An SD card slot shall be provided for configuration downloads, logbook downloads and for embedded software upgrades in the field.
          2. Data management shall be available via a CDI link directly to PC using a serial port and communications interface. (Such as Endress+Hauser FieldCare® Data Management software and Commubox FXA291).
   3. ACCESSORIES
      1. An accessory system shall be available for sampling from a pressurized line.
      2. The sampler shall have a choice of 3 configurations of sampler stands.
      3. The sampler shall have the option for additional inputs including up to 4 Memosens® protocol industrial sensors that can be added in the field.
      4. The sampler shall be available with key locks for both the upper and lower compartments.
      5. Outside and direct sample temperature measurement shall be available as an option.
      6. Optional batter backup system ensures uninterrupted operation in the event of power failure.
   4. SOURCE QUALITY CONTROL & CALIBRATION
      1. Any standards and cleaning solutions will be supplied with MSDS data sheets.
   5. SAFETY
      1. A. All devices shall be suitable for operation in a non-hazardous area.
      2. Device failure modes, self-monitoring characteristics and diagnosis shall follow NAMUR standard NE 43.
5. **Execution**
   1. **EXAMINATION**
      1. Examine the complete set of plans, the process fluids, pressures, and temperatures and ensure instruments are compatible with installed process and environmental conditions.
      2. Examine the installation location for the instrument and verify that the instrument will work properly when installed.
   2. **INSTALLATION**
      1. Contractor will install the sampler in strict accordance with the manufacturer’s instructions and recommendation.
      2. The sampler must be installed in a suitable manner so that the sampler is not directly installed over the sampling area.
      3. The standard one-year warranty against manufacturing defects shall be extendable to three-years on covered equipment if paid start-up service is accomplished on that covered equipment by an authorized service provider.
      4. Coordinate the installation with all trades to ensure that the mechanical system has all necessary appurtenances for proper installation of instruments.
         1. General contractor.
         2. Electrical or Instrumentation contractor.
         3. 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.
      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 authorized service provider – the warranty against manufacturing defects is three years.
         1. Manufacturer field service representative shall verify installation of all installed samplers.
         2. Manufacturer representative shall notify the ENGINEER in writing of any problems or discrepancies and proposed solutions.
         3. Manufacturer representative shall generate a configuration report for each sampler installation following commissioning.
   4. **ADJUSTING**
6. Verify factory calibration of all instruments in accordance with the manufacturer’s instructions.

**3.06 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.