

## PART 1 GENERAL

### 1.0 Section includes

- A. Indoor refrigerated sampler for the representative collection of liquid water samples to monitor influent and effluent waters from municipal and industrial NPDES facilities, monitor effluent waters from indirect industrial dischargers for compliance with pre-treatment regulations, and environmental monitoring including CSO and SSO studies and storm water run-off.
- B. The sampler shall be a Sigma Model AS950 Indoor Refrigerated sampler with options outlined below as manufactured by Hach Company, Loveland, CO.
- C. The naming of a manufacturer is to define minimum acceptable performance and functionality. Other manufacturers may be approved as an equal if they meet the specifications. Alternate manufacturers shall submit equipment specifications to the engineer ten (10) business days prior to the bid date including a written description of the alternate offering and any exceptions to the specifications. Acceptable alternate vendors will be listed by Addendum

### 1.1 Measurement Procedures

- A. The method of sample collection is via high-speed peristaltic pump for collection of the sample liquid.
- B. The method of sample detection is ultrasonic.

### 1.2 Alternates

- A. Other samplers that do not use a high-speed peristaltic pump are not acceptable.
- B. Samplers which require disassembly of the unit for desiccant change are not acceptable.

### 1.3 System Description

#### A. Performance Requirements

- 1. Sample cooling: maintain sample liquid at 4°C (39°F) in ambient temperature to 50°C (122°F) maximum; accurate to  $\pm 0.8^\circ\text{C}$  ( $\pm 1.5^\circ\text{F}$ ).
- 2. Sample volume: programmable in 10 mL increments from 10 to 10,000 mL.
- 3. Sample volume repeatability:  $\pm 5\%$  of 200 mL sample volume with: 4.6 m (15 ft.) vertical lift, 4.9 m (16 ft.) of 3/8-in vinyl intake tube, single bottle, full bottle shut off at room temperature and 1524 m (5000 ft.) elevation.
- 4. Pacing intervals: selectable in single increments from 1 to 9,999 flow pulses or 1 to 999 hours in 1 minute increments. Accepts 4-20mA input from an external device to pace the sampler.
- 5. Vertical lift: minimum 8.5 m (28 ft.) using 8.8 m (29 ft.) of 3/8-in. vinyl intake tube at sea level at 20 to 25°C (68 to 77°F).
- 6. Sample transport velocity: 0.9 m/s (2.9 ft./s) with: 4.6 m (15 ft.) vertical lift (16 ft.) of 3/8-in. vinyl intake tubing, 21°C (70°F) and 1524 m (5000 ft.) elevation.
- 7. Pump flow rate: 4.8 L/min (1.25 gpm) at 1 m (3 ft.) vertical lift with 3/8-in. intake tube typical.

### 1.4 Certifications

- A. Controller: CE
- B. AC power supply: UL/CSA/CE
- C. Cabinet: UL/CSA/CE

1.5 Environmental Requirements

A. Operational Criteria

1. Operating temperature: 0 to 50°C (32 to 122°F)
2. Storage temperature: -40 to 60°C (-14 to 140°F)

1.6 Warranty

- A. The product includes a one-year warranty from date of shipment.

1.7 Maintenance Service

- A. Scheduled maintenance: monthly: visual inspection, if necessary, clean
- B. Unscheduled maintenance:
1. Pump tube replacement
  2. Rotor removal and cleaning
  3. Distributor arm tubing replacement
  4. Desiccant replacement

PART 2 PRODUCTS

2.0 Manufactured Unit

- A. The Sigma AS950 Indoor Refrigerated Sampler consists of a controller and refrigerator.
- B. Tubing:
1. Pump tube: 0.95 ID x 0.16 OD cm (3/8 ID x 5/8 in. OD)
  2. Intake tube: 9.5 mm (3/8 in.) ID vinyl Teflon® lined polyethylene in 10-, 25-, or 100-ft. lengths
- C. Weighted strainer constructed of 316 stainless steel and Teflon

2.1 Equipment

- A. The controller housing of the AS950 sampler is submersible, watertight, dust-tight, corrosion and ice-resistant to NEMA 4X, 6, IP68 standards.
- B. The desiccant cartridge, which prevents moisture from accumulating inside the controller electronics area, shall be visual and accessible externally from the side of the controller; the replacement of the desiccant shall not require tools or disassembly of controller from base.
- C. The pump shall use spring loaded rollers and be accessible by a clear hinged cover with single thumbscrew.
- D. The refrigeration components and copper plumbing are corrosion protected with conformal coating.
- E. Sample cooling is made with a 1/10 HP, 75 Watt, 400 BTU/hr compressor, 120 CFM condenser fan, and three-sided wrap-around plate type evaporator. Rigid foam insulation is used throughout.
- F. An air sensing thermostat is capable of maintaining sample liquid within specified limits.
- G. The power requirement is 115 Vac, 60 Hz (230 Vac optional). The compressor current is 1.5 to 2.0 A, running. The locked rotor current is 12 A. Overload protection is made by a 5 A dc line fuse to the pump and a 1 A dc line fuse (ac power converter). The compressor: thermal overload relay opens at 110°C (230°F).
- H. The internal battery is a lithium ion battery (maintains real time clock for five years minimum).
- I. The Graphics Display is 1/4 VGA, Color; self-prompting/ menu-driven program.
- J. Communication choices include:
1. USB and optional RS485 (Modbus)

2. Permits embedded software upgrades in the field
  3. FSData data management software used to download, analyze, and report data, save templates, download sample history and event logs, create graphs for reports and presentations. Link directly to PC A to A USB cable.
- K. The membrane switch keypad user interface is self-prompting/menu driven program with 2 multiple function soft keys.
- L. Sampling pacing modes shall include Time Weighted, Flow Weighted, Time Table, Flow Table, and Event.
- M. Datalogging
1. Sample History: Stores up to 4000 entries for sample time stamp, bottle number and sample status (success, bottle full, rinse error, user abort, distributor error, pump fault, purge fail, sample timeout, power fail and low main battery).
  2. Measurements: Stores up to 325,000 entries for selected measurement channels in accordance with the selected logging interval.
  3. Event Log: Stores up to 2000 entries. Records Power On, Power Fail, Firmware Updated, Pump Fault, Distributor Arm Error, Low Memory Battery, Low Main Battery, User On, User Off, Program Started, Program Resumed, Program Halted, Program Completed, Grab Sample, Tube Change Required, sensor communication errors, cooling failed, heating failed, thermal error corrected.
- N. Internal software is protected by a 7 amp fuse.
- O. Diagnostics: View event and alarm logs as well as maintenance diagnostics A program lock is provided for access code protection to prevent tampering of program and system settings.
- P. The sampler is convertible to composite operation by installing a composite container and full bottle shut off.
- Q. Sample containers include choice of:
1. Glass: (1) 2-1/2 gal., (2) 2-1/2 gal., (4) 2-1/2 gal., (8) 0.5 gal., (24) 350 mL
  2. Polyethylene: (1) 5-1/2 gal., (2) 2-1/2 gal., (4) 2-1/2 gal., (8) 0.6 gal., (12) 0.5 gal., (24) 1 L
- R. Sampling features include:
1. Dual programming: Up to 2 sample programs can be run sequentially, in parallel, or according to day of week scheduling; enabling a single sampler to function like multiple samplers.
  2. Cascade sampling: for two samplers in combination—the first sampler, at the completion of the program, initiates the second.
  3. Status Screen: Communicates what program is running, if there are any missed samples, when the next sample will be taken, how many samples remain, number of logged channels, time of last measurement, memory available, number of active channels, if alarms were triggered, when alarms were triggered, active sensors and cabinet temperature.
- S. Automatic shutdown modes:
1. Multiple bottle mode: after complete revolution of distributor arm (unless continuous mode is selected).
  2. Composite mode: after preset number of samples have been delivered to composite container, from one to 999 samples, or upon full container.
- T. Sample distribution modes include continuous/non-continuous, bottles per sample, or samples per bottle.
- U. Manual grab sample can be made with the AS950 sampler to deliver a grab sample to a specific bottle location.
- V. The high-speed peristaltic sample pump uses four rollers with spring tension to accommodate larger particles.
- W. The intake air purge is made automatically before and after each sample. The duration automatically compensates for varying intake line lengths.
- X. The intake line is optionally rinsed with source liquid prior to each sample from one to three times.

Y. The sample collection cycle is optionally repeated from one to three times if a sample is not obtained on the initial attempt.

2.2 Factory Installed Options

- A. Two Sensor Ports: Sampler accepts Hach digital Differential pH, Hach digital AV9000 analyzer with submerged area velocity flow and/or Hach digital US9000 ultrasonic level sensors.
- B. Rain/RS485 Port: Sampler accepts Hach Rain Gauge (not included) or can be used as RS485 communications.

2.3 Components

A. Standard equipment:

- 1. Controller: high impact injection-molded ABS/PC plastic
  - 2. Base: 22 gauge steel with vinyl laminate overcoat; 201 stainless steel finish optional. Hinged, lockable lid is available as an option.
  - 3. Pump enclosure: corrosion-resistant polycarbonate door, high impact-resistant plastic, polyphenylene sulfide track
  - 4. Intake strainers in standard size, high velocity, or low profile for shallow depth applications.  
Choice of:
    - a. Teflon and 316 stainless steel construction
    - b. All 316 stainless steel
- B. Dimensions: 61 x 61 x 112 cm (24 x 24 x 44 in.)
- C. Weight: 63 kg (140 lbs.)

2.4 Accessories

- A. Bottle kits
- B. Tubing and strainers
- C. Cables and interfaces
- D. FSData Desktop software
- E. AC battery back up
- F. Controller cover
- G. IO9000 Input/Output Module