

## PART 1 GENERAL

- 1.1 Section includes:
  - A. Phosphate process analyzer for semi - continuous monitoring of phosphate in water.
- 1.2 Measurement Procedures

The phosphate analyzer shall be a semi-continuous reading instrument, monitoring from 1, 2, or 4 channels, using either the ascorbic acid colorimetric method of analysis for low range measurement of phosphate at a wavelength of 880 nm or the molybdovanadate colorimetric method of analysis for high range measurement of phosphate at a wavelength of 480 nm.
- 1.3 Alternates
  - A. Other methods of measurement such as UV absorbance, single parameter colorimetric, or amperometric analyzers are not allowed.
- 1.4 System Description
  - A. Performance Requirements
    1. Measurement Range
      - a. 4 to 3'000 µg/L (parts per billion) as PO<sub>4</sub> (Low Range model) or 200 to 50'000 µg/L (parts per billion) as PO<sub>4</sub> (High Range model)
    2. Detection Limit
      - a. 4 µg/L PO<sub>4</sub> (LR Model) ; 200 µg/L PO<sub>4</sub> (HR Model)
    3. Accuracy
      - a. ± 4 µg/L or ± 4% (the larger value) (LR model) or ± 500 µg/L or ± 5% (the larger value) (HR model)
    4. Repeatability
      - a. ± 1% (LR model) or ± 500 µg/L or ± 5% (the larger value) (HR model)
    5. Response time at T>90%
      - a. 10 minutes at 25 °C (77 °F), but adjustable to 15 minutes to reduce reagents' consumption
- 1.5 Certifications
  - A. EMC: CE compliant for conducted and radiated emissions CISPR 11 (Class A limits), EMC Immunity EN 61326-1 (Industrial limits), and EN 61010-1
  - B. Safety: General Purpose UL/CSA 61010-1 with cETLus safety mark; CSA C22.2 No 61010-1:2012
  - C. NEMA 4x/IP56 dust and water ingress protection rating
  - D. C-tick (EN 61326-1: 2006)
  - E. KC (EN 61326-1: 2006)
- 1.6 Environmental Requirements
  - A. Operational Criteria
    1. Storage Temperature: -20 to 60 °C (-4 to 140 °F)
    2. Operating Temperature: 5 to 45 °C (41 to 113 °F)
    3. Relative Humidity: 5 to 95 %, non-condensing
- 1.7 Warranty
  - A. Warranted from manufacturer defects for two years (Europe) or one year (all other geographies) from date of shipment.
- 1.8 Maintenance and Service
  - A. Scheduled Maintenance

1. Bi or Tri-Monthly (depending on chosen cycle time)
    - a. Replace the reagent(s), standard(s), and cleaning solution; may be extended depending on chosen cycle time
  2. Quarterly
    - a. Clean the instrument
    - b. Clean sample cells and stir bar
    - c. Clean sample holder
  3. Semi-annually
    - a. Replace the stir bar
  4. Annually
    - a. Replace internal and external sample filter
    - b. Replace the fan filter
    - c. Replace the reagent air filter
    - d. Replace tubing
    - e. Replace the check valve on the colorimeter
    - f. Replace the sample cell
- B. Unscheduled Maintenance
1. Depending on sample composition, sample cells and sample holder may need more frequent cleaning

## PART 2 PRODUCTS

### 2.1 Manufacturer

- A. Hach Company, Loveland, Colorado
1. Polymetron 9611sc Phosphate Analyzer

### 2.2 Manufactured Unit

- A. The Polymetron 9611sc Phosphate analyzer consists of a microprocessor controlled analyzer designed to continually monitor concentration of Phosphate (PO<sub>4</sub>) in a sample stream. The analyzer also has the capability to intake grab samples for internal measurement and dispense grab samples for external verification.

### 2.3 Equipment

#### A. Analyzer

1. The display screen shall be a colored 5.7" LCD screen, and shall include a dashboard view, with measurements recent calibration information, reagent status, and Prognosys indicators.
2. The display screen shall be capable of graphing all available parameters on a scalable time.
3. The analyzer shall be capable of a continual measurement of every 9 minutes or a user selectable interval between measurements of 4.5 to 240 minutes.
4. The analyzer shall be capable of grab sample IN (from external source to the analyzer) and grab sample OUT (from the analyzer to external source) to save time, without interrupting continuous sample flow to the analyzer.
5. The analyzer shall have Link2sc capability to communicate measurements and provide calibration information between the analyzer and laboratory spectrophotometers.
6. The analyzer must operate using 110-240VAC, 50/60 Hz power
7. The analyzer must be able to conduct 1-point automatic calibration using installed standards.
8. The analyzer shall operate with an LED light source at a peak wavelength of 815nm.
9. Four electromechanical, UL rated, SPDT relays (Form C) are provided for user-configurable contacts rated 100 to 230 Vac, 5 Amp at 30 VDC resistive maximum.

- a. The following can be programmed:
    - 1) Alarm
    - 2) Warning
    - 3) Scheduler
    - 4) Feeder control
    - 5) Event control
    - 6) Specific event alarm (defined in analyzer)
  - b. The following parameters can be assigned to a relay:
    - 1) Silica measurement
    - 2) Real time clock
10. Four analog 0/4-20 mA outputs (with possibilities to extend to eight (8x)) are provided with a maximum impedance of 500 ohms.
- a. The following can be programmed:
    - 1) Alarms:
      - i. Low alarm point
      - ii. Low alarm point deadband
      - iii. High alarm point
      - iv. High alarm point deadband
      - v. Off delay
      - vi. On delay
    - 2) Controls:
      - i. Linear
      - i. Bi-linear
      - ii. Logarithmic
      - iii. PID
  - b. The following parameters can be assigned to a 4-20mA output:
    - 1) Phosphate Measurement
11. The analyzer shall have Prognosys capability to provide self and predictive diagnostics and provide preventive maintenance alerts and reminders
12. The analyzer shall provide the user with built in help screens
13. The analyzer shall provide for continuous purge of sample to drain to assure fresh sample to the analyzer and reduce analysis lag time
14. Sample shall be delivered to the analyzer at the pressure of 2–87 psi to preset pressure regulator
15. The analyzer shall provide separate discharge lines for unchanged (bypass) and contaminated sample (waste)
16. Software updates and data extraction shall be completed via an SD card
- B. Reagents and Standards
1. The analyzer shall use quick connect reagent bottles with pre-installed tubing.
  2. Reagents shall be pressurized using a built-in air compressor
  3. The analyzer shall include a 90 days' supply of reagents (using a 15 minute cycle time)
  4. The reagents usage shall be 2L of each reagent for every 90 days with a 15 minute cycle time
  5. Manufacturer shall provide certified pre-mixed reagents and standards (closed chemistry version) or user shall prepare its own reagents (open chemistry).

## 2.4 Components

- A. Standard Equipment
  1. 961 Isc Phosphate Analyzer
  2. Installation Kit
  3. Installation Manual

4. Operations Manual
  5. Maintenance and Troubleshooting Manual
  6. Three month supply of reagents, standards, and cleaning solution
- B. Dimensions: 804 mm x 452 mm x 360 mm (31.65 in x 17.79 in x 14.17 in)
- C. Weight: 21 kg (45 lb) without reagents and standards, 36.3 kg (80 lb) with reagents, standards and cleaning solution
- 2.5 Optional Accessories
- A. Reagents/Standards Replacement Kit
  - B. Annual Maintenance Kit
  - C. Sample Filtration Kit
  - D. Colorimeter Cleaning Kit
  - E. RS232/RS485 Modbus output card
  - F. 4x 4-20mA analog output card
  - G. US Power Cord Kit
  - H. EU Power Cord Kit

### PART 3 EXECUTION

#### 3.1 Preparation

1. Mounting
  - a. Bench, panel, or wall mount
2. Sample Inlet
  - a. 6mm OD quick connect fitting
3. Drain Outlet
  - a. 11mm (7/16 in.) ID slip-on fitting
4. Sample Flow
  - a. 55 to 300 mL/minute
5. Sample Pressure
  - a. 2 to 87 psi (0.17 to 6 bar)
6. Sample Temperature
  - a. 5 to 50 °C (41 to 122 °F)

#### 3.2 Installation

- A. Contractor will install the analyzer in strict accordance with the manufacturer's instructions and recommendations.
- B. Manufacturer's representative will include a half-day of start-up service by a factory-trained technician, if requested.
  1. Contractor will schedule a date and time for start-up.
  2. Contractor will require the following people to be present during the start-up procedure.
    - a. General contractor
    - b. Electrical contractor
    - c. Hach Company factory trained representative
    - d. Owner's personnel
    - e. Controls Technician (as required)

3.3 Manufacturer's Service and Start-Up

- A. Contractor will include the manufacturer's services to perform start-up on instrument to include basic operational training and certification of performance of the instrument.
- B. Contractor will include a manufacturer's Service Agreement that covers all the manufacturer's recommended preventative maintenance, and any necessary repairs beginning from the time of equipment startup through to end user acceptance / plant turnover and the first 12 months of end-user operation post turnover.
- C. Items A and B are to be performed by manufacturer's factory-trained service personnel. Field service and factory repair by personnel not employed by the manufacturer is not allowed.
- D. Use of manufacturer's service parts and reagents is required. Third-party parts and reagents are not approved for use.

END OF SECTION