PART 1 GENERAL

1.1 Section includes:

A. A modular single or dual channel controller that works with analog sensor modules and/or digital sensors.

1.2 Measurement Procedures

A. Microprocessor-based sensor controller.
B. Change digital sensors connected to the controller by unplugging and plugging in sensors as necessary.
C. Change analog sensor modules connected to the controller by unplugging and plugging analog sensor modules as necessary.
D. The controller accepts 4 different analog sensor modules in any combination to measure the following:
   1. pH/ORP module
      a. Combination pH/ORP
   2. Conductivity module
      a. Contacting conductivity
      b. Inductive conductivity
      c. Cationic conductivity (Calculated pH)
   3. Dissolved Oxygen/Oxygen Scavengers module
      a. Amperometric dissolved oxygen
      b. Amperometric oxygen scavengers
   4. Analog mA IN module

1.3 Alternates

A. Parameter-specific controllers that do not allow changing parameter configurations in the field are unacceptable.

1.4 System Description

A. Performance Requirements
   B. pH/ORP sensor module
      1. Measurement range:
         a. pH: -2.0 to +14.0 or -2.00 to 14.00 pH
         b. mV: -2100 to +2100 mV
      2. Repeatability: 0.1% of range or better
      3. Response time (t90%): 0.5 s
      4. Temperature range:
         a. PT100/PT1000: -20 to 200 °C
         b. Accuracy: ±0.05 °C
   C. DO sensor module
      1. Measurement range:
         a. 0 to 2000 ppb
      2. Repeatability: ±0.5 ppb or ± 5% whichever is greater
      3. Response time (t90%) for step change between 1-40 ppb: <30s
      4. Temperature range: 0-45°C (32-113°F)

D. Oxygen Scavengers sensor module
   1. Measurement range:
      a. 0 to 500 ppb of dissolved N_2H_4
      b. 0 to 100 ppb of carbohydrazide
      c. Repeatability: <2% of the measured value or < 1ppb, whichever is greater
      d. Response time (t90%): < 60 seconds
      e. Temperature range: 5-45°C (41-113°F)

E. Contacting conductivity sensor module
   1. Measurement range:
      a. Conductivity: 0-20,000µS/cm
      b. Resistivity: 0-50 Ω•cm
      c. TDS: 0-9999 ppm or 0-9999 ppb
   2. Repeatability:
      a. ±1% of reading or 0.002 µS/cm below 0.2 µS/cm, whichever is higher
   3. Response time (t90%): 0.5 s
   4. Temperature range: -20 to 200 °C
      a. Accuracy: ±0.05 °C

F. Inductive conductivity sensor module
   1. Measurement range:
      a. Conductivity: 0.5-10,000 mS/cm
      b. % concentration: 0-99.99 or 0-200.0%
      c. TDS: 0-9999 ppm
   2. Repeatability:
      a. 0.5-10,000 mS/cm: ± 2%
   3. Response time (t90%): 1 s
   4. Temperature range: -2 to 200 °C
      a. Accuracy: ±0.05 °C

1.5 Certifications

A. EMC: CE compliant for conducted and radiated emissions CISPR 11 (Class A limits), EMC Immunity EN 61326-1 (Industrial limits)
B. Safety: General Purpose UL/CSA 61010-1 with cETLus safety mark
C. Australian C-TICK and Korean KC Markings

1.6 Environmental Requirements

A. Operational Criteria
   1. Temperature: -4.0 to 140.0 °F (-20.0 to 60.0 °C)
   2. Relative humidity: 0 to 95%, non-condensing

1.7 Warranty

A. Warranted for two years from date of shipment from manufacturer defects.

1.8 Maintenance Service

A. Clean controller keypad
B. Calibrate mA output signals

PART 2 PRODUCTS

2.1 Manufacturer

A. Hach Company, Loveland, Colorado and Hach Lange GmbH, Berlin, Germany
   1. Hach model sc200 Controller

2.2 Manufactured Unit

A. The controller is available with the following power requirements:
   1. AC powered: 100 to 240 Vac ±10%, 50/60 Hz; 15 W with 7 W sensor/network card load, 37 W with 25 W sensor/network card load.
   2. 24 VDC powered: 24 VDC, -15%, +20%; 16 W with 7 W sensor/network card load, 34 W with 25 W sensor/network card load (optional Modbus RS232/RS485 and Profibus DPV1 network connection).
B. The controller uses a menu-driven operation system.
C. The controller display is graphic dot matrix LCD with LED backlighting.
D. The controller is equipped with a real-time clock.
E. The controller is equipped with two security levels.
F. The controller is equipped with a data logger with RS-232 capability.
G. The controller shall have worded operation menus in 19 languages.
H. The controller is equipped with an SD card reader for data download and controller software upload.
I. 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.
   1. The following can be programmed:
      a. Alarm
      b. Warning
      c. Timer/scheduled cleaning
      d. Feeder control
      e. Event control
      f. Pulse width modulation
      g. Frequency modulation
   2. The following can be assigned:
      a. Primary value measurement I
      b. Secondary value measurement I
      c. Tertiary value measurement I
      d. Quaternary value measurement I
      e. Primary value Measurement II
      f. Secondary value measurement II
      g. Tertiary value measurement II
      h. Quaternary value measurement II
      i. Real time clock
      j. Calculated values
J. Two analog 0/4-20 mA outputs are provided with a maximum impedance of 500 ohms.
   1. The controller can be equipped with three additional 4-20 mA outputs with a maximum impedance of 500 ohms.
   2. The following can be programmed:
      a. Alarms:
         1) Low alarm point

2) Low alarm point deadband
3) High alarm point
4) High alarm point deadband
5) Off delay
6) On delay

b. Controls:
1) Linear
1) Bi-linear
2) Logarithmic
3) PID

1. The following can be assigned:
a. Primary value measurement I
b. Secondary value measurement I
c. Tertiary value measurement I
d. Quaternary value measurement I
e. Primary value measurement II
f. Secondary value measurement II
g. Tertiary value measurement II
h. Quaternary value measurement II
i. Calculated values

K. The controller can be equipped with the following forms of communication:
1. MODBUS RS-232
2. MODBUS RS-485
3. Profibus DP

L. All user settings of the controller are retained for 10 years in flash memory.

M. The controller is equipped with a system check for:
1. Power up test (monitoring and shutdown)
2. Total power draw
3. Memory devices
4. Temperature mother board

N. The controller has the option of graphical measurement that tracks measurement values over time.

2.3 Equipment

A. Materials
1. Housing: polycarbonate, aluminum (powder coated), and stainless steel
2. Rating: NEMA 4X enclosure, rated IP66

B. Conduit openings: 0.5 in. NPT

2.4 Components

A. Standard equipment
1. Controller
2. Mounting hardware for wall, pipe, and panel mounting

B. Dimensions: 144 x 144 x 180 mm (5.7 x 5.7 x 7.1 in.)

C. Weight: 1.6 kg (3.5 lbs.)

2.5 Accessories

A. Weather protection shield
B. Sun screen
C. RS-232 / RS-485 MODBUS output card
D. PROFIBUS DP output card
E. HART output card
F. Additional mA input card
G. Additional mA output card

PART 3 EXECUTION

3.1 Preparation

A. The sensor may need to be installed with additional accessories depending on its application.
   1. Mount on rail, panel, pipe, or wall.
   2. Sensor to analyzer distance: 300 m (985 ft.)

3.2 Installation

A. Contractor will install the analyzer in strict accordance with the manufacturer's instructions and recommendation.
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. Engineer

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, regularly scheduled calibration 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