

## Water Distribution System Monitoring Panel (WDMP) and Controller

### I. General Description

1. The Water Distribution System Monitoring Panel shall be a single panel with instruments pre-mounted, wired and plumbed.
  1. The back plane of the panel shall be not greater than 32" wide by 48" long and made of corrosion resistant material.
  2. The back plane shall be affixed to rigid corrosion resistant struts approximately 51" long centered and extended approximately 1.5" past either end of the back plane
  3. The struts shall be predrilled to permit wall mounting of the entire panel using 1/4" steel bolts; one at each end of the two struts.
  4. The panel shall be fully assembled with all instruments, except controller, mounted, plumbed, and wired prior to shipment.
  5. The sample and drain system for the panel shall accommodate flows of 400 to 600 ml/min.
  6. A common drain system shall be provided for all instruments. The drain manifold shall be terminated with 1/2" hose barb fitting for connection of a flexible drain tube.
  7. Pressure and flow control shall be via a fixed orifice and constant head devices.
    - i. The constant head device shall provide pressure and flow regulation for all sensors down stream from the orifice device.
    - ii. No rotameters or other flow control devices shall be required.
    - iii. Within a pressure range of 20-100 psi, no additional pressure regulation shall be required.
    - iv. The constant head device shall provide a mounting mechanism for the pH and conductivity sensor.
2. The panel shall include the following on-line analytical instruments (See Section II for complete instrument descriptions): A turbidimeter, a chlorine residual analyzer, a conductivity cell, and a pH sensor. The conductivity and pH sensors shall have built-in temperature measurement and compensation.
  1. All analytical instruments shall be pre-wired to a common probe module via quick-connect connectors.
  2. All analytical sensor inputs and sensor power shall be supplied from the probe module.
  3. All devices on the panel shall operate at 100-115/230Vac ~50/60 Hz.
  4. Total power requirement shall not exceed 500 VA.
  5. All instruments shall be powered using a single connection using a modular cord or wiring with conduit.
  6. All devices on the panel shall be capable of operating at a pressure of 15 - 60 psi.

3. The controller for the panel shall be a digital device capable of alphanumeric and graphical display with a 1/4 VGA graphical backlit TFT color touch screen. The controller shall consist of two modules, a probe module and a display module.
  1. The controller shall provide scalable 4-20 mA outputs for connection to recorders, an RTU or PLC.
  2. The controller shall act as a data logger storing up to 28 days of data in 1-minute increments.
  3. In graphical mode, any measurement shall be scalable to periods of one day or one week.
  4. The data shall be downloadable to a Windows-based computer in a delimited format for easy viewing and manipulation by standard spreadsheet or database programs.
  5. All analog outputs from the controller shall be located on a single terminal barrier strip for ease of field connections.
  6. The controller shall provide the ability to program hi and low alarm set points for each measurement. Optional dry contact alarm relay modules shall be available from the manufacturer
  7. The display module of the controller shall be removable from the probe module without affecting sensor inputs or sensor outputs and without disruption of any network connection to external devices. The controller shall be powered separate from the panel and shall operate at 100 to 230 Vac, 50/60 Hz, and 75W. 24Vdc operation also shall be available.
  8. The controller shall be an SC1000 Controller Display and probe module manufactured by Hach Company.
4. The panel shall include a pressure sensor for monitoring water pressure at the sample manifold.
  1. The pressure sensor shall be a CVD Pressure Transducer with a 2 wire, 24 AWG, shielded PVC cable to carry the variable 4 – 20 mA output signal.
  2. The pressure sensor shall have a measuring range of 0 – 150 psi.
  3. The pressure sensor shall have an accuracy of +/-0.25% with +/- 1.5% thermal error band.
  4. The pressure sensor shall be Gems 2200 series

5. Compliance met with this assembly
  1. Electromagnetic Compatibility (EMC)
    - i. US Title 47 CFR - Part 15, Subpart B
    - ii. Canada ISED ICES-003, Issue 7
  2. Safety (Controller & Panel Fluidics):
    - i. UL 61010-1
    - ii. CSA C22.2 No. 61010-1-12
  3. Environmental Compliance for the WDMP in the U.S. and Canada markets only
    - i. Prohibition of Certain Toxic Substances Regulations, 2012 (the 2016 Amendments) Canada Prohibition of Certain Toxic Substances
    - ii. Section 65 of the Canadian Environmental Protection Act, 1999 (CEPA) Canada Virtual Elimination List
    - iii. (EU) 2019/1021 EU POP: Persistent Organic Pollutants Regulation
    - iv. Long-Chain Perfluoroalkyl Carboxylate and Perfluoroalkyl Sulfonate Chemical Substances; Significant New Use Rule (July 27, 2020) US TSCA PFAS Surface Coating SNUR
    - v. Regulation of Persistent Bio accumulative and Toxic Chemicals under TSCA section 6(h) (December 2020) US TSCA Section 6 Rules

I. Analytical Instruments. All analytical instruments installed on the panel shall be from a single manufacturer to minimize maintenance and support issues.

1. On-line Turbidimeter:

1. The On-line Turbidimeter sensor shall meet requirements of the low range online laser turbidimeter consists of a Class 1 650nm (EPA) or 850 nm (ISO) laser light source and 360° x 90° detection system with predictive diagnostics designed to continuously monitor turbidity in a sample stream. Automatic cleaning and flow measurement are available.
2. Range of the turbidity sensor shall be 0-700 NTU.
3. The analyzer shall use method of turbidity measurement with laser light source and a 360-degree x 90-degree detection system.
4. The turbidimeter will provide continuous particle removal using a vortex created by the fluid path.
5. The sensor shall be a digital design and receive sensor inputs from the panel's controller and provide sensor outputs to the controller.
6. Utilizes an identical laser-based optical system that matches the laboratory turbidimeter described in 2.3.C. for direct comparison between laboratory and online measurements.
7. All optical components – light source, lenses, and detector – shall be mounted on a head assembly removable from the turbidimeter body without the use of tools or removal of any fastening device.
8. Includes capability to communicate measurements and calibration information via RFID to the laboratory turbidimeter described in 2.3.C.
9. The turbidimeter must include a system check module.
10. Calibration of the analyzer shall be via StablCal Sealed vial calibration standards. Including glass calibration verification rod
11. The on-line turbidimeter sensor shall be a Hach Brand TU5300

## 2. Chlorine Residual Analyzer:

- 1 Online Chlorine Analyzer shall be capable of measuring free chlorine with measurement range of 0-10 mg/l.
- 2 Housed in an IP66-rated enclosure
- 3 Measurements are taken every 2.5 minutes and results are displayed on a controller display or web-enabled display in the range of 0 to 10 mg/L.
- 4 Utilizes a built-in flow meter.
- 5 Real-time flow rate is measured when sample is flowing through the analyzer and results are displayed on a controller display or web-enabled display in mL / min.
- 6 Connects to a standard controller, which controls and provides power to the analyzer.
- 7 Performs a blank reference measurement check between analysis points to compensate for sample color, turbidity, and changes in light intensity due to voltage fluctuations or light source aging.
- 8 Operates with an LED light source at a peak wavelength of 510nm.
- 9 Capable of operating unattended for 30 days between chemical reagent changes and measurement cell cleaning
- 10 Utilizes a three-color status light to indicate operating status.
- 11 Utilizes three measurement cycle indicator lights to display the phase of the measurement cycle being performed.
- 12 Has a colorimeter measurement cell window for viewing sample inside cell.
- 13 Provides step-by-step, on-screen instructions for all routine maintenance activities, including reagent changes, tubing changes, and cell cleanings.
- 14 The chlorine residual analyzer shall be Hach Brand CL17sc

## 3. On-line pH Analyzer

1. The On-line pH Analyzer shall consist of a control unit and a pH sensor
2. Range of measurement shall be -2 to 14 pH units
3. The pH sensor shall utilize the differential electrode technique.
  - i. The pH sensor shall have a long-life filling solution, which needs to be replenished not more frequently than once every five years.
  - ii. The pH sensor shall be constructed of PEEK
  - iii. The pH sensor shall be mounted in a pipe tee for a continuous flowing sample.
  - iv. The pH sensor mounting shall be designed for easy removal without the use of tools to expedite cleaning and calibration.
  - v. The pH sensor shall have built-in temperature sensor and temperature compensation.
4. The sensor shall be a digital design and receive sensor inputs from the panel's controller and provide sensor outputs to the controller.
5. All sensor calibration information and sensor diagnostics shall be stored in the sensor not in a remote controller or other device.
6. The pH sensor shall be the GLI probe DPD1R1-WDMP

#### 4. On-line Conductivity Analyzer:

1. The On-line Conductivity Analyzer shall consist of a control unit designed to operate at 115Vac and a conductivity cell.
2. The conductivity cell shall have a cell constant of 1.0 and range of 0-2000  $\mu\text{S}/\text{cm}$ .
  - i. The cell shall be calibrated by the DRYCAL calibration method.
  - ii. The cell shall be mounted in a pipe tee for a continuous flowing sample.
  - iii. The cell mounting shall be designed for easy removal without the use of tools to expedite cleaning and calibration.
  - iv. The conductivity cell shall have a built-in temperature sensor.
3. The sensor shall be a digital design and receive sensor inputs from the panel's controller and provide sensor outputs to the controller.
4. All sensor calibration information and sensor diagnostics shall be stored in the sensor not in a remote controller or other device.
5. The conductivity cell shall be GLI probe 3422C3A-WDM

#### II. Installation

1. Contractor will install the analyzer in strict accordance with the manufacturer's instructions and recommendation.
2. Manufacturer's representative will include a half-day of start-up service by a factory-trained technician, if requested.

#### III. Manufacturer's Service and Start UP

1. 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.
2. 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
3. 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.
4. Use of manufacturer's service parts and reagents is required. Third-party parts and reagents are not approved for use.

#### IV. Manufacturer's Top Level Part Numbers and associated instruments to be covered with this specification:

Part Number	Description
8866800	WDMP, SIX SENSORS, TU5300sc W/O ACM & CL17sc
8867000	WDMP, SIX SENSORS, TU5300sc WITH ACM & CLT10sc
8867200	WDMP, SIX SENSORS, TU5300SC WITH ACM & CL17sc
8867300	WDMP, SIX SENSORS, TU5300sc WITH ACM & CLF10sc
8867400	WDMP, SIX SENSORS, TU5300sc W/O ACM & CLF10sc
8867600	WDMP, SIX SENSORS, TU5300sc W/O ACM & CLT10sc