
PART 1 - GENERAL

1.1 WORK OF THIS SECTION

- A. This section of the Specifications details the components to be provided by the BMCS subcontractor relating to the following:
1. Temperature Sensor - Thermowell Mounted.
 2. Water Flowmeters.
 3. Water Differential Pressure Sensor.
 4. Differential Pressure Switch - Water.
 5. Water Pressure Sensor.
 6. Water Presence Sensor (Single Point).
 7. Water Flow Totalizer.

1.2 RTD TRANSMITTERS

- A. Where reference is made in this Section to an RTD transmitter, it shall be interpreted as follows:
1. If the RTD is 100 ohm Pt, provide a transmitter located at the RTD.
 2. If the RTD is 1,000 ohm Pt, provide a transmitter at the RTD:
 3. If the I/O subsystem at the UC or DCP cannot interface directly to an RTD.
 4. If the distance between the RTD and the associated UC or DCP exceeds 20 feet.
 5. Where necessary to meet monitoring accuracy requirements provide a 3-wire or 4-wire configuration. Select a range which is appropriate for the climate. Temperature range should be between -76 Deg. F. and 32 Deg. F. at the low end and shall be between +104 Deg. F. and +140 Deg. F. at the upper end.
 6. Thermistors will be acceptable in lieu of RTD provided the thermistor carries a five-year guarantee that the device will maintain its accuracy within tolerance of 0.5 Deg. F. between 32 Deg. F. and 150 Deg. F.
- B. Transmitter output shall be 4 to 20mA proportional to temperature and shall cover a temperature range as indicated in Part 2 of this Section. The analog-to-analog conversion of the transmitter shall be such that the monitored temperature is reported by the BMCS within the accuracy requirements detailed for the individual temperature sensors.

PART 2 - PRODUCTS

2.1 TEMPERATURE SENSOR - THERMOWELL MOUNTED

- A. Provide thermowell mounted temperature sensors as indicated within the Field Termination Schedules. Temperature sensors shall meet, at minimum, the following requirements:
1. Rigid stainless steel probe of length which is, at minimum, 30% of the pipe diameter.
 2. 100 or 1,000 ohm platinum RTD with a minimum temperature coefficient of resistance of 0.00385 ohm/ohm/Deg. C.
 3. BMCS shall report the monitored temperature with an accuracy of 0.5 Deg. F.
 4. Temperature range that is appropriate for the application. Range for chilled water and condenser water applications shall be between +32 Deg. F. and +41 Deg. F. at the low end and shall be between +104 Deg. F. and +122 Deg. F. at the upper end.
 5. Moisture/waterproof housing with conduit fitting.
 6. Stainless steel thermowell.
 7. Provided with thermal grease to aid temperature sensing.
 8. Sensors required for the determination of temperature differential shall be matched with a maximum variation over the entire temperature range of 0.2 Deg. F.
- B. If it meets the above requirements, provide Automation Components Inc. (ACI) or approved equal.

2.2 WATER FLOWMETER – BI-DIRECTIONAL - IN-LINE ELECTROMAGNETIC

- A. Provide in-line electromagnetic water flowmeters as indicated in the Field Termination Schedules. Turbine flowmeter shall meet, at minimum, the following requirements:

1. Electromagnetic flow sensor.
2. 24 +/- 4 VDC @ 90 mA supply voltage.
3. 0.75% accuracy of actual reading from 1 to 33 ft/s.
4. Output of 4-20 mA proportional to the flow sensed.
5. Suitable for maximum flowrate in line.
6. Flange connections rated for as necessary to withstand the maximum pressure of the system.
7. Temperature range of 0 Deg. C. to 60 Deg. C. (32 Deg. F to 140 Deg. F.).
8. Bi-directional flow.
9. Installed in a suitable location achieving, at minimum, 3 pipe diameters upstream and 2 pipe diameters downstream of clear unobstructed flow. Confirm locations with the mechanical and piping contractors prior to pipe fabrication.

B. If it meets the above requirements, provide Onicon F-3100 Series or approved equal.

2.3 WATER DIFFERENTIAL PRESSURE SENSOR

A. Provide water differential pressure sensors as indicated in the Field Termination Schedules. Water differential pressure sensors shall meet, at minimum, the following requirements:

1. Cast aluminum NEMA 1 enclosure.
2. Output of 4-20 mA or 0-10 VDC proportional to the pressure sensed.
3. Over pressure protection of five times the rated input.
4. Easily accessible, integral non-interacting zero and span adjustment.
5. Operating range of 0 to 30 psig. (0 to 7.5kPa).
6. Accuracy of 2% of full scale reading.
7. Valved tappings shall be installed by the Mechanical subcontractor. Furnish the valves to the Mechanical subcontractor.

B. If it meets the above requirements, provide Veris Industries Alta Labs PW series or approved equal.

2.4 DIFFERENTIAL PRESSURE SWITCH - WATER

A. Provide water differential pressure switches as indicated in the Field Termination Schedules. Water differential pressure switches shall meet, at minimum, the following requirements:

1. 316 stainless steel body.
2. Local display gauge.
3. End to end accuracy not to exceed 1.0% over entire range.
4. Easily accessible, integral non-interacting zero and span adjustment.
5. Over pressure input protection to a minimum of five (5) times rated input.
6. The differential pressure transducer shall be rated to withstand the maximum rated pressure of the system in which it is installed.
7. Range to be coordinated with the chilling unit manufacturer.
8. Valved tappings shall be installed by the Mechanical subcontractor. Furnish the valves to the Mechanical subcontractor.

B. If it meets the above requirements, provide Orange Research, Model 1203PS or approved equal.

2.5 WATER PRESSURE SENSOR

A. Provide water pressure sensors as indicated within the Field Termination Schedules. Pressure sensors shall meet the following requirements:

1. Input range of 0 to 200 psi.
2. 4-20 mA or 0-10 VDC output proportional to water pressure.
3. 2% accuracy of range.
4. Temperature range of 0 Deg. C. to 38 Deg. C. (32 Deg. F to 100 Deg. F.).
5. Easily accessible, integral non-interacting zero and span adjustment.
6. over pressure input protection of two times rated input.
7. NEMA-4 rated fittings.
8. Stainless steel wetted parts.
9. Burst pressure of 5 times rated input
10. Long-term stability of .25 percent of full scale.

- B. If it meets the above requirements, provide Precise Sensor or approved equal.

2.6 WATER PRESENCE SENSOR (LEAK DETECTION MONITORING (SINGLE POINT)) - WATER

- A. Provide water leak monitoring as identified within the Field Termination Schedules and Diagrams. Water leak detection monitors shall meet, at minimum, the following requirements:
 1. Corrosion and abrasion resistant.
 2. Adjustable height.
 3. Configured for normally open or normally closed as required by the application.
 4. Form C output relay.
 5. Operating temperature range of -29 Deg. C. to 49 Deg. C. (-20 Deg. F. to 120 Deg. F.).
- B. If it meets the above requirements, provide Liebert Liqui-tect 410, or approved equal.

2.7 WATER FLOW TOTALIZER

- A. Provide water flow totalizer meters as indicated in the Field Termination Schedules. Water flow totalizer meters for monitoring of incoming domestic water usage shall meet, at minimum, the following requirements:
 1. Internal materials of the flow meter shall be suitable for the application.
 2. Pulse output signal to allow flow transmitted to the BMCS to be totalized.
 3. Minimum operating pressure of 150 psig.
 4. Stainless steel wetted components.
 5. Flanged connections.
 6. Negligible pressure loss.
 7. Accuracy of 2.5 %.
 8. If it meets the above requirements, provide Kobold DPE Series, or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install sensors in accordance with the manufacturer's recommendations to sense the variables specified.
- B. Mount sensors securely. Mountings shall be suitable for the environment within which the sensor operates.
- C. Install sensors as required to properly sense the controlled medium. Sensor locations shall be such that access to the instruments can be obtained for service and removal. If the installation location is found to be unacceptable by the Consultant, then the sensors shall be relocated as directed at no additional cost to the Owner.
- D. Sensors mounted on water lines shall have isolation valves that shall enable the sensor to be easily removed without the need to drain any lines or portions of lines.

END OF SECTION