

## PART 1 - GENERAL

### 1.1 SUMMARY

- .1 Section Includes:
  - .1 Control devices integral to the Building Energy Monitoring and Control System (EMCS): Sensors, controls, dampers, damper operators, valves, and valve actuators.

### 1.2 REFERENCES

- .1 Canadian Standards Association (CSA International).
  - .1 CSA-C22.1-15, Canadian Electrical Code, Part 1 (19th Edition), Safety Standard for Electrical Installations.

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit shop drawings and manufacturer's installation instructions.
- .2 Manufacturer's Instructions:
  - .1 Submit manufacturer's installation instructions for specified equipment and devices.

### 1.4 EXISTING CONDITIONS

- .1 Repair surfaces damaged during execution of Work.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- .1 Control devices of each category to be of same type and manufacturer.
- .2 External trim materials to be corrosion resistant. Internal parts to be assembled in watertight assembly.
- .3 Operating conditions: 0 - 32 degrees C with 10 - 90% RH (non-condensing) unless otherwise specified.
- .4 Terminations: use standard conduit box with slot screwdriver compression connector block unless otherwise specified.
- .5 Transmitters and sensors to be unaffected by external transmitters including walkie talkies.
- .6 Account for hysteresis, relaxation time, maximum and minimum limits in applications of sensors and controls.

- .7 Outdoor installations: use weatherproof construction in NEMA 4 enclosures.
- .8 Devices installed in user occupied space not exceed Noise Criteria (NC) of 30. Noise generated by any device must not be detectable above space ambient conditions.

## 2.2 TEMPERATURE SENSORS

- .1 General: except for room sensors to be resistance or thermocouple type to following requirements:
  - .1 Thermocouples: limit to temperature range of 200 degrees C and over.
  - .2 RTD's: 100 or 1000 ohm at 0 degrees C (plus or minus 0.2 ohms) platinum element with strain minimizing construction, 3 integral anchored lead wires. Coefficient of resistivity: 0.00385 ohms/ohm degrees C.
  - .3 Sensing element: hermetically sealed.
  - .4 Stem and tip construction: copper or type 304 stainless steel.
  - .5 Time constant response: less than 3 seconds to temperature change of 10 degrees C.
  - .6 Immersion wells: NPS 3/4, stainless steel spring loaded construction, with heat transfer compound compatible with sensor. Insertion length 100mm.

## 2.3 CARBON DIOXIDE SENSORS

- .1 Shall be wall mounted, with sensing range from 0 to 2000 ppm, suitable for monitoring through the building automation system.
- .2 Sensors shall control the meeting room exhaust fans through the building automation system, starting the fan when the meeting room CO2 concentration rises above 1100 ppm.

## 2.4 WIRING

- .1 For wiring under 70 volts use FT6 rated wiring where wiring is not run in conduit. Other cases use FT4 wiring.
- .2 Wiring must be continuous without joints.
- .3 Sizes:
  - .1 Field wiring to digital device: #18AWG 20AWG stranded twisted pair.
  - .2 Analog input and output: shielded #18 minimum solid copper #20 minimum stranded twisted pair.

## 2.5 LINE VOLTAGE WIRING

- .1 The controls contractor shall be responsible to supply and install all necessary 120V power supplies to his controllers, terminal equipment controllers, and any other components associated with his installation to provide a complete and fully operational automation system. Retain appropriate trades as requires. All electrical installations shall be performed as per the electrical specification. Source the power supply from appropriate local branch panels.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- .1 Install equipment, components so that manufacturer's and CSA labels are visible and legible after commissioning is complete.
- .2 Install field control devices in accordance with manufacturers recommended methods, procedures and instructions.
- .3 Fire stopping: provide space for fire stopping. Maintain fire rating integrity.
- .4 Electrical:
  - .1 Complete installation in accordance with Section 26 05 00 - Common Work Results for Electrical.
  - .2 Modify existing starters to provide for EMCS as indicated in I/O Summaries and as indicated.
  - .3 Terminate wires with screw terminal type connectors suitable for wire size, and number of terminations.
  - .4 Install communication wiring in conduit.
    - .1 Provide complete conduit system to link Building Controllers, field panels and OWS(s).
    - .2 Conduit sizes to suit wiring requirements and to allow for future expansion capabilities specified for systems.
    - .3 Maximum conduit fill not to exceed 40%.
    - .4 Design drawings do not show conduit layout.
  - .5 Do not run exposed conduits in normally occupied spaces unless otherwise indicated or unless impossible to do otherwise. Departmental Representative to review before starting Work. Wiring in mechanical rooms, wiring in service rooms and exposed wiring must be in conduit.
- .5 VAV Terminal Units: supply, install and adjust as required.
  - .1 Air probe, actuator and associated vav controls.

.2 Tubing from air probe to dp sensor as well as installation and adjustment of air flow sensors and actuators.

.3 Co-ordinate air flow adjustments with balancing trade.

.4 VAV box shall modulate open whenever the space temperature rises above the setpoint, up to the VAV box maximum setting. Similarly, the VAV box shall modulate close as the space temperature drops below the setpoint, down to the VAV box minimum setting.

.6 Meeting room fan:

.1 The wall mounted carbon dioxide (CO2) sensor shall start the meeting room exhaust fan at a CO2 concentration of 1100 ppm, and stop the fan at a concentration of 700 ppm.

### 3.2 TEMPERATURE SENSORS

.1 Stabilize to ensure minimum field adjustments or calibrations.

.2 Readily accessible and adaptable to each type of application to allow for quick easy replacement and servicing without special tools or skills.

### 3.3 PANELS

.1 Arrange for conduit and tubing entry from top, bottom or either side.

.2 Wiring and tubing within panels: locate in trays or individually clipped to back of panel.

.3 Identify wiring and conduit clearly.

### 3.4 IDENTIFICATION

.1 Identify field devices.

### 3.5 TESTING AND COMMISSIONING

.1 Calibrate and test field devices for accuracy and performance.

END OF SECTION