

Part 1 General

1.1 SUMMARY

.1 Section Includes:

- .1 Control devices integral to the Building Energy Monitoring and Control System (EMCS): thermostats, valves, valve actuators and low voltage current transformers.
 - .1 Section 25 01 11 - EMCS: Start-Up, Verification and Commissioning.
 - .2 Section 25 05 02 - EMCS: Shop Drawings, Product Data and Review Process.
 - .3 Section 25 90 01 - EMCS: Site Requirements Applications and Systems Sequences of Operation.
 - .4 Section 26 05 00 - Common Work Results - Electrical.
 - .5 Section 26 27 10 - Modular Wiring System.
 - .6 Section 26 27 26 - Wiring Devices.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI).
 - .1 ANSI C12.7-1993 (R1999), Requirements for Watthour Meter Sockets.
 - .2 ANSI/IEEE C57.13-1993, Standard Requirements for Instrument Transformers.
- .2 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM B148-97(03), Standard Specification for Aluminum-Bronze Sand Castings.
- .3 National Electrical Manufacturer's Association (NEMA).
 - .1 NEMA 250-03, Enclosures for Electrical Equipment (1000 Volts Maximum).
- .4 Air Movement and Control Association, Inc. (AMCA).
 - .1 AMCA Standard 500-D-98, Laboratory Method of Testing Dampers For Rating.
- .5 Canadian Standards Association (CSA International).
 - .1 CSA-C22.1-02, Canadian Electrical Code, Part 1 (19th Edition), Safety Standard for Electrical Installations.

1.3 SUBMITTALS

- .1 Submit shop drawings and manufacturer's installation instructions in accordance with Section 25 05 02 - EMCS: Submittals and Review Process.

- .2 Pre-Installation Tests.
 - .1 Submit samples at random from equipment shipped, as requested by Departmental Representative, for testing before installation. Replace devices not meeting specified performance and accuracy.
- .3 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions for specified equipment and devices.

Part 2 Products

2.1 GENERAL

- .1 Control devices of each category to be of same type.
- .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 Account for hysteresis, relaxation time, maximum and minimum limits in applications of sensors and controls.
- .6 Outdoor installations: use weatherproof construction in NEMA 4 enclosures.
- .7 Devices installed in user occupied space not exceed Noise Criteria (NC) of 35. Noise generated by any device must not be detectable above space ambient conditions.

2.2 THERMOSTATS

- .1 Thermostats shall be 2 position or modulating as per the operating sequence. A stand alone programmable controller will be acceptable to complete all functions described in the sequence in lieu of individual controllers, LCD thermostat is to have multiple adjustment points for all described adjustable points.
- .2 Room temperature thermostats and display wall modules.
 - .1 Temperature sensing and display wall module.
 - .1 Sensors will match existing site sensors, exactly.
 - .2 Buttons for occupant selection of temperature setpoint.
 - .3 Accuracy 0.2 degrees C over range of 0 to 70 degrees C.
 - .4 Stability 0.02 degrees C drift per year.
 - .5 Separate mounting base for ease of installation.
- .3 Duct temperature sensors:
 - .1 General purpose duct type: suitable for insertion into ducts at various orientations, insertion length 460 mm. Provide proper mounting hardware.
- .4 Outdoor thermostat provide bulb style thermostats as required. Mount bulbs on the outside of building in a suitable enclosure on the north wall.
- .5 Freeze stat: to be manual reset.

2.3 ELECTROMECHANICAL RELAYS

- .1 Requirements:

- .1 Double voltage, DPDT, plug-in type with termination base.
- .2 Coils: rated for 120V AC or 24V DC. Other voltage: provide transformer.
- .3 Contacts: rated at 5 amps at 120V AC.
- .4 Relay to have visual status indication

2.4 CONTROL VALVES

- .1 Underfloor: 2 position, 24V, 3 way valves.
- .2 Preheat/Reheat: fully modulating, 24V, ball valve 2 way.

2.5 WIRING

- .1 In accordance with Section 26 27 26 - Wiring Devices.
- .2 For wiring under 70 volts use FT6 rated wiring where wiring is not run in conduit. Other cases use FT4 wiring.
- .3 Wiring must be continuous without joints.
- .4 Sizes:
 - .1 Field wiring to digital device: #18AWG.
 - .2 Analog input and output: as per panel manufacturers requirements.

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 Electrical:
 - .1 Complete installation in accordance with Section 26 05 00 - Common Work Results - Electrical.
 - .2 Terminate wires with screw terminal type connectors suitable for wire size, and number of terminations.
 - .3 Install wiring in conduit.
 - .1 Conduit sizes to suit wiring requirements and to allow for future expansion capabilities specified for systems.
 - .2 Maximum conduit fill not to exceed 40%.
 - .3 Design drawings do not show conduit layout.
 - .4 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.
- .4 Mechanical: supply and install as required.
 - .1 Pipe Taps.
 - .2 Wells and Control Valves.
 - .3 Air flow stations, dampers, and other devices.

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 Duct installations:
 - .1 Do not mount in dead air space.
 - .2 Locate within sensor vibration and velocity limits.
 - .3 Securely mount extended surface sensor used to sense average temperature.
 - .4 Thermally isolate elements from brackets and supports to respond to air temperature only.
 - .5 Support sensor element separately from coils, filter racks.
- .4 Thermowells: install for piping installations.
 - .1 Locate well in elbow where pipe diameter is less than well insertion length.
 - .2 Thermowell to restrict flow by less than 30%.
 - .3 Use thermal conducting paste inside wells.

END OF SECTION