

SECTION 230900 - HVAC CONTROL SYSTEM

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Thermostats, temperature transmitters, controllers, automatic valves, dampers, damper operators, control panels, accessory control equipment, and a complete system to provide the specified sequence of operation with the Energy Management system as shown in Construction Documents.
2. Control System shall employ electronic sensing and electric actuation on all proportional, proportional integral, or 2 position control routines required by the sequence of operation or as specified.

B. Related Sections:

1. 230529 - Hangers and Specialties (HVAC).
2. 260519 – Low-Voltage Electrical Power Conductors and Cables.
3. 262923 – Variable Frequency Motor Controllers.

1.2 SUBMITTALS

- A. Control System: Temperature control and wiring diagrams and sequence of operations. Furnish sets of wiring diagrams to electrical contractor for wiring as provided in Division 16.
- B. Control System Components: Catalog cuts.
- C. Valves, Dampers, and Operators: Catalog cuts, performance data, schedules showing proposed installation location, sizes, and capacities.
- D. System warranty.
- E. Contract Closeout Submittals: After completion of control system installation, control system manufacturer shall furnish 4 sets of operating and maintenance instructions, including complete control system “as-built” diagrams.

1.3 MAINTENANCE

- A. The Owner shall be fully instructed in the operation and maintenance of the environmental control system before substantial completion or beneficial occupancy of the project by the Owner.

- B. Automatic temperature control manufacturer shall furnish a service contract for the system as specified, for 1 year after substantial completion of system.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Control Systems:
 - 1. Johnson Controls Inc.
 - 2. Trane Inc.
 - 3. Control Systems International (CSI).
 - 4. Or Approved Equal

2.2 EQUIPMENT

- A. Electric Actuated Valves:
 - 1. Proportioning automatic valves shall have a plug and disc inner valve to insure modulation of flow.
 - 2. Valve operators shall have power to insure tight seating against the specified working pressures.
 - 3. Valves 2" and smaller shall have screwed connections and valves 2-1/2" and larger shall be flanged.
 - 4. Valves shall have self-sealing packing, arranged to tighten the seal as the water pressure increases, to eliminate manual adjustments.
- B. Damper Operators:
 - 1. Damper operators shall be fully proportioning unless otherwise specified.
 - 2. Operators shall have ample power to overcome friction of damper linkages and air pressure acting on the louvers.
 - 3. The damper operator mounting arrangement shall be outside the air stream wherever possible.

- a. The operators shall be capable of operating in sequence when required by the sequence of operation.
 - b. The operator shall have external adjustable stops to limit the stroke in either direction.
 - c. The operator linkage arrangement shall allow for normally open or normally closed positions of the dampers as required.
- C. Dampers:
1. Control dampers shall be substantially built in steel frames fabricated from 2 inch channels or equal.
 - a. Frames shall be equipped with brass trunnions and bearings and blade end stops.
 - b. Damper blades shall be galvanized steel, maximum blade width shall be 6 inches.
 - c. Furnish corner braces for all damper frames exceeding a 4 square foot area.
 - d. Maximum width of any section shall be 48 inches and maximum height shall be 96 inches.
 - e. Furnish horizontal stiffening for any section exceeding 48 inches in height.
 2. Where low leakage or shutoff dampers are indicated, provide replaceable butyl rubber seals with the damper.
 - a. Install seals along each blade and end stops.
 - b. Seals shall provide a tight closing low leakage damper.
 - c. Leakage and flow characteristic charts must be submitted to A/E before approval of dampers.
 - d. Outdoor air and exhaust air shall be the low leakage type as specified.
 3. Modulating dampers shall be opposed blade operation type and 2 position dampers shall be parallel blade type. Smoke dampers shall meet NFPA 90A requirements.
- D. Differential Pressure Switches shall be diaphragm actuated type with a single pole double throw snap acting switch.

1. Motion of the diaphragm shall be restrained by a calibrated spring that can be adjusted to set the exact pressure differential to actuate the electrical switch.
 2. Motion of the diaphragm shall be transmitted to the switch button by means of a direct mechanical linkage.
- E. Local Control Panels:
1. Controllers, relays, switches, etc., for equipment located within the mechanical equipment rooms shall be mounted next to the system controlled.
 - a. Temperature setting, adjustments, and calibration shall be made at the system control panel.
 - b. Panel shall be extruded alloy with a baked prime coat enamel finish.
 2. Provide LED digital thermometers on the local panels. Temperature indications shall be provided for each point of temperature measurement for control and additionally for those points as outlined in this specification or shown on Construction Documents.
 3. Details of each panel shall be submitted for approval before fabrication.
 - a. Locations of each panel are to be convenient for adjustment and service.
 - b. Provide engraved nameplates beneath each panel mounted control device and air gage clearly describing the function of said device and range of operation.
 - c. Manual switches, dial thermometers, and indicating air gages shall be flush mounted on the hinged door.
 4. Electrical devices within the panels shall be factory prewired to a numbered terminal strip. Wiring within the panel shall be according to NEMA and UL standards and shall meet local codes.
- F. Temperature Elements: RTD's that provide rapid linear responses using a precision nickel wire wound element. No thermistors will be acceptable. Configuration will be available for mounting in:
1. Room.
 2. Duct.
- G. Flow Switches: Equivalent to FG1KB able to detect flow on refrigeration and heating systems. It shall provide a SPDT contact for liquid flow sensing. Paddles shall accommodate pipe diameters up to 10 inches.

- H. Miscellaneous Devices: Provide necessary relays, cumulators, 3-way air valves, positioners, pneumatic/ electric switches, solenoid valves, switches, relays, clocks, transformers, and other appurtenances to make a complete and operable system.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Sequence of Operation:

1. Sequence of operation shall be as indicated in Construction Documents.
2. Where motors are shown on the electrical drawings to be provided with “Hand-Off-Auto” switch in starter, automatic or remote control devices shall be connected in “auto” position. Any safety device, such as firestats or smoke detector, shall be connected in “hand” and “auto” position.

3.2 FIELD QUALITY CONTROL

- A. After completion of installation, Building Automation System manufacturer shall regulate and adjust thermostats control valve actuators, damper actuators, and additional equipment provided under this contract. Place components in operating condition subject to approval of A/E and supply any service incidental to proper performance of temperature control system under guarantee outlined above.

END OF SECTION