

SECTION 230913 - INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Thermostats.
- B. Automatic dampers.
- C. Damper operators.
- D. Miscellaneous accessories.

1.2 RELATED REQUIREMENTS

- A. Section 230548 - Vibration and Seismic Controls for HVAC Piping and Equipment.
- B. Section 230519 - Meters and Gages for HVAC Piping: Thermometer sockets, gage taps.
- C. Section 233300 - Air Duct Accessories: Installation of automatic dampers.
- D. Section 230993 - Sequence of Operations for HVAC Controls.
- E. Section 262717 - Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS

- A. AMCA 500-D - Laboratory Methods for Testing Dampers for Rating; Air Movement and Control Association International, Inc.; 2007.
- B. ASTM D1693 - Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics; 2008.
- C. NEMA DC 3 - Residential Controls - Electrical Wall-Mounted Room Thermostats; National Electrical Manufacturers Association; 2008.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.
- E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilation Systems; National Fire Protection Association; 2009.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.5 SUBMITTALS

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.
- C. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.
- D. Design Data: Provide design data for sizing and selection of compressor.
- E. Manufacturer's Instructions: Provide for all manufactured components.
- F. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors.
 - 1. Revise shop drawings to reflect actual installation and operating sequences.
- G. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.
- H. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.

1.6 QUALITY ASSURANCE

- A. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this work and licensed at the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years experience approved by manufacturer.

- D. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.7 WARRANTY

- A. See Section 017700 - Closeout Procedures, for additional warranty requirements.
- B. Correct defective Work within a five year period after Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Johnson Controls.
- B. Other Acceptable Manufacturers:
 - 1. Trane.
 - 2. Carrier.
- C. Substitutions: See Section 016000 - Product Requirements.

2.2 EQUIPMENT - GENERAL

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.3 DAMPERS

- A. Performance: Test in accordance with AMCA 500-D.
- B. Frames: Galvanized steel, welded or riveted with corner reinforcement, minimum 12 gage (2.7 mm).
- C. Blades: Galvanized steel, maximum blade size 8 inches (200 mm) wide, 48 inches (1200 mm) long, minimum 22 gage (0.85 mm), attached to minimum 1/2 inch (13 mm) shafts with set screws.
- D. Blade Seals: Synthetic elastomeric inflatable mechanically attached, field replaceable.
- E. Jamb Seals: Spring stainless steel.
- F. Shaft Bearings: Oil impregnated sintered bronze.
- G. Linkage Bearings: Oil impregnated sintered bronze.

- H. Leakage: Less than one percent based on approach velocity of 2000 ft/min (10 m/sec) and 4 inches wg (1.0 kPa).
- I. Maximum Pressure Differential: 6 inches wg (1.5 kPa).
- J. Temperature Limits: -40 to 200 degrees F (-40 to 93 degrees C).
- K. Product:
 - 1. Substitutions: See Section 016000 - Product Requirements.

2.4 DAMPER OPERATORS

- A. General: Provide smooth proportional control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.
 - 1. Provide sufficient number of operators to achieve unrestricted movement throughout damper range.
 - 2. Provide one operator for maximum 36 sq ft (3.24 sq m) damper section.
- B. Electric Operators:
 - 1. Spring return, adjustable stroke motor having oil immersed gear train, with auxiliary end switch.
 - 2. Product:
 - a. Substitutions: See Section 016000 - Product Requirements.

2.5 INPUT/OUTPUT SENSORS

- A. Damper Position Indication: Potentiometer mounted in enclosure with adjustable crank arm assembly connected to damper to transmit 0 - 100 percent damper travel.
- B. Carbon Monoxide Detectors:
 - 1. Single or multichannel dual level detectors, using solid state sensors with three year minimum life. Sensor replacement shall take maximum 15 minutes. Suitable over temperature range of 23 to 130 degrees F (-5 to 55 degrees C).
 - 2. Provide individual indicators and contractors for each level, initially calibrated for 50 ppm and 100 ppm.
 - 3. Maximum response time to 100 ppm CO calibration gas: Two minutes.
 - 4. Product:
 - a. Substitutions: See Section 016000 - Product Requirements.

2.6 THERMOSTATS

- A. Electric Room Thermostats:

1. Type: NEMA DC 3, 24 volts, with setback/setup temperature control.
 2. Service: cooling only.
 3. Covers: Locking with set point adjustment, with thermometer.
 4. Product:
 - a. Substitutions: See Section 016000 - Product Requirements.
- B. Line Voltage Thermostats:
1. Integral manual On/Off/Auto selector switch, single or two pole as required.
 2. Dead band: Maximum 2 degrees F (one degree C).
 3. Cover: Locking with set point adjustment, with thermometer.
 4. Rating: Motor load.
 5. Product:
 - a. Substitutions: See Section 016000 - Product Requirements.
- C. Room Thermostat Accessories:
1. Thermostat Covers: Brushed aluminum.
 2. Insulating Bases: For thermostats located on exterior walls.
 3. Thermostat Guards: Metal mounted on separate base.
 4. Adjusting Key: As required for device.
 5. Aspirating Boxes: Where indicated for thermostats requiring flush installation.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that systems are ready to receive work.
- C. Beginning of installation means installer accepts existing conditions.
- D. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.
- E. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.
- F. Ensure installation of components is complementary to installation of similar components.
- G. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check and verify location of thermostats with plans and room details before installation. Locate 60 inches (1500 mm) above floor. Align with lighting switches and humidistats. Refer to Section 262726.
- C. Provide guards on thermostats in entrances.
- D. Provide mixing dampers of opposed blade construction arranged to mix streams. Provide pilot positioners on mixed air damper motors. Provide separate minimum outside air damper section adjacent to return air dampers with separate damper motor.
- E. Provide isolation (two position) dampers of parallel blade construction.
- F. Provide conduit and electrical wiring in accordance with Division 26. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

3.3 MAINTENANCE

- A. See Section 017823 - Operation and Maintenance Data, for additional requirements relating to maintenance service.
- B. Provide service and maintenance of control system for one year from Date of Substantial Completion.
- C. Provide complete service of controls systems, including call backs, and submit written report of each service call.
- D. In addition to normal service calls, make minimum of 1 complete normal inspections of approximately 4 hours duration to inspect, calibrate, and adjust controls.

END OF SECTION