

**SECTION 23 09 00
INSTRUMENTATION AND CONTROL FOR HVAC**

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Thermostats.
 - 2. Control valves.

1.2 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Coordinate submittals with information requested in Section 23 09 93.
- C. Product Data: Submit description and engineering data for each control system component. Include sizing as required.
- D. Manufacturer's Installation Instructions: Submit installation requirements for each control component.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.3 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors.
- C. Operation and Maintenance Data: Submit inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Accept controls on site in original factory packaging Inspect for damage.

1.5 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate installation of control components in piping systems with work of Section 23 21 16.
- C. Coordinate installation of control components in duct systems with work of Section 23 33 00.

1.6 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

- B. Furnish five year manufacturer warranty for each control system component.

PART 2 PRODUCTS

2.1 CONTROL COMPONENT MANUFACTURERS

- A. Manufacturers:
 - 1. Honeywell, Building Control Solutions.
 - 2. Johnson Controls, Inc.
 - 3. Siemens Building Technologies, Inc.

2.2 THERMOSTATS

- A. Manufacturers:
 - 1. Carrier Model TSATCCPHP01-B
 - 2. Approved equal.
- B. Electric Room Thermostats:
 - 1. Type: NEMA DC 3, 24 volts, with seven day programmable setback/setup temperature control
 - 2. Service: Automatic changeover, cooling and heating, one step cooling and two step heating.
 - 3. Covers: Locking with setpoint indication with thermometer.
- C. Room Thermostat Accessories:
 - 1. Thermostat Covers: Brushed aluminum
 - 2. Thermostat Guards: Metal mounted on separate base.
 - 3. Adjusting Key: Matching device.
- D. Electric Low Limit Duct Thermostat:
 - 1. Snap acting, single pole, single throw, automatic reset switch tripping when temperature sensed across any 12 inches of bulb length is equal to or below set point.
 - 2. Bulb length: Minimum 20 feet.
 - 3. Furnish one thermostat for every 20 sq. ft of coil surface.

2.3 CONTROL VALVES

- A. Manufacturers:
 - 1. Taco Model 5431
 - 2. Approved equal
- B. Terminal Finned Tube Radiation Unit Control Valves:
 - 1. Brass body, Class 250, nickel plated brass ball, with optimizer insert for modulating applications, blow out resistant stem, threaded ends.
 - 2. Two way as indicated in schedule or on Drawings.
 - 3. Integral non-electric actuator.
 - 4. Furnish non-spring return valves with manual override capability built into actuator.
 - 5. Minimum Fluid Temperature: 20 degrees F.
 - 6. Maximum Operating Conditions: 250 degrees F.
 - 7. Sizing: 4 psig maximum pressure drop at design flow rate.
 - 8. Flow Characteristics: Furnish two-way valves with equal percentage characteristics.

2.4 ELECTRICAL CHARACTERISTICS AND COMPONENTS

- A. Motors: In accordance with Section 23 05 13.

- B. Disconnect Switch: Factory mount disconnect switch on equipment as indicated on equipment schedules.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify air handling units and ductwork installation is complete and air filters are in place before installing sensors in air streams.
- C. Verify location of thermostats and other exposed control sensors with Drawings before installation.
- D. Verify building systems to be controlled are ready to operate.

3.2 INSTALLATION

- A. Install thermostats and other exposed control sensors 54 inches above floor. Align with light switches.
- B. Install freeze protection thermostats using flanges and element holders.
- C. Install outdoor reset thermostats and outdoor sensors indoors, with sensing elements outdoors.
- D. Provide separable sockets for liquids and flanges for air bulb elements. Refer to Section 23 21 16.
- E. Install guards on thermostats in public areas and as indicated on Drawings.

3.3 FIELD QUALITY CONTROL

- A. Section [01 40 00 - Quality Requirements] [01 70 00 - Execution and Closeout Requirements]: Field inspecting, testing, adjusting, and balancing.
- B. After completion of installation, test and adjust control equipment. Submit data showing set points and final adjustments of controls.

3.4 DEMONSTRATION AND TRAINING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.
- B. Demonstrate complete operation of systems, including sequence of operation prior to Date of Substantial Completion.
- C. Demonstrate complete and operating system to Owner.

END OF SECTION 23 09 00