

SECTION 15910

CONTROL INSTRUMENTATION AND HARDWARE

PART 1 GENERAL

1.1 SUMMARY

- A. This Section describes specific requirements, products, and methods of execution relating to the field hardware related to HVAC controls for the project.

PART 2 PRODUCTS

2.1 TEMPERATURE SENSORS/THERMOSTATS

- A. Room sensors/thermostats for zone temperature control of VAV boxes, finned tube radiation and reheat coils. Provide the following features
1. LCD display, day/night override button, and setpoint slide adjustment, or keypad override options. The setpoint slide adjustment shall be software limited by the automation system to limit the amount of room adjustment.
 2. Temperature monitoring range: 55/95 degrees F.
 3. Output signal: Changing resistance.
 4. Accuracy at Calibration point: plus or minus 0.5 degree F.
 5. Set Point and Display Range: 55 degrees to 95 degrees F.
 6. Wall Mounted unit with finished cover.
 7. Control system network connection port for Portable Operator Terminal.
- B. Space temperature sensors/thermostats for use with unit heaters, cabinet unit heaters:
1. Digital display.
 2. Temperature monitoring range: 55/95 degrees F.
 3. Output signal: Changing resistance.
 4. Setpoint slide adjustment
 5. Accuracy at Calibration point: plus or minus 0.5 degree F.
 6. Setpoint and Display Range: 55 degrees to 95 degrees F.
 7. Wall Mounted unit with finished cover.
- C. Liquid immersion temperature:
1. Temperature monitoring range: Minus 40 to plus 240 degrees F.
 2. Output signal: Changing resistance.
 3. Accuracy at Calibration point: Plus or minus 0.5 degree F.
 4. Provide immersion sensor assembly as specified. Immersion sensors shall include a separate thermowell for sensor installation. Annular space between well and sensor shall be filled with heat conductive compound.

- D. Duct (single point) temperature:
 - 1. Temperature monitoring range: 20 to 120 degrees F.
 - 2. Output signal: Changing resistance.
 - 3. Accuracy at Calibration point: plus or minus 0.5 degree F.
 - 4. Sensing element shall be located a minimum of 25 percent across duct width.
- E. Duct Average temperature:
 - 1. Temperature monitoring range: 20 to 120 degrees F.
 - 2. Output signal: Changing resistance.
 - 3. Accuracy at Calibration point: plus or minus 0.5 degree F.
 - 4. Sensor Probe Length: 25 feet.
- F. Outside air temperature:
 - 1. Temperature monitoring range: Minus 58 to 122 degrees F.
 - 2. Output signal: Changing resistance.
 - 3. Accuracy at Calibration point: plus or minus 0.5 degree F.
 - 4. Provide NEMA3R rated mounting assembly (rain tight).

2.2 THERMOSTAT GUARDS

- A. Provide in areas where activity may damage thermostat.

2.3 CURRENT SENSORS

- A. Provide current sensors that convert AC current to a proportional (4-20ma) DC current. Accuracy 0.5 percent full range, repeatability 0.1 percent full range. Reverse voltage and high over current capacity, operating range minus 58 degrees F. to 149 degrees F.
- B. Nielsen-Kuljian, Veris or approved equal.

2.4 CURRENT SENSING RELAYS

- A. Provide current sensing relays for status of fans or pumps as called out in sequences or input/output summary. Provide with field adjustable current setpoint range.
- B. Nielsen-Kuljian, Veris or approved equal.

2.5 CONTROL DAMPERS

- A. Provide low leakage control dampers with leakage no greater than 10 CFM per square foot at 4 in. W.C. with 20 in.-lbs. torque applied regardless of size.

2.6 ELECTRIC DAMPER AND VALVE ACTUATORS

- A. All modulating damper and valve actuators shall be 24vac electric motor type; floating point, 0-10Vdc, 4-20ma or other industry standard input signal type. Actuators shall function properly within the range of 85 to 110 percent of line voltage. (Specific applications may require 0-10 V spring return).

- B. Provide actuators in sufficient size, quantity and type to match application. Provide a minimum of one damper actuator for each 24 square feet of damper area. Damper areas shall not exceed manufacturer's ratings.

PART 3 EXECUTION

3.1 INSTALLATION OF EQUIPMENT, MATERIALS AND FIELD HARDWARE

- A. Install all sensors and control devices located out of doors or in high moisture areas in weatherproof housings.
- B. When proof of flow is specified, the flow proving device for constant volume fans and pumps shall be a current sensor connected to the motor wiring at the starter. Set upper alarm limit to the maximum rated current of the motor, or as advised by the TAB Agency. Set lower alarm limit at 1/2 the motor running amps. Current relays are not acceptable.
- C. Where proof of flow is specified for variable speed control system, the flow proof shall be made through utilization of the VFD trouble contacts and the loop control differential pressure sensor.
- D. Use differential pressure sensor for filter alarms: The sensor shall be installed across the inlet and discharge side of the filter. The sensor shall be sized for the application and be suitable to withstand all system operating pressures. Set filter alarm pressure as specified. Differential switches for filter alarms not allowed.
- E. Pressure Sensors: All pressure sensors located on liquid lines shall be provided with isolation valves, snubbers, and plugged calibration ports.

3.2 TEMPERATURE SENSORS/THERMOSTATS

- A. Temperature sensors shall require no field calibrations.
- B. Sensors shall be with enclosure where located in finished space.
- C. Room sensors/thermostats installed in public spaces shall be mounted at a height of four feet six inches. Provide locking guards over sensors where shown. Temperature sensor assemblies shall be readily accessible and adaptable to each type of application. Sensor assemblies shall allow for quick, easy replacement and servicing without special tools or skills. Coordinate with Architect and Engineer.
- D. Provide insulated base for room sensors mounted on sheet metal, steel columns or exterior walls. Where insulated bases are installed, caulk all wire penetrations airtight for prevention of thermal convection.

3.3 FILTER DIFFERENTIAL PRESSURE SENSORS AND GAUGES

- A. Provide one gauge for each filter bank where sensors are installed.
- B. Mount gauges and sensors with the appropriate sensing tubes located on the equipment being measured.

END OF SECTION