SECTION 23 09 13 - INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

PART 1 GENERAL

1.01 REFERENCE STANDARDS


1.02 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, 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. Manufacturer's Qualification Statement.
E. Installer's Qualification Statement.
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.

1.03 WARRANTY

A. Correct defective work within a five year period after Substantial Completion.
B. Provide five year manufacturer's warranty for control air compressors.
PART 2 PRODUCTS

2.01 EQUIPMENT - GENERAL

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

2.02 UNIVERSITY GUIDELINES AND REQUIREMENTS

A. TEMPERATURE SENSORS:

1. Resistance Temperature Detectors (RTD's):
   a. Standard: Siemens 1000 Ohm Platinum RTD, Model Number PTM6.2P1K.
   b. Exception: Thermistors are required in some zone applications such as VAV boxes, and may only be used in those areas.
   c. Function: Use for air handlers, Hot Water (HW) and Chilled Water (CHW). Do not install in piping tee. Connect to Energy Management System (EMS) by Siemens.

B. DIFFERENTIAL PRESSURE SENSORS:

1. Resistance Temperature Detectors (RTD's):
   a. Siemens Sitrans 7MF4433 with 3-valve manifold and local display.
   c. Function: Measure differential pressure for monitoring and control of variable speed pumps.
   d. Website: http://www.emersonprocess.com/rosemount/Products/Pressure/m1151.html

C. MOTOR CONTROLS:


2. Function: Connect to Campus Energy Management System (EMS) by Siemens as a Field Level Network (FLN) device to provide direct communication (not hardwired start/stop/status). Proof through drive and via current switches.
2.03 AIR SUPPLY SYSTEM

A. Compressor and Receivers:
   1. Simplex belt driven air compressor and tank unit with belt guard, silencers, flexible connections, air filter, automatic and manual drain assemblies, oil and particle filter for minimum 0.5 micron particles, pressure reducing valves, and pressure relief valves.
   2. Pressure Control: Zinc or aluminum castings, rated for service with elastomeric diaphragm, adjustable electric contacts.
      a. Set to start and stop compressor at 50 and 60 psig (340 and 445 kPa).
   3. Electrical Alternation Set: With motor starters to operate compressors alternately.

B. Pressure Regulators:
   1. Zinc or aluminum castings, rated for service with elastomeric diaphragm, balanced construction to automatically prevent pressure build up, and producing flat, reduced pressure curve for system capacity demand.

C. Particle Filters:
   1. Zinc or aluminum castings with filtration efficiency at rated air flow of 97 percent, rated for service with threaded connections, quick-disconnect service devices, aluminum bowl or plastic bowl with metal guard equipped with manual drain cock, to separate liquid and solid particles.

D. Combination Filter/Regulators:

E. Zinc or aluminum castings, rated for service with elastomeric diaphragm, balanced construction to automatically prevent pressure build up, and producing flat, reduced pressure curve for system capacity demand; with threaded pipe connections, quick-disconnect service devices, aluminum bowl or plastic bowl with metal guard equipped with manual drain cock to separate liquid and solid particles.

F. Airborne Oil Filters:
   1. Rated for service with filtration efficiencies of 99.9 percent for particles of 0.025 micron or larger particles of airborne lubricating oil.

G. Pressure Relief Valves:
1. ASME Code Rated and labeled for high pressure side and sized for installed capacity of pressure regulators at low pressure. Set at maximum 20 percent above low pressure.

H. Pressure Reducing Stations:

1. Assembly of two pressure regulators arranged in parallel to reduce high pressure air to required controls pressure.

I. Control and Instrumentation Tubing:

1. Copper Tube: ASTM B819 Type K, or ASTM B88 (ASTM B88M) Type K (A), seamless, H or O temper (drawn or annealed).


b. Joints: Solder, lead free, ASTM B32 HB alloy (95-5 tin-antimony), or tin and silver.

J. Refrigerated Air Dryers:

1. General Assembly: Self-contained, commercial quality, refrigerated, compressed air dryer complete with heat exchangers, moisture separator, and internal wiring and piping. Provide air inlet and outlet connections connected through manual by-pass valve.

2. Heat Exchangers: Air to refrigerant coils. Provide centrifugal type moisture separator located at discharge of compressed air complete with automatic trap assembly. Provide automatic control system to bypass refrigeration system on low or no load conditions.

3. Refrigeration Unit: Hermetically sealed, operating to maintain dew point of 0 degrees F (minus 18 degrees C) at 20 psig (138 kPa). House in steel cabinet with access door and panel.

2.04 CONTROL PANELS

A. Unitized cabinet type for each system under automatic control with relays and controls mounted in cabinet and temperature indicators, pressure gauges, pilot lights, push buttons and switches flush on cabinet panel face.

B. NEMA 250, general purpose utility enclosures with enameled finished face panel.

2.05 CONTROL VALVES

A. Globe Pattern:
1. Up to 2 inches (50 mm): Bronze body, bronze trim, rising stem, renewable composition disc, screwed ends with backseating capacity repackable under pressure.

2. Over 2 inches (50 mm): Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and disc.

3. Hydronic Systems:
   a. Rate for service pressure of 125 psig at 250 degrees F (860 kPa at 121 degrees C).
   b. Replaceable plugs and seats of stainless steel.
   c. Size for 3 psig (20 kPa) maximum pressure drop at design flow rate.

4. Steam Systems:
   a. Rate for service pressure of 125 psig at 250 degrees F (860 kPa at 121 degrees C).
   b. Replaceable plugs and seats of stainless steel. Pressure drop across any steam valve at maximum flow; as indicated on drawings.
   c. Size for 10 psig (70 kPa) inlet pressure and 5 psig (35 kPa) pressure drop.
   d. Valves shall have modified linear characteristics.

B. Butterfly Pattern:
1. Iron body, bronze disc, resilient replaceable seat for service to 180 degrees F (82 degrees C) wafer or lug ends, extended neck.

2. Hydronic Systems:
   a. Rate for service pressure of 125 psig at 250 degrees F (860 kPa at 121 degrees C).
   b. Size for 1 psig (7 kPa) maximum pressure drop at design flow rate.

C. Pneumatic Operators:
1. Rolling diaphragm, spring loaded, piston type with spring range as indicated.

2. Valves shall spring return to normal position as indicated on freeze, fire, or temperature protection.

3. Select operator for full shut off at maximum pump differential pressure.

D. Electronic Operators:
1. Valves shall spring return to normal position as indicated on freeze, fire, or temperature protection.

2. Select operator for full shut off at maximum pump differential pressure.

E. Radiation Valves:
   1. Bronze body, bronze trim, 2 or 3 port as indicated, replaceable plugs and seats, union and threaded ends.
   2. Rate for service pressure of 125 psig at 250 degrees F (860 kPa at 121 degrees C).

2.06 DAMPERS
   A. Performance: Test in accordance with AMCA 500-D.
   B. Frames: Galvanized steel, welded or riveted with corner reinforcement, minimum 12 gage, 0.1046 inch (2.66 mm).
   C. Blades: Galvanized steel, maximum blade size 8 inches (200 mm) wide, 48 inches (1200 mm) long, minimum 22 gage, 0.0299 inch (0.76 mm), attached to minimum 1/2 inch (13 mm) shafts with set screws.

2.07 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.
   B. Pneumatic Operators:
      1. Rolling diaphragm piston type with adjustable stops.
      2. Pilot Positioners: Starting point adjustable from 2 to 12 psig (15 to 83 kPa) and operating span adjustable from 5 to 13 psig (35 to 90 kPa).
   C. Electric Operators:
      1. Spring return, adjustable stroke motor having oil immersed gear train, with auxiliary end switch.
   D. Inlet Vane Operators:
1. High pressure with pilot positioners and sufficient force to move vanes when fan is started with vanes in closed position. Return vane operator to closed position on fan shutdown.

2.08 HUMIDISTATS
   
   A. Room Humidistats:
      1. Wall mounted, proportioning type.

   B. Limit Duct Humidistats:
      1. Insertion, two position type.

2.09 INPUT/OUTPUT SENSORS
   
   A. Temperature Sensors:
      1. Use thermistor or RTD type temperature sensing elements with characteristics resistant to moisture, vibration, and other conditions consistent with the application without affecting accuracy and life expectancy.

   B. Carbon Dioxide Sensors, Duct and Wall:
      1. General: Provide non-dispersive infrared (NDIR), diffusion sampling CO2 sensors with integral transducers and linear output.

2.10 THERMOSTATS
   
   A. Pneumatic Room Thermostats:

   B. Electric Room Thermostats:

   C. Line Voltage Thermostats:

   D. Airstream Thermostats:

2.11 LEVEL SWITCHES
   
   A. Float Sensors:
      1. Boiler Water Level Control:

END OF SECTION  23 09 13