

SECTION 230993 - SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 23 Section “Common Work Results for Mechanical”
 - 2. Section 230900 – Instrumentation and Control for HVAC for control equipment and devices and submittal requirements.
 - 3. Division 23 – Direct Fired HVAC Units for control interface
 - 4. Division 23 Section “Testing, Adjusting, and Balancing”
 - 5. Division 26

1.2 SUMMARY

- A. This Section includes control sequences for HVAC systems, subsystems, and equipment. Provide control devices, control software and control wiring as required for automatic operation of each sequence specified.
 - 1. Provide automatic control for system operation as described herein, although word “automatic” or “automatically”, is not used.
 - 2. Manual operation is limited only where specifically described; however, provide manual override for each automatic operation.
 - 3. Where manual start-up is called for, also provide scheduled automatic start-stop capabilities.
- B. The system is BAS controlled using electric actuation. Provide proportional-integral-derivative (PID) algorithms for all control programs.
- C. Functions called for in sequence of operations are minimum requirements and not to limit additional BAS system capabilities. Determine, through operation of the system, proportional bands, interval time, integral periods, adjustment rates, and any other input information required to provide stable operation of the control programs.
- D. All setpoints shall be monitored and adjustable. Setpoints listed herein are approximate. It is the responsibility of the BAS contractor to calibrate the system and all setpoints to actual working conditions once the system is on line.

PART 2 - SEQUENCES

2.1 GENERAL

- A. Coordinate with Section 11 40 00 and the Food Service Drawings.

2.2 EXHAUST FANS

A. Fans:

1. EF-25 (Cooking) shall automatically activate the exhaust fan whenever cooking operations occur (heat sensor) or by a wall switch. Refer to Food Service drawing FS-9.
2. EF-18 Steam Kettles: Fan energized by a local wall switch. Refer to Food Service drawing FS-10.
3. EF-41 (New Dishwasher): fan shall be wired to be energized whenever the dishwasher is ON. Wire the fan to start per the DW manufacturer's instruction manual and Sheet FS-12. EF-41 shall also start whenever MUA-1 is energized (see below).
4. EF-45 (Existing Dishwasher): fan shall be wired to be energized whenever the dishwasher is ON. Wire the fan to start per the DW manufacturer's instruction manual. EF-41 shall also start whenever MUA-1 is energized (see below).

B. Each kitchen EF will have a VFD. Current VFD status and operating conditions shall be monitored through its communications interface port. The interface shall monitor the following software points: VFD Hz, motor amps, motor runtime, VFD status, and "In fault condition".

C. During testing-adjusting-balancing, work in cooperation with the TAB contractor to correlate the measured exhaust CFM to the VFD Hz.

2.3 MAKEUP AIR SYSTEM

A. Provide start and stop interface relay, and relay to notify DDC system alarm condition.

B. Occupied mode shall be determined by: User defined occupancy schedule.

C. Outside Air Damper Control: When occupied, MUA OA/RA dampers shall modulate to track the kitchen exhaust fans.

1. Minimum outside air (20%) is required by the makeup air unit. Outdoor-air damper shall open when supply fan starts, and close when fan stops. EF-41 & EF-45 shall be interlocked to run anytime MUA-1 is energized; these fans serve to exhaust the required minimum OA.
2. Monitor the exhaust fan Hz of all exhaust fans as an indicator of CFM. As each fan is energized, the MUA dampers shall index to a predetermined VFD setting, based on TAB measurements.

D. Provide two (3) space temperature sensors, one in Prep, one in Wash, one in Staging; use an average signal. Provide a modulating signal to the MUA unit controller to control heating output. MUA unit will have field adjustable maximum and minimum settings to prevent over or under firing of burner.

E. Unoccupied mode:

1. OA damper closed
2. Associated exhaust fans do not operate.
3. Unit cycles heating on minimum OA to maintain night set back temperature at 62°F (adj). Existing unit heaters shall be adjusted to maintain 65F setback temperature. The intent is for the MUA unit to run during NSB mode in extreme winter cold only, with the existing gas-fired unit heaters being the first stage of heat.

F. Duct smoke detectors shall be provided by the MUA unit manufacturer.

2.4 HOOD FIRE SUPPRESSION

- A. Refer to Sheet FS-9.
- B. A motorized gas valve in the supply pipe to the range shall be installed by the plumber. When the hood fire suppression trips:
 - 1. Associated hood exhaust fan shall remain on.
 - 2. Fuel gas valve serving the appliances shall close.
 - 3. MUA unit shall turn OFF.

END OF SECTION 230993