GEN II - VVT
Automatic Temperature Control Specification

Section 15950 - Controls and Automation

PART 1: General

1.1 The automatic temperature controls (ATC) under this section will be supplied and installed in accordance with the General Conditions, Supplementary Conditions, and all Division I General Requirements and Referenced Documents.

1.2 The installation of the ATC shall be in accordance with all National, State and Local codes pertaining to this type of work.

1.3 All work must comply with Section 15050 − Basic Materials and Methods − and all other Division 15 Sections, as applicable.

1.4 The scope shall include furnishing and installing a temperature control system to include remote control panels, temperature control devices, appurtenances, etc. to accomplish specific control sequences specified herein, to provide overheating and freeze protection for HVAC units, sensing and indicating devices, temperature indicating instruments, supporting structures and other required components.

1.5 The scope shall include all thermostats, sensors, dampers, actuators, microprocessor central controllers, VAV diffusers, static pressure sensors, fan powered boxes, re-heat products and all other new components of the system requiring connections.

PART 2: General Instructions

2.1 The Building Automation System/Automatic Temperature Control (BAS/ATC) Systems as specified herein shall be provided in their entirety by the BAS/ATC Contractor. The BAS/ATC Contractor shall base his Bid on the system as specified and on the sequence of operations.

2.2 As part of his Bid, the BAS/ATC Contractor shall submit for review by the owner's authorized representatives a written description of his BAS/ATC systems, including block diagrams, showing all major components and control panels and required cabling between each.

2.3 The BAS/ATC contractor shall include manufacturer's literature for each type of panel, controller, or device that may be shown on the Riser Diagram.

2.4 The Riser Diagram shall show schematically the entire building system with all major components identified.

PART 3: Scope of Work

3.1 The BAS/ATC systems shall be supplied and installed completely under the BAS/ATC Contract. Control components shall be mounted and wired by the BAS/ATC Contractor.

3.2 The BAS/ATC Contractor shall provide the engineering, installation, calibration, software programming and checkout necessary for complete and fully operational BAS/ATC systems, as specified hereafter.

3.3 Wiring in exposed areas and in mechanical rooms shall be in EMT. Wiring in accessible, concealed areas shall be plenum rated cable.

PART 4: Submittals

4.1 The following data/information shall be submitted for approval:

4.2 Complete sequence of operation.

4.3 Control system drawings, including all pertinent data, to provide a functional operating system.
4.4 Damper schedules showing size, configuration, capacity and location of all equipment.
4.5 Data sheets for all hardware control components.
4.6 A description of the installation materials including conduit, wire, flex, etc.
4.7 Thermostat/Sensor locations.
4.8 Control panel locations.
4.9 Provide as part of the submittal five copies of all data and control drawings.

PART 5: Qualifications

5.1 The BAS/ATC Contractor shall have an office within a 100-mile radius of the job site, staffed with factory trained personnel capable of providing instruction, routine maintenance and 24-hour emergency maintenance service for all system components.
5.2 The BAS/ATC Contractor shall have a minimum of three years' experience installing and servicing similar microprocessor based control systems.
5.3 The Contractor shall be prepared to provide evidence of this history as a condition of acceptance and approval prior to bidding.

PART 6: System Description

6.1 The SYSTEM shall be a commercial Auto Changeover Bypass VAV system with modulating Zone and Bypass dampers that control a single HVAC unit and supports 2 - 17 modulating zones. The control panel shall be Universal and supporting Gas/Electric or Heat Pump applications with two cooling stages and three stages of Heat.
6.2 Zone dampers shall be fully modulating with elliptical dampers. The system shall poll each thermostat every 60 seconds to evaluate the number of heating and cooling calls in the System. Control decisions shall be Vote based. A priority selection device shall be available to weight or add priority to one or more zones from the system controller. System shall also provide an Opposed Call feature to address maverick zones in the system.
6.3 System controller shall digitally display Leaving Air Temperatures at all times from the unit and provide for an adjustable setting for cooling and heating cut out set points. Occupied and unoccupied setup and setback capability shall also be available with 2-hour override capability. A thermostat locking function shall be available from the system controller with minimum local control at each thermostat in the system.
6.4 The System shall provide full control of HVAC heating and cooling equipment in multiple zone applications.

PART 7: Control Manufacturer

7.1 The control system will be the *GEN II - VVT* Zoning System, as manufactured by Zonex Systems, Huntington Beach, CA. Any substitution of the above specified control system will require a 10-day prior approval by the engineer.
7.2 For pricing, contact the factory at 800-228-2966 or visit www.zonexproducts.com
7.3 For substitution, submit a complete description, engineering data, and names of existing installations of substitute products.
7.4 Be prepared to provide a field inspection by the engineer, if he chooses to observe the actual installation of proposed substitution.

PART 8: Stand Alone System Controller

8.1 Each zoned HVAC unit shall contain a stand alone microprocessor controller capable of supporting up to 17 modulating zones (Model ***GEN II***).

8.2 The system controller shall be universal and equipped to handle Gas / Electric or Heat Pump units and will communicate and power all zones with one twisted pair data link and 24-volt AC power daisy chained from thermostat to thermostat.

8.3 The system controller will be automatic changeover logic. The system utilizes first call priority and majority rule operation. System must address or have the ability to address opposing calls. When a call is made to the system, the HVAC system will be turned on to the proper mode. During the operation of the HVAC unit the system controller will poll all zones every 60 seconds to determine that the majority of zones are being satisfied and not wanting the opposite mode.

8.4 If the majority of the zones want the opposite mode during the polling, the changeover to the opposite mode will start after a maximum of five minutes in the existing mode to attempt to satisfy all calls in this mode. After five minutes, the existing mode equipment is terminated with the blower continuing to purge the system for 240 seconds. After the purge cycle is completed, the dampers will take 90 seconds to reposition themselves for the opposite mode. After the dampers reposition themselves, the opposite mode equipment is energized. If the system has satisfied all calls, all dampers shall modulate to the 50% position for ventilation.

8.5 The system controller will communicate to the zone thermostats the mode the system is in, and the zone thermostats will notify the damper of which position to meet that zone's needs.

8.6 The system controller shall have a selectable fan option for continuous or intermittent operation.

8.7 The system controller will have the capability to lock all thermostats from the controller.

8.8 The system controller shall provide occupied and unoccupied or day/night operation with the addition of a system time clock.

8.9 The system controller shall be equipped with an onboard diagnostic routine to ensure the installing contractor his control wiring and communication wiring are operational.

8.10 The system controller shall provide the air balance contractor with the ability to open all zone dampers and energize the fan from the system controller.

8.11 The system controller shall allow the contractor to provide default occupied and unoccupied set points for every thermostat or sensor in the system directly at the controller.

8.12 The system controller shall provide the ability to establish 1 or 2 additional votes on one or all thermostats in the system, establishing priority votes directly at the system controller.

8.13 The system controller shall include an onboard capacity controller and algorithm to protect the HVAC equipment.

PART 9: Capacity Controller (HVAC Equipment Protection)

9.1 The capacity control receives the heating or cooling signal from the system controller and regulates the equipment (on and off) to meet the building requirements.

9.2 The *GEN II* controller shall be equipped with a Leaving Air Temperature sensor constantly monitoring and displaying discharge temperature on the *GEN II* controller.

9.3 The capacity control shall have the capability to shut down stages based on a rise or fall in leaving air temperature above or below a fully adjustable range of temperature. The system shall provide protection from short cycling and protect the unit from coil freeze up or overheating the heat exchanger.

9.4 Capacity control shall also provide second stage heating or cooling operation based on a fully adjustable timer with a range of 3 – 30 minutes in increments of 1 minute. Second stage operation shall be initiated based on time and leaving air temperature or via a selectable jumper, time and room temperature.

PART 10: Zone Temperature Sensors

10.1 The typical Zone Temperature Sensor (Model EzTouch) will contain all of the electronics to:

10.2 Control fully modulating zone dampers and to provide for proper temperature requirement.

10.3 Include push buttons on the face of control to set independent heating and cooling set points and to contain a minimum two-degree dead band.

10.4 The push buttons allow the operator to change or review the EzTouch set points.

10.5 The EzTouch, if remotely locked from the System controller, shall provide local control of +/- 2 degrees from the locked heating or cooling set point. The adjustable temperature range is from 55 to 95 degrees F. Celsius display shall also be available.

10.6 The EzTouch shall contain one microprocessor that receives the current temperature from the space, which communicates this information to the central control microprocessor via a 2-wire unshielded data link.

10.7 The EzTouch shall have a large digital display showing current space temperature, the current mode of operation and the heating and cooling set points established for that zone.

10.8 The EzTouch shall also be equipped with an off switch; when initiated, its zone damper will go fully closed.

10.9 Each EzTouch can control up to three slaved dampers.

10.10 The EzTouch shall be available with Remote sensor capability.

10.11 When utilizing perimeter electric or hot water baseboard heating for supplemental heating, the thermostat operates a zone damper only for airflow and energizes the supplemental heat when the temperature drops two degrees below set point. At one degree below set point, it signals the system of a heating call.

10.12 When utilizing reheat feature, the thermostat shall energize reheat and modulate damper 50% to provide space temperature heating.

PART 11: Bypass Dampers and Controls

11.1 The modulating bypass damper(s) are to be installed as shown on accompanying drawings. When utilizing a ceiling return, there must be a short return plenum with the bypass directly connected to the supply and return plenum.

11.2 When the HVAC unit utilizes an economizer section, the return air inlet to the return air plenum must contain counter balanced dampers to prevent air pressurization of the return air system.

11.3 Each round bypass damper (Model STBP) shall consist of 20-22 gauge galvanized metal duct fitted with an elliptical damper to provide linear airflow. The damper shall contain a foam seal to prevent leakage when fully closed. Each damper will contain a full stall 24-volt modulating actuator, which shall not draw more than 2 VA on one drive assembly. The damper shell will be crimped on one end and beaded on both ends for damper rigidity.

11.4 Each rectangular bypass damper (Model STCDBP) shall be constructed of a 20-gauge “snap-lock” steel frame with S & Drive connections. The total length of the damper will be 16”. Dampers 10” and smaller in height will utilize single blade construction; dampers larger than 10” in height will utilize opposed blade construction. The damper blades are of formed steel design with gasketed stops to provide quiet operation and structural integrity.

11.5 The bypass damper shall be controlled by an electronic integrated static pressure control. This bypass sensor shall be located downstream of the bypass connection from the supply plenum and upstream from the first zone damper. This device continually senses the discharge air static pressure and signals the bypass damper to modulate open or close.

11.6 Bypass may be slaved with additional dampers, if required, to provide additional bypass; or consider utilizing one larger rectangular bypass.

11.7 The transformer powering the bypass damper shall only be energized when the HVAC indoor blower is operating.

PART 12: Zone Dampers

12.1 Each round zone damper (Model STMPD) shall consist of 20-22 gauge galvanized metal duct fitted with an elliptical damper to provide linear airflow. The damper shall contain a foam seal to prevent leakage when fully closed. Each damper will contain a full stall 24-volt modulating actuator, which shall not draw more than 2 VA on one drive assembly. The damper shell will be crimped on one end and beaded on both ends for damper rigidity. Dampers shall be equipped with min/max position stops and indicators.

12.2 Each rectangular zone damper (Model STCD) shall be constructed of a 20-gauge "snap-lock" steel frame with S & Drive connections. The total length of the damper will be 16". Dampers 10" and smaller in height will utilize single blade construction; those dampers larger than 10" in height will utilize opposed blade construction. The damper blades are of formed steel design with gasketed stops to provide quiet operation and structural integrity. Dampers shall be equipped with min/max position stops and indicators.

12.3 Zone dampers shall be fully modulating in operation based on input received from each zone thermostat. Modulation shall be predicated on variance from set point. If the system has satisfied all calls, all dampers shall modulate to the 50% position for ventilation.

12.4 All zone dampers shall be connected to its zone thermostat by 3-wire, 18-gauge copper wiring. The zone thermostat shall continuously monitor room temperature and modulate damper position based on variance from its set point to provide effective temperature control as required.

PART 13: Transformers and Wiring

13.1 An independent 24VAC/100VA transformer sized at 5 VA per zone damper & thermostat or D-Fuser shall power the *GEN II* System Controller and all dampers in the system.

13.2 The bypass dampers shall be served by a 40 VA / 24-volt transformer. The load side of the blower motor starter shall power this transformer.

13.3 All power wiring of this system shall be 24-volt AC.

END OF SECTION 15950

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