

SECTION 23 0933**ELECTRIC AND ELECTRONIC CONTROL SYSTEM FOR HVAC****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Furnish and install automatic temperature control system as described in Contract Documents.
 2. Furnish and install conductors and make connections to control devices, motors, and associated equipment.
 3. Assist in air test and balance procedure.
- B. Related Requirements:
1. Section 01 4546: Duct testing, adjusting, and balancing of ductwork.
 2. Section 23 0501: Common HVAC Requirements.
 3. Section 23 3300: Furnishing and installing of temperature control dampers.
 4. Division 26:
 - a. Furnishing and installing of raceway, conduit, and junction boxes, including pull wires, for temperature control system except as noted above.
 - b. Power wiring to magnetic starters, disconnect switches, and motors.
 - c. Motor starters and disconnect switches, unless integral with packaged equipment.

1.2 SUBMITTALS

- A. Action Submittals:
1. Product Data:
 - a. Installer to provide product literature or cut sheets for all products specified in Project.
 - b. Installer to provide questions of control equipment locations to Mechanical Engineer prior to installation.
- B. Informational Submittals:
1. Certificates:
 - a. Installer must provide 'Certificate of Sponsorship' signed from Approved Distributor with bid confirming Installer sponsorship.
- C. Closeout Submittals:
1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
 - a. Operations and Maintenance Data:
 - 1) Leave with O&M Manual specified in Section 23 0501.
 - b. Record Documentation:
 - 1) Installer's 'Certificate of Sponsorship'.

1.3 QUALITY ASSURANCE

- A. Qualifications: Requirements of Section 01 4301 applies, but is not limited to the following:
1. Installer:
 - a. Before bidding, obtain sponsorship from a local, Approved Distributor specified under PART 2 PRODUCTS of this specification. Initial requirements for sponsorship are:
 - 1) Receive product training from Approved Distributor.
 - 2) Installer to provide Distributor sponsorship by submitting 'Certificate of Sponsorship' as Informational Submittal with bid. Certificate available as Attachment in this Specification.

PART 2 - PRODUCTS**2.1 SYSTEMS**

- A. Manufacturers:
1. Manufacturer Contact List:
 - a. Air Products & Controls Ltd, Pontiac, MI www.ap-c.com.
 - b. Fire-Lite Alarms, Northford, CT www.firelite.com.
 - c. Honeywell Inc, Minneapolis, MN www.honeywell.com.
 - 1) Primary Contact: Chris Brinkerhoff, (801) 550-3344, chris.brinkerhoff@honeywell.com.
 - d. ICCA Firex, Carol Stream, IL www.icca.invensys.com.
 - e. Insul_Guard, Salt Lake City, UT:
 - 1) Primary Contact: Dan Craner, (801) 518-3733, insul_guard@comcast.net.
 - f. System Sensor, St Charles, IL www.systemsensor.com.
 - g. Zimmerman Technologies, Renton, WA:
 - 1) Primary Contact: Tracy Zimmerman, (425) 255-1906, zimmtech@yahoo.com.
- B. Distributors: Obtain devices, RP panels, thermostats, and other control equipment from following Sponsoring Approved Distributors. See Section 01 4301:
1. Virginia:
 - a. Broudy Precision Equipment: (610) 825-7200 jranalli@broudyprecision.com Jay Ranalli.
 - b. First Source Distributors: (704) 553-8510 sales@1stsourcedist.com Daryl Thompson.
 - c. Industrial Controls – CCD Division: (877) 614-4822 paul.thomas@ccdovac.com Paul Thomas.
 - d. M & M Controls: (410) 252-1221 pmarsala@aireco.com Pat Marsala.
 - e. National Energy Control Corp: (800) 227-9800 mmcgann@neccdelivers.com Mark McGann.
- C. Performance:
1. Design Criteria:
 - a. Provide relay panel to extend existing F-5a/CC5a and F-5b/CC-5b controls to new F-5c/CC-5c and F-5d/CC-5d. All four systems shall operate as one unit to provide heating and cooling of the Chapel and rostrum space.
- D. Components:
1. Thermostats And Sensors:
 - a. Thermostat and Sensor Kit:
 - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
 - a) Part Number Honeywell YTHX9421R5085WW consisting of following:
 - (1) Discharge Air / Return Air Sensors: Honeywell C7735A1000, 10k ohms.
 - (2) Equipment Interface Module (EIM) THM5421R1021.
 - b. Outdoor Air Sensor: Honeywell C7089R1013.
 - b. Outdoor Air Sensor: Honeywell C7089R1013.
 2. Sealant Compound:
 - a. Description:
 - 1) Non hardening waterproof, vapor proof, self-adhesive for hot or cold application for sealing conduit openings against drafts, dust moisture and noise.
 - b. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
 - 1) Duct Seal Compound No. DS-130 by Gardner Bender, Menomonee Falls , WI. www.gardnerbender.com.
 - 2) Thumb-Tite Sealing Compound No. 4216-92 by Nu-Calgon, St. Louis, MO www.nucalgon.com.
 3. Duct Smoke Detectors:
 - a. Duct mounted smoke detector in systems with airflow greater than 2000 CFM.
 - b. Intelligent low flow photoelectric duct smoke detector with flash scan.
 - c. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
 - 1) System Sensor Model D4120.

4. Transformer:
 - a. 120 / 24 V, 50VA Honeywell AT150F.
 - b. 120 / 24 V, 75VA Honeywell AT175F.
 5. Damper Actuators:
 - a. Electric type equipped for Class I wiring.
 - b. Shall not consume power during UNOCCUPIED cycle or use chemicals or expandable media.
 - c. Have built in spring return.
 - d. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
 - 1) Honeywell MS8105A1030/U.
 - 2) Honeywell MS8105A1130 w/ End switch.
 - e. Contractor shall cycle existing motorized dampers serving zones 4, 5, and 6. Report all deficiencies to Owner and Engineer. Provide unit pricing to replace each damper actuator.
 6. Conductors:
 - a. Color-coded and No. 16 and No. 12 AWG Type TWN, TFN, or THHN, stranded.
 - b. Thermostat Cable: 12, 8, or 4 conductor, 18AWG solid copper wire, insulated with high-density polyethylene. Conductors parallel enclosed in brown PVC jacket (22 AWG cable not allowed).
 - c. Communicating Cable:
 - 1) Class Two Quality Standard. See Section 01 6200:
 - a) CAT 4, 22 gauge 0.025 in, twisted pair, non-plenum and non-shielded cable.
- E. Operation Sequences:
1. Programmable thermostat shall control unoccupied and occupied status of fan system based on adjustable seven day program and remote room sensor / push button. Fan shall run continuously in occupied mode and cycle in unoccupied mode.
 2. Adjustable heating and cooling set points shall control space temperature by activating either heating or cooling equipment. Programmable thermostat provides automatic change over between heating and cooling.
 3. Remote room sensor provides optional override of thermostat program by allowing three hour timed override of thermostat program at any time by pushing ON / OFF button on remote room sensor cover. This shall activate thermostat to occupied mode and system shall control to occupied set point.
 4. Minimum outside air damper, spring return type, shall open in occupied mode and remain closed in unoccupied mode in zones using outside air.

PART 3 - EXECUTION

3.1 INSTALLERS

- A. Acceptable Installers. See Section 01 4301:
1. Approved HVAC Sub-Contractors shall be pre-approved and included in Construction Documents by Addendum.

3.2 INSTALLATION

- A. Interface With Other Work:
1. Calibrate room thermostats as required during air test and balance. Insulate sensor J-box with fiberglass insulation; expandable/ foam insulation is NOT acceptable.
 2. Instruct air test and balance personnel in proper use and setting of control system components.
 3. Install low voltage electrical wiring in accordance with Division 26 of these Specifications.

- B. Safety Controls:
1. Interlock main return air duct smoke detectors to keep heating, cooling, and system fan from operating when detector is energized. Interlock smoke detector for combination fire / smoke dampers so fire / smoke damper closes on detection of smoke.
 2. Interlock gas valves with cooling compressors and supply air fan.
 3. Gas valves shall obtain their electrical control power from same circuit as supply fan motor.
 4. Check high limit thermostats furnished with heating equipment for correct operation. Gas valves shall close when duct temperature exceeds high limit setting. Perform this work immediately after wiring burner controls.
 5. Wire bonnet thermostatic switches to dissipate all heat in combustion chambers.
 6. Fresh air dampers shall close on fan shut-down, power failure, open fan motor disconnect switch, and when thermostat is in UNOCCUPIED mode.
 7. Gas burner safety controls furnished with furnace units shall be incorporated in control circuits for all modes of operation.
 8. Control twinned furnace systems, where two furnaces serve common supply and return plenums, as one unit with twinning kit. Motors shall start and stop together and gas valves operate together.
- C. Mount damper actuators and actuator linkages external of airflow. Dampers shall operate freely without binding or with actuator housing moving.
- D. Paste copy of record control wiring diagram on back of relay panel door cover for each multiple furnace system.

3.3 FIELD QUALITY CONTROL

- A. Field Tests:
1. Calibrate, adjust, and set controls for proper operation, operate systems, and be prepared to prove operation of any part of control system. This work is to be completed before pre-substantial completion inspection.
 2. Test each individual heating, cooling, and damper control for proper operation using control system.

3.4 SYSTEM STARTUP

- A. For systems with Prestige Thermostat.
1. Contractor is responsible for a fully functioning control system. Contractor is responsible to coordinate start up.
 2. Contractor is responsible configuring all thermostats with proper zone names, zone scheduling, proper Church conference / holiday scheduling, all to be coordinated with local FM manager. Set proper clock setting including day/month/year.
 3. Set Heating / Cooling to proper stages
 4. Set heat cycle rates to 9 cph and cooling to 4 cph.
 5. Set Aux relay to "Time of Day".
 6. Set System switch operation to "Automatic" changeover.
 7. Set fan switch operation to "ON".
 8. Set minimum UnOcc start time for all days. No days shall be scheduled Unconfigured.
 9. Set occupied start times to match meeting start times; provided by local FM manager.
 10. Place all zone over-ride durations to one (1) hour except for Bishop and Stake area which shall be set to two (2) hours.
 11. Set Occupied default heating setpoints to 70 degrees, cooling setpoints to 74 degrees.
 12. Set UnOccupied default heating setpoint to 60 degrees, cooling setpoints to 90 degrees.
 13. Set each zone to applicable Holiday scheduling for General & Stake Conferences.

3.5 ADJUSTING

- A. Thermostat configuration settings; the following are configuration guidelines for consistent installations:
1. 1000 English/French/Spanish (depending upon region).
 2. 1010 Commercial.
 3. 1030 Zone Name (display on Home Screen).
 4. 1040 Programmable.
 5. 2000 Conventional (match equipment).
 6. 2010 Standard / High Efficiency (match equipment).
 7. 2070 Heating / Cooling Stages (match equipment).
 8. 2220 A- L/A Terminal Setup (Time of Day).
 9. 3000 Changeover (Automatic) Deadband (3 degrees).
 10. 3010 Advanced Option +PID Settings – Change cooling settings to 4 cph and heating to 6 (mild climates and 9 cph (cold climates).
 11. 3240 Minimum Compressor Off Time (3 minutes).
 12. 4000 Number of Schedules periods (4 Periods Per Day).
 13. 4010 Pre-Occupancy Purge Duration (off).
 14. 4020 Type of Override (Standard).
 15. 4030 Override Duration (1hr for classrooms, 2 hours for Stake and Bishops zones).
 16. 4100 Temperature Range Stops (Minimum Cooling setpoint 69 degrees, Maximum Heating Setpoint 73 degrees F.
 17. 5000 Return Air (check) Discharge Air (Check).
 18. 5070 Return Air Sensor (EIM – S2).
 19. 5080 (10K).
 20. 5090 Discharge Air Sensor (EIM – S1).
 21. 5100 (10K).
 22. 5110 A-Coil Low Temperature Cutoff (35 degrees).
 23. 7000 – 8700 (default).
 24. 10000 Ventilation Type (None / damper end-switch will control ERV).
 25. 10170 – 12000 (Default).
 26. 13000 Heat Delta T Diagnostics (On).
 27. 13010 Cooling Delta T Diagnostics (On).
 28. 13015 Set Advanced Delta T Diagnostics Options (No).
 29. 14000 – 15020 (default) Contractor is NOT to install business card.
 30. SYSTEM SWITCH Setting (Make sure system is set for Automatic).
 31. MENU/ PREFERENCES/ DISPLAY OPTIONS/ BACKLIGHT (set to 0 Dim).
 32. MENU/ Holiday-Event Scheduler / Custom Events/ Create new event.
 - a. Eastern Time Zone:
 - 1) First Sunday in April: Occupy Chapel from 11:30 am – 6:00 pm / every year.
 - 2) First Sunday in April: UnOccupy all other zones for all day / every year.
 - 3) First Sunday in October: Occupy Chapel from 11:30 am – 6:00 pm / every year.
 - 4) First Sunday in October: UnOccupy all other zones for all day / every year.

3.6 CLOSEOUT ACTIVITIES

- A. Instruction Of Owner:
1. Include as part of training required in Section 23 0501, following training:
 - a. Training shall be by personnel of installing company and utilize operator's manuals and as-built documentation.
 - b. Provide training in (2) two sessions for up to four (4) hours total.
 - 1) First session will occur between system completion and Substantial Completion.
 - 2) Second session will occur within forty five (45) days of Substantial Completion when agreed upon by Owner.

- c. Training shall include sequence of operation review, selection of displays, modification of schedules and setpoints, troubleshooting of sensors, etc, as follows:
- 1) Control System Overview:
 - a) Show access to system and how network works. Scheduling building at minimum for Stake and General Conference, special events.
 - 2) Thermostat Programming from Keypad and USB memory stick: Instructions on developing setpoints and schedules and adjusting local zone temperatures.
 - 3) Thermostat Operation:
 - a) Identify and explain security settings and screen lockouts.

END OF SECTION

ATTACHMENTS

INFORMATION: Following Attachment 'Certificate of Sponsorship' to be given by Installer to Approved Distributor. Installer must fill out Project Information and Installer Information before giving to Approved Distributor. Installer must submit Certificate as specified in the Informational Submittal with Installer's bid.

CERTIFICATE OF SPONSORSHIP
Electric and Electronic Control System for HVAC Installer

PROJECT INFORMATION (To be filled out by Installer - available from project specification):

Project Name: _____
Project Number: _____
Project Address: _____

INSTALLER INFORMATION (To be filled out by Installer):

Installer Name: _____
Installer Firm: _____
Installer Address: _____

I acknowledge and confirm the above listed Installer has received training and exhibit RedLINK/Commercial System skills and is qualified to install the automation control system as specified for Project identified above. Our company will stand behind the Installer meeting the legal specified performance requirements.

Sponsoring Approved Honeywell Distributor Name: _____

Signature: _____ Printed Signature: _____

Date: _____