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 Sections:
   1. Section 23 0501: Common HVAC Requirements.
   2. Section 23 0593: Air test and balance.
   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 SYSTEM DESCRIPTION

A. Design Criteria: System design concept is communicating thermostat located near furnace controlled with all thermostats connected by means of communication cable to LCP.

B. Performance Criteria: Install low voltage electrical wiring in accordance with Division 26 of these Specifications.

1.3 SUBMITTALS

A. Closeout:
   1. Project Record Documents: Provide two copies of record ATC diagrams and one CD with fully commissioned LonSpec database at completion of Project. Leave with O&M Manual specified in Section 23 0501.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Before bidding, obtain sponsorship from a local, Approved Distributor specified under PART 2 PRODUCTS. Initial requirements for sponsorship are:
      a. Be one of following Honeywell supported partners:
         1) Honeywell-Automation Control Specialist (ACS).
2) Honeywell-Commercial Comfort & Energy Specialist (CCES).
3) Honeywell Authorized Control Integrator (ACI).
   b. Receive product training from and exhibit LCBS system skills to sponsoring Approved Distributor.
2. Receive Project specific Letter of Sponsorship from Approved Distributor and have available on Project site when work of this Section is being performed.

1.5 OWNER’S INSTRUCTIONS

A. In addition to training required in Section 23 0501, provide following training:
   1. Control System Overview:
      a. Show access to system through both individual thermostats and Command Display and how network works. Demonstrate scheduling for Stake and General Conferences.
      b. Identify LonSpec database backup CD.
   2. Thermostat Programming And Set-up: With local personnel designated by Architect, develop setpoints and schedules, including Stake and General Conference days. Program in necessary adjustments to factory schedules and setpoints.
   3. Thermostat Operation:
      a. Identify and explain use of buttons on thermostat face, i.e. ‘i’ or information button, warmer button, and cooler button.
      b. Identify and explain buttons under thermostat cover.
   4. Command Display Operations:
      a. Viewing equipment status screens.
      b. Changing building schedules.
      c. Changing individual thermostat setpoints, including details of Unoccupied and Standby.
      d. Zone status screen
      e. Provide Approved Distributor’s PowerPoint presentation explaining use of command display.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Room Thermostats:
   1. Communicating Thermostats:
      a. Low voltage type provided with automatic change-over feature for both heating and cooling stages, seven-day / 365 day program with two starts and stops per day, and provisions for damper operators.
      b. Category Four Approved Product. See Section 01 6000 for definitions of Categories.
         1) Honeywell T7350H1009.
   2. Non-Programmable Thermostat:
      a. Low voltage type.
      b. Category Four Approved Product. See Section 01 6000 for definitions of Categories.
         1) Honeywell T87F1859 with Honeywell TG 587F1016 guard.

B. Remote Room Sensor:
   1. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
      a. Honeywell T7771A1005 with three push buttons, OVERRIDE, WARMER, COOLER, and with selectable ohm resistance, 10k or 20k.
      b. Honeywell T7770A3002, plain face, 10k ohms.

C. Guard For Cultural Center Sensors:
   1. Match color of sensor.
   2. Category Four Approved Product. See Section 01 6000 for definitions of Categories.
      a. MSI-244 Sensor Guard with integral wood base by Zimmerman Technologies.
D. Discharge Air Sensor:
   1. Category Four Approved Product. See Section 01 6000 for definitions of Categories.
      a. Honeywell C7041B2005, 6 inch

E. Duct Smoke Detectors:
   1. Photoelectric duct mounted smoke detector in systems with airflow greater than 2000 CFM.
      Detectors to operate on 120 VAC.
   2. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
      b. Model DH100 ACDCP duct mounted smoke detector by System Sensor.
      c. Model FL-D350RP by Fire-Lite.
      d. Model SL-2000P by Air Products And Controls Inc.
      e. Model 2650-761 by Maplechase / Firex.

F. Transformer:
   1. 120 / 24 V, 50VA Honeywell AT150F.
   2. 120 / 24 V, 75VA Honeywell AT175F.

G. Damper Actuators:
   1. Electric type equipped for Class I wiring.
   2. Shall not consume power during UNOCCUPIED cycle or use chemicals or expandable media.
   3. Have built in spring return.
   4. Category Four Approved Product. See Section 01 6000 for definitions of Categories.
      a. Honeywell S0524-2POS. Also shown as MS8105 1008
      b. Honeywell S0524-2POS-SW2 w/ Auxiliary switches.

H. Conductors:
   1. Color-coded and No. 16 and No. 12 AWG Type TWN, TFN, or THHN, stranded.
   2. 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).
   3. Communicating Cable:
      a. Category Four Approved Product. See Section 01 6000 for definitions of Categories.
         1) Honeywell AK3798.

I. Local Relay (RP) Panels For Chapel And Cultural Center Systems:
   1. 16-ga 1.59 mm screw cover, painted sheet metal. Box with cover and knockouts, pre-wired
      terminal strips, relay, and transformer.
   2. Category Four Approved Product. See Section 01 6000 for definitions of Categories.
      a. LDS Models RP-1 or RP-5.

J. Command Display Interface:
   1. Category Four Approved Product. See Section 01 6000 for definitions of Categories.
      a. Honeywell S7760A2031.

K. Outdoor Air Pre-Heat Coil Temperature Controller:
   1. 0 to 100 deg F minus 18 to plus 38 deg C range.
   2. 5 foot copper capillary and bulb.
   3. Category Four Approved Product. See Section 01 6000 for definitions of Categories.

L. Control Valve And Motor:
   1. Category Four Approved Product. See Section 01 6000 for definitions of Categories.

M. Outdoor Air Temperature Sensor:
   1. Minus 30 to plus 90 deg F operating range.
   2. 5 foot capillary length.
   3. Category Four Approved Product. See Section 01 6000 for definitions of Categories.
a. Honeywell: T6031A1052.

N. Aquastat Controller:
   1. Strap-on type.
   2. Category Four Approved Product. See Section 01 6000 for definitions of Categories.

2.2 APPROVED DISTRIBUTORS

A. Obtain LonSpec database, RP panels, LCP panel, thermostats, and other control equipment from following Category Four Sponsoring Approved Distributors. See Section 01 6000 for definitions of Categories.
   1. Alabama:
      a. Quality Controls Inc: (205) 324-1775. nbrewster@shopqci.com Nettie Brewster
   2. Alaska:
      a. Applied Automation: (801) 486-8791. kathy@appliedutah.com Kathy Murphy
         b. MI Controls: (206) 767-0140. seattlesales@mcontrols.com Steve Roe
         c. RSD Total Control: (800) 245-8007, ext 255. jransford@rsd-tc.com Joe Ransford
         d. Sabol & Rice Inc: (801) 978-4208. ray@sabolrice.com Ray Howe
   3. Alberta:
      a. Sinclair Supply Ltd: (403) 571-6340. andre.boire@ssl.ca Andre Boire
   4. Arizona:
      a. Burke Engineering: (877) 857-2635. bob.pedersen@burkehvacr.com Bob Pedersen
      b. RSD Total Control: (800) 245-8007, ext 255. jransford@rsd-tc.com Joe Ransford
   5. Arkansas:
      a. Ener-Tech Industries: (615) 269-5643. bpfeiger@energytechnologies.com Bob Pfleiger
   6. California:
      a. Burke Engineering: (877) 857-2635. bob.pedersen@burkehvacr.com Bob Pedersen
         b. Controlco Systems: (559) 485-9873. m.schwan@controlco.com Mike Schwan
         c. RSD Total Control: (800) 245-8007, ext 255. jransford@rsd-tc.com Joe Ransford
   7. Colorado:
      a. Applied Automation: (801) 486-8791. kathy@appliedutah.com Kathy Murphy
      b. Burke Engineering: (877) 857-2635. bob.pedersen@burkehvacr.com Bob Pedersen
      c. Charles D. Jones Co: (303) 922-8426 scott@cdjones.com Scott Taylor
      d. RSD Total Control: (801) 485-5000, ext 255. jransford@rsd-tc.com Joe Ransford
      e. Sabol & Rice Inc: (801) 978-4208. ray@sabolrice.com Ray Howe
   8. Delaware:
      a. Broudy Precision Equipment: (610) 825-7200. jranalli@broudyprecision.com Jay Ranalli
      b. M & M Controls: (410) 252-1221. pmarsala@aireco.com Pat Marsala
      c. National Energy Control Corp: (610) 449-9800 pcattie@neccdelivers.com Pete Cattie
   9. Florida:
      a. Building Automation Inc: (954) 492-0110. engineering@buildingautomation.com Tom Gannon
      b. SAEG Engineering: (305) 718-8146 rnovoa@saeg.com Renan Novoa
      c. Stromquist & Co Inc: (407) 299-7070. brogers@stromquist.com Bob Rogers
      d. Victor distributing Co: (727) 572-7276. dwhite@victordist.com Dave White
   10. Georgia:
      a. Stromquist & Co Inc: (407) 299-7070. brogers@stromquist.com Bob Rogers
   11. Hawaii:
      a. Applied Automation: (801) 486-8791. kathy@appliedutah.com Kathy Murphy
      b. Burke Engineering: (877) 857-2635. bob.pedersen@burkehvacr.com Bob Pedersen
      c. Controlco Systems: (559) 485-9873. m.schwan@controlco.com Mike Schwan
      d. RSD Total Control: (800) 245-8007, ext 255. jransford@rsd-tc.com Joe Ransford
      e. Sabol & Rice Inc: (801) 978-4208. ray@sabolrice.com Ray Howe
   12. Idaho:
      a. Applied Automation: (801) 486-8791. kathy@appliedutah.com Kathy Murphy
      b. Control Solutions & Design: (208) 375-4422. pdl@csdidaho.com Paul Lachowsky
      c. RSD Total Control: (800) 245-8007, ext 255. jransford@rsd-tc.com Joe Ransford
d. Sabol & Rice Inc: (801) 978-4208. ray@sabolrice.com  Ray Howe

13. Illinois:
a. Climatic Control Co: (414) 479-9558. jwilliams@climaticcontrol.com Jon Williams
b. G & O Thermal Supply Co: (847) 439-2457. jkoscielniak@gothermal.com Joe Koscielniak
c. South Side Control Supply: (312) 226-4900. wojciech@southsidecontrol.com Wojciech Fugiel

14. Indiana:
a. Jackson Control Co: (317) 231-2200. andy@jacksoncontrol.com Andy Held

15. Iowa:
a. Adel Furnace Wholesalers: (319) 359-7045. markh@adel-wholesales-inc.com Mark Hanson

16. Kansas:
a. O’Connor Co: (888) 800-3540. phuntsman@oconnor.com Patrick Huntsman
b. Superior Control Concepts Inc: (316) 282-0870. vmiller21@cox.net Vern Miller

17. Kentucky:
a. Autotherm Inc: (502) 245-6036. atherminc@aol.com Paul Garcia

18. Louisiana:
a. Control Products: (713) 849-7200. alfredov@control-products.cc Alfredo Valenzuela
b. CIS: (469) 429-1111 tdb@cisc Controls.com Ted Brown
c. Facility Automation Inc: (225) 923-1073. ray@facilityautomation.com Ray Shepherd
d. JDC Sales LLC: (318) 865-2393 abrock@jdsales.com Ted Brown

19. Maine:
a. Control Consultants Inc: (781) 335-8353. jcd@controlconsultantsinc.com John Donahue

20. Maryland:
a. Broudy Precision Equipment: (610) 825-7200. jranalli@broudyprecision.com Jay Ranalli
b. M & M Controls: (410) 252-1221. pmarsala@aireco.com Pat Marsala

21. Massachusetts, Rhode Island, And Connecticut:
a. Control Consultants Inc: (781) 335-8353. jcd@controlconsultantsinc.com John Donahue
b. Tower Equipment Co: (203) 375-4420. mcnabney@snet.net John McNabney

22. Michigan:
a. Cochrane Supply & Engineering: (800) 482-4894. kosinski@cochrane supply.com Ken Osinski

23. Minnesota:
a. MINVALCO: (952) 920-0131. fred.mathew@minvalco.com Fred Mathew

24. Mississippi:
a. Ener-Tech Industries: (615) 269-5643. bpflieger@shopqci.com Bob Pflieger

25. Missouri:
a. Crescent Parts & Equipment: (314) 647-5511. sgorla@crescentparts.com Steve Gorla
b. O’Connor Co: (888) 800-3540. phuntsman@oconnor.com Patrick Huntsman

26. Montana:
a. Applied Automation: (801) 486-8791. kathy@appliedutah.com Kathy Murphy
b. Control Solutions and Design: (208) 375-4422. pdl@csidahoe.com Paul Lachowsky
c. RSD Total Control: (800) 245-8007, ext 255. jransford@rsd-tc.com Joe Ransford
d. Sabol & Rice Inc: (801) 978-4208. ray@sabolrice.com Ray Howe

27. Nebraska:
a. O’Connor Co: (888) 800-3540. phuntsman@oconnor-hvac.com Patrick Huntsman

28. Nevada:
a. Applied Automation: (801) 486-8791. kathy@appliedutah.com Kathy Murphy
b. Burke Engineering: (877) 857-2635. bob.pedersen@burke hvacr.com Bob Pedersen
c. RSD Total Control: (800) 245-8007, ext 255. jransford@rsd-tc.com Joe Ransford
d. Sabol & Rice Inc: (801) 978-4208. ray@sabolrice.com Ray Howe

29. New Hampshire, Maine, And Vermont:
a. Control Consultants Inc: (781) 335-8353. jcd@controlconsultantsinc.com John Donahue

30. New Jersey:
a. Broudy Precision Equipment: (610) 825-7200. jranalli@broudyprecision.com Jay Ranalli
b. Universal Supply Group: (973) 427-3320. kfarley@usginc.com Ken Farley

31. New Mexico:
a. Burke Engineering: (877) 857-2635. bob.pedersen@burke hvacr.com Bob Pedersen
33. New York:
   a. D B M Control Dist.: (716) 876-8026. droland@dbmcontroldist.com Dave Roland
   b. Titan Controls: (516) 358-2407. p.deronde@titancontrols.com Paul Deronde
   c. Twino Supply Corp: (631) 547-1100. ken@twinc.com Ken Freilich
   d. United Refrigeration Supply: (914) 592-8842. roxanna786@aol.com Roxanna Hussain
   e. Universal Supply Group: (718) 227-9685. lhizimmy@aol.com Lenny Zimmerman

34. North Carolina:
   a. First Source Inc: (336) 292-8777 firstsourcedistributors@earthlink.net Daryl Thompson

35. North and South Dakota:
   a. Refrigeration Heating Inc: (701) 232-7070. chris@rhisupply.com Chris Daly

36. Ohio:
   a. Allied Supply: (513) 631-6148 calvin@aliedsupply.com Calvin Hunter
   b. All Weather Supplies: (330) 758-0523. aws@zoominternet.net Dave Schaab
   c. Columbus Temperature Control (614) 294-6216. tcowburn@columbustemp.com Tom Cowburn
   d. Edward C. Symers Co: (412) 4713222. dave@symers.com Dave Symers
   e. Habegger Totalline Parts Ctr: (513) 772-2233. doughabegger@habeggercorp.com Doug Habegger
   f. Professional Energy Systems Inc: (216) 529-9030 cbrown@famous-supply.com Charlie Brown

37. Oklahoma:
   a. O’Connor Co: (800) 580-8640. pbeach@oconnor-hvac.com Phil Beach

38. Ontario:
   a. Baymar Supply Ltd: (519) 974-5800. wmarcon@baymarsupply.com Walter Marcon
   b. Jack Dougan Associates Ltd: (705) 692-5837. fred@jadaltd.ca Fred Vance
   c. Yorkland Controls Ltd: (416) 661-3306. gcellucci@yorkland.net Gerry Cellucci

39. Oregon:
   a. MI Controls: (206) 767-0140. seattlesale.com Steve Roe
   b. RSD Total Control: (800) 245-8007, ext 255. jransford@rsd-tc.com Joe Ransford

40. Pennsylvania:
   a. Broudy Precision Equipment: (610) 825-7200 jranalli@broudyprecision.com Jay Ranalli
   b. Energy Equipment & Controls Inc: (610) 437-9715 bobnovak@energyequipment.com Bob Novak
   c. National Energy Control Corp: (610) 449-9800 pcastile@neccdelivers.com Pete Casteil
   d. T F Campbell Co Inc. (412) 881-8006. ginajl@peoplepc.com Gina Ladebian
   e. Universal Supply Group: (215) 830-4135. jciorletti@usginc.com Jim Ciorletti

41. Quebec:
   a. SCI Montreal Inc: (450) 668-8866. plongval@scimtl.ca Pierre Longval

42. South Carolina:
   a. Carolina Controls Depot: (919) 614-4822 jack.connell@ecscontrols.net Jack Connell
   b. FirstSource Distributors: (919) 742-6100 sales@1stsourceinc.com Daryl Thompson

43. Tennessee:
   a. Ener-Tech Industries: (615) 269-5643. bpfeiger@ener-techindustries.com Bob Pfieger

44. Texas:
   a. Amcon Controls: (210) 349-6161 bob@amcon.com Bob Barneby
   b. Control Products: (713) 849-7200 alfredov@control-products.com Alfredo Valenzuela
   c. CIS: (469) 429-1111 tedb@ciscontrols.com Ted Brown
   d. Temperature Control Systems: (214) 343-1444. k.mitchell@tempconsys.com Ken Mitchell

45. Utah:
   a. Applied Automation: (801) 486-8791. kathy@appliedutah.com Kathy Murphy
   b. RSD Total Control: (801) 485-5000, ext 255. jransford@rsd-tc.com Joe Ransford
   c. Sabol & Rice Inc: (801) 978-4208. ray@sabolrice.com Ray Howe

46. Virginia:
   a. Carolina Controls Depot: (919) 614-4822 jack.connell@ecscontrols.net Jack Connell
   b. First Source Inc: (336) 292-8777 firstsourcedistributors@earthlink.net Daryl Thompson
   c. M & M Controls: (410) 252-1221. pmarzala@aireco.com Pat Marsala
   d. Hoffman & Hoffman: (336) 292-8777. david.williams@hoffman-hoffman.com David Willians

47. Washington:
   a. MI Controls: (206) 767-0140. tracismith@micontrols.com Traci Smith
b. RSD Total Control: (800) 245-8007. jransford@rsd-tc.com Joe Ransford

48. Washington DC:
   a. Broudy Precision Equipment: (610) 825-7200. jranalli@broudyprecision.com Jay Ranalli
   b. M & M Controls: (410) 252-1221. pmarsala@aireco.com Pat Marsala

49. West Virginia:
   a. Edward C. Symers Co: (412) 4713222. dave@symers.com Dave Symers

50. Wisconsin:
   a. Auer Steel & Heating Supply: (414) 463-1234. artcurtes@auersteel.com Art Curtes
   b. Climatic Control Co: (414) 479-9558. jwilliam@climaticcontrol.com Jon Williams

51. Wyoming:
   a. Applied Automation: (801) 486-8791. kathy@appliedutah.com Kathy Murphy
   b. Burke Engineering: (877) 857-2635. bob.pedersen@burkehvacr.com Bob Pedersen
   c. Charles D. Jones Co: (303) 922-8426 scott@cdjones.com
   d. RSD Total Control: (801) 485-5000, ext 255. jransford@rsd-tc.com Joe Ransford
   e. Sabol & Rice Inc: (801) 978-4208. ray@sabolrice.com Ray Howe

2.3 MANUFACTURERS

A. Contact Information:
   4. Honeywell Inc, Minneapolis, MN (800) 328-5111 or (612) 951-1000. www.honeywell.com
   5. Maple Chase Co, Downers Grove, IL (800) 445-8299 or (630) 719-1550. www.invensys.com
   6. System Sensor, St Charles, IL (800) 736-7672 or (630) 377-6580. www.systemsensor.com

PART 3 - EXECUTION

3.1 INSTALLATION

A. Interface With Other Work:
   1. Calibrate room thermostats as required during air test and balance.
   2. Instruct air test and balance personnel in proper use and setting of control system components.

B. Communication Cable:
   1. Network communicating thermostats together with specified communicating cable. After installation of LCP panel, connect communication cable.
   2. Do not bundle communication cables with cables of other systems. Maintain 12 inches minimum distance from wires of other systems, except communication cable may cross other low-voltage wiring if done perpendicularly.

C. Safety Controls: Interlock duct smoke detectors to keep heating, cooling, and system fan from operating when detector is energized.

D. Mount damper actuators and actuator linkages external of airflow. Make certain dampers operate freely without binding or with actuator housing moving.

E. Program ATC system using standard LonSpec database CD provided by Approved Distributor. Download database into network and verify system operation. Adjust settings as required by local Church leaders.

F. Sequence of Control:
   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.

5. Two Sensor Averaging, Bishop Zone:
   a. Sensors shall control zone HVAC equipment by averaging temperature in spaces containing sensors.
   b. Third dummy sensor, typically located in unlocked common space, is place-holder for OVERRIDE, WARMER, and COOLER buttons and does not sense temperature.

6. Two Sensor Averaging, Stake Suite: One sensor has OVERRIDE, WARMER, COOLER buttons. Set jumper to appropriate setting necessary to average with another sensor.

7. Three Sensor Averaging:
   a. Sensors shall control zone HVAC equipment by averaging temperature in spaces containing sensors.
   b. Fourth dummy sensor, typically located in unlocked common space, is place-holder for OVERRIDE, WARMER, and COOLER buttons and does not sense temperature.

8. Electric Booster Heat:
   a. On call for heat from non-programmable thermostat, blower motor of associated furnace shall energize and duct heater shall be enabled.
   b. Internal safeties and controls of duct heater shall be satisfied before operation of duct heater.
   c. Duct heater shall be locked out whenever T7350 thermostat cooling or heating circuits are energized.

9. Outdoor Air Pre-Heat System:
   a. Enable pre-heat system only under one of following conditions:
      1) At least one programmable thermostat is in occupied mode and outside air temperature is below setpoint, adjustable.
      2) Aquastat at pre-heat coil senses temperature below setpoint, adjustable, and outside air temperature is below setpoint, adjustable.
   b. Preheat boiler shall operate under its own safety and operating controls to maintain fluid temperature setpoint, adjustable. Flow switch installed in boiler shall prove flow before boiler will operate.
   c. Interlock circulating pump with boiler low voltage control panel. When boiler is enabled, pump shall be activated and run continuously. When boiler is disabled, circulating pump shall continue to run long enough to dissipate residual heat in boiler heat exchanger. Length of run time shall be sufficient to prevent tripping high water temperature alarm.
   d. When multiple boilers are used, sequencing control panel shall be enabled or disabled in accordance with paragraph ‘a’. Sequencing control panel shall then enable or disable boilers and shall determine firing order of boilers and staging sequence. Also, interlock circulating pump with sequencing control panel.
   e. Outdoor Air Damper Operation:
      1) Outdoor Air Pre-Heat Coil Serving Multiple Furnaces: Damper operates at full open position when at least one programmable thermostat in zones served is in occupied mode. Damper shall remain closed when all thermostats in zone served are in unoccupied mode.
      2) Outdoor Air Pre-Heat Coil Serving Single Furnace: Damper operates at full open position when programmable thermostat serving furnace is in occupied mode. Damper shall remain closed when thermostat is in unoccupied mode.
   f. Three-way control valve shall modulate to maintain outdoor air pre-heat coil discharge air temperature at setpoint, adjustable.

10. De-humidification System:
   a. Each de-humidification unit shall operate independently.
   b. Humidistat on de-humidification unit shall activate unit to maintain humidity setpoint, adjustable, in occupied space.
c. On specified de-humidification units, thermostat provided with unit shall activate equipment to maintain temperature setpoint, adjustable, in occupied space. Set setpoint 4 degrees higher than cooling setpoint of programmable thermostat.

G. Paste copy of record control wiring diagram on back of relay panel door cover for each twin furnace system.

3.2 FIELD QUALITY CONTROL

A. Manufacturer's Field Service:
   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.

3.3 ADJUSTING

A. Program minimum of one day's operation into thermostat memory function.

END OF SECTION