

## DIVISION 23 09 23

### INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section includes HVAC instrumentation and temperature controls.
- B. Related Sections

*Specifier Note: Use as needed*

- 1. Building Services Piping – Division 23 21 00
- 2. HVAC Instrumentation and Controls – Division 23 09 00
- 3. Electrical – Division 23 09 33

##### 1.2 REFERENCES

- A. 2006 UMC, Section 1107.6
- B. ANSI/ASHRAE 15-2010, Section 8.13.6
- C. National Electrical Code, ANSI/NFPA 70

##### 1.3 SUBMITTALS

- A. Product data sheet (including dimensions, rated capacities, shipping weights, accessories)
- B. Warranty information
- C. Installation and operating instructions

##### 1.4 QUALITY ASSURANCE

- A. Listings and/or Certifications
  - 1. CSA; both Canada and United States, ANSI Z21.23, CAN 1-6.6-M 78-R2001

##### 1.5 WARRANTY

- A. Limited one-year warranty from date of installation

#### PART 2 - PRODUCTS

##### 2.1 MANUFACTURER

- A. Raypak, Inc.
  - 1. Contact: 2151 Eastman Ave., Oxnard, CA 93030; Telephone: (805) 278-5300; Fax: (800) 872-9725; Web site: [www.raypak.com](http://www.raypak.com)
  - 2. Product: TempTracker 2 & 4 Stage Temperature Control

##### 2.2 TEMPERATURE CONTROLLERS

###### A. General

- 1. Provide a Raypak TempTracker 2 or 4 Stage Electronic Boiler Control system capable of controlling \_\_\_\_\_ (\_\_\_) Raypak Model \_\_\_\_\_ boiler(s). The electronic boiler control system shall consist of a boiler control module, 3 water temperature sensors and an outdoor air temperature sensor. An internal power transformer shall be integral to the boiler control module.
- 2. The three system water temperature and one outdoor air sensors shall be single element thermistors capable of maintaining  $\pm 1$  °F sense accuracy when installed with a maximum of 500 feet of shielded cable as recommended by the manufacturer.
- 3. The boiler control shall carry a one-year limited warranty against failure caused by defective workmanship or material.
- 4. The boiler(s) and control system shall be manufactured by the same company and shall carry single-source responsibility.

#### B. Enclosure

1. The boiler control module shall be boiler or remote mountable in a weather resistant NEMA 1 rated enclosure. The control enclosure shall be constructed of epoxy coated galvanized sheet metal and shall be vandal and tamper resistant. The access door of the enclosure shall be easily removable with the use of a flat blade screwdriver.
2. The outdoor air temperature sensor shall be mounted in a protective plastic housing.

#### C. Control Functions

1. The control shall have 8 different modes of operation available.
2. The boiler control system shall be microprocessor-based and shall control the firing sequencing of the boiler(s) to meet the system demand within the selectable limits of the Control Band, the Setpoint, the outdoor temperature, and the Reset Ratio.
3. The boiler control's operational algorithm shall have an advanced Proportional plus Integral plus Derivative (PID) logic structure.
4. The microprocessor shall be self-checking.
5. Boiler lead/lag selection will be performed based upon run-time using a First-on Last-off protocol or manually.
6. The boiler control shall have a system pump control output. An energy-saving Pump-off Delay function shall be an integral part of the primary pump control.
7. The system shall incorporate an outdoor cutoff function that shuts down the boiler(s) and the system pump when the outdoor air temperature exceeds a user adjustable setpoint.
8. The boiler control shall have a manual override function that allows independent operation of the boiler(s) for the purpose of testing the boiler(s).
9. The standard control shall incorporate software to allow for alternate setpoint periods or morning boosts from an external signal from a BMS.
10. The control shall be designed to accept an external analog signal of 4-20 mA or 0-10 VDC as an override to normal Setpoint. Remote enable/disable capability.

#### D. Adjustable Parameters

1. The following Shall be included:
  - a. Outdoor Cutoff
  - b. Outdoor Air Reset
  - c. Lead/Lag
  - d. Setpoint

#### E. Display Function

1. OUTDR Always -60 to 190 °F (Outdoor air temperature)
2. BOIL TARGET 35 to 230 °F, OFF (Target boiler water temperature)
3. TANK TARGET 70 to 190 °F, OFF (Target tank water temperature)
4. BOIL SUP -20 to 266 °F (Actual system supply water temperature)
5. BOIL OUT -20 to 266 °F (Actual boiler outlet water temperature)
6. BOIL IN -20 to 266 °F (Actual boiler inlet water temperature)
7. BOIL ΔT 0 to 252 °F (Actual temperature difference between the boiler outlet sensor and the boiler inlet sensor).
8. TANK -20 to 266 °F (Current DHW tank temperature as measured by the DHW sensor)
9. BOIL ON 'Burner' 1 0 to 999 (Total number of running hours of stage 1 of boiler 1 since this item was last cleared. To clear, press and hold UP and DOWN buttons together while viewing item)
10. BOIL ON 'Burner' 2 0 to 999 (Total number of running hours of stage 2 of boiler 1 since this item was last cleared. To clear, press and hold UP and DOWN buttons together while viewing item)
11. BOIL ON 'Burner' 3 0 to 999 (Total number of running hours of stage 3 of boiler 1 (or stage 1 of boiler 2) since this item was last cleared. To clear, press and hold UP and DOWN buttons together while viewing item)
12. BOIL ON 'Burner' 4 0 to 999 (Total number of running hours of stage 4 of boiler 1 (or stage 2

of boiler 2) since this item was last cleared. To clear, press and hold UP and DOWN buttons together while viewing item)

F. Ratings

1. Enclosure — black noryl plastic
2. Dimensions — 4-3/4" H x 2-7/8" W x 1-7/8" D (120 x 74 x 48 mm)
3. Ambient conditions — -40 to 140°F (-40 to 60°C), < 90% RH non-condensing.
4. Power supply — 24 V (ac) ±10% 50/60 Hz, 100 mA, 3 VA, 75 VA max.
5. Pump, Stage 1 relays — 120 V (ac) 5 A pilot duty 240 V(ac)
6. Stage 2, 3 relays — 120 V (ac) 3 A pilot duty 240 V(ac)
7. Alarm relay — 24 V (ac) 3 A
8. Demands — 20 to 130 V(ac) 2 VA
9. Sensors — NTC thermistor, 10 k@ 77°F (25°C ±0.2°C) β=3892
  - a. required — 1 of Raypak Universal Sensor (Boiler Outlet)
  - b. optional — Raypak Universal Sensor (Boiler Inlet), Raypak Universal Sensor (System Supply/DHW), Raypak Outdoor Sensor
10. Shall be constructed of heavy gauge plastic and shall be mounted inside of the boiler or in a weather resistant cabinet.

2.3 SOURCE QUALITY CONTROL

- A. The temperature control shall be completely assembled, wired, and fire-tested prior to shipment from the factory.
- B. The boiler mounted or cabinet mounted temperature controller shall be furnished with the sales order, inspection sheet, wiring diagram, and Installation and Operating Manual.

**PART 3 - EXECUTION**

3.1 INSTALLATION

- A. Must comply with:
  1. Local, state, provincial, and national codes, laws, regulations and ordinances
  2. National Electrical Code, ANSI/NFPA 70 – latest edition
  3. Manufacturer's installation instructions, including required service clearances.
- B. Manufacturer's representative to verify proper and complete installation.

3.2 START-UP

- A. Shall be performed by Raypak factory-trained personnel.

3.3 TRAINING

- A. Provide factory-authorized service representative to train maintenance personnel on procedures and schedules related to start-up, shut-down, trouble shooting, servicing, and preventive maintenance.
- B. Test during operation and adjust if necessary:
  1. Safeties
  2. Operating Control
- C. Schedule training at least seven days in advance.

**END OF SECTION**