

Suggested Specifications

Price Rooftop Unit Controller

Division 23 – Heating, Ventilating, and Air Conditioning

Section 23 09 00 – Instrumentation and Control for HVAC

The following specification is for a defined application. Price would be pleased to assist in developing a specification for your specific need.

PART 1 – GENERAL

1.01 Section Includes

- A. Rooftop Unit Controller.

1.02 Related Requirements

- A. Section 01 40 00 - Quality Requirements
- B. Section 01 78 00 - Closeout Submittals
- C. Section 01 79 00 - Demonstration and Training

1.03 Reference Standards

- A. All referenced standards and recommended practices in this section pertain to the most recent publication thereof, including all addenda and errata.
- B. BACnet International – Building Automation and Control networks: communications protocol for building automation control networks that leverage the ASHRAE, ANSI and ISO standard protocols.
 - 1. ANSI/ASHRAE Standard 135.1 – Method of Test for Conformance to BACnet.
 - 2. ISO 16484-5 – Building Automation and Control Systems: Data communication protocol.

1.04 Documentation

- A. The manufacturer shall provide documentation for each device to address typical wiring, sequence of operation, physical dimensions of components and installation procedures and requirements.

1.05 Quality Assurance

The manufacturer qualifications shall be specified in this section, with a minimum ten years of experience.

1.06 Warranty

- A. The warranty shall begin upon the date of shipment and continue for a period of 18 months.
 - 1. The warranty shall cover all products from manufacturer defect and shall include any replacement parts only during the coverage period.
 - 2. The manufacturer shall not include the cost of labor to replace or recalibrate, if necessary, any components found to be defective.
 - 3. This warranty does not cover any product failure which results from, either directly or indirectly, any damage which occurs to the device by improper installation or from failure to comply with the preventative maintenance required per the manufacturer's instructions, or by codes set by local or facility authorities.
 - 4. An extended warranty shall be available at additional cost from the manufacturer.
- B. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

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PART 2 – PRODUCTS

2.01 Rooftop Unit Controller

- A. Basis of Design: Price Industries, Inc.
1. Rooftop Unit Controller: PRTU

2.02 Rooftop Unit Controller

- A. Description:
1. Furnish and install Price model [PRTU] rooftop unit controller in the configurations as indicated on the plans.
 2. The rooftop unit controller shall be a proportional-integral (PI) controller for packaged rooftop unit control. The rooftop unit controller shall be digital and utilize a microcontroller with Electrically Erasable Programmable Read-Only Memory (EEPROM) for storing setup and calibration variables.
 - a. All network connections shall be pluggable terminal blocks and/or RJ-45 jacks for error-proof field connections.
 - b. Indicator light-emitting diodes (LED) shall be on all outputs to indicate current status. Each output shall be protected by a thermal fuse.
 - c. The rooftop unit controller shall feature individual LEDs to show status of power, inputs, outputs, and shall be coded such that:
 1. GREEN LED = ACTIVE
 2. RED LED = FAULT
 3. YELLOW LED = NETWORK OVERRIDE.
 - d. The rooftop unit controller shall be supplied with a backlit liquid-crystal display (LCD) thermostat having password protected menus that allow full configuration and setup of the controller in the field.
 - e. The controller assembly shall include BACnet MS/TP connectivity.
 - f. The rooftop unit controller shall function in either stand-alone mode (not networked to any zone controllers) or networked mode to poll zone controllers [Price Intelligent Controller – PIC, Prodigy Smart Diffuser] via BACnet MS/TP.
 - g. Network polling mode shall include four preset strategies:
 1. Average polling, weighting each zone equally.
 2. Non-majority polling, giving specified zones more weight, i.e. board rooms or any temperature sensitive spaces.
 3. Optimal comfort mode, i.e. on a 1% call for cooling, cooling is enabled.
 4. Seasonal strategy.
- B. Controller Operation:
1. The rooftop unit controller shall poll each zone controller over BACnet, reading its zone PI to calculate rooftop unit PI and switch the rooftop into heating, cooling or neutral mode.
 2. In case of network communication loss of less than 50% of network devices, the rooftop unit controller shall poll the remaining zones left on the network.
 3. If the Rooftop Unit Controller loses communication with more than 50% of the network devices, the Rooftop Unit Controller shall control based on the setpoint and zone PI local to the Rooftop Unit Controller's own thermostat, while still maintaining all other settings such as scheduling, temperature limits etc. Rooftop unit controllers calculating rooftop PI based on a sample measured from various single function space sensors with the sole purpose of reporting back to the rooftop unit controller shall not be accepted.
- C. Construction:
1. The Rooftop Controller shall consist of the following but shall not be limited to:
 - a. On board real time clock and calendar for scheduling.
 - b. Super capacitor backup to maintain time clock operation during power failures. Battery backup shall not be acceptable.
 - c. Discharge air temperature (DAT) monitoring.
 - d. Return air temperature (RAT) monitoring.
 - e. Two binary inputs with contact closure.
 - f. Six analog 10k thermistor inputs.
 - g. Six analog (0-10 VDC) inputs.
 - h. Ten binary outputs rated at 0.5 amps each and protected with a thermal fuse indicating a red status LED on trip, with automatic recovery when fault is corrected.
 - i. Switch for selecting binary output type [internal 24 VAC – HOT, COMMON or external power source].
 - j. Four analog outputs (0-10 VDC) fully configurable for fan, heating, cooling and spare.
 - k. Multi-level surge protection with user replaceable MINI type fuse.
 - l. Pluggable terminal blocks to simplify wiring.
 - m. BACnet MS/TP Client/Server stack for polling zones for data.
 - n. LEDs for BACnet wiring fault, BACnet network fault, and MS/TP termination.
 2. Thermostat:
 - a. The LCD thermostat shall support one occupied/unoccupied schedule per day. The thermostat communication to the rooftop unit controller board shall be accomplished with one plenum rated CAT5 cable with RJ45 connections.
 - b. The thermostat shall include onscreen menus and have the following features:

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1. Backlit 14x2 LCD thermostat with true character display.
 2. Motion sensor to allow automatic occupancy mode with adjustable timeout feature.
 3. Password protected menu.
 4. Easy to read MENU for system setup.
 5. Local thermistor with +/- 1 degree accuracy and room temperature adjustable offset.
 6. Service port for use with Price LINKER software accessible without removing thermostat from the wall.
 7. RJ45 plenum rated cable for fast, error free hookup.
 8. Setup Wizard to walk through setup of the PRTU when first powered up.
- c. The configurable LCD plus Key Pad combination will allow for the following on screen functions/modes:
1. Customer Mode:
 - i. Setpoint adjustment (only if the rooftop unit controller is operating in standalone PI).
 - ii. Date and time.
 - iii. Current PI (whether standalone or networked), current occupancy status (occupied, or unoccupied).
 2. Info Mode for Networked Controllers (display only – no adjustments):
 - i. MAC address.
 - ii. Network health (communication status).
 - iii. Number of zones up.
 - iv. Percent of zones polled, heating.
 - v. Percent of zones polled, cooling.
 - vi. Percent of zones polled, neutral.
 - vii. Pending mode (heat, cool, or neutral).
 - viii. Occupancy status.
 3. Service Mode (password protected):
 - i. Strategy.
 - ii. Setpoint.
 - iii. Inputs.
 - iv. Outputs.
 - v. BACnet settings.
 - vi. Thermostat setup.
 - vii. Diagnostic (BACnet).
 - viii. Polling.
 - ix. Time/Date set.
 - x. Schedule set.
 - xi. Operation.
 - xii. Setup Wizard.
- D. Return Air Temperature and Discharge Air Temperature Probes:
1. The rooftop unit controller shall be shipped complete with Return Air Temperature (RAT) and Discharge Air Temperature (DAT) probes to ensure that the rooftop unit does not overheat or overcool air past configurable heating and cooling limits by disabling stages of heat or cooling as required.
 - a. These safety features shall be designed to prevent icing of coils and prevent high temperature limit tripping of HVAC equipment.
 - b. Rooftop unit controllers without DAT and RAT probes with integrated safety programming as mentioned above shall not be accepted.
- E. Electrical Requirements:
1. The rooftop unit controller shall operate with 24 VAC power supplied by the rooftop unit transformer, and shall be sized for a 10VA external power load for the PRTU controller.
- F. Interfacing to EMS/BMS/BAS:
1. The VAV Zone Controller shall interface with the building management system (BMS) to allow remote monitoring of room parameters or permit settings adjustments over the building network.
 2. The BMS shall use BACnet MS/TP network protocol to view points or status of room space. The use of BACnet protocol shall be native to the device and shall not require the use of an external gateway.
 3. The thermostat shall include the ability to change MAC address, device instance and baud rates (9600, 19200, 38400, 76800) for proper interfacing to BACnet network.
 4. The rooftop unit controller shall support on board network termination for the MS/TP network.
 5. The VAV Zone Controller shall be BTL listed.
 6. Manufacturer shall be a member of BACnet International.
 7. All temperature set points and VAV airflows shall be adjustable from the BACnet network.
 8. The BACnet points shall include:
 - a. Device Object.
 - b. Analog Input (AI).
 - c. Analog Output (AO).
 - d. Binary Input (BI).

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- e. Binary Output (BO).
- f. Multi-state (MSV).

G. Start-up & Commissioning:

1. Start-up shall include verifying proper installation, testing and airflow control, setting all parameters and set points, and configuring and verifying network communication, as applicable.
2. The Test and Balance (TAB) contractor shall be responsible for final verification of airflow measurement.

PART 3 – EXECUTION

3.01 Examination

- A. Verify that conditions are suitable for installation.
- B. Verify that field measurements are as shown on the drawings.

3.02 Installation

- A. The mechanical contractor, controls contractor, or factory authorized commissioning contractor shall install and wire the components of the rooftop unit controller. This shall include the thermostat, rooftop unit controller, DAT and RAT probes, optional web server and associated routers, and all network wires and zone controllers.
- B. The rooftop unit controller and optional webserver package shall be shipped with a DIN rail for easy wall mounting and removal or reinstallation of the devices should it be necessary to relocate.
- C. All BACnet networking of zone controllers to the rooftop unit controller shall be completed using factory shipped plenum FT6 rated CAT 5 cables with RJ45 ends to ensure uniform polarity and network coms throughout network, and to ensure error-proof installation.
- D. The rooftop unit controller shall have the following cable and wire requirements:
 1. Factory supplied 35 foot length of plenum rated (CMP) RJ-45 Cat 5 cable for connecting thermostat to the rooftop unit Controller.
 2. Factory supplied 35 foot length of plenum rated (CMP) RJ-45 Cat 5 cable for networking to zone controllers (if networked, cables shall be included with zone controllers).

3.03 Field Quality Control

- A. See Section 01 40 00 - Quality Requirements, for additional quality requirements.

3.04 Closeout Activities

- A. The manufacturer or manufacturer's representative shall provide a minimum of four hours of owner training to facilities personnel or other parties as required.
- B. See Section 01 79 00 - Demonstration and Training for additional closeout requirements.