HEAT-TIMER CORPORATION

CSI SPECIFICATION: *HWRQ PLATINUM*

SECTION: 230913 Instrumentation and Control devices for HVAC

PART 1 GENERAL

1.1 Summary

A. Section Includes:

1. Multiple Multi-Stage Boiler Outdoor Reset Modular Hydronic Heating Control.

B. Related Sections:

1. Conforms to applicable building code requirements of all authorities having jurisdiction.

1.2 References

A. International Organization for Standardization (ISO) Manufacturer shall be ISO 9001:2008 Quality Management Systems Certified.

B. Underwriters Laboratories, Inc. (UL):

1. The control shall be tested per standard 916 “Energy Management Equipment”.

C. The City of New York, Department of Environmental Protection (DEP).

1. The control shall be approved for installation in New York City by DEP.

1.3 Quality Assurance

A. Manufacturer’s Quality System:

1. Registered to ISO 9001:2008 Quality Standard, including in-house engineering for product design activities.
2. The control must be UL tested and certified per standard 916, Temperature Indicating and regulating Equipment.

1.4 Control Operation

A. Description: The control shall operate on 120VAC, with a maximum power of 30 watts. The control shall be pre-engineered and programmed exclusively for the operation of multiple multi-stage boilers in a Hydronic heating systems. It shall be capable of controlling eight boiler stages without any additional extra modules. However, it shall be modular and capable of controlling a total of 32 boiler stages using a maximum of three external extension controls. It shall incorporate the following integrated functions: Hydronic outdoor reset, Outdoor temperature cutoff; day/night heat level programming; and Boost (optimum start/stop).

B. Stages: The control shall have eight normally open stage relay contacts. Each can be used to start/stop a burner stage. These relays shall be field replaceable. The control shall have the capability of operating single-stage, 2-stage, 3-stage, and 4-stage burners.

C. Sequence of Operation: When heat is required, the control PID shall activate the lead boiler and start its pre-purge cycle. When additional heat is needed, the control shall start an additional stage after the reaction time has elapsed. If the additional stage was a new boiler, the control shall start with a pre-purge cycle. When the control PID requires reduced output, the control shall turn of the higher firing stage after the stage minimum runtime expires.

D. Space Average Feedback Operation: Is used to prevent space from over heating and minimizes fuel consumption. If the control is equipped with Internet communication, the control shall have the option of accepting values from up to 64 space sensors. The sensors shall be of the wired or wireless type. For each space sensor configured, the control shall provide the option of including it

in or excluding it from the space average calculation. The control Space Feedback logic shall predict the need to increase or decrease the system target temperature based on the average of the space temperature over the previous 2 hours.

1. **Smart Space Average:** The control shall incorporate a statistical logic to exclude erroneous sensors from the space average based on how far off their current values are from the total average based on an adjustable differential. The control shall average the temperature of all the space sensors that are selected to be part of the space average. Then it shall scan through them and exclude all the sensors that have a reading greater than the sum of space average and the differential. In addition, it shall exclude all the sensors that have a reading that is less than the space average minus the differential. Then, the control shall recalculate the space average using only the included sensors (all excluded sensors values shall be logged but not included in the space average). This new calculation shall be the smart space average that shall be used by the control logic to manage the space heat.
2. **Day and Night Space Average Target:** The control shall have two independently adjustable space average target settings; a day setting and a night setting. The day space target setting is for the day schedule while the night space target setting is for the night schedule.

E. Features:

1. **Outdoor Reset or Set Point:** The control shall provide an integral sensor set point adjustment. The set point shall be adjustable or varying based on an outdoor reset selectable curve. The outdoor reset shall have additional adjustable parameters.
2. **Reaction Time:** Adjustable from 0- 10 minutes. This setting shall set the delay time required to start the lag stage after the lead stage turns on.
3. **Minimum Runtime:** Adjustable from 0- 60 minutes. This setting shall set the minimum time any stage shall run before turning off.
4. **Purge Time:** Adjustable from 0- 10.0 minutes. This setting shall set the delay time required by the boiler manufacturer before the boiler is able to produce output.
5. **Last Stage Hold**: Adjustable from 0°F to 30°F. The last stage hold shall keep the lead boiler at low fire for an additional number of degrees to reduce lead boiler short cycling.
6. **Rotation:** The control shall be capable of rotating the boilers either based on an adjustable period ranging from 1 hour to 41 days, Last-On/last-Off, or manually.
7. **Boost/Optimum Start and Stop:** The control shall offer a variable boost that varies with the outdoor temperature. This boost shall be used to bring the building space temperature from the night to the day level sooner by increasing the system water target for a period of time calculated based on the outdoor temperature.
8. **Auto/Bypass Manual Switch:** An Auto/Bypass switch shall be integrated into the control to select the required operating mode. In Bypass the heating system shall operate independently of the control. The Auto mode shall allow the control to regulate the heating system. A counter shall record the cumulative days, hours and minutes in Bypass. The accumulated time in bypass shall be stored indefinitely in EE Prom.
9. **Memory:** The control shall store all configuration and settings on EE-Prom. In case of power failure the control should be able to retrieve all of its latest settings.
10. **Display:** The control shall have a four line by twenty-character alphanumeric display capable of displaying both numbers and characters. The display shall be visible with no ambient light. All control operation information shall be available for display. During times of inactivity, or 10 minutes after last user entry, the display shall enter a lower power mode. In this mode the control should display date and time of day, cycle status, outdoor temperature, and system temperature. In this mode, the display shall reduce visible light output. The control shall exit this mode whenever a button or knob activity is sensed.
11. **Boiler Lockout Input:** The control shall have a dry contact input for boiler failure. The control shall not include failed boilers in its sequencing logic.

F. Input Points:

1. **Outdoor Temperature:** This shall be the value read from the Outdoor Thermistor placed on the north side of the building at least 10 Ft. above the ground.
2. **System temperature:** This shall be the value read from the system sensor placed on the supply piping before any major takeoffs.
3. **Prove Input:** The control shall provide a dry-contact prove check input on system components. This input shall be checked before the system energize any boiler or activate the heating output.
4. **Shutdown:** The control shall provide a dry-contact shutdown input to turn the operation of the control off during maintenance period.
5. **Optional Auxiliary Sensor Inputs:** The control circuitry shall be capable of accepting two standard and up to three optional (sensor) inputs. Standard sensor inputs shall be of the thermistor type. Operating temperature range shall be -30°F to 250°F. Optional (sensor) inputs shall include multiple thermistor type or dry-contact sensors.
6. **Optional Wireless Sensor Input:** The Internet capable control shall be able to accept up to 64 wireless sensor and wireless transceiver devices through a single wired RS485 connection. Wireless sensors shall be of the space temperature sensor, outdoor temperature sensor, water temperature sensor, and switch sensor types.
7. **Optional Network Sensor Inputs:** The Internet capable control shall be able to communicate to up to 64 additional sensors through these inputs.

G. Output Points/Relays:

1. Eight stage relay output.
2. System relay output.

H. Data Points:

1. The communication capable control shall offer all sensor values and control settings as data points to be used in energy management systems.

I. Optional Add-Ons: Internet capable controls shall be capable of connecting to and alarming on different adjustable settings and delays for the following sensors.

1. **Wireless Temperature and Switch Sensors:** The control shall be capable of communicating to wireless space temperature, wireless outdoor temperature, and wireless temperature/ switch sensors.
2. **Network Sensors:** Stack Network Temperature Sensor, Oil Tank Level, Domestic Hot Water and other Temperature Sensors, Flame Failure and other Switch Sensor, Pressure Network Sensor, Water Counter/Pulse Network Sensor, Smoke Alarm Sensor, Sump Pump Float Sensor.

1.5 Regulatory Approvals

A. Underwriters Laboratories, Inc. (UL):

1. The control shall be tested per standard 916 “Energy Management Equipment”.

B. The City of New York, Department of Environmental Protection (DEP).

1. The control shall be approved for installation in New York City by DEP under “Engineering Criteria for Fuel Oil Burning Equipment”.

1.6 Included Items

A. Outdoor Temperature Sensor shall be of the Thermistor type capable of measuring between –30°F to 250°F. It shall have a weather shield to protect it from moisture and direct sun.

B. System return line temperature Sensor shall be of the Thermistor type capable of measuring from –30°F to 250°F. It shall be of the strap-on type.

C. Five Control Relays. Control relays shall be plug-in type, UL listed, and shall have dust cover and LED "energized" indicator. Contact rating, configuration, and coil voltage shall be suitable for application.

1.7 Communication (Select one of these Options)

A. Internet Communication: The control shall be capable of communicating to the Internet using a high-speed Internet connection to communicate to the manufacturer or manufacturer representative web servers to send or receive its information. Remote users of the control shall have the capability of the control remotely using an Internet Browser with built-in Java when provided with security logging information. The user shall be capable of viewing and changing control settings remotely. In addition, the web server shall offer customizable history reporting and graphing of all control and sensor data. The control and web system shall be capable of sending alarms to web viewers, several E-mails, and several cellular phones as text messages.

B. BACnet IP Communication: The control shall be BACnet IP capable. It shall provide the user with BACnet IP communication Interface to an Energy Management System (EMS) or Building Management System (BMS) on the same BACnet network. The control shall be designed to be BACnet Application Specific Controller (B-ASC). The control shall manage the valve and/or boiler through direct wiring to the equipment and not through the BACnet network.

C. BACnet MSTP Communication: The control shall be BACnet IP capable. It shall provide the user with BACnet MSTP communication Interface to an Energy Management System (EMS) or Building Management System (BMS) on the same BACnet network. The control shall be designed to be BACnet Application Specific Controller (B-ASC). The control shall manage the valve and/or boiler through direct wiring to the equipment and not through the BACnet network.

D. MODBUS (RTU): The control shall be MODBUS RTU capable. It shall provide the user with RS485 communication Interface to an Energy Management System (EMS) or Building Management System (BMS) on the same BACnet network. The control shall manage the boilers and pump through direct wiring to the equipment and not through the MODBUS network.

E. Johnson Metasys, Johnson N2, LonWorks, Honeywell, Tridium, and other protocol communications: The control shall be BACnet IP capable. However, will communicate to the other proprietary protocol through a BACnet IP or BACnet MSTP to the specified proprietary protocol through a gateway that is supplied by the control manufacturer at additional cost. It shall provide the user with proprietary protocol communication Interface to an Energy Management System (EMS) or Building Management System (BMS). The control shall be designed to be BACnet Application Specific Controller (B-ASC). The control shall manage the valve and/or boiler through direct wiring to the equipment and not through the EMS/ BMS network.

1.8 Security

A. Control Local Security:

1. The control shall have a secure password to deter unauthorized users. The password shall be optionally activated.
2. The control shall have a key-locked enclosure.

B. Control Remote Security:

1. To access the control remotely, the control, web server, or proprietary software shall deter unauthorized users by requiring a secure password for logging to the control interface.