[redacted]

Date: Bid Date:

Project #: Location:

Project Name: Engineer:

Contractor: Prepared By:

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Laars Sequencing Controls

Models SC6, SC12, SC24

Specification

The contractor shall furnish and install a microprocessor based control system. The control shall be pre-engineered and programmed for the operation of multiple hot water boilers. It shall incorporate the following integrated functions:

Manual or automatic lead stage rotation and stage sequencing control. The control shall be of modular construction to facilitate field modification, upgrading or repair. It shall include the following features:

SENSORS: The temperature sensors shall be of the thermistor type, suitable for insertion into a 3/8" I.D. well. The standard operating range shall be -30°F to 250°F.

SENSOR SET POINT: The control shall provide an integral sensor set point adjustment. The set point shall be adjustable in 1°F increments. The setting shall be stored until otherwise changed by the user.

DIGITAL DISPLAY: The control shall provide a digital display of the actual temperature or pressure, set point temperature or pressure, the reaction time, the system delay, and the purge time. LEDs shall be provided to indicate the lead stage and all activated stages.

MODE SELECTION SWITCH: A three-position switch shall be provided for each stage to set the operating mode of the respective stage. Each switch shall include On, Auto and Off positions.

LEAD STAGE ROTATION: The control shall have an Auto/Off/Increment switch for rotation of the lead stage. When set in the Auto position, the lead stage shall automatically change. The automatic rotation shall be selectable for either every 24 hours, or a first on/first off basis. The Increment position shall manually change the lead stage. In the OFF position, the lead stage shall remain as the current lead stage until the switch is reset to Auto or Increment or power is interrupted.

SC6: 6-STAGE OUTPUTS: The control shall have the capability of operating multiple stages. Each stage shall have a normally open contact to start/stop the respective stage. Outputs shall be up to six on/off, three 2-stage (lo/hi), two 3-stage, or one 4-stage.

SC12: 12-STAGE OUTPUTS: The control shall have the capability of operating up to twelve stages. Each stage shall have a normally open contact to start/stop the respective stage. Outputs shall be up to twelve on/off, six 2-stage (lo/hi), four 3-stage, or three 4-stage.

SC24: 24-STAGE OUTPUTS: The control shall have the capability of operating up to 24 stages. Each stage shall have a normally open contact to start/stop the respective stage. Outputs shall be up to 24 on/off, twelve 2-stage (lo/hi), eight 3-stage, or six 4-stage.

SEQUENCING OPTIONS: The control shall be capable of sequencing lo/hi units in a lo/lo/hi/hi or lo/hi/lo/hi fashion. 3-stage units shall be sequenced lo/mid/hi. 4-stage units shall be sequenced lo/midlo/midhi/hi. The control's software shall automatically allow only lo stages to be lead stages.

ADDITIONAL OUTPUT: An additional normally open contact shall be energized when any stage is energized. After the last stage is turned off, this additional contact shall remain energized for an adjustable period of time up to 30 minutes (designated as the system delay).

LOGIC: The control shall have a PID type control algorithm. The control shall monitor the rate of temperature or pressure change in the system. This information, combined with the reaction time setting, shall be used to control when stages are activated and deactivated. The algorithm shall be specifically designed to allow the control to adjust to specific system requirements and to minimize fluctuation around the set point.

REACTION TIME: The control shall have a programmable reaction time, fully adjustable from 0.5 minutes to 8.0 minutes. To prevent short cycling, once a stage has been activated, it shall remain activated for at least one-half the reaction time. The reaction time shall also be used as an input to the PID logic algorithm.

SYSTEM DELAY: The control shall have a programmable system delay time, fully adjustable from 0 to 30 minutes. The additional output shall remain active for time period set for the system delay after the last stage has been deactivated.

PURGE TIME: The control shall have a programmable purge time, fully adjustable from 0 to 10 minutes to compensate for units pre-purge cycles. The purge time shall apply when any on/off stage is activated, or when the lo stage of any multi-stage unit is activated.

MEMORY BACKUP: The control shall save all adjustable system parameters including the set point, reaction time, system delay, and purge time in EEPROM. The user-defined settings of these parameters shall not be lost due to power interruptions.

EXTERNAL SET POINT: The control shall be capable of accepting an external set point from a 4-20mA signal. The range of the external set point shall be 60° to 220°F.

EXTERNAL SHUTDOWN: The control shall be capable of accepting a dry contact input to turn off all stages.

INTERFACE MODE: The control shall be capable of interfacing to Heat Timer HWRQ, MPCQ, or HWM550 outdoor reset control.

PROVE INPUT: The control shall be capable of accepting a dry contact type system prove input. This shall prevent any stages from activating until the contact is closed.

ENCLOSURE: A surface mounted, locking steel enclosure NEMA 1 type, minimum 18 gauge shall be provided for the SC 6/12. The SC24 shall have two such enclosures.

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