

**CONTROL SYSTEM SPECIFICATION: VSP
AS MANUFACTURED BY HEAT-TIMER CORPORATION
20 NEW DUTCH LANE, FAIRFIELD, NJ 07004**

PURPOSE

To control the temperature of a secondary heating supply loop by varying the speed of an injection pump. The micro-processor based control shall recognize when the secondary heating supply loop needs more or less heat and vary the speed of the injection pump as required to maintain the desired temperature of the secondary loop.

The control shall include all the following features:

SENSORS

Three solid state (thermistor type) sensors which are interchangeable. The sensors measure from -30°F to 250°F, maintain +/- 1°F accuracy, and may be located up to 500 feet from the control. The sensors shall fit in a 3/8" ID well or be mounted outdoors with a clip. One sensor shall measure outdoor temperature, one shall measure the temperature of the secondary loop, and one shall (optionally) measure the return boiler water temperature.

DIGITAL DISPLAY

The control shall have a digital display of all sensor values and the control parameters listed below. In addition, error codes shall indicate when there is a fault with the sensors.

CONTROL PARAMETERS

SYSTEM START

The control shall provide an adjustable system start temperature which shall select the outside temperature below which the unit shall activate the heating system. Range shall be adjustable from OFF to 40°F to 70°F (in 1°F increments) and ON. OFF shall disable all the outputs. ON shall activate the system regardless of the outside temp. If control is in the thermostat mode, both the thermostat (or switch) input and the outdoor cutoff must be satisfied before the heating system is activated.

RESET RATIO

The control shall provide adjustable reset ratios. The reset ratios shall be variable from 8:1 to 1:4 (Outdoor:Water) and displayed as numbers from 1 to 12. The factory setting shall be a ratio of 1:1 which shall be displayed as 7. A setting of 1 shall give the least amount of heat. A setting of 12 shall give the maximum amount of heat.

OFFSET

The control shall provide an offset adjustment to parallel shift the selected reset curve. The range of settings shall be -30°F to 30°F. The factory default shall be 0.

MINIMUM RETURN

The control shall provide a minimum boiler return water temperature setting. Should the boiler return water fall below the setting, the controller shall reduce the calculated pump speed by 50% and prevent any further pump speed increases. The control shall still provide heat to the secondary loop even if the return water setting can not be achieved. The range of the setting shall be 70 to 170°F. An additional OFF setting is the factory default and shall be available if the installation does not have a boiler return water sensor installed.

MAXIMUM SECONDARY (RESET APPLICATIONS ONLY)

The control shall provide a maximum secondary loop temperature setting. The range of the setting shall be 80 to 190°F. The factory default shall be 175°F.

SET POINT (SET POINT APPLICATIONS ONLY)

The secondary loop temperature set point shall be adjustable from 80 to 190°F. The factory default shall be 175°F.

INDICATOR LIGHT

The control shall have an indicator light to show the operating status of the control. The light off shall indicate the heating system is not active. The light on continuously shall indicate the secondary pump output is active and the injection is running. The light shall flash when the heating system is active but the injection pump is not running.

RELAY OUTPUT

The control shall have one Normally Open relay contact to activate the secondary loop pump. The relay shall be rated for 8A 1/8HP 125VAC.

SOLID STATE OUTPUT

The control shall have one solid state switching output for the exclusive purpose of varying the speed of a fractional horsepower permanent split capacitor pump motor. The output rating shall be 3A 1/4HP 125VAC only.

SYSTEM POWER

The control shall be powered by 120VAC, 60hz 5VA.

OPERATING MODES

The control shall have the capability to run in any of the following modes:

- °F or °C display mode for sensor readings and settings

- Reset or Set Point operation

- Auxiliary input can provide either a setback or a thermostat start/stop signal

These modes shall be selectable by the user when the control is powered up. Factory default operation shall be °F, Reset, and Setback.

SEQUENCE OF OPERATION

The control shall turn on the secondary pump whenever there is a call for heat generated by the System Start and Thermostat input (if selected). The outside temperature along with the Reset, Offset, and Setback (if selected) shall determine the calculated temperature of the secondary loop if the Reset mode of operation is selected. If the Set Point operation is selected, the Set Point and Setback (if selected) shall determine the temperature of the secondary loop.

The speed of the injection pump shall be varied from OFF to FULL in order to maintain the calculated temperature in the secondary loop. If the minimum boiler return sensor is being used, and if the return water falls below the desired set point, the injection pump speed shall be reduced by 50% not be increased until the boiler return temperature has recovered.

The injection pump output shall be designed to control a fractional horsepower permanent split capacitor motor. The pump control circuit and software shall be designed to minimize the possibility of motor stalls at low speeds as well as providing a soft turn on and off which shall minimize current spikes and pump knocking. The control shall provide a geometric progression for the pumped volume to provide for more precise control at lower pump speeds. These features and the PID type control shall provide for more stable secondary loop temperatures.