

SUPERHEAT CONTROLLER

Installation and Servicing Instructions

SD-257
March 2005

The Superheat Controller will control one Sporlan Electric Expansion Valve by means of pressure-temperature control. Pressure-temperature superheat control for one of four common refrigerants may be selected. Controllers can be ordered configured for R-22, R-134a, R-404A, R-407C and R-507. The refrigerant type can be changed in the field by use of the optional "Panel Display". Onboard readouts show actual superheat, superheat set point, and valve position. Two push buttons are provided on the board, to change the superheat set point, as well as open, close, or position the valve. Proportional and Integral set points are also included to change responsiveness of the valve.

As illustrated in Figure 1, the controller is provided with hardware and input/output connections for a number of user specified purposes. See below:

- One valve control
- One pressure input (transducer supplied by Sporlan)
- One digital input (from external switches or relays)
- Two temperature inputs (Sporlan supplied surface or air sensors)
- Optional battery backup for onboard time clock and fail-safe valve closure
- Two digit LED readout
- One green LED indicator
- One red LED indicator
- Two push buttons for set point, alarm cancellation, etc.
- RS 485 port
- Panel Display jack

Please note that although RS485 port appears on the Superheat Board, standard software does not support communication. Custom (proprietary) software must be written for anything other than superheat control. Please contact Sporlan for more information.

INSTALLATION

When handling the boards, electrostatic protection procedures should be followed. The installer should be grounded through a ground strap. If ground straps or other ESD protection is not available, ONLY handle the board by its edges or by the battery holders. **DO NOT TOUCH ANY COMPONENTS ON THE BOARD EXCEPT THE BATTERY HOLDER AND RELAYS.**

1. The board should be mounted in a dry, protected environment using the predrilled mounting holes in each corner. Make sure none of the printed circuit paths or components are touching the metal panel or anything conductive. See Figure 3.
2. Connections are to be made to terminal block shown.
3. Controllers are configured for pressure temperature superheat control.
4. Connect temperature sensor to **TS2**. The sensor is not polarized. For suction lines 7/8" or less, the sensor should be mounted to the copper suction line after the evaporator, using the furnished clamps. For larger lines or steel piping, a well sensor (P/N 952795), available from Sporlan, should be installed.
5. The pressure transducer should be mounted on the top of the suction line near the temperature sensor location. Transducer connections to the board are as follows:
 - The power wire is red and is connected to the **1+** terminal.
 - The signal wire is green and is connected to the **1S** terminal.
 - The ground wire is black and is connected the **1-** terminal.

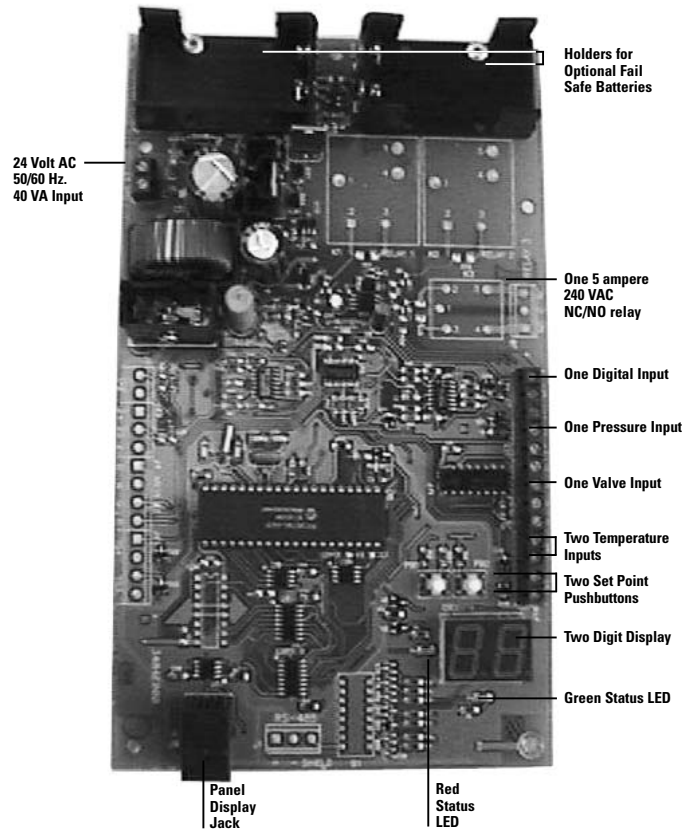


Figure 1

6. The valve leads are connected to the terminals labeled **Valve 1**.
 - The black lead is connected to terminal labeled **B** of **Valve 1**.
 - The white lead is connected to terminal labeled **W** of **Valve 1**.
 - The green lead is connected to terminal labeled **G** of **Valve 1**.
 - The red lead is connected to terminal labeled **R** of **Valve 1**.
7. **DI1** is a digital input used as a pumpdown terminal. A short or closed contact from an external relay will close the valve for pumpdown. When the relay opens or the short is removed, the valve will return to normal operation.
8. Power is connected to the terminal marked **24VAC**. Power requirements are 24 volts AC at 40 VA. For protection from electrical transients, connect one MOV varistor between one leg of the input voltage of the 24 VAC transformer and earth ground. Connect a second MOV varistor between the other leg of the input voltage of the 24 VAC transformer to earth ground. Two MOV varistors are included with the controller.

NOTE: Sensor and valve wires may be extended for remote applications. Waterproof butt connectors should be used, and the cable should be at least 16 gauge. Care must be taken to ensure a good splice and that the individual wires are correctly identified. For remote installation where the sensors are located more than 25 ft. from the controller, contact Sporlan for guidance.

OPERATION

1. When first powered up the numeric display will show actual super heat.
2. The small Green LED will be lit.

3. PB2 will toggle the readings as follows and the small Green LED will be steady or flash:
 - Actual Superheat, LED constant.
 - Valve percentage open, LED slow flash.
4. To change superheat set point:
 - Make sure the display shows the superheat.
 - Press and hold PB1 and PB2 for 8 seconds, LED will flash rapidly.
 - Use PB1 to increment set point.
 - Use PB2 to decrement set point.
 - Press and hold PB1 and PB2 simultaneously for 5 seconds to lock in set point and return to actual superheat.
5. To manually change valve position:
 - Scroll to valve position reading with PB2.
 - Press and hold PB1 and PB2 simultaneously for 8 seconds, Green LED will flash rapidly.
 - Increment "valve open" percentage by pressing PB1 for 1 second.
 - Decrement "valve open" percentage by pressing PB2 for 1 second. Valve will maintain manual open position for 1 hour or until PB1 and PB2 are pressed simultaneously and held for 5 seconds.

REMOTE PANEL DISPLAY

A remote panel display is available that will allow access to all the parameters of the controller. The Remote Panel Display can be used as a set point tool in production, a diagnostic tool in the field or as a permanent readout device for the controller. A five-foot cable is included.

Plug the remote display into the telephone jack (J9) on the controller. The following is a list of readings available:

- SUPH** Superheat read by controller for AC circuit 1
- POSN** Number of steps valve is open (0-6386) for AC circuit 1
- PRES** Pressure read by the transducer (0-153 psi gauge) for AC circuit 1
- TEMP** Temperature read by the temperature sensor (-50 to 103°F) for AC circuit 1
- TSAT** Saturated temperature for AC circuit 1
- ACON, PMDN**
ACON when in normal operation,
PMDN when in pumpdown
- R22, 134A, 407C, 404A, 507**
R22 for refrigerant R-22, 134A for refrigerant R-134a, 407C for refrigerant R-407C, and 404A for refrigerant R-404A and R507 for refrigerant R-507. **Note: not all controllers have both R-507 and R-407C.**
- LRGE, SMAL, MEDM**
LRGE if the EEV used is an SEI-50 or larger.
SMAL if the EEV used is smaller than an SEI-25 and all SER.
MEDM if the EEV used is a SEI-25.
- SHSP** Superheat set point (0 to 16°F). Default is 10°F.
- MOPD** Maximum operating suction pressure set point (0 to 153 PSI). Default is 153 PSI.
- CTSP** Cut out suction pressure set point (0 to 153 PSI)
- CALP** Calibrate pressure transducer for AC circuit 1
- CALT** Calibrate temperature sensor for AC circuit 1
- PROP** Proportional gain set point. Number of steps per degree that superheat is above or below the superheat set point (5 to 255 steps per degree). Default is 45 for LRGE setting, 22 for MEDM setting, and 11 for SMAL setting.
- INTG** Integral set point. Number of seconds the controller waits to update the reference valve position. (1 to 120 seconds). Default is 10 seconds.
- DLCN** Time to open and keep valve open 'DLST' steps when the pumpdown signal is removed (0 to 120 seconds). Default is 0.
- DLST** Number of steps to open valve when the pumpdown signal is removed (0 to 6386). Default is 0.

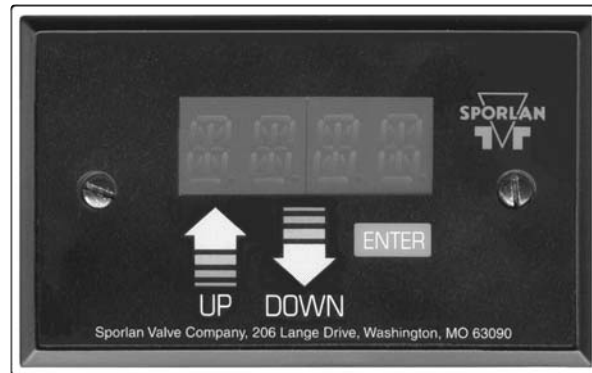


Figure 2

CONTROLLER MENUS

- ENTER** Will toggle display between one of the displays described above and the numeric value read for that particular display.
- UP** Will scroll through the menu from SHSP to POSN, etc.
- DOWN** Will scroll through the menu the opposite way.

POSN MODE

Press and hold the **UP** button and **ENTER** button simultaneously for 5 seconds to put the controller in manual valve position. The number of steps open will be displayed and the 1000's digit will blink.

Pressing the **UP** button will open the valve 1000 steps.
Pressing the **DOWN** button will close the valve 1000 steps.
Pressing the **ENTER** button will change the flashing digit from 1000's digit to the 100's digit.

Pressing the **UP** button will open the valve 100 steps.
Pressing the **DOWN** button will close the valve 100 steps.
Pressing the **ENTER** button will change the flashing digit from 100's digit to the 10's digit.

Pressing the **UP** button will open the valve 10 steps.
Pressing the **DOWN** button will close the valve 10 steps.
Pressing the **ENTER** button will change the flashing digit from 10's digit to the 1's digit.

Pressing the **UP** button will open the valve 1 step.
Pressing the **DOWN** button will close the valve 1 step.
Pressing the **ENTER** button will change the flashing digit from 1's digit to the 1000's digit.

Press and hold the **UP** button and **ENTER** button simultaneously for 5 seconds to put the controller in normal control. The digits will stop blinking.

SHSP MODE

Press and hold the **UP** button and **ENTER** button simultaneously for 5 seconds to enable the superheat set point to be changed. The set point is displayed and the 100's digit will blink.

Pressing the **UP** button will increase the set point by 100 degrees. Pressing the **DOWN** button will decrease the set point by 100 degrees. Pressing the **ENTER** button will change the flashing digit from 100's digit to the 10's digit.

Pressing the **UP** button will increase the set point by 10 degrees.
Pressing the **DOWN** button will decrease the set point by 10 degrees.
Pressing the **ENTER** button will change the flashing digit from 10's digit to the 1's digit.

Pressing the **UP** button will increase the set point by 1 degree.
Pressing the **DOWN** button will decrease the set point by 1 degree.
Pressing the **ENTER** button will change the flashing digit from 1's digit to the 100's digit.

Press and hold the **UP** button and **ENTER** button simultaneously for 5 seconds to save the set point. The digits will stop blinking.

MOPD MODE

Press and hold the **UP** button and **ENTER** button simultaneously for 5 seconds to enable the Maximum Operating suction Pressure set point to be changed. The set point is displayed and the 100's digit will blink.

Pressing the **UP** button will increase the set point by 100 PSI.
Pressing the **DOWN** button will decrease the set point by 100 PSI.
Pressing the **ENTER** button will change the flashing digit from 100's digit to the 10's digit.

Pressing the **UP** button will increase the set point by 10 PSI.
Pressing the **DOWN** button will decrease the set point by 10 PSI.
Pressing the **ENTER** button will change the flashing digit from 10's digit to the 1's digit.

Pressing the **UP** button will increase the set point by 1 PSI.
Pressing the **DOWN** button will decrease the set point by 1 PSI.
Pressing the **ENTER** button will change the flashing digit from 1's digit to the 100's digit.

Press and hold the **UP** button and **ENTER** button simultaneously for 5 seconds to save the set point. The digits will stop blinking.

CTSP MODE

Press and hold the **UP** button and **ENTER** button simultaneously for 5 seconds to enable the cut out suction pressure set point to be changed. The set point is displayed and the 100's digit will blink.

Pressing the **UP** button will increase the set point by 100 PSI.
Pressing the **DOWN** button will decrease the set point by 100 PSI.
Pressing the **ENTER** button will change the flashing digit from 100's digit to the 10's digit.

Pressing the **UP** button will increase the set point by 10 PSI.
Pressing the **DOWN** button will decrease the set point by 10 PSI.
Pressing the **ENTER** button will change the flashing digit from 10's digit to the 1's digit.

Pressing the **UP** button will increase the set point by 1 PSI.
Pressing the **DOWN** button will decrease the set point by 1 PSI.
Pressing the **ENTER** button will change the flashing digit from 1's digit to the 100's digit.

Press and hold the **UP** button and **ENTER** button simultaneously for 5 seconds to save the set point. The digits will stop blinking.

NOTE: CTSP set point is used to help stop nuisance, low suction pressure trips of the compressor. If the suction pressure goes below CTSP, and the superheat is above the superheat set point, the valve will keep opening until the suction pressure is above CTSP or the superheat is below its set point. The controller will start controlling superheat from this new valve position. If the superheat is below its set point and the suction pressure is below this set point, the controller will change CTSP to 12 PSI below current suction pressure. If power is lost, the original saved set point is used again.

When in **CALP** or **CALT**, the numeric display shows the PSI or degrees to be either added or subtracted from that particular sensor, depending if the reading is negative or positive. Press and hold the **UP** button and **ENTER** button for 5 seconds to enable the sensor to be calibrated.

The **CAL** number is displayed and the 10's digit will blink.
Pressing the **UP** button will increase the CAL number by 10 PSI or degrees.
Pressing the **DOWN** button will decrease the CAL number by 10 PSI or degrees.

Pressing the **ENTER** button will change the flashing digit from 10's digit to the 1's digit.

Pressing the **UP** button will increase the CAL number by 1 PSI or degree.
Pressing the **DOWN** button will decrease the CAL number by 1 PSI or degree.
Pressing the **ENTER** button will change the flashing digit from 1's digit to the 0.1's digit.

Pressing the **UP** button will increase the CAL number by 0.2 PSI or degree.
Pressing the **DOWN** button will decrease the CAL number by 0.2 PSI or degree.
Pressing the **ENTER** button will change the flashing digit from 0.1's digit to the 10's digit.

Press and hold the **UP** button and **ENTER** button simultaneously for 5 seconds to save the CAL number. The digits will stop blinking.

PROP MODE

Press and hold the **UP** button and **ENTER** button simultaneously for 5 seconds to enable the proportional gain set point to be changed. The set point is displayed and the 100's digit will blink.

Pressing the **UP** button will increase the set point by 100 steps per degree.
Pressing the **DOWN** button will decrease the set point by 100 steps per degree.
Pressing the **ENTER** button will change the flashing digit from 100's digit to the 10's digit.

Pressing the **UP** button will increase the set point by 10 steps per degree.
Pressing the **DOWN** button will decrease the set point by 10 steps per degree.
Pressing the **ENTER** button will change the flashing digit from 10's digit to the 1's digit.

Pressing the **UP** button will increase the set point by 1 step per degree.
Pressing the **DOWN** button will decrease the set point by 1 step per degree.
Pressing the **ENTER** button will change the flashing digit from 1's digit to the 100's digit.

Press and hold the **UP** button and **ENTER** button simultaneously for 5 seconds to save the set point. The digits will stop blinking.

INTG MODE

Press and hold the **UP** button and **ENTER** button simultaneously for 5 seconds to enable the integral set point to be changed. The set point is displayed and the 100's digit will blink.

Pressing the **UP** button will increase the set point by 100 seconds.
Pressing the **DOWN** button will decrease the set point by 100 seconds.
Pressing the **ENTER** button will change the flashing digit from 100's digit to the 10's digit.

Pressing the **UP** button will increase the set point by 10 seconds.
Pressing the **DOWN** button will decrease the set point by 10 seconds.
Pressing the **ENTER** button will change the flashing digit from 10's digit to the 1's digit.

Pressing the **UP** button will increase the set point by 1 second.
Pressing the **DOWN** button will decrease the set point by 1 second.
Pressing the **ENTER** button will change the flashing digit from 1's digit to the 100's digit.

Press and hold the **UP** button and **ENTER** button simultaneously for 5 seconds to save the set point. The digits will stop blinking.

CHANGING REFRIGERANTS

Press and hold the **UP** button and **ENTER** button simultaneously for 5 seconds to enable the controller to change to another type of refrigerant. All 4 digits will start to blink.

Pressing the **UP** button or the **DOWN** button will change the display to other refrigerants.

When the display shows the desired refrigerant, press and hold the **UP** button and **ENTER** button simultaneously for 5 seconds. The controller will save and use the selected refrigerant's table for saturated temperature. The digits will stop blinking.

CHANGING VALVE TYPES – LRGE, SMAL, or MEDM
 Press and hold the **UP** button and **ENTER** button simultaneously for 5 seconds to enable the controller to change to the other type of valves. All 4 digits will start to blink.

Pressing either the **UP** button or the **DOWN** button will change the display between the different valve types. Press and hold the **UP** button and **ENTER** button together for 5 seconds to save the selection. The digits will stop blinking.

Pressing the **UP** button and the **DOWN** button simultaneously will toggle the display between AC circuit 1 and AC circuit 2.

DLCN MODE
 Press and hold the **UP** button and **ENTER** button simultaneously for 5 seconds to enable the DLCN set point to be changed. The set point is displayed and the 100's digit will blink.

Pressing the **UP** button will increase the set point by 100 seconds. Pressing the **DOWN** button will decrease the set point by 100 seconds. Pressing the **ENTER** button will change the flashing digit from 100's digit to the 10's digit.

Pressing the **UP** button will increase the set point by 10 seconds. Pressing the **DOWN** button will decrease the set point by 10 seconds. Pressing the **ENTER** button will change the flashing digit from 10's digit to the 1's digit.

Pressing the **UP** button will increase the set point by 1 second. Pressing the **DOWN** button will decrease the set point by 1 second. Pressing the **ENTER** button will change the flashing digit from 1's digit to the 100's digit.

Press and hold **UP** button and **ENTER** button simultaneously for 5 seconds to save the set point. The digits will stop blinking.

DLST MODE
 Press and hold **UP** button and **ENTER** button simultaneously for 5 seconds to enable this set point to be changed. The number of steps to open will be displayed and the 1000's digit will blink.

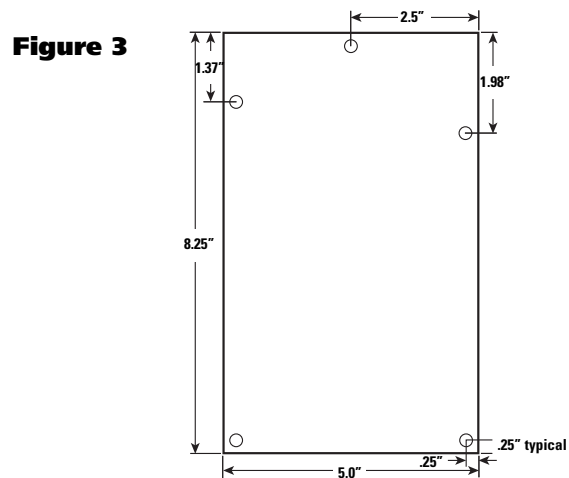
Pressing the **UP** button will increase the set point by 1000 steps. Pressing the **DOWN** button will decrease the set point by 1000 steps. Pressing the **ENTER** button will change the flashing digit from 1000's digit to the 100's digit.

Pressing the **UP** button will increase the set point by 100 steps. Pressing the **DOWN** button will decrease the set point by 100 steps. Pressing the **ENTER** button will change the flashing digit from 100's digit to the 10's digit.

Pressing the **UP** button will increase the set point by 10 steps. Pressing the **DOWN** button will decrease the set point by 10 steps. Pressing the **ENTER** button will change the flashing digit from 10's digit to the 1's digit.

Pressing the **UP** button will increase the set point by 1 step. Pressing the **DOWN** button will decrease the set point by 1 step. Pressing the **ENTER** button will change the flashing digit from 1's digit to the 1000's digit.

Press and hold **UP** button and **ENTER** button simultaneously for 5 seconds to save the set point. The digits will stop blinking.



SUPERHEAT CONTROLLER WIRING SCHEMATIC

