TWO VALVE TEMPERATURE CONTROLLER
Installation and Servicing Instructions

This Temperature controller was designed as a simple and economical means of controlling of 2 Electric Evaporator Pressure Regulator Valves, 2 Electric Hot Gas Bypass Valves, or 1 of each on almost any refrigeration or air conditioning system. A complete package of valves, controller and temperature sensors can be supplied by Sporlan Valve. Onboard readouts show actual temperature and temperature set point. Two push buttons are provided on the board to change the temperature set point.

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

• One or two valve control
• Two pressure inputs (transducer supplied by Sporlan or customer)
• Two digital inputs (from external switches or relays)
• Four 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 pushbuttons for set point, alarm cancellation, etc.
• One 8-position dip switch for addressing, mode selection, etc.
• Two 20 amp, 240 VAC NC/NO relays
• One 5 amp 240 VAC NC/NO relay
• RS 232 port
• Panel Display jack

Please note that although relays, etc. appear on the board, standard software does not support those devices. Custom (proprietary) software must be written for anything other than temperature control.

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 are not available, handle the board only by the edges of the board. Another safe place to hold the board is by the battery holders. DO NOT TOUCH ANY COMPONENTS ON THE BOARD EXCEPT THE BATTERY HOLDER OR RELAYS.

1. The board should be mounted in a dry, protected environment using the mounting holes in each corner. Make sure none of the printed circuit paths or components are touching the metal panel or any thing else conductive.
2. If only one valve is used, connections are to be made to terminal block closest to display readout and push buttons PB1 and PB2.
3. Controllers are configured for temperature.
4. The temperature sensor should be mounted on the line where the temperature is to be controlled. The sensor connections to the board for Valve #1 are at terminals labeled 'TS2'. The sensor connections to the board for Valve #2 are at terminals labeled 'TS4'.
5. DI1 is a digital input used as a pumpdown terminal for Valve #1. DI2 is a digital input used as a pumpdown terminal for Valve #2. A short or closed contact from an external relay will close that valve for pumpdown. When the relay opens or the short is removed the valve will return to normal operation.
6. Power is connected to the terminal marked 24 VAC. 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
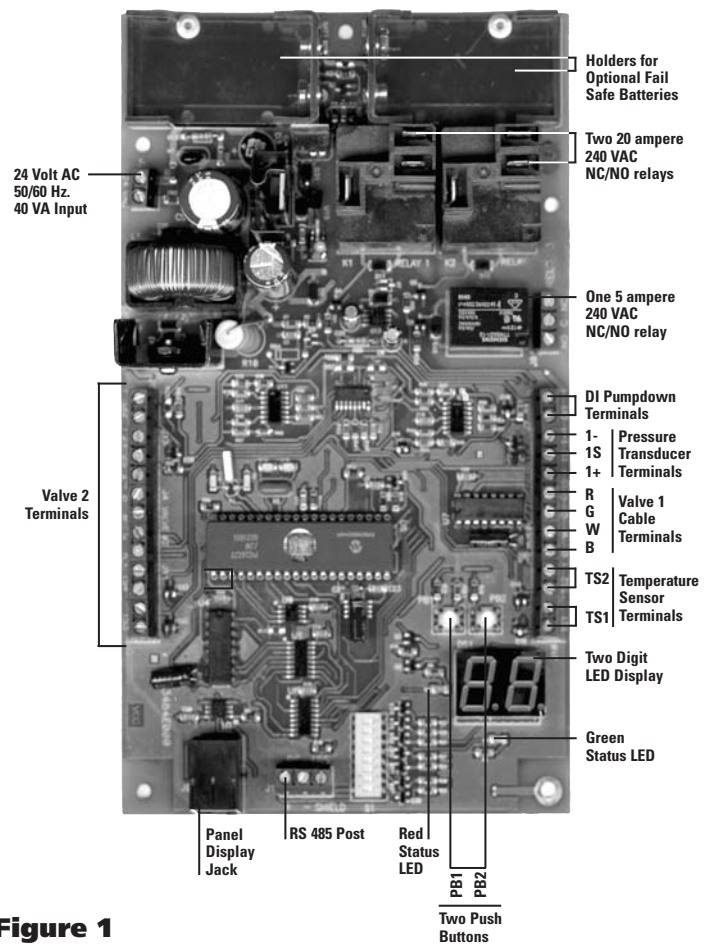

Figure 1
Terminals for Valve 1 shown.
Terminals for Valve 2 similar.

varistor between the other leg of the input voltage of the 24 VAC transformer to earth ground. A recommended part number for a MOV is manufacturer: Harris Semiconductor
manufacturer's part number for 120 VAC input is V150LA20A
manufacturer's part number for 208/240 VAC input is V275LA20A

OPERATION

When first powered up the numeric display will show actual temperature for Valve #1.

1. The small Green LED will be off.
2. The red LED is the negative sign. If on, the temperature displayed is between –50 and 0°F. If the red LED is off, the temperature displayed is between 0 and 100°F.
3. To change set point for temperature:
   Press and hold PB1 and PB2 for 8 seconds, Green LED will flash rapidly.
   Use PB1 to increment set point.
   Use PB2 to decrement set point.
   Do not press any keys until the green LED stops flashing. The last set point displayed will be the new temperature set point.
4. To display the temperature and change the temperature set point for Valve #2, press PB1. The small green LED will be on. The temperature displayed is the temperature read for Valve #2. Repeat steps 2 and 3 above to change the temperature set point for Valve #2.

REMOTE PANEL DISPLAY

A remote panel display is available that will allow access to all the parameters that the controller uses. 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 on 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:

TMP1 Temperature read by the sensor for Valve #1 (-50 to 102°F.)
PSN1 Number of steps Valve #1 is open (0-6386)
AC1, PDN1
AC1 when Valve #1 in normal operation, PDN1 when Valve #1 in pumpdown
OPT1, CLT1
OPT1 Valve #1 will open when temperature is above its set point. CLT1 Valve #1 will close when temperature is above its set point.
TSP1 Temperature set point for Valve #1 (-40 to 103°F). Default is 35°F.
CAL1 Calibrate temperature sensor for Valve #1
GAN1 Proportional gain of the controller (5 to 200 steps per degree temperature is from set point) for Valve #1. Default is 80.
INT1 Integral set point for Valve #1. Number of seconds the controller waits to update the reference valve position. (1 to 120 seconds). Default is 40 seconds.
MXS1 Maximum number of steps the controller will allow the valve to open (0 to 6386) for Valve #1

Pressing **ENTER** will toggle display between one of the displays described above and the numeric value read for that particular display. Pressing **UP** will scroll through the menu from 'TMP1' to 'PSN1', etc. Pressing **DOWN** will scroll through the menu the opposite way.

PSN1 MODE
Press and hold **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 **UP** button and **ENTER** button together for 5 seconds to put the controller in normal control. The digits will stop blinking.

OPT1 OR CLT1 MODE
Press and hold **UP** button and **ENTER** button for 5 seconds to enable this set point to be changed. All 4 digits will blink.

Figure 2

Pressing either the **UP** button or the **DOWN** button will toggle the display between 'OPT1' and 'CLT1'. When the display is reading desired option, press and hold **UP** button and **ENTER** button for 5 seconds to save the set point. The digits will stop blinking.

TSP1 MODE
Press and hold **UP** button and **ENTER** button for 5 seconds to enable the temperature 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°F.
Pressing the **DOWN** button will decrease the set point by 100°F.
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°F.
Pressing the **DOWN** button will decrease the set point by 10°F.
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°F.
Pressing the **DOWN** button will decrease the set point by 1°F.
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 for 5 seconds to save the set point. The digits will stop blinking.

CTL1 MODE
The numeric display shows the number of degrees to be either added or subtracted from that particular sensor, depending if the reading is negative or positive.

Press and hold **UP** button and **ENTER** button for 5 seconds to enable that 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°F.
Pressing the **DOWN** button will decrease the CAL number by 10°F.
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°F.
Pressing the **DOWN** button will decrease the CAL number by 1°F.
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°F.
Pressing the **DOWN** button will decrease the CAL number by 0.2°F.
Pressing the **ENTER** button will change the flashing digit from 0.1's digit to the 10's digit.

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

GAN1 MODE

The numeric display shows the proportional gain of the controller or the number of steps the valve is moved open or closed per number of degrees F. the temperature is from the set point. The gain can be changed from 5 to 200 steps per degree F. from the set point.

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

Pressing the **UP** button will increase the set point by 100.
Pressing the **DOWN** button will decrease the set point by 100.
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.
Pressing the **DOWN** button will decrease the set point by 10.
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.
Pressing the **DOWN** button will decrease the set point by 1.
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 for 5 seconds to save the gain. The digits will stop blinking.

MXS1 MODE

The numeric display shows the maximum number of steps the controller will open the valve. This can be changed from 0 to 6386 steps.

Press and hold **UP** button and **ENTER** button for 5 seconds to enable the set point to be changed. The set point is displayed and the 1000's digit will blink. Pressing the **UP** button will increase the set point by 1000.

Pressing the **DOWN** button will decrease the set point by 1000.
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.
Pressing the **DOWN** button will decrease the set point by 100.
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.
Pressing the **DOWN** button will decrease the set point by 10.
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.
Pressing the **DOWN** button will decrease the set point by 1.
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 for 5 seconds to save the set point. The digits will stop blinking.

INT1 MODE

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

VALVE 2 SETUP

Pressing the **UP** button and the **DOWN** button simultaneously will toggle the display between Valve #1 and Valve #2.
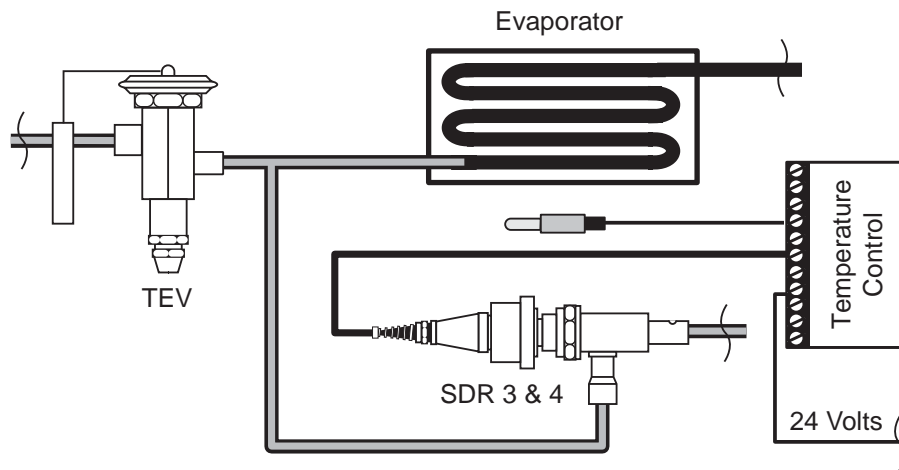
Following is the menu for Valve #2. The above instructions will work for Valve #2 in the same way as Valve #1:

TMP2 Temperature read by the sensor for Valve #2 (-50 to 102 °F.)
PSN2 Number of steps Valve #2 is open (0-6386)
AC2, PDN2 AC2 when Valve #2 in normal operation, PDN2 when Valve #2 in pumpdown
OPT2, CLT2 OPT2
Valve #2 will open when temperature is above its set point. CLT2 Valve #2 will close when temperature is above its set point.
TSP2 Temperature set point for Valve #2 (-40 to 103°F). Default is 35 °F.
CAL2 Calibrate temperature sensor for Valve #2
GAN2 Proportional gain of the controller (5 to 200 steps per degree temperature is from set point) for Valve #2
INT2 Integral set point for Valve #2. Number of seconds the controller waits to update the reference valve position. (1 to 120 seconds). Default is 40 seconds.
MXS2 MXST Maximum number of steps the controller will allow the valve to open (0 to 6386) for Valve #2
CLP2 Calibrate pressure transducer for AC circuit 2
CLT2 Calibrate temperature sensor for AC circuit 2
PRO2 Proportional gain set point for AC circuit 2. 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 the LGE2 setting, 22 for the MED2 setting, or 11 for the SML2 setting.
INT2 Integral set point for AC circuit 2. Number of seconds the controller waits to update the reference valve position. (1 to 120 seconds). Default is 10 seconds.

CONTROLLING AN ELECTRIC EVAPORATOR CONTROL VALVE

Air Sensor p/n 952669 or
Surface Sensor p/n 952662

Temperature
Control

24 Volts

TEV   Evaporator   CDS-9
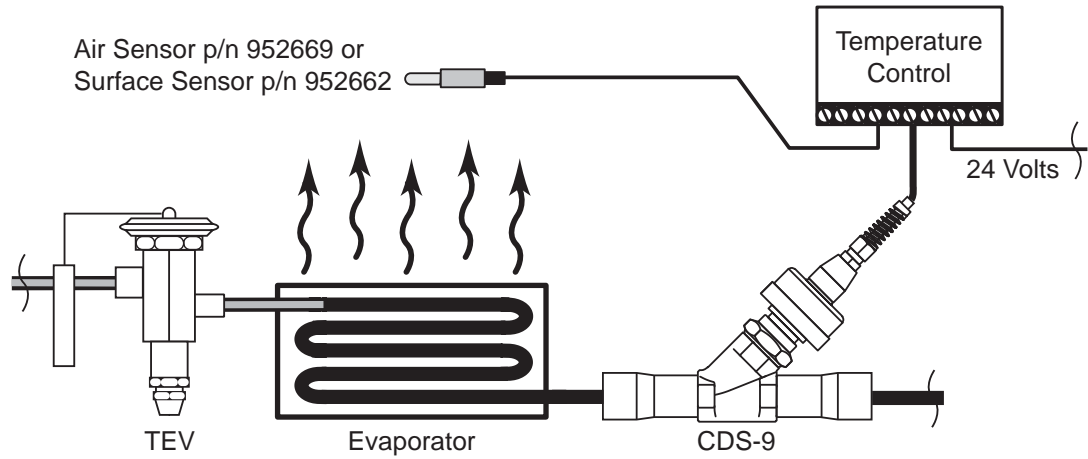
CONTROLLING AN ELECTRIC HOT GAS BYPASS VALVE

Evaporator

TEV

Temperature
Control

SDR 3 & 4

24 Volts

NOTE: For clarity only one valve is shown connected. The second valve is piped and wired similarly.