SMART CONTROLS

Operational Manual
SI-10, Temperature Sensor

Standard Display Mode

The standard display mode of the SI-10 is to continuously show the room ambient temperature by indicating “ROOMTEMP” on the display. Pressing of a push-button will change the display information. The temperature can be displayed in degrees Fahrenheit or Celsius. See “Configuration Menu” and “Temperature Units” on how to change the temperature units.

Override Push-Button

By pressing the OVERRIDE push-button, the SI-10 display will change and display the word “OVERRIDE” indicating the SI-10 has been given an override command and will energize the override relay contact for approximately four (4) seconds. At the expiration of the four-second override period the display will return to the standard display mode by displaying the current ambient temperature and de-energize the override relay contact.

Warmer/Cooler Push-Buttons

By pressing the WARMER or COOLER push-buttons a numeric value that establishes a particular setting for the digital set point adjustment potentiometer can be varied. The WARMER push-button increases the numeric value and the COOLER push-button decreases the numeric value within the adjustment range. The adjustment range is established by the “SETPOINT ADJ” value in the SI-10 configuration menu. See “Configuration Menu” and “Set Point Adjustment Range” to change the set point adjustment range.

Configuration Menu

To enter the Configuration Menu all three push-buttons (OVERRIDE, WARMER, COOLER) must be pressed simultaneously and continuously for 8 seconds. At the end of the 8 second period, the SI-10 will leave the standard display mode and will display the first item in the Configuration Menu. The first item in the Configuration Menu is the Display Calibration (“DISP CAL”). The nine (9) calibration options that follow are the items in the calibration menu that can be adjusted to tailor the operation of the SI-10. The optional settings are in the order they are presented in the Configuration Menu on the SI-10.

If no push-button is pressed for a period of 8 seconds, the SI-10 will return the display to the standard display mode and indicate the room ambient temperature. If any push-button is pressed and released during the eight-second period, a new eight-second period is started. As long as any push-button is pressed and released in the eight-second period, the SI-10 will stay in the Configuration Menu mode. Continuously pressing a push-button will not keep the SI-10 in the Configuration Menu Mode. The only exception is when in the Minimum or Maximum Set Point Adjustment Output Resistance setting that allows the WARMER and COOLER push-buttons to be pressed and held to increment or decrement the minimum or maximum digital potentiometer range. A push-button must be pressed and released to start another eight-second period with all other settings.

In the Configuration Menu mode, the OVERRIDE push-button will scroll the menu forward. The menu cannot be scrolled backwards. The menu will loop back to the beginning of the menu after the last menu item is displayed. The WARMER and COOLER push-button will increase or decrease, respectively, a menu item value. When a predefined value within a menu option is shown, the WARMER and COOLER push-buttons will scroll forward or backwards through the particular menu item selection options.

Display Calibration

The Display Calibration adjustment is used to change the value of the ambient temperature being displayed on the SI-10 to a temperature value more suitable to the user. When in the display Configuration Menu mode, the display will indicate “DISP CAL”. The range of adjustment is ±9.9 degrees Fahrenheit and can be changed in 0.1 degree Fahrenheit increments using the WARMER and COOLER push-buttons. The Display Calibration adjustment is only in Fahrenheit units and not Celsius units even when the SI-10 is set to display degrees Celsius. The factory default setting is 0.0 degrees Fahrenheit.

Display Resolution

The Display Resolution allows the numeric ambient temperature value to be displayed in one of three different formats. When in the Display Resolution mode, the display will indicate “DISP RES”.

Tenth Degree Resolution, “00.0”
The first format has three digits with a resolution of 0.1 degree. The resolution 0.1 degrees is in Fahrenheit or Celsius depending on the Temperature Unit selected. The display will indicate “00.0” for this option. The Tenth Degree Resolution (“00.0”) is the factory default.

Half Degree Resolution, “00.5”
The second format has three digits with a resolution of 0.5 degrees. The resolution of 0.5 degrees is in Fahrenheit or Celsius depending on the Temperature Unit selected. The display will indicate “00.5” for this option.

One Degree Resolution, “00”
The third format has two digits with a resolution of one (1) degree. The resolution of one degree is in Fahrenheit or Celsius depending on the Temperature Unit selected. The display will indicate “00” for this option.

Set Point Adjustment Range

The Set Point Adjustment Range allows the numeric value the 10K ohm digital potentiometer is scaled over for the set point adjustment to be changed. When in the Set Point Adjustment Range mode, the display will indicate “STPT ADJ”. The range value established is a plus or minus (±) value. The minimum value for the range is zero (0) and the maximum value for the range is 10. The value can be incremented or decremented with the WARMER and COOLER push-buttons, respectively. When decrementing the value and the minimum value (0) is reached, the value will roll-over to the maximum value (10) and continue decrementing. When incrementing the value and the maximum value (10) is reached, the value will roll-over to the minimum value (0) and continue incrementing. The Set Point Adjustment Range value is scaled over the Minimum and Maximum Set Point Adjustment Output Resistance range setting for the digital adjustment potentiometer. The factory default is 0 to 10K ohms. The smaller the Set Point Adjustment Range numeric value the greater the change in resistance for a set-point adjustment. The larger the Set Point Adjustment Range numeric value the smaller the change in resistance for the set point adjustment. The factory default range setting is three (3).

Reset Hours

The Reset Hours is a time period that is started after a change in the set point adjustment value using the WARMER and COOLER push buttons. When the time period expires it resets the set point adjustment value back to zero (0), thus re-establishing a set point with no adjustment. When in the Reset Hours mode, the display will indicate “RESET HR”. All values are in hours. The minimum value is zero (0) and disables the ability to automatically reset the set point adjustment. The maximum time value is 24. The value can be incremented or decremented with the WARMER and COOLER push-buttons, respectively. When decrementing the value and the minimum value (0) is reached, the value will roll-over to the maximum value (24) and continue decrementing. When incrementing the value and the maximum value (24) is reached, the value will roll-over to the minimum value (0) and continue incrementing. The factory default setting is zero (0), which disables the ability to automatically reset the set point adjustment value.

Temperature Units

The Temperature Units selects the units the ambient temperature is displayed. When in the Temperature Units mode, the display will indicate “TEMP UNIT”. Using the WARMER and COOLER push-buttons the Temperature units can be toggled between Fahrenheit and Celsius. The factory default is Fahrenheit.

Sample Average

The Sample Average is a numeric value that is selected that determines the number of samples that are measured to calculate the average ambient temperature value that will be displayed. When in the Sample Average mode, the display will indicate “SAMP AVG”. Using the WARMER and COOLER push-buttons the number of samples to be averaged can be increased or decreased, respectively. The minimum number of samples is zero (0), which allows for no samples to be averaged and the ambient temperature value measured to be directly displayed. The maximum number of samples is ninety-nine (99). The factory default setting is fifteen (15).

Direct or Reverse Action

The Direct or Reverse Action setting allows the set point adjustment potentiometer output resistance to be adjusted from the minimum to maximum value for Direct Action or maximum to minimum value for Reverse Action when the set point adjustment value is changed with the WARMER and COOLER push-buttons. When in the Direct Action mode, as the set point adjustment value is increased with the WARMER push-button, the digital adjustment potentiometer output resistance will increase. When the COOLER push-button is pressed the digital adjustment potentiometer output resistance with decrease. When in the Reverse Action mode, as the set point adjustment value is increased with the WARMER push-button, the digital adjustment potentiometer output resistance will decrease. When the COOLER push-button is pressed the digital adjustment potentiometer output resistance with increase. To select Direct or Reverse Action in the Configuration Menu, simply press the WARMER or COOL push-buttons to toggle the display between “DIR ACT” for Direct Action and “REV ACT” for Reverse Action. There is no distinction with the WARMER and COOLER push-buttons to toggle the setting. Either push-button can be pressed multiple times to toggle the setting.

Minimum Set Point Adjustment Output Resistance

The Minimum Set Point Adjustment Output Resistance can be set on the digital adjustment potentiometer. When in the Minimum Set Point Adjustment Output Resistance mode, the display will indicate “MIN RES”. The factory default for the minimum value of the digital adjustment potentiometer is zero (0) ohms plus the wiper resistance of the digital potentiometer. When the minimum output resistance is set for zero (0) ohms, there will still be a small amount of resistance due to the wiper arm of the digital potentiometer. The wiper resistance can range between 50 to 120 ohms. The application software takes into account the wiper resistance for all Minimum Set Point Adjustment settings greater than the wiper resistance. To adjust the Minimum Set Point Adjustment Output Resistance, press the WARMER push-button to increase the minimum resistance value and press the COOLER push-button to decrease the minimum resistance value. The Minimum Set Point Adjustment Output Resistance value will not be allowed by the application software to be set equal to or greater than the Maximum Set Point Adjustment Output Resistance. The maximum adjustment range is 0 to 9998 ohms assuming the Maximum Set Point Adjustment Output Resistance is set to 9999. Because the adjustment range is large, the WARMER and COOLER push-buttons can be pressed and held to increment or decrement the resistance value. The longer the push-buttons are held the faster the resistance value will be incremented or decremented.

Maximum Set Point Adjustment Output Resistance

The Maximum Set Point Adjustment Output Resistance can be set on the digital adjustment potentiometer. When in the Maximum Set Point Adjustment Output Resistance mode, the display will indicate “MAX RES”. The factory default for the maximum value of the digital adjustment potentiometer is 9999 ohms. To adjust the Maximum Set Point Adjustment Output Resistance, press the WARMER push-button to increase the maximum resistance value and press the COOLER push-button to decrease the maximum resistance value. The Maximum Set Point Adjustment Output Resistance value will not be allowed by the application software to be set equal to or less than the Minimum Set Point Adjustment Output Resistance. The maximum adjustment range is 1 to 9999 ohms assuming the Minimum Set Point Adjustment Output Resistance is set to zero (0). The digital potentiometer has a small amount of fixed resistance due to the wiper arm on the potentiometer. The wiper resistance can range between 50 to 120 ohms. The application software takes into account the wiper resistance for all Maximum Set Point Adjustment settings greater than the wiper resistance. Because the adjustment range is large, the WARMER and COOLER push-buttons can be pressed and held to increment or decrement the resistance value. The longer the push-buttons are held the faster the resistance value will be incremented or decremented.

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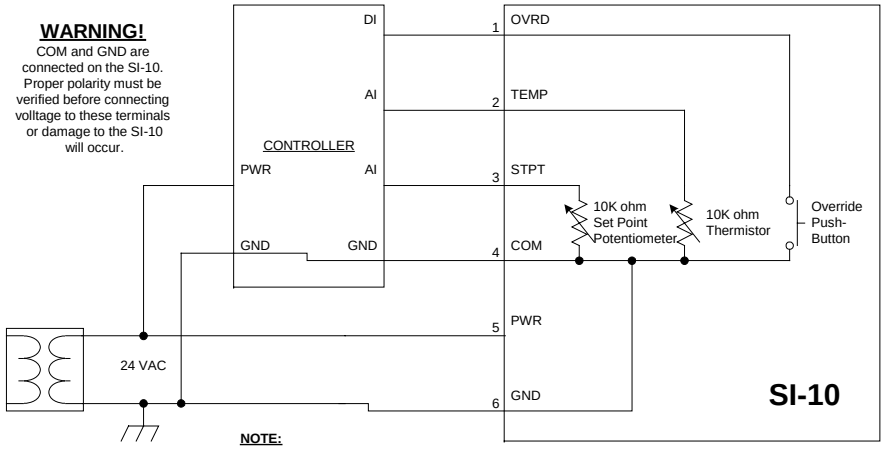
037-0255-00, Rev. B

SI-10
Typical Interconnection
Wiring Diagram

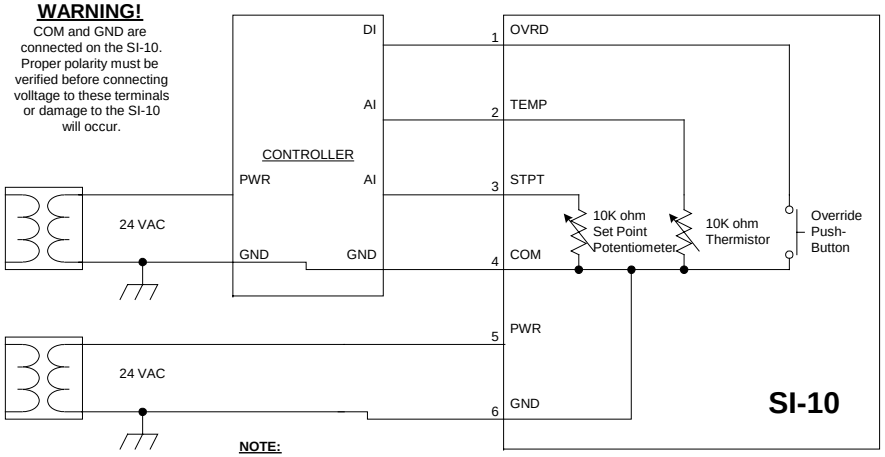
Single Supply Transformer Connection



NOTE:

1. "OVRD", "TEMP" and "STPT" use the same signal common.
2. Signal "COM" and power "GND" are electrically connected on the SI-10.
3. If multiple devices are powered by one transformer, polarity must be observed on transformer wiring.

Two Supply Transformer Connection



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