SYXTHSENSE

Product sheet **CT2.140**

Type **SRC-100-MOD**

SRC-100 Series Zone Controllers with Modbus RTU

The SRC-100 series controllers have been designed for zone heating and cooling control. The controllers have 3 analogue 0..10Vdc outputs and two digital outputs that can be configured for heating and cooling control. The controllers can operate as Proportional Only or as Proportional + Integral Controllers.

The controller can have up to 2 heating and cooling stages. The analogue outputs can be individually configured for any of the heating/cooling stages and digital outputs can be configured as 3-point, PWM (thermic) or On/Off control. The controller can also operate as heating/cooling controller where the change-over is done via digital Input or via network.

The controller setpoint can be adjusted -/+3°C (default) by rotating the potentiometer. The setpoint centre and setpoint limits can be adjusted in the configuration mode or via the configuration tool.

The controller can also use an external sensor for high limit and low limit control used typically in under-floor heating.

On the models without the display; red and blue LEDs indicate the controller operation in heating or cooling mode. In the display models, the display shows the heating and cooling modes, the current active actuator position, and the current temperature reading. When the setpoint is adjusted, the backlight is switched temporarily on and the current setpoint is displayed.
The controllers have built-in Modbus RS-485 communication for connection to BMS systems.

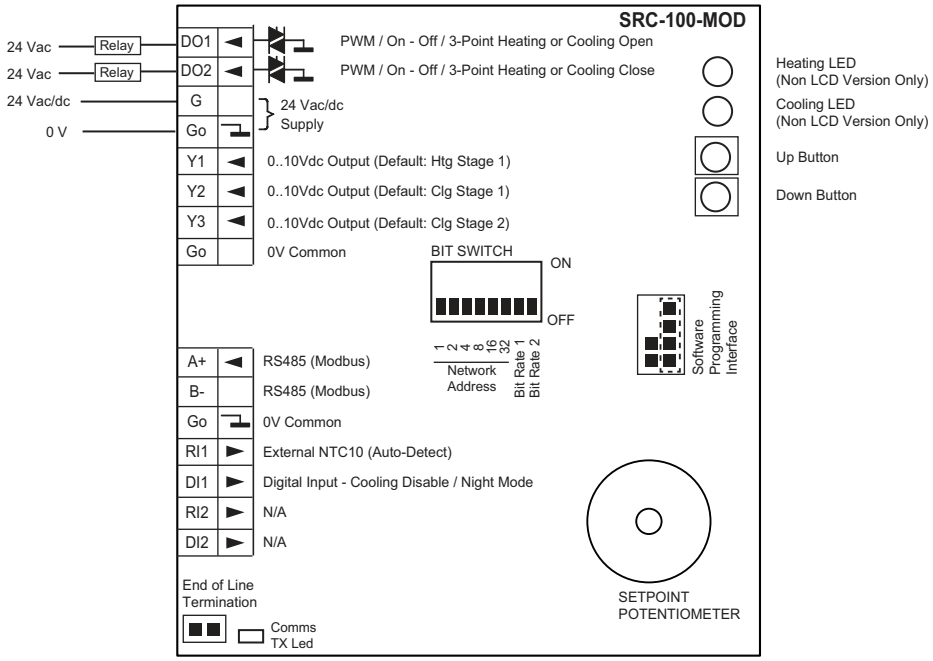
Model Type	Model	Description
	SRC-100-MOD	Zone (Room) Controller with Heating and Cooling Outputs, Modbus RS485
	SRC-100-LCD-MOD	Zone (Room) Controller with Heating and Cooling Outputs, LCD Display, Modbus RS485
	-LCD	LCD Display Option for Commissioning of SRC-100
	SW-DCT-USB	Windows Device Configuration Tool with 1.8m USB Cable

Technical Data

Power Supply	Power supply		24Vac/dc -10%/+15% <1VA
Displays and Interfaces	LEDs (SRC-100)		LEDs Indicating the Status (Red = Heating; Blue = Cooling)
	LCD (SRC-100-LCD)		LCD Display for Showing Plant Status (Heating/Cooling Mode, Current Temperature, Setpoint, Valve Position)
	Setpoint Potentiometer		Setpoint Adjust between 18°C and 24°C (limits adjustable)
Signal Outputs	Analogue Outputs		3 x 0..10V < 5mA
	Digital Outputs		2 x 24Vac Triacs; 1A maximum; requires 24Vac Power Supply
Signal Inputs	Built-In Sensor		0..50°C (32..122°F) ±0.3°C @ 25°C
	Resistive Input		1 x External NTC10K3 Sensor (Auto-Detect)
	Digital Input		1 x Digital Input, Volt-Free Contact, Impedance <1KOhm
Communication	Modbus Communications		
		Procotol	Modbus RTU
		Interface	RS485; maximum 63 devices
		Addressing	1..63 via a bit switch; 1..247 via network
		Communication	9k6/19k2/38k4/57k6 Baud; Parity None/Even/Odd, 1 or 2 Stop Bits (baud rate adjustable through bit switch or network)
Connections	Terminal Connections		Solid and Stranded Cable; 55° Angle for Wiring Maximum Size: 0.05 to 1.5mm^2 (EN ISO) / 14 to 30 AWG (UL) Rising Clamp: Size 2.5 x 1.9mm

Environmental Conditions	Operating	
	Temperature	0°C...+50°C (32..122°F)
	Humidity	0...95%rh (non-cond.)
	Storage	
	Temperature	-30°C...+70°C (-22..158°F)
	Humidity	0...95%rh (non-cond.)
Standards	CE Conformity	CE Directive 2004/108/EY EN61000-6-3: 2001 (Generic Emission) EN61000-6-1: 2001 (Generic Immunity).
	Degree of Protection	IP20
Housing	Housing Material	ABS Plastics, Self Extinguishing
	Mounting	Wall or Junction Box Mounting, RAL9010 Pure White
	Dimensions	W86 x H120 x D29mm
	Weight	180g

Wiring Connections



DO1	24Vac Triac; PWM, On/Off; 3-Point Open
DO2	24Vac Triac; PWM, On/Off; 3-Point Close
G	24Vac/dc Power Supply
G0	0V Common
Y1	0..10Vdc Output
Y2	0..10Vdc Output
Y3	0..10Vdc Output
G0	0V Common
A+	RS485 A+ Connection (Modbus)
B-	RS485 B- Connection (Modbus)
G0	0V Common
RI1	External NTC10 Sensor; Main Control (Auto-detect) or High/Low Limit Sensor
DI1	Digital Input; Disable Cooling Stage / Activate Night Mode / Change-Over Heating-Cooling
RI2	Not Applicable
DI2	Not Applicable

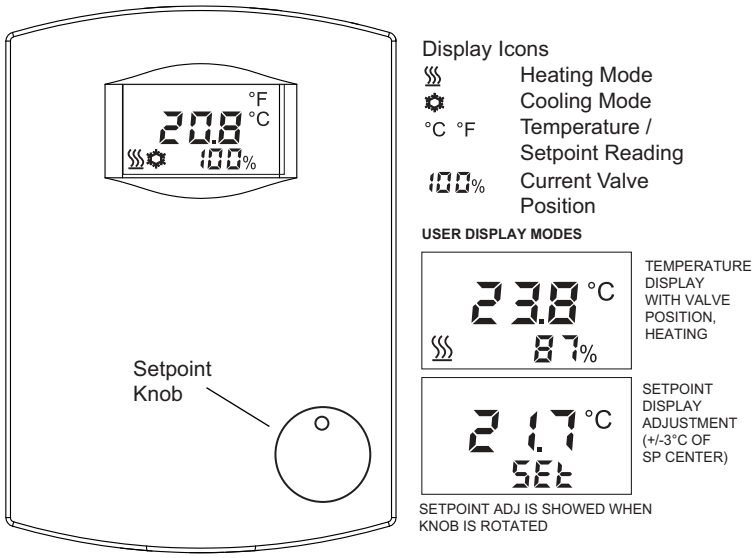
Wiring Precautions

Switch off the power before any wiring is carried out.

Display (SRC-100-LCD-MOD or Commissioning LCD Display): Unplug the LCD display and then wire the power supply and the analogue outputs, if relevant. After the wiring has been completed; plug-in the display and power up the device.

SRC-100-LCD User Interface (User Mode)

The SRC-100-LCD controllers have a built-in LCD that can be used to show the current status of the controller. The display is also used to show number of configuration settings. The images below illustrate different display options.



LCD Display (SRC-100-LCD MODEL)

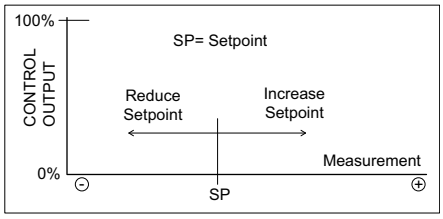
The LCD display shows the controller current operation status to the user.

- Current Temperature
- Current Cooling/Heating Demand
- Heating mode icon when in heating stage
- Cooling mode icon when is cooling stage
- No heating or cooling icon if neither heating or cooling stages are active. Note: With PI control the outputs are usually active within the deadzone.

SRC-100 Control Mode Indication (LEDs)

With SRC-100 model (no display) the LEDs indicate when the controller is in the heating/cooling mode. If the current sensor temperature is less than the lower deadzone limit then the heating LED will be turned on. If the current sensor temperature is greater than the upper deadzone limit then the cooling LED will be turned on. If the current sensor temperature is withing the deadzone limits both LEDs will be turned off.

Setpoint Adjustment (User Mode)



By rotating the setpoint knob option it is possible to adjust the current temperature control setpoint +/-3°C. The adjustment shifts temperature setpoint up and down. In the configuration mode or via the configuration tool it is possible to adjust the setpoint centre, and the min and max adjustments of the setpoint.

When the potentiometer is rotated the current setpoint is displayed on the screen (in display model), and the backlight is switched on momentarily.

Controller Configuration

The controller is configured using the push buttons located on the right side of the PCB and the LCD display. Alternatively the controller can be configured via the PC Based Software Configuration Tool.

If the controller model does not have a display, please order the LCD display option for the configuration purposes, if Configuration Tool software is not used.

1. Press either UP or DOWN button and you enter the Parameter Select/Review mode - three character parameter identifier text will flash to indicate this. The display shows the first configuration parameter (setpoint centre) and its current setting.

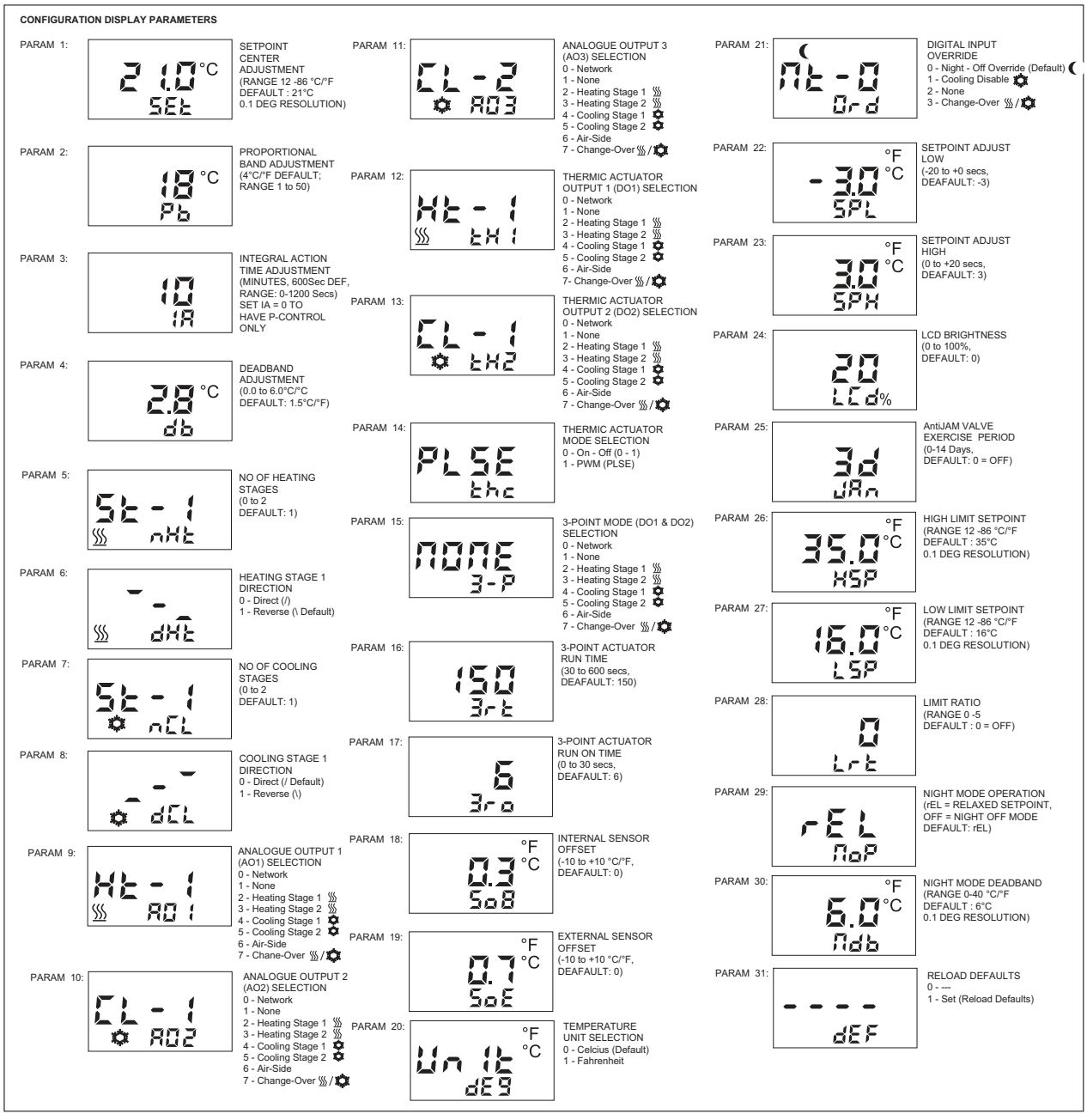
2. Pressing the UP and DOWN buttons when in the Select/Review mode (three character identifier flashing) will cycle you through the various configuration parameters.

3. If you stay on a parameter for a set length of time you enter parameter change mode and parameter value itself will flash to indicate this (and the backlight changes to amber); pressing the buttons will change its value (flashing will stop). After a timeout if no buttons are pressed the display returns to the Parameter Select/Review mode, and now the next parameter can be selected using UP and DOWN buttons. Note: If you want to change the same parameter again, select the next parameter and return back to activate change mode.

4. Once the configuration is complete, the controller returns after a few second timeout back to the normal temperature control/display mode.

When the configuration is completed, the display can then be removed if not required.

Precaution. If possible switch off the power before the LCD display is fitted or removed to prevent damage to the electronics.



Control Loop Operation

The controllers can have up to 2 heating stages and up to 2 cooling stages (as default one heating stage and one cooling stage), and can also carry out automatic change-over from heating to cooling via digital input / network.

This allows various control configurations:-

- One/Two Stage Heating Control
- One/Two Stage Cooling Control

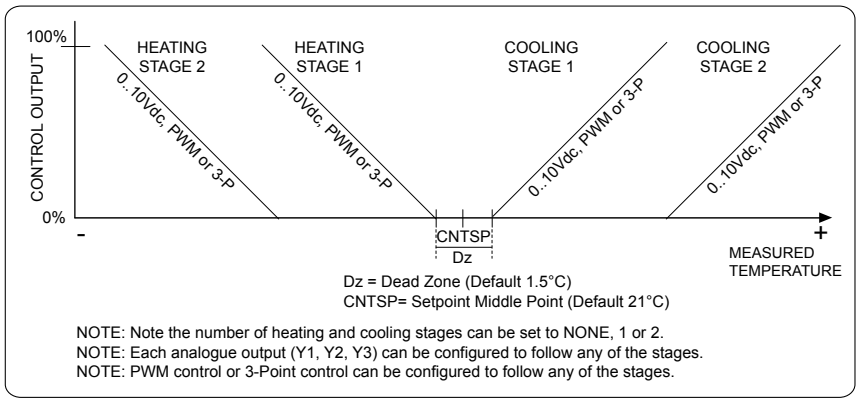
- One/Two Stage Heating and One/Two Stage Cooling Control
- One Stage Heating/Cooling Control (Change-Over)

The controller modulates the heating and cooling demand outputs according to the calculated setpoint and the current temperature. The control can be either P-control or PI-control.

As default, heating stage 1 output is linked to Y1 for fully modulating 0..10Vdc control, cooling stage 1 is linked to analogue output Y2 and cooling stage 2 to analogue output Y3.

The controller has also two digital outputs that can be configured to work as PWM or 3-Point control. The PWM or 3-Point control can then be linked to any of the control stages (Heating Stage 1/2 or Cooling Stage 1/2) as required. As default DO1 is linked to PWM control of heating stage 1 and DO2 is linked to the PWM control of cooling stage 1.

Please note that it is possible to set the control loop outputs to direct/reverse, which reverses the control output (valve) running direction (valve drives from 100% to 0%). This can be configured individually for each stage in the Configuration Tool. Via the (configuration) display the Heating Stage 1 and the Cooling Stage 1 operation can also be reversed.



Between heating and cooling stage 1 is a control deadband. This prevent rapid switching between heating and cooling. The deadband is adjustable in the configuration parameters.

Night Mode Operation

The controller has two operation modes at night time; Night Off and Night Expanded Deadzone (Relaxed Setpoints). The mode is configured via the display or via the DCT Configuration Tool. The controller can be overridden to Night via

- the Digital Input, if is configured to operate in Night (Off) mode.
- via the Network (Modbus/BACnet models)

In the Night Off mode all controller outputs are switched OFF. The LCD displays Night icon and the temperature only.

In the Night Expanded Deadzone mode the controller operates as in the day mode diagram but the Deadzone around the setpoint is expanded to the Relaxed Deadzone setting (as default 6.0°C). The LCD display shows the Night icon and the current temperature.

High/Low Limit Control (Reset Control)

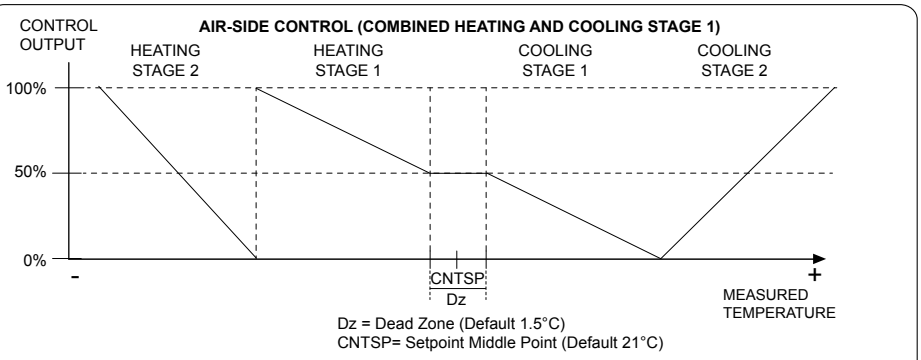
If an external NTC10 sensor is fitted and the Setpoint Adjust Limit Ratio has been set (>0) then the controller can carry out high limit and/or low limit control. In high limit control, if the external temperature exceeds the High Limit setpoint, the main control setpoint is reduced by the amount set in the Limit Ratio. E.g. if the Limit Ratio is 2, every degree that the external temperature exceeds the High Limit setpoint, the main setpoint is reset by 2 degrees.

The Low Limit control works in reverse. If the external temperature drops below the Low Limit setpoint, the main control setpoint is increased by the amount of the ratio for every degree below the Low Limit setpoint.

The current calculated setpoint is available via Modbus or via the DCT configuration tool.

Air-Side Control Logic

Air-side control is implemented by combining the Heating Stage1 and Cooling Stage 1 demands. As such to use air-side the number of heating stages must be set to 1 or more and the number of cooling stages must be set to 1 or more. In normal operation the stage direction for heating stage 1 and cooling stage 1 should be set the same.



NOTE: Number of heating and cooling stages must be set to 1 or more.
NOTE: Heating Stage 1 and Cooling Stage 1 direction must be set the same for the air-side control to work (e.g. both reverse).
NOTE: Each analogue output (Y1, Y2, Y3) can be configured to follow air-side control (combined htg stage 1 and clg stage 1).
NOTE: PWM control or 3-Point control can be configured to follow air-side control (combined htg stage 1 and clg stage 1).

Note: The effective proportional band of the Air-side control is twice that of the Heating2 and Cooling2 stages due to the fact there is only one proportional band setting for all stages.

Digital Output (Triac) Operating Modes

The digital outputs (24Vac Triacs that switch 24Vac to 0V) can operate as 3-point control for heating, as PWM control (pulse width modulation control) or as On/Off control. The type of the control is selected via the configuration parameters. If the 3-point actuator mode is selected, the controller modulates the DO1 on when valve is required to be opened and DO2 when the valve is required to be closed. The 3-point operation can be configured to follow any of the stages. It is also possible to reverse the output operation by reversing the corresponding loop output.

When the 3-point output is driven fully open or closed, the output is driven against the edge for a "run on" period (default 6 seconds) and this will be repeated every 10 minutes. The run on time time adjustable via the configuration parameters and this behaviour can be disabled completely by setting the run on time to 0.

If PWM actuator is used the duty cycle is 30 seconds as default (configurable via the tool). E.g. if the output is at 50% then the output is ON for 15 seconds and OFF for 15 seconds.

If the PWM mode has been set to On/Off, then the corresponding digital output is switched ON at the Max Level (default 100%) and are switched OFF at the Min level (default 0%).

Digital Input Modes; Cooling Disable / Night Mode / Heating-Cooling Change-Over

If the Digital Input has been configured as Cooling Disable, by closing the digital input contact (volt-free), the cooling modes are disabled and the cooling stage outputs are set to 0%.

If the Digital Input has been configured as Night mode, by closing the input contact, all outputs are disabled.

If the Digital Input is set to Change-Over, when the input is open the Heating Stage 1 is active, if the digital input is closed e.g. by an external thermostat, the Cooling Stage 1 is active. To activate this mode on the outputs, select Change-Over option for the DO1, DO2 or 3-Point Modes.

AntiJAM Valve Exercise Function

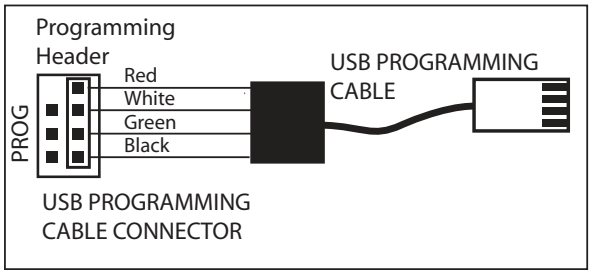
If the AntiJAM function is enabled the controller monitors for inactivity. If the control outputs have been fully closed or fully open more than the AntiJAM period, the controller will open/close the outputs to by 30% (or ON/OFF in case of ON-OFF mode) for a short period of time. The AntiJAM function is enabled through the configuration parameters or via the DCT configuration tool by selecting the required AntiJAM period by days.

External Sensor Input

The controller uses as default the internal temperature sensor. If an external NTC10 temperature sensor is connected to the input RI1, and a valid sensor reading is measured, the controller starts automatically to use the external temperature sensor for the control.

Software Configuration Tool

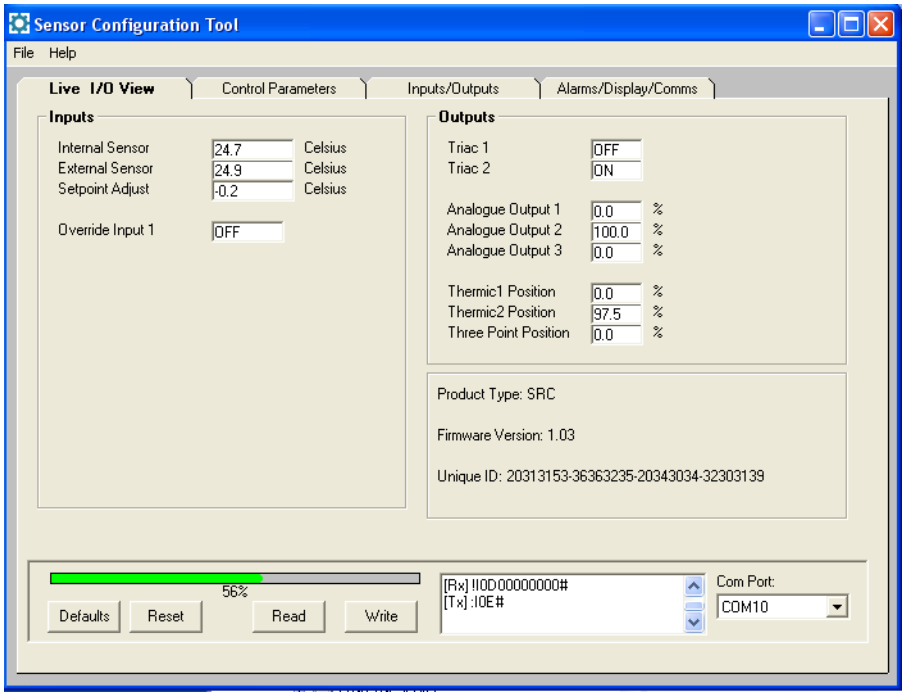
The parameter options can also be configured using the Software Configuration Tool in addition to the configuration via the LCD and buttons. If the Configuration software is used, this is connected via the PC USB cable to the programming header of the transmitter as shown on the image below.



The correct process for connecting the controller via the USB is as follows:-

- Disconnect USB Connector from PC
- Disconnect the Controller from Power
- Plug-In the 4-Way Connector to the Sensor
- Connect the USB to the PC
- Power Up the Controller

NOTE: Always disconnect USB from PC before plugging the cable into the controller.



Common Parameters	
Parameter Name	**Description**
Defaults	Reloads the default configuration from the sensor non-volatile memory. **Note: All modified settings are lost.**
Reset	Performs soft reset of the controller. Apply after major changes.
Read	Reads the controller data.
Write	Writes the new settings to the controller (automatically stored in the non-volatile memory)
COM Port	Select the COM port for the USB Cable or Bluetooth. USB cable driver must be installed in order the Serial to TTL connection to operate.

Live IO-View		
Parameter Name	**Description**	**Range**
INPUTS		
Internal Sensor	Internal Temperature Sensor Reading	0..50°C (32..122°F)
External Sensor	External Temperature Sensor Reading (RI1)	0..50°C (32..122°F)
Setpoint Adjust	Current Setpoint Adjustment	-20..+20°C/°F
Override Input 1	Digital Input Status	Off - On
OUTPUTS		
Triac 1	Digital Output 1	Off - On
Triac 2	Digital Output 2	Off - On
Analogue Output 1	Analogue Output 1	0..100%
Analogue Output 2	Analogue Output 2	0..100%
Analogue Output 3	Analogue Output 3	0..100%
Thermic1 Position	Thermic Output 1 Position	0..100%
Thermic2 Position	Thermic Output 2 Position	0..100%
Three Point Position	Three Point Output Position	0..100%

Live IO-View		
Parameter Name	**Description**	**Range**
CONTROL		
Calculated Setpoint	Current Calculated Setpoint	12..86°C/°F
Heating Demand	Current Heating Demand	0..100%
Cooling Demand	Current Cooling Demand	0..100%

Control Parameters		
Parameter Name	**Description**	**Range**
Setpoint	Setpoint Middle Position.	12..86°C/°F (Default 21.0°C)
Setpoint Adjust Max	Temperature Setpoint Maximum Adjustment	0.0...20°C/°F (Default 3.0)
Setpoint Adjust Min	Temperature Setpoint Minimum Adjustment	-20.0...0°C/°F (Default -3.0)
Proportional Band	Proportional Ban	1.0..50.0 °C/°F (Default 4.0)
Integral Action Time	Integral Action time of the control loop. Set to 0 to disable.	0..1,200 seconds (Default 600s)
Deadzone	Deadzone Between Heating and Cooling Stages	0.0..6.0°C/°F (Default 1.5°C)
Heating Stages	Number of Heating Stages	0 = None 1 = 1-Stage 2 = 2-Stages
Heating Stage 1 Direction	Heating Stage 1 Direction	0 = Reverse (Default) 1 = Direct
Heating Stage 2 Direction	Heating Stage 2 Direction	0 = Reverse (Default) 1 = Direct
Cooling Stages	Number of Cooling Stages	0 = None 1 = 1-Stage 2 = 2-Stages
Cooling Stage 1 Direction	Cooling Stage 1 Direction	0 = Reverse 1 = Direct (Default)
Cooling Stage 2 Direction	Cooling Stage 2 Direction	0 = Reverse 1 = Direct (Default)
RESET CONTROL (HIGH AND/OR LOW LIMIT CONTROL)		
Enable	Enable Reset Control	Disabled/Enabled
High Limit Setpoint	High Limit Setpointh	12..86°C/°F (Default 35.0°C)
Low Limit Setpoint	Low Limit Setpoint	12..86°C/°F (Default 16.0°C)
Limit Ratio	Low/High Limit Ratio	0-5 (0=Disabled, Default)

Inputs / Outputs		
Parameter Name	**Description**	**Range**
INPUTS		
Internal Sensor Offset	One Point Internal Temperature Calibration Field	-10.0..+10.0°C/°K (Default 0°C)
External Sensor Offset	One Point External Temperature Calibration Field	-10.0..+10.0°C/°K (Default 0°C)
DI1 Function	Digital Input 1 Function	0 = Override Night 1 = Disable Cooling 2 = None 3 = Change-Over
OUTPUT ASSIGNMENTS		
AO1 (Y1)	Analogue Output Y1 Mode	0 = Network Value 1 = None 2 = Heating Stage 1 (Default) 3 = Heating Stage 2 4 = Cooling Stage 1 5 = Cooling Stage 2 6 = Air-Side 7 = Change-Over

Inputs / Outputs		
Parameter Name	**Description**	**Range**
AO2 (Y2)	Analogue Output Y2 Mode	0 = Network Value 1 = None 2 = Heating Stage 1 3 = Heating Stage 2 4 = Cooling Stage 1 (Default) 5 = Cooling Stage 2 6 = Air-Side 7 = Change-Over
AO3 (Y3)	Analogue Output Y3 Mode	0 = Network Value 1 = None 2 = Heating Stage 1 3 = Heating Stage 2 4 = Cooling Stage 1 5 = Cooling Stage 2 (Default) 6 = Air-Side 7 = Change-Over
Thermic 1	Thermic Output 1 Mode (Linked to DO1)	0 = Network Value 1 = None 2 = Heating Stage 1 (Default) 3 = Heating Stage 2 4 = Cooling Stage 1 5 = Cooling Stage 2 6 = Air-Side 7 = Change-Over
Thermic 2	Thermic Output 2 Mode (Linked to DO2)	0 = Network Value 1 = None 2 = Heating Stage 1 3 = Heating Stage 2 4 = Cooling Stage 1 (Default) 5 = Cooling Stage 2 6 = Air-Side 7 = Change-Over
3-Point	Three Point Output Mode (Linked to DO1 & DO2) NOTE: If selected Thermic 1 and Thermic 2 are automatically set to None.	0 = Network Value 1 = None (Default) 2 = Heating Stage 1 3 = Heating Stage 2 4 = Cooling Stage 1 5 = Cooling Stage 2 6 = Air-Side 7 = Change-Over
DO1	Digital Output 1 Mode. Set to Control to activate control logic.	0 = Network 1 = Control (Default)
DO2	Digital Output 2 Mode. Set to Control to activate control logic.	0 = Network 1 = Control (Default)
THERMIC ACTUATORS		
Mode	Thermic Actuator Mode	0 = PWM (Pulse Width Modulation, Default) 1 = On/Off
Min. Level	Minimum Output Level (Switch Off Level)	0..100% (Default 0)
Max. Level	Maximum Output Level (Switch On Output)	0..100% (Default 100)
PWM Period	Pulse Width Modulation Period	0..255 seconds (Default 30)
3-POINT ACTUATOR		
Stroke Time	3-Point Actuator Running Time	30..600 seconds (Default 150)
Run On Time	3-Point Actuator Run On TIme when Fully Open /Closed	0..30 seconds (Default 6)
VALVE EXERCISE (AntiJAM)		
Anti-Jam Timeout	Valve Exercise Monitoring Period.	0 = Disabled 1-14 days

Alarm/Display/Comms		
Parameter Name	**Description**	**Range**
DISPLAY		
Temperature Units	Temperature Unit Selection	0 = Celsius (Default) 1 = Fahrenheit
LCD brightness	Brightness of the LCD	Off - 10% to 100% (Default Off)

Alarm/Display/Comms		
Parameter Name	**Description**	**Range**
COMMS		
Modbus Baud Rate NOTE: Does not show Modbus Baud Rate set via bit switches.	Modbus Baud Rate (can only be set if BR1 and BR2 are in OFF position)	0 = 9600 (Default) 1 = 19200 2 = 38400 3 = 57600
Modbus Parity	Modbus Parity	0 = None (Default) 1 = Odd 2 = Even
Stop Bits	Stop Bits	0 = 1 Stop Bit (Default) 1 = 2 Stop Bits
Address NOTE: Does not show Modbus address set via bit switches.	Modbus Address (can only be set if all address bit switches are in OFF position)	0..247 (Default 1)

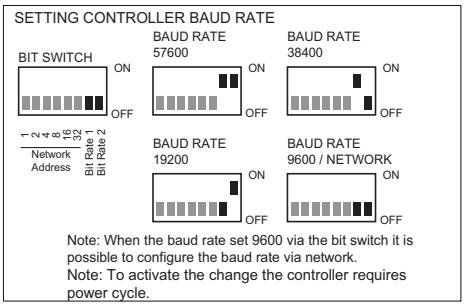
Parameter Storage

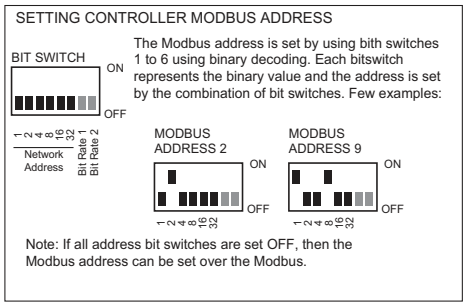
The configuration parameters are stored in the non-volatile memory. When the changes are carried out via the configuration display or via the Configuration Tool, the parameters are stored in the non-volatile memory when the controller returns to a normal display mode. If the changes are carried out over the network (Modbus or BACnet), then "NonVol Update" flag is required to be forced on to save the changes.

Setting Up Modbus Address and Baud Rate

The SRC Modbus address and the baud rate are normally set through the bit switch. It is also possible to set the address and baud rate over the over the Modbus communication network.

NOTE: The new settings are not activated until software reset or power down/up cycle has been applied.





Modbus Registers

The controller supports the following Modbus registers and function codes. The default communication speed is 9600 bps, 8 data bits, Parity None and 1 Stop Bit. The default Modbus Slave address is 0. The device Parity can be changed between Odd, None and Even. The baud rate is selectable between 9600, 19200, 38400 and 57600 bps. The baud rate speeds can be selected using the built-in bit switch, or over the network if BR1 and BR2 are set to OFF. The sensor addresses 1 to 63 can be set using the local bit switch, and over the Modbus the adjustable address range is 1 to 247.

Please note that Modbus register space is specified from the Modbus master perspective as in the Modbus Application Protocol specification. The Modbus registers for Function Codes 02, 03, 06 and 16 have presentation for both Modbus "address blocks" and for actual Modbus register offsets. For example, the Temperature is read from Modbus register 1 using Function Code 04. Some Modbus masters will require Function Code 04, register 1 to be entered, whereas the others will require register 30001 and Function Code 04. The Modbus addressing starts from the zero Base address. (Some Modbus masters start addressing from 1, in this case add one to the listed register values).

Register	Parameter Description	Data Type	Raw Data	Range
	FUNCTION CODE 01 - READ COILS FUNCTION CODE 05 - WRITE SINGLE COIL FUNCTION CODE 15 - WRITE MULTIPLE COILS			
0	Digital Output 1 Override (Network Write)		0..1	Off - On
1	Digital Output 2 Override (Network Write)		0..1	Off - On
2	Night Mode Override		0..1	Off - On
3	Summer/Winter Mode (Change-Over)		0..1	Off - Heating (DI1 can still override cooling if Change-Over) On - Cooling
4	Cooling Disable		0..1	Off - On

Register	Parameter Description	Data Type	Raw Data	Range
	FUNCTION CODE 02 - READ DISCRETE INPUTS			
1000**0**	Digital Input 1 Override Status		0..1	Off - On
1000**2**	Digital Output 1 Status		0..1	Off - On
1000**3**	Digital Output 2 Status		0..1	Off - On
	FUNCTION CODE 04 - READ INPUT REGISTERS			
3000**0**	Built-In Temperature Measurement	Signed 16	-400...3020	-40.0...150.0°C (-40.0..302.0°F)
3000**1**	External Temperature Measurement (Resistive Input 1)	Signed 16	-400...3020	-40.0...150.0°C (-40.0..302.0°F)
3000**2**	Current Calculated Setpoint (°C)	Signed 16	-400...3020	-40.0...150.0°C (-40.0..302.0°F)
3000**3**	Analogue Output Y1	Unsigned 16	0..1000	0..100.0 %
3000**4**	Analogue Output Y2	Unsigned 16	0..1000	0..100.0 %
3000**5**	Analogue Output Y3	Unsigned 16	0..1000	0..100.0 %
3000**7**	Thermic 1 Level	Unsigned 16	0..1000	0..100.0 %
3000**8**	Thermic 2 Level	Unsigned 16	0..1000	0..100.0 %
3000**9**	Three Point Level	Unsigned 16	0..1000	0..100.0 %
	FUNCTION CODE 03 - READ HOLDING REGISTERS FUNCTION CODE 06 - WRITE SINGLE HOLDING REGISTER FUNCTION CODE 16 - WRITE MULTIPLE HOLDING REGISTERS			
4000**0**	Temperature Control Setpoint	Unsigned 16	120...860	12.0...86.0°C/°F (Default 21°C)
4000**1**	Temperature Proportional Band	Unsigned 16	1...500	0.1...50.0°C/°F (Default 4°C)
4000**2**	Temperature Control Integral Action	Unsigned 16	0..1200	0..1200 seconds (600s default)
4000**3**	Deadzone	Unsigned 16	0..60	0...6.0°C/°F (Default 1.5°C)
4000**4**	Number of Heating Stages	Unsigned 16	0..2	0..2
4000**5**	Number of Cooling Stages	Unsigned 16	0..2	0..2
4000**6**	Heating Stage 1 Direction	Unsigned 16	0..1	0 = Reverse, 1 = Direct
4000**7**	Cooling Stage 1 Direction	Unsigned 16	0..1	0 = Reverse, 1 = Direct
4000**8**	Digital Input Override Mode	Unsigned 16	0..1	0 = Night, 1 = Cooling Disable, 2 = None, 3 = Change-Over
4000**9**	Temperature Units	Unsigned 16	0..1	0 = Celsius, 1 = Fahrenheit
4001**0**	Analogue Output Y1 Override Value	Unsigned 16	0..1000	0..100% (0..10.0V) Default 0
4001**1**	Analogue Output Y2 Override Value	Unsigned 16	0..1000	0..100% (0..10.0V) Default 0
4001**2**	Analogue Output Y3 Override Value	Unsigned 16	0..1000	0..100% (0..10.0V) Default 0
4001**4**	Analogue Output Y1 Mode	Unsigned 16	0..6	0 = Network Value 1 = None 2 = Heating Stage 1 (Default) 3 = Heating Stage 2 4 = Cooling Stage 1 5 = Cooling Stage 2 6 = Air-Side 7 = Change-Over
4001**5**	Analogue Output Y2 Mode	Unsigned 16	0..6	0 = Network Value 1 = None 2 = Heating Stage 1 3 = Heating Stage 2 4 = Cooling Stage 1 (Default) 5 = Cooling Stage 2 6 = Air-Side 7 = Change-Over

Register	Parameter Description	Data Type	Raw Data	Range
400**16**	Analogue Output Y3 Mode	Unsigned 16	0..6	0 = Network Value 1 = None 2 = Heating Stage 1 3 = Heating Stage 2 4 = Cooling Stage 1 5 = Cooling Stage 2 (Default) 6 = Air-Side 7 = Change-Over
400**18**	PWM1 Override Value	Unsigned 16	0..1000	0..100%
400**19**	PWM1 Mode Assignment	Unsigned 16	0..6	0 = Network Value 1 = None 2 = Heating Stage 1 (Default) 3 = Heating Stage 2 4 = Cooling Stage 1 5 = Cooling Stage 2 6 = Air-Side 7 = Change-Over
400**20**	PWM2 Override Value	Unsigned 16	0..1000	0..100%
400**21**	PWM2 Mode Assignment	Unsigned 16	0..6	0 = Network Value 1 = None 2 = Heating Stage 1 3 = Heating Stage 2 4 = Cooling Stage 1 (Default) 5 = Cooling Stage 2 6 = Air-Side 7 = Change-Over
400**22**	3-Point Override Value	Unsigned 16	0..1000	0..100%
400**23**	3-Point Mode Assignment	Unsigned 16	0..6	0 = Network Value 1 = None (Default) 2 = Heating Stage 1 3 = Heating Stage 2 4 = Cooling Stage 1 5 = Cooling Stage 2 6 = Air-Side 7 = Change-Over
400**24**	3-Point Run Time	Unsigned 16	30..600	30..600 Seconds
400**25**	3-P Run On Time	Unsigned 16	0..30	0..30
400**26**	DO1 Override Mode	Unsigned 16	0..1	0 = Network, 1 = Control
400**27**	DO2 Override Mode	Unsigned 16	0..1	0 = Network, 1 = Control
400**28**	Internal Sensor One Point Compensation	Signed 16	-100..100	-10.0..+10.0 °C/°F
400**29**	External Sensor One Point Compensation	Signed 16	-100..100	-10.0..+10.0 °C/°F
400**30**	Setpoint Adjust Minimum	Signed 16	-200..0	-20.0..0.0 °C/°F
400**31**	Setpoint Adjust Maximum	Signed 16	0..200	0.0..200.0 °C/°F
400**32**	AntiJAM Valve Exercise Period	Unsigned 16	0..14	0..14
400**33**	Low Limit Control Setpoint	Signed 16	120...860	12.0...86.0°C/°F (Default 35°C)
400**34**	High Limit Control Setpoint	Signed 16	120...860	12.0...86.0°C/°F (Default 16°C)
400**35**	Reset Control Adjust Ratio	Signed 16	0..50	0 (Default = Disabled) 1..5.0
400**36**	Night Deadzone	Signed 16	0..400	0..40.0
400**37**	Night Mode	Unsigned 16	0..3	0 = Expanded Deadzone 1 = Off Mode
400**50**	Modbus Address	Unsigned 16	0..247	0..247 (Default 1)
400**51**	Modbus Baud Rate	Unsigned 16	0...3	0 = 9600 (Default) 1 = 19200 2 = 38400 3 = 57600
400**52**	Modbus Parity	Unsigned 16	0...2	0 = None (Default) 1 = Odd 2 = Even

Register	Parameter Description	Data Type	Raw Data	Range
400**53**	Stop Bits	Unsigned 16	0...1	0 = 1 Stop Bit (Default) 1 = 2 Stop Bits
400**80**	LCD Brightness	Unsigned 16	0...10	0..10
40**100**	Force Reset	Unsigned 16	0..1	0 = Normal 1 = Force Reset
40**101**	Non Volatile Memory Update	Unsigned 16	0..1 Note 3	0 = Normal 1 = Update
40**103**	Force Factory Defaults	Unsigned 16	0..1	0 = Normal 1 = Force Defaults

Dimensions