



Features & Benefits

- BACnet MS/TP over RS-485 communication
- Control signal options: SPST relays on/off or 0-10Vdc modulating
- Implemented control strategy
- Input options for PIR sensor, window contact, remote sensor and more
- Centralised supervision of HVAC systems, with defined local access into the control strategy (features lockable)
- High energy efficiency and smart user interface
- Sleep-mode, Countdown-timer and Auto-Fan off feature

Technical Overview

The Smart Temperature Controllers offer tight control of heating, cooling and ventilation demand in modern building control systems such as hotels or office buildings. Depending on the chosen model, operation is either as a conventional thermostat or a P+I controller, with relay output switching or modulating 0-10V control signals for modern EC fans and actuators. Additional inputs include energy saving, configurable for either window contact or occupancy detector, and remote temperature sensing into the built in control strategy.

The respective control parameters are available via the cost efficient 2-wire RS-485 bus, using the BACnet MS/TP protocol. This allows centralised supervision of HVAC systems, with defined local access into the control strategy which makes this range ideal for large building projects aiming for high energy efficiency and smart user interaction.

Product Codes

SC-ST-B

Smart Temperature Controller

SC-ST-P

Smart Temperature Controller PLUS

SC-ST-EC

Smart Temperature Controller EC

SC-ST-AC

Smart Temperature Controller AC

Specification

Heating and cooling

SC-ST-B & -AC	2x SPST relays, 5(1)A @ 250Vac, 4-pipe
SC-ST-P & -EC	2x 0-10Vdc@10mA, input impedance >1k5Ω, 4-pipe

Fan speed control

SC-ST-B & -P	2x SPST relays, 10(4) A @ 250Vac
SC-ST-EC & -AC	1x 0-10Vdc@10mA, input impedance >1k5Ω

Operating Mode

Automatic changeover between heating and cooling set by the setpoint and space temperature differential

Additional Inputs

SC-ST-B	ESI VFC, configurable NO or NC (window contact or PIR)
	External Temp sensor 10K3A1 (-A)
SC-ST-P/EC/ AC	ESI VFC, configurable NO or NC (window contact or PIR)
	External Temp sensor 10K3A1 (-A)
	Digital input VFC, configurable NO or NC for eg. fan proving Air DP switch

BACnet communication

BACnet Application Specific Controller(B-ASC) Supports DS-RPM-B and DS-WPM-B BIBBs RS-485, 2 wire connectionBACnet MS/TP 9k6/19k2/38k4/57k6/76k8 + auto baudN81 data format (BACnet Standard)

Power supply

SC-ST-B	85-260Vac, 50/60Hz
SC-ST-P/EC/AC	24Vac, 50/60Hz

Housing

Material	ABS (flame retardant) RAL9003
Dimensions	115 x 85 x 28mm

Protection

IP30

Weight

130g



The products referred to in this data sheet (SC-ST-EC) meet the requirements of EU Directive 2014/30/EU.

The products referred to in this data sheet (SC-ST-B/P/AC) meet the requirements of EU Directive 2014/30/EU & 2014/35/EU

WEEE Directive:



At the end of the products useful life please dispose as per the local regulations.
Do not dispose of with normal household waste.
Do not burn.

	SC-ST-B	SC-ST-P	SC-ST-EC	SC-ST-AC
Fan speed control	3 stage On/off		0-10V modulating	
Heating and cooling valve	On/off	0-10V modulating		On/off

Installation



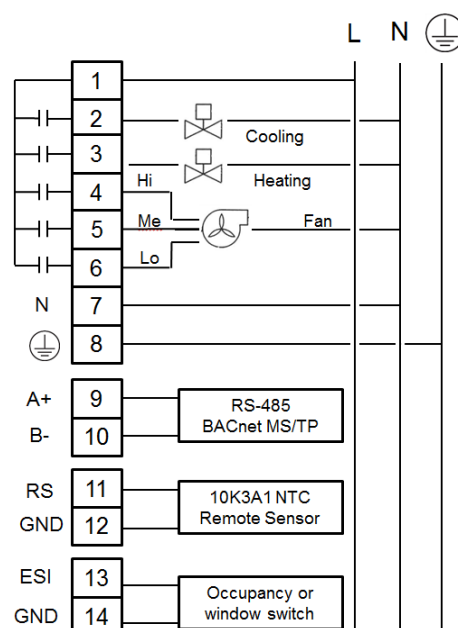
Antistatic precautions must be observed when handling these sensors. The PCB contains circuitry that can be damaged by static discharge.

- The SC-ST-x should only be installed by a competent, suitably trained technician, experienced in installation with hazardous voltages. (<50Vac & <1000Vac or >75Vdc & <1500Vdc)
- Ensure that all power is disconnected before carrying out any work on the SC-ST-x.
- Select a location on a wall of the controlled space which will give a representative sample of the prevailing room condition. Avoid sitting the sensor in direct sunlight, on an outside wall or near heat sources. An ideal mounting height is 1.5m from the floor.
- Undo the tamperproof screw at the bottom of the housing.
- To remove the front panel from the base, twist a screwdriver as below and pull gently the front panel from the base.
- Using the base as a template mark the hole centres and fix to the wall with suitable screws. Alternatively the base plate can be mounted on to a conduit box or standard recessed back box. The base plate is suitable for EU & North America fixings.
- Feed cable through the hole in the base plate of the housing and terminate the cores at the terminal block as required. Leaving some slack inside the unit.
- Replace the housing to the base plate and fit the tamperproof screw (if required) through the lug at the bottom of the base plate.
- Before powering the sensor, ensure that the supply voltage is within the specified tolerances.
- Allow 10 minutes before carrying out pre-commissioning checks.

Connections

SC-ST-B

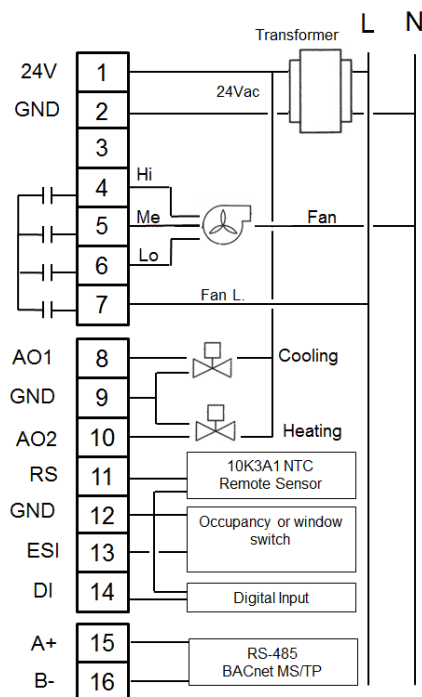
- 1 (L) and 7 (N) and 8 (Earth)** Power supply
- 2 (C)** Switched output Cooling
- 3 (H)** Switched output Heating
- 4 (Hi)** Switched output Fan (stage high)
- 5 (Me)** Switched output Fan (stage medium)
- 6 (Lo)** Switched output Fan (stage low)
- 9 (A+)** RS-485 A+ (BACnet MS/TP protocol)
- 10 (B-)** RS-485 B- (BACnet MS/TP protocol)
- 11 & 12 (RS)** Resistive Input for remote temperature sensor type 10K3A1 (Sontay -A)
- 13 & 14 (ESI)** Digital Energy Saving Input for window contact or occupancy sensor switch (selectable in engineering setup or via BACnet objects)



Connections (continued)

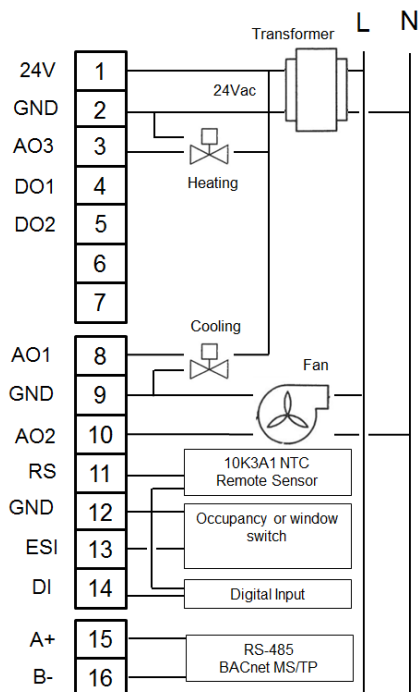
SC-ST-P

1 (24Vac)	Power supply 24Vac
2 (GND)	Power supply GND and GND for AO3 (heating)
3 (n/a)	Not used
4 (Hi)	Switched outputFan (stage high)
5 (Me)	Switched outputFan (stage medium)
6 (Lo)	Switched outputFan (stage low)
7 (Ext. L)	Not used
8 (AO1)	Modulating 0-10Vdc for cooling
9 (GND)	GND for AO1(cooling) and AO2(heating)
10 (AO2)	Modulating 0-10Vdc for heating
11 (RS)	Resistive Input for remote temperature sensor type 10K3A1 (Sontay -A)
12 (GND)	GND for RS, ESI and DI
13 (ESI)	Digital Energy Saving Input for window contact or occupancy sensor switch (selectable in engineering setup or via BACnet objects)
14 (DI)	Additional digital input for e.g. fan proving DP switch
15 (A+)	RS-485 A+ (BACnet MS/TP protocol)
16 (B-)	RS-485 B- (BACnet MS/TP protocol)



SC-ST-EC

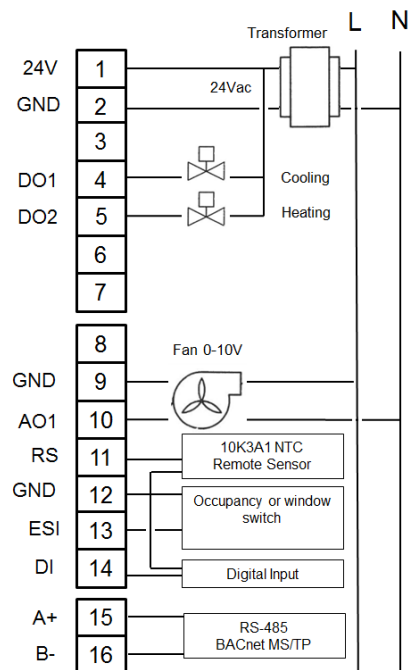
1 (24Vac)	Power supply 24Vac
2 (GND)	Power supply GND and GND for AO3 (heating)
3 (AO3)	Modulating 0-10Vdc for heating
4-7 (n/a)	Not used
8 (AO1)	Modulating 0-10Vdc for cooling
9 (GND)	GND for AO1(cooling) and AO2 (fan)
10 (AO2)	Modulating 0-10Vdc for fan speed control
11 (RS)	Resistive Input for remote temperature sensor type 10K3A1 (Sontay -A)
12 (GND)	GND for RS and DI
13 (ESI)	Digital Energy Saving Input for window contact or occupancy sensor switch (selectable in engineering setup or via BACnet objects)
14 (DI)	Additional digital input for e.g. fan proving DP switch
15 (A+)	RS-485 A+ (BACnet MS/TP protocol)
16 (B-)	RS-485 B- (BACnet MS/TP protocol)



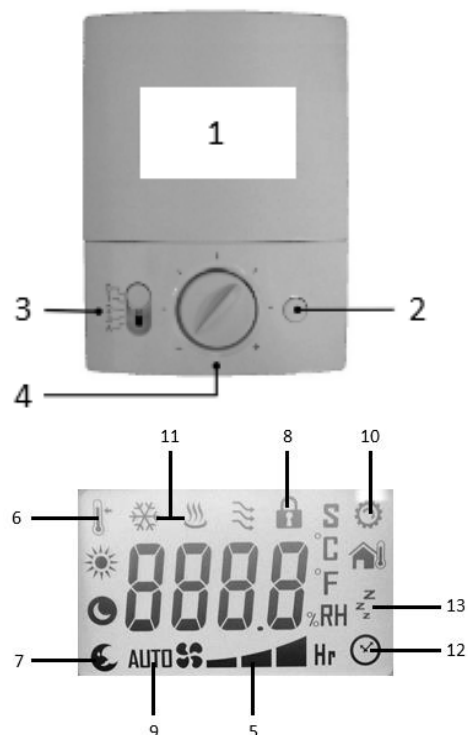
Connections (continued)

SC-ST-AC

1 (24Vac)	Power supply 24Vac
2 (GND)	Power supply GND and GND for DO1 and DO2
3 (n/a)	Not used
4 (DO1)	Switched output Cooling
5 (DO2)	Switched output Heating
6/7/8 (n/a)	Not used
9 (GND)	GND for AO1(fan)
10 (AO2)	Modulating 0-10Vdc for fan
11 (RS)	Resistive Input for remote temperature sensor type 10K3A1 (Sontay -A)
12 (GND)	GND for RS, ESI and DI
13 (ESI)	Digital Energy Saving Input for window contact or occupancy sensor switch (selectable in engineering setup or via BACnet objects)
14 (DI)	Additional digital input for e.g. fan proving DP switch
15 (A+)	RS-485 A+ (BACnet MS/TP protocol)
16 (B-)	RS-485 B- (BACnet MS/TP protocol)



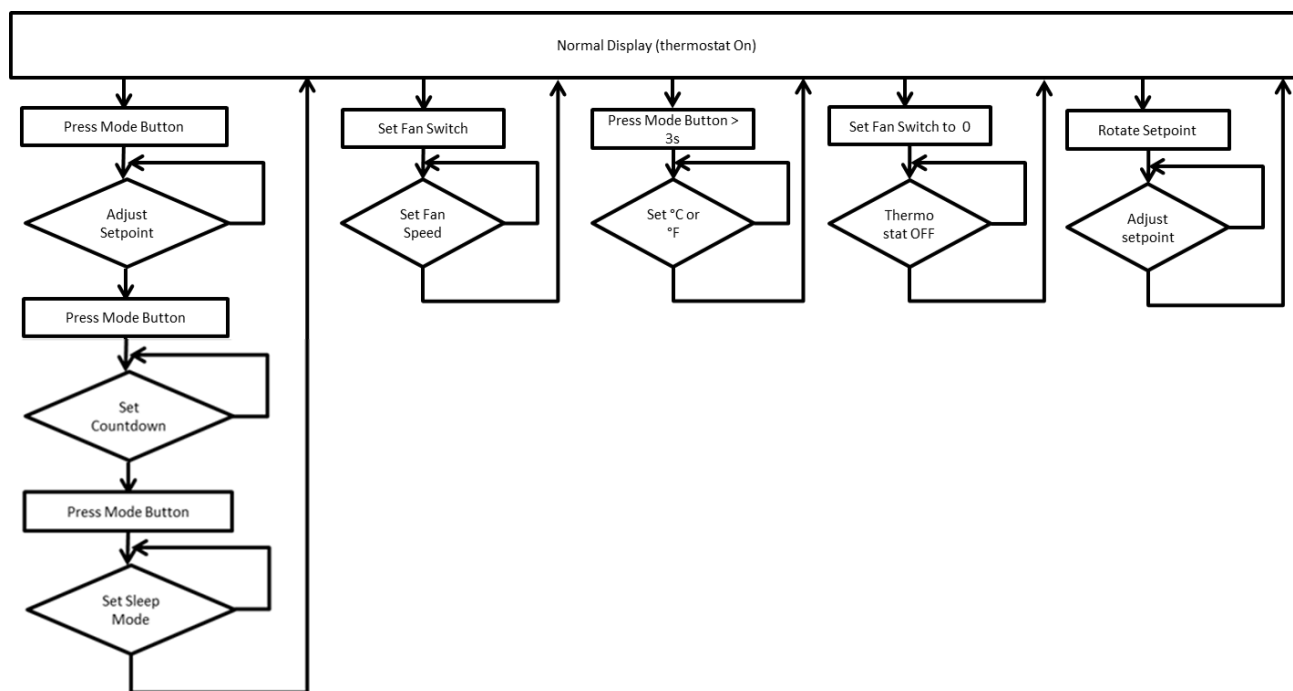
User Interaction & Display



- 1** LCD
- 2** Mode button
- 3** Device On/Off & Fan speed stage selection
- 4** Setpoint
- 5** Fan speed icon
- 6** Setpoint icon
- 7** Occupancy status icon
- 8** Lock icon
- 9** Fan auto mode icon
- 10** Operating icon
- 11** Heating or cooling icon
- 12** Countdown timer icon
- 13** Sleep mode icon

Operation

1. Set the fan speed switch to 1/2/3/A to start
2. Set the fan speed switch to 0 to stop the thermostat
3. Rotate the setpoint knob to adjust the occupied setpoint
4. While the fan speed switch is set to the 1/2/3/A position, press the MODE button to enter User Mode adjustments:
 - To show setpoint temperature
 - Ventilation mode (Heating or Cooling) only on SC-ST-EC/AC models!
 - Set countdown timer
 - Enable/disable sleep mode
5. Rotate the setpoint knob to increase/decrease or scroll through each setting.
6. While the fan speed switch is set at 1/2/3/A position, pressing the MODE button for more than 3 seconds will toggle the temperature units (°C or °F)
7. If no button pressed or adjustment made for 10 seconds the thermostat will return to normal display with the latest settings.

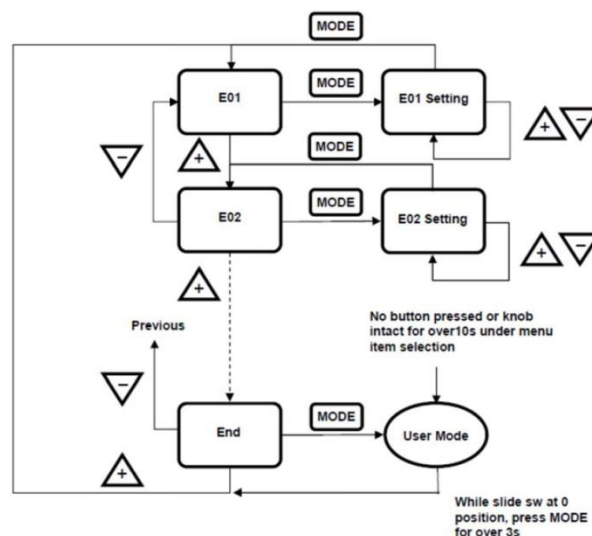


Glossary

- Countdown timer: 1 to 24 hours, adjustable countdown timer to turn off all control outputs after the set time expires, if the function is enabled.
- Deadband – a temperature range centered about the setpoint which is used to create a band in which neither a heating nor a cooling demand is generated. This is applicable only to 4-pipe system, where the thermostat has both heating and cooling functions.
- Fan auto mode: The lowest fan speed to be able to be set to 0 (off) in auto mode. If the lowest fan speed is set to 0, there is a 5 minute OFF delay after the heating output is switched off.
- Setpoint: The required temperature for the controlled space, adjustable by a local user or via BACnet
- Sleep mode: Increases the deadband by 4°C in 2 hours (1°C every 30 minutes) if the function is enabled.
- Stage Differential - a small temperature range about the cooling switch on temperature and/or the heating switch on temperature, to prevent rapid on/off cycling of heating or cooling equipment. The higher the stage differential, the higher are the potential energy savings.

Operation

- While the fan speed switch is set to the 0 position, press the MODE button for at least 3 seconds to enter engineering mode adjustments.
- The first item in the engineer menu will appear.
- Rotate the setpoint knob to change setting value or status
- Press MODE button to confirm the setting and move to the next item
- When a menu item is displayed, the current position of the setpoint knob must be determined and the appropriate setting value displayed.
- To leave Engineer Menu, rotate to "End" and press MODE button or leave the MODE button and setpoint knob unchanged for 10 seconds.
- At any stage, if no button pressed for 10 seconds, it will go back to User mode.



NOTE: means rotating rotary knob right/left.

Engineering Mode menu:

** Notes:

- Changing these values requires that communication parameters must be unlocked in advance. Please refer to the parameter LOC for details.
- Device instance number = "dEUH" * 1000 + "dEUL"

Item	Mnemonic	Description	°C		°F		Step
			Default	Range	Default	Range	
1	db	Deadband	4	0 - 10.0	7	0 - 18.0	0.5 (°C/°F)
2	C-9P	Unoccupied(ESI) Cooling Setpoint Minimum Gap from Occupied Cooling Setpoint	2	0 ~ 10	4	0 ~ 18	1 (°C/°F)
3	H-9P	Unoccupied(ESI) Heating Setpoint Minimum Gap from Occupied Heating Setpoint	2	0 ~ 10	4	0 ~ 18	1 (°C/°F)
4	I-t	Integral Time and Output Cycle time. Not used on this model!	90	0 - 500	90	0 - 500	10 (Sec.)
5	SP-L	Low limit for temperature setpoint	10	0 ~ SP-H	50	32.0 ~ SP-H	1.0 (°C/°F)
6	SP-H	High limit for temperature setpoint	35	SP-L ~ 50.0	95	SP-L ~ 122.0	1.0 (°C/°F)
7	OFSt	Current temperature offset	0	-10 - 10	0	-18.0 - 18.0	0.1 (°C/°F)
8	Pb	Proportional band. Not used on this model!	2	0 - 10.0	3.6	0 - 18.0	0.1 (°C/°F)
9	diFF	Stage differential	0.5	0.1 - 1.0	0.9	0.1 - 1.8	0.1 (°C/°F)

10	LOC	Bit Definition --- Bit 0: MODE button 1~5: Reserved 6: disable ESI detection 7: Reserved 8: Lock the modification for communication parameters, i.e. baud rate, MAC address and device instance 9: Override/DOs set by device (0) or BMS (1) 10: Disable local thermostat on/off setting 11: Disable local Fan speed setting *Bit Value 0: Unlock / enable 1: Lock / disable Examples: 0 - Unlock/enable all 1 - Lock MODE Button ... 64 - Disable ESI detection ... 256 - Lock the modification for communication parameters ... 512: Override/DOs set by BMS ... 4095 - Lock/disable all	0	0-4095	0	0-4095	1
11	ESI	ESI contact definition	0	0 - 1	0	0 - 1	0: N.O. 1: N.C.
12	rS	Select the source of the present temperature, from built-in temperature sensor, remote temperature sensor, or assigned through communication	0	0 - 2	0	0 - 2	0: built-in 1: remote 2: assigned through network
13	-SP-	Display present value of temperature or set-point for Normal Displaying	0	0 - 1	0	0 - 1	0: display temperature 1: display SP
14	LFA	Lowest Fan speed in Auto fan mode	1	0 - 3	0	0 - 3	0: stop 1: low 2: Med. 3: Hi
15	bAud**	Baud rate	Auto	9.6 kbps 19.2 kbps 38.4 kbps 57.6 kbps 76.8 kbps Auto	Auto	9.6 kbps 19.2 kbps 38.4 kbps 57.6 kbps 76.8 kbps Auto	
16	Addr**	MS/TP MAC address	1	0 - AdrH (Default: 0 - 127)	1	0 - AdrH (Default: 0 - 127)	1
17	dEUH**	Device instance number - Hi bytes	662	0 - 4194	662	0 - 4194	1

18	dEUL**	Device instance number - Low bytes	001	0 - 999 (if ID-H <= 4193) 0 - 302 (if ID-H = 4194)	001	0 - 999 (if ID-H <= 4193) 0 - 302 (if ID-H = 4194)	1
19	AdrH	Max_Master -- The highest allowable address for master nodes.	1	1 - 127	1	1 - 127	1
20	tEst	Self-Diagnostic					
21	rSt	Reset all parameters to factory defaults					
22	End	Exit Engineer Mode					

SC-ST-P

Item	Mnemonic	Description	°C		°F		Step
			Default	Range	Default	Range	
1	OCdb	Occupied Deadband	2	0 - 10.0	3.5	0 - 18.0	0.5 (°C/°F)
2	I-t	Integral Time	90	0 - 500	90	0 - 500	10 (Sec.)
3	OP-L	Minimum output voltage in digital value for AO when reach Low limit	0(0V)	0~125	0(0V)	0~125	1 (LSB) (0.044V)
4	SPAN	Span Offset	-5(10V)	-55~0	-5(10V)	-55~0	1 (LSB) (0.044V)
5	SP-L	Low limit for temperature setpoint	10	0 ~SP-H	50	32.0 ~ SP-H	1.0 (°C/°F)
6	SP-H	High limit for temperature setpoint	35	SP-L ~ 50.0	95	SP-L ~ 122.0	1.0 (°C/°F)
7	OFSt	Current temperature offset	0	-10.0~10.0 °C	0	-18.0 - 18.0	0.1 (°C/°F)
8	Pb	Proportional band	2	0 - 10.0	3.6	0 - 18.0	0.1 (°C/°F)
9	FdiF	Fan Stage Differential	0.2	0.1 ~ 1.0	0.4	0.1 ~ 1.8	0.1 (°C/°F)
10	LOC	Bit Definition --- Bit 0: MODE button 1~5: reserved 6: Disable PIR/occupancy detection 7: Disable Window open detection 8: Lock the modification for communication parameters, i.e. baud rate, MAC address and device instance 9: Override/DOs set by device (0) or BMS (1) 10: Disable local thermostat on/off setting 11: Disable local Fan speed setting *Bit Value 0: Unlock / enable 1: Lock / disable Examples: 0 - Unlock/enable all 1 - Lock MODE Button ... 64 - Disable PIR/occupancy detection ... 256 - Lock the modification for communication parameters ... 512: Override/DOs set by BMS ... 4095 - Lock/disable all	0	0-4095	0	0-4095	1
11	ESId	ESI contact definition	0	0 - 1	0	0 - 1	0: N.O. 1: N.C.

12	ESIt	ESI contact type	0	0 - 1	0	0 - 1	0: PIR 1: Window switch
13	rE-C	Modulating Cooling direct/ reverse signal output	0	0-1	0	0-1	0 (direct) 1 (reverse)
14	rE-H	Modulating Heating direct/ reverse signal output	0	0-1	0	0-1	0 (direct) 1 (reverse)
15	rS	Select the source of the present temperature, from built-in temperature sensor, remote temperature sensor, or assigned through communication	0	0 - 2	0	0 - 2	0: built-in 1: remote 2: assigned through communication
16	-SP-	Display present value of temperature or set-point for Normal Displaying	0	0 - 1	0	0 - 1	0: display temperature 1: display SP
17	FdPS	Fan Diff. Pressure Switch contact definition	0	0~1	0	0~1	0: N.O. 1: N.C.
18	LFAn	Lowest Fan speed in Auto fan mode	1	0 - 3	1	0 - 3	0: stop 1: low 2: Med. 3: Hi
19	BAud**	Baud rate	Auto	9.6 kbps 19.2 kbps 38.4kbps 57.6kbps 76.8kbps Auto	Auto	9.6 kbps 19.2 kbps 38.4kbps 57.6kbps 76.8kbps Auto	
20	Addr**	MS/TP MAC address	1	0 - AdrH (Default: 0 - 127)	1	0 - AdrH (Default: 0 - 127)	1
21	dEUH**	Device instance number - Hi bytes	662	0 - 4194	662	0 - 4194	1
22	dEUL**	Device instance number - Low bytes	001	0 - 999 (if ID-H <= 4193) 0 - 302 (if ID-H = 4194)	001	0 - 999 (if ID-H <= 4193) 0 - 302 (if ID-H = 4194)	1
23	AdrH	Max_Master -- The highest allowable address for master nodes.	127	1 - 127	127	1 - 127	1
24	Sb9P	Standby Cooling/ Heating Setpoint Gap from Occupied Cooling/ Heating Setpoint	2	0 ~ 10	3.5	0 ~ 18	0.5 (°C/°F)
25	Uo9P	Unoccupied Cooling/ Heating Setpoint Gap from Occupied Cooling/ Heating Setpoint	4	0 ~ 10	7	0 ~ 18	0.5 (°C/°F)
26	Stbt	Standby timer	0.5	0 - 24 Hours	0.5	0 - 24 Hours	0.5 Hours
27	Uoct	Unoccupied timer	0.5	0 - 24 Hours	0.5	0 - 24 Hours	0.5 Hours
28	OPnt	Window switch grace timer	30 secs	10 - 120 secs	30 secs	10 - 120 secs	5 secs
29	tESt	Self-Diagnostic					
30	rSt	Reset all parameters as factory defaults					
31	End	Exit Engineer Mode					

SC-ST-EC

Item	Mnemonic	Description	°C		°F		Step
			Default	Range	Default	Range	
1	OCdb	Occupied Deadband	2	0 - 10.0	3.5	0 - 18.0	0.5 (°C/°F)
2	I-t	Integral Time	90	0 - 500	90	0 - 500	10 (Sec.)
3	OP-L	Minimum output voltage in digital value for AO when reach Low limit	0(0V)	0~125	0(0V)	0~125	1 (LSB) (0.044V)
4	SPAn	Span Offset	-5(10V)	-55~0	-5(10V)	-55~0	1 (LSB) (0.044V)
5	SP-L	Low limit for temperature setpoint	10	0 ~SP-H	50	32.0 ~ SP-H	1.0 (°C/°F)
6	SP-H	High limit for temperature setpoint	35	SP-L ~ 50.0	95	SP-L ~ 122.0	1.0 (°C/°F)
7	OFSt	Current temperature offset	0	-10.0~10.0 °C	0	-18.0 - 18.0	0.1 (°C/°F)
8	Pb	Proportional band	2	0 - 10.0	3.6	0 - 18.0	0.1 (°C/°F)
9	LOC	Bit Definition --- Bit 0: MODE button 1~5: reserved 6: Disable PIR/occupancy detection 7: Disable Window open detection 8: Lock the modification for communication parameters, i.e. baud rate, MAC address and device instance 9: Override/DOs set by device (0) or BMS (1) 10: Disable local thermostat on/off setting 11: Disable local Fan speed setting *Bit Value 0: Unlock / enable 1: Lock / disable Examples: 0 - Unlock/enable all 1 - Lock MODE Button ... 64 - Disable PIR/occupancy detection ... 256 - Lock the modification for communication parameters ... 512: Override/DOs set by BMS ... 4095 - Lock/disable all	0	0-4095	0	0-4095	1
10	ESId	ESI contact definition	0	0 - 1	0	0 - 1	0: N.O. 1: N.C.
11	ESIt	ESI contact type	0	0 - 1	0	0 - 1	0: PIR 1: Window switch

12	rE-C	Modulating Cooling direct/ reverse signal output	0	0-1	0	0-1	0 (direct) 1 (reverse)
13	rE-H	Modulating Heating direct/ reverse signal output	0	0-1	0	0-1	0 (direct) 1 (reverse)
14	rS	Select the source of the present temperature, from built-in temperature sensor, remote temperature sensor, or assigned through communication	0	0 - 2	0	0 - 2	0: built-in 1: remote 2: assigned through communication
15	-SP-	Display present value of temperature or set-point for Normal Displaying	0	0 - 1	0	0 - 1	0: display temperature 1: display SP
16	FdPS	Fan Diff. Pressure Switch contact definition	0	0~1	0	0~1	0: N.O. 1: N.C.
17	LFAn	Lowest Fan speed in Auto fan mode	1	0 - 3	1	0 - 3	0: stop 1: low 2: Med. 3: Hi
18	BAud**	Baud rate	Auto	9.6 kbps 19.2 kbps 38.4kbps 57.6kbps 76.8kbps Auto	Auto	9.6 kbps 19.2 kbps 38.4kbps 57.6kbps 76.8kbps Auto	
19	Addr**	MS/TP MAC address	1	0 - AdrH (Default: 0 - 127)	1	0 - AdrH (Default: 0 - 127)	1
20	dEUH**	Device instance number - Hi bytes	662	0 - 4194	662	0 - 4194	1
21	dEUL**	Device instance number - Low bytes	001	0 - 999 (if ID-H ≤ 4193) 0 - 302 (if ID-H = 4194)	001	0 - 999 (if ID-H ≤ 4193) 0 - 302 (if ID-H = 4194)	1
22	AdrH	Max_Master -- The highest allowable address for master nodes.	127	1 - 127	127	1 - 127	1
23	Sb9P	Standby Cooling/ Heating Setpoint Gap from Occupied Cooling/ Heating Setpoint	2	0 ~ 10	3.5	0 ~ 18	0.5 (°C/°F)
24	Uo9P	Unoccupied Cooling/ Heating Setpoint Gap from Occupied Cooling/ Heating Setpoint	4	0 ~ 10	7	0 ~ 18	0.5 (°C/°F)
25	Stbt	Standby timer	0.5	0 - 24 Hours	0.5	0 - 24 Hours	0.5 Hours
26	Uoct	Unoccupied timer	0.5	0 - 24 Hours	0.5	0 - 24 Hours	0.5 Hours
27	OPnt	Window switch grace timer	30 secs	10 - 120 secs	30 secs	10 - 120 secs	5 secs
28	nFSP	Low fan speed	50%	0 - 70%	50%	0 - 70%	5%
29	HFSP	High fan speed	100%	10 - 100%	100%	10 - 100%	5%

30	tEst	Self-Diagnostic					
31	rSt	Reset all parameters as factory defaults					
32	End	Exit Engineer Mode					

SC-ST-AC

Item	Mnemonic	Description	°C		°F		Step
			Default	Range	Default	Range	
1	OCdb	Occupied Deadband	2	0 - 10.0	3.5	0 - 18.0	0.5 (°C/°F)
2	I-t	Integral Time	90	0 - 500	90	0 - 500	10 (Sec.)
3	OP-L	Minimum output voltage in digital value for AO when reach Low limit	0(0V)	0~125	0(0V)	0~125	1 (LSB) (0.044V)
4	SPAn	Span Offset	-5(10V)	-55~0	-5(10V)	-55~0	1 (LSB) (0.044V)
5	SP-L	Low limit for temperature setpoint	10	0 ~SP-H	50	32.0 ~ SP-H	1.0 (°C/°F)
6	SP-H	High limit for temperature setpoint	35	SP-L ~ 50.0	95	SP-L ~ 122.0	1.0 (°C/°F)
7	OFSt	Current temperature offset	0	-10.0~10.0 °C	0	-18.0 - 18.0	0.1 (°C/°F)
8	Pb	Proportional band	2	0 - 10.0	3.6	0 - 18.0	0.1 (°C/°F)
9	diFF	Stage differential	0.5	0.1~1.0	0.9	0.1~1.8	0.1 (°C/°F)
10	LOC	Bit Definition --- Bit 0: MODE button 1~5: reserved 6: Disable PIR/occupancy detection 7: Disable Window open detection 8: Lock the modification for communication parameters, i.e. baud rate, MAC address and device instance 9: Override/DOs set by device (0) or BMS (1) 10: Disable local thermostat on/off setting 11: Disable local Fan speed setting *Bit Value 0: Unlock / enable 1: Lock / disable Examples: 0 - Unlock/enable all 1 - Lock MODE Button ... 64 - Disable PIR/occupancy detection ... 256 - Lock the modification for communication parameters ... 512: Override/DOs set by BMS ... 4095 - Lock/disable all	0	0-4095	0	0-4095	1

11	ESId	ESI contact definition	0	0 - 1	0	0 - 1	0: N.O. 1: N.C.
12	ESIt	ESI contact type	0	0 - 1	0	0 - 1	0: PIR 1: Window switch
13	rS	Select the source of the present temperature, from built-in temperature sensor, remote temperature sensor, or assigned through communication	0	0 - 2	0	0 - 2	0: built-in 1: remote 2: assigned through communication
14	-SP-	Display present value of temperature or set-point for Normal Displaying	0	0 - 1	0	0 - 1	0: display temperature 1: display SP
15	FdPS	Fan Diff. Pressure Switch contact definition	0	0~1	0	0~1	0: N.O. 1: N.C.
16	LFAn	Lowest Fan speed in Auto fan mode	1	0 - 3	1	0 - 3	0: stop 1: low 2: Med. 3: Hi
17	Baud**	Baud rate	Auto	9.6 kbps 19.2 kbps 38.4kbps 57.6kbps 76.8kbps Auto	Auto	9.6 kbps 19.2 kbps 38.4kbps 57.6kbps 76.8kbps Auto	
18	Addr**	MS/TP MAC address	1	0 - AdrH (Default: 0 - 127)	1	0 - AdrH (Default: 0 - 127)	1
19	dEUH**	Device instance number - Hi bytes	662	0 - 4194	662	0 - 4194	1
20	dEUL**	Device instance number - Low bytes	001	0 - 999 (if ID-H <= 4193) 0 - 302 (if ID-H = 4194)	001	0 - 999 (if ID-H <= 4193) 0 - 302 (if ID-H = 4194)	1
21	AdrH	Max_Master -- The highest allowable address for master nodes.	127	1 - 127	127	1 - 127	1
22	Sb9P	Standby Cooling/ Heating Setpoint Gap from Occupied Cooling/ Heating Setpoint	2	0 ~ 10	3.5	0 ~ 18	0.5 (°C/°F)
23	Uo9P	Unoccupied Cooling/ Heating Setpoint Gap from Occupied Cooling/ Heating Setpoint	4	0 ~ 10	7	0 ~ 18	0.5 (°C/°F)
24	Stbt	Standby timer	0.5	0 - 24 Hours	0.5	0 - 24 Hours	0.5 Hours
25	Uoct	Unoccupied timer	0.5	0 - 24 Hours	0.5	0 - 24 Hours	0.5 Hours
26	OPnt	Window switch grace timer	30 secs	10 - 120 secs	30 secs	10 - 120 secs	5 secs
27	nFSP	Low fan speed	50%	0 - 70%	50%	0 - 70%	5%
28	HFSP	High fan speed	100%	10 - 100%	100%	10 - 100%	5%
29	tESt	Self-Diagnostic					

30	rSt	Reset all parameters as factory defaults					
31	End	Exit Engineer Mode					

Lock Bits (all Variants)

Lock Bit	Function	Decimal Value
Bit 0	Mode Button [0 = unlocked, 1 = locked]	1
Bit 1	Reserved	2
Bit 2	Reserved	4
Bit 3	Reserved	8
Bit 4	Reserved	16
Bit 5	Reserved	32
Bit 6	ESI Detection [0 = Enable ESI detection, 1 = Disable ESI detection]	64
Bit 7	Reserved	128
Bit 8	BACnet communications parameters ¹ [0 = unlock, 1 = lock]	256
Bit 9	Override relay outputs [0 = Device, 1 = BMS]	512
Bit 10	Local ON/OFF switch [0 = Enabled, 1 = Disabled]	1024
Bit 11	Local fan speed switch [0 = enabled, 1 = Disabled]	2048
¹	Baud rate, MAC address & device instance	Total

Self Test and Diagnostic

12 The SC-ST-x Smart Temperature Controller incorporates a self-diagnostic test to check the functionality of the LCD, buttons, sliders, setpoint wheel, outputs and inputs. The display guides the user through the self test:

1. **Enter Test Mode:** While the LCD shows "test", press the MODE button to enter the Test Mode.



2. **LCD test:** After entering Test Mode, the LCD is tested. If the LCD shows all icons one by one and then all icons are shown, the LCD is ok.



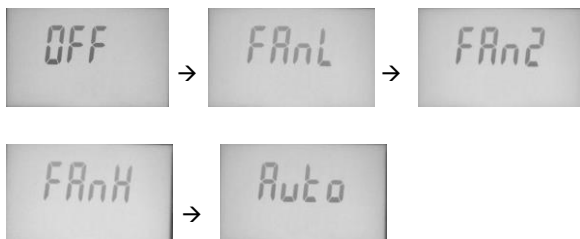
3. **Firmware version:** After testing the LCD, the firmware version is shown.



4. **MODE button test:** If the LCD shows "nnod", this tells the operator to press the MODE button to test it. After this button is pressed, if it is ok, the LCD will change to show the next test.



5. **Fan speed switch test:** Slide the fan speed switch to OFF, FanL, Fan2, FanH and Auto positions respectively. If the LCD shows OFF->FanL->Fan2->FanH->Auto one by one, this tells the operator it is ok, and the LCD will change to show the next test.



6. **SC-ST-P/EC/AC types only:** Dial the setpoint wheel from its very minimum to its max position and check if the LCD displays the full range of values (2-1015). Confirm by pressing the MODE button

7. **RS interfaces test:** RS terminals needs to connect to a remote temperature. If LCD showing a temperature, it means the RS interface is ok. Otherwise, if LCD showing "err.9", it means the RS interface is not OK or no remote temperature connected.

8. **Output test:** The device is operating all available outputs one by one.

9. **ESI input test:** When the LCD shows "ESI", this tells the operator to short ESI terminals. If the LCD changes to show the next test, it means the ESI interface is OK. Otherwise, if the LCD will always show "ESI". Note: To skip the ESI test, simply press MODE button.



10. **SC-ST-P/EC/AC types only:** The display asks the operator to short the DI input (fan proving Air DP switch - dPS). This should bring the user to the next test if DI is OK. To skip this test press MODE.



11. **Test finished**



Control Strategy

SC-ST-B

List of BACnet control objects:

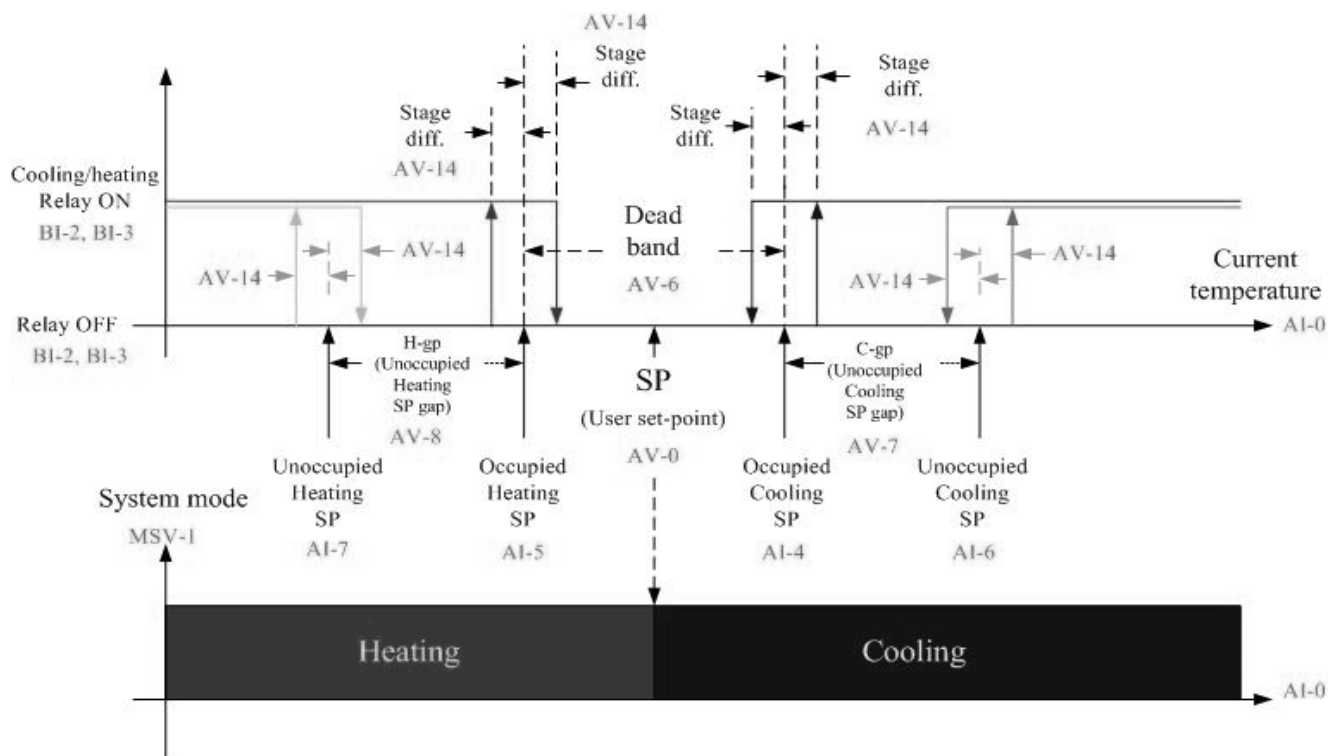
AI-1 = Current active setpoint
AI-4 = Occupied cooling setpoint
AI-5 = Occupied heating Setpoint
AI-6 = Unoccupied cooling setpoint
AI-7 = Unoccupied heating Setpoint
AV-0 = User setpoint
AV-6 = Deadband
AV-7 = Unoccupied cooling setpoint gap
AV-8 = Unoccupied heating setpoint gap
AV-14 = Stage differential

The heating and cooling setpoints are calculated as follows;

AI5 = AV0 - (AV6/2), [Occupied Heating SP = User Setpoint - (Deadband/2)]
AI4 = AV0 + (AV6/2), [Occupied Cooling SP = User Setpoint + (Deadband/2)]
AI6 = AI4 + AV7, [Unoccupied Cooling SP = Occupied Cooling SP + Unoccupied Cooling SP Gap]
AI7 = AI5 - AV8, [Unoccupied Heating SP = Occupied Heating SP - Unoccupied Heating SP Gap]

The heating and cooling ON and OFF points are calculated as follows;

- Occupied heating ON point = AI5 - AV14
- Occupied heating OFF point = AI5 + AV14
- Occupied cooling ON point = AI4 + AV14
- Occupied cooling OFF point = AI4 - AV14
- Unoccupied heating ON point = AI5 - AV8 - AV14
- Unoccupied heating OFF point = AI5 - AV8 + AV14
- Unoccupied cooling ON point = AI4 + AV7 + AV14
- Unoccupied cooling OFF point = AI4 + AV7 - AV14



Control Strategy

SC-ST-P

List of BACnet control objects:

AI0	Current Temp
AI1	Current active SP
AI4	Cooling output
AI5	Heating output
AI6	STBY cooling SP
AI7	STBY heating SP
AI8	Unoccupied cooling SP
AI9	Unoccupied heating SP
AV0	User setpoint
AV6	Occupied deadband
AV18	STBY cooling/heating SP gap
AV19	Unoccupied cooling/heating SP gap

Setpoint Selection - The required setpoint and deadband values are determined by;

Occupancy status (MSV-6)
Stand-by timer (AV-20)
Unoccupied timer (AV-21)

The heating and cooling setpoints are calculated as follows;

Occupied Status:

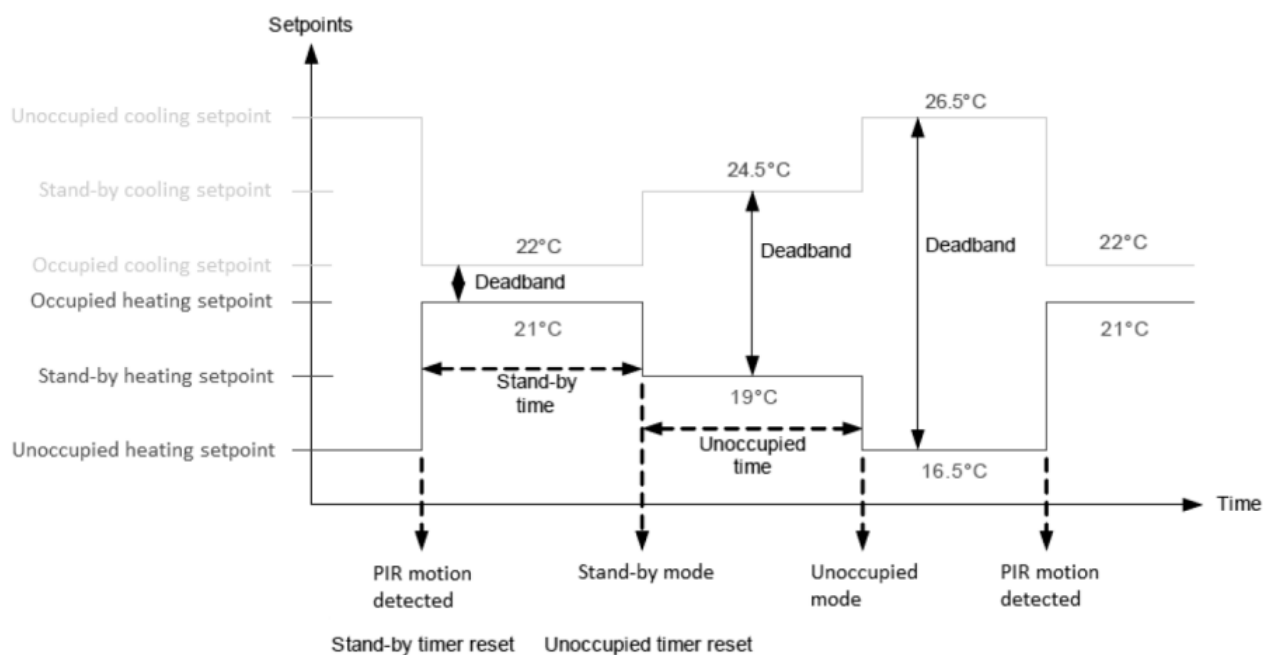
For cooling: $AI-1 = AV0 + (AV-6/2)$
For heating: $AI-1 = AV0 - (AV-6/2)$

Standby Status:

$AI-6 = AV0 + (AV-6/2) + AV-18$
 $AI-7 = AV0 - (AV-6/2) - AV-18$

Unoccupied Status:

$AI-8 = AV0 + (AV-6/2) + AV-19$
 $AI-9 = AV0 - (AV-6/2) - AV-19$



Control Strategy

SC-ST-EC

List of BACnet control objects:

AI0	Current Temp
AI1	Current active SP
AI4	Cooling output
AI5	Heating output
AI6	Fan output
AI7	STBY cooling SP
AI8	STBY heating SP
AI9	Unoccupied cooling SP
AI10	Unoccupied heating SP
AV0	User setpoint
AV6	Occupied deadband
AV18	STBY cooling/heating SP gap
AV19	Unoccupied cooling/heating SP gap

Setpoint Selection - The required setpoint and deadband values are determined by;

- Occupancy status (MSV-4)
- Stand-by timer (AV-20)
- Unoccupied timer (AV-21)

The heating and cooling setpoints are calculated as follows;

Occupied Status:

For cooling: $AI-1 = AV0 + (AV-6/2)$

For heating: $AI-1 = AV0 - (AV-6/2)$

Standby Status:

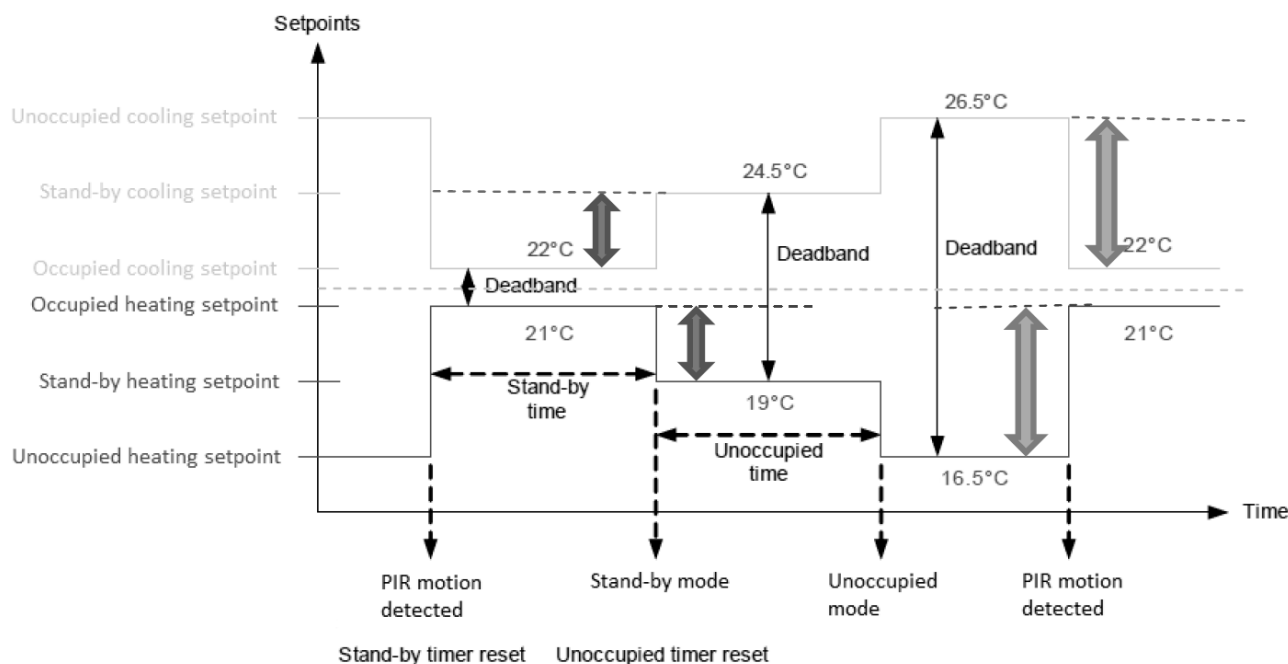
$AI-7 = AV0 + (AV-6/2) + AV-18$

$AI-8 = AV0 - (AV-6/2) - AV-18$

Unoccupied Status:

$AI-9 = AV0 + (AV-6/2) + AV-19$

$AI-10 = AV0 - (AV-6/2) - AV-19$



Control Strategy

SC-ST-AC

List of BACnet control objects:

AI0	Current Temp
AI1	Current active SP
BI3	Cooling output
BI4	Heating output
AI4	Fan output
AI5	STBY cooling SP
AI6	STBY heating SP
AI7	Unoccupied cooling SP
AI8	Unoccupied heating SP
AV0	User setpoint
AV6	Occupied deadband
AV14	Stage differential
AV19	STBY cooling/heating SP gap
AV20	Unoccupied cooling/heating SP gap
AV21	Standby time
AV22	Unoccupied time

The heating and cooling setpoints are calculated as follows;

Occupied Status:

Occupied Cooling Setpoint: $AI-1 = AV0 + AV-6/2$

Occupied Heating Setpoint: $AI-1 = AV0 - AV-6/2$

Standby Status:

Standby Cooling Setpoint: $AI-5 = AV0 + AV-6/2 + AV-19$

Standby Heating Setpoint: $AI-6 = AV0 - AV-6/2 - AV-19$

Unoccupied Status:

Unoccupied Cooling Setpoint: $AI-7 = AV0 + AV-6/2 + AV-20$

Unoccupied Heating Setpoint: $AI-8 = AV0 - AV-6/2 - AV-20$

The heating and cooling relay ON and OFF points are calculated as follows;

Occupied Status:

Occupied heating ON point = $AV0 - (AV6/2) - AV14$

Occupied heating OFF point = $AV0 - (AV6/2) + AV14$

Occupied cooling ON point = $AV0 + (AV6/2) + AV14$

Occupied cooling OFF point = $AV0 + (AV6/2) - AV14$

Standby Status:

Standby heating ON point = $AI-6 - AV14$

Standby heating OFF point = $AI-6 + AV14$

Standby cooling ON point = $AI-5 + AV14$

Standby cooling OFF point = $AI-5 - AV14$

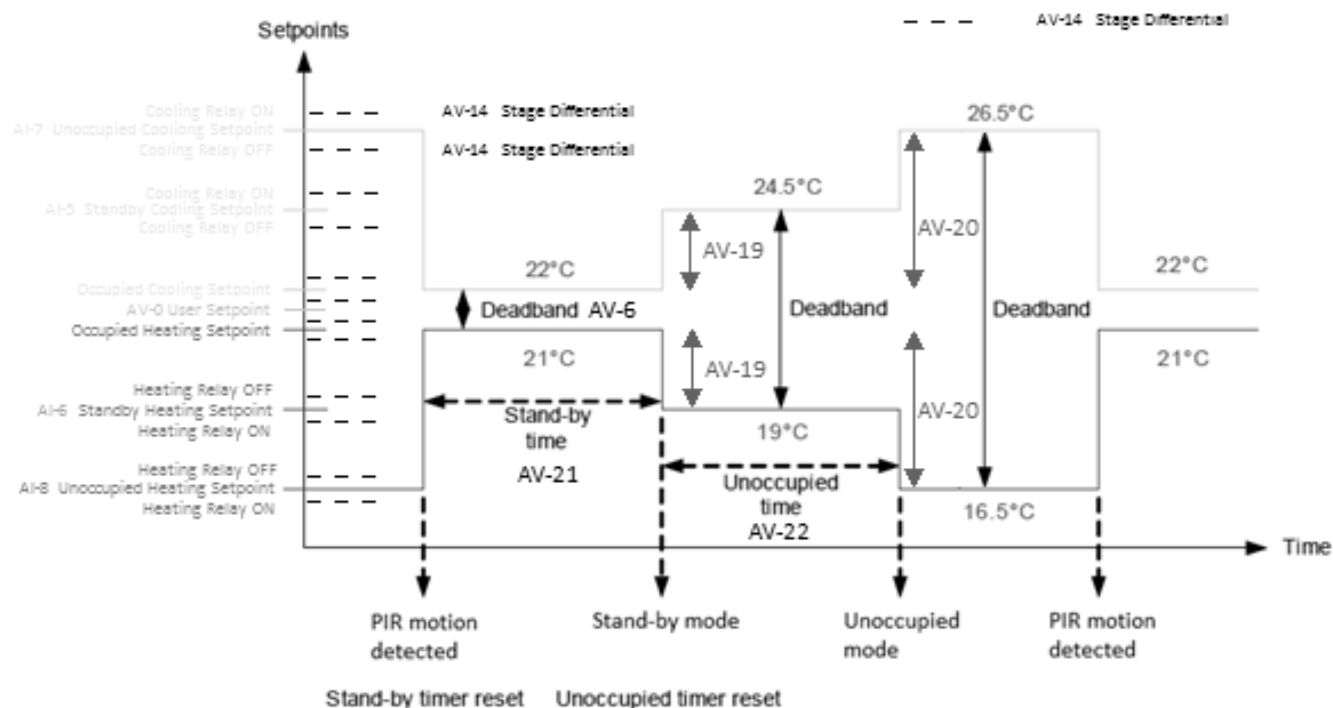
Unoccupied Status:

Unoccupied heating ON point = $AI-8 - AV14$

Unoccupied heating OFF point = $AI-8 + AV14$

Unoccupied cooling ON point = $AI-7 + AV14$

Unoccupied cooling OFF point = $AI-7 - AV14$



Whilst every effort has been made to ensure the accuracy of this specification, Sontay cannot accept responsibility for damage, injury, loss or expense from errors or omissions. In the interest of technical improvement, this specification may be altered without notice.

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