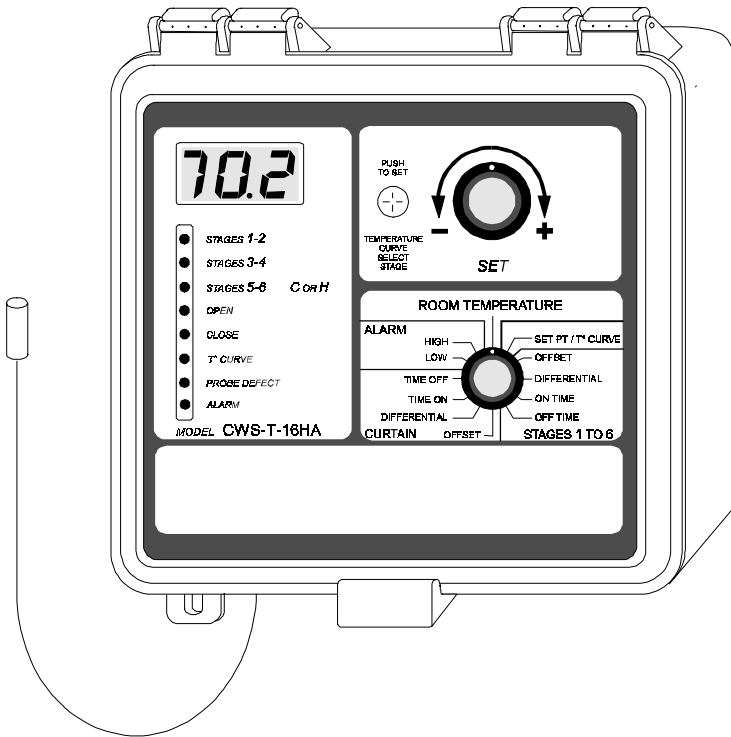

Temperature Controller

CWS-T-16HA

User's Guide



Read this guide carefully before using the controller.

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FOR CUSTOMER USE

This controller has a serial number located on the side of the enclosure. Please record this number and retain it for your records.

Model number CWS-T-16HA
 Serial number

FEATURES

The CWS-T-16HA controls four stages of constant speed fans, two stages of either constant speed fans or heating units, as well as curtains for natural ventilation.

The main features of the controller are as follows:

- A **THREE DIGIT DISPLAY** allows you to specify temperatures to within one tenth of a degree (Celsius or Fahrenheit).
- **PILOT LIGHTS** indicate the state of outputs, allowing you to monitor the operation of the system without having to enter the room.
- Up to **FOUR INDEPENDENT TEMPERATURE PROBES** can be connected to the controller in order to obtain a more accurate reading of the average room temperature and a faster reaction time.
- A **TEMPERATURE CURVE** comprised of six different points provides an automatic adjustment of the target room temperature over a given period of time.
- A **MINIMUM VENTILATION CYCLE** allows you to operate the fans continuously or intermittently when ventilation is not required for a cooling purpose. This reduces the level of humidity and supplies oxygen to the room. It also prevents the fans from freezing in the winter.
- The controller will **ACTIVATE ANY ALARM SYSTEM** in case of a rise or fall in temperature beyond a specified limit, a power failure or a fault in the supply circuit.
- Fuses located at the input and outputs of the controller provide **OVERLOAD AND OVERVOLTAGE PROTECTION**.
- When used with a computer communication module, the controller **COMMUNICATES WITH A COMPUTER**. This makes possible the centralization of information management and a more diversified control strategy.

PRECAUTIONS

In case of a system failure, we strongly recommend that you install an independent alarm system as well as supplementary natural ventilation in the room. We also recommend that you install a back-up thermostat on at least one cooling stage (to connect the thermostat, refer to the wiring diagram enclosed with this user's guide).

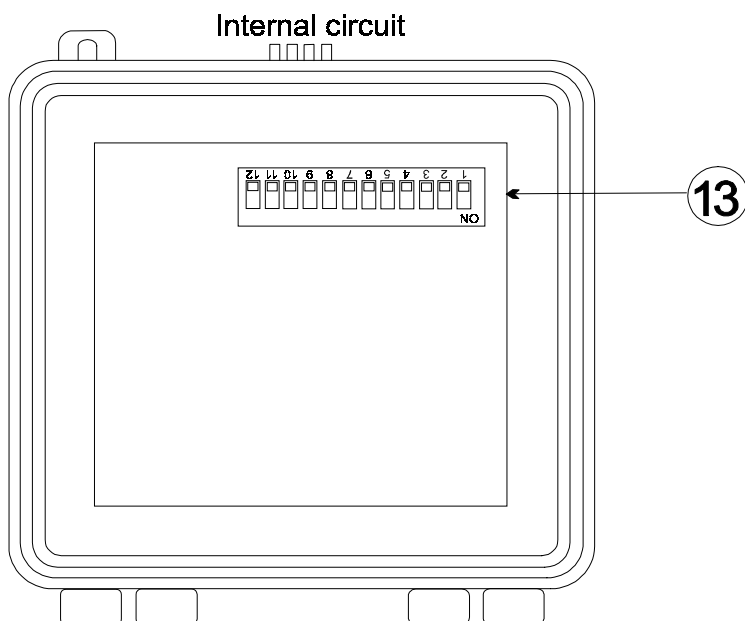
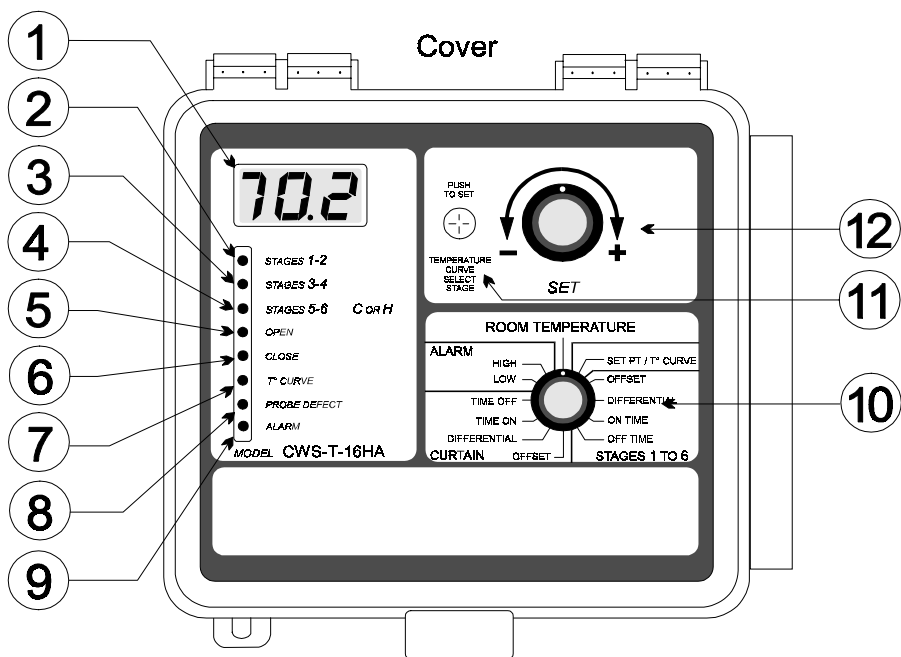
Fuses on the input and outputs of the controller provide overload and overvoltage protection. To further prolong the life of the controller, we recommend that you install an additional protection device on the supply circuit as well as an external relay on all ON/OFF stages.

The room temperature where the controller is installed **MUST ALWAYS REMAIN BETWEEN 32° ET 104°F (0° ET 40°C)**.

To avoid exposing the controller to harmful gases or excessive humidity, it is preferable to install it in a corridor.

DO NOT SPRAY WATER ON THE CONTROLLER

LOCATION OF THE CONTROLS



1**THREE DIGIT DISPLAY**

Displays temperatures and other parameters shown around the parameter selection knob.

2**STAGES 1-2 PILOT LIGHT**

Flashes when stage 1 fans are on. Stays on when stage 1 and 2 fans are on.

3**STAGES 3-4 PILOT LIGHT**

Flashes when stage 3 fans are on. Stays on when stage 3 and 4 fans are on.

4**STAGES 5-6 PILOT LIGHT**

Flashes when stage 5 fans or heating units are on. Stays on when stage 5 and 6 fans or heating units are on.

5**OPEN PILOT LIGHT**

Turns on when the curtains are opening.

6**CLOSE PILOT LIGHT**

Turns on when the curtains are closing.

7**TEMPERATURE CURVE PILOT LIGHT**

Turns on when the temperature curve is activated.

8**DEFECTIVE PROBE PILOT LIGHT**

Turns on when a defective probe is detected.

9**ALARM PILOT LIGHT**

Turns on when the alarm is activated.

10**PARAMETER SELECTION KNOB**

Use this selection knob to select a parameter.

11**PUSH-BUTTON**

Use this push-button to program the temperature curve and other functions.

12**ADJUSTMENT KNOB**

Use this adjustment knob to adjust the value of the selected parameter.

13

SWITCHES

Use these switches to set the operating modes as described in the table below.

DESCRIPTION	SWITCH		OPERATING MODE
	#	POSITION	
LOCKING THE PARAMETERS	1	ON OFF	Locked parameters Unlocked parameters
TEMPERATURE UNITS	2	ON OFF	Degrees Celsius Degrees Fahrenheit
PROBE # 2	3	ON OFF	Activated probe Deactivated probe
PROBE # 3	4	ON OFF	Activated probe Deactivated probe
PROBE # 4	5	ON OFF	Activated probe Deactivated probe
STAGE 6 COOLING OR HEATING	6	ON OFF	Stage 6 used for heating Stage 6 used for cooling
STAGE 5 COOLING OR HEATING	7	ON OFF	Stage 5 used for heating Stage 5 used for cooling
STAGE 3 TIMER MODE	8	ON OFF	Activated timer mode Deactivated timer mode
STAGE 4 TIMER MODE	9	ON OFF	Activated timer mode Deactivated timer mode
STAGE 5 TIMER MODE	10	ON OFF	Activated timer mode Deactivated timer mode
STAGE 6 TIMER MODE	11	ON OFF	Activated timer mode Deactivated timer mode
CURTAIN TIMER COMPENSATION	12	ON OFF	Progressive mode Normal mode

INSTALLATION

Step 1 : MOUNTING THE CONTROLLER

Open the latch and lift the cover. Remove the black caps located on each of the four mounting holes. Mount the enclosure to the wall using four screws. Insert the screws into the mounting holes and tighten. **Fasten the black caps onto the mounting holes.**

Step 2 : CONNECTING THE EQUIPMENT

To connect the equipment, refer to the wiring diagram enclosed with this user's guide.

- Set the voltage switch located inside the enclosure to the appropriate line voltage.
- Use the electrical knockouts provided at the bottom of the enclosure. Do not make additional holes in the enclosure, particularly on the side of the enclosure when using a computer communication module.
- If metallic cable holders are used to secure cables entering the enclosure, use the ground plate provided with the controller. Connect the ground wire to the ground stud on the plate.
- When connecting heating units to the controller, it may be necessary to install a transformer in order to adapt the voltage to the heating units.

CONCERNING THE ALARM CONNECTION: There are two types of alarms in the industry. One type activates when current is cut off at its input, whereas the other activates when current is supplied at its input. For an alarm of the first type, use the NO terminal as shown in the wiring diagram. For an alarm of the second type, use the NC terminal.



ALL WIRING MUST BE DONE BY AN AUTHORIZED ELECTRICIAN AND MUST COMPLY WITH APPLICABLE CODES , LAWS AND REGULATIONS. BE SURE POWER IS OFF BEFORE DOING ANY WIRING TO AVOID ELECTRICAL SHOCK AND EQUIPMENT DAMAGE.

Step 3 : CONNECTING THE PROBES

To extend the probes:

Each probe can be extended up to 500 ft (150 m). To extend a probe:

- Use 18-2-SJO cord (CHORE-TIME P/N 2290-5 or equivalent) of outside diameter between 0.245 and 0.260 in (6.22 and 6.60 mm) to ensure the cable entry is liquid-tight
- It is preferable to solder any splice joints to ensure a proper contact between the two cables.

To connect the probes:

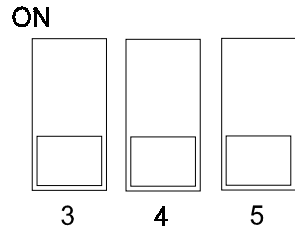
The controller is supplied with one probe connected to terminal #1. Up to three additional probes can be connected to the controller.

- Use terminals # 2, 3 and 4 to connect the additional probes as shown on the wiring diagram enclosed with this user's guide.

CAUTION: The probes operate under low voltage and are isolated from the supply. Do not route the probe cables and other power cables through the same electrical knockout. Do not run the probe cables next to other power cables. Never run the probe cable within the same conduit raceway or trough with other wires.

- Activate each additional probe by setting the appropriate switch to ON:

- Switch # 3 activates terminal # 2.
- Switch # 4 activates terminal # 3.
- Switch # 5 activates terminal # 4.



FACTORY SETTING: When the controller is shipped from the factory, switches # 3, 4 and 5 are set to OFF (the probes are deactivated).

Defective probes:

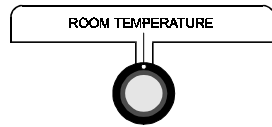
If a defective probe is detected, the defective probe pilot light turns on. The room temperature shown on the display will then be the average value of all temperatures measured by the probes remaining in proper condition and the controller will operate according to this temperature.

To determine which probe is defective:

- Set the parameter selection knob to ROOM TEMPERATURE. The room temperature appears on the display.



- Press the push-button. If the probe connected to terminal #1 (supplied with the controller) is not defective, the word "PR1" and the temperature measured by the probe will alternately appear on the display. If the probe connected to terminal #1 (supplied with the controller) is defective, the word "PR1" and the letter "P" will alternately appear on the display.



For each additional probe connected to the controller:

- Press the push-button once again. If the probe is not defective, the word "PR#" (# is the number of the terminal to which the probe is connected) and the temperature measured by the probe will alternately appear on the display. If the probe is defective, the word "PR#" and the letter "P" will alternately appear on the display.

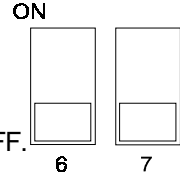
Step 4 : SELECTING THE OPERATING MODE FOR STAGES 5 AND 6

Stages 5 and 6 can both be used either for cooling or for heating. If one stage is used for cooling and the other for heating, the fans must be connected to stage 5 and the heating units to stage 6.

To select the operating mode:

- Set switches # 6 and # 7 to the required position:

- Stages 5 and 6 used for heating:
set switch # 6 to ON and switch # 7 to ON.
- Stages 5 and 6 used for cooling:
set switch # 6 to OFF and switch # 7 to ON or OFF.
- Stage 5 used for cooling and stage 6 used for heating:
set switch # 6 to ON and switch # 7 to OFF.

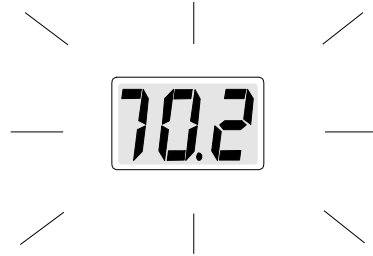


FACTORY SETTING: When the controller is shipped from the factory, switch # 6 is set to ON and switch # 7 is set to OFF (stage 5 used for cooling and stage 6 used for heating).

USING THE CONTROLLER

1 VALUES FLASHING ON THE DISPLAY

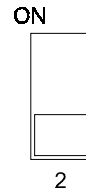
The display flashes certain values and does not flash others. The flashing indicates that the value on the display can be adjusted. Values that are not flashing can not be adjusted.



2 HOW TO SELECT A TEMPERATURE UNIT

Temperatures can be displayed either in degrees Celsius or degrees Fahrenheit.

- Set switch # 2 to the desired position:
 - ON : degrees Celsius.
 - OFF : degrees Fahrenheit.



FACTORY SETTING: When the controller is shipped from the factory, switch # 2 is set to OFF (temperatures are displayed in degrees Fahrenheit).

3 PARAMETER ADJUSTMENT RANGES

PARAMETER		ADJUSTMENT RANGE
Set point		-40.0 and 99.9°F (-40.0 and 37.7°C)
STAGES 1, 2, 3, 4, 5, 6	Time on	0 to 900 seconds, by increments of 15 seconds
	Time off	0 to 900 seconds, by increments of 15 seconds
	Differential	0.5 and Offset - 0.3°F (0.3 and Offset - 0.17°C)
	Offset	Differential + 0.3 and 40.0°F (Differential + 0.17 and 22.2°C)
CURTAIN	Time on	1 to 900 seconds
	Time off	0 to 900 seconds
	Differential	0.5 and 20.0°F (0.3 and 11.1°C)
	Offset	0.0 and 40.0°F (0.0 and 22.2°C)
ALARM	High	0.5 and 40.0°F (0.3 and 22.2°C)
	Low	0.5 and 40.0°F (0.3 and 22.2°C)

4 PARAMETER FACTORY SETTINGS

The controller is programmed at the factory with the settings shown below. Keep the settings that are convenient for you and make changes where necessary. These factory settings will not be retained in memory once they have been changed.

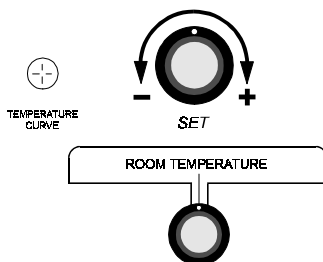
NOTE: If the power supply is cut off, the current parameter settings will be kept in memory until the power is restored.

PARAMETER		FACTORY SETTING
Set point		75.0°F (23.9 °C)
Temperature curve		Deactivated
STAGES 1 and 2	Time on	15 seconds (Timer 1 only)
	Time off	0 seconds
	Differential	1.0°F (0.6°C)
	Offset	2.0°F (1.1°C)
STAGES 3, 4, 5 AND 6	Time on	0 seconds
	Time off	15 seconds
	Differential	1.0°F (0.6°C)
	Offset	2.0°F (1.1°C)
CURTAIN	Time on	20 seconds
	Time off	30 seconds
	Differential	1.0°F (0.6°C)
	Offset	2.0°F (1.1°C)
ALARM	High	12.0°F (6.7°C)
	Low	10.0°F (5.6°C)

5 HOW TO VIEW AND RESET TEMPERATURES

To view the room temperature and the temperature measured by each probe:

- Set the parameter selection knob to ROOM TEMPERATURE. The room temperature appears on the display.



The room temperature shown on the display is the average value of all temperatures measured by probes that are activated and in proper operating condition.

- Press the push-button. The word "PR1" and the temperature measured by the probe connected to terminal # 1 (supplied with the controller) alternately appear on the display.

For each additional probe connected to the controller:

- Press the push-button once again. The word "PR#" (# is the number of the terminal to which the probe is connected) and the temperature measured by the probe alternately appear on the display.

To view the minimum and maximum temperatures:

- Set the parameter selection knob to ROOM TEMPERATURE. The room temperature appears on the display.
- Turn the adjustment knob clockwise by one notch. The minimum temperature appears flashing on the display.
- Turn the adjustment knob clockwise one notch further. The maximum temperature appears flashing on the display.
- Turn the adjustment knob clockwise a third notch. The room temperature again appears on the display.

- If the adjustment knob is turned counterclockwise rather than clockwise, the display sequence will be reversed (room-maximum-minimum-room).

The minimum and maximum temperatures are the lowest and highest values of all room temperatures measured since the last reset.

To reset the minimum and maximum temperatures:

- Set the parameter selection knob to ROOM TEMPERATURE. The room temperature appears on the display.
- Turn the adjustment knob clockwise (or counterclockwise) by one notch and leave it in this position. The minimum (or maximum) temperature first appears flashing on the display. After 10 seconds, the display stops flashing and the room temperature again appears on the display, indicating that the reset is completed.

When the minimum and maximum temperatures are reset, their current values are erased from memory and the controller begins to store in memory new values measured from that moment on.

NOTE : To avoid resetting the minimum and maximum temperatures while viewing them, be sure to return to the room temperature display within the 10 second delay.

6 SET POINT / TEMPERATURE CURVE

6.1 Description of operation

The controller maintains a specified target room temperature by controlling the operation of the fans, heating units and curtains. The target room temperature can be specified in two ways:

1 - With a single set point

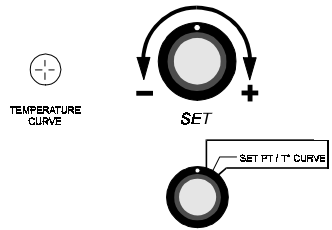
When a single set point is specified and the temperature curve is not activated, the controller considers this set point as the target room temperature.

2 - With a temperature curve

When a temperature curve is specified and activated, the controller automatically adjusts the target room temperature over a given period of time. The temperature curve is comprised of six points. A day number as well as a set point for this day number must be specified for each of the six points. When the temperature curve is activated, the controller adjusts the target room temperature every hour in a linear fashion between two consecutive points. When the last point of the curve is reached, the temperature curve becomes deactivated. The controller maintains the last set point of the curve until the curve is reactivated or until a new single set point is specified.

6.2 Adjusting the parameters

The single set point and the points of the temperature curve can be adjusted only if the temperature curve is deactivated. If the temperature curve pilot light is on, the temperature curve is presently activated.



Deactivate the temperature curve as follows:

- Set the parameter selection knob to SET PT / T° CURVE. The current set point appears flashing on the display.
- Press the temperature curve push-button repeatedly until the word ON appears flashing on the display.
- Turn the adjustment knob counterclockwise one notch and leave it in this position. The word OFF appears flashing on the display and after 10 seconds, the temperature curve pilot light turns off indicating that the temperature curve is now deactivated.

To adjust the single set point:

- Set the parameter selection knob to SET PT / T° CURVE. The current set point appears flashing on the display.
- Turn the adjustment knob to adjust the set point to the desired value.

To adjust the points of the temperature curve:

- Set the parameter selection knob to SET PT / T° CURVE. The current set point appears flashing on the display.
- Press the temperature curve push-button. The word OFF appears on the display, indicating the temperature curve is deactivated.

Repeat the following steps for each of the six points:

- Press the temperature curve push-button once again. A day number, preceded by the letter "d", appears flashing on the display.
- Turn the adjustment knob to adjust the day number to the desired value.
- Press the temperature curve push-button once again. The current set point for this day number appears flashing on the display.
- Turn the adjustment knob to adjust the set point to the desired value.

NOTES: (1) All six points of the curve must be specified. If you do not need six different points, repeat your last set point for each unnecessary point of the curve.

(2) To reduce the risk of errors:

- it is not permitted to specify decreasing day numbers;
- it is not permitted to specify increasing set points;
- the highest day number is 99;
- the temperature variation can not exceed 3°F (1.6°C) per day.

When the six points of the temperature curve have been specified, the temperature curve must be activated for the controller to begin to automatically adjust the target room temperature.

Activate the temperature curve as follows:

- Press the temperature curve push-button once again. The word OFF appears flashing on the display.

- Turn the adjustment knob clockwise by one notch and leave it in this position. The word ON appears flashing on the display and after 10 seconds, the temperature curve pilot light turns on indicating that the temperature curve is now activated.

When the temperature curve is activated, the current target room temperature and the current day number can be viewed at any time. The current day number can also be changed in order to move backward or forward on the temperature curve.

To view the current target room temperature and day number and to change the current day number:

- Set the parameter selection knob to SET PT / T°CURVE. The current target room temperature appears on the display.
- Press the push-button. The current day number appears flashing on the display.
- Turn the adjustment knob to adjust the day number to the desired value.

STAGES 1 TO 6

7.1 OPERATION DIAGRAMS

STAGE 1

 Refer to Figure 1 below

If the room temperature is rising:

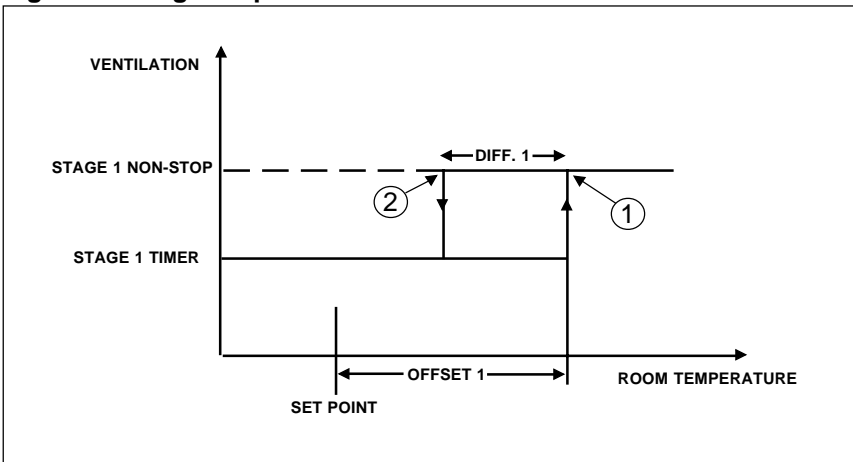
When the room temperature is below "set point + offset 1", the stage 1 fans operate according to the timer settings.

At POINT 1: the stage 1 fans begin to operate continuously.

If the room temperature is falling:

At POINT 2: the stage 1 fans stop operating continuously and operate according to the timer settings.

Figure 1: Stage 1 Operation



Note: To operate Stage 1 without the timer mode, set the Time On parameter to zero.

STAGE 2: WITH TIMER MODE ACTIVATED

 Refer to Figure 2 below

If the room temperature is rising:

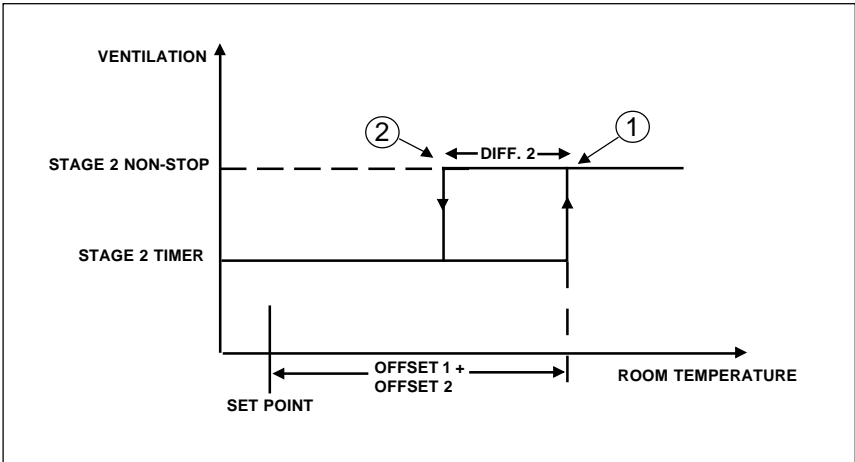
When the room temperature is below "set point + offset 1 + offset 2", the stage 1 fans operate according to the timer settings for stage 1.

At POINT 1: the stage 2 fans begin to operate continuously.


If the room temperature is falling:

At POINT 2: the stage 2 fans stop operating continuously and operate according to the timer settings for stage 1.

Figure 2: Stage 2 Operation — Timer Mode Activated



STAGE 2: WITH TIMER MODE DEACTIVATED

 Refer to Figure 3 below

If the room temperature is rising:

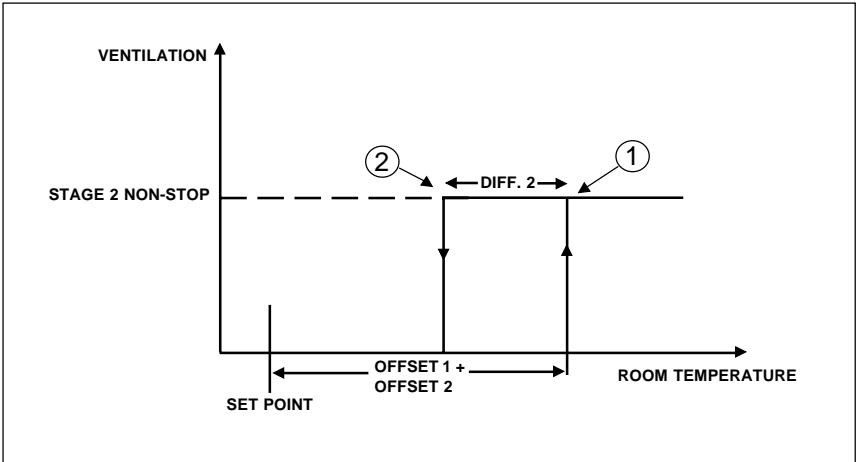
When the room temperature is below "set point + offset 1 + offset 2", the stage 2 fans do not operate

At POINT 1: the stage 2 fans begin to operate continuously.

If the room temperature is falling:

At POINT 2: the stage 2 fans stop operating.

Figure 3: Stage 2 Operation — Timer Mode Deactivated



STAGES 3 to 6 - WITH TIMER MODE ACTIVATED

Stages 3 to 6 can be operated according to the timer settings without reference to the room temperature. Dipswitches 8, 9, 10 and 11 are reserved for this purpose. Different types of equipment can be controlled in this way. When this mode is used, it should be assigned to the last cooling stage to avoid interfering with the operation of the other stages. When a stage is not in timer mode, the offset is based on the sum of the offsets from the preceding stages even if they are in timer mode.

STAGES 3 to 6 USED FOR COOLING - WITH TIMER MODE DEACTIVATED



Refer to Figure 4 on the following page

If the room temperature is rising:

At POINT 1: the fans of the current stage begin to operate according to the timer settings (sum of offsets from preceding stages + current stage offset - current stage differential).

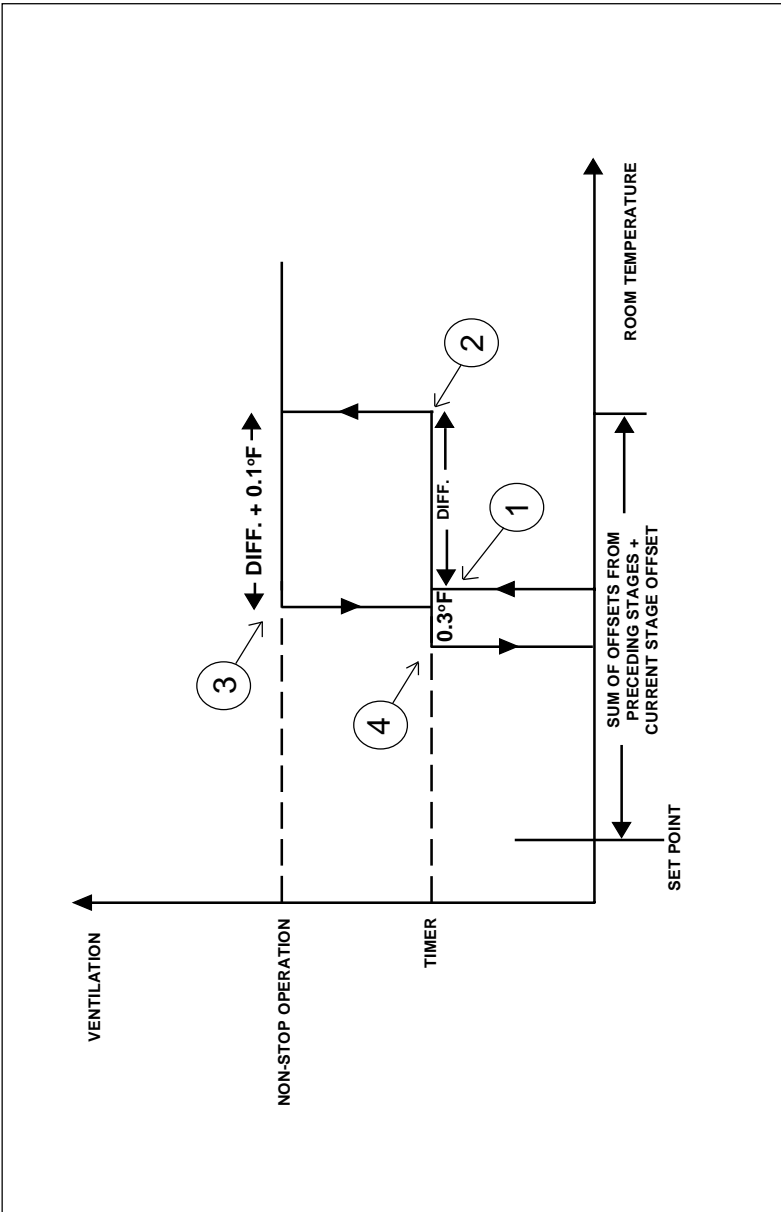
At POINT 2: the fans of the current stage begin to operate continuously (sum of offsets from preceding stages + current stage offset).

If the room temperature is falling:

At POINT 3: the fans of the current stage stop operating continuously and operate according to the timer settings (sum of offsets from preceding stages + current stage offset - current stage differential - 0.1°F).

At POINT 4: the fans of the current stage stop operating (sum of offsets from preceding stages + current stage offset - current stage differential - 0.3°F).

Figure 4: Stage 3 to 6 Operation — Timer Mode Deactivated



STAGES 5 AND 6 USED FOR HEATING - WITH TIMER MODE DEACTIVATED



Refer to Figure 5 on the following page

If the room temperature is rising:

At POINT 1: Heater 1 operates according to the timer settings (Heater 1 offset - Heater 1 differential).

At POINT 2: Heater 1 stops operating according to the timer settings and operates continuously (Heater 1 offset).

At POINT 3: Heater 2 operates according to the timer settings (Heater 1 offset + Heater 2 offset - Heater 2 differential).

At POINT 4: Heater 2 stops operating according to the timer settings and operates continuously (Heater 1 offset + Heater 2 offset).

If the room temperature is falling:

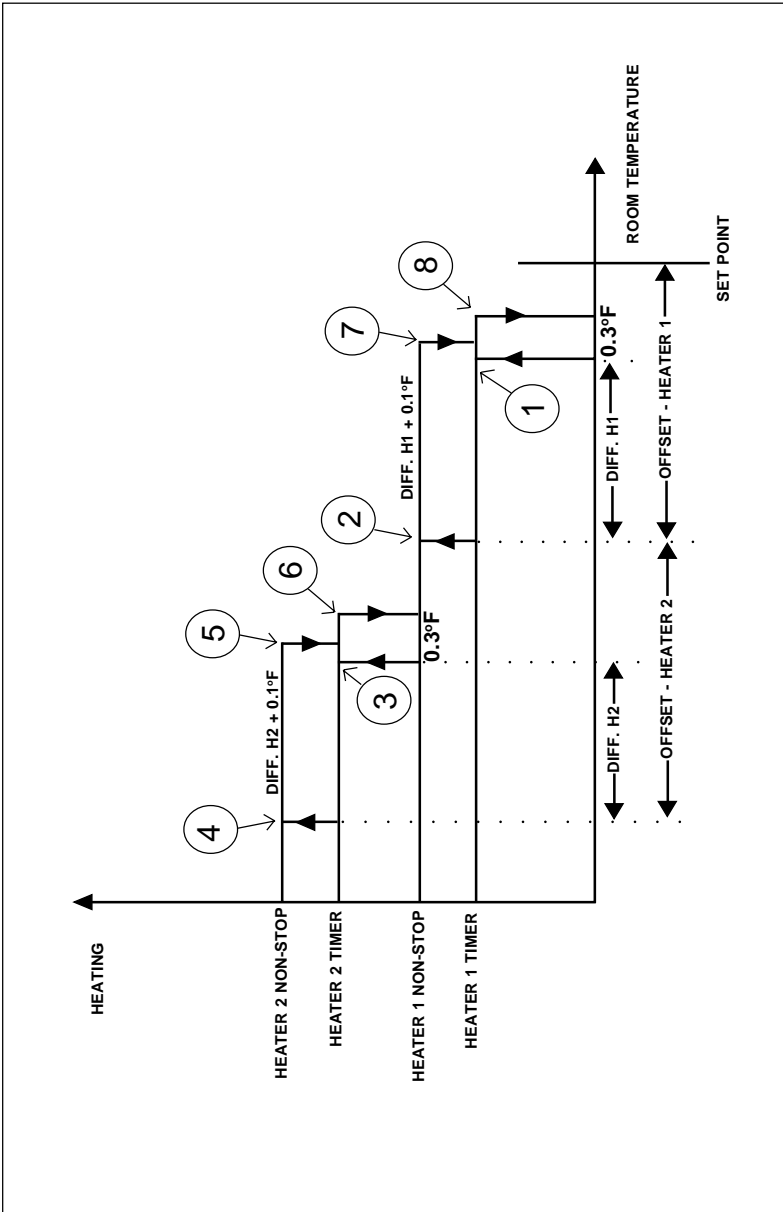
At POINT 5: Heater 2 stops operating continuously and operates according to the timer settings (Heater 1 offset + Heater 2 offset - Heater 2 differential - 0.1°F)

At POINT 6: Heater 2 stops operating (Heater 1 offset + Heater 2 offset - Heater 2 differential - 0.3°F).

At POINT 7: Heater 1 stops operating continuously and operates according to the timer settings (Heater 1 offset - Heater 1 differential - 0.1°F)

At POINT 8: Heater 1 stops operating (Heater 1 offset - Heater 1 differential - 0.3°F).

Figure 5: Heaters 1 and 2 Operation — Timer Mode Deactivated



7.2 HOW TO USE THE STAGE TIMER SETTINGS

When the fans or heating units are operating according to the timer settings, they repeatedly run during TIME ON and stop running during TIME OFF. The fans or heating units can therefore be set to run in different ways:

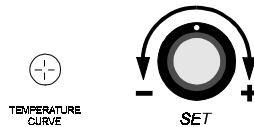
1- To run the fans or heating units intermittently: set TIME ON to the desired running time and TIME OFF to the desired off time.

2- To stop the fans or heating units: set TIME ON to zero and TIME OFF to any value (equal to or other than zero).

7.3 HOW TO ADJUST THE STAGE PARAMETERS

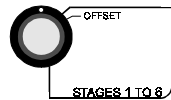
To adjust the offset for stages 1 to 6:

- Set the parameter selection knob to OFFSET - STAGES 1 TO 6. A stage number, preceded by the letter "C", and the current offset for this stage number alternately appear flashing on the display.



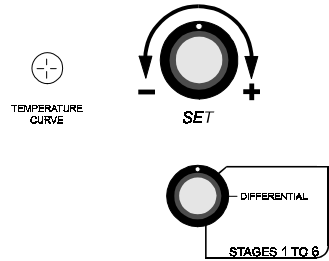
Repeat the following for each stage:

- Press the push-button to select the desired stage number, then turn the adjustment knob to adjust the offset to the desired value.



To adjust the differential for stages 1 to 6:

- Set the parameter selection knob to DIFFERENTIAL - STAGES 1 TO 6. A stage number, preceded by the letter "C", and the current differential for this stage number alternately appear flashing on the display.

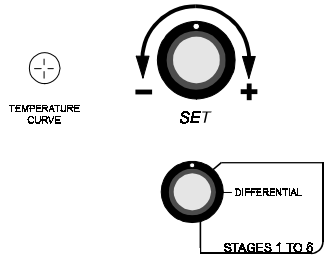


Repeat the following for each stage:

- Press the push-button to select the desired stage number, then turn the adjustment knob to adjust the differential to the desired value.

To adjust the timer settings for stages 1 , 3, 4, 5 and 6:

- Set the parameter selection knob to ON TIME - STAGES 1 TO 6. A stage number, preceded by the letter "C", and the current time on for this stage number alternately appear flashing on the display.



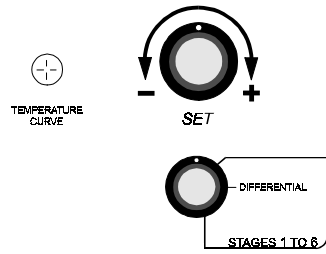
- Repeat the following for each stage: Press the push-button to select the desired stage number, then turn the adjustment knob to adjust the time on to the desired value.
- Set the parameter selection knob to OFF TIME - STAGES 1 TO 6. A stage number, preceded by the letter "C", and the current time off for this stage number alternately appear flashing on the display.
- Repeat the following for each stage: Press the push-button to select the desired stage number, then turn the adjustment knob to adjust the time off to the desired value.

To adjust the timer settings for stage 2:

Stages 1 and 2 have identical timer settings. You must first adjust the timer settings for stage 1 as previously described, and then:

- EITHER:
Set the stage 2 timer settings to ON ➡ During timer operation, the stage 2 fans will operate according to the previously adjusted timer 1 settings.
- OR:
Set the stage 2 timer settings to OFF ➡ During timer operation, the stage 2 fans will be off.

- Set the parameter selection knob to either ON TIME or OFF TIME - STAGES 1 TO 6. (The stage 2 timer settings can be adjusted using either one of these parameters). A stage number, preceded by the letter "C", and the current time on or time off for this stage number alternately appear flashing on the display.

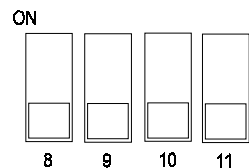


- Press the push-button until the word "C2" and the word ON or OFF alternately appear flashing on the display.
- Turn the adjustment knob clockwise to set the timer 2 settings to ON (the word ON appears flashing on the display) or counterclockwise to set the timer 2 settings to OFF (the word OFF appears flashing on the display).

To activate or deactivate the timer mode for stages 3, 4, 5 or 6:

- Set switch # 8, 9, 10 or 11 to the required position:
 - ON to activate the timer mode
 - OFF to deactivate the timer mode

(Refer to description of switches on page 7).



8

CURTAINS

8.1

OPERATION DIAGRAMS



Refer to Figure 6 on next page

If the room temperature is rising:

- When the room temperature is below "*set point + offset + differential*" (point 29), the curtains close according to the timer settings.
- When the room temperature rises above "*set point + offset + differential*" (point 29), the curtains stop closing.
- When the room temperature rises above "*set point + offset*" (point 30), the curtains begin to open according to the timer settings.

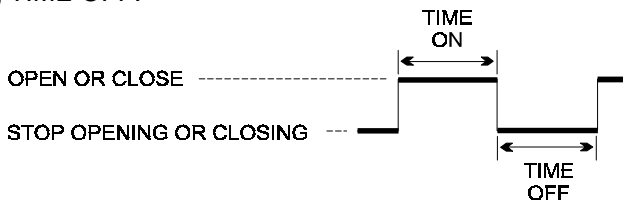
If the room temperature is falling:

- When the room temperature is above "*set point + offset*" (point 31), the curtains open according to the timer settings.
- When the room temperature falls below "*set point + offset*" (point 31), the curtains stop opening.
- When the room temperature falls below "*set point + offset - differential*" (point 32), the curtains begin to close according to the timer settings.

8.2

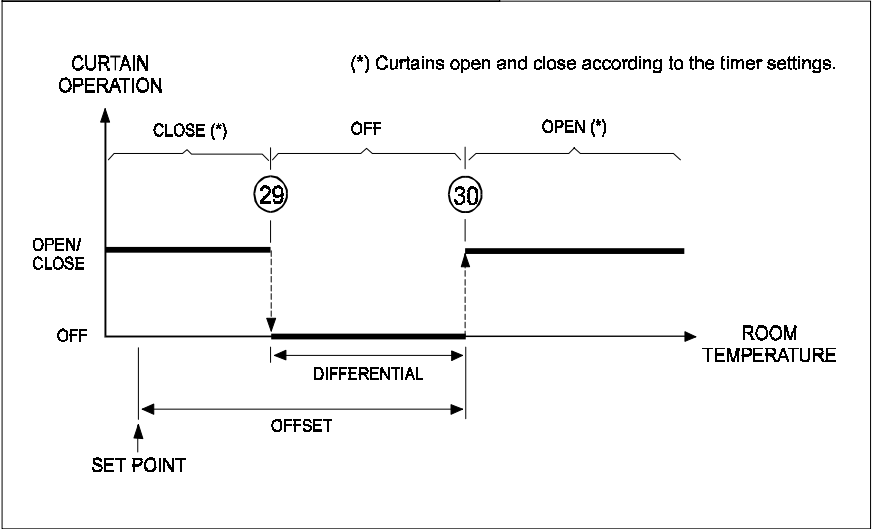
HOW TO USE THE CURTAIN TIMER SETTINGS

When the curtains are opening or closing according to the timer settings, they repeatedly open or close during TIME ON and stop opening or closing during TIME OFF.

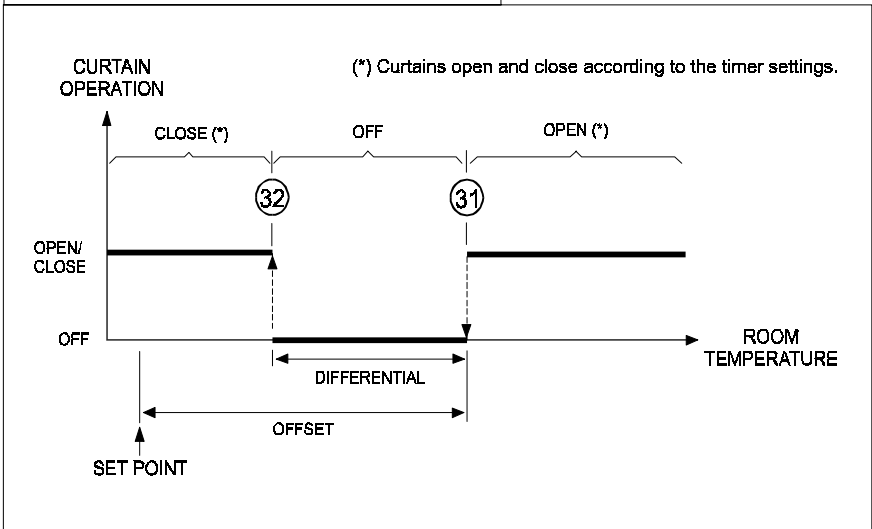


**FIGURE 6
CURTAIN OPERATION DIAGRAMS**

When the room temperature is rising:



When the room temperature is falling:



The curtains can be set to open and close in two different ways:

1- To open and close the curtains continuously: set TIME OFF to zero and TIME ON to any value other than zero.

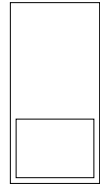
2- To open and close the curtains intermittently: set TIME ON to the desired opening and closing time and TIME OFF to the desired off time.

8.3 ROOM TEMPERATURE COMPENSATION

1 When switch # 12 is set to OFF (normal mode):

ON

The curtains open and close according to the specified timer settings, as described above. There is no room temperature compensation.



2 When switch # 12 is set to ON (progressive mode):

12

The controller compensates the timer settings according to the room temperature, as described hereafter:

- When the curtains open:

Each time the room temperature rises by a certain number of degrees above "*set point + offset*", the controller multiplies TIME ON by a given factor and reduces TIME OFF so that the total cycle time remains constant.



The higher the room temperature, the faster the curtains open.

When the curtains close:

Each time the room temperature falls by a certain number of degrees below " *set point + offset - differential*", the controller multiplies TIME OFF by a given factor and reduces TIME ON so that the total cycle time remains constant.

⇒ The lower the room temperature, the faster the curtains close.

The formula used for compensating TIME ON is as follows:

$$\text{COMPENSATED TIME ON} = \text{CURRENT TIME ON} \times 2^{(\text{TEMP} - \text{SET POINT})}$$

In other words, for each degree difference from the set point, TIME ON is doubled. The number of degrees and corresponding multiplication factors are shown in table 1 below.

Table 1: Multiplication Factors

<u>Number of Degrees</u>	<u>Multiplication Factor</u>
1°F (0.6°C)	1
2°F (1.2°C)	2
3°F (1.8°C)	4
4°F (2.4°C)	8
	etc...

Example:

Time On = 2 seconds
Time Off = 180 seconds
Set Point = 70 °F

At a room temperature of 74 °F, the compensated Time On is:

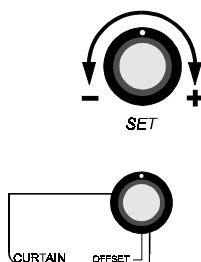
Temperature Difference = 74 - 70 = 4 degrees

Compensated Time On = 2 seconds x 2⁴ = 32 seconds

8.4 HOW TO ADJUST THE CURTAIN PARAMETERS

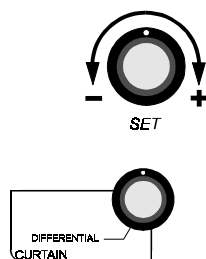
To adjust the curtain offset:

- Set the parameter selection knob to OFFSET - CURTAIN. The current curtain offset appears flashing on the display.
- Turn the adjustment knob to adjust the curtain offset to the desired value.



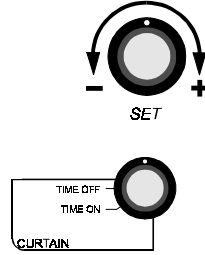
To adjust the curtain differential:

- Set the parameter selection knob to DIFFERENTIAL - CURTAIN. The current curtain differential appears flashing on the display.
- Turn the adjustment knob to adjust the curtain differential to the desired value.



To adjust the curtain timer settings:

- Set the parameter selection knob to TIME ON - CURTAIN. The current curtain time on appears flashing on the display.
- Turn the adjustment knob to adjust the curtain time on to the desired value.
- Set the parameter selection knob to TIME OFF - CURTAIN. The current curtain time off appears flashing on the display.
- Turn the adjustment knob to adjust the curtain time off to the desired value.



9 ALARM

9.1 DESCRIPTION OF OPERATION

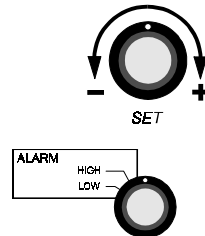
Low temperature alarm: When the room temperature falls below "*set point - low offset*", the alarm activates.

High temperature alarm: When the room temperature rises above "*set point + high offset*", the alarm activates.

9.2 HOW TO ADJUST THE ALARM PARAMETERS

To adjust the high and low offsets:

- Set the parameter selection knob to ALARM - HIGH or ALARM - LOW. The current alarm offset appears flashing on the display.



- Turn the adjustment knob to adjust the alarm offset to the desired value.

10 HOW TO LOCK THE PARAMETERS

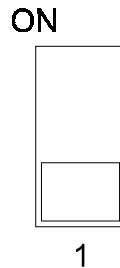
Locking the parameters ensures their settings are not changed by accident. When the parameters are locked, the only setting that can be changed is the temperature set point (if the temperature curve is deactivated). All other parameter settings can not be changed.

To lock the parameters:

- Set switch # 1 to ON.

To unlock the parameters:

- Set switch # 1 to OFF.



FACTORY SETTING : When the controller is shipped from the factory, switch # 1 is set to OFF (the parameters are unlocked).

TROUBLESHOOTING

PROBLEM	CHECK POINTS
<p>There is no display.</p>	<ul style="list-style-type: none"> ▶ The circuit breaker at the service panel is off or tripped. <ul style="list-style-type: none"> — Reset the circuit breaker. ▶ The wiring is incorrect. <ul style="list-style-type: none"> — Correct the wiring. ▶ The input fuse is open. <ul style="list-style-type: none"> — Replace the fuse. ▶ The voltage selector switch is in the wrong position. <ul style="list-style-type: none"> — Set the switch to the correct position. ▶ The display board inter-connect cable is not plugged into the power supply board properly. <ul style="list-style-type: none"> — Be sure the cable is firmly plugged in.
<p>The defective probe pilot light is on.</p>	<ul style="list-style-type: none"> ▶ The controller has detected a defective probe. <ul style="list-style-type: none"> — Follow the procedure described in DEFECTIVE PROBES (page 10) to identify the defective probe. Replace the defective probe.
<p>The display shows sudden variations in the room temperature.</p>	<ul style="list-style-type: none"> ▶ A variation in resistance is induced on the probe circuit. <ul style="list-style-type: none"> — Be sure the probes are dry. Also, move them away from drafts and from any source of radiant heating. ▶ There is electrical noise near the cable of an extended probe. <ul style="list-style-type: none"> — Do not run probe cables next to other power cables. When crossing over other power cables, cross at 90°.

PROBLEM	CHECK POINTS
<p>Stage 1, 2, 3, 4, 5 or 6 does not operate.</p>	<ul style="list-style-type: none"> ▶ The wiring is incorrect. <ul style="list-style-type: none"> — Correct the wiring. In particular, be sure two different lines are connected to each fan motor or heating unit: line L1 modulated by the controller should be combined with another line (N for 115V or L2 for 230V) to activate the fan motor or heating unit. Also be sure the stage's IN terminal is supplied by line L1. ▶ The stage's fuse is open. <ul style="list-style-type: none"> — Replace the fuse. ▶ The display board inter-connect cable is not plugged into the power supply board properly. <ul style="list-style-type: none"> — Be sure the cable is firmly plugged in. ▶ The fan motor or heating unit is defective. <ul style="list-style-type: none"> — Connect the fan motor or heating unit to an alternate power supply. Replace the fan motor or heating unit if it still is not operating.
<p>Stage 1, 2, 3, 4, 5 or 6 does not operate correctly.</p>	<ul style="list-style-type: none"> ▶ The wiring is incorrect. <ul style="list-style-type: none"> — Correct the wiring. In particular, be sure two different lines are connected to each fan motor or heating unit: line L1 modulated by the controller should be combined with another line (N for 115V or L2 for 230V) to activate the fan motor or heating unit. Also be sure the stage's IN terminal is supplied by line L1. ▶ The stage's timer settings are incorrect. <ul style="list-style-type: none"> — Correct the stage's timer settings. Refer to "How to use the timer settings".

TECHNICAL SPECIFICATIONS

MASTER BOX

Supply: - 115/230 VAC (-18%, +10%), 50/60 Hz, overload and overvoltage protection fuse F6-1A fast blow.

- 12 VDC for AC back-up supply; can activate all stages and alarm if supplied with DC back-up voltage.

AUXILIARY BOX

Supply: - 115/230 VAC, 50/60 Hz, overload and overvoltage protection fuse F6-1A fast blow.

- 12 VDC for AC back-up supply; can activate all stages and alarm if supplied with DC back-up voltage.

Stage 1: ON-OFF output, 115/230 VAC, 50/60 Hz, 30VDC, 1/2HP max., fuse F1-10A slow blow.

Stage 2: ON-OFF output, 115/230 VAC, 50/60 Hz, 30VDC, 1/2HP max., fuse F2-10A slow blow.

Stage 3: ON-OFF output, 115/230 VAC, 50/60 Hz, 30VDC, 1/2HP max., fuse F3-10A slow blow.

Stage 4: ON-OFF output, 115/230 VAC, 50/60 Hz, 30VDC, 1/2HP max., fuse F4-10A slow blow.

Stage 5: ON-OFF output, 115/230 VAC, 50/60 Hz, 30VDC, 1/2HP max., heating or ventilation, fuse F5-10A slow blow.

Stage 6: ON-OFF output, 115/230 VAC, 50/60 Hz, 30VDC, 1/2HP max., heating or ventilation, fuse F6-10A slow blow.

Curtains: OPEN-CLOSE output, 115/230 VAC, 50/60 Hz, 30VDC, 1/2HP max., fuse F7-5A fast blow.

OTHER

Probes: Low voltage (< 5V), isolated from the supply. Operating range: -40.0° to 120.0°F (-40.0° to 49°C). Accuracy: 1.8°F (1°C) between 41° and 95°F (5° and 35°C).

Enclosure: ABS, moisture and dust-tight.

The temperature where the controller is installed MUST ALL AT TIMES REMAIN BETWEEN 32 AND 104 °F (0 and 40 °C).

NOTES