

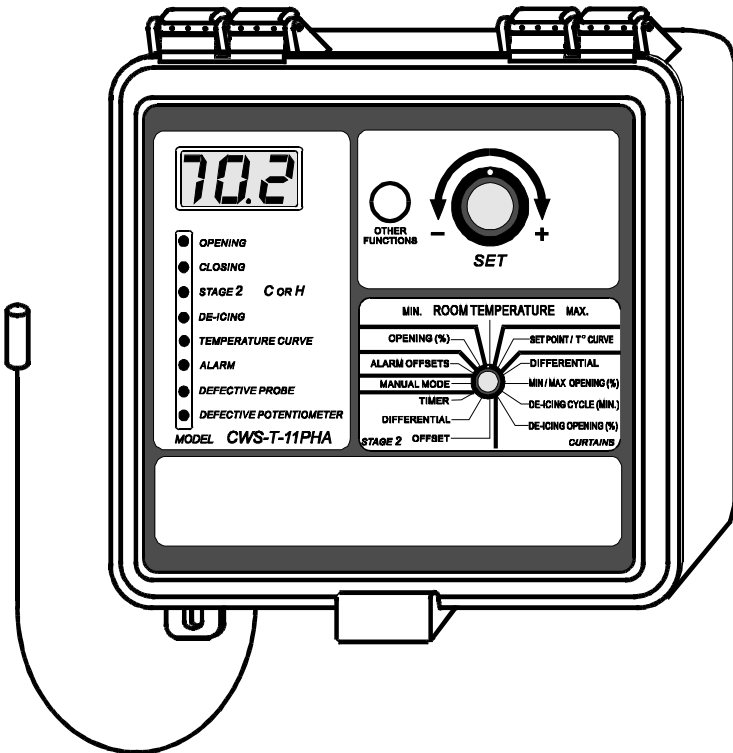
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# Natural Ventilation Controller

## CWS-T-11PHA

### User's Guide

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Read this guide carefully before using the controller

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# FEATURES

The CWS-T-11PHA is an electronic device used for environmental control in livestock buildings. One stage of either constant-speed fans, heaters or mist units can be connected to the controller, as well as curtains for natural ventilation.

The main features of the CWS-T-11PHA 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.
- An **ALARM FOR EXTREME TEMPERATURES, POWER FAILURES AND CIRCUIT FAULTS.**
- The controller can **COMPENSATE CURTAIN OPENING, CLOSING AND STOP TIMES ACCORDING TO ROOM TEMPERATURE.** The higher the temperature, the faster the curtains open and vice versa.
- Fuses located at the input and outputs of the controller provide **OVERLOAD AND OVERVOLTAGE PROTECTION** and a connector allows you to detect blown fuses.

# CWS-T-11PHA

- 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.
- The controller is compatible with all types of air inlet systems.

## **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-11PHA  

Serial number

# **PRECAUTIONS**

We strongly recommend installing a back-up thermostat on stage 2 (refer to the wiring diagram enclosed with this user's manual to connect the thermostat) as well as an independent failure alarm system and a curtain drop or manual winch .

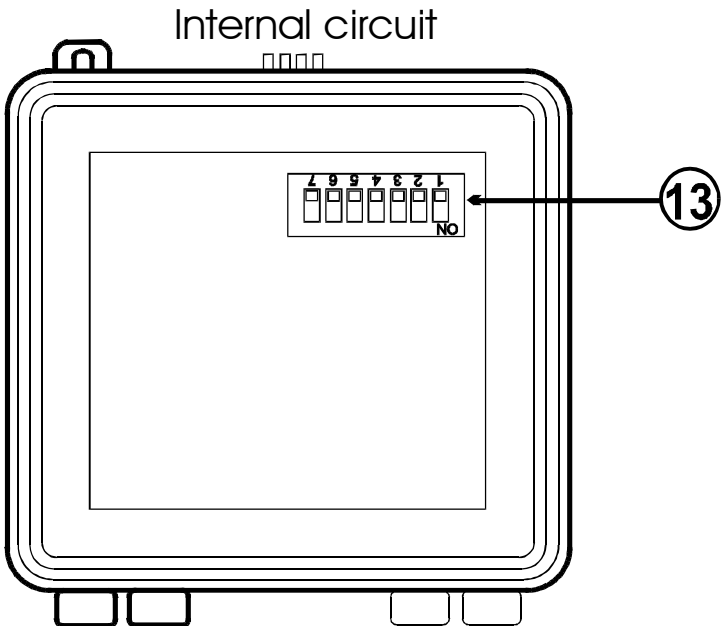
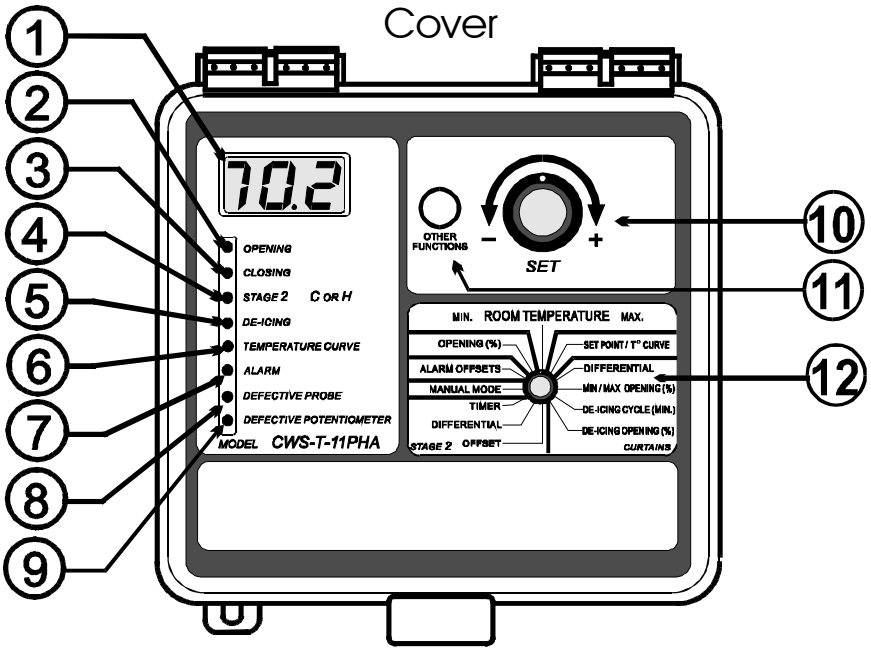
Fuses at the input and outputs of the controller adequately protect its circuitry in the case of an overload or overvoltage. However, we recommend installing an additional protection device on the supply circuit as well as an external relay on stage 2 to prolong the life of the controller.

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

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

**DO NOT SPRAY WATER ON THE CONTROLLER**

# LOCATION OF CONTROLS



- 1 THREE DIGIT DISPLAY**  
Displays temperatures and other parameters.
- 2 CURTAIN OPENING PILOT LIGHT**  
Turns on when the curtains are opening.
- 3 CURTAIN CLOSING PILOT LIGHT**  
Turns on when the curtains are closing.
- 4 STAGE 2 PILOT LIGHT**  
Turns on when the stage 2 fans, heaters or mist units are on.
- 5 DE-ICING PILOT LIGHT**  
Turns on when the curtain de-icing is on.
- 6 TEMPERATURE CURVE PILOT LIGHT**  
Turns on when the temperature curve is activated.
- 7 ALARM PILOT LIGHT**  
Turns on when the controller activates the alarm.
- 8 DEFECTIVE PROBE PILOT LIGHT**  
Turns on when a defective probe is detected.
- 9 DEFECTIVE POTENTIOMETER PILOT LIGHT**  
Turns on when the potentiometer is defective.
- 10 ADJUSTMENT KNOB**  
Used to adjust the value of the selected parameter.
- 11 PUSH-BUTTON**  
Used to access other parameter setting functions.
- 12 PARAMETER SELECTION KNOB**  
Used to select a parameter.

## 10 Internal Switches

The internal switches are located on the inside of the front cover and are defined in the following table:

#	OFF	ON
1	UNLOCKED PARAMETERS	LOCKED PARAMETERS
2	FAHRENHEIT UNITS	CELSIUS UNITS
3	PROBE 2 DEACTIVATED	PROBE 2 ACTIVATED
4	COOLING	HEATING
5	FANS	RECIRCULATION
6	X	MIST
7	X	CALIBRATION

**NOTE:** When the controller is shipped from the factory, all the switches are set to OFF.



# FACTORY SETTINGS

PARAMETER		FACTORY SETTINGS	RANGE OF VALUES
Temperature Set Point		75 °F (23.9 °C)	-40 to 99.9 °F (-40 to 37.7 °C)
Temperature Curve <sup>a</sup>		OFF	days < 100
Curtains	Differential	8 °F (4.4 °C)	3 to 20 °F (1.7 à 11.1 °C)
	Minimum Opening	0 %	0 to 100 %
	Maximum Opening	100 %	0 to 100 %
	De-icing Cycle	30 min.	1 to 120 minutes
	De-icing Opening	8 %	0 to 100 %
Stage 2	Differential	2 °F (1.1 °C)	0.5 to 20 °F (0.3 to 11.1 °C)
	Time On	15 seconds	0 to 900 seconds, increments of 15 seconds
	Time Off	30 seconds	
	Offset	0.5 °F (0.3 °C)	0 to 20 °F (0 to 11.1 °C) <sup>b</sup>
Alarm Offsets	High Offset	10.0 °F (5.6 °C)	0.5 to 40 °F (0.3 to 22.2 °C)
	Low Offset	12.0 °F (6.7 °C)	

## NOTES :

i) These initial parameter settings will not be retained in the controller's memory. Each new setting will replace the preceding one.

ii) If the power supply is cut off, the last parameter settings will be retained in memory until the power is restored.

(a) The range of values for curve temperatures is 35°F to 99.9°F (1.7°C to 37.7°C).

(b) If the negative values option is activated, the range of values for the heater offset is -9.9°F to 20.0°F (-5.5°C to 11.1°C).

# INSTALLATION

## STEP 1 - MOUNTING INSTRUCTIONS

Remove the four screws on the front cover and lift the cover. Mount the enclosure on the wall using three screws. Be sure the electrical knockouts are at the bottom of the enclosure in order to prevent water from entering the controller. Insert the screws in the mounting holes provided in three corners of the enclosure and tighten. Fasten the three black caps provided with the controller onto the three mounting holes.

## STEP 2 - CONNECTIONS

To connect the controller, refer to the wiring diagram enclosed with this user's manual.

- Set the voltage switch to the appropriate 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 communications module.
- If Stage 2 is used for heating, it may be necessary to install a transformer in order to supply the appropriate voltage to the heating unit.

**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 SHOCKS AND EQUIPMENT DAMAGE.**

## **STEP 3 - TEMPERATURE PROBES**

### **Extending the Probes**

Each probe can be extended up to 500 feet (150 m):

⇒ Use a shielded cable of outside diameter between 0.245 and 0.260 in (6.22 and 6.60 mm) to ensure the cable entry is liquid tight (cable dimensions should not be under 18 AWG). Do not ground the shielding.

⇒ It is preferable to solder the cable joint to ensure a proper contact between the two cables.

**CAUTION:** Do not run probe cables next to other power cables. When crossing over other cables, cross at 90°.

### **Connecting the Probes**

The controller is supplied with two temperature probes connected to terminals # 1 and 2. Probe 2 can be deactivated by setting internal switch # 3 to OFF.

**CAUTION:** Probes operate at low voltage and are insulated from the supply. Be sure that probe cables remain insulated from all high voltage sources. In particular, do not route the probe cables through the same electrical knockout as other cables. Do not connect the shield from the probe cable to a terminal or a ground.

### **Detecting Faulty Probes**

If a faulty probe is detected, the Defective Probe pilot light turns on. The room temperature shown on the display is then the average temperature measured by the probes in working condition. The controller will operate according to this temperature. If all the probes are defective, the display shows "P".

# CWS-T-11PHA

To identify the faulty probe:

⇒ Set the selection knob to **ROOM TEMPERATURE**. The room temperature is displayed.

MIN. ROOM TEMPERATURE MAX.



⇒ Press the push-button. If the probe connected to terminal # 1 is not faulty, "Pr 1" is displayed, alternating with the temperature measured by the probe. Otherwise, "Pr 1" alternates with "P".

⇒ Press the push-button once again to display the status of probe 2.

## STEP 4 - STAGE 2 OPERATION

Stage 2 can be configured for heating, ventilation, mist or recirculation. Use internal switches # 4, 5 and 6 to configure the stage.

	SWITCH # 4	SWITCH # 5	SWITCH # 6
VENTILATION	OFF	OFF	OFF
HEATING	ON	OFF	OFF
MIST	OFF	OFF	ON
RECIRCULATION	OFF	ON	OFF

**FACTORY SETTING:** When the controller is shipped from the factory, Stage 2 is configured for ventilation.

## **STEP 5 - CONNECTING THE WINCH**

Follow the wiring diagram to make the connections. The curtain should open when the controller is in manual open and should close when the controller is in manual close. If the curtain moves in the wrong direction, switch the wires connected to the OPEN and CLOSE terminals.

## **STEP 6 - CHECKING CURTAIN LIMITS**

To check curtain limits, close the curtain all the way by turning to the MANUAL position on the controller and pressing the push-button twice. Adjust the limit switch at this position to stop the winch from closing any further. Open the curtain all the way by turning to the MANUAL position on the controller and pressing the push-button once. Adjust the limit switch at this position to stop the winch from opening any further.

## **STEP 7 - CONNECTING THE POTENTIOMETER**

Follow the wiring diagram to make the connections. Make sure the variable output on the potentiometer is connected to terminal #3 on the probe terminals. The two power supply wires can be reversed. Check the potentiometer by opening and closing the curtain all the way in the MANUAL position. If the signal from the potentiometer (0 to 2.5 VDC) does not vary when the controller sends a signal to the winch, the "Defective Potentiometer" pilot light turns on.

NOTE: The potentiometer signal may not follow the winch signal. If this happens, do not reverse the power supply wires on the potentiometer. The calibration will correct this problem.



**USE A SHIELDED WIRE FOR THE POTENTIOMETER AND DO NOT GROUND THE SHIELD. ISOLATE THE POTENTIOMETER WIRE FROM ALL HIGH VOLTAGE CABLES. DO NOT RUN THE WIRE ALONG POWER CABLES.**

## **STEP 8 - CALIBRATION**

A calibrated controller will more accurately control the opening of the curtains. Calibration is automatically performed when internal switch # 7 is set to ON. The letters "**CAL**" are displayed during the calibration. The controller first closes the curtains completely and stores the position. The curtains are then opened completely and the position is stored. When the calibration is completed, "**END**" is displayed. After a 10-second delay, the controller resumes normal operation.

# USING THE CONTROLLER

## 1 THE MEANING OF A FLASHING DISPLAY

The display will flash in certain cases and not in others. The flashing indicates that the value shown can be adjusted. A value that is not flashing cannot be adjusted.

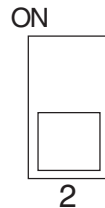


## 2 TEMPERATURE UNITS

Temperatures can be displayed in either Celsius or Fahrenheit units.

■ Set internal switch # 2 to the desired position:

- **ON** to display temperatures in Celsius units.
- **OFF** to display temperatures in Fahrenheit units.



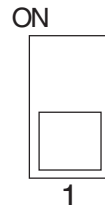
**FACTORY SETTING:** When the controller is shipped from the factory, internal switch # 2 is set to OFF (temperatures are displayed in Fahrenheit units).

## 3 LOCKING THE PARAMETER SETTINGS

The parameter settings can be locked to prevent accidentally modifying them. When the settings are locked, only the temperature set point (as long as the temperature curve is deactivated) can be modified.

**Locking the parameters:**

- Set internal switch # 1 to ON.



## Unlocking the parameters:

- Set internal switch # 1 to OFF.

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

## 4 MANUAL OPERATION



When the selection knob is turned to MANUAL MODE, the curtains can be manually opened, closed or stopped. In all other positions of the selection knob, the curtains operate in automatic mode according to the temperature settings.

## To operate the curtains manually:

- Turn the selection knob to MANUAL MODE. The word OFF is displayed and, after a 5-second delay, the curtains close.
- Press the push-button. The letters OPE are displayed and, after a 5-second delay, the curtains open.
- Press the push-button once again. The letters CLO are displayed and, after a 5-second delay, the curtains close.
- Keep pressing the push-button to stop, open or close the curtains respectively.

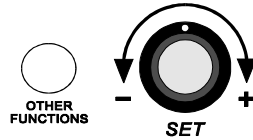


# TEMPERATURE SETTINGS

## 1 VIEWING 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.

MIN. ROOM TEMPERATURE MAX.



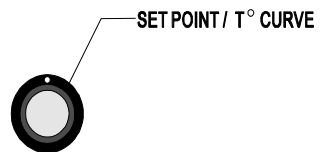
- Press the push-button. The letters "PR1" and the temperature measured by the probe connected to terminal # 1 (supplied with the controller) alternate on the display.

For each additional probe connected to the controller:

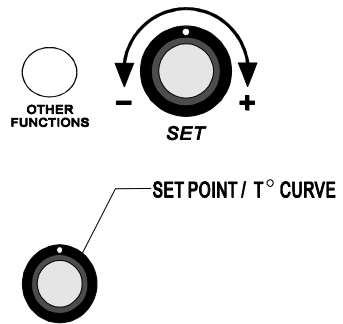
- Press the push-button once again. The letters "PR#" (# is the number of the terminal to which the probe is connected) and the temperature measured by the probe alternate on the display.

## 2 ADJUSTING THE SINGLE SET POINT

The controller maintains a specified target room temperature by controlling the operation of the fans and heating units. The target room temperature can be specified in two ways: a single set point or a temperature curve. When using a single set point, the controller operates according to the specified temperature as long as the temperature curve is deactivated.



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



## Deactivating the Temperature Curve:

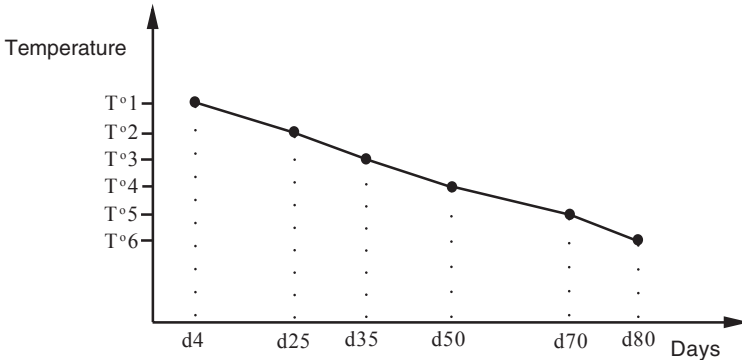
- Set the parameter selection knob to SET POINT / T° CURVE. The current set point appears is displayed.
- Press the push-button repeatedly until the word ON appears flashing on the display.
- Turn the adjustment knob counterclockwise one notch and leave it in this position. The word OFF appears flashing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

## Adjusting the single set point:

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

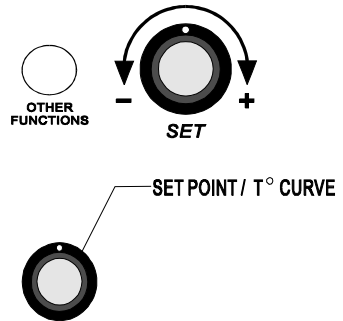
## 3 ADJUSTING THE TEMPERATURE CURVE

The user can define a temperature curve to adjust the set point automatically over a given time period.



A curve is defined using six points. Each point specifies a day number and a set point for that day. Once the points of the curve are defined, the curve must be activated. The controller will change the temperature set point every hour in a linear fashion between consecutive points of the curve. When the last point of the curve is reached, the temperature set point for that day is maintained until the curve is reactivated.

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



### Deactivating the temperature curve:

- Set the parameter selection knob to SET POINT / T° CURVE. The current set point is displayed.
- Press the 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.

## Adjusting the points of the temperature curve:

- Set the parameter selection knob to SET POINT / T° CURVE. The current set point appears flashing on the display.
- Press the 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 push-button once again. A day number, preceded by the word "day", appears flashing on the display.
- Turn the adjustment knob to adjust the day number to the desired value.
- Press the 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 temperature 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.

## Activating the temperature curve:

- Press the 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.

## Viewing Current Set Point / Adjusting Current Day Number

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

- Set the selection knob to **SET POINT / T° CURVE**. The current temperature set point is displayed.
- Press the push-button. The current day number is displayed.
- Use the adjustment knob to set the day number to the desired value.

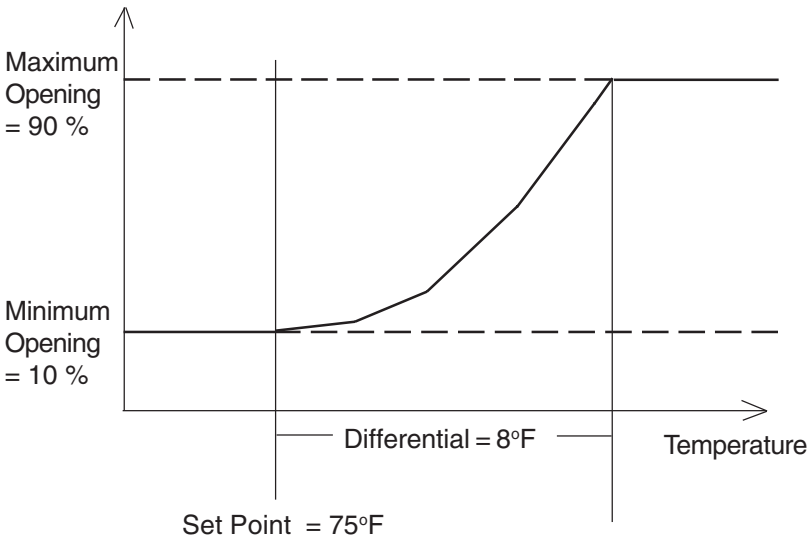
# STAGE 1 — CURTAINS

## OPERATION

Stage 1 controls the sidewall curtains. The controller opens and closes the curtains as a function of room temperature in non-linear fashion. The curtains open and close slightly when the temperature is close to the set point. If the room temperature is significantly different from the set point, the curtains are opened to a much greater measure. The curtain opening curve is bounded by two user-defined points: the maximum opening and the minimum opening. The minimum opening can be used to provide minimum ventilation in the building.

### Curtain Opening Curve

Curtain Opening



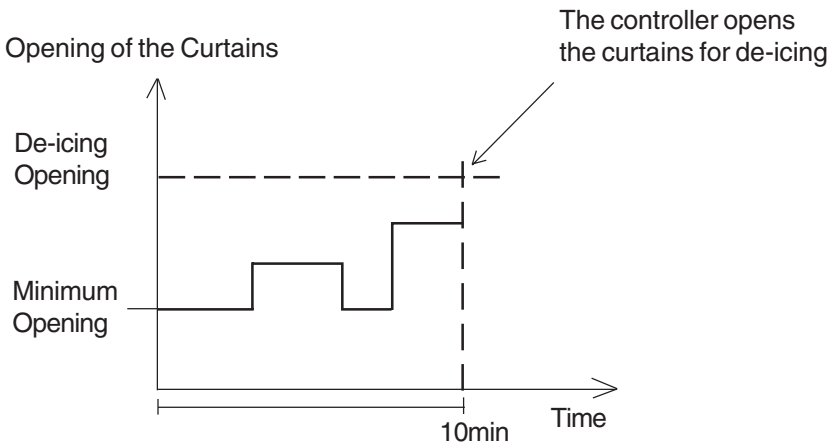
In the above graph, the curtains are open at their minimum opening when the temperature is below the set point. The curtains open progressively up to their maximum opening in the differential interval. The maximum curtain opening is attained at a temperature equal to the set point plus the differential. In the example above, the openings calculated by the controller are as follows:

- at 77°F, the curtains are 15% open
- at 80°F, the curtains are 41% open
- at 81°F, the curtains are 55% open
- at 82°F, the curtains are 71% open.

## DE-ICING THE CURTAINS

In order to prevent the curtains from freezing in winter weather conditions, the controller opens the curtains according to a cycle and an opening percentage defined by the user. If, during the duration of the de-icing cycle, the opening of the curtains has remained less than the de-icing opening, the controller opens the curtains to the value of the de-icing opening. For example, let the de-icing cycle be 10 minutes and the de-icing opening 15%. If, after 10 minutes, the opening of the curtains has remained below 15%, the controller opens the curtains to 15% and returns them to their initial state. In this example, the de-icing counter is reset each time the opening of the curtains exceeds 15% during normal operation.

### Illustration of De-icing



## PARAMETER SETTINGS

### 1 Viewing the Curtain Opening

The curtain opening is displayed as a percentage from 0 % (completely closed) to 100 % (completely open).

- Turn the selection knob to **OPENING**. The current curtain opening is displayed.

### 2 Adjusting the Curtain Differential

The differential is the temperature interval within which the curtains open and close. At a room temperature equal to the set point, the curtains are open at their minimum opening. At a room temperature equal to the set point plus the curtain differential, the curtains are open at their maximum opening. The curtain differential varies from 0.5 °F to 20.0 °F (0.3 to 11.1 °C).

- Turn the selection knob to **DIFFERENTIAL — CURTAINS**. The current value of the differential flashes on the display. Use the adjustment knob to adjust the differential to the desired value.

### 3 Adjusting the Minimum and Maximum Opening

The minimum and maximum openings vary from 0 to 100%.

- Turn the selection knob to **MIN. / MAX. OPENING (%) — CURTAINS**. The minimum opening is displayed, alternating with the letters «**LO**». Use the adjustment knob to adjust the minimum opening to the desired value.
- Press the push-button. The maximum opening is displayed, alternating with the letters «**HI**». Use the adjustment knob to adjust the maximum opening to the desired value.



- Use the push-button to switch from one value to the other.

#### **4 Adjusting the De-Icing Cycle**

The de-icing cycle determines the frequency at which the controller de-ices the curtains. At least once during the de-icing cycle, the controller opens the curtains to their de-icing opening. The de-icing cycle varies from 1 to 120 minutes.

- Turn the selection knob to **DE-ICING CYCLE — CURTAINS**. The de-icing cycle is displayed. Use the adjustment knob to adjust the cycle to the desired value.

#### **5 Adjusting the De-Icing Opening**

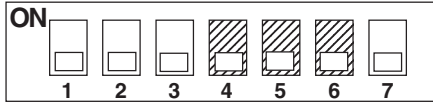
The de-icing opening is the opening of the curtains used when de-icing the curtains. It is defined as a percentage of opening from 0 % (completely closed) to 100 % (completely open). To deactivate curtain de-icing, set the de-icing opening to 0.

- Turn the selection knob to **DE-ICING OPENING — CURTAINS**. The current de-icing opening is displayed. Use the adjustment knob to set the opening to the desired value.

# STAGE 2 OPERATION

Stage 2 can be configured for cooling, heating, mist or recirculation. Use internal dipswitches # 4, 5 and 6 to select a configuration.

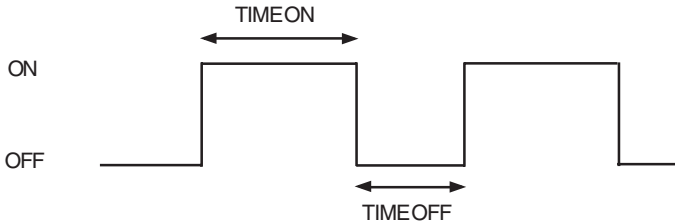
## 1. COOLING



Stage 2 has two modes of operation when used for cooling: (i) Continuous Mode — used when cooling is required to lower the room temperature; (ii) Minimum Ventilation Mode — provides oxygen to the room and reduces humidity levels when cooling is not needed.

## Minimum Ventilation Cycle

When cooling is not required, Stage 2 fans operate according to the minimum ventilation cycle.



TIME ON [in seconds] - Time on is the portion of the minimum ventilation cycle when Stage 2 fans are in operation.

TIME OFF [in seconds] - Time off is the portion of the minimum ventilation cycle when the Stage 2 fans are turned off.

## Minimum Ventilation Cycle Settings

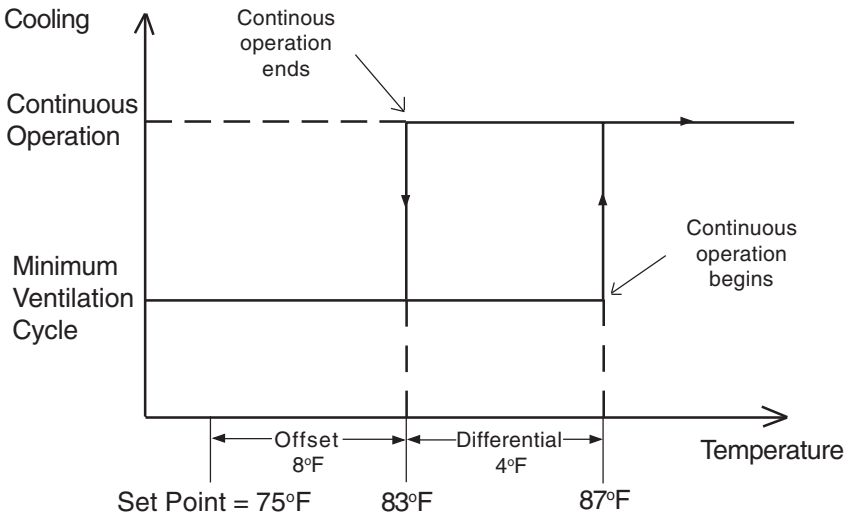
1. To run the fans continuously at minimum speed, set time off to zero and time on to any value other than zero.
2. To stop the fans, set time on to zero and time off to any value.

- To run the fans intermittently, set time on to the desired running time and time off to the desired off time.

## PRINCIPLE OF OPERATION

The **differential** is the temperature interval which determines when the fans turn on and off in continuous mode. The Stage 2 **offset** is the number of degrees above the set point at which Stage 2 fans stop operating continuously. The fans run continuously when the temperature reaches the set point plus the offset plus the differential for Stage 2. In the example below, the set point is 75°F, the offset is 8°F and the differential is 4°F. At 87°F, the fans stop operating according to the minimum ventilation cycle and run continuously. If the temperature falls to 83°F, the fans stop running continuously and operate according to the minimum ventilation cycle.

### Operation of the Fans



## VENTILATION SETTINGS

### 1 Adjusting the Cooling Offset

The cooling offset ranges from 0 to 20.0 °F ( 0 to 11.1 °C).

- Turn the selection knob to **OFFSET — STAGE 2**. The current offset flashes on the display.
- Use the adjustment knob to set the offset to the desired value.

### 2 Adjusting the Cooling Differential

The cooling differential ranges from 0.5 °F to 20.0 °F (0.3 to 11.1 °C).

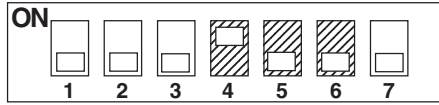
- Turn the selection knob to **DIFFERENTIAL — STAGE 2**. The current differential flashes on the display.
- Use the adjustment knob to set the differential to the desired value.

### 3 Adjusting the Minimum Ventilation Cycle

Time on and time off range from 0 to 900 seconds, in increments of 15 seconds.

- Turn the selection knob to **TIMER — STAGE 2**. The current time on is displayed, alternating with the word "On".
- Use the adjustment knob to set time on to the desired value.
- Press the push-button. The current time off is displayed, alternating with the word "OFF".
- Use the adjustment knob to set time off to the desired value.

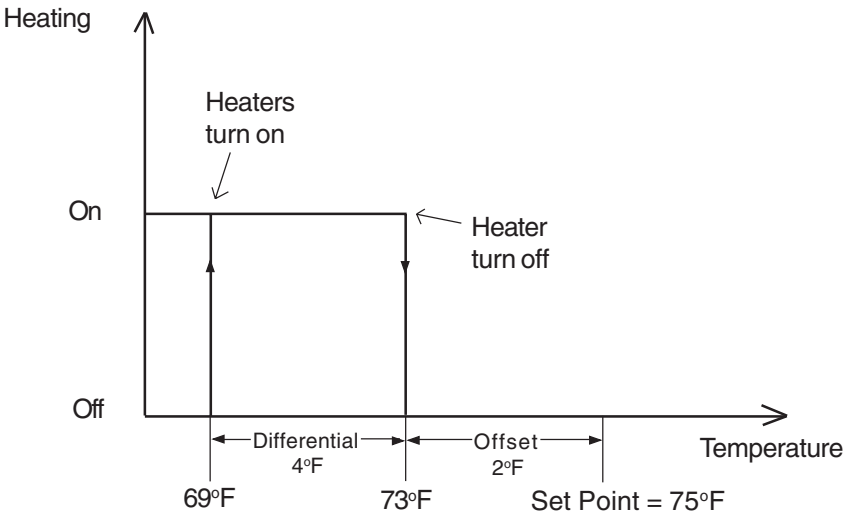
## 2. HEATING



### PRINCIPLE OF OPERATION

**The differential** is the temperature interval which determines when the heaters turn on and off. The **heater offset** is the number of degrees below the set point at which the heaters stop. The heater offset can also take on negative values. In this case, the heaters stop when the temperature exceeds the set point by the offset value. When heating is used, the timer does not function. In the example below, the set point is 75°F, the offset is 2°F and the differential is 4°F. At 69°F, the heaters turn on. When the temperature rises to 73°F, the heaters stop.

### Heater Operation



## HEATER SETTINGS

### 1 Adjusting the Heater Offset

The heater offset ranges from 0 to 20.0 °F (0 to 11.1 °C).

- Turn the selection knob to **OFFSET — STAGE 2**. The current offset flashes on the display.
- Use the adjustment knob to set the offset to the desired value.

### 2 Activating Negative Heater Offsets

When the negative heater offsets option is activated, the offset can range from -9.9 to 20.0 °F (-5.5 to 11.1 °C).

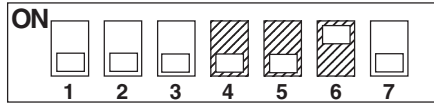
- Turn the selection knob to **OFFSET — STAGE 2**. The current offset value flashes on the display.
- Press the push-button. The current state of the negative offsets option is displayed; i.e. "**On**" — negative offsets permitted, "**Off**" — negative offsets not permitted.
- Use the adjustment knob to set the state of the negative offsets option to the desired value.

### 3 Adjusting the Heater Differential

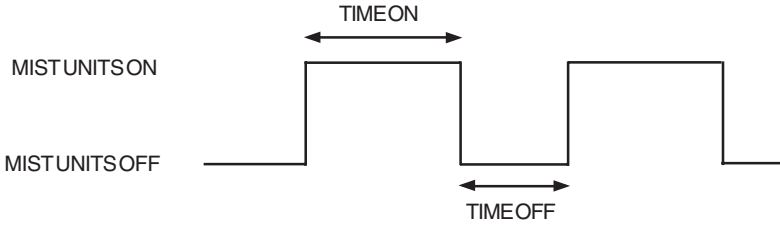
The heater differential ranges from 0.5 °F to 20.0 °F (0.3 to 11.1 °C).

- Turn the selection knob to **DIFFERENTIAL — STAGE 2**. The current differential flashes on the display.
- Use the adjustment knob to set the differential to the desired value.

## 3. MIST



When used as a mist stage, Stage 2 operates according to the mist timer.



Time on [in seconds] - The portion of the mist cycle during which the mist units are on.

Time off [in seconds] - The portion of the mist cycle during which the mist units are turned off.

The **differential** is the temperature interval which determines when the mist units turn on and off. The **offset** is the number of degrees above the set point at which the mist units turn off. Mist units operate only according to the timer settings. In the example below, the set point is 75°F, the offset is 4°F and the differential is 2°F. At 81°F, the mist units start operating according to the mist timer settings. If the temperature falls to 79°F, the mist units stop operating.

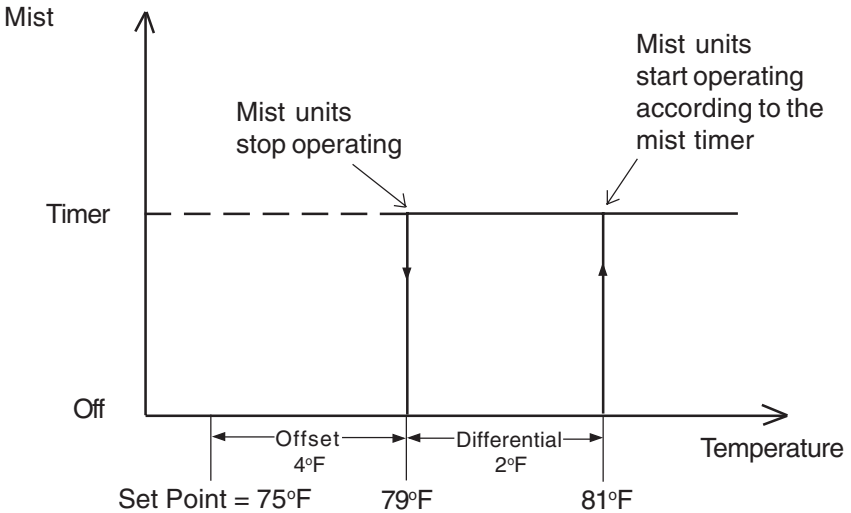
## MIST SETTINGS

### 1 Adjusting the Mist Offset

The mist offset ranges from 0 to 20.0 °F (0 to 11.1 °C).

- Turn the selection knob to **OFFSET — STAGE 2**. The current offset value flashes on the display.
- Use the adjustment knob to set the offset to the desired value.

## Mist Operation



## 2 Adjusting the Mist Differential

The mist differential ranges from 0.5 °F to 20.0 °F (0.3 to 11.1 °C).

- Turn the selection knob to **DIFFERENTIAL — STAGE 2**. The current differential value flashes on the display.
- Use the adjustment knob to set the differential to the desired value.

## 3 Adjusting the Mist Timer

Time on and time off range from 0 to 900 seconds, in increments of 15 seconds.

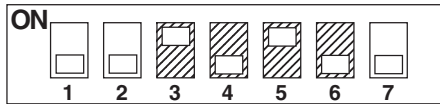
- Turn the selection knob to **TIMER — STAGE 2**. The current



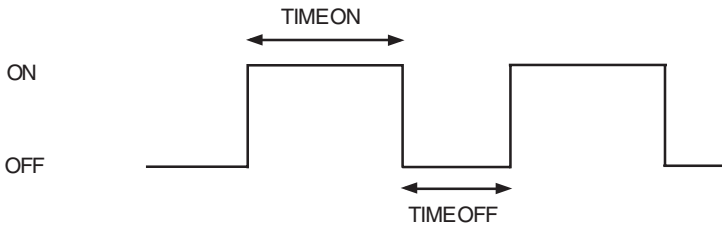
time on is displayed, alternating with the word "On".

- Use the adjustment knob to set time on to the desired value.
- Press the push-button. The current time off is displayed, alternating with the word "OFF".
- Use the adjustment knob to set time off to the desired value.

## 4. RECIRCULATION



In recirculation mode, the controller calculates the temperature difference between the two probes and starts the fans when the difference is equal to a user-defined value. The fans operate according to the timer settings.



Time on [in seconds] - The portion of the timer cycle during which the Stage 2 fans are on.

Time off [in seconds] - The portion of the timer cycle during which the Stage 2 fans are off.

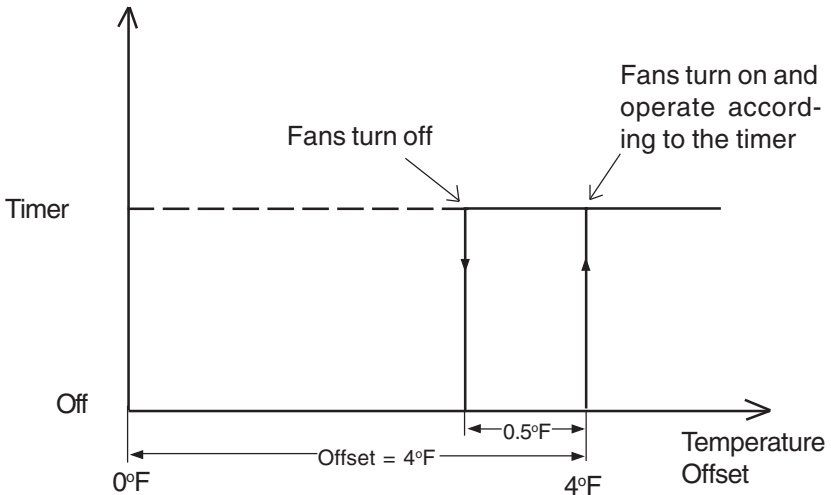
The **Stage 2 offset** is the temperature difference between the two probes at which the Stage 2 recirculation fans turn on. When the temperature difference decreases by 0.5°F, the fans stop running. The differential value is not used in recirculation mode. In the following example, the offset is 4°F.

# CWS-T-11PHA

When the temperature difference between the two probes is 4°F, the fans start running and operate according to the timer settings. When the difference decreases to 3.5°F, the fans stop running.

## Operation of the Recirculation Fans

Recirculation  
Fans



## RECIRCULATION SETTINGS

### 1 Adjusting the Offset

The offset ranges from 0 to 20°F (0 to 11.1°C).

- Turn the selection knob to **OFFSET — STAGE 2**. The current offset flashes on the display.
- Use the adjustment knob to set the offset to the desired value.

## **2** Adjusting the Timer Settings

Time on and time off range from 0 to 900 seconds, in increments of 15 seconds.

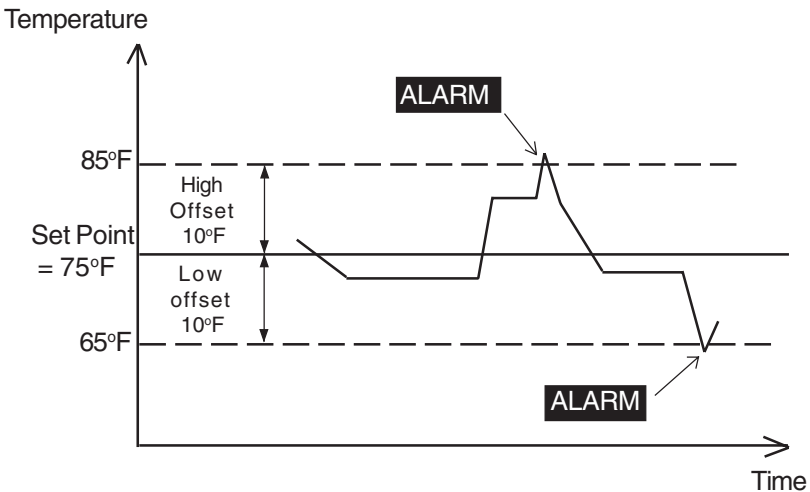
- Turn the selection knob to **TIMER — STAGE 2**. The current time on is displayed, alternating with the word "**On**".
- Use the adjustment knob to set time on to the desired value.
- Press the push-button. The current time off is displayed, alternating with the word "**OFF**".
- Use the adjustment knob to set time off to the desired value.

# ALARMS

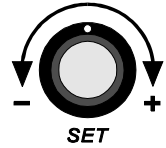
The controller activates the alarm when the room temperature reaches a user-defined limit value. The lower limit is defined by the set point minus the lower alarm offset. The upper limit is defined by the set point plus the upper alarm offset. The controller also activates the alarm in case of a power failure or a fault in the supply circuit.

**In case of a high temperature alarm:** if the temperature reaches the high temperature limit and if the curtain has reached its maximum opening value (as defined by the user), the curtain continues to open according to the timer cycle until it is completely open (100%).

**In case of a low temperature alarm:** if the temperature reaches the low temperature limit, the curtain is closed according to the timer cycle until it is completely closed (0%).



## ALARM OFFSET SETTINGS



- Turn the selection knob to **ALARM OFFSETS**. The low offset is displayed, alternating with the word "**LO**".
- Use the adjustment knob to set the low offset to the desired value.
- Press the push-button. The high offset is displayed, alternating with the word "**HI**".
- Use the adjustment knob to set the high offset to the desired value.



Alarm offset range from 0.5° to 40.0°F (0.3° to 22.0°C).

# TROUBLESHOOTING GUIDE

PROBLEM	CHECK POINTS
There is no display.	<ul style="list-style-type: none"> <li>▶ The circuit breaker at the service panel is off or tripped.               <ul style="list-style-type: none"> <li>— Reset the circuit breaker.</li> </ul> </li> <li>▶ The wiring is incorrect.               <ul style="list-style-type: none"> <li>— Correct the wiring.</li> </ul> </li> <li>▶ The input fuse is open.               <ul style="list-style-type: none"> <li>— Replace the fuse.</li> </ul> </li> <li>▶ The voltage selector switch is in the wrong position.               <ul style="list-style-type: none"> <li>— Set the switch to the correct position.</li> </ul> </li> <li>▶ The display board inter-connect cable is not plugged into the power supply board properly.               <ul style="list-style-type: none"> <li>— Be sure the cable is firmly plugged in.</li> </ul> </li> </ul>
The display shows the letter "p".	<ul style="list-style-type: none"> <li>▶ Probe # 1 is connected improperly.               <ul style="list-style-type: none"> <li>— Correct the probe's connection.</li> </ul> </li> </ul>
The defective probe pilot light is on.	<ul style="list-style-type: none"> <li>▶ The controller has detected a defective probe.               <ul style="list-style-type: none"> <li>— Follow the procedure described in DEFECTIVE PROBES to identify the defective probe. Replace the defective probe.</li> </ul> </li> </ul>
The display shows sudden variations in the ambient temperature.	<ul style="list-style-type: none"> <li>▶ A variation in resistance is induced on the probe circuit.               <ul style="list-style-type: none"> <li>— Be sure the probes are dry. Also, move them away from drafts and from any source of radiant heating.</li> </ul> </li> <li>▶ There is electrical noise near the cable of an extended probe.               <ul style="list-style-type: none"> <li>— Do not run probe cables next to other power cables. When crossing over other power cables, cross at 90°.</li> </ul> </li> </ul>

PROBLEM	CHECK POINTS
The curtains do not work.	<ul style="list-style-type: none"> <li>▶ The stage 1 fuse is blown.                             <ul style="list-style-type: none"> <li>— Replace the fuse.</li> </ul> </li> </ul>
The curtains run in manual mode but not in automatic mode.	<ul style="list-style-type: none"> <li>▶ The curtain parameter settings are not correct.                             <ul style="list-style-type: none"> <li>— Correct the parameter settings. See Stage 1 — Curtains.</li> </ul> </li> </ul>
The defective potentiometer pilot light turns on.	<ul style="list-style-type: none"> <li>▶ The potentiometer signal does not vary when the winch is working.                             <ul style="list-style-type: none"> <li>— Check the potentiometer.</li> <li>— Check the potentiometer wiring.</li> <li>— Redo the calibration.</li> <li>— Put the controller in manual mode. Measure the voltage between terminals C and #3 on the probe connections. Voltage should vary between 0 and 2.5 VDC.</li> </ul> </li> <li>▶ The fuse on the winch output is blown.                             <ul style="list-style-type: none"> <li>— Replace the fuse.</li> </ul> </li> </ul>
The Stage 2 fans or heaters do not work.	<ul style="list-style-type: none"> <li>▶ The display board inter-connect cable is not plugged into the power supply board properly.                             <ul style="list-style-type: none"> <li>— Be sure the cable is firmly plugged in.</li> </ul> </li> <li>▶ The wiring is incorrect.                             <ul style="list-style-type: none"> <li>— Correct the wiring. In particular, be sure two different lines are connected to each motor: line L1 modulated by the controller should be combined with another line (N for 115V or L2 for 230V) to activate the fan motor. Also be sure the stage 2 COMMON is supplied by line L1.</li> </ul> </li> </ul>

PROBLEM	CHECK POINTS
The Stage 2 fans or heaters do not work (continued).	<ul style="list-style-type: none"><li>▶ The fan motor or heating unit is defective.<ul style="list-style-type: none"><li>— 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.</li></ul></li> <li>▶ The controller is defective.<ul style="list-style-type: none"><li>— Listen to see if there is a clicking sound when the stage's pilot light turns on. If there is no clicking sound, contact your distributor to get the controller repaired.</li></ul></li></ul>



# TECHNICAL SPECIFICATIONS

**Supply:** - 115/230 VAC (- 18%, + 8%), 50/60 Hz, overload and overvoltage protection fuse F6-1A fast blow.

- 12 VDC for AC back-up supply, can activate the curtains, stage 2 and alarm if supplied with DC back-up voltage.

**Curtains:** OPEN-CLOSE output, 50/60 Hz, 5A motor output, fuse F1-5A slow blow.

**Stage 2:** ON-OFF output, 115/230 VAC, 60 Hz, 30 VDC, 6A motor output, 10A RES, heating or cooling or mist, fuse F3-10A slow blow.

**Alarm:** ON-OFF output, 115/230 VAC, 50/60 Hz, 30 VDC, 3A, fuse F5-3A slow blow.

**Potentiometer:** 5k $\Omega$  to 10k $\Omega$

**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 AT ALL TIMES REMAIN BETWEEN 32 AND 104°F (0 AND 40°C).**