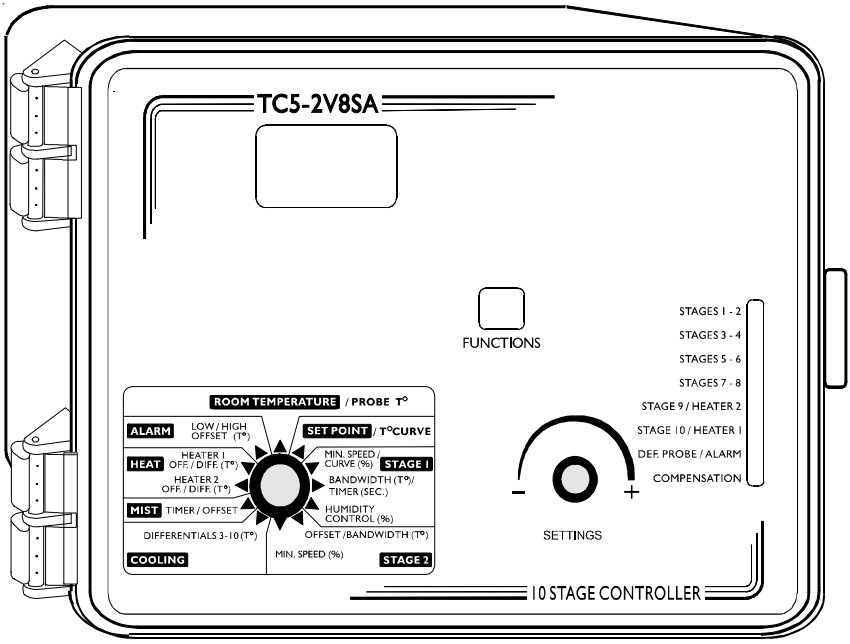
Temperature Controller

TC5-2V8SA

USER'S MANUAL



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PRECAUTIONS

We strongly recommend installing supplementary natural ventilation as well as a back-up thermostat on at least one cooling stage (refer to the wiring diagram enclosed with this user's manual to connect the thermostat).

Although fuses on the outputs of the controller protect its circuits in case of an overload or overvoltage, we recommend installing an additional protection device on the controller's supply circuit.

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

FOR CUSTOMER USE
Enter the serial number located on the side of the controller below for future reference.

Model number: **TC5-2V8SA**
Serial number: _____

FEATURES

The TC5-2V8SA is an electronic device used for environmental control in livestock buildings. It allows the user to maintain a specified target temperature by controlling the operation of ventilation and heating equipment. Two stages of variable speed fans can be connected to the controller, as well as six stages of constant-speed fans and two stages of either constant-speed fans or heating units. In addition, one of the constant-speed fan stages can be configured as a mist cooling stage.

The main features of the TC5-2V8SA are as follows:

THREE-DIGIT DISPLAY

A three-digit display provides a high level of accuracy, allowing the user to specify a temperature to within one tenth of a degree (in Fahrenheit or Celsius units).

PILOT LIGHTS

Pilot lights indicating the state of outputs allow the user to monitor the operation of the system without having to enter the building.

MINIMUM VENTILATION CYCLE

When ventilation is not required for cooling, the first stage fans can be operated either continously or intermittently to reduce the level of humidity and supply oxygen to the room.

TEMPERATURE AND MINIMUM VENTILATION SPEED CURVES

The controller can be set to automatically change the temperature set point and the minimum ventilation speed over a given period of time in accordance with the user's requirements by specifying a temperature curve and a minimum ventilation speed curve with up to six different points each.

CHOICE OF TEN MOTOR CURVES

The variation in motor speed resulting from a change in voltage will depend on the make and capacity of the motor. In order to achieve a high degree of compatibility between controller and motor, the user can choose from among ten different motor curves, thus ensuring that the correct voltage is supplied.

HUMIDITY COMPENSATION

The stage 1 and 2 minimum speed can be adjusted automatically as a function of relative humidity. As humidity increases, the minimum speed increases proportionally to compensate for the change.

HIGH/LOW TEMPERATURE ALARM OUTPUT

FULL-SPEED FAN START-UP

In order to overcome the inertia of the ventilation system components and de-ice the fan blades in cold weather conditions, the controller supplies maximum voltage to the variable speed fans during the 2 seconds immediately following each start-up.

FOUR INDEPENDENT TEMPERATURE PROBE INPUTS

Up to four 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.

OVERLOAD AND OVERVOLTAGE PROTECTION

Fuses and other protection devices are installed on the outputs of the controller to protect its circuitry in the case of an overload or overvoltage.

COMPUTER CONTROL

The controller can be connected to a computer, thus making it possible to centralize the management of information and diversify control strategies.

CONTROL OF AIR INLET MOVEMENT

If the TC5-2V8SA is used in combination with a PF-5B controller, the movement of the air inlets can be coordinated with the operation of the fans using a potentiometer located on the panel drive. This allows the air inlets to be adjusted correctly, without the influence of uncontrollable factors such as wind or air from adjoining rooms.

TEST MODE

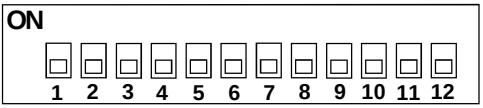
A test mode allows you to simulate temperature changes and verify controller performance.

LOCATION OF THE CONTROLS

CONTROLLER STATUS LEDS

LED	MEANING
STAGES 1 - 2	FLASHES WHEN STAGE 1 FANS ARE ON. TURNS ON WHEN BOTH STAGES ARE ACTIVE.
STAGES 3 - 4	FLASHES WHEN STAGE 3 IS ACTIVE. TURNS ON WHEN STAGE 4 IS ACTIVE.
STAGES 5 - 6	FLASHES WHEN STAGE 5 IS ACTIVE. TURNS ON WHEN STAGE 6 IS ACTIVE.
STAGES 7 - 8	FLASHES WHEN STAGE 7 IS ACTIVE. TURNS ON WHEN STAGE 8 IS ACTIVE.
STAGE 9 / HEATER 2	TURNS ON WHEN THE STAGE 9 FANS OR HEATER 2 HEATING UNITS ARE OPERATING.
STAGE 10 / HEATER 1	TURNS ON WHEN THE STAGE 10 FANS OR HEATER 1 HEATING UNITS ARE OPERATING.
DEF. PROBE/ ALARM	TURNS ON WHEN AN ALARM IS DETECTED. FLASHES WHEN A DEFECTIVE PROBE IS DETECTED.
COMPENSATION	TURNS ON WHEN THE COMPENSATION ON OUTPUT 1 MINIMUM VENTILATION SPEED OR ON THE MIST UNITS IS IN EFFECT.

INTERNAL SWITCHES



The internal switches are located on the inside of the front cover. When the controller is shipped from the factory, all the switches are set to OFF.

#	OFF	ON
1	UNLOCKED PARAMETERS	LOCKED PARAMETERS
2	FAHRENHEIT DEGREES	CELSIUS DEGREES
3	PROBE 2 DISABLED	PROBE 2 ENABLED
4	PROBE 3 DISABLED	PROBE 3 ENABLED
5	PROBE 4 DISABLED	PROBE 4 ENABLED
6	NO HEATING STAGES	HEATING
7	1 HEATER	2 HEATERS
8	CASCADING HEATERS	ZONED HEATERS
9	MIST OFF	MIST ON
10	RESERVED	
11	RESERVED	
12	NORMAL MODE	TEMPERATURE SIMULATION MODE

INSTALLATION

MOUNTING INSTRUCTIONS

Open the latch and lift the cover. Remove the black caps located on each of the four mounting holes. Mount the enclosure on the wall using four 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 and tighten. Fasten the four black caps provided with the controller onto the four mounting holes. The master enclosure must be mounted in a location that will allow the cover to be completely opened right up against the wall. Install the slave enclosure to the right of the master.

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.
- It may be necessary to install a transformer in order to supply the appropriate voltage to the heating units.

ALARM CONNECTION: There are two types of alarms on the market. 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 on 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.

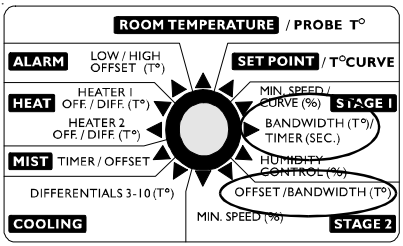
MOTOR TYPES

The relationship between the voltage supplied to a motor and its operating speed is described by a motor curve. This curve varies with the make and capacity of the motor. The various motors available in the industry have been divided into ten categories and the controller has been programmed with a different motor curve for each of these categories. To ensure that the controller supplies the correct voltages, an appropriate curve must be selected for stages 1 and 2 according to the type of fan motors used.

Selecting a Motor Type for Stage 1

Refer to the list of motors enclosed with this user's manual to determine which curve number (1 to 10) is appropriate for the type of motors used.

- Set the selection knob to **STAGE 1 — BANDWIDTH/ TIMER**. The Stage 1 bandwidth is displayed and flashes.



- Press the push-button three times. The currently selected type is displayed, alternating with the letters "**tYP**".

- Use the adjustment knob to adjust the motor type to the desired value.

- Return to the Stage 1 bandwidth display either by pressing the push-button once again.

2 Selecting A Motor Type for Stage 2

Refer to the list of motors enclosed with this user's manual to determine which type (1 to 10) is appropriate for the motors used.

- Set the selection knob to **STAGE 2 — OFFSET/BANDWIDTH**. The offset is displayed, alternating with the letters "**OFt**".
- Press the push-button twice. The currently selected motor type is displayed, alternating with the letters "**tYP**".
- Use the adjustment knob to adjust the motor type to the desired value.
- Return to the Stage 2 offset display by pressing the push-button once again.

TEMPERATURE PROBES

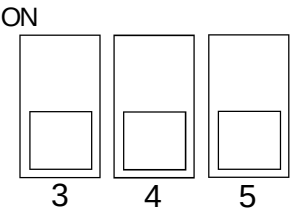
1 Connecting the Probes

The controller is supplied with one temperature probe connected to input # 1. Three additional room probes can be connected to inputs # 2, 3 and 4 (see wiring diagram enclosed).

CAUTION: Probes operate at low voltage and are isolated 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.

Switches are used to activate or deactivate the additional probes connected to the controller.

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



• Switch # 3 activates the probe connected to input # 2.
• Switch # 4 activates the probe connected to input # 3.
• Switch # 5 activates the probe connected to input # 4.

2 Extending the Probes

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

- Use a shielded cable of outside diameter between 0.245 and 0.260 in (6.22 and 6.60 mm) (the cable dimensions should not be under 18 AWG) to ensure the cable entry is liquid tight. Do not ground the shielding.
- It is preferable to solder the cable joint to ensure a proper contact between the two cables.

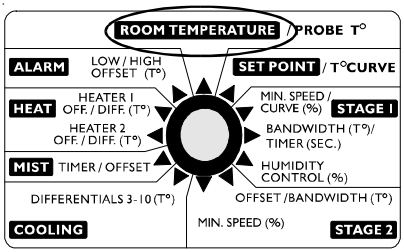
CAUTION: Do not run probe cables next to other power cables. When crossing over other cables, cross at 90°.

4 Defective Probes

If a defective probe is detected, the Defective Probe Pilot Light flashes. 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.

To identify the defective probe:

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



- Press the push-button. If the probe connected to input # 1 and supplied with the controller is not defective, the letters"**PR1**" are displayed, alternating with the on/off state of the probe and the temperature measured by the probe. If the probe is defective, the letters "**PR1**" are displayed, alternating with the state of the probe and the letter "**P**".

For each additional probe connected to the controller:

- Press the push-button once again. If the probe is not defective, the letters "**PR#**" (where # is the number of the input to which the probe is connected) are displayed, alternating with the on/off state of the probe and the temperature measured by the probe. If the probe is defective, the letters "**PR#**" are displayed, alternating with the on/off state of the probe and the letter "**P**".

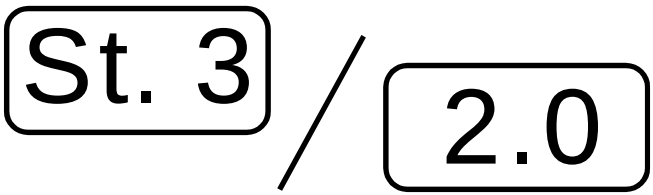
CHANGING THE PARAMETER SETTINGS

USING THE DISPLAY

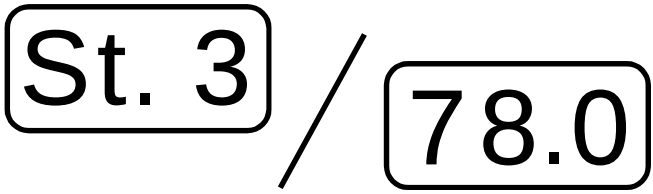
Flashing Values: The display will flash in certain cases and not in others. The flashing indicates that the value shown can be adjusted. A value that is not flashing cannot be adjusted.

Relative and Absolute Values: Some parameter adjustments are displayed both as a relative value and an absolute temperature. This applies to all heating and cooling differentials, the mist differential and the mist and heater offsets. The parameter is first displayed as a relative value. The corresponding absolute temperature is displayed after six seconds if no action is taken by the user. The absolute value is the temperature at which the stage turns on (except in the case of the heater and mist offset where the value displayed is the temperature at which the stage turns off). If the user turns the adjustment knob, the relative value reappears. For example, when the user turns the selection knob to a differential position, i.e. DIFFERENTIALS 3-10, the sequence is as follows:

(i) The current differential for stage 3 flashes on the display, alternating with "**St. 3**".



(ii) If, after about 6 seconds, no action is taken by the user, the absolute temperature value is displayed, alternating with "**St. 3**". In this case, the absolute value is: Set Point + Bandwidth 1 + Offset 2 + Bandwidth 2 + Differential 3.



(iii) When the user turns the adjustment knob to make an adjustment to the stage 3 differential, the relative value reappears on the display.

In the case of the mist and heating units, the starting temperature is displayed with the letters "**STr**" when adjusting the differential and the stopping temperature is displayed with the letters "**STP**" when adjusting the offset.

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 and the Stage 1 minimum ventilation speed can be modified (as long as the temperature curve and the minimum ventilation speed curve are deactivated respectively).

To lock the parameter settings:

- Set internal switch # 1 to **ON**.

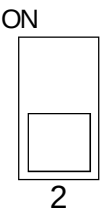
To unlock the parameter settings:

- Set internal switch # 1 to **OFF**.

TEMPERATURE SETTINGS

TEMPERATURE UNITS

Temperatures can be displayed in either Celsius or Fahrenheit units

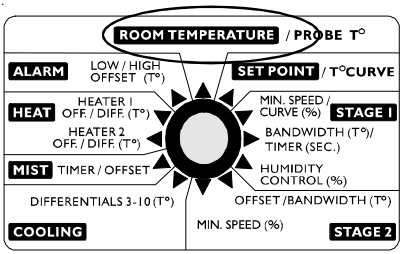


■ Set internal switch # 2 to the desired position:

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

VIEWING TEMPERATURES

To display the desired temperature, set the selection knob to **ROOM TEMPERATURE**. The readout can display values from -40.0ºF to 120.0ºF (-40.0ºC to 48.9ºC).



1 Viewing Room Temperature

The room temperature is the average value of all temperatures measured by activated probes in proper operating condition.

■ Set the selection knob to **ROOM TEMPERATURE / PROBE T°**. The room temperature is displayed.

2 Viewing Probe Temperatures

The controller can display probe temperatures individually. Probes can also be turned on or off (using the internal switches) to control the temperature in different parts of the building.

■ Set selection knob to **ROOM TEMPERATURE / PROBE TEMP.** The average room temperature is displayed.

- Press the push-button. The temperature reading from probe 1 is displayed, alternating with the letters "**Pr 1**" and the on/off state of probe 1.

- For each additional probe, press the push-button. The temperature reading from probe x is displayed, alternating with the letters "**Pr x**" and the on/off state of the probe, etc.

Note: The display returns to the average room temperature after one minute.

3 Viewing Minimum / Maximum Temperatures

The minimum and maximum temperatures are the lowest and highest temperature values recorded since the last reset. Maximum and minimum temperatures values are recorded for the average room temperature as well as for individual probe temperatures.

- Set the selection knob to **ROOM TEMPERATURE / PROBE TEMP**. The room temperature is displayed.

- Turn the adjustment knob clockwise by one notch. The minimum temperature flashes on the display, alternating with the letters "**Lo**".

- Turn the adjustment knob clockwise one notch further. The maximum temperature flashes on the display, alternating with the letters "**Hi**".

- Turn the adjustment knob clockwise a third notch. The room temperature is displayed again.

- For each individual probe, press the push-button. The temperature reading from probe x is displayed, alternating with the letters "**Pr x**" and the on/off state of the probe.

- Turn the adjustment knob clockwise by one notch. The minimum temperature is displayed, alternating with the letters "**Lo**".

- Turn the adjustment knob clockwise one notch further. The maximum temperature is displayed, alternating with the letters "**Hi**".

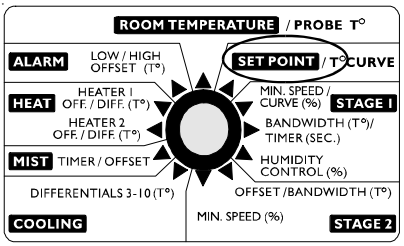
- Turn the adjustment knob clockwise a third notch. The probe temperature is displayed again.

- Press the push-button to access the other probes, etc.

NOTE: If you let the display flash for more than 10 seconds, the controller resets the minimum and maximum temperatures currently in memory (the display stops flashing to indicate that the reset has been done).

TEMPERATURE SET POINT

The temperature set point is the target room temperature. It can be adjusted between -40.0°F and 99.9°F (-40.0°C and 37.7°C).



Adjusting Temperature Set Point

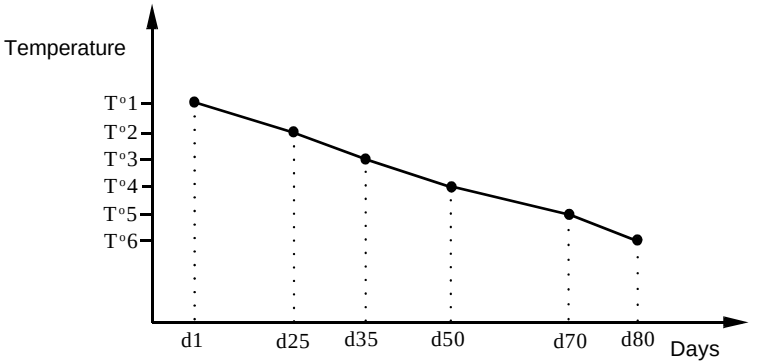
- Set the selection knob to **SET POINT / T° CURVE**.The current set point flashes on the display.

- Use the adjustment knob to adjust the set point to the desired value.

NOTE: The temperature set point can be adjusted only if the temperature curve is deactivated (see following section).

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.

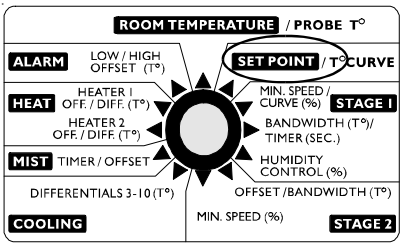
NOTES :

i) All six points of the curve must be specified. If six points are not needed, repeat the last temperature value for each unnecessary point.

ii) Certain restrictions apply to reduce the risk of errors:

- The highest possible day number is 99.
- Decreasing day numbers are not allowed.
- Increasing temperatures are not allowed.
- The temperature variation cannot exceed 3°F (1.6°C) per day.

1 Specifying the Curve



- Set the selection knob to **SET POINT / T° CURVE**. The current temperature set point flashes on the display.

- Press the push-button. The word **OFF** is displayed indicating that the termperature curve is deactivated. If this is not the case, see below to deactivate the curve.

Repeat the following steps for each of the six points:

- Press the push-button once again. The day number is displayed, alternating with the word "**day**".

- Using the adjustment knob, set the day number to the desired value.

- Press the push-button once again. The current temperature set point is displayed, alternating with the word "**set**".

- Using the adjustment knob, adjust the set point to the desired value.

Once the six points of the curve have been specified, activate the curve as explained below.

NOTE: Make sure the temperature curve is deactivated before specifying new points (see below).

2 Activating Temperature Curve

If you have just finished specifying the points on the curve:

- Press the push-button once again. The word **OFF** flashes on the display.
- Turn the adjustment knob clockwise one notch. The word **ON** flashes on the display, indicating that the temperature curve is now activated.
- Set the selection knob to **ROOM TEMPERATURE**.

If you have previously defined the points on the curve:

- Set the selection knob to **SET POINT / T° CURVE**. The current value of the temperature set point flashes on the display.
- Press the push-button. The word **OFF** is displayed.
- Press the push-button to display the points of the curve currently defined until the word **OFF** appears (thirteen clicks).
- Turn the adjustment knob clockwise one notch. The word **ON** flashes on the display, indicating that the temperature curve is now activated.
- Set the selection knob to **ROOM TEMPERATURE**.

3 Viewing Current Set Point and 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 flashes on the display.
- Press the push-button. The current day number is displayed, alternating with the letters "**cur. day**".
- Use the adjustment knob to set the day number to the desired value.

4 Deactivating Temperature Curve

- Set the selection knob to **SET POINT / T° CURVE**. The current temperature set point is displayed.
- Press the push-button to display the points of the curve actually defined until the word **ON** appears (fourteen clicks).
- Turn the adjustment knob counterclockwise one notch. The word **OFF** flashes on the display, indicating that the temperature curve is now deactivated.
- Set the selection knob to **ROOM TEMPERATURE**.

VENTILATION SETTINGS

COOLING OPERATION

The TC5-2V8SA controls two stages of variable-speed fans (Stage 1 - 2), six stages of constant-speed fans (Stage 3 - 8) and two optional stages of constant-speed fans (Stages 9 & 10). Figure 1 on the next page gives an overview of cooling operation.

If room temperature rises:

- When room temperature < Set Point, stage 1 fans run at minimum speed according to the minimum ventilation cycle. If minimum ventilation has been activated on Stage 2, Stage 2 fans also provide minimum ventilation.
- At Set Point: stage 1 fans stop operating according to the minimum ventilation cycle and run continuously, increasing in speed as the room temperature rises.
- At Set Point + Bandwidth 1: stage 1 fans reach full speed.
- At Set Point + Bandwidth 1 + Stage 2 Offset: stage 2 fans start running continuously.
- At Set Point + Bandwidth 1 + Stage 2 Offset + Bandwidth 2: stage 2 fans reach full speed.
- At Set Point + Bandwidth 1 + Stage 2 Offset + Bandwidth 2 + Diff. 3: stage 3 fans start running.
- At Set Point + Bandwidth 1 + Stage 2 Offset + Bandwidth 2 + Diff. 3 + Diff. 4: stage 4 fans start running.
- At Set Point + Bandwidth 1 + Stage 2 Offset + Bandwidth 2 + Diff. 3 + Diff. 4 + Diff. 5: stage 5 fans start running.
- At Set Point + Bandwidth 1 + Stage 2 Offset + Bandwidth 2 + Diff. 3 + Diff. 4 + Diff. 5 + Diff. 6: stage 6 fans start running.
- At Set Point + Bandwidth 1 + Stage 2 Offset + Bandwidth 2 + Diff. 3 + Diff. 4 + Diff. 5 + Diff. 6 + Diff. 7: stage 7 fans start running.
- At Set Point + Bandwidth 1 + Stage 2 Offset + Bandwidth 2 + Diff. 3 + Diff. 4 + Diff. 5 + Diff. 6 + Diff. 7 + Diff. 8: stage 8 fans start running.
- At Set Point + Bandwidth 1 + Stage 2 Offset + Bandwidth 2 + Diff. 3 + Diff. 4 + Diff. 5 + Diff. 6 + Diff. 7 + Diff. 8 + Diff. 9: stage 9 fans start running.

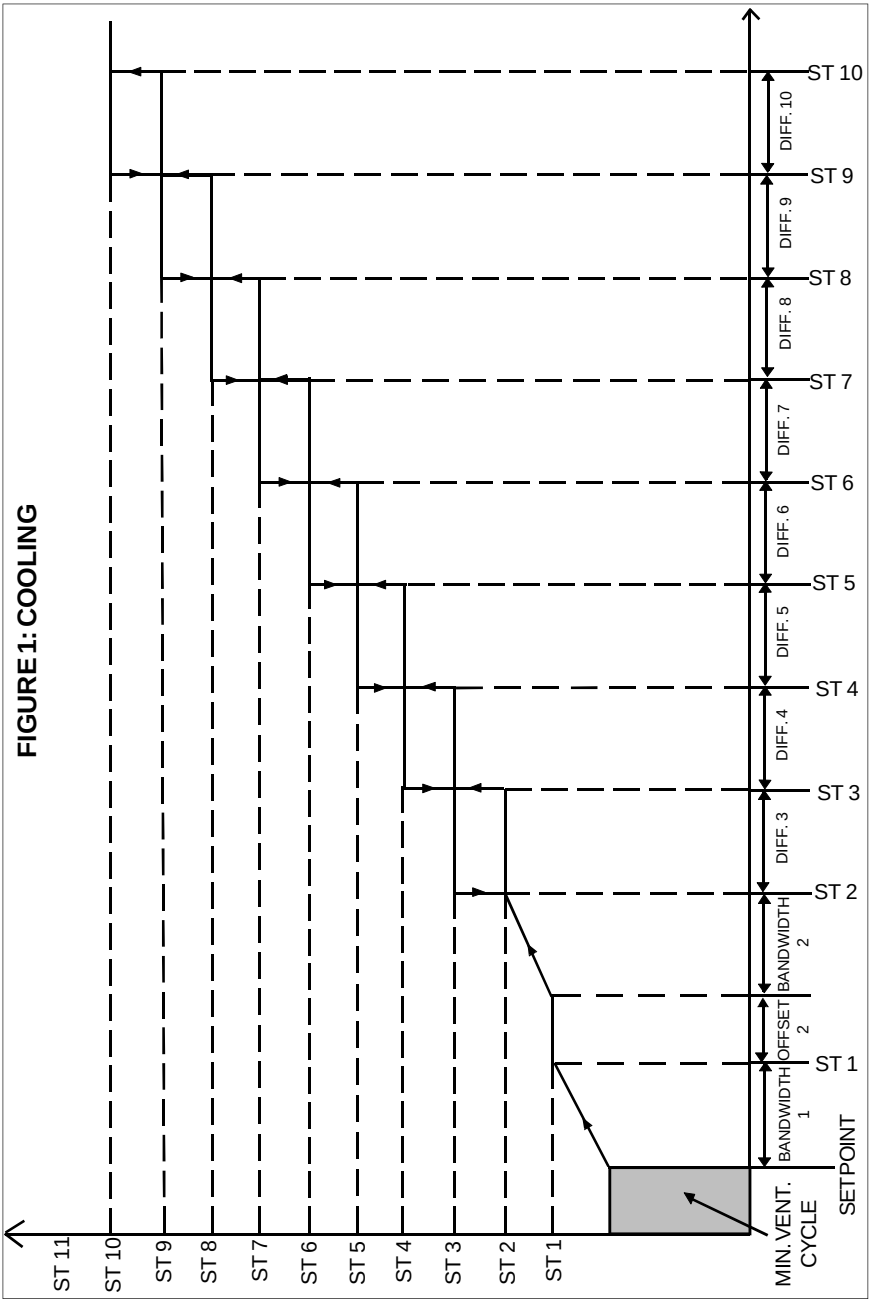


FIGURE 1: COOLING

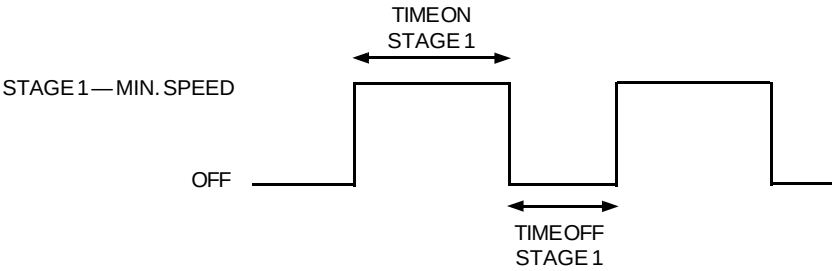
- At Set Point + Bandwidth 1 + Stage 2 Offset + Bandwidth 2 + Diff. 3 + Diff. 4 + Diff. 5 + Diff. 6 + Diff. 7 + Diff. 8 + Diff. 9 + Diff. 10: stage 10 fans start running.

If the room temperature falls:

- At Set Point + Bandwidth 1 + Stage 2 Offset + Bandwidth 2 + Diff. 3 + Diff. 4 + Diff. 5 + Diff. 6 + Diff. 7 + Diff. 8 + Diff. 9: stage 10 fans return to a stop.
- At Set Point + Bandwidth 1 + Stage 2 Offset + Bandwidth 2 + Diff. 3 + Diff. 4 + Diff. 5 + Diff. 6 + Diff. 7 + Diff. 8: stage 9 fans return to a stop.
- At Set Point + Bandwidth 1 + Stage 2 Offset + Bandwidth 2 + Diff. 3 + Diff. 4 + Diff. 5 + Diff. 6 + Diff. 7: stage 8 fans return to a stop.
- At Set Point + Bandwidth 1 + Stage 2 Offset + Bandwidth 2 + Diff. 3 + Diff. 4 + Diff. 5 + Diff. 6: stage 7 fans return to a stop.
- At Set Point + Bandwidth 1 + Stage 2 Offset + Bandwidth 2 + Diff. 3 + Diff. 4 + Diff. 5: stage 6 fans return to a stop.
- At Set Point + Bandwidth 1 + Stage 2 Offset + Bandwidth 2 + Diff. 3 + Diff. 4: stage 5 fans return to a stop.
- At Set Point + Bandwidth 1 + Stage 2 Offset + Bandwidth 2 + Diff. 3: stage 4 fans return to a stop;
- At Set Point + Bandwidth 1 + Stage 2 Offset + Bandwidth 2: stage 3 fans return to a stop; stage 2 fans start decreasing in speed as the temperature decreases.
- At Set Point + Bandwidth 1 + Stage 2 Offset: if minimum ventilation has been activated on Stage 2, Stage 2 fans run according to the minimum ventilation cycle; otherwise, stage 2 fans return to a stop.
- At Set Point + Bandwidth 1**:** Stage 1 fans start decreasing in speed as the temperature decreases.
- At Set Point**:** Stage 1 fans reach minimum speed.
- Below the Set Point: stage 1 fans stop operating continuously and operate according to the minimum ventilation cycle at minimum speed. If minimum ventilation has been activated on Stage 2, Stage 2 fans also provide minimum ventilation.

MINIMUM VENTILATION CYCLE

When the room temperature is below the set point, the Stage 1 fans operate according to the minimum ventilation cycle. Running the fans even though ventilation is not required for a cooling purpose is useful to reduce humidity levels and supply oxygen to the room. It also prevents the fans from freezing in winter.



During time on, the Stage 1 fans run at Stage 1 minimum speed. The Stage 1 pilot light flashes. During time off, the Stage 1 fans do not run. The Stage 1 pilot light turns off. The Stage 1 minimum speed can also be defined by a speed curve (see below).

NOTE: The controller supplies maximum voltage to the variable-speed fans for 2 seconds immediately following each start-up.

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.

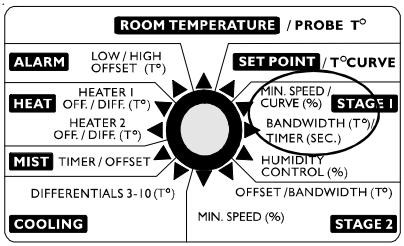
2. To stop the fans, set time on to zero and time off to any value.

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

1 Adjusting Stage 1 Minimum Speed

The minimum speed can be adjusted between 10 and 100% of the full speed of the fans.

- Set the selection knob to **STAGE 1 — MINIMUM SPEED/CURVE**. The current minimum speed for Stage 1 flashes on the display.
- Use the adjustment knob to adjust the minimum speed to the desired value.



NOTE: The minimum speed can be adjusted only if the minimum speed curve is deactivated or if the minimum speed curve is activated but not currently operating (see below).

2 Adjusting Stage 1 Time On and Time Off

Time On and Time Off can be adjusted between 0 and 900 seconds, in increments of 15 seconds.

- Set the selection knob to **STAGE 1 — BANDWIDTH/TIMER**. The current bandwidth for stage 1 flashes on the display.
- Press the push-button. The current time on for Stage 1 flashes on the display, alternating with the letters "**On**".
- Use the adjustment knob to adjust time on to the desired value.
- Press the push-button. The current time off for Stage 1 flashes on the display, alternating with the letters "**Off**".
- Use the adjustment knob to adjust time off to the desired value.

USING STAGE 2 FANS FOR MINIMUM VENTILATION

Stage 2 fans provide minimum ventilation whenever they are not needed for cooling purposes, i.e. when the room temperature is less than Set Point + Stage 1 Bandwidth + Stage 2 Offset. This feature must be activated from the front panel.The timer settings used are the same as for Stage 1 minimum ventilation. Figure 2 below sums up the operation of stage 1 and 2 fans:

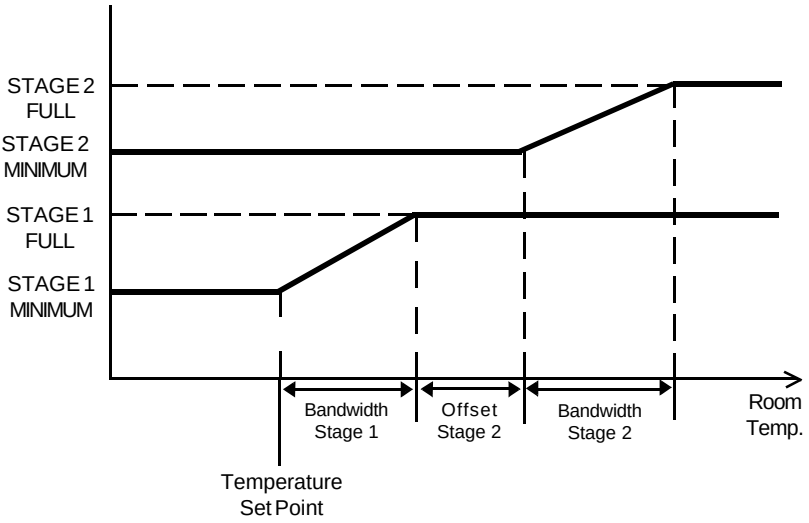


Figure 2: Stage 1 and 2 Operation showing Minimum Ventilation

Activating / Deactivating Minimum Ventilation on Stage 2

- Set the selection knob to **STAGE 2 — MIN. SPEED**. The current minimum speed for stage 2 flashes on the display.
- Press the push-button. The current on/off state for Stage 2 minimum ventilation is displayed.
- Use the adjustment knob to adjust the state to the desired value.

HUMIDITY COMPENSATION

The stage 1 and 2 minimum speed can be adjusted automatically as a function of relative humidity. As humidity increases, the minimum speed increases proportionally to compensate for the change. At humidity levels at or below the humidity set point, minimum speed is equal to the normal uncompensated speed. The user specifies the percentage increase in minimum speed for a relative humidity equal to the humidity set point + 10%. For example, if the minimum speed is 40% and the compensation adjustment is 30%, the minimum speed will be adjusted to 70% of full speed when the humidity rises 10% above the humidity set point. In addition to adjusting the minimum speed, the humidity compensation feature also changes the operation of the minimum ventilation cycle: if the controller is operating in minimum ventilation mode when the relative humidity exceeds the humidity set point, the minimum ventilation fans are operated continuously rather than cycled (this is true even if humidity compensation is disabled).

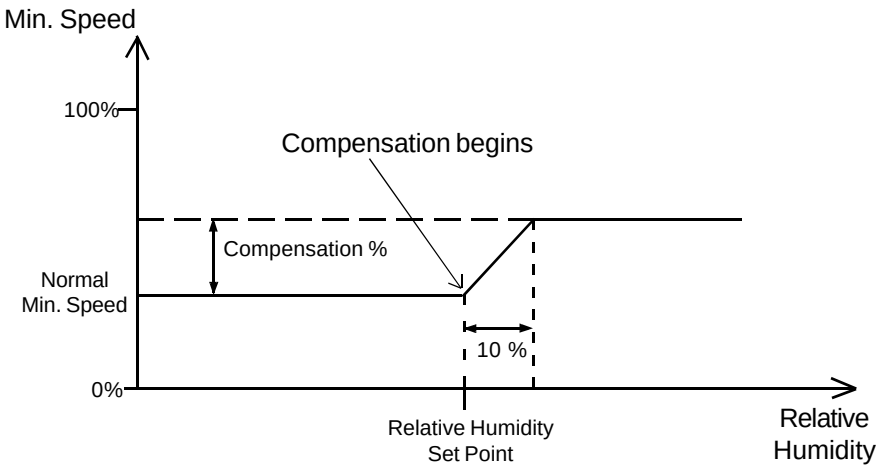
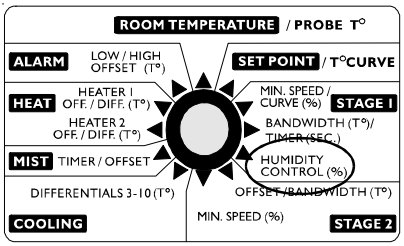


Figure 3: Humidity Compensation on Minimum Speed

This feature also applies when the minimum ventilation curve is activated. Note that for the compensation to take place, the compensation feature must be activated by the user. When a compensation is applied to the minimum speed, the compensation pilot light turns on.

1 Viewing Relative Humidity

The relative humidity is expressed as a percentage.



- Set the selection knob to **STAGE 1 — HUMIDITY CONTROL**. The current relative humidity is displayed.
- Turn the adjustment knob clockwise by one notch. The minimum humidity flashes on the display, alternating with the letters "**Lo**".
- Turn the adjustment knob clockwise one notch further. The maximum humidity flashes on the display, alternating with the letters "**Hi**".
- Turn the adjustment knob clockwise a third notch. The current humidity value is displayed again.

NOTE: If you let the display flash for more than 10 seconds when the maximum or minimum humidity is displayed, the controller resets the minimum and maximum humidity values currently in memory (the display stops flashing to indicate that the reset has been done).

2 Adjusting Relative Humidity Set Point

When the relative humidity exceeds the humidity set point, stage 1 minimum speed is increased by a proportional amount to compensate for the increase in humidity. Note that the humidity compensation feature must be activated for this to work.

- Set the selection knob to **STAGE 1 — HUMIDITY CONTROL**. The current humidity reading is displayed.

- Press the push-button. The relative humidity set point is displayed, alternating with the letters "**set rH**".

- Use the adjustment knob to adjust the set point to the desired value.

3 Adjusting Minimum Speed Compensation

This is the percentage increase in minimum speed for a relative humidity equal to the humidity set point + 10%. The value ranges from 0 to 100%.

- Set the selection knob to **STAGE 1 — HUMIDITY CONTROL**. The current humidity reading is displayed.

- Press the push-button twice. The current minimum speed compensation is displayed, alternating with the letters "**SPd**".

- Use the adjustment knob to adjust the minimum speed compensation to the desired value.

4 Activating / Deactivating Humidity Compensation

- Set the selection knob to **STAGE 1 — HUMIDITY CONTROL**. The current humidity reading is displayed.

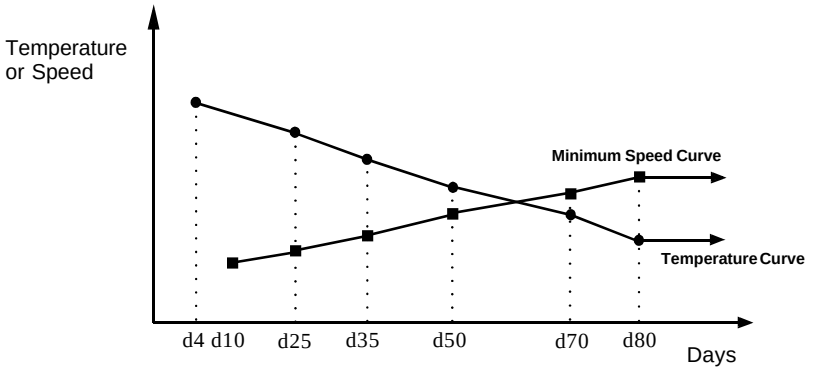
- Press the push-button three times. The current on/off state of humidity compensation flashes on the display.

- Use the adjustment knob to adjust the on/off state to the desired value.

MINIMUM VENTILATION SPEED CURVE

The user can define a minimum ventilation speed curve to adjust the Stage 1 minimum speed automatically over a given time period. Each curve is defined by six points. Each point specifies a day number and a fan speed for that day. Once the points are defined, the minimum speed curve must be activated. When the minimum speed curve is activated, the controller adjusts the Stage 1 minimum speed every hour in a linear fashion between two consecutive points.

When the last point of the curve is reached, the curve is deactivated. The controller maintains the minimum speed specified for this point until the curve is reactivated or until a new single minimum speed is specified using the first method.



NOTE:

If the room temperature falls below "Set Point - 5.0°F (2.8°C) - heater offset - heater 1 differential", the fans will begin to run at the minimum speed specified for the first point of the curve and will continue to do so as long as the room temperature remains below the set point. When the room temperature rises above the set point, the fans will return to the current minimum speed, calculated according to the minimum speed curve.

Interaction Between Temperature and Minimum Speed Curves

- The minimum speed curve can be activated only if the temperature curve is already activated

- All points of the minimum speed curve other than the first one are automatically given day numbers identical to those specified for the temperature curve. Only the first point of the minimum speed curve has an adjustable day number. This day number must be greater or equal to the day number specified for the first point of the temperature curve and less than the day number specified for the second point of the temperature curve (see example 1).

EXAMPLE 1

	TEMPERATURE CURVE	MINIMUM SPEED CURVE
POINT 1	d1	d1 to d6 (adjustable)
POINT 2	d7	d7 (not adjustable)

- When the minimum speed curve is activated, it will effectively be operating (i.e. the controller will begin to adjust the minimum speed according to the specified points of the curve) only when the current day number of the temperature curve reaches the first day number of the minimum speed curve.

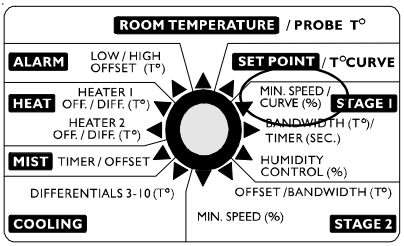
EXAMPLE 2

	TEMPERATURE CURVE		MINIMUM SPEED CURVE	
	Day	Temperature	Day	Speed
POINT 1	d1	85.0 °F	d3	10 %
POINT 2	d7	85.0 °F	d7	20 %

- If you activated the temperature curve yesterday, the current day number of the temperature curve is d2. Therefore, if you activate the minimum speed curve today, it will effectively be in operation the next day, when the current day number of the temperature curve reaches d3. In the meantime, the fans will run at the specified single minimum speed (see example 2).

- If you activated the temperature curve six days ago, the current day number of the temperature curve is d6. Therefore, if you activate the minimum speed curve today, it will effectively be in operation the moment you activate it. In this case, the current minimum speed will be a value between 10% and 20%.

1 Specifying Minimum Speed Curve



- Set the selection knob to **STAGE 1 — MINIMUM SPEED / CURVE**. The current minimum speed flashes on the display.

- Press the push-button. The word **OFF** is displayed, indicating that the minimum speed curve is de-activated. If this is not the case, deactivate the curve as described below.

Repeat the following steps for each of the six points:

- Press the push-button once again. A day number is displayed, alternating with the word "**day**".

- For the first point of the curve, use the adjustment knob to adjust the day number to the desired value. For all other points of the curve, the day number can not be adjusted.

- Press the push-button once again. The minimum speed for that day is displayed, alternating with the letters "**SPd**".

- Use the adjustment knob to adjust the minimum speed to the desired value.

NOTES:

i) The minimum speed curve must be deactivated before specifying the points on the curve (see below).

ii) All six points of the curve must be specified. If you do not need six different points, repeat your last minimum speed for each unnecessary point of the curve.

iii) Certain restrictions apply to reduce the risk of errors:

- decreasing minimum speeds are not allowed.
- the minimum speed variation cannot exceed 10% per day.

2 Activating Minimum Speed Curve

If you have just finished specifying the points on the curve:

- Press the push-button once again. The word **OFF** flashes on the display.
- Turn the adjustment knob clockwise by one notch. The word **ON** flashes on the display, indicating that the minimum speed curve is now activated.

If you have previously specified the points on the curve:

- Set the selection knob to **STAGE 1 — MINIMUM SPEED / CURVE**. The current minimum speed flashes on the display.
- Press the push-button to display the points of the curve currently defined until the word **OFF** appears (fourteen clicks).
- Turn the adjustment knob clockwise by one notch. The word **ON** flashes on the display, indicating that the minimum speed curve is now activated.

3 Viewing Current Minimum Speed and Day

When the minimum speed curve is activated, the current minimum speed and day number can be viewed at any time. To modify the day number, refer to the section on temperature curves.

- Set the selection knob to **STAGE 1 — MINIMUM SPEED / CURVE**. The current minimum speed is displayed.
- Press the push-button. The current day is displayed, alternating with the letters "**cur. dAY**".

4 Deactivating Minimum Speed Curve

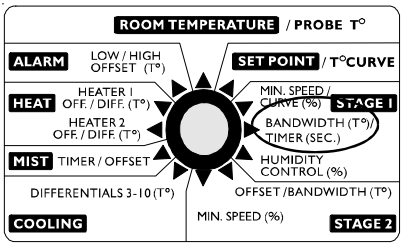
- Set the selection knob to **STAGE 1 — MINIMUM SPEED / CURVE**. The current minimum speed is displayed.
- Press the push-button to display the points of the curve currently defined until the word **ON** appears (fourteen clicks).
- Turn the adjustment knob counterclockwise by one notch. The word **OFF** flashes on the display, indicating that the minimum speed curve is now deactivated.

VENTILATION SETTINGS

1 Adjusting Stage 1 Bandwidth

The Stage 1 bandwidth is the temperature interval within which the Stage 1 variable speed fans increase or decrease in speed proportionally to the temperature (see Fig. 4 below). The bandwidth can be adjusted between 0.5°F and 20.0°F (0.3°C and 11.1°C).

- Set the selection knob to **STAGE 1 — BANDWIDTH/TIMER**. The current bandwidth for Stage 1 flashes on the display.
- Use the adjustment knob to adjust bandwidth to the desired value.



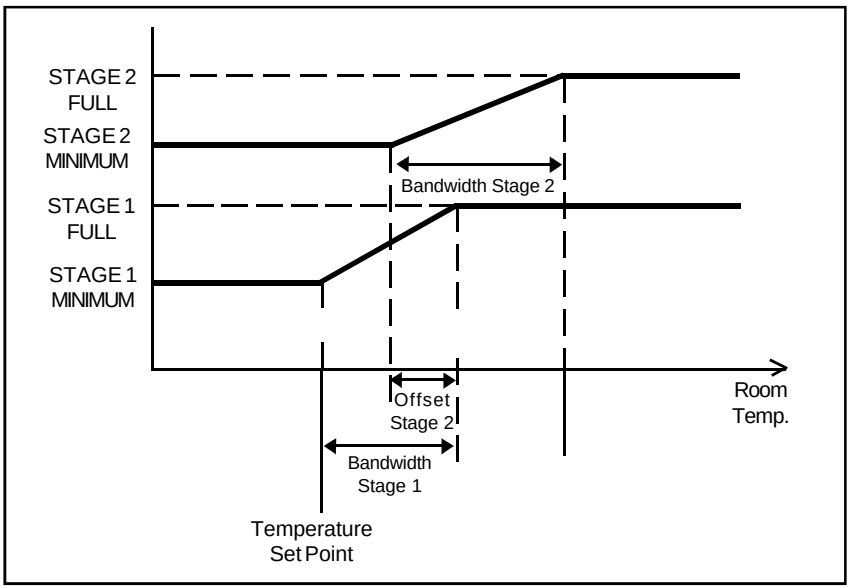
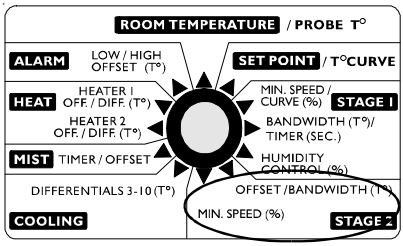


Figure 4: Operation of Stages 1 and 2 With Negative Offset

2 Adjusting Stage 2 Offset

The Stage 2 offset is the temperature difference from the set point at which the Stage 2 variable-speed fans start to run at Stage 2 minimum speed. (see Fig. 4 above). The offset can be adjusted between -20.0°F and 20.0°F (-11.1°C and 11.1°C). When the offset is negative, Stage 2 fans start running before Stage 1 fans reach full speed (see Fig. 4). If properly adjusted, this makes for a smoother transition in air displacement. Note that Stage 2 fans do not operate below the set point.

- Set the selection knob to **STAGE 2 — OFFSET/BANDWIDTH**. The current offset for Stage 2 is displayed, alternating with the letters "**OFt**".



- Use the adjustment knob to adjust the offset to the desired value.

3 Adjusting Stage 2 Bandwidth

The Stage 2 bandwidth is the temperature interval within which the Stage 2 variable speed fans increase or decrease in speed proportionally to the temperature (see Fig. 4 above). The bandwidth can be adjusted between 0.5°F and 20.0°F (0.3°C and 11.1°C).

- Set the selection knob to **STAGE 2 — OFFSET/BANDWIDTH**. The current offset for Stage 2 is displayed, alternating with the letters "**OFt**".
- Press the push-button. The current bandwidth for Stage 2 is displayed, alternating with the letters "**bd**".
- Use the adjustment knob to adjust bandwidth to the desired value.

4 Adjusting Stage 2 Minimum Speed

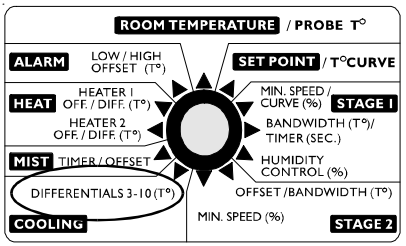
The minimum speed can be adjusted between 10% and 100% of the full speed of the fans.

- Set the selection knob to **STAGE 2 — MIN. SPEED/TIMER ON/OFF**. The current minimum speed for Stage 2 flashes on the display.
- Use the adjustment knob to adjust the speed to the desired value.

5 Adjusting Stage 3 - 10 Differentials

The Stage 3 - 10 cooling differentials are the temperature differences between the moment the constant-speed fans start to run and the moment they turn off for each stage (see Figure 1 above). The differentials can be adjusted between 0.5°F and 20.0°F (0.3°C and 11.1°C). Note that if the stage 2 offset is negative, the stage 3 differential is calculated from the bandwidth of the stage that reaches full speed last (stage 1 or 2 – see Fig. 4 above).

- Set the selection knob to **COOLING — DIFFERENTIALS 3-10**. The current differential for Stage 3 is displayed, alternating with the letters «**St. 3**».
- Use the adjustment knob to adjust the differential to the desired value.



- Press the push-button. The current differential for Stage 4 flashes on the display, alternating with the letters "**St 4**".
- Use the adjustment knob to adjust the differential to the desired value.
- Press the push-button. The current differential for Stage 5 flashes on the display, alternating with the letters "**St 5**".

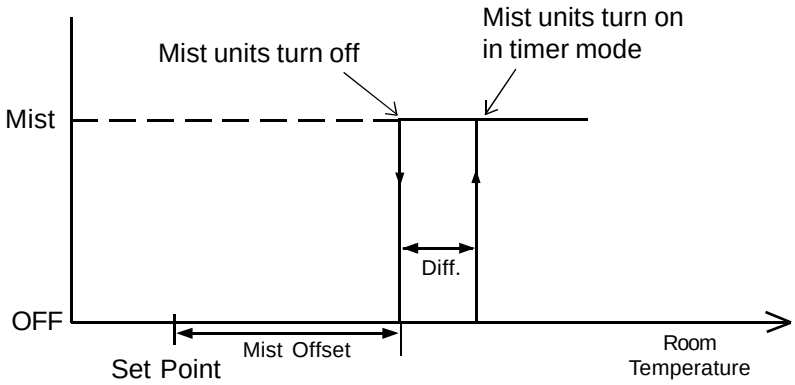
- Use the adjustment knob to adjust the differential to the desired value.
- Press the push-button. The current differential for Stage 6 flashes on the display, alternating with the letters "**St 6**".
- Use the adjustment knob to adjust the differential to the desired value.
- Press the push-button. The current differential for Stage 7 flashes on the display, alternating with the letters "**St 7**".
- Use the adjustment knob to adjust the differential to the desired value.
- Press the push-button. The current differential for Stage 8 flashes on the display, alternating with the letters "**St 8**".
- Use the adjustment knob to adjust the differential to the desired value.
- If Stage 9 has been configured for cooling, press the push-button. The current differential for Stage 9 flashes on the display, alternating with the letters "**St 9**".
- Use the adjustment knob to adjust the differential to the desired value.
- If Stage 10 has been configured for cooling, press the push-button. The current differential for Stage 10 flashes on the display, alternating with the letters "**St 10**".
- Use the adjustment knob to adjust the differential to the desired value.

MIST COOLING

The last cooling stage can be configured as a mist stage. To activate mist cooling, set internal switch #9 to ON. The number of heating stages determines which stage this is.

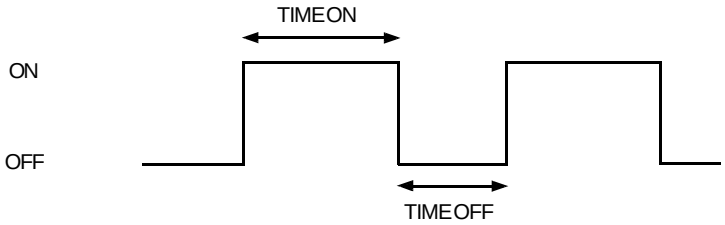
NUMBER OF HEATING STAGES	MIST STAGE
0	10
1	9
2	8

The following diagram sums up the operation of the mist units.



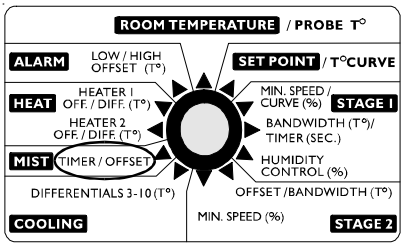
If the humidity compensation is activated, the mist units are turned off when the humidity reaches a user-defined maximum humidity level.

The mist units operate according to a timer cycle. Time on is the running time of the mist units and time off is the off time of the mist units.



1 Adjusting Mist Differential

The mist differential is the variation in room temperature between the moment the mist units turn on and the moment they turn off.The differential can be adjusted between 0.5°F and 20.0°F (0.3°C and 11.1°C).



- Set the parameter selection knob to **MIST — TIMER/OFF-SET**. The current time on for the mist cycle is displayed, alternating with the letters "**On**".
- Press the push-button three times. The mist differential is displayed, alternating with the letters "**dIF**".
- Using the adjustment knob, set the differential to the desired value.

2 Adjusting Mist Offset

The mist offset is the temperature difference from the set point at which the mist units turn off. The offset can be adjusted between 0.5°F and 40.0°F (0.3°C and 22.2°C).

- Set the parameter selection knob to **MIST — TIMER/OFFSET**. The current time on for the mist cycle is displayed, alternating with the letters "**On**".
- Press the push-button twice. The mist offset is displayed, alternating with the letters "**Oft**".
- Using the adjustment knob, set the offset to the desired value.

3 Adjusting Mist Timer Settings

Time on and time off can be adjusted between 0 and 60 minutes, in increments of 1 minute. To deactivate mist cooling, set time on to zero.

- Set the parameter selection knob to **MIST — TIMER/OFFSET**. The current time on for the mist cycle is displayed, alternating with the letters "**On**".
- Use the adjustment knob to set time on to the desired value (in minutes).
- Press the push-button. The current time off for the mist cycle is displayed, alternating with the letters "**Off**".
- Use the adjustment knob to set time off to the desired value (in minutes).

4 Adjusting Humidity Cut-Off Level

The humidity cut-off level is the humidity level at which mist units are turned off. This parameter is not displayed unless humidity compensation is activated (see Humidity Compensation). The value ranges from 40 to 100%. When the mist units are turned off, the compensation pilot light turns on.

- Set the parameter selection knob to **MIST — TIMER/OFFSET**. The current time on for the mist cycle is displayed, alternating with the letters "**On**".
- Press the push-button four times. The current cut-off level is displayed, alternating with the letters "**StP rH**"
- Use the adjustment knob to set the turn off level to the desired value.

HEATER SETTINGS

MODE 1: CASCADING HEATERS

When cascading heating is used, the temperature used is the average room temperature (internal switch 8 is turned OFF). To use stages 9 and 10 for heating, set internal switches # 6 and 7 to ON. To use only stage 10 for heating, set internal switch # 6 to ON and # 7 to OFF.

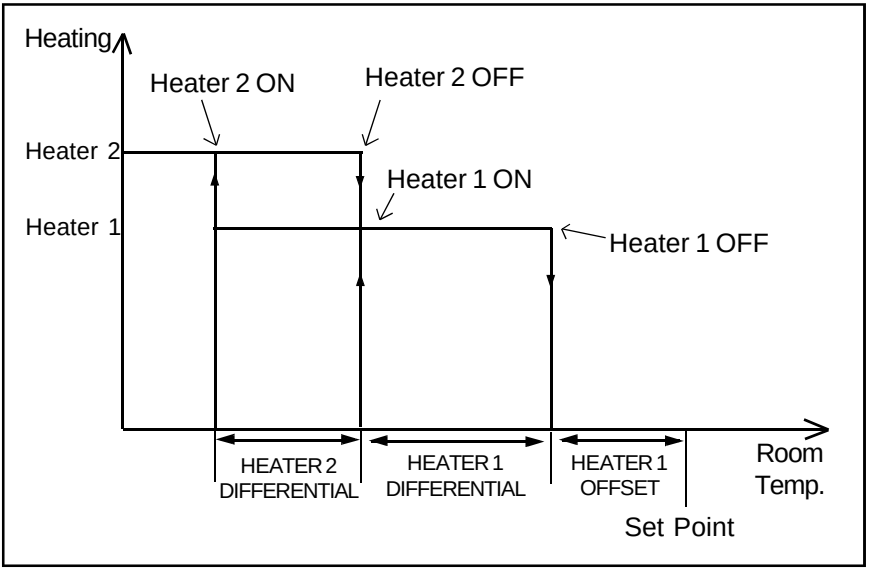


Figure 5: Operation of Cascading Heaters

If the room temperature rises:

- at Set Point - Heater 1 Offset - Heater 1 Diff.: Heater 2 turns off.

- at Set Point - Heater 1 Offset: Heater 1 turns off.

If the room temperature falls:

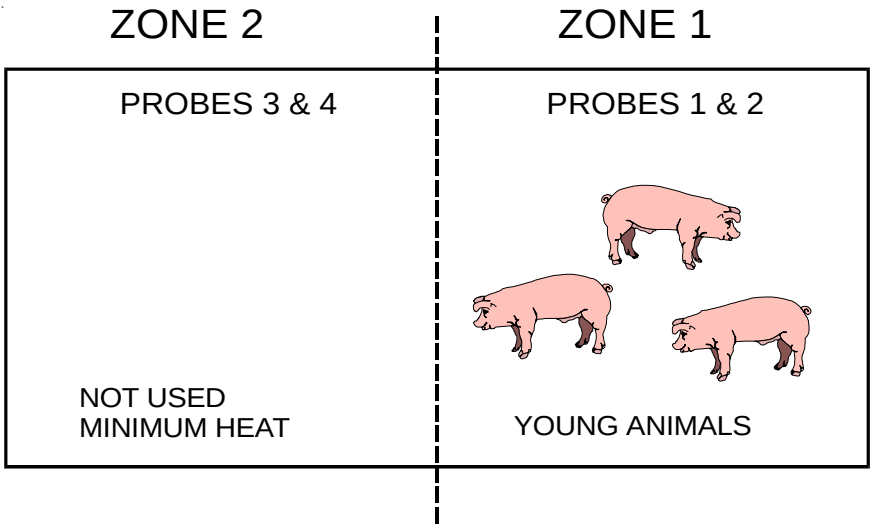
- at Set Point - Heater 1 Offset - Heater 1 Diff.: Heater 1 turns on.

- at Set Point - Heater 1 Offset - Heater 1 Diff. - Heater 2 Diff.: Heater 2 turns on.

MODE 2: ZONED HEATERS

When zoned heating is used, Heater 1 is assigned to zone 1 and Heater 2 is assigned to zone 2. Since the two zones function independently, different probes are assigned to each zone: Probes 1 and 2 are assigned to zone 1 and Probes 3 and 4 are assigned to zone 2. Individual probes can be turned on or off using the dipswitch settings. If both probes are activated for a given heater, the average temperature from both probes is used. To configure your system for zoned heaters, set dipswitches #6, 7 and 8 to ON.

To avoid ventilation problems when using zoned heating, a special protection is built into the device. Suppose the animals are young and confined to one part of the building (zone 1) while the rest of the building is heated at a minimum level (zone 2). If the temperature difference between zones is too great and zone 1 fans operate according to the average temperature for both zones, cooling in zone 1 may be insufficient. A built-in protection will operate the fans according to the probes of the zone with the highest temperature whenever the temperature difference between zones is greater than a user-defined value.



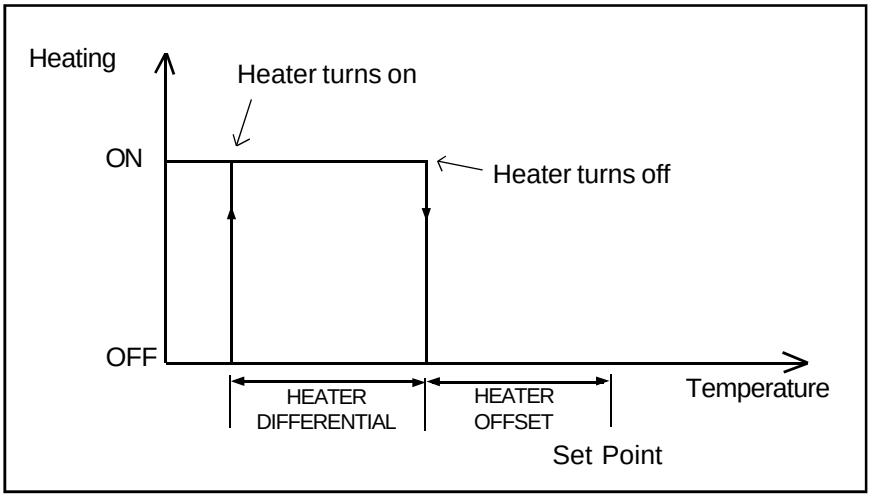


Figure 6: Operation of Zoned Heaters

If the room temperature rises:

- at Set Point - Heater Offset 1 (Zone 1) : Heater 1 turns off.
- at Set Point - Heater Offset 2 (Zone 2) : Heater 2 turns off.

If the room temperature falls:

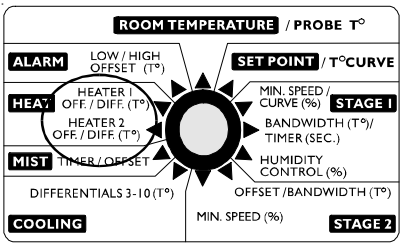
- at Set Point - Heater Offset 1 - Diff. 1 (Zone 1) : Heater 1 turns on.
- at Set Point - Heater Offset 2 - Diff. 2 (Zone 2) : Heater 2 turns on.

1 Adjusting Heater Offsets

The heater offset can provide substantial energy savings if correctly adjusted according to the outside temperature. It is the number of degrees below the set point at which the heating units turn off (see Fig. 6 above). The heater 1 and 2 offsets can be adjusted between -10°F and 20.0°F (-5.6°C and 11.1°C). If cascading heating is used, only heater 1 offset is used.

- Set selection knob to **HEATER 1 — OFF./DIFF.** or **HEATER 2 — OFF./DIFF**. The current heating offset is displayed, alternating with the letters "**OFT**".

- Use the adjustment knob to adjust the offset to the desired value.



2 Adjusting Heater Differentials

The heating differential is the temperature difference between the moment the heater units turn on and the moment they turn off (see Fig. 6 above). The differential can be adjusted between 0.5°F and 20.0°F (0.3°C and 11.1°C).

- Set the selection knob to **HEATER 1 — OFF./DIFF.** or **HEATER 2 — OFF./DIFF**. The current heater offset is displayed, alternating with the letters "**OFT**".

- Press the push-button. The heater differential is displayed, alternating with the letters "**DIF**".

- Use the adjustment knob to adjust the differential to the desired value.

3 Adjusting Max. Temperature Difference Between Zones

When using zoned heating, a built-in protection will operate the fans according to the probes of the zone with the highest temperature whenever the temperature difference between zones is greater than this parameter. The default is 7.5°F (4.2°C) and values range from 5°F to 40.0°F (2.8°C and 22.2°C). To disable this feature, set the parameter to the maximum value.

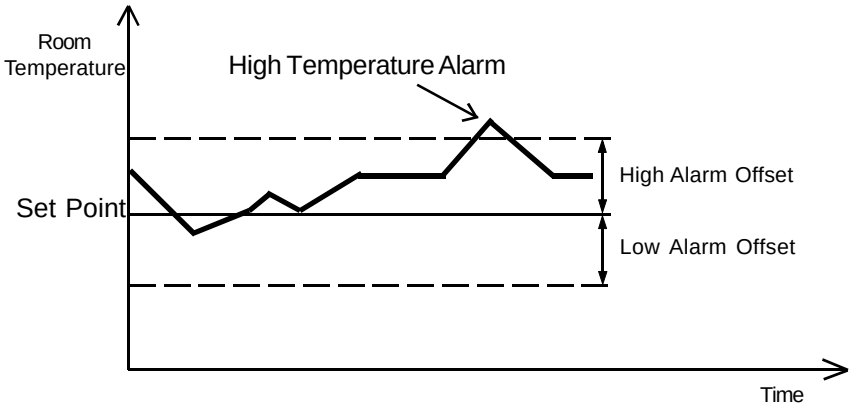
- Set the selection knob to **HEATER 2 — OFF./DIFF.** The current heater offset is displayed, alternating with the letters "**OFT**".

- Press the push-button twice. The maximum temperature difference between zones is displayed, alternating with the letters "**dif Zon**".

- Use the adjustment knob to adjust the temperature difference to the desired value.

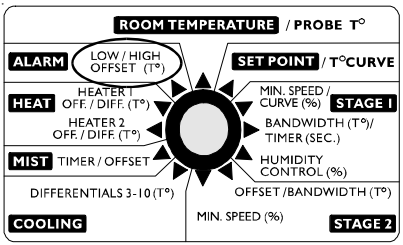
ALARM SETTINGS

The controller sets off an alarm in the case of a power failure, a fault in the supply circuit or a high or low temperature. Temperature alarms are defined according to the set point as shown in the diagram below.



Adjusting the Alarm Settings

The high and low alarm offsets range from 0.5°F to 40°F (0.3°C and 22.2°C).



- Set the selection knob to **ALARM — LOW / HIGH OFFSET**. The current low alarm offset flashes on the display, alternating with the word "**LO**".
- Use the adjustment knob to set the low alarm offset to the desired value.
- Press the push-button. The current high alarm offset flashes on the display, alternating with the word "**HI**".
- Use the adjustment knob to set the high alarm offset to the desired value.

TEST MODE

A test mode allows you to simulate temperature changes and verify controller performance. In test mode, the temperature probe inputs are turned off, allowing the user to change the room temperature used by the controller to operate the stages. The controller operates as before using the new temperature settings.

To enter test mode:

- Set internal switch # 12 to **ON**. At the **ROOM TEMPERATURE** position, the letters "**TST**" are displayed, alternating with the room temperature.

- Turn the adjustment knob to adjust the room temperature to the desired value. The controller operates the stages according to the new temperature setting.

To exit test mode:

- Set internal switch # 12 to **OFF**.

TROUBLESHOOTING GUIDE

PROBLEM	CAUSE	SOLUTION
The display doesn't work.	The circuit breaker on the service panel is off or tripped.	Reset the circuit breaker.
	The wiring is incorrect.	Fix the wiring.
	The input fuse is open.	Replace the fuse.
	The voltage selector switch is in the wrong position.	Set the switch to the correct position.
	The display board interconnect cable is unplugged from the power supply board.	Plug the cable.
The display shows the letter "P"	Probe # 1 is improperly connected.	Fix the probe's connection.
The Defective Probe Pilot Light flashes.	One or more probes are defective.	Follow the procedure described in DEFECTIVE PROBES to identify and replace the defective probe.
The display shows sudden variations in the room temperature.	A variation in resistance is induced on a probe.	Make sure the probes are dry and move them away from drafts and sources of radiant heating.
	There is electrical noise near an extended probe cable.	Do not run probe cables next to other power cables. When crossing other power cables, cross at 90°.

PROBLEM	CAUSE	SOLUTION
Stage 1 or 2 fans are not running.	The wiring is incorrect.	Correct the wiring. In particular, make 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 motor. Also, be sure the stage's COMMON is supplied by line L1.
	The Stage's fuse is open.	Replace the fuse.
	The display board interconnect cable is not plugged into the power supply board properly.	Make sure the cable is firmly plugged in with the tabs in place.
	The minimum speed is too low.	Adjust the minimum speed to a higher value.
	The fan motor is defective.	Check if motor is defective by connecting it to an alternate power supply. Replace the motor if it still doesn't operate.

PROBLEM	CAUSE	SOLUTION
Stage 1 or 2 fans run continuously at full speed.	The wiring is incorrect. The ambient temperature is above the set point.	Fix the wiring. Adjust the set point to the desired value.
Stage 1 or 2 fans run erratically.	The selected motor curve is inappropriate. The bandwidth is too small. The time on or time off is too short.	Select an appropriate motor curve. Adjust the bandwidth to a higher value. Adjust the time on or time off to a higher value.
Stage 1 or 2 fans do not stop running when the controller is operating in minimum ventilation cycle.	Time off is set to zero. The wiring is incorrect.	Set time off to a value other than zero. Correct the wiring. In particular, make 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 motor. Also, be sure the stage 1 COMMON is supplied by line L1.

PROBLEM	CAUSE	SOLUTION
One of the other outputs is not operating.	The output's fuse is open.	Replace the fuse.
	The display board interconnect cable is not plugged into the power supply board properly.	Make sure the cable is firmly plugged in with the tabs in place.
	The wiring is incorrect.	Correct the wiring. In particular, make 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 motor or heating unit. Also, make sure the output COMMON is supplied by line L1.
	The fan motor or heating unit is defective.	Verify if the motor or heating unit is defective by connecting it to an alternate power supply. Replace the motor or heating unit If it still is not operating.
	The controller is defective.	Listen to see if there is a clicking sound when the output's pilot light turns on. If there is no clicking sound, contact your distributor to repair the controller.

TECHNICAL SPECIFICATIONS

MASTER:

TC5-2V8SA Supply: - 115/230 VAC (-18%, +8%), 60 Hz, L1 same phases as Stage 1 and 2, overload and overvoltage protection fuse F9-1A fast blow.

T55-2V8SA Supply: - 115/230 VAC (-18%, +8%), 50 Hz, L1 same phases as Stage 1 and 2, overload and overvoltage protection fuse F9-1A fast blow.

- 12 VDC for AC back-up supply; can activate stages 3 - 10 if supplied with DC back-up voltage.

Stage 1: Variable output, 60 Hz, 10A FAN (3/4 HP/115 VAC) / (1.5 HP/ 230VAC), fuse F1-15A slow blow.

Stage 9: ON-OFF output, 115/230 VAC, 60 Hz, 30VDC, 6A FAN,10A RES, heating or cooling, fuse F2-15A slow blow.

Stage 10: ON-OFF output, 115/230 VAC, 60 Hz, 30VDC, 6A FAN,10A RES, heating or cooling, fuse F3-15A slow blow.

Alarm: ON-OFF output, 115/230 VAC, 60 Hz, 30VDC, 3A , fuse F8-3A slow blow.

SLAVE:

TC5-2V8SA Supply: - 115/230 VAC (-18%, +8%), 60 Hz, L1 same phases as Stage 1 and 2, overload and overvoltage protection fuse F11-1A fast blow.

T55-2V8SA Supply: - 115/230 VAC (-18%, +8%), 50 Hz, L1 same phases as Stage 1 and 2, overload and overvoltage protection fuse F11-1A fast blow.

- 12 VDC for AC back-up supply; can activate stages 3 - 8 if supplied with DC back-up voltage.

Stage 2: Variable output, 60 Hz, 10A FAN (3/4 HP/115 VAC) / (1.5 HP/ 230VAC), fuse F1-15A slow blow.

Stage 3: ON-OFF output, 115/230 VAC, 60 Hz, 30VDC, 6A FAN,10A RES, fuse F2-15A slow blow.

Stage 4: ON-OFF output, 115/230 VAC, 60 Hz, 30VDC, 6A FAN,10A RES, fuse F3-15A slow blow.

Stage 5: ON-OFF output, 115/230 VAC, 60 Hz, 30VDC, 6A FAN,10A RES, fuse F4-15A slow blow.

Stage 6: ON-OFF output, 115/230 VAC, 60 Hz, 30VDC, 6A FAN,10A RES, fuse F5-15A slow blow.

Stage 7: ON-OFF output, 115/230 VAC, 60 Hz, 30VDC, 6A FAN,10A RES, fuse F6-15A slow blow.

Stage 8: ON-OFF output, 115/230 VAC, 60 Hz, 30VDC, 6A FAN,10A RES, fuse F7-15A slow blow.

Probes: Low voltage (< 5V), isolated from the supply. Operating range: -40.0° to 120.0°F (-40.0° to 48.9°C). Accuracy: 1.8°F (1°C) between 41° and 95°F (5° and 35°C).

Enclosure: ABS, moisture and dust-tight.

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

FACTORY SETTINGS

PARAMETER		FACTORY SETTING	RANGE OF VALUES
Temperature Set Point		75°F(23.9°C)	-40 to 99.9 °F (-40 to 37.7 °C)
Stage 1	Minimum Speed	40 %	10 % to 100 %
	Time On	15 seconds	0 to 900 seconds by increments of 15 seconds
	Time Off	0 seconds	
	Bandwidth	2°F(1.1°C)	0.5 to 20 °F (0.3 to 11.1 °C)
Humidity Control	Humidity Set Point	65%	40 to 100% relative humidity
	Compensation Percentage	60%	0 to 100% of stage 1 minimum speed
Stage 2	Minimum Speed	40%	10 % to 100 %
	Bandwidth	2°F(1.1°C)	0.5 to 20 °F (0.3 to 11.1 °C)
	Offset	0.5°F(0.3°C)	-20 to 20 °F (-11.1 to 11.1 °C)
Stage 3 - 10	Differential	2°F(1.1°C)	0.5 to 20 °F (0.3 to 11.1 °C)

TC5-2V8SA

PARAMETER		FACTORY SETTING	RANGE OF VALUES
Mist	Offset	14°F(7.8°C)	0.5 to 40 °F (0.3 to 22.2 °C)
	Differential	2°F(1.1°C)	0.5 to 20 °F (0.3 to 11.1 °C)
	Time On	1 minute	0 to 60 minutes, by increments of 1 minute
	Time Off	1 minute	
	Humidity Cut-off	95%	40 to 100%
Heater 1	Offset	2°F(1.1°C)	-10 to 20 °F (-5.6 to 11.1 °C)
	Differential	2°F(1.1°C)	0.5 to 20 °F (0.3 to 11.1 °C)
Heater 2	Offset	0.5°F(0.3°C)	-10 to 20 °F (-5.6 to 11.1 °C)
	Differential	2°F(1.1°C)	0.5 to 20 °F (0.3 to 11.1 °C)
Max. Temp. Diff. Between Zones		7.5°F (4.2°C)	5 to 40°F (2.8 to 22.2°C)
Alarms	High Offset	12.0°F(6.7°C)	0.5 to 40 °F (0.3 to 22 °C)
	Low Offset	10.0°F(5.6°C)	0.5 to 40 °F (0.3 to 22 °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.

GLOSSARY

BANDWIDTH: The temperature interval within which the variable-speed fans of a given stage increase or decrease in speed proportionally to the temperature.

CASCADING HEATERS: Heaters operate in a sequence. As the average room temperature drops, additional heaters are turned on as needed.

CURTAIN DEAD BAND: The dead band is the temperature difference between the opening and closing temperatures of the curtains. Within this interval, the curtains are at rest.

DEFAULT VALUE: A typical parameter setting defined at the factory.

DIFFERENTIAL: The differential is the temperature difference between the moment the constant-speed fans or heating units of a given stage start running and the moment they return to a stop.

HYSTERESIS: A hysteresis is used to smooth the transition from one state to another. For example, when the temperature drops to the cut-off point for a stage of constant-speed fans, the fans will actually be cut off at slightly less than the cut-off point. This way, if the temperature fluctuates around the cut-off point without dropping significantly below it, the controller will not oscillate between two states. For example, if the hysteresis is 0.3°F and the stage 2 fans are programmed to be cut off at 75°F, the cut-off will actually occur at 74.7°F.

MINIMUM VENTILATION CYCLE: When the room temperature is below the set point, the Stage 1 fans operate intermittently to provide minimum ventilation to the room.

MINIMUM VENTILATION SPEED CURVE: When Stage 1 operates variable-speed fans, they will run at minimum speed during the minimum ventilation cycle. The user can define a minimum ventilation speed curve to adjust the Stage 1 minimum speed automatically over a given time period. The minimum speed increases over time as the animals grow.

OFFSET: An offset is a temperature difference from the set point that normally defines a cut-off point for a stage operation. For example, a heater offset of 2°F means the heaters will turn off at 2°F below the set point.

RAMPING ON STAGE 1: When the temperature rises to the point where Stage 1 constant-speed fans are needed for cooling, the running time of the fans is increased gradually from the minimum ventilation settings up to full operation. Likewise, when the temperature drops below the set point, the running time is decreased gradually until the minimum ventilation settings are reached.

SET POINT: The set point is the target room temperature. When the temperature is above the set point, the controller cools the room by turning on the cooling fans. When the temperature is below the set point, the controller heats the room by turning on the heaters.

TEMPERATURE CURVE: The controller can be set to automatically change the temperature set point over a given period of time in accordance with the user's requirements. The set point decreases over time as the animals grow.

ZONED HEATERS: When zoned heaters are used, heaters in each zone operate according to their own probes rather than the average temperature for the entire room. In this way, heaters across zones are independent of one another.