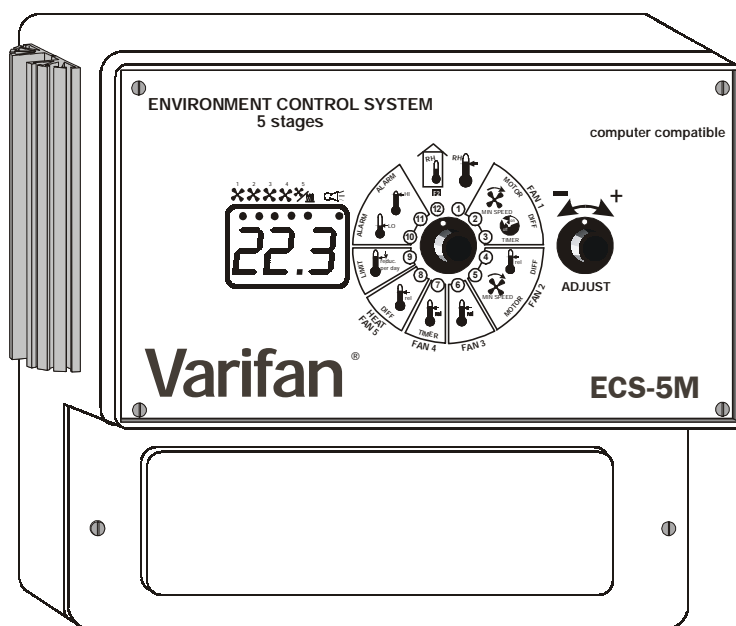


ECS 5M

USER'S MANUAL



ECS 5M

Although the manufacturer has made every effort to ensure the accuracy of the information contained herein, this document is subject to change without notice due to ongoing product development.

WARNING AND PRECAUTIONS

Equipment , probe failure, blown fuses and/or tripped breakers may prove harmful to the contents of the building. Therefore it is strongly recommended to install backup devices and alarm or warning devices. Spare equipment should also be available at the owner's site. Equipment manufactured by the manufacturer is protected against normal line surges. High surges caused by thunder storms or power supply equipment may damage this equipment. For added security against line voltage surges it is recommended that surge and noise suppression devices be installed at the electrical distribution panel. Use of shielded cable for probes is recommended for protection against lightning. These devices are available from most electrical supply distributors.

RECOMMENDATIONS

The manufacturer recommends that all installation procedures described herein be performed by a qualified electrician or installation technician. Further more the manufacturer recommends to test all the functions and equipment connected to the ECS, including the alarm system and backup devices, after installation, after change to the installation and at least once a month after that.

Fuse verification and replacement, as well as the proper setting of control values shall be the responsibility of the owner of this equipment.

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1. GENERAL

This document provides a description of the ECS 5M control panel. This document is organized as follows:

- Introduction
- Installation
- User's Guide
- Appendix

1.1 DESCRIPTION

Congratulations on the purchase of your ECS 5M environmental control system. The ECS M product line provides you with full control over temperature, humidity, air flow, and heat resulting in a comfortable environment for your livestock.

The ECS 5M offer these features:

- Compatible with IPM-1 and DIP-1.
- Hi / Lo temperature indication.
- Automatic temperature reduction (ramping).
- Adaptable variable speed outputs for a wide selection of fan model types.
- Humidity probe.
- Full torque fan start preventing motor damage.

The ECS 5M provides microprocessor control over a five stage output.

The first stage controls a variable speed fan which can operate at a continuous low speed to ensure good quality of air when the room temperature is below the main set point. In addition, the first stage may be programmed to cycle on and off. When the room temperature rises above the main set point, the fan accelerates to increase the air flow.

ECS 5M

DESCRIPTION CONTINUED...

The second stage provides control over a second variable speed fan. The second stage is also fully programmable for settings such as minimum speed, relative set point etc.

The third stage controls a third single speed fan to aid the second fan for increased air flow.

The fourth stage controls either a fourth single fan or a drip cool unit with programmable duty cycle and adjustable timer setting.

The fifth stage controls either a heater for colder climates, or a fifth single speed fan where even cooling is required.

The ECS 5M provides you with full control over all five stages via the use of an easy to follow display panel. All programmable features can be customized to meet your requirements. The ECS 5M keeps you constantly informed by displaying the status of all of its outputs as well as the ambient temperature. With an optional humidity probe, the ECS 5M displays current humidity levels.

Safety of livestock is ensured by the continuous control of climate and timely alarm notification should environmental conditions exceed alarm set points. Further security may be obtained by connecting all ECS series controls in a network configuration to a computer via the use of an optional RCM 40 remote monitoring unit . This provides remote control monitoring of each room. All ECS variable outputs are fused, and all programmable settings are maintained whether or not the ECS 5M is powered.

The ECS 5M provides an automatic constant temperature reduction (ramping) feature for your maturing livestock. A built in low temperature safety factor prevents temperatures reaching dangerous limits.

With ECS 5M in control of your climate, you are assured of optimal living conditions for your livestock.

DEFINITION OF TERMS

MAIN SET POINT

The desired room temperature. Other temperature settings on the ECS 5M are relative to the main set point temperature.

RELATIVE TEMPERATURE

A value added to or subtracted from the main set point which results in a new temperature at which a desired action starts or stops.

AMBIENT TEMPERATURE

The actual temperature of the room.

AMBIENT HUMIDITY

The actual humidity level of the room.

MINIMUM FAN SPEED

The desired minimum speed for variable speed fans.

RAMPING

An automatic daily reduction in the main set point and all temperature settings relative to this.

DIFFERENTIAL

ON/OFF (relay). Range of temperature where two conditions are possible. The output depends on whether the temperature was increasing or decreasing when it enters that range.

VARIABLE. (Bandwidth) Temperature range where a variable fan speed fan accelerates, as the temperature increase. Minimum value at relative set point and 100% at relative set point + Bandwidth.

DRIP COOL

A device used to cool down livestock.

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CHAPTER 2 - INSTALLATION

Chapter 2 describes the installation of the ECS 5M control.

The manufacturer recommends that the installation instructions which follow be adhered to as closely as possible, and all work be performed by a certified electrician. Failure to do so may void the warranty!

2.1 UNPACKING

Unpack the ECS 5M from its box and inspect contents for damage. Should the contents appear to be damaged, contact your local distributor for return material procedures.

The package should contain the following standard items:

- 1 ECS 5M control .
- 1 installed temperature probe (model number 2004-1K).
- 5 cable fasteners or fuses.
- 1 User's manual.

The following optional items may be included:

- 3 additional temperature probes for temperature averaging,
- 1 humidity probe. The ECS 5M requires the RHT-1 humidity probe for maximum accuracy of monitoring and control of humidity levels.

2.2 MOUNTING

To limit the unit's exposure to noxious gases install the unit in a hallway.

Make certain that the unit is mounted right side up with the cable entry holes facing down.

The ECS 5M will operate in a temperature range of 32°F - 120 °F (0 °C - 50 °C).

* It is prohibited to use overhead cables outside the building.

Mont the control panel to the wall using the mounting holes located on the flange of the control housing.

Mounting hardware is not shipped with the unit.

Once the ECS 5M is in place, use a screwdriver to remove the six screws holding the faceplate to the housing.

2.3 SWITCH SETTINGS

The ECS 5M is configured for a variety of options via two switches as follows:

2.3.1 - Line Voltage

This switch is the main (bottom) control panel for 115 voltage.

230V

115V





Selector Switch

located on the surface of board and adapts the VAC or 230 VAC line voltage.

CHAPTER 2 - INSTALLATION

2.3.2 - Software Settings Switch

This switch is located at the rear of the ECS faceplate and adjusts the following options.

OFF ON		OFF	ON
	1	Fahrenheit	Celsius
	2	Settings locked	Setting unlocked
	3	Stage 5 = Heat	Stage 5 = Fan
	4	Not used	Relative Humidity

- Switch 1 Selects between a Fahrenheit or Celsius display on the front panel.
- Switch 2 Locks/unlocks user settings. All settings except for main set point, record low, and record high are locked while this switch is off.
- Switch 3 Selects between a Heater or Fan control on Stage Five of the ECS.
- Switch 4 To connect a humidity probe, DIP switch #4 must be at ON.

2.4 CONNECTION PROCEDURE

For the connection procedures which follow refer to Figures 1 through 3.

2.4.1 - Input power

Use a screwdriver to remove cable knock-outs for the installation of cabling to the ECS.

Do not apply power to the ECS and all loads until all connections have been completed!

2.4.1.1 - 115 VAC

Make certain that the line voltage selector switch is set to 115 VAC. Connect the power cable to terminals 11 and 12 on the main (bottom) board, connect the ground wire to the terminal 13 on the main board .

ECS 5M

2.4.1.2 - 230 VAC

Make certain that the line voltage selector switch is set to 230 VAC. Connect the power cable to terminals 11 and 12 on the main (bottom) board, connect the ground wire to terminal 13 on the main board.

2.4.2 - Fan 1 (terminals 9 and 10)

Stage 1 of the ECS 5M controls the operation of the primary fan. Connect the two leads from Fan 1 to terminals 9 and 10 on the main (bottom) board.

2.4.3 - Fan 2 (terminals 7 and 8)

Stage 2 of the ECS 5M controls the operation of the secondary fan. Connect the two leads from Fan 2 to terminals 7 and 8 on the main (bottom) board.

2.4.4 - Fan 3 (terminals 5 and 6)

Stage 3 provides a dry contact closure which controls the operation of a third fan. The current rating of dry contact is 6 Amps (conductive) for a fan. Make connections as follow:

- Connect L1 to terminal 6.
- Connect a wire of the fan to terminal 5.
- For a 115V fan, connect the second wire of the fan to N (neutral).
- For a 230V fan connect the second wire of the fan to L2.

2.4.5 - Fan 4 Drip Cool

Stage 4 provides a dry contact closure which controls the operation of a fourth single speed fan or a drip cool unit. This contact closure is voltage rated to 230 VAC. The current rating of the dry contact is 6 Amps (conductive) for a fan. Make connections as follow:

- Connect L1 to terminal 4.
- Connect a wire of the fan or drip cool unit to terminal 5.
- For a 115V fan or Drip Cool unit, connect the second wire of fan or Drip Cool unit to N (neutral).
- For a 230V fan or Drip Cool unit, connect the second wire of the fan or Drip Cool unit to L2.

2.4.6 - Fan 5 / Heater

Stage 5 provides a dry contact closure which controls the operation of a fifth single speed fan or a heater. This contact closure is voltage rated to 230VAC. The current rating of the dry contact is 10 Amps (resistive) for a heater and 6 Amps (conductive) for a fan. Set the software settings DIP switch at the rear of the ECS faceplate to ON for a fan or OFF for a heater. Make connections as follow:

CHAPTER 2 - INSTALLATION

- Connect L1 to terminal 2.
- Connect a wire of the fan or heater to terminal 1.
- For a 115V fan or heater, connect the second wire of the fan or heater to N (neutral)
- For a 230V fan or heater, connect the second wire of the fan or heater to L2.

2.5 TEMPERATURE / HUMIDITY PROBES

Temperature and humidity probes use a “Class 2” low voltage circuit. These cables can extend up to a distance of 500 feet (150 meters). Single probe temperature and humidity connections are illustrated in Figure 4 while temperature probe averaging connections are illustrated in Figure 5.

Use shielded cabling for probes . Connect the shields to “SHLD” terminal. Failure to do so may result in inaccurate readings!

2.5.1 Single Temperature Probe

Install a single temperature probe in an area that best reflects the overall temperature of the room. Connect the two leads and the shield of the temperature probe to the ECS terminals labelled “Probe” as indicated in Figure 4.

2.5.2 Averaging (optional)

Four temperature probes are required if temperature averaging is desired in larger rooms. Place the probes in appropriate locations to best average the ambient temperature. Refer to Figure 5.

2.5.3 Humidity Probe (optional)

Install one humidity probe in an area that best reflects the overall humidity of the room. Connect the humidity probe to the ECS terminals labeled “Probe” as indicated in Figure 4.

2.6 ALARM

The ECS 5M provides a normally open and normally closed dry contact for alarming low or high temperature conditions. In addition, this same contact can be used to signal a power failure. This contact may be connected to an alarm system, or directly to a siren and / or auto-dialer.

Momentary power interruptions may trigger false alarms! To avoid false alarming when the ECS is connected to an alarm system, install a time delay relay between the ECS and the alarm system.

2.7 POWERING UP

Before powering up the ECS 5M, attach the faceplate to the casing of the control panel using the six screws previously removed.

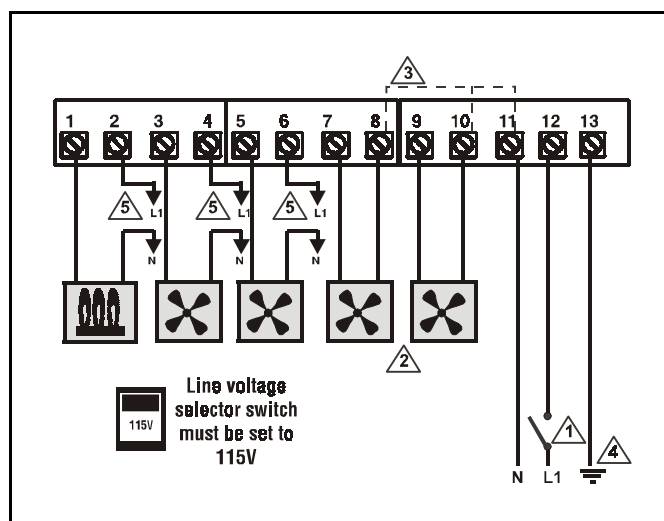
Set Selector knob to position (12).

Upon power up, the unit will test it's display by briefly lighting all the segments of it's LED. Make certain that all segments light.

Following the LED display test, the unit displays the ambient temperature of the room.

If the temperature is not displayed, refer to the Trouble Shooting section in the appendix of this document.

Fig. 1
Four Fans (115V) and One Heating Unit (115V)



CHAPTER 2 - INSTALLATION

Fig. 2
Five Fans (230V)

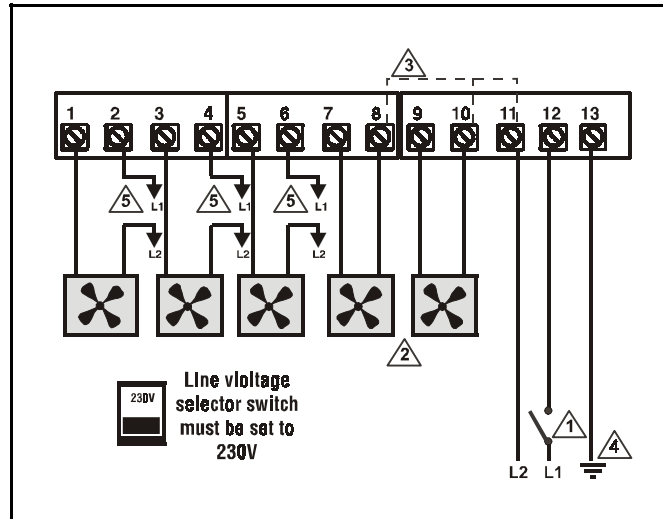
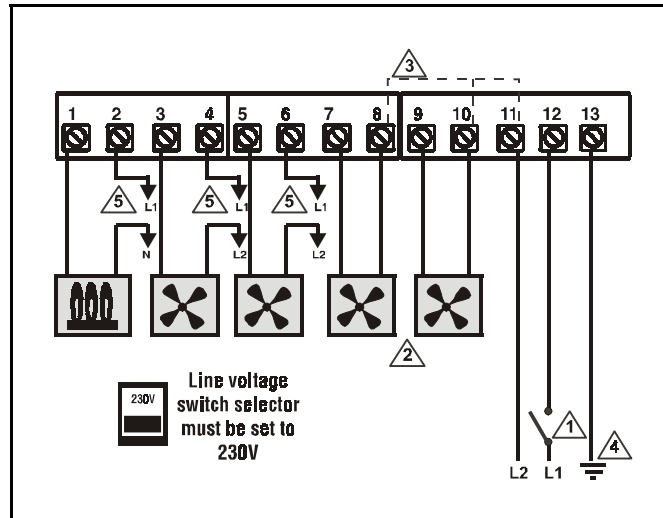


Fig. 3
Four Fans (230V) and One Heating Unit (115V)

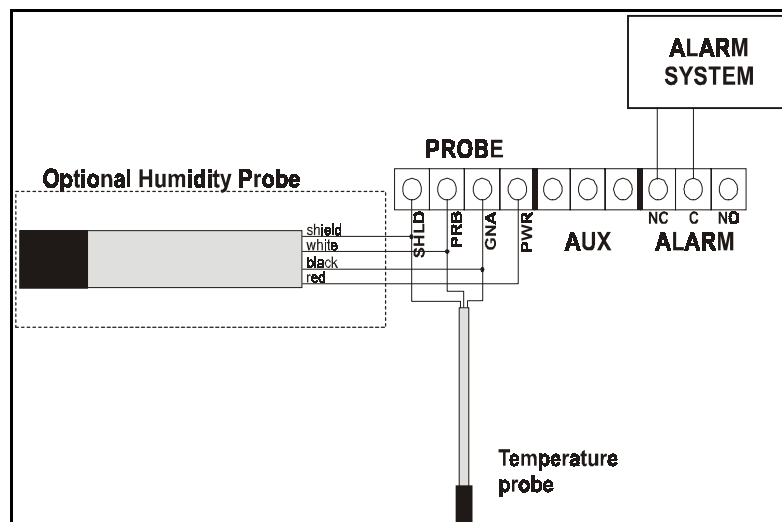


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Notes for Figures 1, 2, and 3

- ① Power cut and protection devices in case of overload.
- ② Only use fans that have thermal protection devices.
- ③ Terminals 8, 10, and 11 are internally connected.
- ④ Connect the grounding wire to the ground terminal 13.
- ⑤ **IMPORTANT** Must be on a 15A separate circuit of the ECS. Make sure to disconnect power of the source and all loads before wiring.

Fig. 4.
Probes and Alarm Wiring



CHAPTER 2 - INSTALLATION

Fig. 5
Temperature Averaging Probe Connection

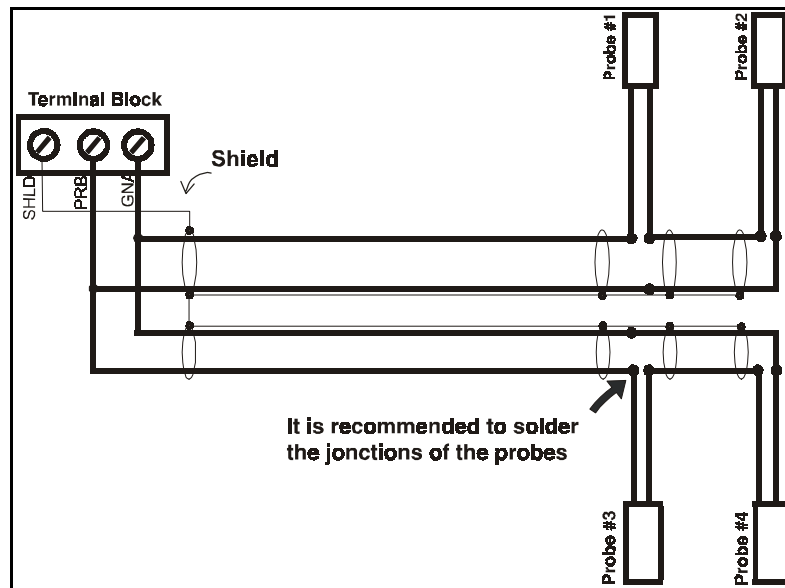
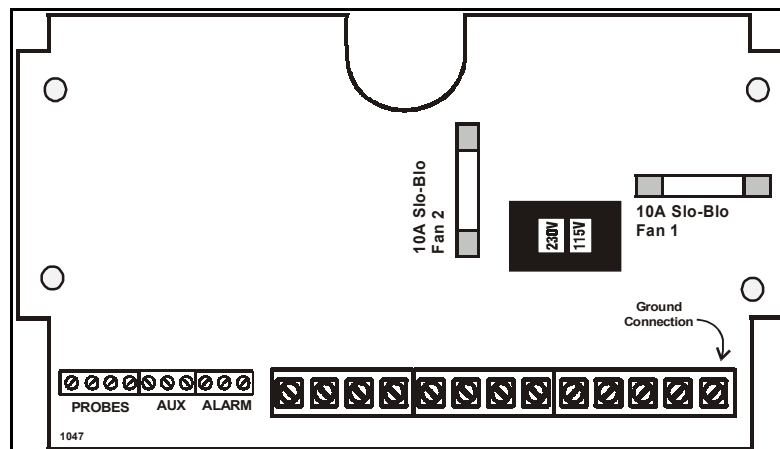


Fig. 6
Main Board: Terminal, Blocks, Switches, Fuses and Ground



VARIFAN RECOMMENDED CONTROL BACKUP

WARNING AND PRECAUTIONS

Equipment failure, blown fuses and/or tripped breakers may prove harmful to the content of the building. It is therefore strongly recommended to install backup devices and alarm or warning devices (see example fig. 7).

BACKUP THERMOSTAT. If the Varifan control fails, then the thermostat will start the dedicated fan at full speed when the temperature will reach the T15-WD set value. Therefore, the T15-WD should be accessible for its adjustment and it should be set at the same temperature as the alarm, i.e. approximately 5°F above the fan relative set point.

BACKUP POWER SOURCE. The DPDT relay connects to the source 1 in normal operation but will switch to the source 2 if source 1 is off. The relay shall be chosen to support the load connect to it.

ALARM CIRCUIT. In normal operation, the alarm circuit of the Varifan Control is a short circuit. But if the Varifan control is defective or if there is no power applied to it, then the alarm circuit of the control will be an open circuit.

CHAPTER 2 - INSTALLATION

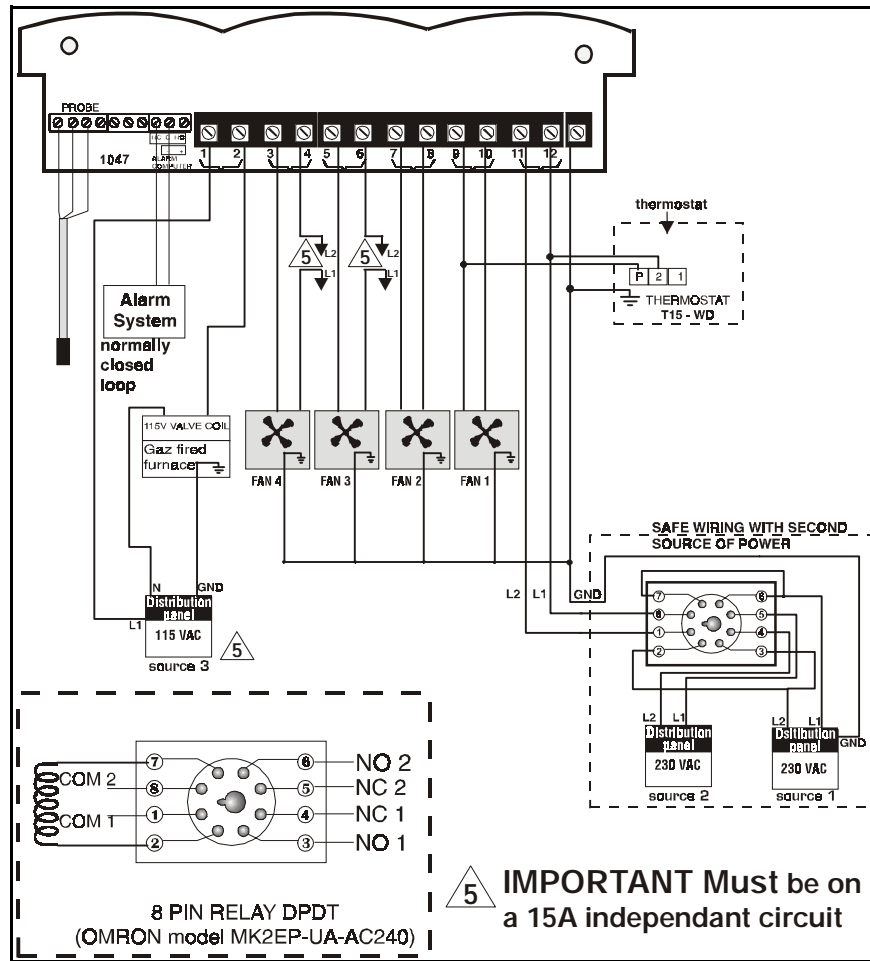
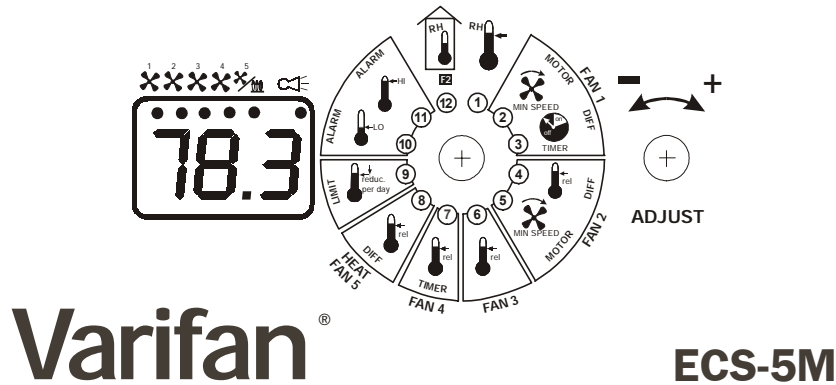


Fig 7.
Recommended control backup

ECS 5M

ENVIRONMENT CONTROL SYSTEM
5 stages

computer compatible



Varifan[®] **ECS-5M**

The ECS 5M front panel shown above features a LED status window and two control dials which are respectively used to select a function and adjust a setting.

LED STATUS WINDOW

The LED status window features a 3 digit LED readout for the display of temperature in Fahrenheit or Celsius, humidity level, and programmable settings.

In addition, the LED status window displays the operational status of stage 1 through 5 via six additional LEDs (shown above in LED window). When illuminated, each LED indicates that its associated fan or heater is operating. The sixth LED lights to indicate a low or high temperature alarm condition.

CONTROL DIALS

The center dial is the Selector dial and is used to select one of the control panel's 12 primary or 11 secondary functions. The dial located to the right of the Selector dial is the Adjustor dial and is used to enter secondary function mode and to adjust the setting of each function.

NOTE

The Dip switch #2 must be set ON to enable you changing all settings.

ECS 5M

The 12 primary functions are:

- 1 Main set point temperature
- 2 Fan 1 minimum speed
- 3 Fan 1 duty cycle timer
- 4 Fan 2 relative set point temperature
- 5 Fan 2 minimum speed
- 6 Fan 3 relative set point
- 7 Fan 4 / Drip cool relative set point
- 8 Fan 5 / Heater relative temperature set point
- 9 Ramping
- 10 Record low temperature display
- 11 Record high temperature display
- 12 Ambient temperature display

Any one of these functions is selected by rotating the Selector dial to the corresponding number and associated graphical image printed on the faceplate of the ECS. When primary functions 1 through 11 are selected, the LED status window displays a blinking value. Function 12 displays ambient temperature.

The 11 secondary functions are:

- 1 Relative humidity setting
- 2 Fan 1 motor compatibility
- 3 Fan 1 differential temperature
- 4 Fan 2 differential temperature
- 5 Fan 2 motor compatibility
- 7 Drip Cool duty cycle timer
- 8 Fan 5 / Heater differential
- 9 Ramping minimum temperature limit
- 10 Low temperature alarm
- 11 High temperature alarm
- 12 Relative humidity display

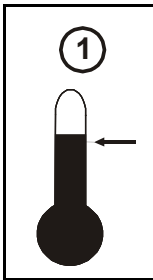
Select any one of these secondary mode functions by:

- rotating the Selector dial to (12)
- rapidly rotating the Adjustor dial back and forth to enter secondary mode.
- rotating the Selector dial from function (12) to any other function.

When secondary functions 1 through 5, and 7 through 11 are selected the status window displays a blinking value along with a scrolling LED display. Selection of function 12 removes the ECS from the secondary function mode.

PRIMARY FUNCTIONS

MAIN SET POINT



The main set point establishes the target temperature in the building. This value is used as the reference point for other settings. The main set point temperature is adjusted in 0.5 degree increments from a minimum setting of 13.5°F (-9.5°C) to a maximum setting of 105.0°F (41.0°C).

Adjusting the main set point temperature:

- rotate the Selector dial to position (1),
- rotate the Adjustor dial counterclockwise to decrease the temperature setting, clockwise to increase it.

The main set point temperature is displayed on the ECS.

Note: The ramping feature (primary function 9) must be (OFF) to adjust the main set point.

FAN 1 MINIMUM SPEED



This function sets the minimum speed of Fan 1 when room temperature is below the main set point. This value is entered as a percentage of fan maximum speed. The Fan 1 minimum speed is adjusted in 2% increments from a minimum setting of 12% to a maximum setting of 100%.

Adjusting the minimum speed of Fan 1:

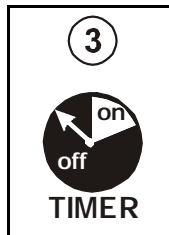
- rotate the Selector dial to position (2),
- rotate the Adjustor dial counterclockwise to decrease fan speed, clockwise to increase it.

The minimum fan speed is displayed on the ECS.

NOTE: Upon start-up, Fan 1 will run at its maximum speed for 4 seconds.

This feature aids Fan 1 in attaining its set speed as quickly as possible.

FAN 1 DUTY CYCLE



As long as the actual temperature is below the main set point, Fan 1 operates under a timer at the minimum speed set by Fan 1 Minimum Speed (primary function 2). The Fan 1 duty cycle sets the percentage of time the fan is ON versus the percentage of time the fan is OFF. The ON time is entered as a percentage of a 3 minutes period.

The Fan 1 duty cycle is adjusted in 5% increments from a minimum setting of OFF, 5%, 10% etc., up to a maximum setting of ON corresponding to continuous operation.

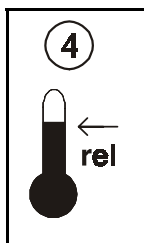
Adjusting the duty cycle of Fan 1:

- rotate the Selector dial to position (3),
- rotate the Adjustor dial counterclockwise to decrease the duty cycle, clockwise to increase it.

The duty cycle is displayed on the ECS.

Example: The duty cycle is set to 30%. As long as the main set point temperature of the room has not been reached, the fans operates at minimum speed for 1 minute, and OFF for 2 minute.

FAN 2 RELATIVE SET POINT



The Fan 2 relative set point establishes the temperature above the main set point at which Fan 2 begins to operate at its minimum speed. The value is a temperature **difference** from the main set point.

The Fan 2 relative set point is adjusted in 0.5 degree increments from a minimum setting of 0.0°F (0.0°C) to a maximum setting of 18.0°F (10.0°C).

Adjusting the relative set point of Fan 2:

- rotate the Selector dial to position (4),
- rotate the Adjustor dial counterclockwise to decrease the relative set point, clockwise to increase it.

The Fan 2 relative set point is displayed on the ECS.

Example: A main set point of 70°F along with a Fan 2 relative set point of 5°F is selected. When the temperature of the room reaches 75°F, Fan 2 begins to operate at minimum speed.

FAN 2 MINIMUM SPEED



When the room temperature is at the Fan 2 relative set point, Fan 2 runs at minimum speed set by this function. This value is entered as a percentage of fan maximum speed. The Fan 2 minimum speed is adjusted in 2% increments from a minimum setting of 12% to a maximum setting of 100%.

Adjusting the minimum speed of Fan 2:

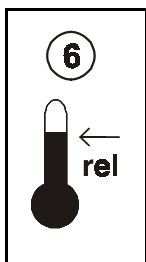
- rotate the Selector dial to position (5),
- rotate the Adjustor dial counterclockwise to decrease fan speed, clockwise to increase it.

The minimum fan speed is displayed on the ECS.

NOTE: Upon start-up, Fan 2 will run at its maximum speed for 4 seconds.

This feature aids Fan 2 in attaining its set speed as quickly as possible.

FAN 3 RELATIVE SET POINT



The Fan 3 relative set point establishes the temperature above the main set point at which Fan 3 begins to operate. The value is a temperature **difference** from the main set point.

The Fan 3 relative set point is adjusted in 0.5 degree increments from a minimum setting of 0.0°F (0.0°C) to a maximum setting of 30.0°F (16.0°C).

Note: The differential on fan 3 is not adjustable and the default value is set at 2°F (1°C).

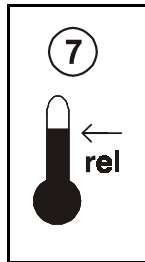
Adjusting the relative set point of Fan 3:

- rotate The Selector dial to position (6),
- rotate the Adjustor dial counterclockwise to decrease the relative set point, clockwise to increase it.

The Fan 3 relative set point is displayed on the ECS.

Example: A main set point of 70°F along with a Fan 3 relative set point of 8°F is selected. When the temperature room reaches 78°F, Fan 3 begins to operate.

FAN 4 / DRIP COOL RELATIVE SET POINT



The Fan 4 / Drip Cool relative set point establishes the temperature above the main set point at which Fan 4 or a Drip Cool unit begins to operate. The value is a temperature **difference** from the main set point.

The Fan 4 / Drip Cool relative set point is adjusted in 0.5 degree increments from a minimum settings of 0.0°F (0.0°C) to a maximum setting of 30.0°F (16.0°C).

Note: The differential on fan 4 is not adjustable and the default value is set at 2°F (1°C).

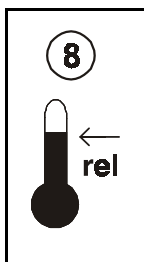
Adjusting the relative set point of Fan 4 / Drip Cool:

- rotate the Selector dial to position (7),
- rotate the Adjustor dial counterclockwise to decrease the relative set point, clockwise to increase it.

The Fan 4 / Drip Cool relative set point is displayed on the ECS.

Example: A main set point of 70°F along with a Fan 4 / Drip Cool relative set point of 10.0°F is selected. When the temperature of the room reaches 80.0°F, Fan 4 or a Drip Cool unit begins to operate.

HEATER / FAN 5 RELATIVE SET POINT



The Heater / Fan 5 relative set point is the relative temperature at which Heater / Fan 5 begins to operate. This value is the temperature **difference** from the main set point.

When a heater is being controlled the relative set point is below the main set point. When a fan is being controlled the relative set point is above the main set point.

The Heater / Fan 5 relative set point temperature is adjusted in 0.5 degree increments from a minimum setting of -9.0°F (-5.0°C) to a maximum setting of 30.0°F (16.0°C).

Adjusting the Heater / Fan 5 relative temperature:

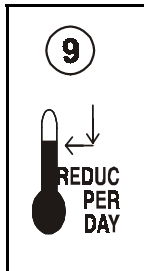
- rotate the Selector dial to position (8),
- rotate the Adjustor dial counterclockwise to decrease the temperature setting, clockwise to increase it.

The relative temperature setting is displayed ECS.

Example: The main set point temperature is adjusted to 70°F. A heater is in use and the relative set point is adjusted to -5°F. When the room temperature reaches 65°F the heater begins to operate.

A fifth fan is in use and the relative set point is adjusted to 15°F. When the room temperature reaches 85°F the fifth fan begins to run.

RAMPING



The ramping function automatically reduces the main set point by the set amount every 24 hours.

The ramping setting is adjusted in 0.01 degree decrements from a minimum setting of OFF, -0.01°F (-0.01°C) to a maximum setting of -0.99°F (-0.50°C).

The main set point must be greater than the limit.

Adjusting ramping:

- rotate the Selector dial to position (9),
- rotate the Adjustor dial counterclockwise to increase the ramping rate, clockwise to decrease it.

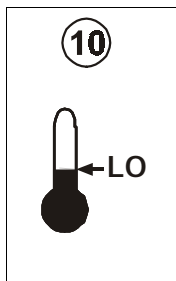
The ramping setting is displayed on the ECS.

NOTE: When ramping is activated or enabled, the main set point temperature cannot be manually adjusted.

Ramping automatically turns OFF when the minimum temperature limit is reached!

Example: The main set point temperature is set to 70°F and ramping is adjusted to -0.05°F. The following day the main set point temperature drops to 69.95°F followed by 69.90°F on the next day. Although the main set point real value decreases, the display will be changed after 10 days. The main set point will then be 69.5°F.

RECORD LOW TEMPERATURE



This function displays the lowest recorded temperature since the last clear.

The record low temperature is rounded to the nearest 0.5 degree from a minimum display of 13.5°F (-10.0°C) to a maximum display of 105.0°F (40.5°C). If a temperature lower than 13.5°F is recorded, Lo is displayed.

Viewing the lowest temperature recorded:

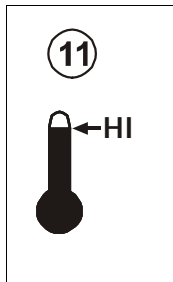
- rotate the Selector dial to position (10)

Clearing the low temperature value

- quickly rotate the Adjustor dial counterclockwise, then clockwise.

CLr will be briefly displayed on the ECS.

RECORD HIGH TEMPERATURE



This function displays the highest recorded temperature since the last clear.

The record high temperature is rounded to the nearest 0.5 degree from a minimum display of 13.5°F (-10.0°C) to a maximum display of 105.0°F (40.5°C). If a temperature higher than 105.0°F is recorded, Hi is displayed.

Displaying the highest temperature recorded:

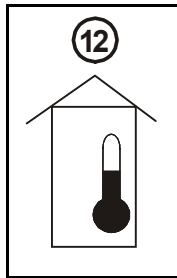
- rotate the Selector dial to position (11)

Clearing the high temperature value

- quickly rotate the Adjustor dial counterclockwise, then clockwise.

CLr will be briefly displayed on the ECS.

AMBIENT ROOM TEMPERATURE DISPLAY



This function displays the ambient room temperature. The Selector dial should normally be left in this position.

The ambient temperature is displayed to the nearest 0.5 degree from a minimum display of 13.5°F (-10.0°C) to a maximum display of 105.0°F (41.0°C). If the temperature is lower than 13.5°F, Lo is displayed. If the temperature is higher than 105.0°F, Hi is displayed.

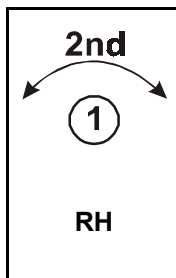
Viewing the ambient temperature:

- rotate the Selector dial to position (12)

The ambient temperature is displayed on the ECS.

SECONDARY FUNCTIONS

RELATIVE HUMIDITY SET POINT



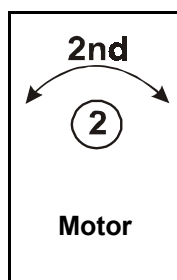
If the ECS is equipped with an optional humidity probe, this setting regulates the humidity level of the room. The humidity setting affects the operation of Fan 1 only. When the humidity level of the room exceeds the relative humidity setting, Fan 1 runs at new minimum speed. The speed that Fan 1 operates at, is governed by the ambient humidity of the room. This turn may cause the fan to increase to a speed 30% higher than the Fan 1 minimum speed set by primary function (2). The fan operates at this increased speed for as long as the ambient room temperature is below the main set point. When the temperature of the room is greater than the main set point temperature the fan speed increases until the maximum speed has been reached. The humidity level is adjustable in 1% increments from a minimum setting of 30% to a maximum setting of 80%.

Adjusting the relative humidity level:

- rotate the Selector dial to position (12),
- rapidly rotate the Adjustor dial back and forth to enter secondary function mode,
- rotate the Selector dial to position (1),
- rotate the Adjustor dial counterclockwise to decrease the humidity setting, clockwise to increase it.

The humidity setting is displayed on the ECS.

FAN 1 MOTOR



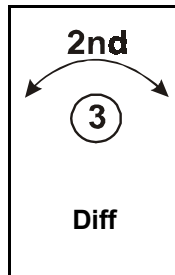
The Fan 1 motor compatibility setting adjusts the ECS 5M outputs to the electrical characteristics of the fan motor. Eight choices are available. Choice 1 is suited for most fans. If your motor is not listed **in the compatibility table in the Appendix**, try all choices and take the one that give the best performance with your fan. Settings 2 - 8 are the optimized settings for fan models listed in the compatibility table. Using the compatibility table, find the model number of your fan motor and take note of the fan motor compatibility number.

Setting the Fan 1 motor compatibility:

- rotate the Selector dial to position (12),
- rapidly rotate the Adjustor dial back and forth to enter secondary function mode,
- rotate the Selector dial to position (2),
- rotate the Adjustor dial to select a motor curve.

The Fan 1 motor compatibility setting is displayed on ECS.

FAN 1 DIFFERENTIAL



The Fan 1 differential setting establishes the temperature at which Fan 1 reaches maximum speed. The value is a temperature **difference** from the main set point.

The Fan 1 differential is adjusted in 0.5 degree increments from a minimum setting of 2.0°F (1.0°C) to a maximum setting of 18.0°F (10.0°C).

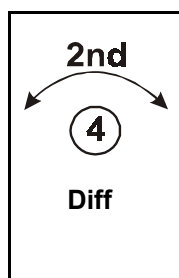
Adjusting the Fan 1 differential:

- rotate the Selector dial to position (12),
- rapidly rotate the Adjustor dial back and forth to enter secondary function mode,
- rotate the Selector dial to position (3),
- rotate the Adjustor dial counterclockwise to decrease the period, clockwise to increase it.

The Fan 1 Differential setting is displayed on the ECS.

Example: A main set point temperature of 70°F along with a Fan 1 differential setting of 5°F is set. When the temperature of the room reaches 75°F, Fan 1 operates at its maximum speed.

FAN 2 DIFFERENTIAL



The Fan 2 differential setting is the temperature at which Fan 2 reaches maximum speed. The value entered is the temperature **difference** above the Fan 2 relative set point temperature setting.

The Fan 2 differential is adjusted in 0.5 degree increments from a minimum setting of 2.0°F (1.0°C) to a maximum setting of 18.0°F (10.0°C).

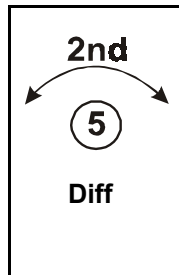
Adjusting the Fan 2 differential:

- rotate the Selector dial to position (12),
- rapidly rotate the Adjustor dial back and forth to enter secondary function mode,
- rotate the Selector dial to position (4),
- rotate the Adjustor dial counterclockwise to decrease the differential setting, clockwise to increase it.

The Fan 2 differential setting is displayed on the ECS.

Example: The main set point temperature of the room is 70°F. A Fan 2 relative set point of 5°F along with a Fan 2 differential setting of 5°F is set. When the temperature of the room reaches 80°F Fan 2 operates at its maximum speed.

FAN 2 MOTOR



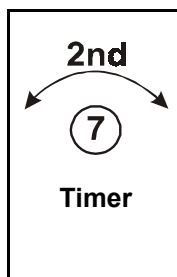
The Fan 2 motor compatibility setting adjusts the ECS 5M outputs to the electrical characteristics of the fan motor. Eight choices are available. Choice 1 is suited for most fans. If your fan is not listed **in the compatibility table in the Appendix**, try all choices and take the one that give the best performance with your fan. Settings 2 - 8 are the optimized settings for fan models listed in the compatibility table. Using the compatibility table, find the model number of your fan and take note of the fan motor compatibility number.

Setting the Fan 2 motor compatibility:

- rotate the Selector dial to position (12),
- rapidly rotate the Adjustor dial back and forth to enter secondary function mode,
- rotate the Selector dial to position (5),
- rotate the Adjustor dial to select a motor curve.

The Fan 2 motor compatibility setting is displayed on the ECS.

DRIP COOL DUTY CYCLE



As long as the actual temperature is below the main set point, the Drip Cool unit will not operate. When the ambient temperature rises above the stage 4 relative set point configured by primary function (7), the drip cool units begins to operate in a duty cycle mode. The duty cycle sets the percentage of time the Drip Cool unit is ON versus the percentage of time the unit is OFF. The ON time is entered as a percentage of a **12 minutes** period. If a fan is used, set this value at 100%.

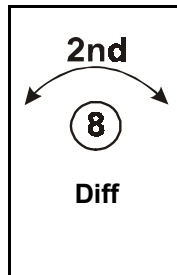
Adjusting the duty cycle setting:

- rotate the Selector dial to position (12),
- rapidly rotate the Adjustor dial back and forth to enter secondary function mode,
- rotate the Selector dial to position (7),
- rotate the Adjustor dial counterclockwise to decrease the duty cycle setting, clockwise to increase it.

The duty cycle setting is displayed on the ECS.

Example: The duty cycle is set to 25%. When the ambient room temperature rises above the relative set point the Drip Cool units operates for 3 minutes, and turns OFF for 9 minutes.

HEATER/FAN 5 DIFFERENTIAL



In order to minimize erratic behavior of Heater / Fan 5 when ambient room temperature is exactly at the relative set point, the differential setting separates this ON / OFF threshold into two: one ON threshold and one OFF. This feature greatly reduces equipment wear.

The temperature difference between the two thresholds is the differential.

The differential is adjusted in 0.5 degree increments from a minimum setting of 1°F (0.5°C) to a maximum setting of 6°F (3°C) degrees.

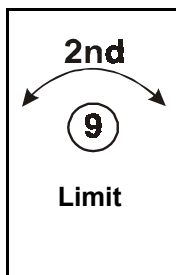
Adjusting the differential setting:

- rotate the Selector dial to position (12),
- rapidly rotate the Adjustor dial back and forth to enter secondary function mode,
- rotate the Selector dial to position (8),
- rotate the Adjustor dial counterclockwise to decrease the differential setting, clockwise to increase it.

The differential setting is displayed on the ECS.

Example: The heater / Fan 5 relative temperature set by primary function (8) is adjusted to 75°F, and the differential is set to 2°F. When stage 5 is configured for a fan, the temperature of the room must reach 73°F before the fan shuts off, and rise to 75°F before the fan begins to operate.

MINIMUM RAMPING



Minimum ramping is the lowest that the ramping function can adjust the main set point to. This is a security feature.

The minimum ramping setting is adjusted in 0.5 degree increments from a minimum setting of 13.5°F (-9.5°C) to a maximum setting of 105.0°F (41.0°C).

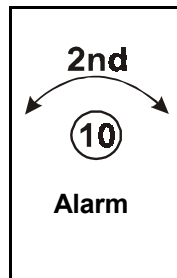
Adjusting the minimum ramping setting:

- rotate the Selector dial to position (12),
- rapidly rotate the Adjustor dial back and forth to enter secondary function mode,
- rotate the Selector dial to position (9),
- rotate the Adjustor dial counterclockwise to decrease the minimum ramping setting, clockwise to increase it.

The minimum ramping setting is displayed on the ECS.

NOTE: When the main set point temperature reaches the minimum ramping limit, the ramping setting (primary function 9) automatically shuts off.

LOW TEMPERATURE ALARM



This function establishes the temperature **difference** below the main set point that the room can reach before a low temperature alarm is signalled. When a low temperature alarm occurs an alarm contact is activated and the alarm LED lights on the ECS.

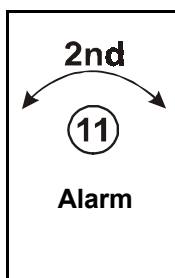
The low temperature alarm is adjusted in 0.5 degree increments from a minimum setting of -32.0°F (-18.0°C) to a maximum setting of 0.0°F (0.0°C)

Adjusting the low temperature alarm setting:

- rotate the Selector dial to position (12),
- rapidly rotate the Adjustor dial back and forth to enter secondary function mode,
- rotate the Selector dial to position (10),
- rotate the Adjustor dial counterclockwise to decrease the setting, clockwise to increase it.

The low temperature alarm setting is displayed on the ECS.

HIGH TEMPERATURE ALARM



This function establishes the temperature **difference** above the main set point that the room can reach before a high temperature alarm is signalled. When a high temperature alarm occurs an alarm contact is activated and the alarm LED lights on the ECS.

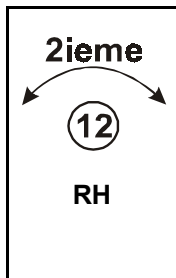
The high temperature alarm is adjusted in 0.5 degree increments from a minimum setting of 0°F (0°C) to a maximum setting of 32.0°F (18.0°C)

Adjusting the high temperature alarm:

- rotate the Selector dial to position (12),
- rapidly rotate the Adjustor dial back and forth to enter secondary function mode,
- rotate the Selector dial to position (11),
- rotate the Adjustor dial counterclockwise to decrease the setting, clockwise to increase it.

The high temperature alarm setting is displayed on the ECS.

RELATIVE HUMIDITY DISPLAY



This function displays the relative humidity of the room.

Relative humidity is displayed in 1% increments from a minimum display of 30% to a maximum display of 90%. If a humidity level lower than 30% is sensed, F2 is displayed. Conversely, if a humidity level higher than 90% is sensed, 90 stay displayed.

Displaying the humidity level:

- rotate the Selector dial to position (12),
- rapidly rotate the Adjustor dial back and forth to enter secondary function mode.

The humidity level is displayed on the ECS.

MOTOR COMPATIBILITY

CURVE	BRAND	MODEL	VOLT	SIZE
1	Multifan	4E40	230 v.	16"
2	Multifan	2E20	230	8"
2	Multifan	4E35	230 v	14"
2	Multifan	4E40	115 v.	16"
2	Multifan	4E45	115 v.	18"
2	Multifan	4E50	115 v.	20"
2	Multifan	4E50	230 v.	20"
2	Multifan	AF24M'E	230 v.	24"
2	Multifan	6E63	230 v.	24"
2	Multifan	6E71	230 v.	28"
2	Multifan	8E92	230 v.	36"
2	Ziehl		115/230v	
3	Multifan	2E30	230 v.	12"
3	Multifan	4E30	115 v.	12"
3	Multifan	4E45	230 v.	18"
3	Multifan	6E56	230 v	22"
3	Multifan/AF	AF36M	230 v.	36"
3	Leeson 1/2H	PAF20L	115 v.	20"
3	Leeson 1/2HP	AF24L	115 v.	24"
3	Aerotech-F	AT242	230 v.	24"
4	Multifan	2E25	230 v.	10"
4	Leeson 1/4HP	AF14L	115 v.	14"
4	Leeson 1/4HP	AF16L	115 v.	16"
4	Marathon 1/4HP		230 v.	16"
4	Marathon 1/3HP		230 v.	18"
4	Leeson 1/3HP	AF18L	115 v.	18"
5	GE Motor	5KCP39...	230 v.	12"
5	Leeson 1/4HP	AF12L	230 v.	12"
5	GE Motor	5KCP39...	230 v.	14"
5	Emerson	K55HXJ...	230 v.	14"
6	Oversized motors			
7	Multifan	4E30	230 v.	12"
7	Multifan	2E35	230 v.	14"
8	Multifan	4E25	230 v.	10"

TROUBLESHOOTING

SYMPTOM	CAUSE and REMEDY
Lo is continually displayed	<ul style="list-style-type: none">– Temperature is below minimum (13.5°F or -10.0°C).
Hi is continually displayed	<ul style="list-style-type: none">– Temperature is above maximum (105.0°F or 41°C).– Probe is short circuited.
Fan(s) or heater not operating	<ul style="list-style-type: none">– Verify whether the fan LED is on. If LED is on yet fan or heater is not operating, verify wiring, fan and fuse. Refer Figure 6 for fuse location. If fuse is blown, replace with fuse of same type.
Stage 5 Fan or Heater is operating erratically	<ul style="list-style-type: none">– Verify that the software setting switch located at the rear of the faceplate is properly set.– Verify the minimum rating (10mA at 230V or 20mA at 230V).
Display is blank	<ul style="list-style-type: none">– Verify that the line voltage selector switch is properly set.– Verify that the 10 pin flat cable between the main board and the faceplate board is connected.
F2 displayed for relative humidity	<ul style="list-style-type: none">– Humidity is below minimum (30%).– Probe is disconnected or defective.

SPECIFICATIONS

DESCRIPTION	VALUE
INPUT POWER	<ul style="list-style-type: none">– 12 AMP– 115/230 -20%, +10% VAC– 50 / 60 Hz
STAGE 1 (variable speed)	<ul style="list-style-type: none">– 6 AMP; inductive 115V / 230V– 10 AMP; max (fuse 10A)
STAGE 2 (variable speed)	<ul style="list-style-type: none">– 6 AMP; inductive 115V / 230V– 10 AMP; max (fuse 10A)
STAGE 3 (dry relay contact) Not Fused	<ul style="list-style-type: none">– 10 AMP ; 115V/230V– 1/2 HP @ 115V– 1 HP @ 230V– Min. Rating 10mA at 115V*– 20mA at 230V*
STAGE 4 (dry relay contact) Not Fused	<ul style="list-style-type: none">– 10 AMP ; 115V/230V– 1/2 HP @ 115V– 1 HP @ 230V– Min. Rating 10mA at 115V*– 20mA at 230V*
STAGE 5 (dry relay contact) Not Fused	<ul style="list-style-type: none">– 10 AMP ; 115V/230V– 1/2 HP @ 115V– 1 HP @ 230V– Min. Rating 10mA at 115V*– 20mA at 230V*
ALARM (dry relay contact)	<ul style="list-style-type: none">– 2 AMP; 30V AC/DC

* Relay will not function properly if load is smaller than the min. value.

RECORD FORM

Dial	Option	Default setting		User setting
1	Main Set Point Temperature	77°F	25°C	
2	Fan 1 Minimum Speed	24%	24%	
3	Fan 1 Duty Cycle Timer	ON	ON	
4	Fan 2 Relative Set Point	4°F	2°C	
5	Fan 2 Minimum Speed	24%	24%	
6	Fan 3 Relative Set Point	8°F	4°C	
7	Fan 4 / Drip Cool Relative Set Point	10°F	5°C	
8	Heater / Fan 5 Relative Set Point	-3°F	-1.5°C	
9	Ramping	OFF	OFF	

2nd Function

1	Relative Humidity	65%	65%	
2	Fan 1 Motor Compatibility	2	2	
3	Fan 1 Differential	4°F	2°C	
4	Fan 2 Differential	4°F	2°C	
5	Fan 2 Motor Compatibility	2	2	
7	Drip Cool Duty Cycle Timer	100%	100%	
8	Temperature Differential	2°F	1°C	
9	Minimum Ramping Limit	65°F	18°C	
10	Low Temperature Limit	-9°F	-5°C	
11	High Temperature Alarm	20°F	12°C	

WARRANTY

Limited Warranty

The manufactured equipment and supplied components have gone through rigorous inspection to assure optimal quality of product and reliability. Individual controls are factory tested under load, however the possibility of equipment failure and/or malfunction may still exist.

For service, contact your local retailer or supplier. The warranty period shall be for two years from manufacturing date. Proof of purchase is required for warranty validation.

In all cases, the warranty shall apply only to defects in workmanship and specifically exclude any damage caused by over-voltage, short circuit, misuse, acts of vandalism, fortuitous events, acts of God, flood, fire, hail, lightning or any other natural disaster. Any unauthorized work, modification or repair on this product automatically voids the warranty and disclaims the manufacturer from all responsibility.

The manufacturer assumes only those obligations set forth herein, excluding all other warranties or obligations. This warranty stipulates that in all cases the manufacturer shall be liable only for the supply of replacement parts or goods and shall not be liable for any personal injury, damages, loss of profits, interrupted operations, fine contravention of the law or damages to the production of the PURCHASER and the PURCHASER shall take up the defense and hold the manufacturer faultless regarding any legal or extra legal proceedings, notice, or claim by the customer or by a third party, and regarding any legal and extra legal expenses and fees brought forward on by such damages.

MAV ECS-5M Ver: 03
June 2001