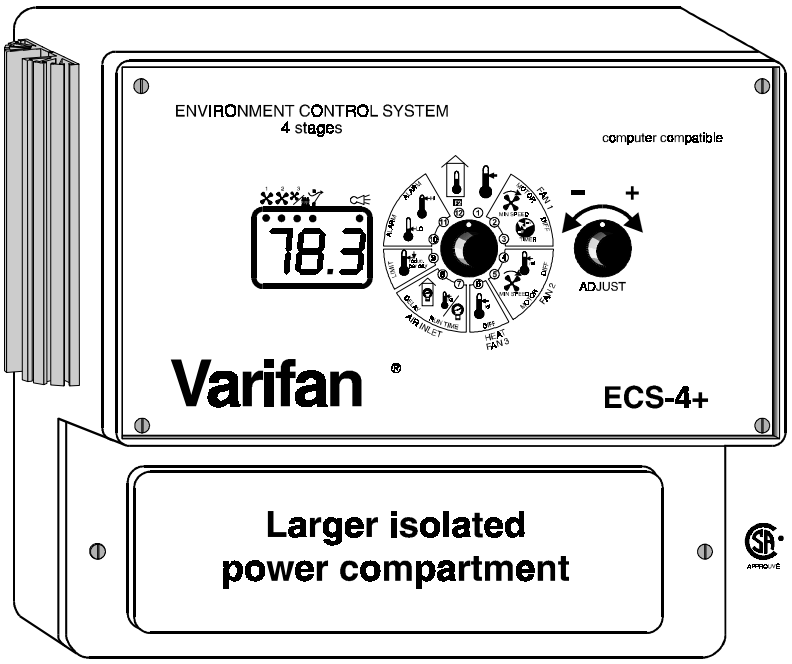
ECS-4+

USER'S GUIDE



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.

WARNINGS 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 every 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.

CHAPTER 1 - INTRODUCTION

CHAPTER 2 - INSTALLATION

CHAPTER 3 - USER'S GUIDE

PRIMARY FUNCTIONS

SECONDARY FUNCTIONS

APPENDIX

1. GENERAL

This document provides a description of the ECS 4+ control. This document is organized as follows:

- Introduction
- Installation
- User's Guide
- Appendix

1.1 DESCRIPTION

Congratulations on the purchase of your ECS 4+ environmental control system. The ECS 4+ provides you with full control over temperature, static pressure, air flow, and heat resulting in a comfortable environment for your livestock.

The ECS + product line offers a number of added features over existing ECS controls such as:

- Hi/Lo temperature indication
- Automatic temperature reduction (ramping)
- Adaptable variable speed outputs for a wide selection of fan models.
- Static pressure probe

Kits are available to upgrade existing control units.

The ECS 4+ provides microprocessor control over a four stage output.

The first stage controls a variable speed fan which can operate at a continuous low speed to ensure good quality of air at all times. In addition, the first stage may be programmed to cycle ON and OFF. When room temperature rises above the main set point, the fan accelerates to increase the airflow.

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

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

The fourth stage regulates the static pressure level of the room by controlling an air inlet baffle board which controls the airflow entering the room. Static pressure may be controlled by monitoring the room temperature or via an optional SPS-1 static pressure probe for greater accuracy of static pressure control.

The ECS-4+ provides full control over all four stages via a user-friendly display panel. All programmable features can be customized to meet your requirements. The ECS-4+ keeps you constantly informed by displaying the status of all its outputs as well as the room temperature. With an optional static pressure probe, the ECS-4+ displays current static pressure 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 an optional RCM-40 remote monitoring unit. This provides remote control monitoring of each room. All control panel outputs are fused, and all programmable settings are maintained indefinitely whether or not the ECS-4+ is powered.

The ECS-4+ provides an automatic temperature reduction per day (ramping) feature for your maturing livestock. A built in low temperature safety factor prevents temperatures from reaching dangerous limits.

With the ECS-4+ in control of your climate, you are assured of optimal living conditions for your livestock.

MAIN SET POINT

The desired room temperature. Other temperature settings on the ECS-4+ are relative to the main set point temperature.

RELATIVE SET POINT

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.

ROOM TEMPERATURE

The actual temperature 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.

AIR INLET BAFFLE BOARD

A device which regulates air flow into a building by controlling the opening or closure of an air passage.

DIFFERENTIAL

ON/OFF (relay), Range of temperature where 2 conditions are possible. The output depends on whether the temperature is increasing or decreasing when it enters that range.

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

Chapter 2 describes the installation of the ECS-4+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-4+ from its box and inspect contents for damage. Should the contents appear to be damaged, contact your local distributor to return the material.

The package should contain the following standard items:

- 1 ECS-4+ control
- 1 installed temperature probe (model number 2004-1K)
- 4 or 5 cable fasteners (4 stages and 1 line)

The following optional items may be included:

- 3 additional temperature probes for temperature averaging,
- 1 SPS-1 static pressure probe. The ECS 4+ requires the SPS-1 static pressure probe for maximum accuracy in monitoring and control of pressure levels.

2.2 MOUNTING

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

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

The ECS-4+ will operate in a temperature range of 32°F - 120 °F (0 °C - 50 °C).

The enclosure is watertight, it is not splash proof or immersion proof. DO NOT WATER the control. Cover the control carefully with plastic when you are cleaning the room.

It is prohibited to use overhead cables outside the building.

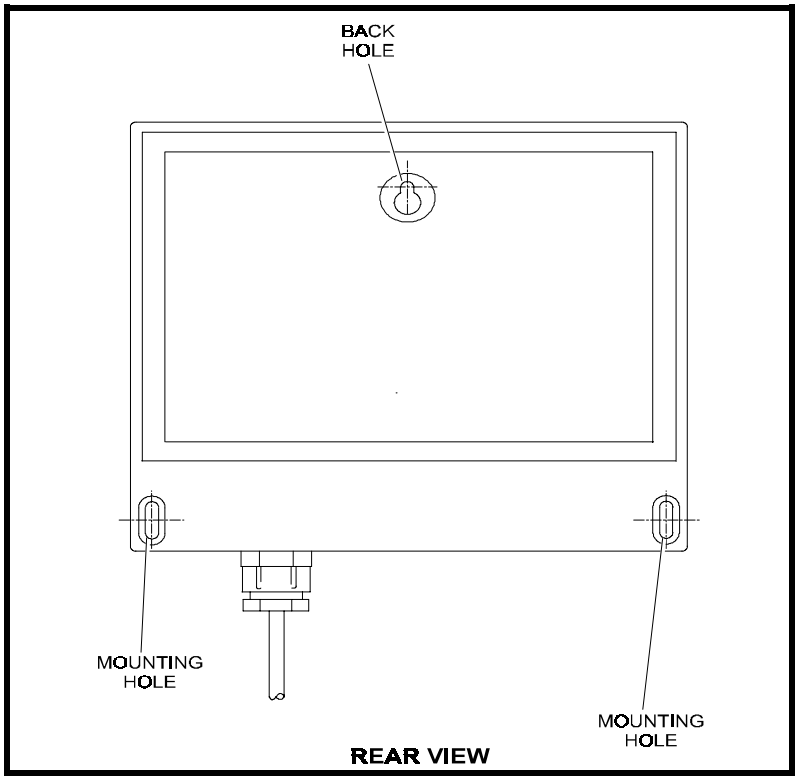
Use a screwdriver to remove the lower terminal cover exposing two mounting holes located at the bottom left and right corners of the control panel box as shown in figure 1.

A third mounting hole is located on the rear side of the control panel box. Refer to figure 1.

Mounting hardware is not shipped with the unit

Install mounting screw on wall and hang the unit in place by sliding the rear mounting hole of the control panel over the screw.
Use two more screws to secure the control panel in place using the bottom mounting holes shown in figure 1.

Figure 1
Mounting holes location



2.3 SWITCH SETTINGS

The ECS-4+ is configured for a variety of options via two switches: the line voltage selector switch, and the software settings DIP switch. These switches are described in the following two sections.

2.3.1 - Line Voltage Selector Switch

This switch is located on the surface of the main (bottom) board and adapts the control panel for 115 VAC or 230 VAC line voltage.

230V
115V

Refer to Figures 2, 3, and 4.

2.3.2 - Software Settings DIP Switch

This switch is located behind the control panel faceplate and adjusts the following options.

OFF	ON
Fahrenheit Settings locked Stage 3 = Heat Stage 4= Pressure mode	Celsius Setting unlocked Stage 3 = Fan Stage 4= Temperature mode

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 three of the control panel.

Switch 4 — Selects whether the air inlet baffle board is controlled by monitoring temperature or pressure

2.4 CONNECTION PROCEDURE

For the connection procedures which follow refer to Figures 2 through 6.

2.4.1 - Input power

To facilitate the installation work, the unit is shipped with two cable knock-outs removed. If two cable paths are not sufficient, remove other cable knock-outs with a screwdriver to install extra-cabling.

Do not apply power to the control panel until all connections have been completed!

2.4.1.1 - 115 VAC (terminals 11 and 12)

Make sure 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 terminal 13 on the main board .

2.4.1.2 - 230 VAC (terminals 11 and 12)

Make sure 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 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 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/Heater

Stage 3 provides a dry contact which controls the operation of a third single speed fan or a heater. This contact closure is voltage rated to 230 VAC. 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 behind the control panel faceplate to ON for a fan or OFF for a heater.

2.4.5 - Air Inlet Baffle Board

Stage 4 provides two dry contact which control a linear actuator motor used to operate an air inlet baffle board. One dry contact closure is used to operate the motor winding which extends the actuator arm outwards, and one dry contact closure is used to operate the motor winding which retracts the actuator arm inwards. The current rating of these dry contacts are 6 Amps (inductive).

2.5 TEMPERATURE/STATIC PRESSURE PROBES

Temperature and static pressure 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 static pressure connections are illustrated in Figure 3 while temperature probe averaging connections are illustrated in Figure 4.

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 3.

2.5.2 Temperature Averaging (optional)

Four temperature probes are required to do temperature averaging in larger rooms. Place the probes in appropriate locations to best average the room temperature. Refer to Figure 4.

2.5.3 Static Pressure Probe (optional)

To properly install a SPS-1 static pressure probe refer to its installation manual supplied with the unit.

Connect the static pressure probe to the control panel terminals labeled SCK, PWR, and GND as indicated in Figure 3.

2.6 ALARM

The ECS 4+ 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.

Make connections as indicated in Figure 3.

Momentary power interruptions may trigger false alarms! To avoid them, when the ECS 4+ is connected to an alarm system, install a time delay relay between the ECS 4+ and the alarm system.

2.7 POWERING UP

Before powering up the ECS 4+, attach the faceplate and the terminal strip cover to the casing of the control panel, using the six screws previously removed.

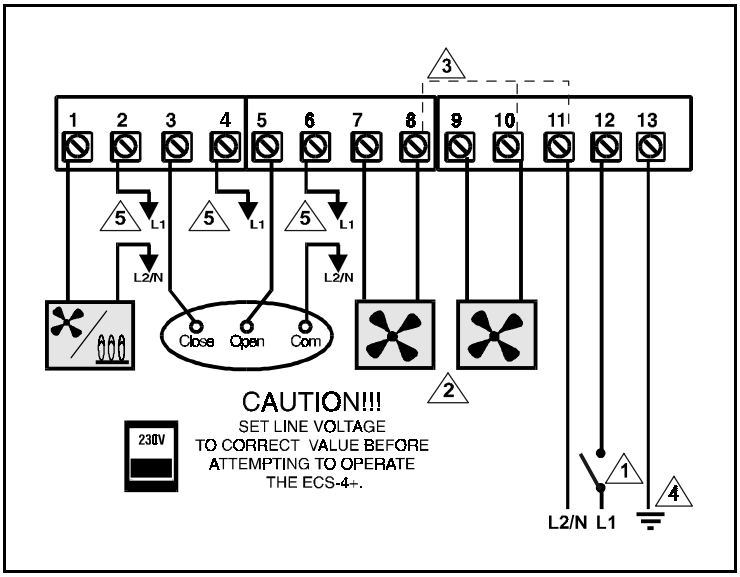
Set Selector knob to position (12).

Upon power up, the unit will test its display by briefly lighting all the segments of its LEDs. Make certain that all segments light up.

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

If the temperature is not displayed, refer to the Troubleshooting section in the Appendix of this document.

Figure 2
Two fans, one actuator and one heating unit



Notes for Figures 2 and 6

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 ground wire to 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.

Figure 3
Probes and Alarm Wiring

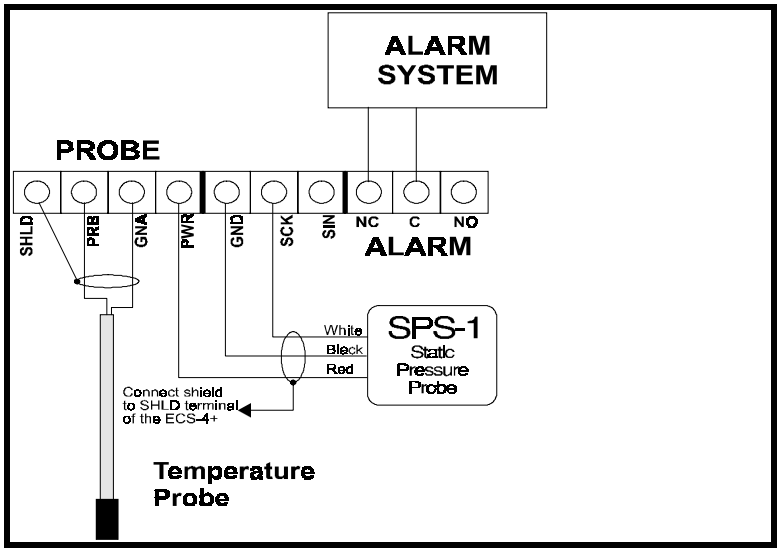


Figure 4
Temperature Averaging Probe connections

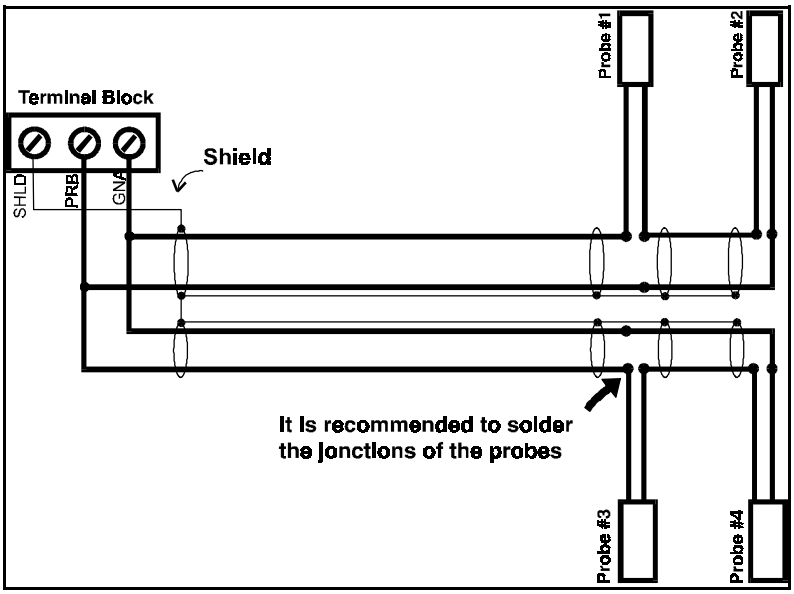


Figure 5
Main Board: Terminal block, switches, fuses and ground.

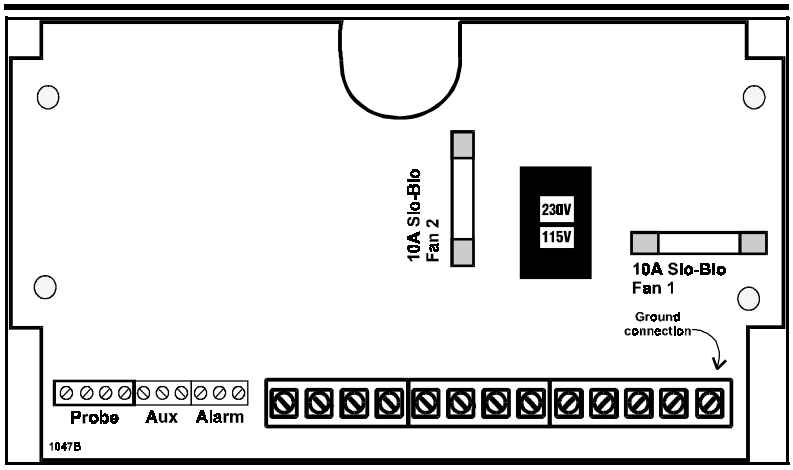
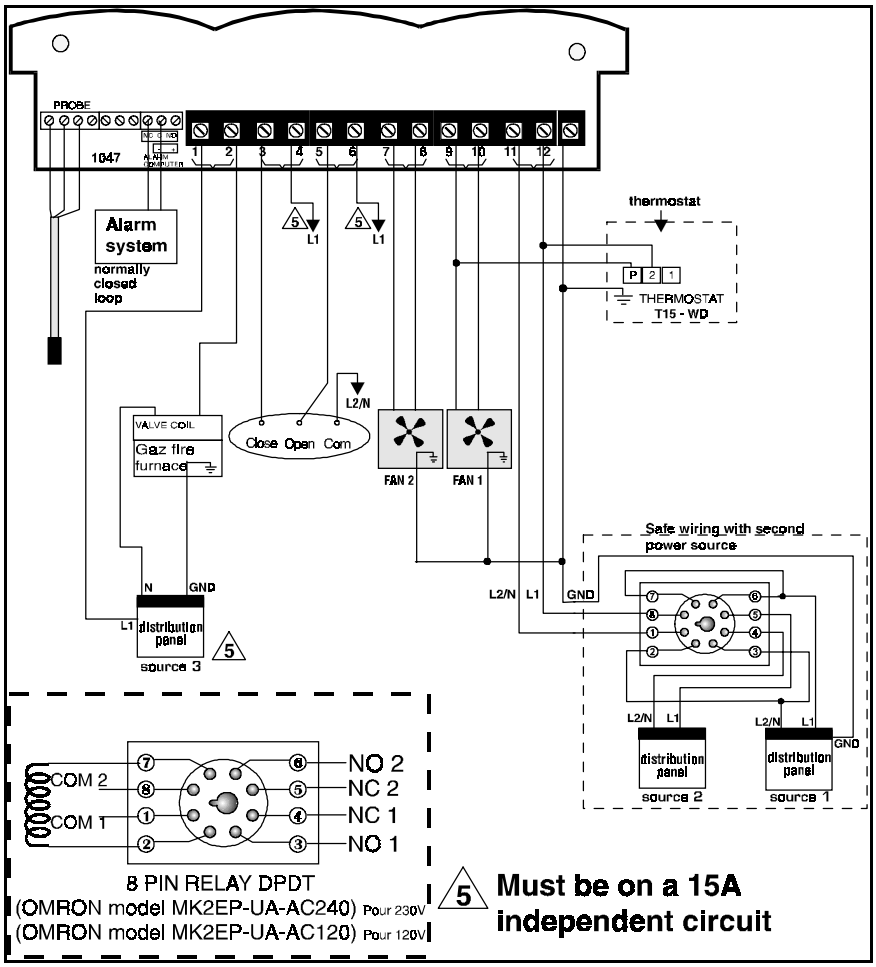
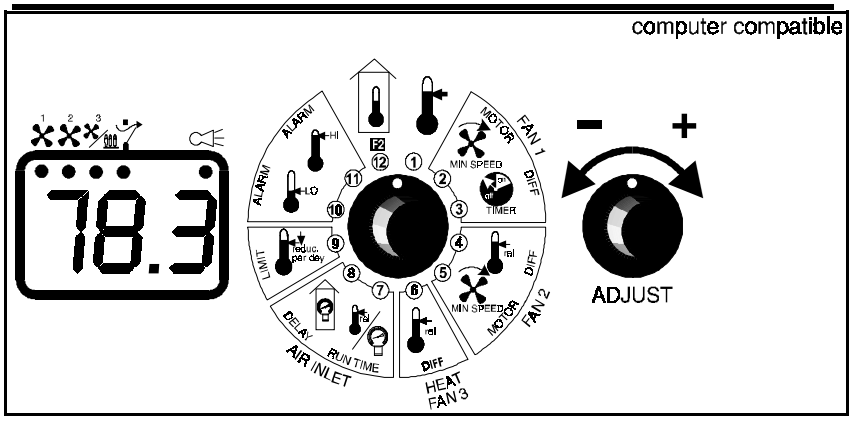


Figure 6
Recommended control backup





The ECS 4+ 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, pressure level, and programmable settings.

In addition, the LED status window displays the operational status of stages 1 through 4 via five additional LEDS (top part of LED window). When illuminated, each LED indicates that its associated fan, heater, or actuator motor is active. The fifth LED lights up 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 10 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.

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 Heater/Fan 3 relative set point temperature
7 Either the air inlet relative temperature, or the air inlet static pressure set point
8 Static room pressure display
9 Ramping
10 Record low temperature display
11 Record high temperature display
12 Room 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 panel. When primary functions 1 through 7 and 9 through 11 are selected, the LED status window displays a flashing value. When a static pressure probe is installed, function 8 displays static pressure. Function 12 displays room temperature.

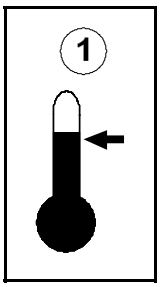
The 10 secondary functions are:
2 Fan 1 motor compatibility
3 Fan 1 differential temperature
4 Fan 2 differential temperature
5 Fan 2 motor compatibility
6 Fan 3/Heater hysteresis
7 Air inlet run timer
8 Air inlet delay timer
9 Ramping minimum temperature limit
10 Low temperature alarm
11 High temperature alarm

Select any one of these secondary 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 2 through 11 are selected the status window displays a flashing value along with a scrolling LED display. Selection of function 12 takes the control back to primary mode.

PRIMARY FUNCTIONS

MAIN SET POINT TEMPERATURE



The main set point establishes the target temperature in the building. This value is used as the reference point for other temperature settings. The main set point temperature is adjusted in 0.5 degree increments from a minimum setting of 42.0°F (5.5°C) to a maximum setting of 111°F (44.0°C).

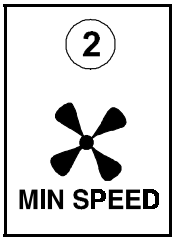
Adjusting the main set point temperature:

- 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 front panel.

Note: The reduction per day feature (primary function 9) must be off to adjust the main set point.

FAN 1 MINIMUM SPEED



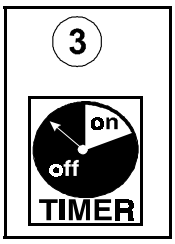
This function sets the minimum speed of Fan 1 when room temperature is below the main setpoint. This value is entered as a percentage of maximum speed. The Fan 1 minimum speed is adjusted in 2% increments from a minimum setting of 12% to a maximum setting of 100%.

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 front panel.

FAN 1 DUTY CYCLE



As long as the actual temperature is below the main set point, Fan 1 operates 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 the total time which is a built in value of 3 minutes.

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:

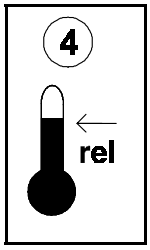
- rotate the Selector dial to position (***3***),
- rotate the Adjustor dial counterclockwise to decrease the duty cycle, clockwise to increase it.

The duty cycle is displayed on the front panel.

Example:

The duty cycle is set to 50%. As long as the main set point temperature of the room has not been reached, the fan operates at a minimum speed for 1.5 minutes, and goes OFF for 1.5 minutes.

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).

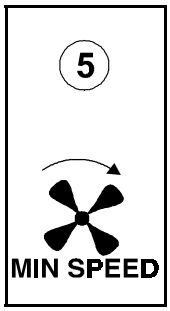
Adjusting the relative set point of Fan 2:

- 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 front panel.

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

FAN 2 MINIMUM SPEED



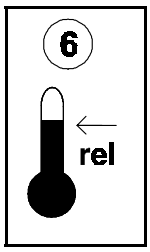
When the room temperature is at the Fan 2 relative set point, Fan 2 runs at minimum speed set by this function. This value is entered as a percentage of maximum speed. The Fan 2 minimum speed is adjusted in 2% increments from a minimum setting of 12% to a maximum setting of 100%.

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 front panel.

HEATER / FAN 3 RELATIVE SET POINT



The Heater/Fan 3 relative set point is the relative set point at which Heater/Fan 3 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 3 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 3 relative set point:

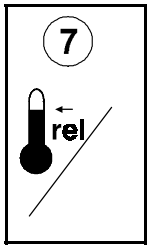
- rotate the Selector dial to position (6),
- rotate the Adjustor dial counterclockwise to decrease the setting, clockwise to increase it.

The relative temperature setting is displayed on the front panel

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 room temperature reaches 65°F, the heater begins to operate.

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

AIR INLET RELATIVE SET POINT



The air inlet relative set point establishes the relative temperature at which the actuator motor begins to open or close the air inlet baffle board. This value is a temperature **difference** from the main set point.

The air inlet relative set point is adjusted in 0.5 degree increments from a minimum setting of Opn, -0.9°F (-0.5°C) up to a maximum setting of 30.0°F (16.0°C), Clo.

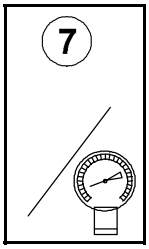
Adjusting the air inlet relative set point:

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

The air inlet relative set point is displayed on the front panel.

Example:
A main set point of 70°F along with an air inlet relative set point of 5°F is selected. When room temperature reaches 75°F, and the air inlet timer delay has expired as set by secondary function (8), the air inlet baffle board begins to open for the period of time set by secondary function (7). Due to a built-in 2 degree hysteresis, when room temperature drops to 73°F, and the same timer has expired, the air inlet baffle board begins to close for a period of time set by secondary function (7).

AIR INLET PRESSURE SET POINT



The air inlet static pressure set point establishes the desired room static pressure level. When the room static pressure rises above the static pressure set point, the air inlet baffle board begins to open. When the static pressure of the room drops below the static pressure set point, the air inlet baffle board begins to close.

The Air inlet static pressure set point is adjusted in 0.01" H_2O (water) increments from a minimum setting of 0.00" H_2O to a maximum setting of 14" H_2O

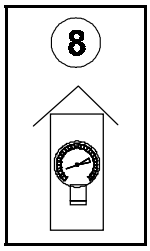
Adjusting the static pressure set point:

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

The air inlet static pressure set point is displayed on the front panel.

Example:
A static pressure set point of 0.08" H_2O is selected. When room pressure rises above 0.08" H_2O , and the air inlet timer delay has expired as set by secondary function (8), the air inlet baffle board begins to open. Due to a built-in 0.01" hysteresis, when the room pressure drops to 0.07" H_2O , and the same timer has expired, the air inlet baffle board begins to close.

STATIC PRESSURE DISPLAY



This function displays the static pressure level of the room.

Static pressure is displayed in 0.01" H_2O increments from a minimum display of -20" H_2O , to a maximum display of 20" H_2O . If a static pressure level is lower than -20" H_2O is senced, LO is displayed. On the other hand, if static pressurelevel is higher than 20" H_2O is sensed, Hi is displayed.

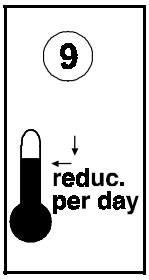
Dislaying the static pressure level:

- rotate the Selector dial to position (8).

The static pressure level is displayed on the front panel.

NOTE: If a static pressure probe is not installed the unit displays "---".

REDUTION PER DAY



The reduction per day function automatically reduces the main set point by the set amount every 24 hours.

The reduction 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).

Adjusting the reduction per day:

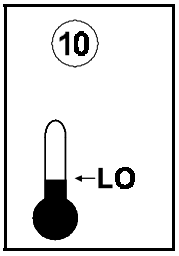
- rotate the Selector dial to position (9),
- rotate the Adjustor dial counterclockwise to decrease the reduction rate, clockwise to increase it.

The reduction per day setting is displayed on the front panel.

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

Reduction per day automatically shuts OFF when the minimum temperature limit is reached!

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 42.0°F (5.5°C) to a maximum display of 111°F (44.0°C). If a temperature lower than 42.0°F is recorded, Lo is displayed.

Viewing the lowest temperature recorded:

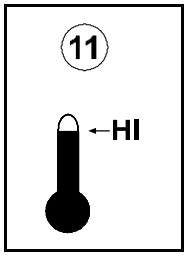
- rotate the Selector dial to position (10)

Clearing the low temperature value:

- quickly rotate the Adjustor dial counterclockwise, then clockwise.

CLr will be briefly displayed on the front panel.

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 42.0°F (5.5°C) to a maximum display of 111°F (44.0°C). If a temperature higher than 111°F is recorded, Hi is displayed.

Displaying the highest temperature recorded:

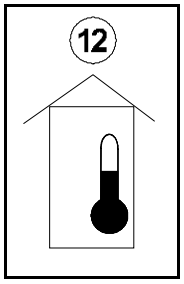
- rotate the Selector dial to position (11)

Clearing the high temperature value:

- quickly rotate the Adjustor dial counterclockwise, then clockwise.

CLr will be briefly displayed on the front panel.

ROOM TEMPERATURE DISPLAY



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

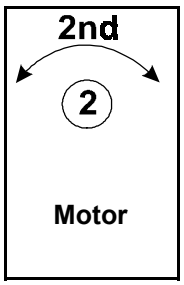
The room temperature is displayed to the neerest 0.5 degree from a minimum display of 42.0°F (5.5°C) to a maximum display of 111°F (44.0°C) If the temperature is lower than 42.0°F, Lo is displayed. If the temperature is higher than 111°F, Hi is displayed.

Viewing the room temperature:

- rotate the Selector dial to position (12).

The room temperature is displayed on the front panel.

FAN 1 MOTOR



The Fan 1 motor compatibility setting adjusts the control panel outputs to the electrical characteristics of the fan motor. Six choices are available.

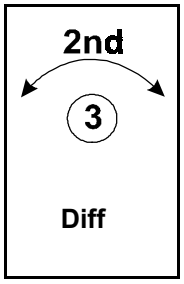
Using the compatibility table in the Appendix, find the model number of your fan motor and take note of the fan motor compatibility number. Contact your local distributor if your model of fan is not listed.

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 setting.

The Fan 1 motor compatibility setting is displayed on the front panel.

FAN 1 DIFFERENTIAL



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

The Fan 1 diferential is adjusted in 0.5 degree increments from a minimum setting of 2.0°F (1.0°C) to a maximum setting of 18°F (10.0°C).

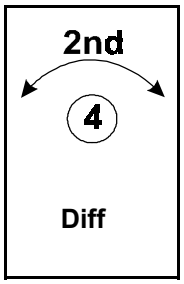
Adjusting the Fan 1 differential:

- 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 differential, clockwise to increase it.

The Fan 1 differential setting is displayed on the front panel.

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

FAN 2 DIFFERENTIAL



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

The Fan 2 diferential is adjusted in 0.5 degree increments from a minimum setting of 2.0°F (1.0°C) to a maximum setting of 18°F (10.0°C).

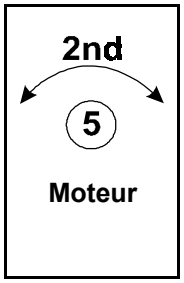
Adjusting the Fan 2 differential:

- 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, clockwise to increase it.

The Fan 2 differential setting is displayed on the front panel.

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 control panel outputs to the electrical characteristics of the fan motor. Six choices are available.

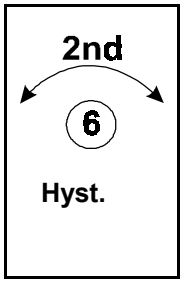
Using the compatibility table in the Appendix, find the model number of your fan motor and take note of the fan motor compatibility number. Contact your local distributor if your model of fan is not listed.

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 setting.

The Fan 2 motor compatibility setting is displayed on the front panel.

HEATER/FAN 3 HYSTERESIS



In order to minimize erratic behavior of Heater/Fan 3 when room temperature is exactly at the relative set point, the hsteresis setting separates this ON/OFF threshhold into two: one ON threshhold and one OFF. This feature greatly reduces equipment wear.

The temperature difference between the two thresholds is the hysteresis.

The hysteresis 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.

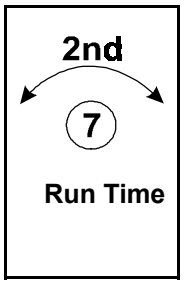
Adjusting the hysteresis setting:

- 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 (6);

rotate the Adjustor dial counterclockwise to decrease the hysteresis setting, clockwise to increase it.
The hysteresis setting is displayed on the front panel.

Example:
The Heater/Fan 3 relative temperature set by primary function (6) is adjusted to 75°F, and the hysteresis is set to 2°F. When stage 3 is configured for a third fan, the room temperature must reach 73°F before the fan shuts off, and rises to 75°F before the fan begins to operate.

AIR INLET RUN TIMER



The air inlet run timer establishes the period of time that the actuator motor operates when opening or closing the air inlet baffle board.

The air inlet run timer is adjusted in 1 second increments from a minimum setting of 1 second to a maximum setting of 60 seconds.

Adjusting the air inlet run timer:

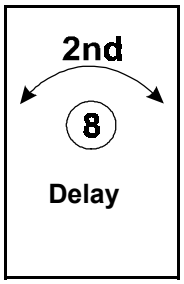
- rotate the Selector dial to position (12);
- rapidly rotate the Adjustor dial back and forth to enter secondary function mode;
- rotate the Selector dial to position (7);

rotate the Adjustor dial counterclockwise to decrease the air inlet run timer, clockwise to increase it.

The run timer setting is displayed on the front panel.

Example:
The air inlet run timer is set to 30 seconds. When the actuator motor is called upon to either open or close the air inlet baffle board, the delay timer as set by the secondary function (8) must have expired. At this point, the actuator motor will operate for 30 seconds before stopping.

AIR INLET DELAY TIMER



The air inlet delay timer establishes the delay time before the actuator motor begins to operate.

The air inlet delay timer is adjusted in 1 minute increments from a minimum setting of 1 minute to a maximum setting of 20 minutes.

Adjusting the air inlet delay timer:

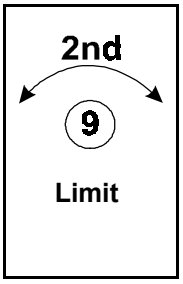
- rotate the Selector dial to position (12);
- rapidly rotate the Adjustor dial back and forth to enter secondary function mode;
- rotate the Selector dial to position (8);

rotate the Adjustor dial counterclockwise to decrease the air inlet delay timer, clockwise to increase it.

The delay timer setting is displayed on the front panel.

Example:
The air inlet delay timer is set to 5 minutes. The actuator motor, when called upon to open or to close the air inlet baffle board, will operate only once 5 minutes have expired.

MINIMUM RAMPING



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

The minimum ramping setting is adjusted in 0.5 degree increments from a minimum setting of 42.0°F (5.5°C) to a maximum setting of 111°F (44.0°C).

Adjusting the minimum ramping setting:

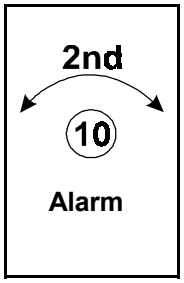
- rotate the Selector dial to position (12);
- rapidly rotate the Adjustor dial back and forth to enter secondary function mode;
- rotate the Selector dial to position (9);

rotate the Adjustor dial counterclockwise to decrease the ramping setting, clockwise to increase it.

The minimum ramping setting is displayed on the front panel.

Note:
When the main set point temperature reaches the minimum ramping limit, the reduct. per day 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 triggered. When a low temperature alarm occurs, an alarm contact is activated and the alarm LED segment lights up on the panel.

The low temperature alarm is adjusted in 0.5 degree increments from a minimum setting of -32.0°F (-18°C) to a maximum setting of 0.0°F (0.0°C).

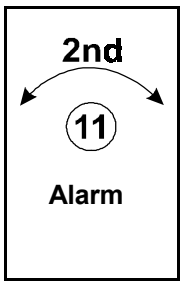
Adusting the low temperature alarm setting:

- 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 front panel.

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 triggered. When a high temperature alarm occurs, an alarm contact is activated and the alarm LED segment lights up on the panel.

The high temperature alarm is adjusted in 0.5 degree increments from a minimum setting of 0.0°F (0°C) to a maximum setting of 32.0°F (18.0°C).

Adusting 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 high temperature alarm setting is displayed on the front panel.

MOTOR COMPATIBILITY TABLE

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	– Temperature is below minimum 42.0°F (5.5°C). – Probe is disconnected or defective.
Hi is continually displayed	– Temperature is above maximum 111°F (42°C). – Probe is short circuited.
Fan(s) or heater not operating	– Verify whether the fan LED is on. If LED is on, yet fan, actuator or heater is not operating, verify wiring, fan and fuse. Refer to Figure 5 for fuse location. If fuse is blown, replace with fuse of same type.
Stage 4 Fan, actuator or Heater is operating erratically	– Verify that the software setting switch (position 3) located behind the faceplate is properly set. – Verify the minimum rating (10mA at 230V or 20mA at 230V.
Display is blank	– 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 properly.

SPECIFICATIONS

DESCRIPTION	VALUE
INPUT POWER	– 12 AMP inductive – 115/230 -20%, +10% VAC – 50 / 60 Hz
STAGE 1 (variable speed)	– 6 AMP; inductive 115V / 230V – 10 AMP; max (fuse 10A)
STAGE 2 (variable speed)	– 6 AMP; inductive 115V / 230V – 10 AMP; max (fuse 10A)
STAGE 3 (dry relay contact) Not Fused	– 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	– 10 AMP ; 115V/230V – 1/2 HP @ 115V – 1 HP @ 230V – Min. Rating 10mA at 115V* – 20mA at 230V*
ALARM (dry relay contact)	– 2 AMP; 30V AC/DC

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

Limited Warranty

The manufacturered 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 ECS4+ V2.1
July 2001