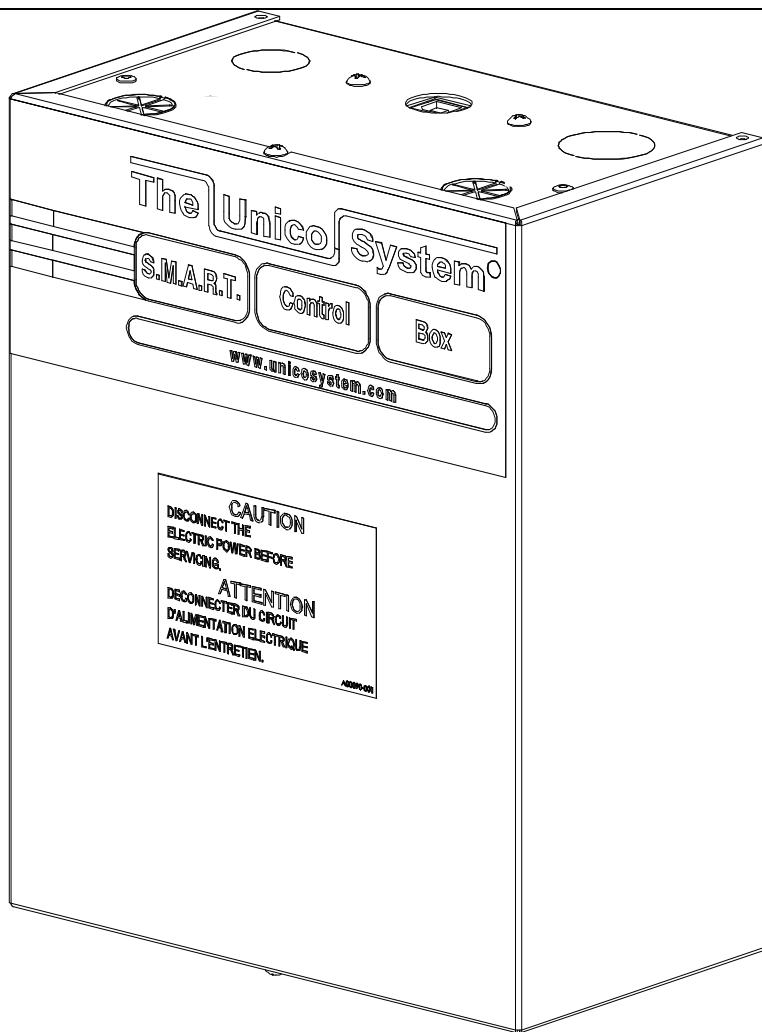




# S.M.A.R.T. CONTROL BOARD (SCB) INSTALLATION INSTRUCTIONS

BULLETIN 30-039.008



# IMPORTANT!

## Please read before installation

### For safe installation and trouble-free operation, you must:

- Carefully read this instruction booklet before beginning.
- Follow each installation or repair step exactly as shown.
- The unit must be installed in accordance with all local, state, and national wiring regulations.
- Pay close attention to all warning and caution notices given in this manual.
- The unit must be supplied with a dedicated electrical line.

### If necessary, get help

These instructions are all you need for most installation sites and maintenance conditions.

If you require additional help for a special problem, contact our customer service department for additional instructions.

### In case of improper installation

The manufacturer shall in no way be responsible for improper installation or maintenance service, including failure to follow the instructions in this document.

This appliance is not accessible to the general public as classified per IEC 60335-2-40 Clause 6.101.

### WARNING

### When wiring



ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. ONLY A QUALIFIED, EXPERIENCED ELECTRICIAN SHOULD ATTEMPT TO WIRE THIS SYSTEM

Do not supply power to the unit until all wiring and tubing are completed or reconnected and checked, to ensure the grounding.

- Highly dangerous electrical voltages are used in this system. Carefully refer to the wiring diagram and these instructions when wiring.

Improper connections and inadequate grounding can cause **accidental injury and death**.

- **Ground the unit** following local electrical codes.

- The Yellow/Green wire cannot be used for any connection different from the ground connection.
- Connect all wiring tightly. Loose wiring may cause overheating at connection points and a possible fire hazard.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Children should be supervised to ensure that they do not play with the appliance.
- Means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules and codes.

Digital copies and additional Bulletins can be found online at: [www.unicosystem.com](http://www.unicosystem.com)

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# DESIGN & SPECIFICATIONS

## GENERAL

The information on the following pages is to provide the installer the necessary information to properly install the Unico software managed air flow rate and temperature S.M.A.R.T.<sup>1</sup> control board (SCB). The SCB is available as part of the variable speed ECM blower assembly or as part of retrofit kit that includes the ECM motor and blower wheel.

The control box comes with the setup software (ECMConfig) and a USB cable to connect to a personal computer running Windows 7 or 10 operating system. For Mac systems, it is sometimes possible to use a Windows emulator. The ECMConfig software can also be downloaded from: <http://www.unicosystem.com/>.

The SCB is included with the following blower modules and fan-coil units:

<b>Part no.*</b>	<b>Description</b>
M1218BL1-EC2*	Blower Module, 1218
M2430BL1-EC2*	Blower Module, 2430
M3036BL1-EC2	Blower Module, 3036
M3642BL1-EC2*	Blower Module, 3642
M4860BL1-EC2*	Blower Module, 4860
V2430*	Vertical Fan-coil, 2430
V3036*	Vertical Fan-coil, 3036
V3642*	Vertical Fan-coil, 3642

\* There may be additional characters at the end for other options.

Single speed blowers manufactured after 2003 may be upgraded to use variable speed ECM motor with the following kits:

<b>Part no.*</b>	<b>Description</b>
A01543-K22	Upgrade Kit, EC2 (240V), 2430
A01543-K23	Upgrade Kit, EC2 (240V), 3642
A01543-K24	Upgrade Kit, EC2 (240V), 4860

Additional accessories are listed at the end of this document.

## FEATURES

This control board is only compatible with the Unico Electronically Communicated Motor (ECM). The control board comes standard with the following features:

**Multiple Configurations.** Compatible with refrigerant-cooling (AC) systems; refrigerant-heating (heat-pump) systems; chilled water systems, hot water systems, electric heat furnaces, and just about every practical combination of them.

**Soft-start/Soft-stop.** For the ultimate in quiet, the control board allows the blower motor to slowly ramp up to speed when it starts and slowly ramp down when it shuts off (total ramp time 45 seconds).

**ASHRAE 62.2 Compliance.** The SCB software will control the fan speed to provide the required amount of fresh air per ASHRAE Standard 62.2 (2010). See “Programming the SCB” for more information.

**Ventilation Mode.** The SCB is pre-configured to provide ventilation air at 50 percent of the High Cool airflow rate.

**Simplified Wiring.** The control box was developed with the contractor in mind. All wiring terminals are clearly labeled and are designed for point-to-point wiring (one wire per terminal). In addition, all terminal connections can be made without passing the cables through the slotted bushing. All wires can be inserted into the bushing after the terminal connections have been made. Never again will you have to disconnect and re-wire the board because the cable was not pre-inserted through the bushings.

**Accessories.** The control board provides separate relays and contacts to energize a separate Electronic Air Cleaner (EAC), ERV, HRV, UV light, or fresh air damper. We also provide a relay to energize a humidifier with a separate humidistat input for proper control. The board allows the humidistat to control the fan so that humidity can be added even if the fan is not already on. And, of course, the control is smart enough to sense when the system is trying to cool, so that humidity is not added if in cooling mode.

**Designed for the Unico Electric Furnace.** The control board is designed for single or multiple stage thermostats. Both will gradually turn on the electric heat, but the multistage thermostat is more efficient as

<sup>1</sup> S.M.A.R.T. = Software Managed Air Rate and Temperature

it limits the need for electric heaters more than a single stage thermostat. The SCB controller will not energize the third stage electric heat when the heat pump is calling. This reduces the possibility of overheating the electric elements. Without this feature, the user would be required to add a field installed relay or outdoor thermostat.

**Designed for Chillers and Air-to-water Heat Pumps.** The control is designed to operate a chiller or AWHP from the thermostat. For systems with multiple indoor units, the control board will communicate between them, making one the “Leader” and the others as “Followers”. In this way, each air handler knows whether the chiller is making hot or cold water and will turn on the blower as appropriate.

**Designed for Hot Water Heating Systems.** The control allows you to select whether the hot water heating is primary, secondary or emergency heat for single or multi-staged systems. Also, a timer function is included to operate the hot water pump when used with potable water ‘combo’ systems on a periodic basis; this prevents the water from becoming stagnant over time.

**2-Speed Condenser Compatibility.** The SCB is pre-programmed to operate the blower at 75% of full speed during low stage operation for heating or cooling. For systems that use 66% or 50% for low stage, this setting may be modified by using the ECMConfig software.

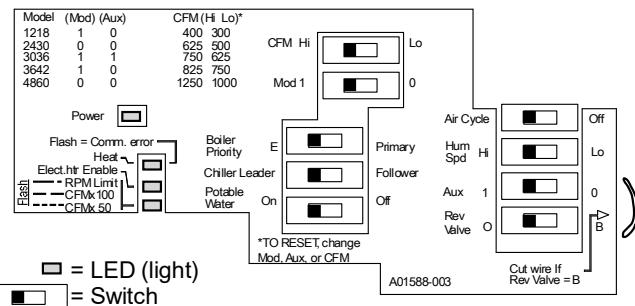
**Ideal for Zone-Damper Systems.** The SCB will control the fan for up to 2 zones with a single speed condenser or up to 3 zones with a two-stage condenser. For more information refer to the Unico Zoning Manual. A chilled or hot water system can have any number of zones. The SCB can be programmed to maintain almost constant duct pressure to avoid the need for bypass dampers at the air handler.

**Quality Design and Manufacture.** The board is made from high quality electronic parts and includes a conformal coating to eliminate problems with humidity, moisture, and dust. Each board is thoroughly tested at the factory.

**Multiple Voltages.** The SCB contains a dual voltage transformer capable of stepping down 208/230V or 120V to 24V as well as a dual voltage wire harness (A02624-G01) to easily connect to the required voltage. Factory default is 230V to avoid damage. If 120V is required, this can be done with the connection of a few wires on the control board and motor wire harness.

## CONTROL SWITCHES

There are nine manual function switches on the SCB. All the switches can be moved while the unit is operating although changes to CFM, MOD, and AUX will not take effect until the board is turned off and then back on. Changing these switches and then cycling the power will erase any custom settings, so do not adjust them unless necessary.



**Figure 1. Switch and LED layout. SCB boards (p/n: A01469-G03)**

**CFM (High|Low, factory default = Hi).** This switch sets the High Cool airflow rate in accordance with Table 1. The airflow for all other modes of operation are set to a percentage of the High Cool airflow as shown in Table 2. All airflows can be customized using the ECMConfig program. Moving this switch and powering the board off and on will erase any customized settings.

**Table 1. Default high-cool airflow rate (CFM switch)**

Blower Model	CFM Switch Setting			
	Low		High	
	CFM	L/s	CFM	L/s
1218	300	141	400	189
2430	500	236	625	295
3036	625	295	750	354
3642	750	354	875	413
4860	1000	472	1250	590

**Table 2. Airflow defaults (for all modes)**

Operating Mode	Percentage of High Cool Airflow
High Cool (Y2)	100%
Low Cool (Y1)	75%
High Heat (W2)	100%
Low Heat (W1)	75%
Emergency Heat (E)	100%
Fan Recirculation (G)	50%

**MOD (1 | 0, no factory default).** This switch plus the AUX must be set to match the blower model as shown in Table 4.

**AUX** (1 | 0, factory default=0). Use this switch along with the MOD switch to set the blower model as shown in Table 3.

**Table 3. Blower Model selection**

Blower Model	MOD	AUX
1218	1	0
2430	0	0
3036	1	1
3642	1	0
4860	0	0

**NOTE:** For all control boards, changing the MOD or AUX switch and cycling the power will reset the program settings to the factory default.

**POTABLE WATER** (ON|OFF, factory default=OFF) For ‘combo’ systems<sup>1</sup>, where potable water is circulated through the hot water heating coil, it is necessary to ensure that the water is never stagnant in the coil. The switch will activate a timer so that the HotW relay will energize a pump to circulate water once per day for 5 minutes regardless.

**AIR CYCLE** (ON|OFF, factory default=OFF) Used to periodically circulate air through the ducts to reduce the chance of moisture build-up in the winter months. By default, the fan will run on Fan speed for 10 minutes every 8 hours even if there is no thermostat demand for heat or cool or fan. This timing, along with ASHRAE 62.2-2010 compliant modes of operation, can be configured using the ECMConfig interface.

**HUM SPD** (HIGH|LOW, factory default = HIGH) Allows a separate humidistat to control the fan operation under certain conditions. A humidistat with a dry contact input is required to energize the fan and close the dry contact relay on the HumVlv terminals.

If the unit is not in cooling or heating (when it is off) the HumStat will turn on the fan to the speed set by the switch. In the default condition (Humidistat Control=HIGH) the relay will energize the fan at the high-heat speed. If the Humidistat Control switch is moved to the LOW position, the blower will run at the FAN airflow rate.

**REV VALVE** (B|O, factory default = O). This switch indicates whether the reversing valve coil is energized during cooling (O) or in heating (B). Most heat pumps energize the reversing valve in cooling, so this switch is disabled with a jumper wire to reduce the chance of being in the wrong position. For heat pumps that

energize the reversing valve in heating (B), be sure to cut the jumper wire, remove the jumper between R and O/B inputs, and move the switch position to B; otherwise, the board will still behave as if the O position is selected.

For cooling-only (air conditioning) systems, the reversing valve is not used but the control board still needs to know that it is a cooling system. For AC-only systems, always set the switch to the O position (or do not cut the jumper wire) and be sure there is a jumper across the R and O/B inputs.

## CAUTION

**To prevent the potential of coil frosting for ‘cooling-only’ systems, be sure the jumper across R and O-b is in place. If not, the AFS may not work properly.**

**CHILLER** (Leader|Follower, default=Leader). This switch controls the operation of both the chiller relay (ColdW) and the boiler relay (HotW). If the switch is in the ‘leader’ position, the ColdW relay will energize with any call to Y1 or Y2.

**Note: For cooling-only chillers, always set the chiller to “leader”. The “follower” function is only necessary for heat pump chillers.**

For heat pump chiller systems, if there is more than one air handler connected to the system, we recommend that all air handlers be set to the same mode (either heating or cooling). Otherwise, the chiller could frequently switch between heating and cooling. This will not damage the equipment but is energy wasteful because the chiller must heat and cool a large volume of water every time it changes mode.

To prevent this switching behavior, use a manual switch to set the mode by sending an O-b signal to all air handlers, which must all be set as a “follower”.

It is possible to automate this by setting one of the air handlers as “leader” and all others as “followers”. This is not completely fool proof though. The system can still switch back and forth if the leader is not calling for heat or cool (the unit appears to be off so there is no O-b signal). In this case, the “leader” air handler must use a heat pump thermostat. Always use a heat-cool thermostat when in “follower” mode.

By utilizing a manual leader switch or leader air handler, the leading air handler is the master controller and determines the temperature of the water by utilizing the O-b signal from the heat pump thermostat. Subordinate air handlers are followers and will only energize the blowers if the water is the correct temperature.

<sup>1</sup> Combo System refers to using a hot water heater to combine the function of hot water for domestic water and for heating the space

As recommended above, it is best to simulate the leader function by installing a manual switch create the O-b signal; this makes all the air-handlers as followers.

**Note:** When setting the unit to “follower”, the W1 and W2 inputs will not energize the HotW relay even if the BOILER switch is set to PRIMARY because the system assumes that the system is a heat pump chiller.

**BOILER PRIORITY** (Emergency|Primary, factory default = Primary). This switch controls when the HotW relay is energized as shown in table 4.

**Table 4. When the ColdW (CW) and HotW (HW)**

Switch Position		Thermostat Input				
Chiller	Boiler	Y1	Y2	W1	W2	E
Leader	Primary	CW	CW	HW	HW	-
	Emergency	CW	CW	-	-	HW
Follower*	Primary	CW	CW	CW	CW	-
	Emergency	CW	CW	CW	CW	HW

\* ColdW will energize if the system is in the correct mode, i.e. heating if W1 or W2, or cooling if Y1 or Y2. If not in correct mode, only the fan will energize.

**Reset Factory Defaults.** It is possible to reset the airflow settings to their factory defaults at any time. This will erase any custom settings created with the software, therefore only do this if you do not have a computer connected and are unsure if the airflow has been modified.

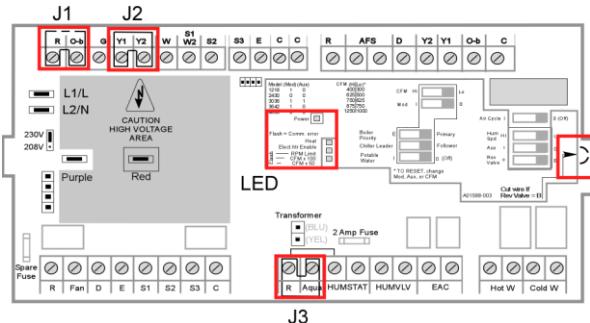
To reset the airflow to the default, turn off the power, change the position of either the Capacity, Mod, or Aux switches, then turn the power back on (in effect, cycle the power).

If you change the position of the switch with the power on, the SCB will flash an error code indicating that a reset will happen if the power is cycled. If you accidentally change a switch, simply switch it back again before you cycle the power. Then turn off the power to the SCB and then turn it on. The board will check the switch position each time it is first powered on. If the positions have been changed since the last time the board was on, the internal airflow values will be reset to the factory default.

Changing the position of these switches when the unit is powered on or while it is off will have no effect unless the positions are different at the time it is turned on compared to the last time it was turned on.

## JUMPERS

There are several jumpers on the SCB that are provided to make the most common wiring applications easier. These must be removed for some applications. The description of each jumper is listed below:



EL00071D.CDX

**Figure 2. Board layout**

**J1 : R/O-b** (thermostat block) jumper is required for all cooling-only systems. The board is preconfigured for heat-pump systems that energize the reversing valve in the cooling mode (i.e. require ‘O’). The control senses the signal on the O-b terminal to determine whether it is in cooling or heating mode. Therefore, for cooling-only systems it is necessary to provide this jumper, so the control knows it is in the cooling mode. For heat pump systems, this jumper must be removed.

**J2 : Y2-Y1** (thermostat block) jumper is used for the convenience of the installer when using a single-speed condenser. If the thermostat calls for cooling at the Y2 terminal the fan speed is high, whereas, at the Y1 terminal the fan speed is low. The jumper forces the fan to run on high during all cooling modes. Therefore, the jumper is in place to allow the installer the ability to use either terminal. For two-stage condensers, this jumper must be removed.

**J3 : R-Aqua** (accessories block) allows fan to energize without an optional aquastat when using a hot water system. If an aquastat is used, this jumper must be removed.

**J4 : Rev. Valve Jumper Wire** (permanent jumper on board) disables the Reversing Valve switch so that it is permanently in the ‘O’ position. For systems that have a reversing valve that is energized in heating and requires a ‘B’ connection, cut the jumper with wire snips and move the Rev. Valve switch to ‘B’.

**Note:** The heat pump jumper wire must be cut for proper heat pump operation.

## LED LIGHTS

There are four LEDs on the SCB board, as shown in Figure 2 and described in Table 5.

**Table 5. LEDs (Board model, A01469-G03)**

LED	State	Meaning
Power (green)	Off	No power. Check voltage.
	Flashing	Board is functioning properly.
	Solid	The control board program has stopped. Turn power off and on to reset. Replace board if unable to reset.
Heat (red)	Off	System is not in heating mode
	Flashing (Long ON flashes)	Pending program reset. The MOD, CFM, or AUX switch has changed.
	Flashing (Short ON flashes)	No communication to the motor. Check cables and power to motor.
	Solid	System is in the heating or reheat (simultaneous cooling and heating) mode.
Elect. Htr. Enable (green) [Fan]*	Off	No call for fan or airflow less than 75% of programmed value; electric heater enable relay is off.
	Solid	Fan has reached 75% of programmed airflow; electric heater enabled relay is on.
Flash 'Check Airflow' (red) [PCBct]	Off	Fan is not running.
	Long flash	100 CFM
	Short Flash	50 CFM (last flash in a sequence)
	Extra-long flash (1 sec)	Motor is at maximum RPM limit and cannot achieve desired air flow (flashes between airflow sequence)
	Solid	(Reserved for future use)

\*[] indicates the name of the LED for A01469-G01 and A01469-G02.

The USB board has two LED lights.

**Table 6. USB board LEDs**

LED 1 (green)	Flashing	SCB sending message to ECMConfig program
LED 2 (red)	Flashing	ECMConfig program sending message to SCB

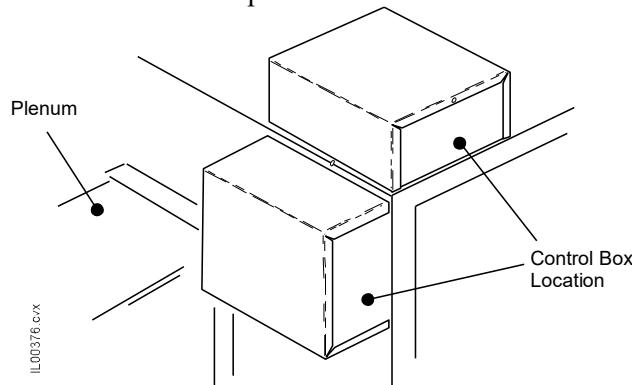
## LOCATION AND MOUNTING

The control box can be installed in either one of two positions on the modular air handler (Figure 3). Choose the position that allows the best access. The control box can also be mounted remotely using a 5 ft (1.5 m) or 8 ft (2 m) extension cable, part number A01525-G01 or A01525-G02, respectively.

### CAUTION

**THE CONTROL BOX MUST BE SCREWED TO THE AIR HANDLER OR REMOTE MOUNTED USING THE UNICO EXTENSION CABLE TO PROVIDE PROPER GROUND FOR THE MOTOR.**

The knock-out on top/front of the air handler must be removed to allow the motor cable connector to extend into the air handler space.



**Figure 3. Control Box Mounting Locations.**

## BOARD TERMINALS

The following tables describe in detail the function of each terminal on the control board.

**Table 7. Thermostat Terminal Block Description**

<b>Inputs</b>	<b>R</b>	Power out. 24VAC power signal.
	<b>O-b</b>	Reversing valve input from thermostat. Can be either O or B, depending on the requirements of the outdoor unit.
	<b>G</b>	Fan input. Blower will operate at fan speed unless there is a call on Y1, Y2, W1, W2 or E. Refer to Tables 1 and 2 for default blower airflow settings.
	<b>Y2</b>	High Cool input. Will energize the blower at High Cool airflow and pass a signal to Y2 on the condenser terminal block.
	<b>Y1</b>	Low Cool input. Will energize the blower at Low Cool airflow and pass a signal to Y1 on the condenser terminal block.
	<b>W1</b>	Heat input (first stage of two-stage heat). Electric heater will not turn on with this signal. Blower will run at Low Heat airflow rate.
	<b>W/ W2/ S1</b>	Heat input (single stage heat, second stage of two-stage heat, or first stage electric heat) Powers S1 electric heat terminal (direct connection). Electric heater will energize when fan is at full speed (not ramping). Blower will operate at High Heat speed.
	<b>S2</b>	Heat input (second stage heat). Connects to S2 on the thermostat terminal block. Powers S2 on the electric heat terminal block (direct connection). Will not power the blower.
	<b>S3</b>	Heat input (third stage). Connects through a NC relay to S3 on the thermostat terminal block. Powers S3 electric heat terminal if operating in heat pump mode (signal present at Y2 or Y1). Will not power the blower.
	<b>E</b>	Emergency heat input. Powers E on the electric heat terminal block (direct connection from Thermostat Terminal Block terminal E input). Blower will operate at the Emergency airflow rate.
	<b>C</b>	Common. Used to power the thermostat, or an external relay, if required.

Note: Factory ships with jumper across Y2 and Y1, and a jumper across R and O-b.

**The Y2-Y1 jumper must be removed for two-speed condensers.** The jumper is only a convenience so that either terminal may be used for single-speed condensers.

**The R-Ob jumper must be removed for heat pump systems.** The Rev.Valve switch must be set properly.

**Table 8. Condenser Terminal Block Description**

	<b>R</b>	Power out. 24VAC power signal.
<b>Dry Contact Input (Rated 24VAC, 2 amp)</b>	<b>AFS</b>	Anti-frost switch input. The AFS is mounted on all refrigerant coils. When the AFS is closed and in cooling mode, the control will allow the Y1 or Y2 condenser terminals to be energized. If the AFS switch opens, the condensers will stop although the indoor blower will continue to operate. The AFS will not affect operation of the condensers if in the heating mode. The AFS switch will open at 34°F±3°F (1°C±1.6°C) and close at 60°F±3°F (15.5°C±2.8°C). The AFS contacts are normally open and close when the R-Ob jumper is removed for heat pump application.
<b>Input (24 VAC)</b>	<b>D</b>	Defrost input from the outdoor unit. Powers D on the electric heat terminal block (direct connection). The D terminal must be connected for all heat pumps. This prevents AFS nuisance trips from occurring if the outdoor unit control board energizes O-b during defrost.
<b>Outputs (24 VAC)</b>	<b>Y1</b>	Cool output. Will energize single-speed condenser or the first stage of a two-stage condenser.
	<b>Y2</b>	Cool output. Will energize the second stage of a two-stage condenser.
	<b>O-b</b>	Reversing valve output. Can be configured as either O or B, depending on the requirements of the outdoor unit.
	<b>C</b>	Common. Used to power the relays and controls in the condenser.

**Table 9. Accessories Terminal Block Description**

	<b>R</b>	Power out. 24VAC power signal.
<b>Dry Contact Input</b>	<b>Aqua</b>	Aquastat input. Allows the option of using an aquastat to reduce the time it takes for the air to become hot when heating. The fan will not energize until the aquastat is satisfied.
	<b>HumStat</b>	Humidistat input. The HumVlv contacts will close whenever the humidistat calls for humidity and the unit is not in cooling. The fan will come on if necessary.
<b>Dry Contact Output (120VAC, 3 amp)</b>	<b>HumVlv</b>	Used to turn on humidifier (contacts close) when there is a call from the Humidistat.
	<b>EAC</b>	Used to energize an electronic air cleaner (EAC), ERV, HRV, or UV-light (contacts close when fan is on). Can also be software-configured to control a fresh air damper (contacts close as required by software algorithms.)
<b>Dry Contact Output (250VAC, 5 Amps)</b>	<b>HotW</b>	Used to energize either a boiler, valve, or pump. Contacts will close based on the inputs shown in Table 4.
	<b>ColdW</b>	Used to energize a chiller, valve, or pump. Contacts will close based on the inputs shown in Table 4.

**Note:** All boards ship from the factory with a jumper across R and Aqua. This jumper must be removed if an aquastat is used.

**Table 10. Electric Furnace Terminal Block Description**

<b>Outputs</b>	<b>R</b>	Power out. 24VAC power signal.
	<b>Fan</b>	Fan proving output, connected through a relay directly from G on the thermostat terminal block. Once the motor reaches full speed, this relay closes sending a 24VAC signal to the electric heater to allow the heating elements to energize. The Unico Electric Furnace will not function unless this signal is present.
	<b>D</b>	Defrost output, direct connection from D on the condenser terminal block. Will send a signal to electric furnace defrost terminal to turn on the defrost elements to prevent cold blow during defrost.
	<b>E</b>	Emergency heat output, direct connection from E on the thermostat terminal block. Will energize all the electric furnace elements.
	<b>S1</b>	Heat output, direct connection from W/W1 on the thermostat block. Blower will operate at High Heat airflow, electric furnace S1 terminal will be energized, and accessory relays (HotW and ColdW) will energize in accordance with Table 5.
	<b>S2</b>	Heat output (second stage), direct connection from W2 on the thermostat terminal block. S2 terminal on electric furnace terminal block will be energized. The electric furnace requires that the S1 signal is present to energize the second stage heating element.
	<b>S3</b>	Heat output (third stage), connected through an NC-relay directly from S3 on the terminal block. Relay is energized and contacts open whenever Y1 or Y2 is energized. This prevents the third stage of electric heating elements from energizing when the heat pump is operating. The electric heater requires that the S1 signal is present in order to energize third stage electric heat.
	<b>C</b>	Common. Used to power the relays in the electric heater.

## WIRING

### WARNING!

**DISCONNECT ELECTRICAL SUPPLY BEFORE WIRING UNIT TO PREVENT INJURY OR DEATH FROM ELECTRICAL SHOCK.**

All electrical wiring must comply with all local codes and ordinances. Use a separate power supply with appropriate amp fuse or breaker and wire gauge for the specified amperage. Do not wire directly to condenser or add other equipment to the blower power circuit.

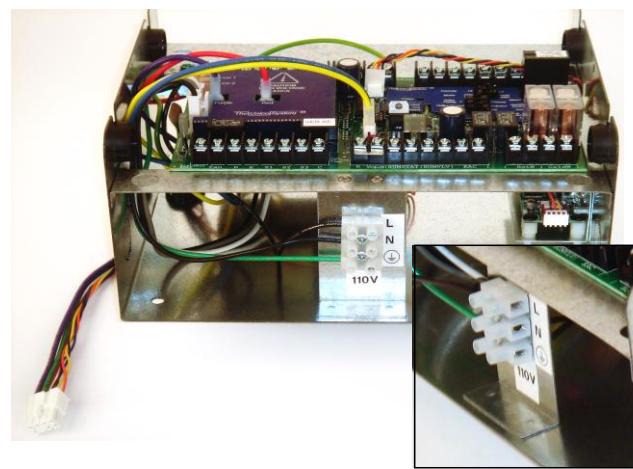
### CAUTION

**Be sure that the input power voltage matches the control box to prevent damage to the equipment.**

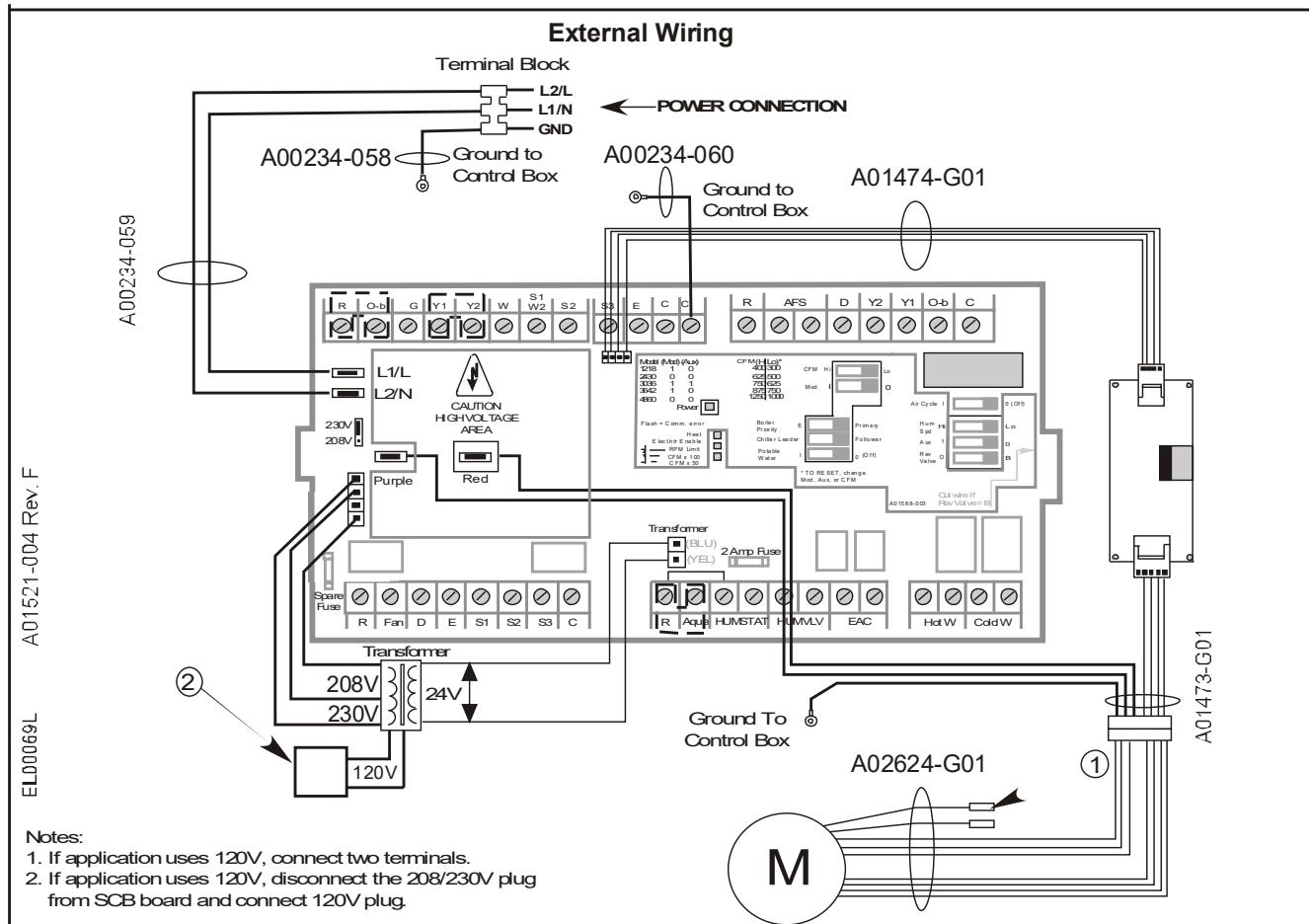
Once the control box is mounted to the cabinet, the motor can be connected from inside the air handler. Remove the appropriate air handler access panel. Connect the motor connector to the mating end of the control box wiring harness, pushing firmly to be sure the connector is seated.

Connect the control wiring for the external devices such as the thermostat, condenser, and electric furnace to the SCB using the appropriate wiring diagrams as shown below.

There are several knockouts on the sides of the control box to bring in the power lines. Use the most convenient ones to bring in line voltage and ground to the terminal block as shown in Figure 5.



**Figure 4. Terminal block for incoming line voltage connections.**



**Figure 5. Power and internal wiring diagram.**

## VOLTAGE SWITCH

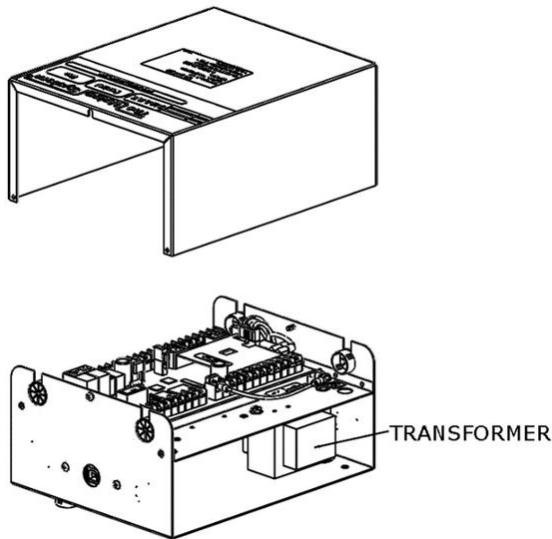
The control box has a two-position transformer voltage switch marked 208-230. The 230 position sets the low voltage transformer to 24V output with 230V input. If the input power is 208V, move the switch to the 208 position; otherwise, the low voltage will drop to 22V. In effect, this moving the switch from 230 to 208 boosts the low voltage by 10 percent.

For 120V applications, the boost feature is disabled so always set the switch to 230V.

## 120V APPLICATIONS

The control box is factory set for 208/230V power input. To use 120V power input, do the following:

1. Shut off/disconnect power to the control box/unit. Remove the lid of the control box.



2. Move the voltage switch to the 230V setting.
3. Remove the 230/208V transformer connector and plug in the 120V connector. The transformer is located under the top shelf as shown in the figure below.

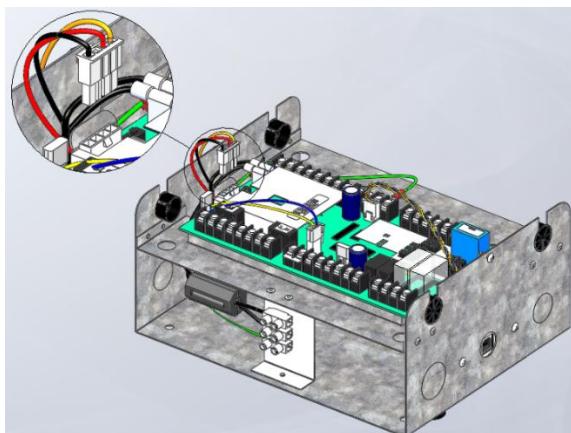


Figure 6. Remove 230V power connector

The 230/208V connector has three wires (red, orange, black) and is connected to the control board as the factory default. The 120V connector is loose under the top shelf. It has two wires (black, white). Plug it into the same connector on the board.

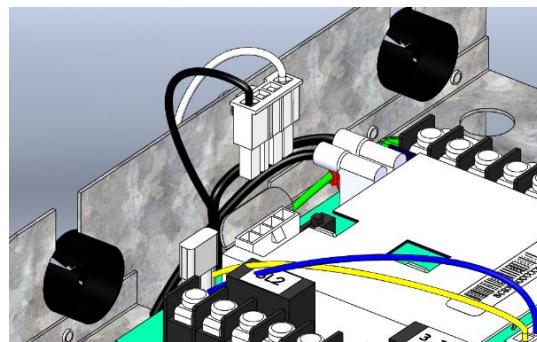


Figure 7. Connect 120V power connector

4. Remove the 4 screws attaching the door panel to the cabinet and remove the door panel.

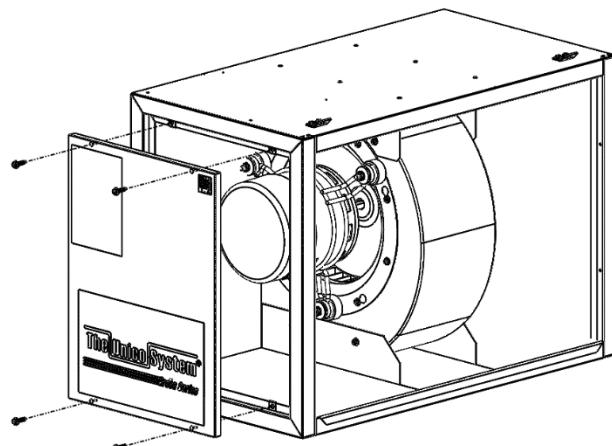


Figure 8. Remove panel to access motor

5. On the wire harness connected to the motor, two black wires are wrapped in plastic. Remove this plastic and connect the two wires by aligning the slots and tabs.

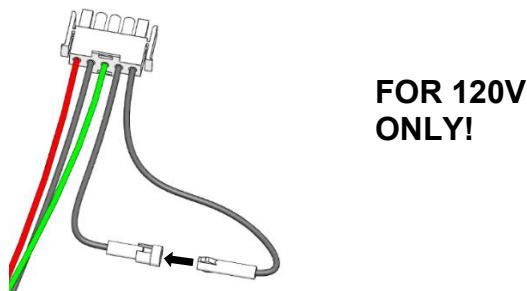


Figure 9. Connect 120V jumper

6. Reattach the door panel to the unit.
7. Reconnect/turn on power to the unit.

## WIRING CONFIGURATION DIAGRAMS

The SCB is compatible with most heating and cooling systems: cooling-only air conditioning, heat pumps, boiler systems, chiller systems, electric furnaces, and various combinations of each. The control board is organized by input type as shown in Figure 10.

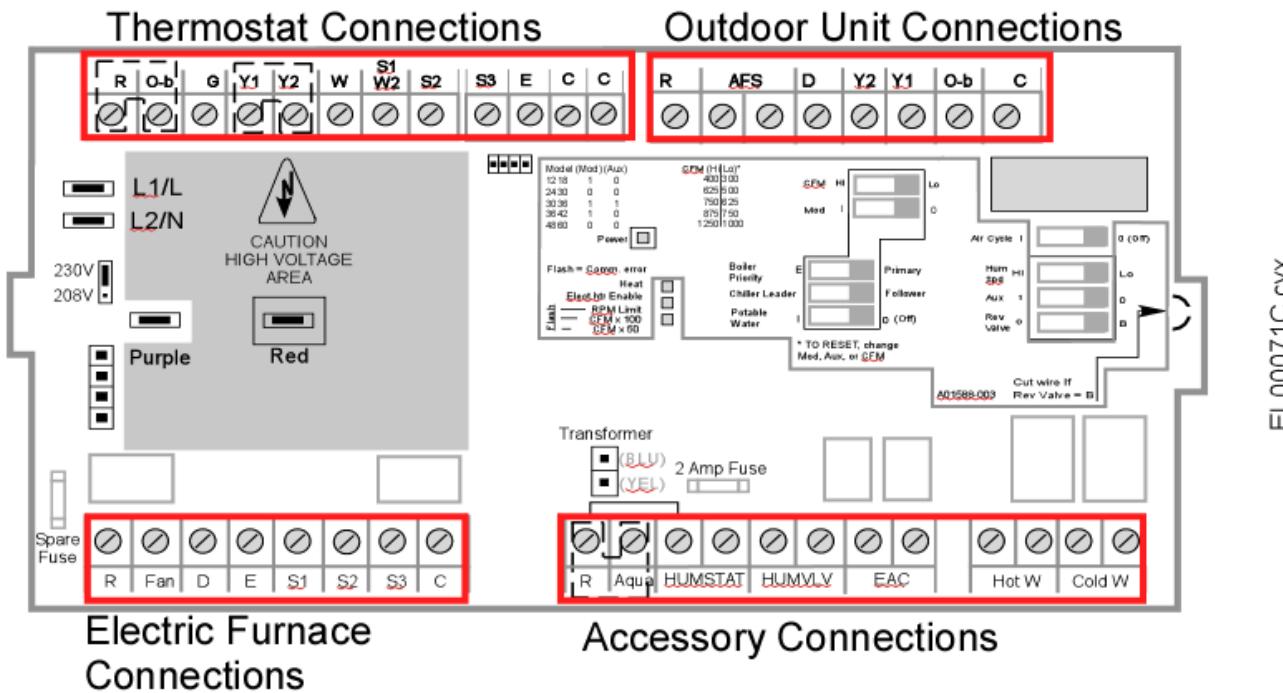
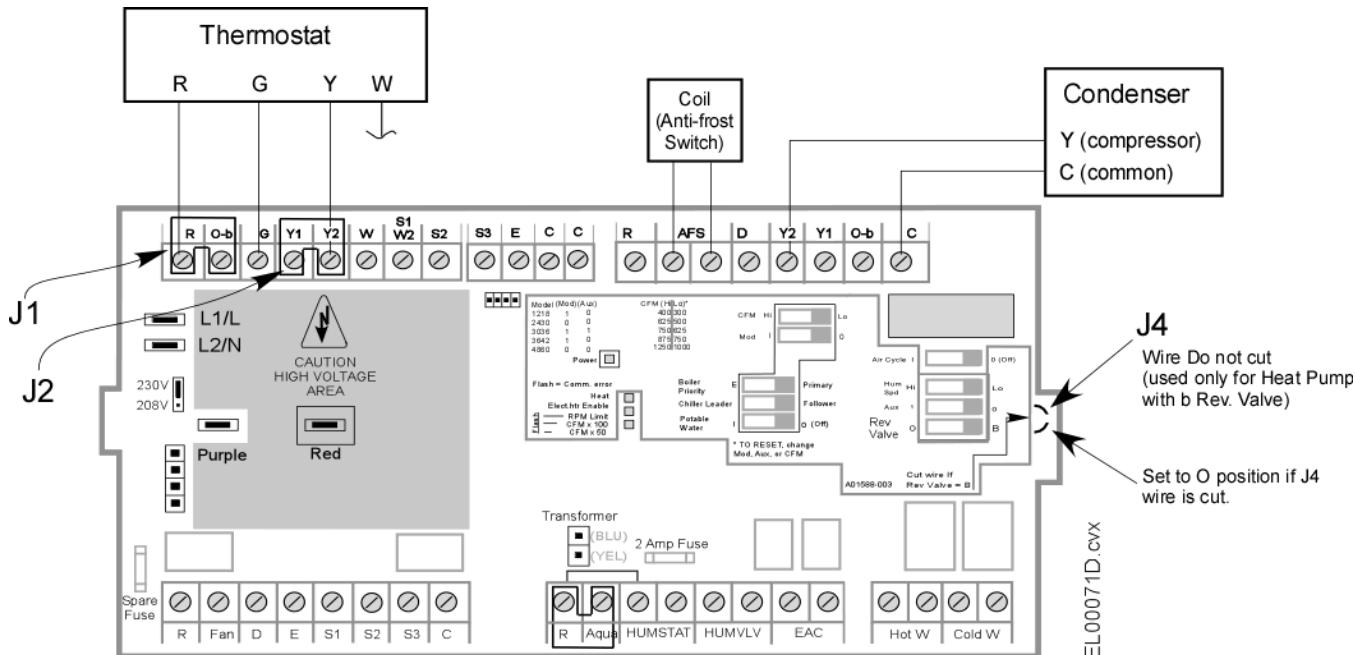


Figure 10. Control board input/output connections

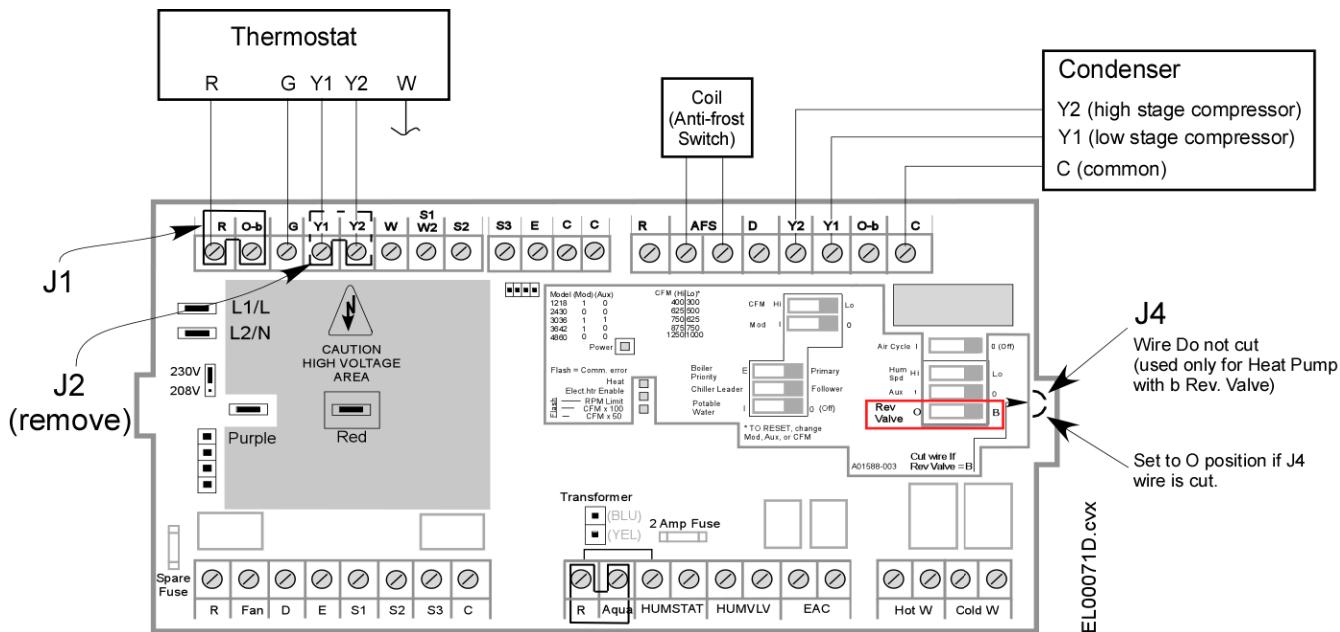
Diagram 1. Air-conditioner, single-stage



Note for A/C systems:

- Be certain that the jumpers (J1 and J2) are in place. If the Rev. Valve switch jumper (J4) is cut, then move Rev. Valve switch to O.

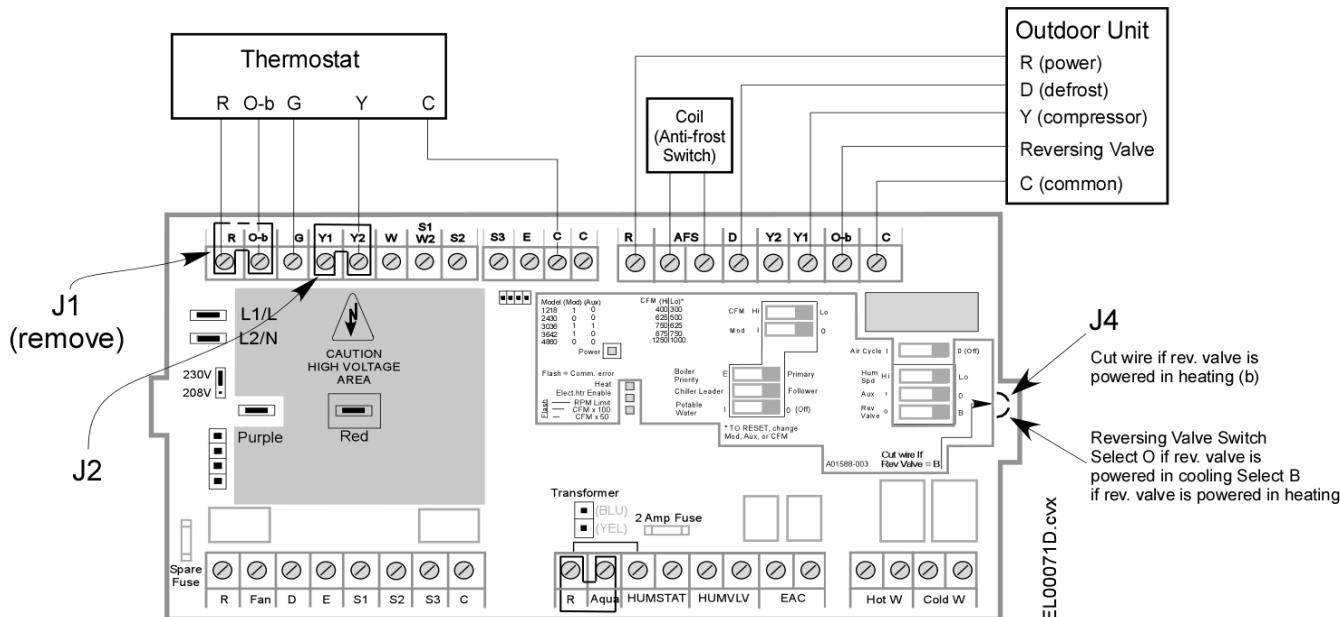
Diagram 2. Air-conditioner, two-stage



Notes:

- Be certain that the jumper (J1) is in place between R and O-b.
- Remove jumper (J2) between Y1 and Y2 on the thermostat block.
- If the Rev. Valve switch jumper (J4) is cut, then move Rev. Valve switch to O.

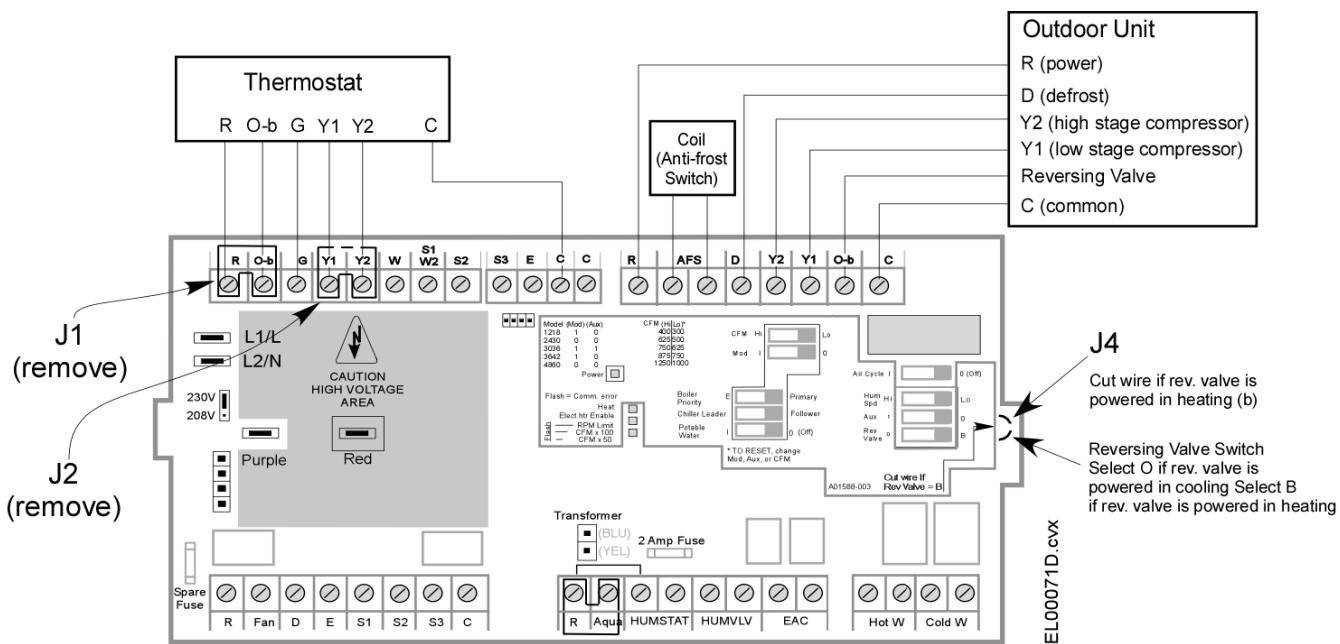
Diagram 3. Heat pump, single-stage



Notes.

- Use a single or multi-stage heat pump thermostat.
- Remove jumper (J1) between R and O-b on the thermostat block; leave J2 in place.
- If the heat pump reversing valve is energized in the cooling mode (O is energized in cooling), it is not necessary to cut the reversing valve jumper wire (J4). However, if the wire is cut, then move the switch to the 'O' position and connect 'O' from the thermostat to 'O-b' on the thermostat input terminal block on the board.
- If the reversing valve is energized in the heating mode (B is energized in heating), cut the heat pump jumper wire (J4) and move the Reversing Valve switch in the 'B' position. Connect 'B' from the thermostat to 'O-b' on the thermostat input terminal block on the board.

Diagram 4. Heat pump, two-stage

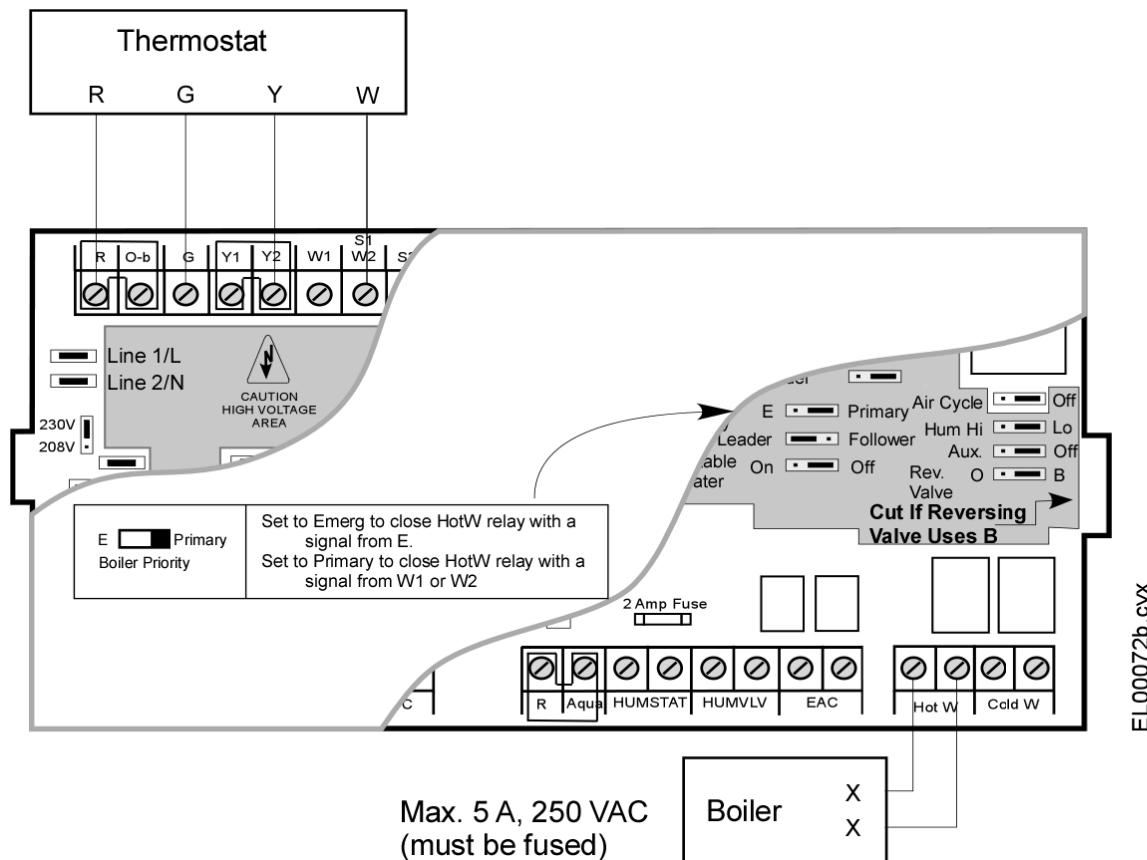


## Notes:

- Use a multi-stage heat pump thermostat.
- Remove jumper (J1) between R and O-b on the thermostat block.
- Remove jumper (J2) between Y1 and Y2 on the thermostat block.
- If the heat pump reversing valve is energized in the cooling mode (O is energized in cooling), it is not necessary to cut the reversing valve jumper wire (J4). However, if the wire is cut, then move the switch to the 'O' position and connect 'O' from the thermostat to 'O-b' on the thermostat input terminal block on the board.
- If the reversing valve is energized in the heating mode (B is energized in heating), cut the heat pump jumper wire (J4) and move the Reversing Valve switch in the 'B' position. Connect 'B' from the thermostat to 'O-b' on the thermostat input terminal block on the board.

Two-stage condensers and heat pumps generally operate between 50% and 75% capacity at low stage. By default, Unico configures the low stage airflow rates(Y1) of the SCB to be 75% of the high stage airflow(Y2). If your outdoor unit uses a different low stage capacity ratio, you can easily adjust the airflows to match by using the ECMConfig program. For more information on how to make this change, refer to section *Programming the SCB*.

## Diagram 5. Air-conditioner with hot water heating

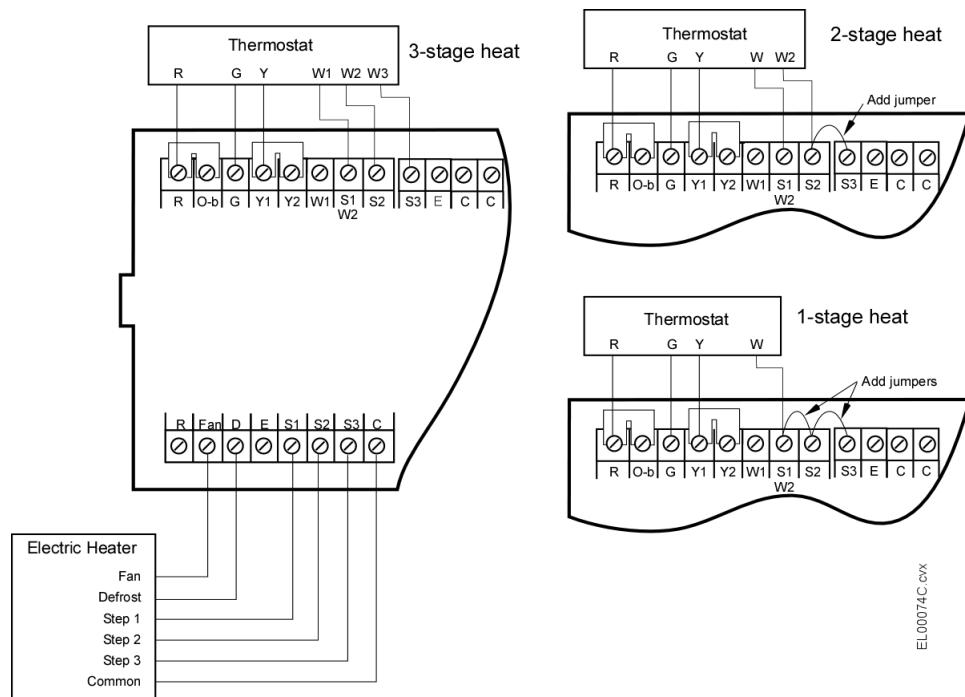


## Notes

- Use a heat cool thermostat
- Set boiler priority to Primary.
- Option: Use an aquastat (Diagram 14) to delay the fan until the water is hot.

Caution. To prevent damage to the control board, be sure the load on the HotW relay is fuse protected.

### Diagram 6. Air conditioner with electric furnace secondary

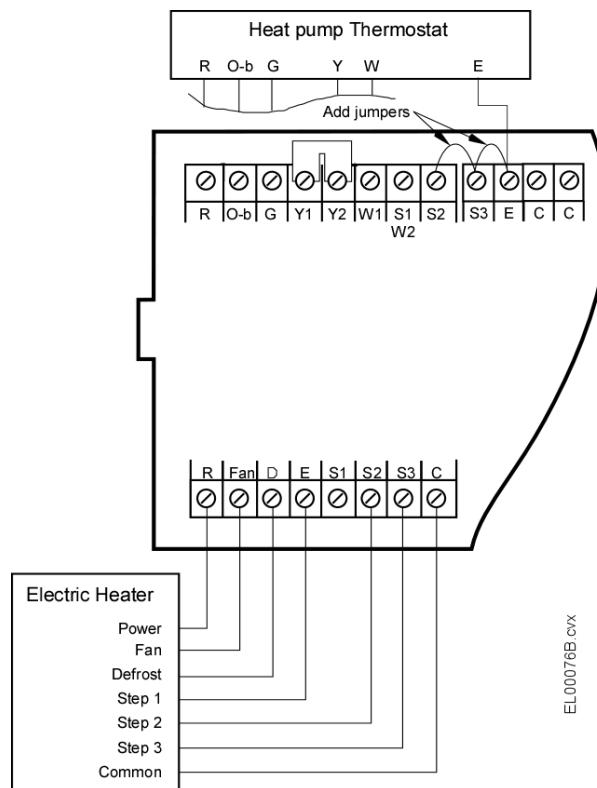


EL00074C cyx

Notes:

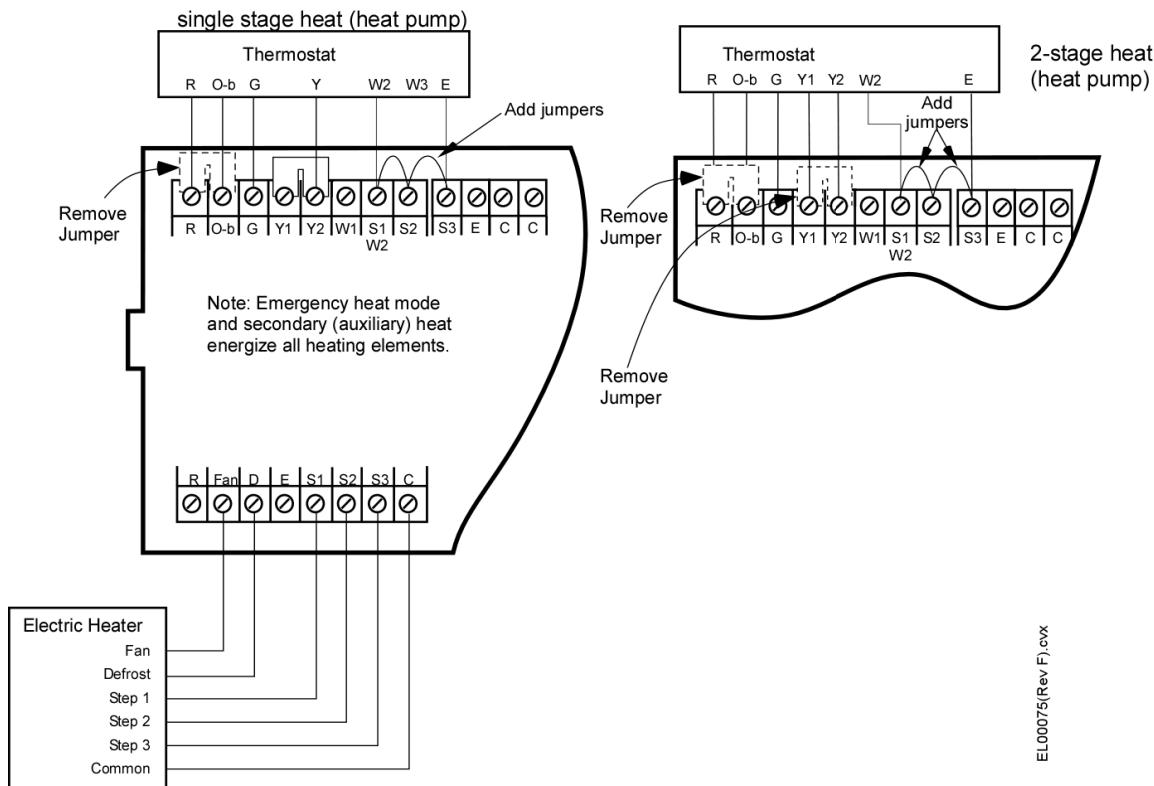
- Use multi-stage electric furnace thermostat.
- Refer to Diagram 1 or 2 to wire outdoor condenser unit.

### Diagram 7. Heat pump with electric furnace emergency



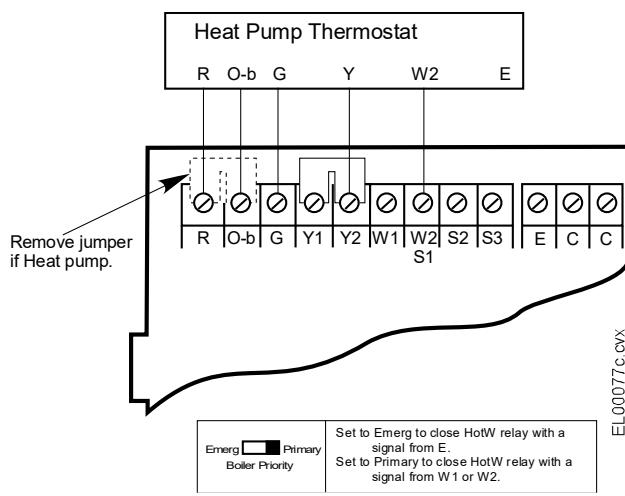
EL00076B cyx

### Diagram 8. Heat pump with electric furnace secondary and emergency



Refer to Diagram 3 or 4 for instructions to set the reversing valve O-b switch.

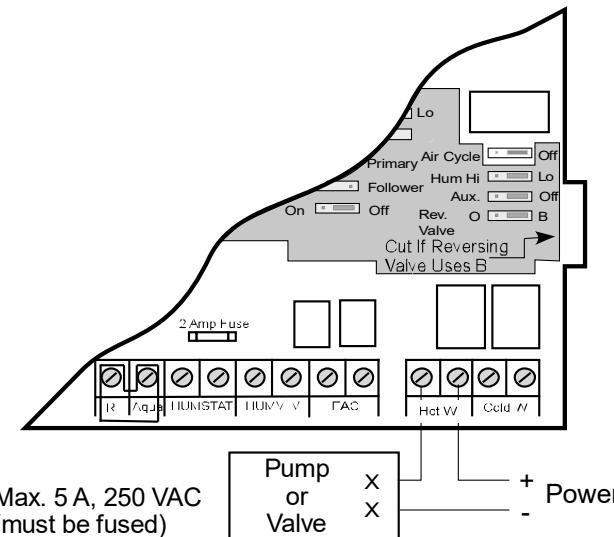
### Diagram 9. Heat pump with hot water secondary



Notes:

- Set the Boiler Priority switch to 'Primary' position.
- As an option to delay the fan, use an aquastat and refer to Diagram 14.

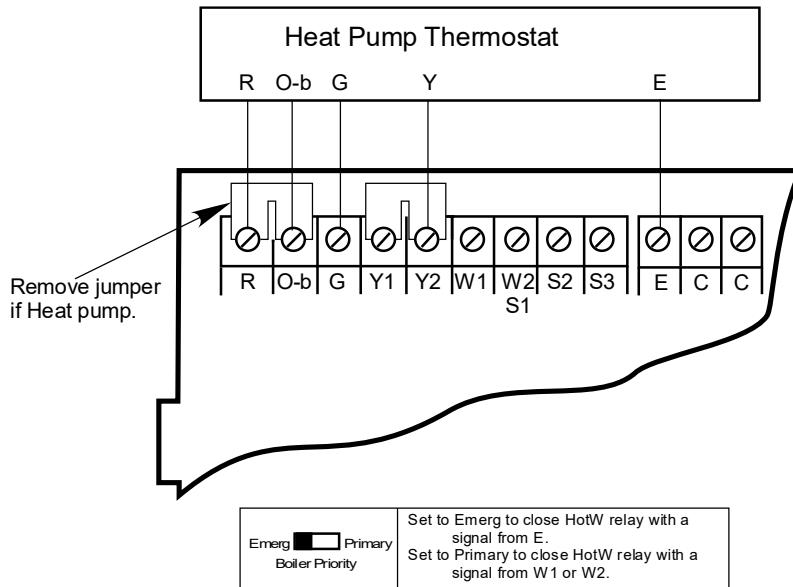
Boiler, valve, or pump connection.



Notes:

- As an option, use a valve with an end switch to power on the pump or boiler separately.

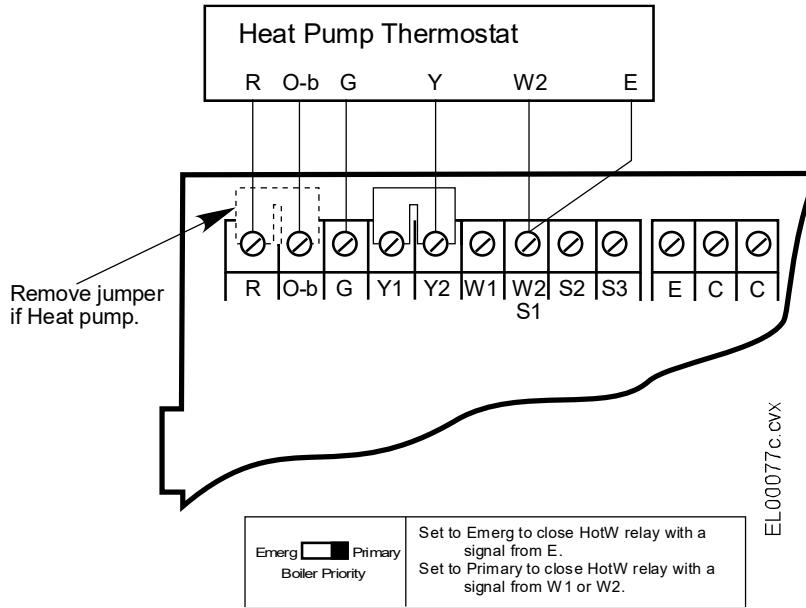
### Diagram 10. Heat pump with hot water emergency (dual fuel)



## Notes:

- Set the Boiler Priority switch to 'Emergency' position.
- As an option to delay the fan, use an aquastat and refer to Diagram 14.
- Refer to Diagram 9 to connect the boiler, valve, or pump.

### Diagram 11. Heat pump with hot water secondary and emergency (dual fuel)



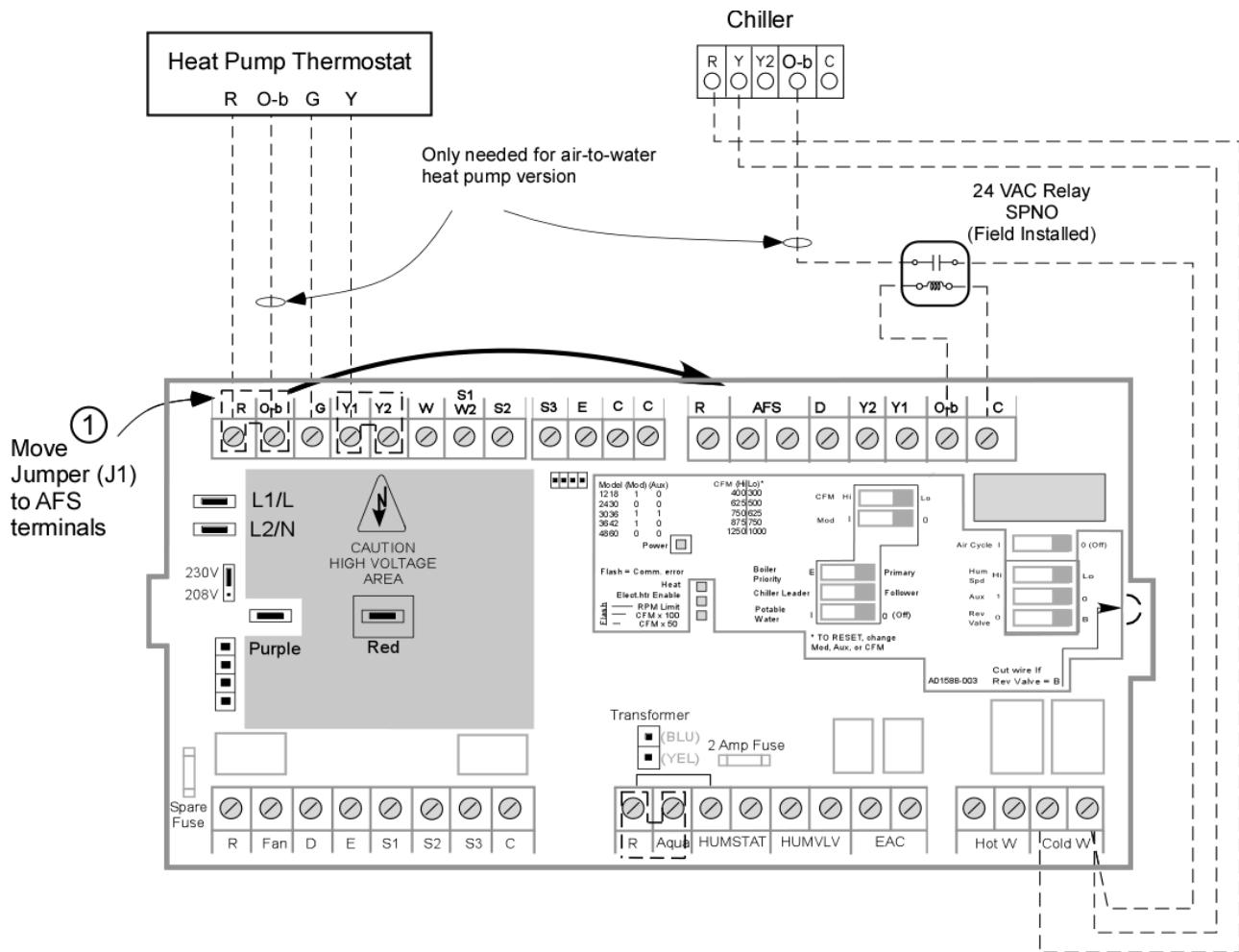
## Notes:

- Set the Boiler Priority switch to 'Primary' position.
- As an option to delay the fan, use an aquastat and refer to Diagram 14.
- Refer to Diagram 9 to connect the boiler, valve, or pump.

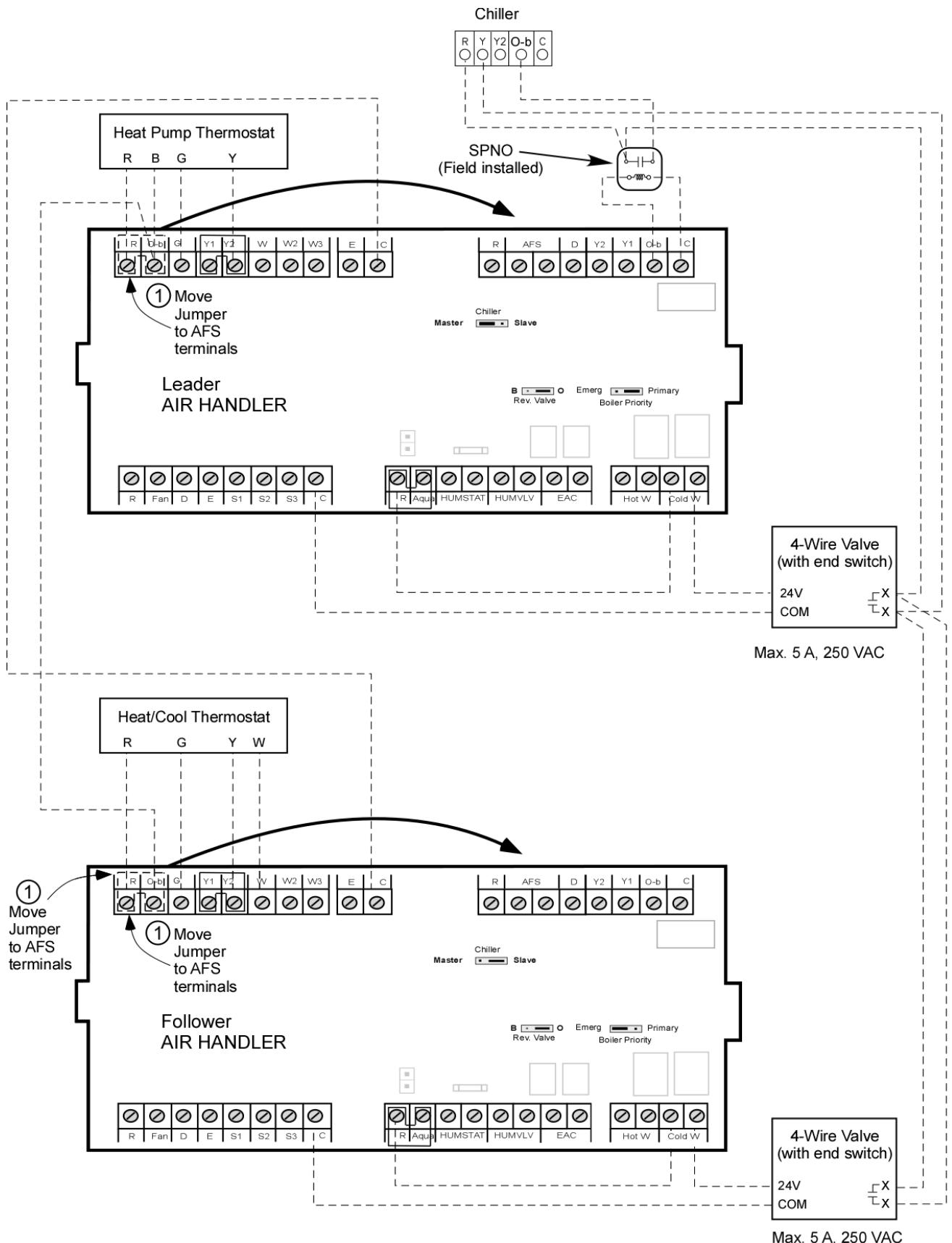
## WIRING TO A CHILLER

The Unico SCB controller is compatible with any chiller system that uses a dry contact input to energize and air-to-water heat pump (AWHP) or chiller. The following diagram illustrates one specific example where the chiller has its own R-Y-B-C inputs, like a heat pump. Refer to your chiller manufacturer's installation instructions for other types of systems. For more than one chiller or more than one air handler, we recommend the use of a stage controller.

**Diagram 12. AWHP/Chiller with one air-handler**

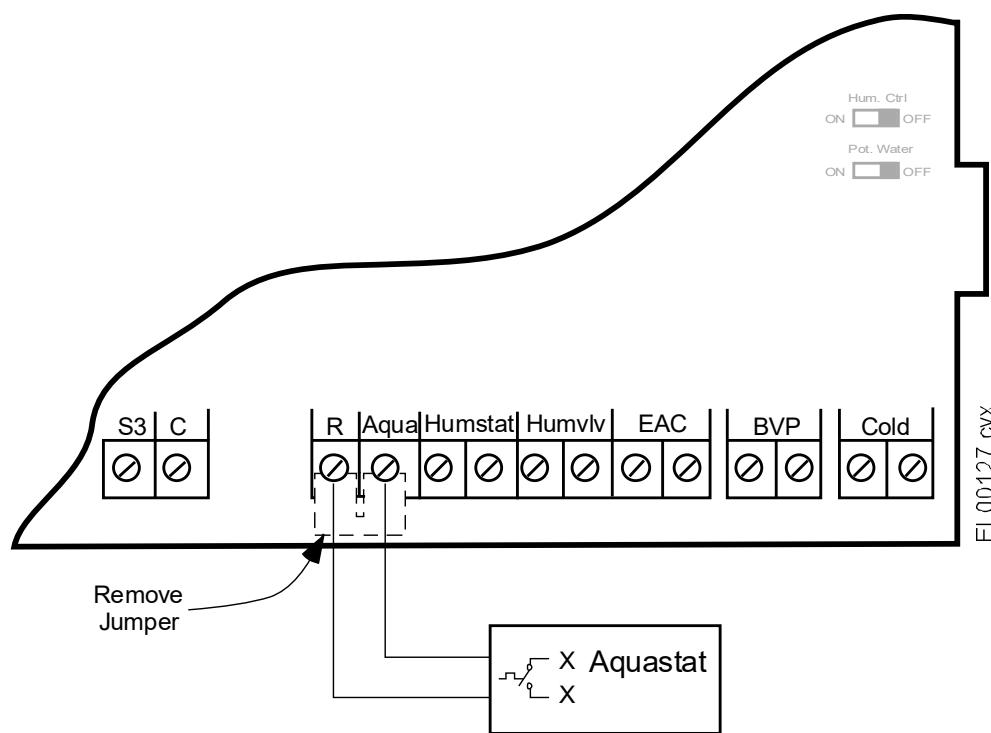


## Diagram 13. AWHP/chiller with multiple air handlers

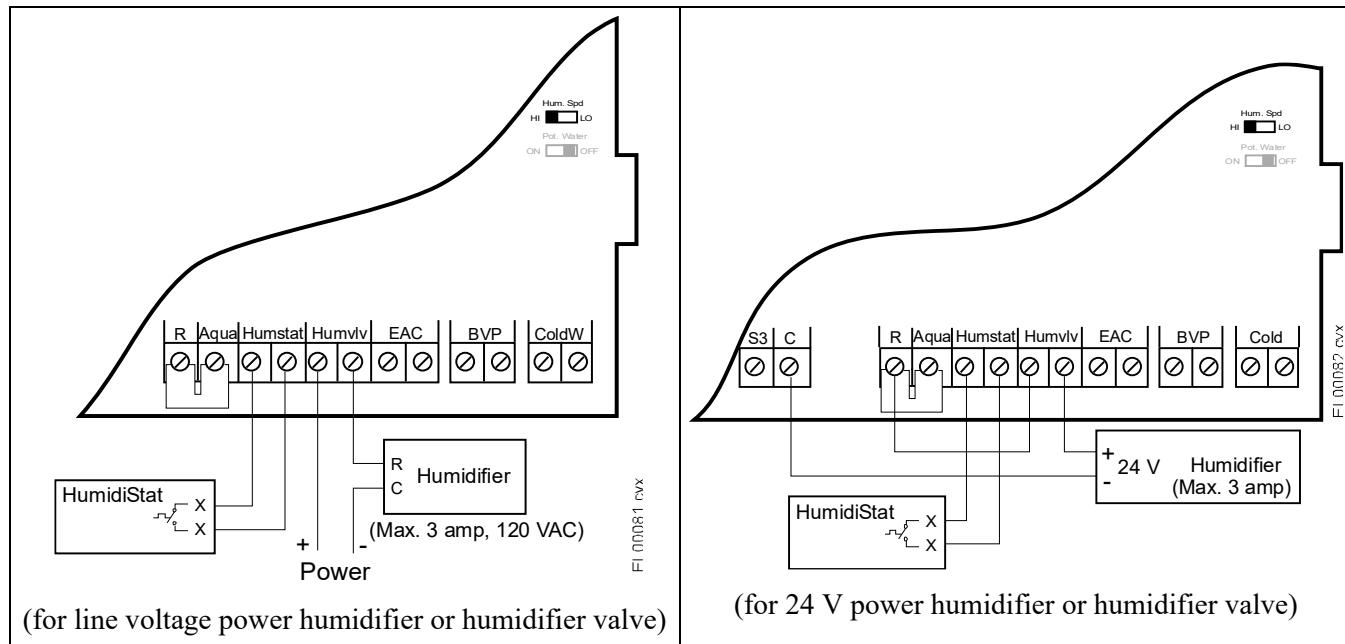


### Diagram 14. Option: Aquastat

An aquastat can be used to prevent cold air by delaying the blower until the water is hot.



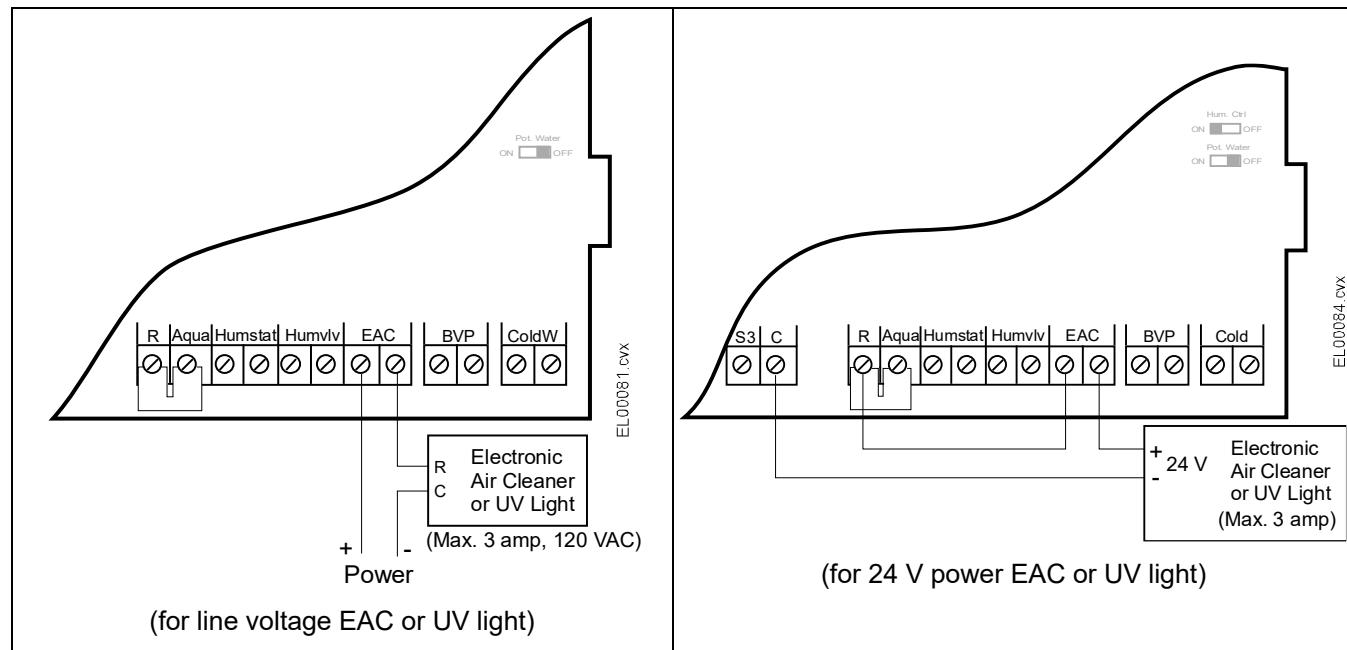
### Diagram 15. Option: Humidifier/Humidistat



Set Humidity Control switch (Hum Spd) to proper position. The 'HI' position will energize the high cool fan airflow in response to a call for humidity from the humidistat unless the fan is already operating at high. The Humidity Valve relay (HumVlv) will then close and turn on the humidifier. If the switch is in the 'LOW' position, then the blower will operate at the Fan airflow rate, and the Humidity Valve relay will close and turn on the humidifier.

### Diagram 16. Option: ERV/HRV/EAC

The SCB includes a set of zero-volt (dry) contacts to turn on an energy recovery ventilator (ERV), heat recovery ventilator (HRV) or an electronic air cleaner (EAC).



## EC Motor Test Mode

To test the EC Motor to confirm proper operation, the motor can be run in Test Mode. This is achieved by connecting the motor to 24VAC using the Motor Test Wiring Harness (A02454-G01) included with every SCB control box. Test Mode is especially helpful in determining if there is a problem with the motor or SCB.

1. Turn power off.
2. Remove the blower door panel to access the motor. Disconnect the 4-terminal plug from the motor (connected by 4 brown wires).
3. Connect the Motor Test Wiring Harness 4-terminal plug to the matching 4-terminal plug on the motor (5).
4. Connect the spade terminals of the loose wires of the Motor Test Wiring Harness to the SCB: Connect the Red wire to any R terminal and the Black wire to any Common pin shown in Figure 11.
5. If the motor rotates, the motor is functional, and the issue may be with the control board or the smaller USB board. If the motor does not rotate, the motor is bad.

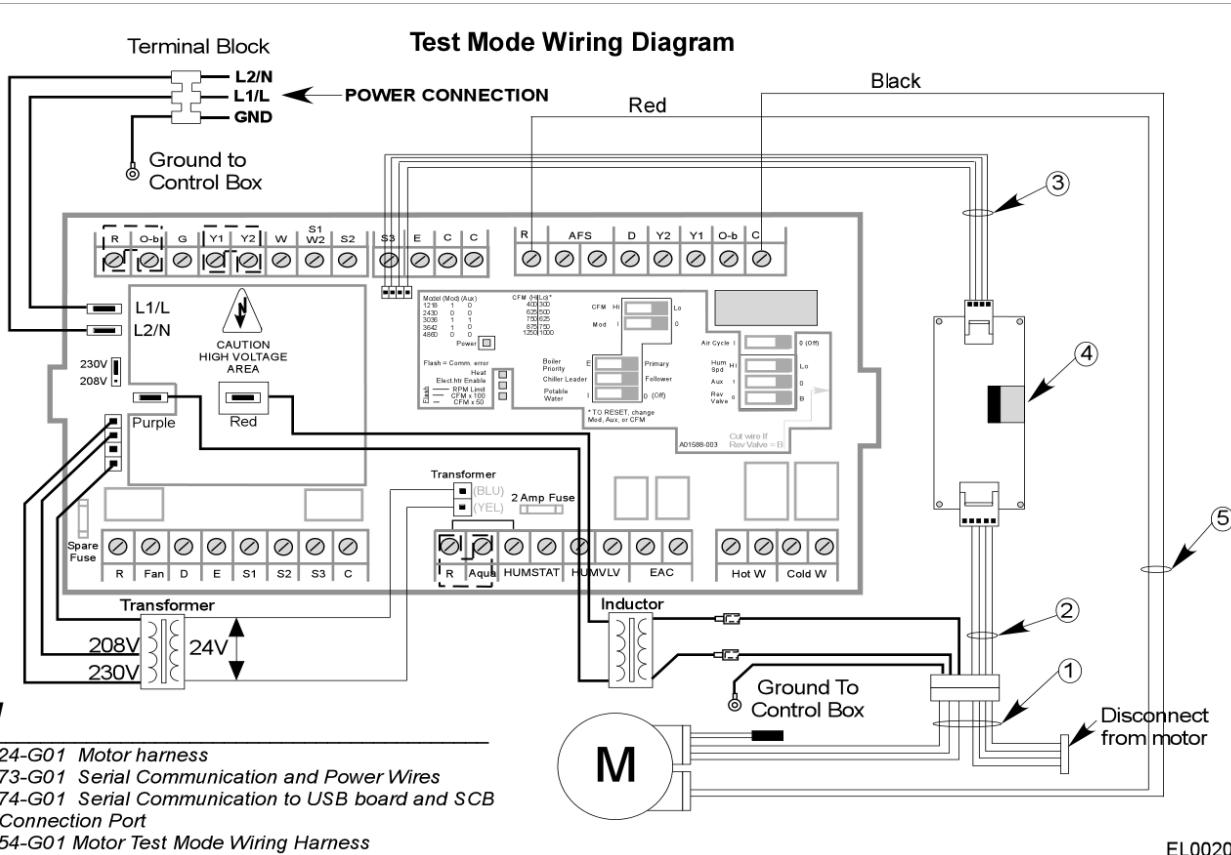


Figure 11. Motor Test Mode wiring diagram.

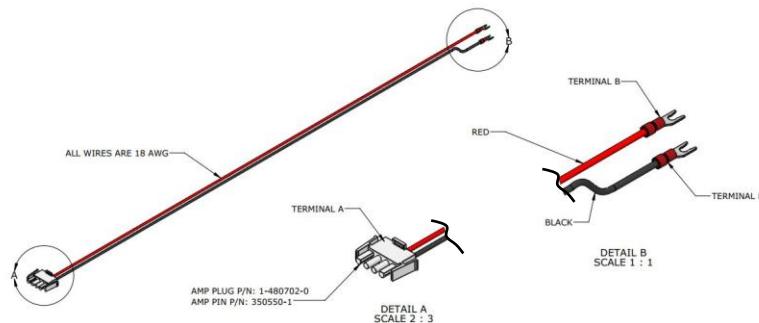


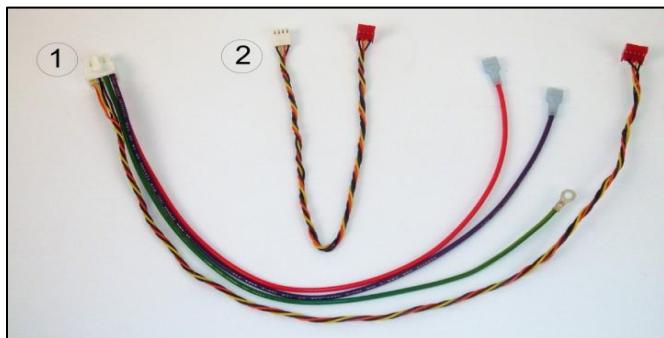
Figure 12. EC motor test cable (A02454-G01)

### External Wiring of the SCB

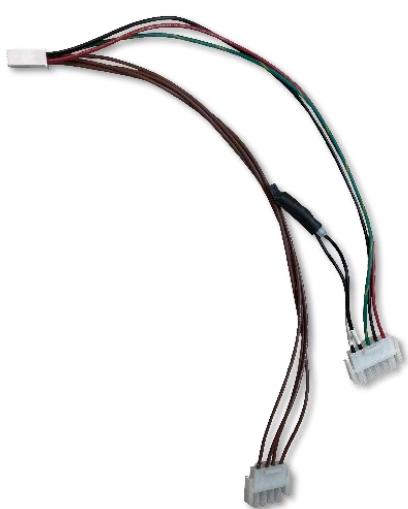
The SCB connects to the EC motor using a combination of three different wiring harnesses. Each wiring harness uses either a quick disconnect or Molex plug for ease of termination.

**Table 11. Wiring Harness Description**

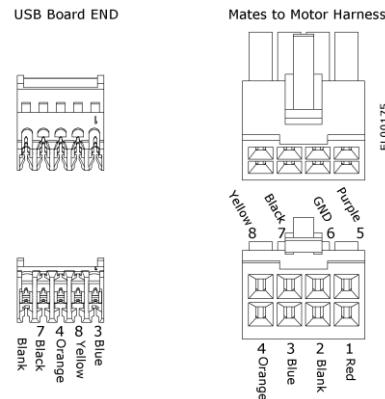
#	P/N	Description
1	A01473-G01	Wiring Harness, SCB/USB to Motor harness Supplies power and communication to the motor.
2	A01474-G01	Wiring Harness, SCB Data Cable Links SCB to USB board
3	A02624-G01	Wiring Harness, EC Motor Connects to the motor and to the SCB/USB-motor harness (A01473-G01).



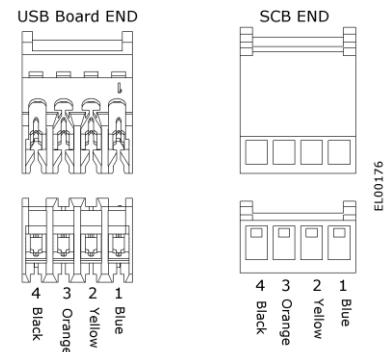
**Figure 13. SCB Harness and Data Cable**



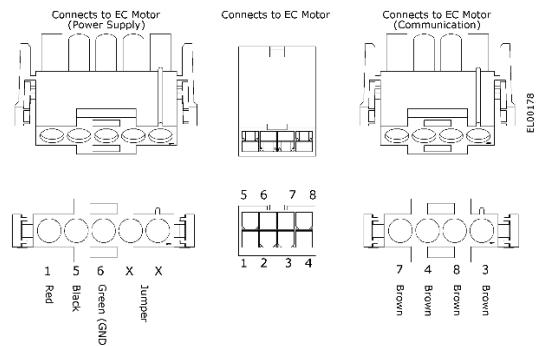
**Figure 14. A02624-G01 Motor Harness**



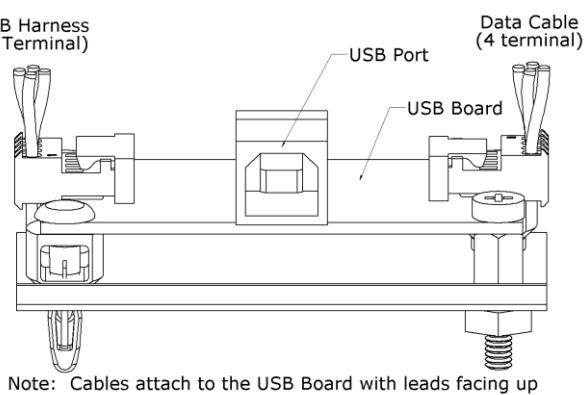
**Figure 15. A01473-G01 (SCB Harness) pin map**



**Figure 16. A01474-G01 (Data Cable) pin map**



**Figure 17. A02624-G01 (Motor Harness) pin map**



**Figure 18. USB board.**

## REFRIGERANT DETECTION SYSTEM (RDS)

Each coil module and vertical unit is equipped with the following components which make up the Refrigerant Detection System (RDS):

- Refrigerant Leak Detection Sensor (R-454B/R-32)
- Refrigerant Leak Mitigation Control Board and Enclosure
- Sensor to Mitigation Control Board Cable (8ft)
- Mitigation Control Board-to-Smart Control Board (SCB) Adapter Wire Harness

The Refrigerant Leak Detection Sensor comes factory mounted on the drain pan inside the refrigerant coil module. The Mitigation Control Board, Control Board Enclosure, and Cable are shipped loose inside the refrigerant coil module. These components will need to be wired after the modules have been connected and the Control Box has been wired.

## SETUP

**WARNING**  
**DISCONNECT ELECTRICAL SUPPLY  
 BEFORE WIRING UNIT TO PREVENT  
 INJURY OR DEATH FROM  
 ELECTRICAL SHOCK.**

1. Mount the Mitigation Control Board Enclosure near the location the Control Box is mounted using (2) #10-16 x 1/2in sheet metal screws.

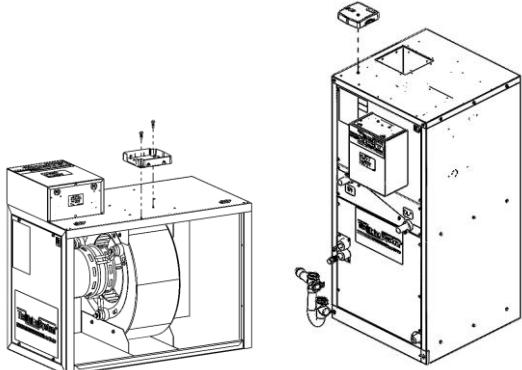


Figure 19. Mitigation Board Enclosure Mounting

2. Mount the Mitigation Control Board inside the Enclosure by aligning the tabs and pressing firmly until the Control Board snaps in place

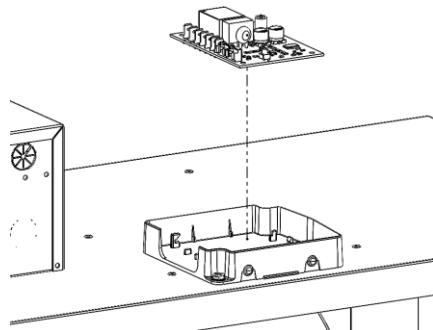


Figure 20. Mitigation Board Mounting

3. Remove the door panel for coil section of the module or unit. Attach the sensor cable to the sensor which will be mounted to a bracket attached to the drain pan near the condensate connection.

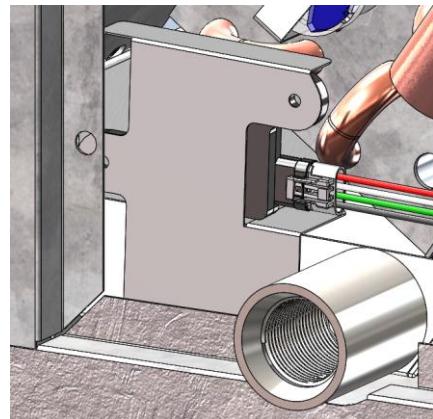


Figure 21. Sensor Cable Attachment to Sensor

4. Attach the opposite end of the cable to the Mitigation Control Board inside the Enclosure

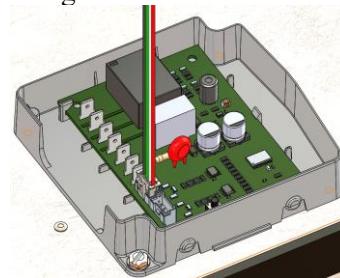


Figure 22. Sensor Cable Attachment to Mitigation Board

5. Next, the mitigation board will need to be wired to a thermostat and Unico Control Board. Figure 25 shows the standard wiring diagram for the RDS. Figure 23 shows an example of the Sensor Cable routing.

Note: The wire in Figure 25 and Figure 26 connected to (Fan) NC terminal on the Mitigation Board is connected to the STAT terminal on the SMART Control Board (SCB).

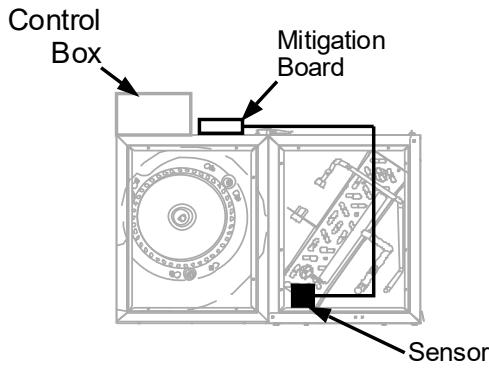


Figure 23a. Mitigation to Sensor Wiring

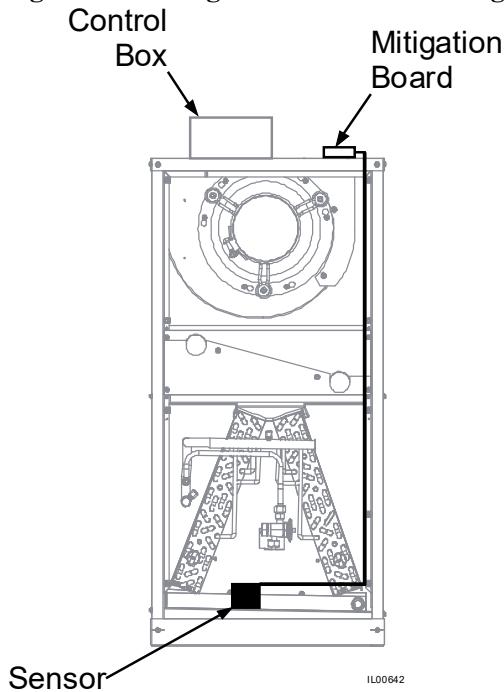


Figure 23b. Mitigation to Sensor Wiring



Figure 24. Mitigation Board-to-SCB Wire Harness

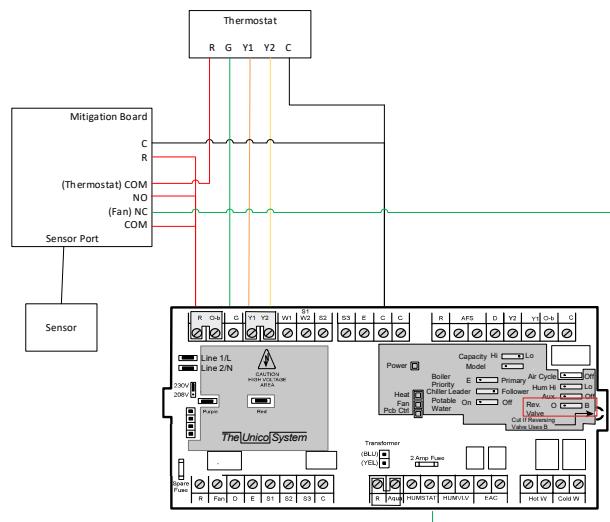


Figure 25. Leak Detection System Wiring Diagram

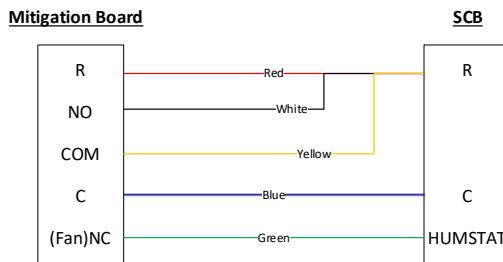


Figure 26. Mitigation Board -to-SCB Wire Harness Connection Diagram

6. Power the system and confirm the status of the system using the on-board LED lights (Table 12)

Table 12. Mitigation Board LED Codes

Status LED	Mode
Off	Normal Operation
On	Sensor "warm up"
1-blink	LFL Fault
2-blink	Communication Fault

7. Test the system to confirm the system operates appropriately. With the system powered but not running, and no call from the thermostat, disconnect the sensor cable from the sensor. This will initiate the RDS mitigation protocol and energize the G terminal to deliver the minimum circulation airflow. The fault should be confirmed by 1 blink on the Mitigation Board as stated in Table 12. Plugging in the Sensor should clear the fault and resume normal operation.

## ZONED SYSTEMS

For systems that employ zone dampers, refer to the damper manufacturer's wiring diagram to ensure that the zone dampers open in the event of a refrigerant leak.

## Programming the SCB

The SCB switches allow the user to select from two different default high-cool airflow rates for each model blower by changing the position of the “CFM” or “Capacity” switch, depending on the model of the control board [refer to Table 3 for the default values]. These settings are based on design airflow requirements for refrigerant cooling coils and should be sufficient for most applications. The default airflow for all other modes of operation are a percentage of the high-cool value and can be found in Table 2. However, if the installation calls for a modification, each airflow can be individually modified using the Unico ECMConfig program.

**Compatibility.** The ECMConfig software requires the use of a Windows XP/7/8 operating system. Use of a Windows emulator for Mac systems may be possible, but is not supported. The software requires .NET version 3.5 or later. The ECMConfig installer will automatically check for this.

**Installation.** A software installation CD ships with every SCB control box. This software can also be downloaded from: <http://www.unicosystem.com/>. If you have an older version of the software, you will first need to uninstall it. The installer will search your operating system for the correct .NET framework and automatically install it if it is not found. If using the CD, simply insert and follow the instructions. If the installer does not automatically begin, go to the Start button, select RUN and type “*drive://ECMconfig.msi*”.

**Connecting your computer.** After the software is installed, connect your computer to the control box using the included USB cable (Type A/B). Start the program and apply power to the control box. Your computer should immediately recognize the control box and the software will indicate that it is connected.



Figure 27. Location of USB (computer) port

## Startup and Main Tab

Upon startup, you will see a temporary ‘splash’ screen, and then the Main tab of the ECMConfig program. There are three Tabs: Main, Air Cycle and Switches. The Main tab is used to set the Airflow and RPM Limit for each Mode of operation. It also provides information on the current airflow and fan RPM, as well as the Model number of the blower as identified by the motor size and position of the MOD and AUX switches. The blower model and any calls from the thermostat will be highlighted on this screen, as shown in Figure 28. If the highlighted model is not what is installed, set the switches to the correct position for your model blower as shown in Table 4, and cycle the power to the SCB.

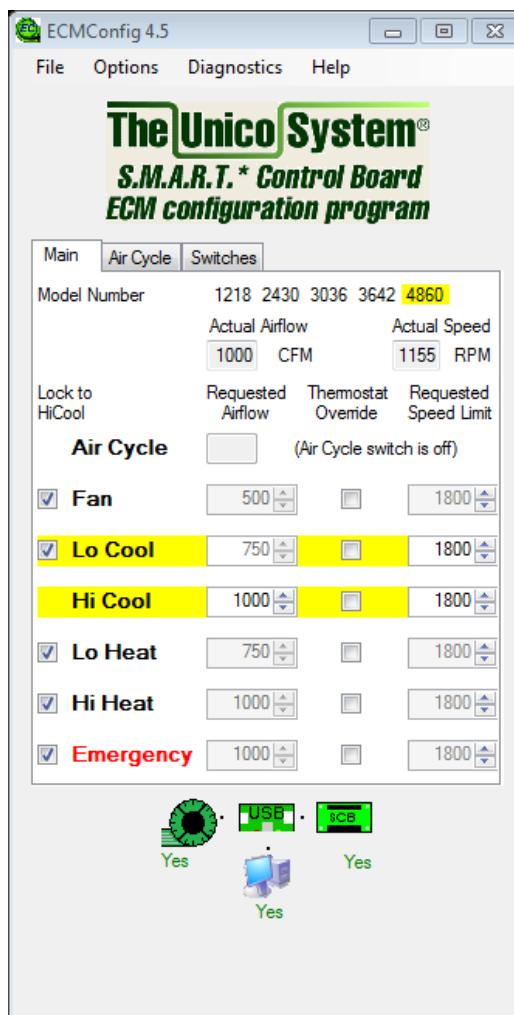


Figure 28. ECMConfig Main Tab. Model number and thermostat calls highlighted.

## Communication Status

At the bottom of the ECMConfig window is a graphic that shows the blower, USB board, SCB board and your computer, and indicates the current communication status between each component. Moving dots indicate that communication between two adjoining components has been established and red “X” marks indicate that there is no communication. Red error

messages will be displayed that indicate the source of the problem. The most likely problem is no power to the SCB or motor, or a bad cable. See table below for more details.

**Table 13. Communication Error codes.**

Symbol	Error Message/Symbol	Interpretation	Action
	Normal Operation Shown.	Proper Communication Established.	None.
	Unable to open computer port. Scanning for ports. “X” between Computer and USB board.	Computer cannot communicate with USB board. USB board or cables may be faulty or disconnected. The COM port assigned to the USB board may be too high.	1. Check for loose USB cable. 2. Check that Red, Green LEDS on USB board are flashing. 3. Check Device Manager. Set COM port value to 16 or less. 4.) Reinstall Software.
	No communication with SCB board. “X” between USB board and SCB board.	Computer cannot communicate with SCB board. SCB cable is not connected or is faulty.	1. Check that the SCB board has power. 2. Reseat multi-colored cable between USB board and SCB., cable A01474-G01
	No communication with motor. “X” between USB board and motor.	SCB cannot communicate with the motor.	1. Check power to the motor. Check power wires on cables A01473-G01 and A02624-G01 2. Check the 4-wire twisted data cable (part of A01473-G01) connected between the USB board and the motor cable. 3. Check 4 black data wires (part of cable A02624-G01) from motor to USB board.

## Actual Airflow

This is the current actual airflow. This value will fluctuate as the motor ramps to achieve the Requested Airflow. Once Actual Speed is stable (no longer increasing), the “Actual Airflow” is accurate.

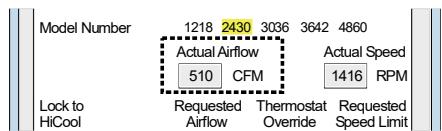


Figure 29. Real Time Actual CFM

## Actual Speed

The program queries the motor for the motor speed in revolutions per minute. This value is exact and will fluctuate somewhat as the motor attempts to hold the airflow constant.

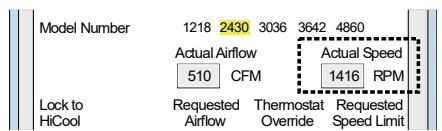


Figure 30. Real Time Motor Speed

## Lock to HiCool

If this box is checked, the airflow will be locked to the High Cool (Y2) mode at the default percentage shown in Table 3. You must uncheck this box before you can change the requested airflow for a particular mode. This will change the input box for requested airflow from gray to white, indicating that you can edit its contents.

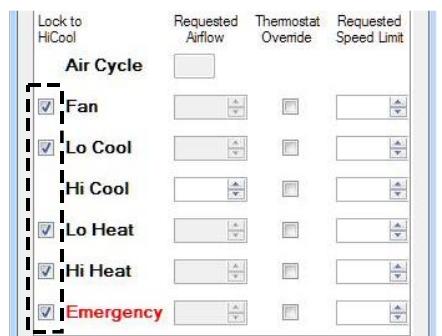


Figure 31 Lock to Hi Cool.

## Air Cycle Indicator

The program indicates the mode of operation by highlighting the mode in yellow. It is possible to have more than one mode highlighted. For example, if the Air Cycle switch is in the “on” position and the thermostat is calling for low cooling, then both of those modes will be highlighted. The program will display the words “Air Cycle” when that mode is operating.

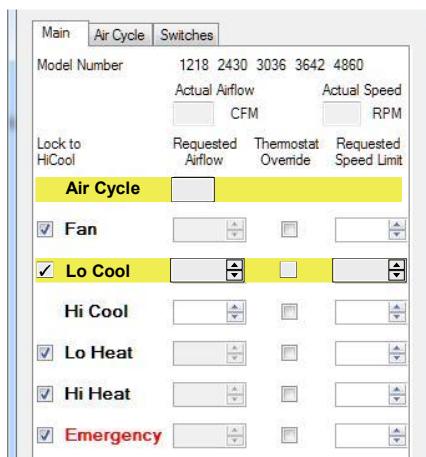


Figure 32. Air Cycle mode

## Requested Airflow

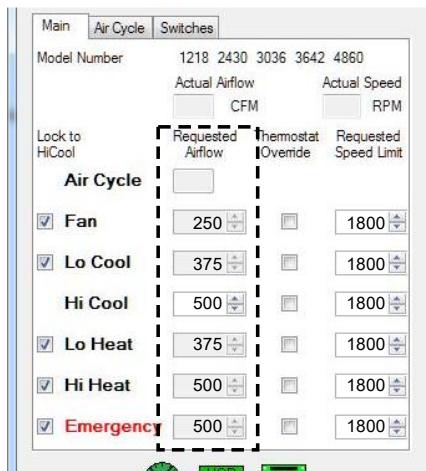


Figure 33. Requested Airflow

The airflow for each mode can be modified individually. To modify the airflow enter the desired value with the number pad or use the up/down arrows to change incrementally. Any changes are saved to the SCB memory immediately. The program will not allow you to enter a value outside the minimum and maximum airflows as shown in Table 14.

Table 14. Airflow range by model number.

Blower Model	Minimum Airflow	Maximum Airflow
	CFM (L/s)	CFM (L/s)
1218	100 (47)	500 (236)
2430	200 (95)	750 (353)
3036	300 (142)	900 (425)
3642	300 (142)	1200 (566)
4860	400 (189)	1500 (707)

## Thermostat Override

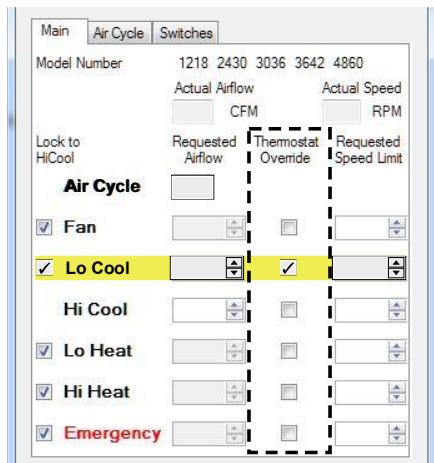


Figure 34. Thermostat Simulation

Thermostat Override acts to simulate a thermostat call and can be used to troubleshoot the system. These settings will not be retained in the SCB once the computer is disconnected. To simulate the operation of the thermostat, disconnect the physical thermostat wires from the terminal block, then simply click on the check box for the Mode of operation you are troubleshooting. This will activate the blower and relays on the SCB; it will not turn on the condensing unit.

## Air Cycle Tab

The latest versions of the firmware and software include fresh air algorithms that meet the requirements of the ASHRAE 62.2 (2010) residential ventilation standard when the system is installed with a fresh air intake duct. These algorithms are embodied in our Air Cycle Auto Modes, and allow the system to periodically draw in fresh air even when there is no call from the thermostat. There are two different 62.2 compliant modes: *MaxComfort* and *EnergySaver*. Use of a fresh air damper is required to fully realize the benefits of these Modes of operation. The system will draw in air through the fresh air duct whenever the system is running if no fresh air damper is installed.

**MaxComfort Mode.** This Mode works to bring in most fresh air while the system is either heating or cooling. This reduces temperature swings caused by bringing in unconditioned fresh air. In this mode, the program will continuously track the inventory of fresh air for the previous four hours on a rolling basis. If the fresh air delivered dips below the amount required, the blower will automatically turn on at the Auto Mode airflow rate and will run until the airflow requirements have been satisfied. If enough fresh air is brought in during heating and cooling operation, the blower will not need this additional runtime.

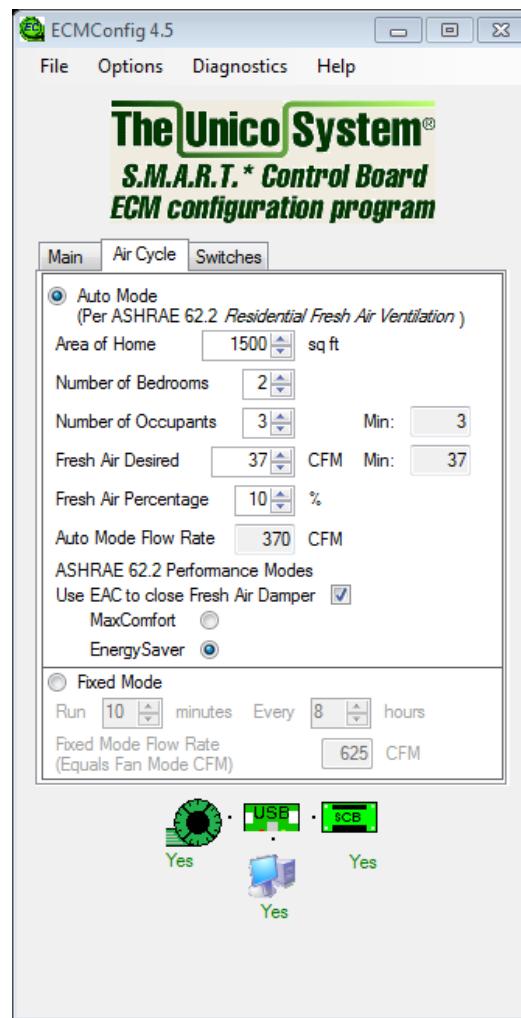


Figure 35. Air Cycle Tab. Auto Mode Selected.

When used with a fresh air damper, MaxComfort Mode will bring in up to twice the amount of fresh air required in a four hour period while the system is operating so that it can remain off for as long as possible while there is no call from the thermostat. If there is no damper installed, the system will bring in fresh air whenever the system is running, and may over-ventilate the home.

**EnergySaver Mode.** This Mode brings in the minimum amount of fresh air required by the Standard. This technique minimizes the amount of energy required to condition the outside air. In this Mode, the program will continuously track the inventory of fresh air for each four hour block of time. This is not a rolling time frame. At the start of each period, the fresh air inventory starts at zero. This will start the blower at the Auto Mode flow rate if there is not already a call from the thermostat. The blower will run until the fresh air delivered meets the

requirement for that four hour period. If there is never a call from the thermostat, the blower will run at this ventilation rate continuously. If there is a call from the thermostat, then the system will close the fresh air damper once the four hour inventory requirement has been met.

**Fixed Mode.** This mode turns on the blower at the Fan airflow rate according to a schedule set by the user. For example (See Figure 28), 10 minutes every 8 hours. Simply fill in the two fields in the Fixed Mode section of the Air Cycle tab to determine how long and how often the air will circulate. This mode can be used to circulate air within the house, or also to bring in fresh air if there is a fresh air intake duct installed with the system.

## Complying with ASHRAE 62.2

ASHRAE 62.2 is a fresh air and indoor air quality standard that applies to low-rise residential buildings. Complying with ASHRAE 62.2 is only necessary if it is required by your municipality. Please check your local building codes to determine if and when you need to comply. For more information on the standard, visit [www.ashrae.org](http://www.ashrae.org).

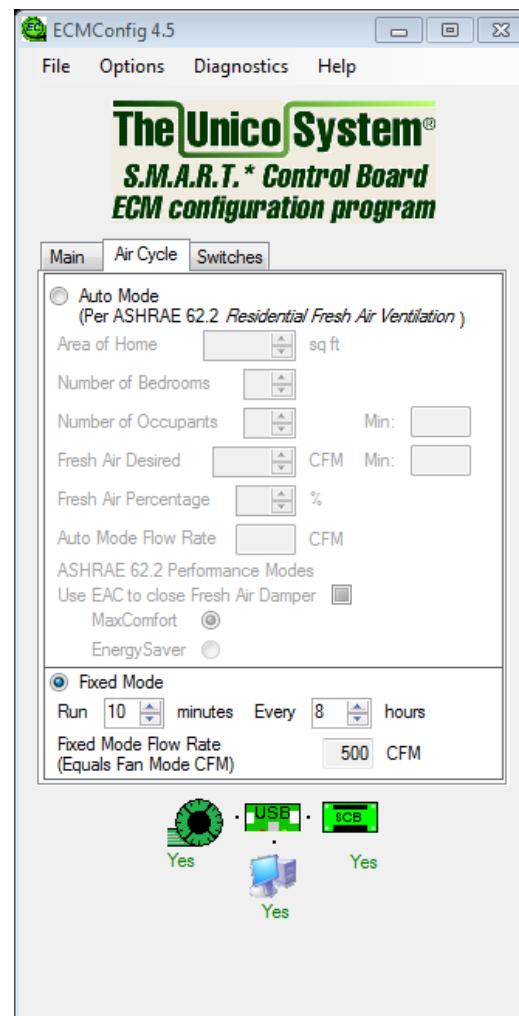
## System Configuration for ASHRAE 62.2 Compliance

In order to configure your system to comply with ASHRAE 62.2, you must input certain information about the installation into the Auto Mode fields. Below are descriptions of each entry. See Figure 27 for the program screen.

**Area of Home.** Enter the area of the home that is to be conditioned.

**Number of bedrooms.** Enter the number of bedrooms in the home. Other rooms do not need to be considered.

**Number of occupants.** The minimum number of occupants is calculated automatically by the program. This is a feature of the ASHRAE 62.2 standard, and cannot be reduced. If the actual number of occupants is greater than the minimum indicated, that number may be entered in the field to the left of the minimum value.



**Figure 36. Air Cycle Tab. Fixed Mode Selected.**

**Fresh Air Desired.** The minimum amount of fresh air required to comply with 62.2 will be calculated by the program. If more fresh air is desired, simply enter the amount in the field to the left of the minimum value.

**Fresh Air Percentage.** To calculate the fresh air required, the program needs to know how much fresh air is being brought in, as a percentage of the total system airflow. This must be measured during system setup.

Use the following procedure to determine the percentage of fresh air:

1. Turn the blower on at high speed and measure the airflow. This value may be obtained from the Main Tab of the ECMConfig interface.
2. Measure the airflow at the fresh air intake duct.
3. Divide the amount of fresh air from Step 2 by the total blower airflow from Step 1. This is the Fresh Air Percentage.
4. Enter this percentage into the program.

The program will then automatically determine the blower airflow rate required to deliver the proper amount of fresh air. If this calculated rate is out of the allowed range for the blower, the program will display an error message. This error can only be corrected by increasing the percentage of intake air that is fresh air(e.g. by increasing the size of the fresh air intake duct), or by reducing the amount of fresh air desired.

### Switches Tab

The latest software now includes a way to check the position of the switches on the control board without opening up the cover. This window is useful when diagnosing a problem. There are no settings in this window.

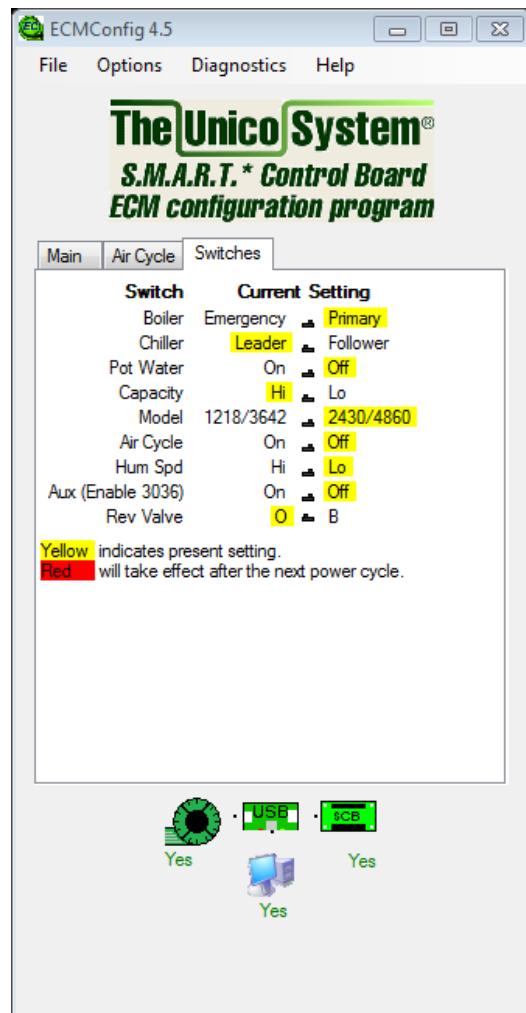


Figure 37. Switches Tab.

### ECMConfig Program Menus

The ECMConfig program has several dropdown menus with configurable settings. Each menu is described below.

#### File

*Save/load.* To save the customized settings to your computer, select the ‘Save’ button. You will be prompted to enter a file name and a location. This is a useful feature if you want to have a record of how you configured the unit or if you want to duplicate the same settings in another installation. The ‘Load’ button will retrieve any saved settings. Again, it will prompt you for the file name and location. It is unnecessary to press ‘Save’ to store the airflow settings into the SCB memory. This happens automatically.

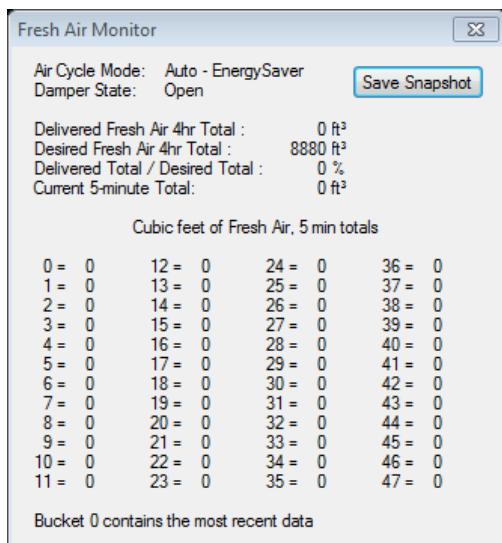
#### Options

*Fresh Air Damper Configuration.* The latest versions of the firmware and software include the option to repurpose the EAC relay to open or close a fresh air damper. The damper configuration menu allows the user to set this relay as a normally open or normally closed relay, depending on how the damper motor is configured. If the damper seems to close when it should be open, or vice versa, simply change this setting to reverse the action.

*Units of Measure.* To change between English (CFM) and SI (m<sup>3</sup>/s) units, go to Options|Units in the menu.

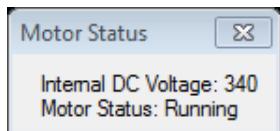
#### Diagnostics

*Fresh Air Monitor.* The fresh air monitor will display the amount of inventory of fresh air in five-minute intervals for the last four hours on a rolling basis. This is useful if you have a concern about how much air is being introduced into the home. The Air Cycle Mode, Damper State, along with several other quantities are also reported. Bucket “0” contains the most recent data, and Bucket “47” contains the oldest airflow data.



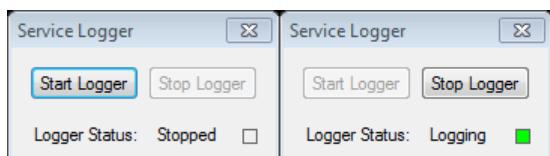
**Figure 38. Fresh Air Monitor.**

**Motor Status.** The motor status indicator will display the current motor status and will show whether there have been any errors in the last 24 hours. This is useful if you suspect the motor is tripping due to high amperage or air temperatures.



**Figure 39. Motor Status**

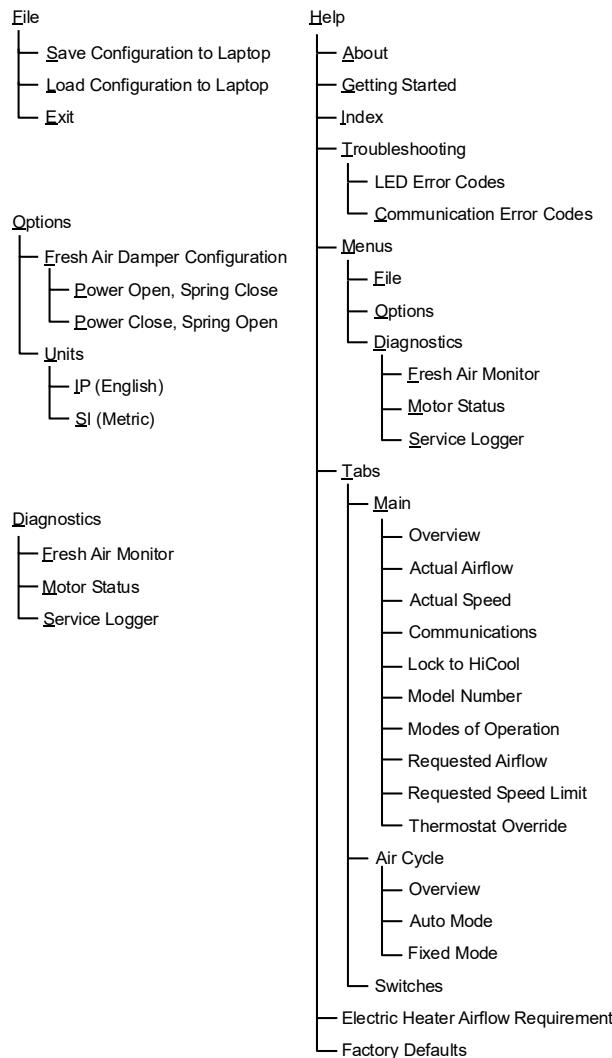
**Service Logger.** The service logger will save the data from the fresh air monitor to the computer continuously until it is turned off. This function turns the program into a data-logger. If you open the data file with Excel, you can plot the operation of the blower and the airflow. This can be used to verify compliance with ASHRAE 62.2.



**Figure 40. Service Logger**

## Help Menu

There are a number of help screens that explain in detail each of the screen inputs and menu functions, along with a list of error messages.



**Figure 41. ECMConfig Menu Structure.**

## TROUBLESHOOTING

### Default Airflow seems too High/Low

Check that the **MOD** switch on the SCB is in the correct position. If not, select the appropriate model and cycle the power.

**Note:** If the model switch is set for 1218 and is connected to a  $\frac{1}{2}$  hp motor, the blower will spin counterclockwise. If the model switch is set for 2430 the blower will spin clockwise.

Check the air flow against the default setting listed in Table 2. The Flash LED (previously PCB Ctrl LED) will flash the actual airflow in CFM. A long flash indicates 100 cfm and a short flash at the end of the long flashes indicates 50 cfm (example: 7 long flashes followed by a short flash indicate an actual airflow of 750 cfm). If the blower reaches its RPM limit, an extra-long flash will occur between the CFM sequences. The maximum motor speed is 1800 RPM which is the default limit. Check to see that the limit is not too low. If motor speed limit is at 1800 RPM then add more outlets or change the plenum design to decrease the duct friction.

### Fan does not run

**“Power” LED off?** SCB is not receiving power. The SCB LED’s are activated by 24V. Check to make sure the transformer is getting 230V or 110V and then check to make sure the output of the transformer is delivering 24V (Common problem is a loose connection).

**“Power” LED on but not flashing?** SCB has power but processor is not executing. Disconnect power, wait 10 seconds, reconnect power.

**Is the thermostat energizing G, W or Y?** Check if 24Vac exists from C to G, W, Y1, Y2, or E. If no voltage exists on any of these, check connection between SCB and the thermostat. Check connection at the thermostat or replace the thermostat.

If 24Vac does exist on G, W, or Y check the Heat LED on the SCB. Flashing indicates the motor has lost communication. Inspect the connections between the control box and the motor. Disconnect and reset the motor connector. Check that the motor is free to turn.

### Fan runs without demand from thermostat

The software in the board will automatically turn the fan on for the following conditions:

1. The humidistat is calling for humidity and there is no call for heating.
2. The winter cycling function is activated (fixed mode).

3. The fresh air cycling function is activated.
4. The blower is ramping down after shut down.

**Is “Power” LED flashing?** If not, the processor has stopped executing, remove and reapply power.

### Heat pump compressor runs in heat mode but does not run for air conditioning.

AFS (automatic frost switch) input is open. The AFS terminals must be connected to a frost switch.

### Heat pump compressor runs but is cooling when it should be heating or heating when it should be cooling.

**Is the “Reversing Valve” switch set properly?** (If the outdoor reversing valve requires 24vac for heating, then the Reversing Valve switch should be switched to “B” and the jumper wire must be cut.

### 3rd stage electric heat (S3) does not energize

**Is the thermostat demanding heat pump operation?** This is normal. The third stage is disabled during heat pump operation.

## Parts List

A00175-G07

FindNo.	PartNo.	Description
1	A01469-G03	Circuitboard, SCB
2	A00057-G04	Transformer, 208/230V
3	A01470-G01	Control Board, USB
4	A01530-003	Terminal Strip, Europa, 10mm
5	A00800-001	Cover, Control Box
6	A01474-G01	Harness, Wire, SCB to USB Board
7	A01473-G01	Harness, SCB/USB to ECM
8	A01472-G01	Harness, ECM, 240V
9	A01412-001	Fuse, Fast-Acting,Mini Blade, 32VDC, 2A

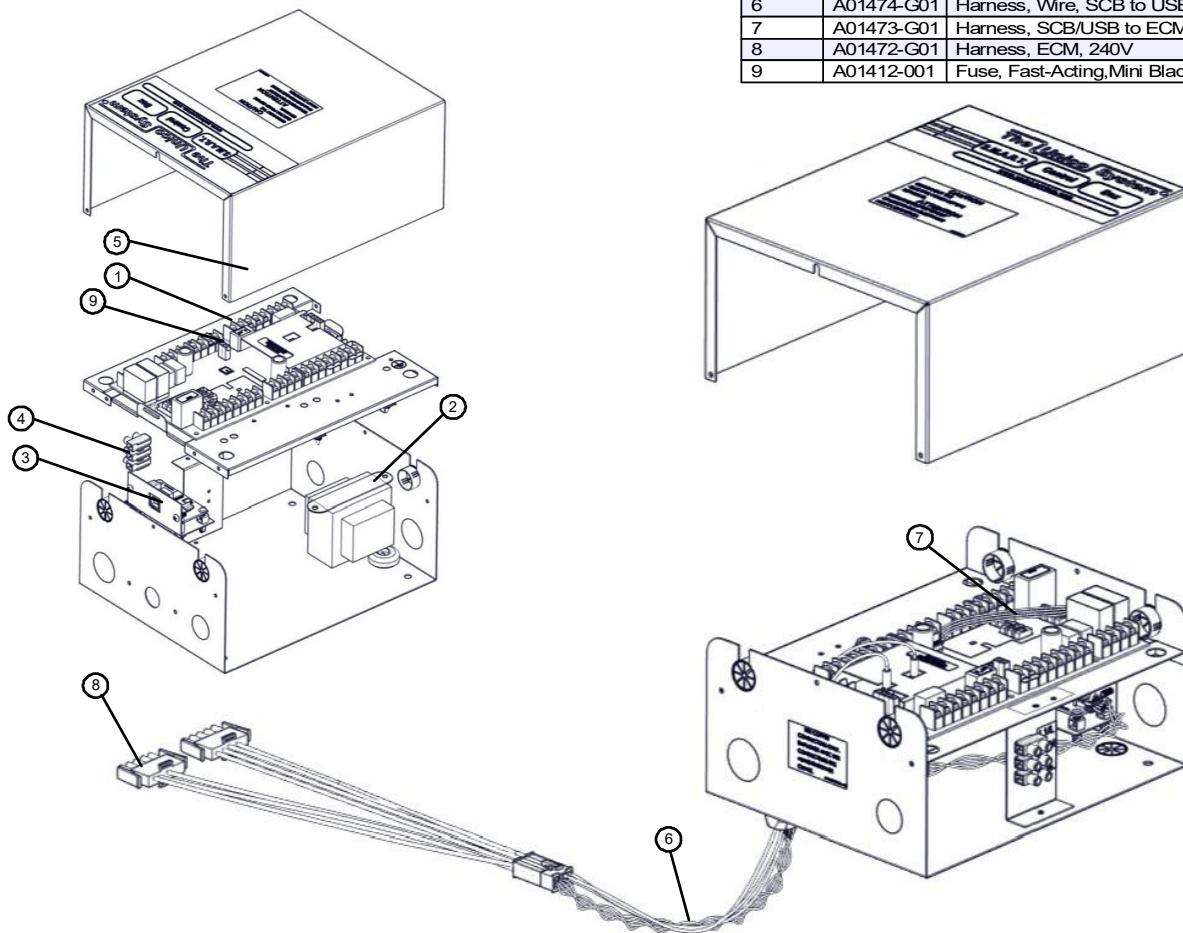


Figure 42. Exploded drawing with parts list

Optional Accessories/Replacement Parts not shown in drawing.

Part No.	Description
A01722-005	Chip, EEPROM
A01525-G01	Cable, Extension, 59 inch (1.5 m)
A02454-G01	Cable, ECM Test