



HIRED-HAND®

Evolution Back-Up

**Hired Hand, Inc.
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Bremen, AL 35033**

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1. Ratings and Specifications

- 115/230 Volts (Depending on switch position.)
- 50/60 Hz.
- Room Temperature must be between 32°F/0°C and 122°F/50°C.

2. Warnings

Warning!

When this controller is used in a life support heating and ventilation system where failure could result in loss or injury, the user should provide adequate back-up, or accept the risk of such loss or injury!

3. Limited Warranty

All products are warranted to be free from defects in material and workmanship for a period of one year from the date of purchase if installed and used in strict accordance with the installation instructions. Liability is limited to the sale price of any products proved to be defective or, at manufacturer's option, to the replacement of such products upon their return. No products are to be returned to the manufacturer, until there is an inspection and/or a return-goods authorization (RGA) number is issued.

All complaints should be directed first to the authorized distributor who sold the product. If satisfaction is not obtained or the name of the distributor is not known, write the manufacturer that appears below, directed to the attention of Customer Service Manager.

This limited warranty is expressly in lieu of any and all representations and warranties expressed or implied, including any implied warranty of merchantability or fitness for a particular purpose. The remedy set forth in this limited warranty shall be the exclusive remedy available to any person. No person has authority to bind the manufacturer to any representation or warranty other than this limited warranty. The manufacturer shall not be liable for any consequential damages resulting from the use of our products or caused by any defect, failure or malfunction of our products. (Some areas do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.)

This warranty gives you specific legal rights and you may also have other rights that vary from area to area.

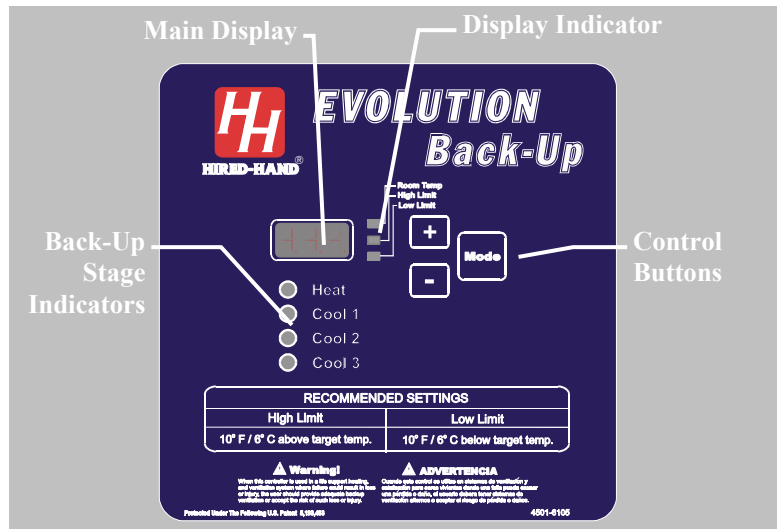
Warrantor:

Hired-Hand, Inc.
1733 Co. Rd. 68
PO Box 99
Bremen, AL 35033

4. Introduction to the Evolution Back-Up System

The Evolution system has the option of containing an integrated Back-Up System. This Back-Up System contains 4 stages: 1 Heat and 3 Cool. This system's purpose is to back up the master controller in the case of failure. The Back-Up System is a stand-alone control system. It contains its own temperature sensors that react to a High and Low Limit.

This Back-Up System is unlike any emergency control system on the market. This system offers a much higher level of protection. In addition to being able to monitor for high and low temperatures, it also stays in constant communication with the master controller. This communication allows the Back-Up System to run a minimum ventilation timer on Cool 1 or override the Evolution panel if certain conditions warrant. The conditions are explained in Section 5. All Back-Up Systems can protect against a high or low temperature, but only this system can protect against today's biggest grower concern: **MINIMUM VENTILATION FAILURE!**



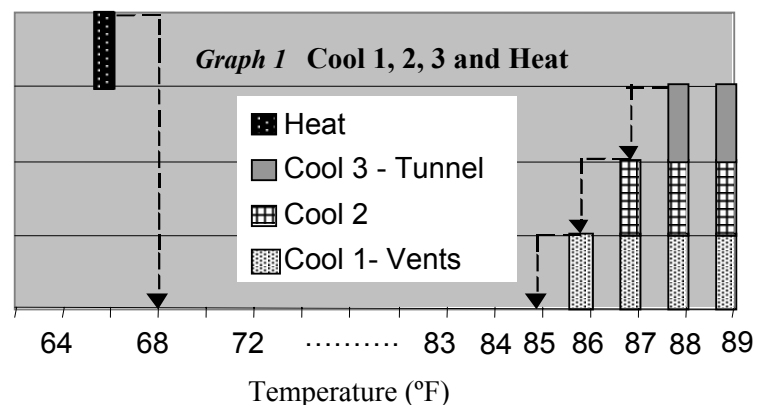
5. Evolution Back-Up Operating Conditions

As explained above, this is more than your customary Back-Up System. This system contains three separate modes of operation that are entered depending on the circumstances. These modes are Normal Operation, Emergency Operation, and Override Operation. These modes will be explained in more detail below. These modes are entered based on information that it has received, or not received, from the master controller. No matter what mode of operation the Back-Up System is in, it will always attempt to maintain the temperature inside the High and Low Limits.

5.1 Normal Evolution Operation

During Normal Operation, the Back-Up System always maintains the temperature between its high and low limits. It accomplishes this by using its temperature sensors and its four stage outputs. If the temperature drops below the Low Limit, the Heat stage will come on. That stage will not turn off until it warms the building at least 2°. The same is true if the temperature goes above the High Limit however, there are three levels of cooling stages on the Back-Up System. The following example explains the operation of the stages in relationship to the temperature and the limits. In this example the Low Limit is set as 66° F, and the High Limit is set as 86° F. If the

temperature drops to 66° F, then the HEAT stage turns on. The HEAT stage turns off when the temperature rises to 68° F (1° above the Low Limit). If the temperature rises to 86° F, then COOL 1 turns on. If the temperature continues to rise to 87° F (1° above the High Limit), then COOL 2 turns on. If the temperature rises to 88° F, then COOL 3 turns on. Stages turn off at temperatures as indicated by the arrows in Graph 1.



5.2 Emergency Operation

In this mode of operation, the system still maintains the temperature as it does in Normal Operation. In addition, it will begin running the first cooling stage (Cool 1) on a 5 minute timer. The timer percentage is determined by the setting in P3 (Emergency Timer Percentage). This mode of operation is entered if communication is lost between the master controller and the Back-Up System. In this case, the Back-Up System assumes that the master controller is lost and tries to maintain the minimum ventilation until someone recognizes the problem. Emergency Operation is indicated by a “LnE” flashing in the display of the Back-Up System. The alarm relay on the Back-Up System is also engaged in this mode operation.

5.3 Override Operation

In this mode of operation, the system still maintains the temperature as it does in Normal Operation. In addition, it receives commands from the master controller to turn on certain stages of heating or cooling. There are many different circumstances that could cause this to happen, in this manual, we will list one of the most common. For example, if communication were lost inside the EV-3000, the master controller would be unable to turn the appropriate stages on in the usual way. Therefore, the master controller would communicate to the Back-Up System and indicate which stages that it is trying to turn on. At this point, the Back-Up System would obey the command and turn the appropriate stages on. For this mode of operation to work to its fullest potential, care must be taken to insure that the stage jumpers on the relay strips match the stage setting in the master controller (Refer to Section 12). Override Operation is indicated by a “LnO” flashing in the display of the Back-Up System. The alarm relay is also engaged in this mode of operation.

5.4 Fail-Safe Relay Operation

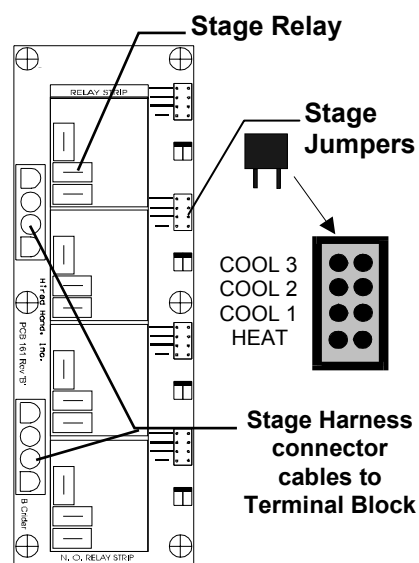
There are two types of Relay strips used in the Evolution 3000. The Normally Open (NO) strip requires a signal from the controller board in order to energize a stage of ventilation. Should power be removed from the EV-3000 the Normally Open Relay strips would not be able to energize a ventilator. On the other hand the Fail-Safe relay strip would close each of the relays in the strip resulting in energizing the ventilators in case of a controller power failure. Each of the relay strips contains four relays for controlling four stages. In the EV-3000 there are a total of four relay strips, three will be N.O. and one will be a Fail-Safe. The operator must insure that the Fail Safe relay strip is connected only to stages that should be turned on in case of a controller failure. See the EV-3000 Owners manual Part No. 4801-5307 for a physical description of the relay strips. It is not recommended to place heating equipment on Fail-Safe stages.

6. Inlet Operation During Back-up

The EV-Back-Up contains a relay that can operate the Vents and/or Tunnel during Back-up operation of the EV-3000. The Inlets will automatically open during back-up. Cool 1 controls Vents Inlet. Cool 3 controls Tunnel Inlets. When Cool 1 and Cool 3 are not set, Back-up reverts to Normal operation.

7. Setting EV-Back-Up Stage Jumpers

Pictured at the right is a Stage Relay Board consisting of four stage relays and the associated stage jumper for each stage relay. The stage jumpers are labeled COOL 1, COOL 2, COOL 3 and HEAT. Location of the jumper places the stage in one of these four modes, or if the jumper is **not** inserted, the stage is **not** placed on Back-Up. The jumpers should be placed based on the operation of stage equipment and should be the same as assigned in the EV-3000 Controller. Jumpers are placed according the following table:



STAGE RELAY BOARD

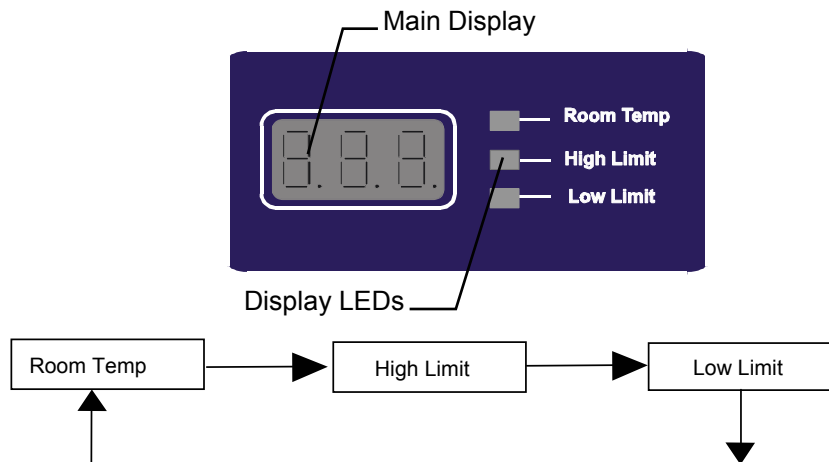
Type of Stage Operation	Jumper Assignment
Cool Negative Fan	COOL 1
Cool Negative Tunnel Fan	COOL 2
Cool Tunnel Fan	COOL 3
Heat Stage	HEAT
Stage not on Back-Up	No Jumper Installed

Additional information can be found in the Evolution 3000 Owners Manual, Part Number 4801-5307.

8. Day-to-Day Back-Up Operating Instructions

8.1 Toggle Sequence of Mode Button

Continuously pressing the Mode button cycles the display through the parameter sequence as illustrated below. The parameter data is shown in the display.



8.2 Checking/Adjusting Temperatures, and Settings

When you press the Mode button, watch the green LED's beside the main display. Whichever LED is lit is the parameter you are viewing: "Room Temp", "High Limit", and "Low Limit" values. Note: To adjust these parameters, press the Mode button until you see the parameter you want to adjust, then use the + button to increase the value, and the - button to decrease the value.

Room Temperature - The average of the sensors located inside the house.

High Limit - The temperature inside the house at which the controller will turn on the first Evolution Back-Up cooling stage.

Low Limit - The temperature inside the house at which the controller will turn on the first Evolution heating stage.

9. Set Limits

The EV-3000 Back-Up System requires setting of a High Limit and a Low Limit at which cool/heat stages will turn on. To determine where to set the High Limit and the Low Limit, first decide on a target temperature of the house. This is usually the target temperature of the primary controller. Then set the High Limit to a temperature several degrees above the desired target temperature. Set the Low Limit to a temperature several degrees below the desired target temperature. **Note: It is recommended that the High Limit be at least 10° above the room's target temperature and that the Low Limit be 10° below the room's target temperature.**

To Set High Limit:

1. Press the “Mode” button to select the High Limit Indicator.
2. Press the ”+” and ”-“ buttons to enter the value of the High Limit.
3. Setting Complete.

To Set Low Limit:

1. Press the “Mode” button to select the Low Limit Indicator.
2. Press the + and – button to enter the value of the Low Limit.
3. Setting Complete.

10. Program Mode Parameters

Settings that are usually set up once per growout, or maybe even just for summer or winter are referred to as program parameters and are accessed by taking the controller to program mode. To get to program mode, press and hold the “Mode” button for five seconds. When the controller has entered program mode, the main display will flash between “P1” and the value of this parameter.

The “P1” is known as a parameter number. All the program items for the controller have a parameter number assigned to them. The numbers are listed in the table “Program Mode Parameters” below with a short description of each parameter. When in program mode, you change the value of certain parameters by using the + and - buttons as needed. When you have finished with the current setting, press the “Mode” button to move to the next parameter. The program mode parameters for the Evolution Back-Up are shown in Table 1.

Table 1. Program Mode Parameters

Parameter	Description
P1	This selects either English (OFF = Fahrenheit) or Metric (ON = Celsius) temperature units.
P2	Determines if an alarm is sent on a Back-Up condition. (ON = Alarm On, OFF = Alarm OFF) An alarm will be generated on an error condition even if P2 is set to OFF. See Section 14.
P3	Emergency Timer Percentage. (0% to 100%). This determines the percentage that COOL 1 will be run in an Emergency condition.
P41	This is the software version number. Not Changeable.
PS1	This is the calibration temperature for Sensor 1. <u>Instructions:</u> With the controller operating, use a digital thermometer or similar independent temperature measuring device to measure the temperature at Sensor 1 location. With PS1 selected, use the + and – buttons to set the calibration temperature to the thermometer reading.
PS2	This is the calibration temperature for Sensor 2. <u>Instructions:</u> Same as Sensor 1 except substitute PS2 for PS1 in the instructions above.

11. Calibrate Sensors

The temperature sensors should be calibrated to ensure accurate temperature detection. To calibrate the sensors an independent temperature measurement is required such as a thermometer or thermocouple.

1. Place a thermometer inside the house at the location of each sensor. Allow a few minutes for the temperature to stabilize.
2. Take readings from the thermometers located at Sensor 1 and Sensor 2.
3. Use the Program Mode to set calibrations of Sensor 1 and Sensor 2 (Refer to Table 1).

11.1 Installation

11.2 Unpacking Components

Unpack the system, and check that all components are present. Locate the required tools.

1	Evolution 3000 Back-Up
1	Temperature Sensor
1	Manual

Tools Required:
Mini Screwdriver
Wire Strippers
Standard Screwdriver

11.3 Installation Instructions

1. Hang Evolution Back-Up with four screws and the plastic mounting brackets included.
2. Make sure all power supplies are disconnected before breaking any wires, or reaching into the enclosure.
3. Locate the sensor connections. Refer to Wiring Diagrams, Schematics, etc.
4. For the Back-Up, run sensors out to locations inside the house. Be sure that the sensors are in a safe location, free from any extreme temperature influences (direct sunlight, water, etc.) Use care when securing sensor wires so that you do not cut the wire. Any short or break in the wire will cause improper sensor operation.
5. Connect each sensor to its appropriate terminals inside the enclosure. See Section 12.2.
6. Wire the power supply. See Section 12.4.
7. Wire the Back-Up to the EV-3000. See Wiring Diagrams at the back of this manual.
8. Wire the Local Network connection.
9. Connect the PowerTrak to the Overrides. See Diagram in Section 12.3.
10. Close the Back-Up and tighten the two screws in the lid to secure the unit shut.

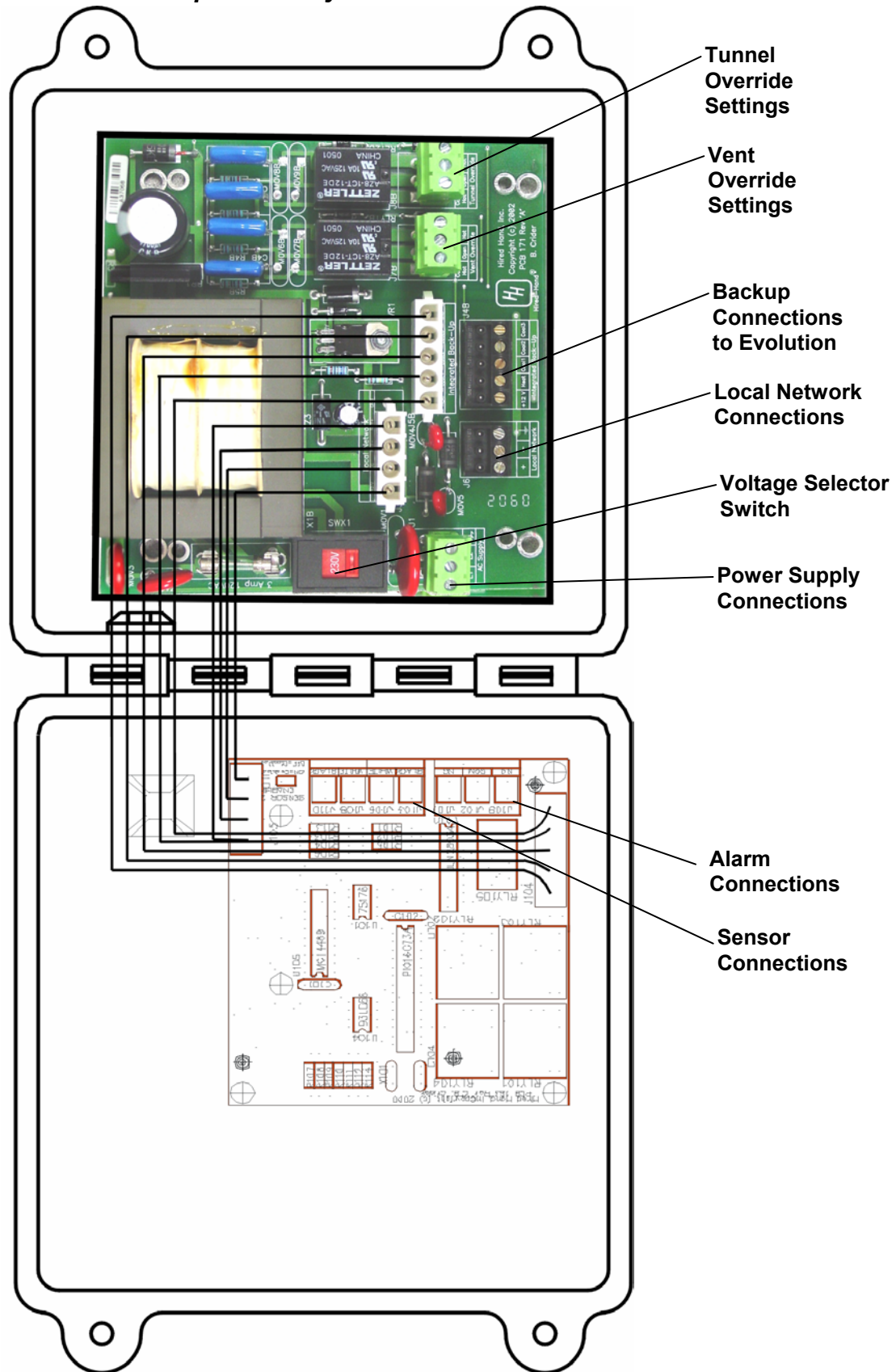
11.4 Checklist For Setting Up Control of House Temperature

Please read and follow the Installation instructions on the following pages. Refer to the following checklist as an aid in setting the Evolution Back-Up controller.

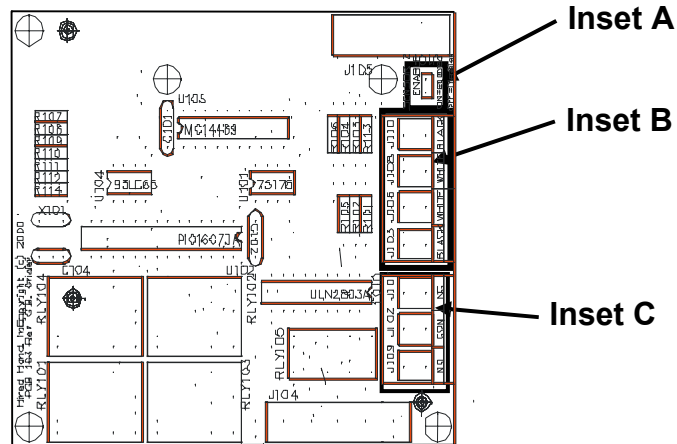
1. Physically install the controller, temperature sensors, and wires leading from the output stages to cooling and/or heat equipment or to a control panel.	Refer to Section 12, Wiring Diagrams
2. Verify the Back-Up jumpers on the Stage Block. Set Heat/Cooling Stage options.	Refer to the Evolution 3000 Owners Manual, Part Number 4801-5307 and to Section 7 of this manual,
3. Install power to controller.	Refer to Section 12.4.
4. Set High Limit & Low Limit	Refer to Section 9, Set Limits.
5. Calibrate Sensors	Refer to Section 11, Calibrate Sensors

12. Wiring Diagrams

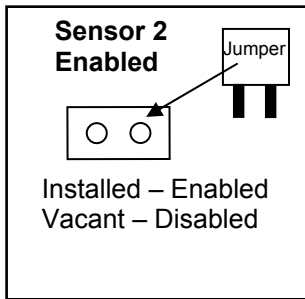
12.1 Evolution Back-Up Assembly



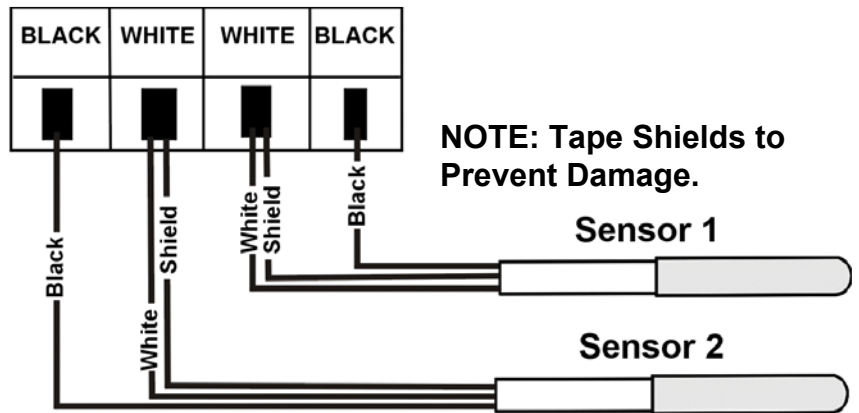
12.2 Wiring the Back-Up Board Sensors and Alarm Connections



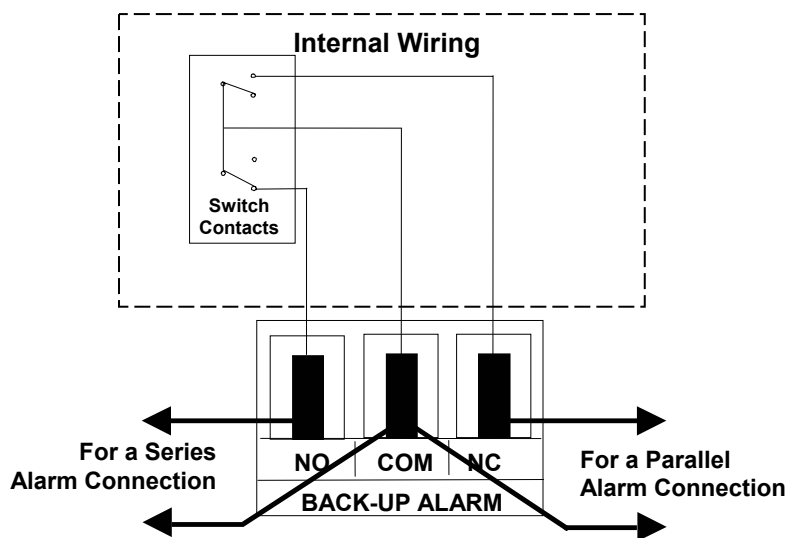
Inset A
Jumper Connection to Enable Sensor 2



Inset B
Sensor 1 & 2 Connections

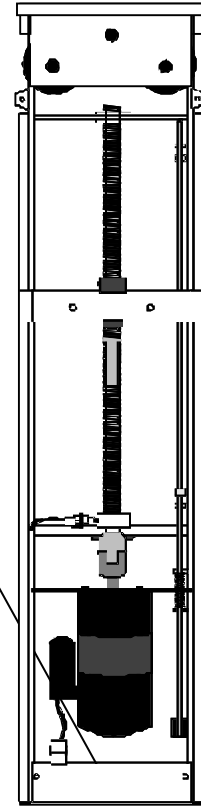
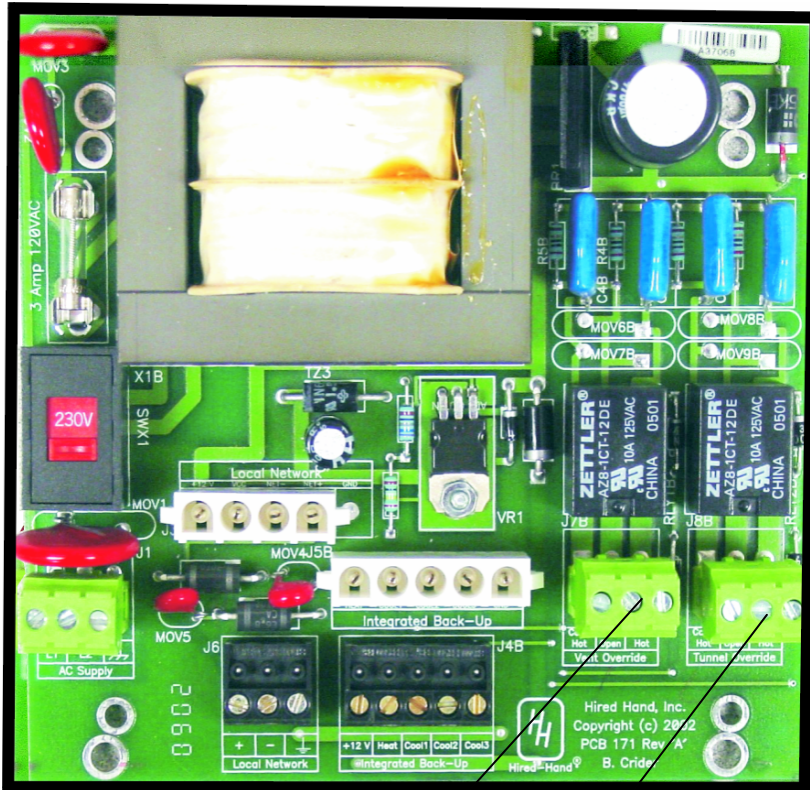


Inset C
Back-Up Alarm Connection



12.3 Evolution Back-Up Power Trak Override Settings and Wiring

Evolution Back-Up Circuit Board

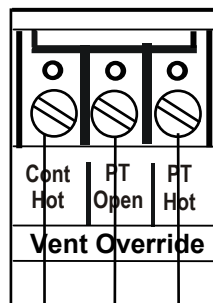


PowerTrak

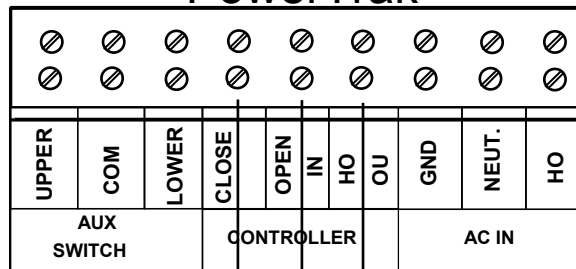
Inset A
Vents Override
Tunnel Override

INLET	MODE
Vent Override	Cool 1
Tunnel Override	Cool 3
Vents & Tunnel Will Wire The Same	

Inset A
Vent Override



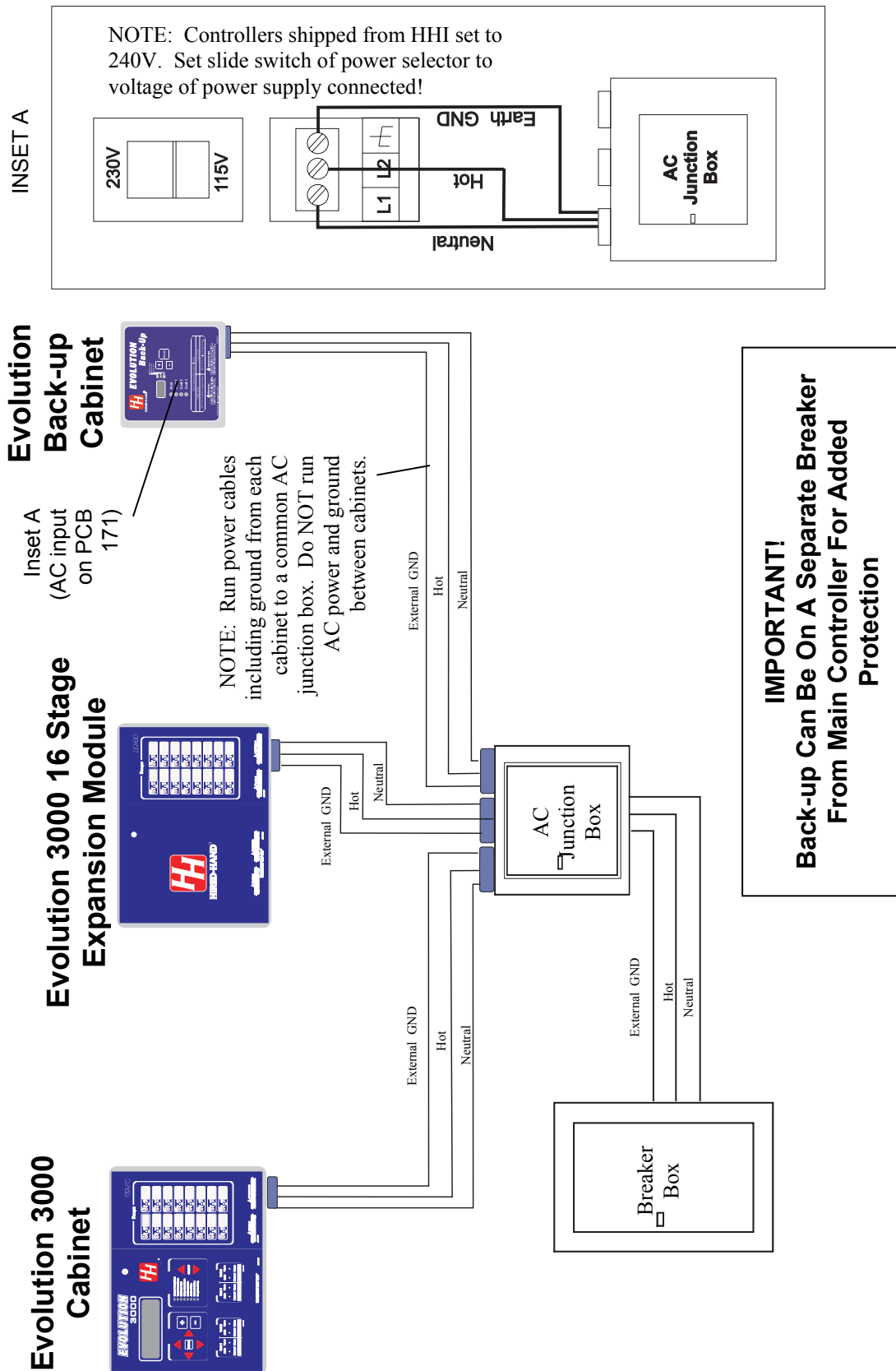
Inset B
PowerTrak



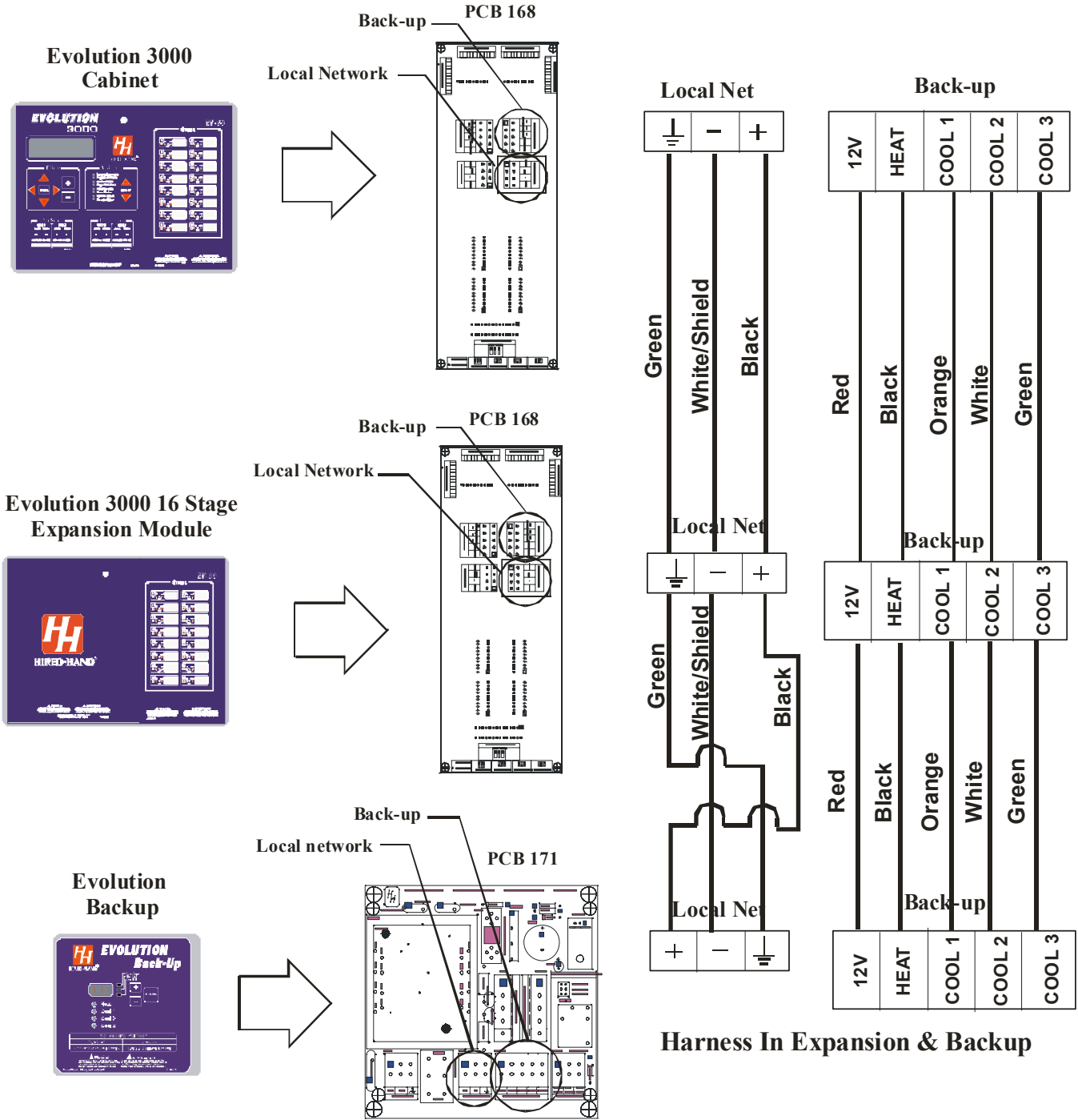
To EV-3000
Com
Open
Close

NOTE: If curtain is setup to pull curtain up to open, then reverse wires connected to 'Open' and 'Close' terminals.

12.4 Power Supply Connection



12.5 Connecting Local Network & Back-up to the Evolution 3000



Harness In Expansion & Backup

Warning!

Tape Shield To Prevent Damage!

NOTE: Harness to connect Local Network and Back-up together are connected & included in the Back-up and 16 Stage Expansion units.

13. Temperature vs. Sensor Resistance Table

The following chart gives the resistance when measured between the white and black sensor wires at a given temperature. To check a sensor, first know the temperature in the area, then, use a multi-meter to check the resistance.

Resistance Kohms	Temp (F)	Temp (C)	Resistance Kohms	Temp (F)	Temp (C)	Resistance Kohms	Temp (F)	Temp (C)
32.654	32	0	15.714	59	15	8.59	83.3	28.5
32.158	32.5	0.3	15.568	59.4	15.2	8.517	83.7	28.7
31.671	33.1	0.6	15.353	59.9	15.5	8.408	84	28.9
31.191	33.6	0.9	15.211	60.3	15.7	8.336	84.6	29.2
30.72	34.2	1.2	15.001	60.8	16	8.23	85.1	29.5
30.257	34.7	1.5	14.863	61.2	16.2	8.125	85.6	29.8
29.802	35.2	1.8	14.658	61.7	16.5	8.056	86	30
29.355	35.8	2.1	14.457	62.2	16.8	7.954	86.5	30.3
28.915	36.3	2.4	14.325	62.6	17	7.853	87.1	30.6
28.482	36.9	2.7	14.128	63.1	17.3	7.787	87.4	30.8
28.057	37.4	3	13.999	63.5	17.5	7.689	88	31.1
27.777	37.8	3.2	13.808	64	17.8	7.592	88.5	31.4
27.363	38.3	3.5	13.682	64.4	18	7.496	89.1	31.7
26.957	38.8	3.8	13.496	64.9	18.3	7.433	89.4	31.9
26.557	39.4	4.1	13.373	65.3	18.5	7.34	90	32.2
26.164	39.9	4.4	13.192	65.8	18.8	7.248	90.5	32.5
25.777	40.5	4.7	13.073	66.2	19	7.157	91	32.8
25.523	40.8	4.9	12.896	66.7	19.3	7.098	91.4	33
25.147	41.4	5.2	12.779	67.1	19.5	7.009	91.9	33.3
24.777	41.9	5.5	12.607	67.6	19.8	6.922	92.5	33.6
24.413	42.4	5.8	12.493	68	20	6.836	93	33.9
24.055	43	6.1	12.325	68.5	20.3	6.779	93.4	34.1
23.82	43.3	6.3	12.215	68.9	20.5	6.695	93.9	34.4
23.472	43.9	6.6	12.051	69.4	20.8	6.612	94.5	34.7
23.13	44.4	6.9	11.943	69.8	21	6.531	95	35
22.793	45	7.2	11.783	70.3	21.3	6.45	95.5	35.3
22.572	45.3	7.4	11.678	70.7	21.5	6.371	96.1	35.6
22.244	45.9	7.7	11.522	71.2	21.8	6.319	96.4	35.8
21.922	46.4	8	11.42	71.6	22	6.241	97	36.1
21.71	46.8	8.2	11.268	72.1	22.3	6.165	97.5	36.4
21.397	47.3	8.5	11.168	72.5	22.5	6.089	98.1	36.7
21.088	47.8	8.8	11.02	73	22.8	6.015	98.6	37
20.886	48.2	9	10.874	73.6	23.1	5.941	99.1	37.3
20.586	48.7	9.3	10.778	73.9	23.3	5.869	99.7	37.6
20.29	49.3	9.6	10.636	74.5	23.6	5.798	100.2	37.9
20.096	49.6	9.8	10.542	74.8	23.8	5.728	100.8	38.2
19.809	50.2	10.1	10.404	75.4	24.1	5.658	101.3	38.5
19.526	50.7	10.4	10.312	75.7	24.3	5.59	101.8	38.8
19.34	51.1	10.6	10.177	76.3	24.6	5.522	102.4	39.1
19.065	51.6	10.9	10.088	76.6	24.8	5.456	102.9	39.4
18.884	52	11.1	9.956	77.2	25.1	5.39	103.4	39.7
18.616	52.5	11.4	9.869	77.5	25.3	5.326	104	40
18.352	53.1	11.7	9.741	78.1	25.6	5.262	104.5	40.3
18.179	53.4	11.9	9.614	78.6	25.9	5.199	105.1	40.6
17.503	54.9	12.7	9.53	79	26.1	5.137	105.6	40.9
17.339	55.2	12.9	9.407	79.5	26.4	5.076	106.2	41.2
17.095	55.8	13.2	9.325	79.9	26.6	4.995	106.9	41.6
16.856	56.3	13.5	9.205	80.4	26.9	4.936	107.4	41.9
16.698	56.7	13.7	9.086	81	27.2	4.877	108	42.2
16.465	57.2	14	9.007	81.3	27.4	4.82	108.5	42.5
16.312	57.6	14.2	8.891	81.9	27.7	4.763	109	42.8
16.085	58.1	14.5	8.815	82.2	27.9	4.688	109.8	43.2
15.935	58.5	14.7	8.702	82.8	28.2			

14. Error Codes

If your controller is displaying an “E1” or “E2”, etc. the controller has recorded an error. The controller records errors based on sensor reading and the communications links. When any of these errors occur an alarm will be generated.

Error Codes for the Evolution Back-Up System

Error Code	Description	Explanation
E1	Sensor 1 Error	Usually indicates a shorted sensor wire. Check sensor resistance.
E2	Sensor 2 Error	Usually indicates a shorted sensor wire. Check sensor resistance. Note: If Sensor 2 is switched OFF, then this error code is not active.
E3	Sensor 1 and Sensor 2	Sensors 1 and 2 both shorted.
LnE	Local Network Error	The Back-Up has lost Communications with the Master Controller. NOTE: During this condition the Back-Up will run Cool 1 on a 5 minute timer.
LnO	Local Network Override Error	The Master Controller has lost communications with one or more of the StageUnits (PCB 168) connected to it. In this condition the Back-Up takes control over the stages.