



**HIRED-HAND®**

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# **FARM HAND POWER VENT**

**INLET CONTROLLER**

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

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## 1. Ratings and specifications

115 or 230 Volts 50/60 Hz

8 amps maximum per vent machine

Room temperature must be kept above 32°F/0°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 manufacturers 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. Installation

### 4.1. Tools Required

- 1 Drill with a flat head screw driver attachment.
- 1 Small Screwdriver
- Wire Strippers

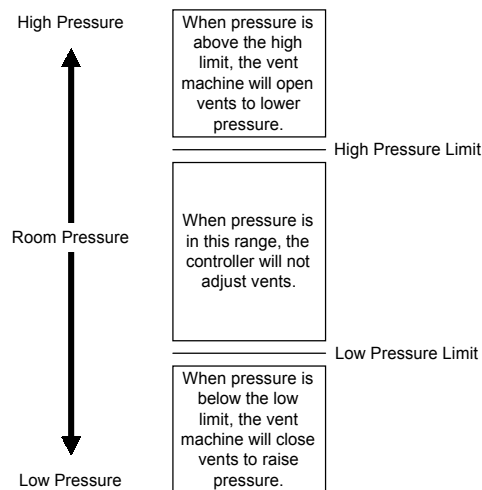
### 4.2. Instructions

1. Screw brackets to the back side of the box in all four corners
2. Mount in a safe location, vertically. Location needs to have adequate ventilation.
3. Mark bracket holes with pencil and pre-drill.
4. Place controller on the wall and match holes.
5. Insert wood screws and use drill to tighten in place.
6. Attach temperature sensors to inside terminals marked temp.- white and black. See wiring diagrams for the locations and wiring instructions.
7. Connect wiring from PowerTrak unit. See wiring diagrams for the locations and wiring instructions.
8. When controller is installed check the operation of the vents when in manual mode, and then check for proper operation in automatic mode.

## 5. Basic Overview

The Farm Hand Power Vent has been designed with the producer in mind. Routine tasks such as changing the pressure limits are easily reset, and are familiar in nature.

This controller has only two basic settings Target High Pressure, and a Target Low Pressure. Think of these settings as the two needles on a photohelic. The controller will open and close the vents as needed to maintain pressure between these limits.



Now that we know how the controller works, lets move on to how to set up those limits.

Press the mode button a few times, and you will see that the display changes each time. If you will look just to the right of the display, you will see four green lights labeled Room Pressure, Target High Pressure, Target Low Pressure, and Outside Temperature. The green light tells you what setting you are looking at in the main display. If the light beside Room Pressure is lit, the numbers in the display show you the pressure in your building.

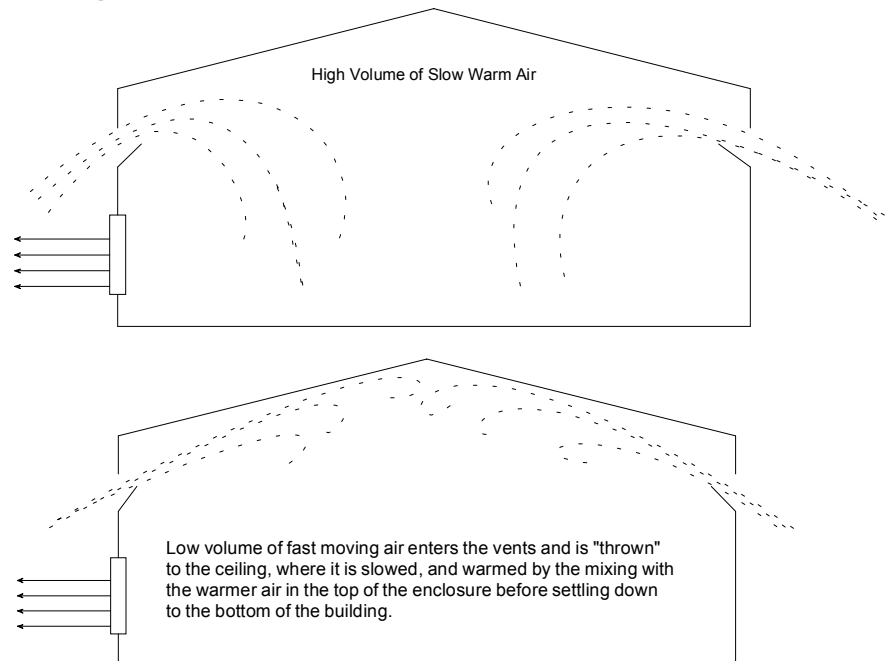
Let's assume that you have this controller installed in your house, and you decide you want pressure to be kept a little bit lower. You walk to the controller, press and release the mode button, watching the green lights until the "Target High Pressure light" is lit. If you look at the display now, you see the present setting for the high limit. To lower it, press and release the minus (-) button until you see the high limit you want. The controller will now start operating using your new limit. Set your low limit the same way.

## 6. Why a Pressure Controller?

The Farm Hand Power Vent is used to control vent inlets in agricultural enclosures. Maintaining a slight negative pressure inside a building ensures that air flows in evenly from all openings in the building. As static pressure increases, the speed of the incoming air increases.

It is important to set the pressure at the appropriate level to ensure maximum efficiency. Too little vacuum, and the livestock could suffer from drafting, and temperature shock. Too much vacuum, and fan efficiency is reduced, increasing the levels of moisture, and ammonia in the enclosure, also driving up electricity costs.

## 7. Pressure Ramping (Optional) Explanation

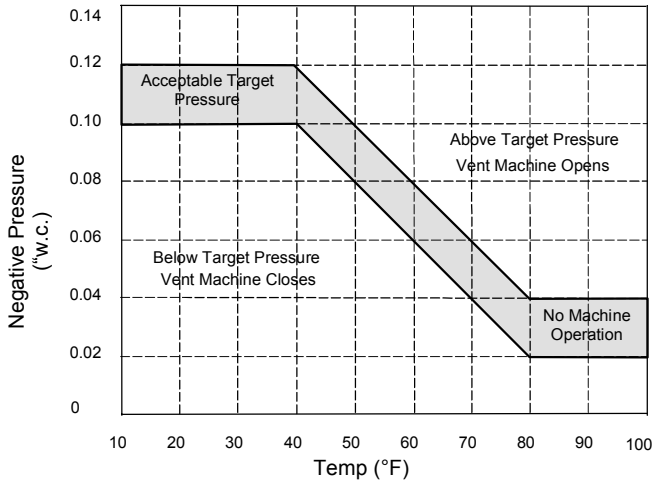


The above illustrations show that you need a different air flow rate when the temperature changes. This is accomplished with the ramping feature.

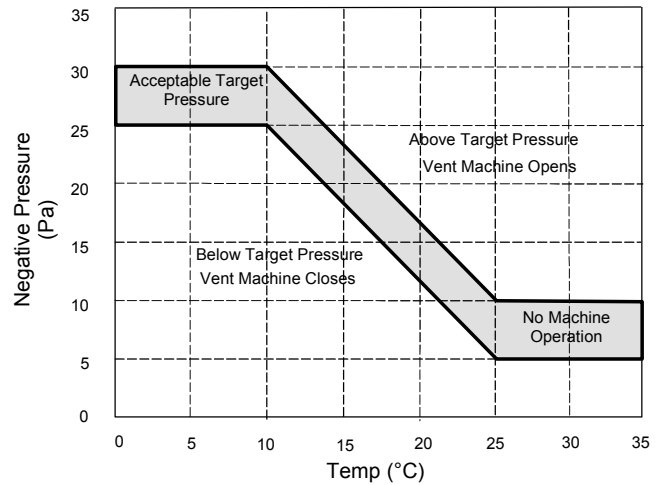
Ramping allows you to set a band of pressure to be maintained, taking into account **OUTSIDE** temperature. (Since, after all, outside air is what you are bringing into the house.) If outside temperature is warm, it will allow you to take in a large volume of slow moving warm air (low static pressure), but when outside air is cold, the unit will adjust to allow only a low volume of fast moving cold air (high static pressure).

Following are two examples of ramping:

## English Units Example



## Metric Units Example



Using values from the English chart above; the controller was programmed as follows:

P30 = Ramping Mode	ON
P31 = High Temperature Limit	80°F
P32 = High Temperature High Pressure	.04" w.c.
P33 = High Temperature Low Pressure	.02" w.c.
P34 = Low Temperature Limit	40°F
P35 = Low Temperature High Pressure	.12" w.c.
P36 = Low Temperature Low Pressure	.10" w.c.

Using values from the Metric chart above; the controller was programmed as follows:

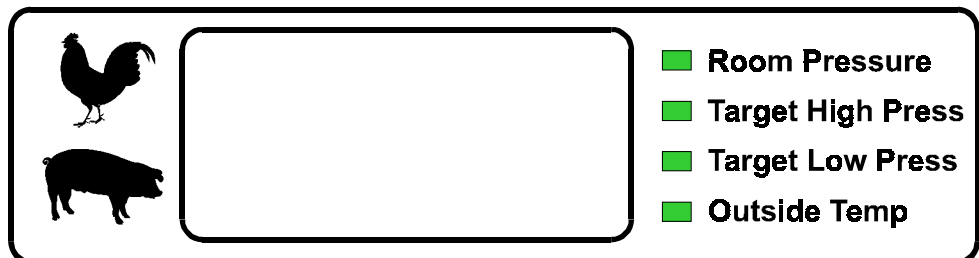
P30 = Ramping Mode	ON
P31 = High Temperature Limit	25°C
P32 = High Temperature High Pressure	10 Pa
P33 = High Temperature Low Pressure	5 Pa
P34 = Low Temperature Limit	10°C
P35 = Low Temperature High Pressure	30 Pa
P36 = Low Temperature Low Pressure	25 Pa

As you can see from the English graph, if outside temperature is 50°F, the controller will try to maintain a static pressure between 0.08, and 0.1" w.c. If pressure goes above 0.1" w.c., the vent machine will open, and reduce static pressure, and if pressure goes below 0.08" w.c., the vent machine will close, increasing the static pressure.

## 8. Set up/Programming

### 8.1. Facepad Descriptions

#### 8.1.1. Display Screen



This section includes the main display, and four green LED's which tell what the display is indicating. When you press the mode button, you step through these four parameters.

### Room Pressure

When the Room Pressure light is lit, the main display shows the static pressure sensed by the controller.

### Target High Pressure

When the Target High Pressure light is lit, the main display shows the high limit pressure set by the operator (or calculated by the controller if ramping is used).

### Target Low Pressure

When the Target Low Pressure light is lit, the main display shows the low limit pressure set by the operator (or calculated by the controller if ramping is used).

### Outside Temperature

When the Outside Temperature light is lit, the main display shows the temperature read by the sensor located outside the building.

## 8.1.2. Manual Mode Indicator

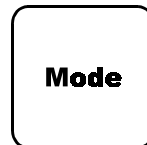


### Manual Mode

Manual mode allows you to control the vents manually. To enter manual mode, press and hold the Plus and Minus buttons simultaneously for five seconds. When you are in manual mode, the Manual Mode light will be lit. During this time, the controller will not control the vents, but you must operate them using the plus button to open the vents, and the minus button to close the vents.

When you have finished operating the vents manually, press and hold the Plus and Minus button until the Manual Mode light goes off. The controller will now be in automatic mode.

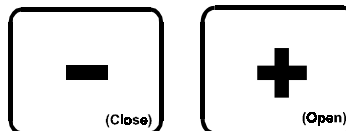
## 8.1.3. The Mode Button



The Mode button is the primary user operated button on the controller. It has two functions.

First, when you press the button you will step through Room Pressure, High Pressure Limit, Low Pressure Limit, and Outside Temperature. (All of these shown on the display.) Second, The mode button allows you to go into program mode. To do this, press and hold the mode button for five seconds, until you see “P1” in the display. This P1 will alternate with the actual setting of Parameter P1 (See section 8.2 “Programming Mode” for more information.)

## 8.1.4. Plus and Minus Buttons



The Plus and Minus buttons are used to adjust settings (Low and High Pressure, for example), and for entering Manual Mode (See Section 8.1.2 “Manual Mode” for more information.) If you press the Plus button, the setting will increase, and when you press the minus button, the setting will decrease.

## 8.2. Programming Mode

Programming Mode allows you to set up the controller to act the way you want. While in program mode you change the settings the controller uses for time delay, ramping, Fahrenheit or Celsius temperature display, and Network (HHNet PC Compatibility) settings. Section 15 contains a Program Data Sheet for recording your personal program settings for the Power Vent. Copy this form as needed.

As you go through the program, you will press the Plus or Minus buttons to adjust the setpoint of the current parameter (shown in the display screen). When you have the value to the setting you want, press the mode button and move to the next parameter and adjust it's value until it is acceptable. When you are finished making changes to the controller's settings, press the mode button until "PS1" appears in the display, then press the mode button one more time. You are now out of programming mode.

<b>Note:</b> If at any time you wait for one minute while in programming mode, the controller will "time out" and return to normal operation.
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Enter programming mode by holding the mode button down for 5 seconds.

### 8.2.1. P1 = Temperature Unit (Fahrenheit or Celsius)

Choose a zero(0) if you want Fahrenheit, or a one(1) if you want Celsius operation.

### 8.2.2. P2 = Pressure Units

0 = Inches of w.c.  
1 = Millimeters of w.c.  
2 = Pascals

### 8.2.3. P20 = Vent Machine Time Delay

This setting is the length of time a pressure reading must be out of range before the controller will operate the vents. This will keep the vents from constantly cycling open, then closed. If your vents cycle too much, increase this setting using the plus (+) button.

### 8.2.4. P30 = Ramping Mode On/Off

Ramping mode may be turned on or off. If you choose a zero (0) or "Ramping Off" here you will not see the following settings.

However, if you choose a one (1) or "Ramping On", with the plus or minus button, you turn ramping on, and will have to set the following items. See the section on ramping for more information on this feature.

#### P31 = High Temperature Limit

The outside temperature the controller will use in determining the low range of its limits.

#### P32 = High Temperature - High Pressure Setpoint

The upper limit for pressure when outside temperature is at the high temperature limit.

#### P33 = High Temperature - Low Pressure Setpoint

The lower limit for pressure when outside temperature is at the high temperature limit.

### **P34 = Low Temperature Limit**

The outside temperature the controller will use in determining the high range of its limits.

### **P35 = Low Temperature - High Pressure Setpoint**

The upper limit for pressure when outside temperature is at the low temperature limit.

### **P36 = Low Temperature - Low Pressure Setpoint**

The lower limit for pressure when outside temperature is at the low temperature limit.

#### **8.2.5. P40 = Network Address**

This option requires HHNet Farm Manager Software from Hired Hand. If you are not running this software on a PC linked to the controller, this setting has no effect. HHNet allows you to connect up to 32 controllers on a single communications port of your personal computer (PC). In order for the computer to recognize the communications from the controllers, each controller must have a unique address. For example: If you have two *Stage Master* controllers, and two *Power Vent* controllers you would need to set the first *Stage Master* to be address 1, the second *Stage Master* to address 2, the first *Power Vent* to address 3, and the second *Power Vent* to address 4. Valid settings are: 1 - 32.

#### **8.2.6. P41 = Software Version**

This is not settable. It is the version of controller code.

#### **8.2.7. P42 = Controller Set up**

This is not settable. It is a unique number that allows the network software (Farm Manager) to know the type of controller.

#### **8.2.8. P60 = Low Pressure Alarm Limit (Ramping Model Only)**

The Low Pressure alarm will send a signal when pressure drops below the low pressure setpoint for greater than 45 seconds. This alarm warns if the vents failed to close for some reason. Setting the low pressure alarm setpoint to 0 (zero) prevents the alarm from sounding.

#### **8.2.9. P61 = High Pressure Alarm Limit (Ramping Model Only)**

The High Pressure Alarm will send a signal to your existing alarm system in the same manner as the High Pressure alarm, but only when pressure exceeds the High Pressure Setpoint for greater than 45 seconds. (High Negative Pressure.) This alarm warns if the vents did not open for some reason. Setting the alarm setpoint to .20 prevents the alarm from sounding.

#### **8.2.10. P62 = Cycle Alarm Limit (Ramping Model Only)**

The cycle alarm is a very important alarm in that it will warn if your timer fans failed to operate. The controller will look for a pressure surge which would normally be caused when the timer fans turn on. If this pressure surge is not sensed within the timer period you specify, the controller will signal your alarm system, thus triggering an alarm. The setting is for time in minutes, and setting the value of this limit to 0 (zero) prevents the alarm from sounding.

### 8.2.11. P63 = Cycle Pressure Alarm Limit (Ramping Model Only)

This setting determines the pressure limit the cycle alarm looks for. For example, If you set this value to .20, and the controller never sees a pressure spike of at least .20”w.c. during it’s cycle time, the controller will sound the alarm.

### 8.2.12. PS1 = Calibrate Sensor 1

The sensor temperature reading is alternately displayed along with the parameter number. You should never attempt to calibrate a sensor more than 8 degrees. If you have a setting that far out of range, it indicates that there is a problem that should be corrected.

This reading can be changed by pressing the + or - button until the desired reading is displayed.

Remember that in order to properly calibrate sensors you need two persons. One at the controller, and one with a trusted thermometer actually at the sensor.

Press the mode button to return the controller to automatic operation.

## 9. Error Codes

E2	=	Cycle Error
E4	=	High Pressure Error
E6	=	Cycle Error and High Pressure Error
E8	=	Low Pressure Error
E10	=	Cycle Error and Low Pressure Error
E12	=	Low Pressure and High Pressure Error
E14	=	Cycle Pressure, Low Pressure, and High Pressure Error

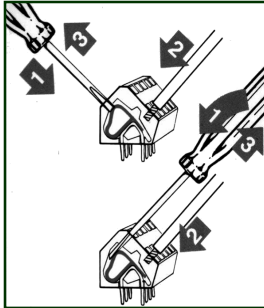
As long as the error condition exists, the alarm will sound. If the error condition clears (pressure drops below high pressure alarm setpoint, for example) the controller will stop sounding the alarm, but record the error and continue to display the error in the display until the controller is reset by disconnecting power to the controller and reconnecting power to the controller.

## 10. Maintenance

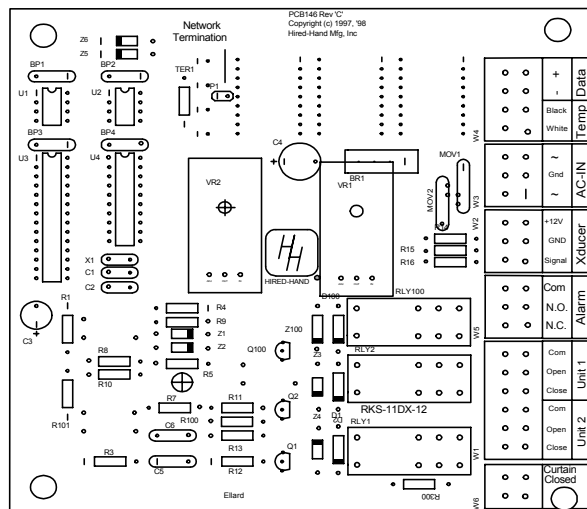
There are few items on the controller that require maintenance. However you should check the calibration of your sensors once per quarter to be sure of accurate readings. Also, inspect any wiring associated with the vent system and replace any wires with worn, or cracked insulation.

## 11. Wiring Diagrams, Schematics, etc.

All wiring connections for stages, curtain machines, variable speed fans, and curtain sensors inside the controller are made without terminals on the end of the wire. To make the connection, strip about 1/4" of the insulation off the wire, and follow the diagram below.

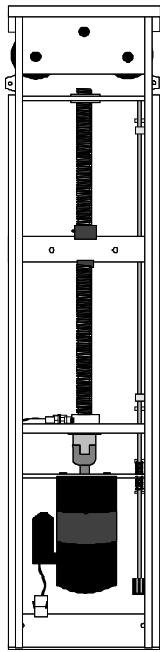


1. Insert a small screwdriver into the hole as shown in the diagram.
2. Insert the stripped end of the wire into the hole as shown in the diagram.
3. Remove the screwdriver, and tug slightly on the wire to check that it is snug.

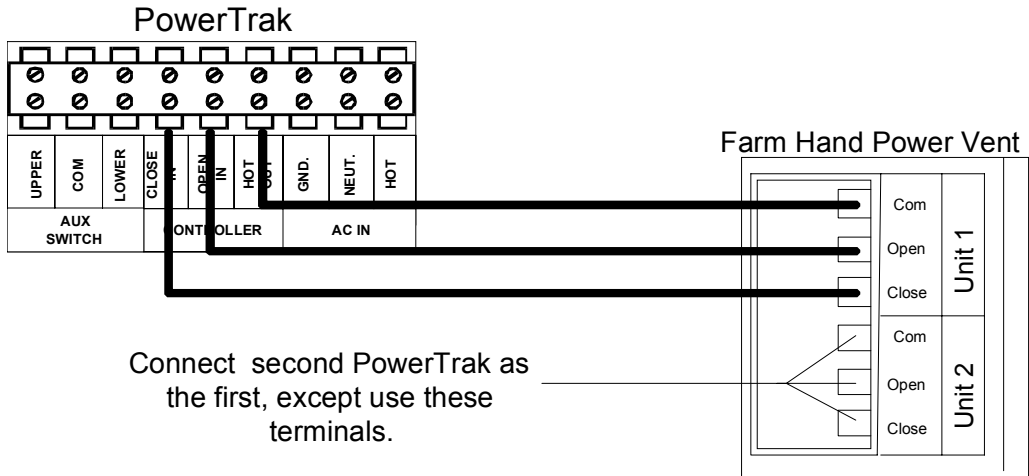
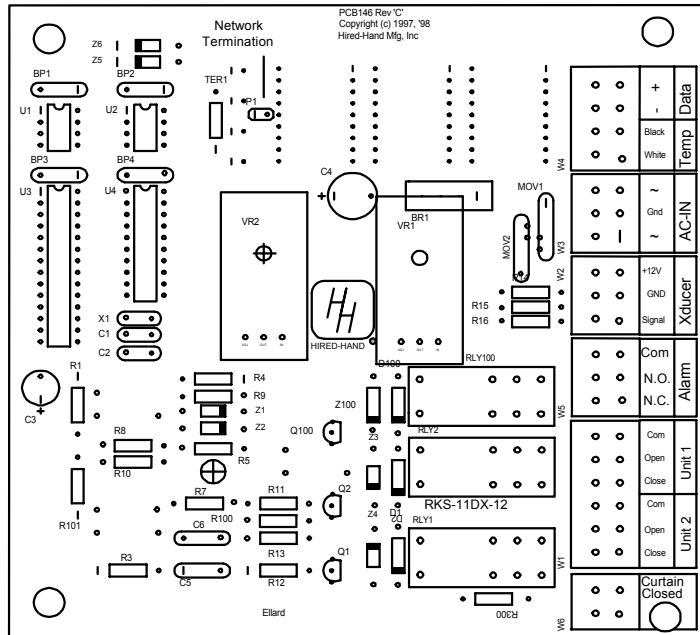


*Circuit Board inside Farm Hand Power Vent Door.*

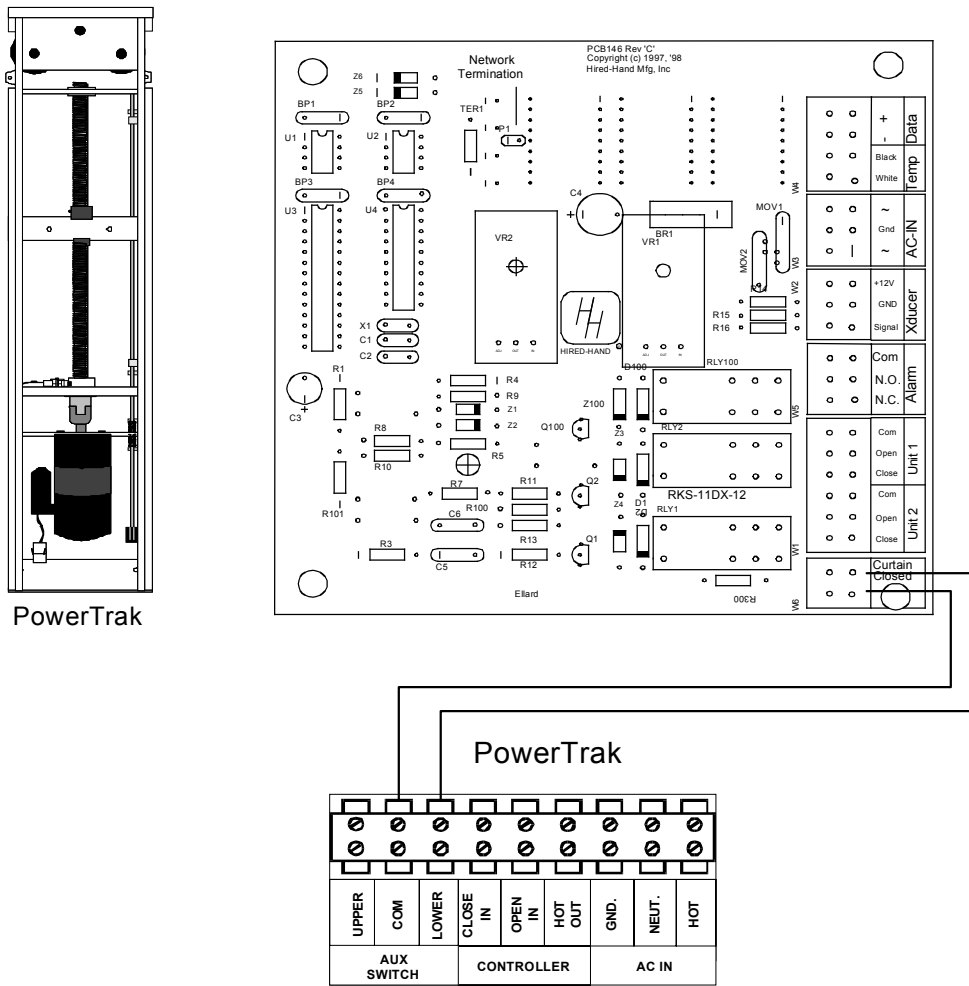
# 11.1. Connecting Vent Machine to the Farm Hand Power Vent Controller



PowerTrak



## 11.2. Connecting the Curtain Closed Switch from the PowerTrak to the Controller



### Curtain Closed Switch

The curtain closed switch signals the controller when the curtains are closed. This information is used in enabling and disabling alarms. In the alarms section of this manual you will see that the cycle alarm looks for a rise in static pressure within a given time period. If the curtains on the house were open, you normally would not see this rise in pressure, so the alarm would go off each time the cycle had elapsed. With this switch in place, the cycle alarm would be disabled unless the curtains were closed, preventing the unnecessary alarm.

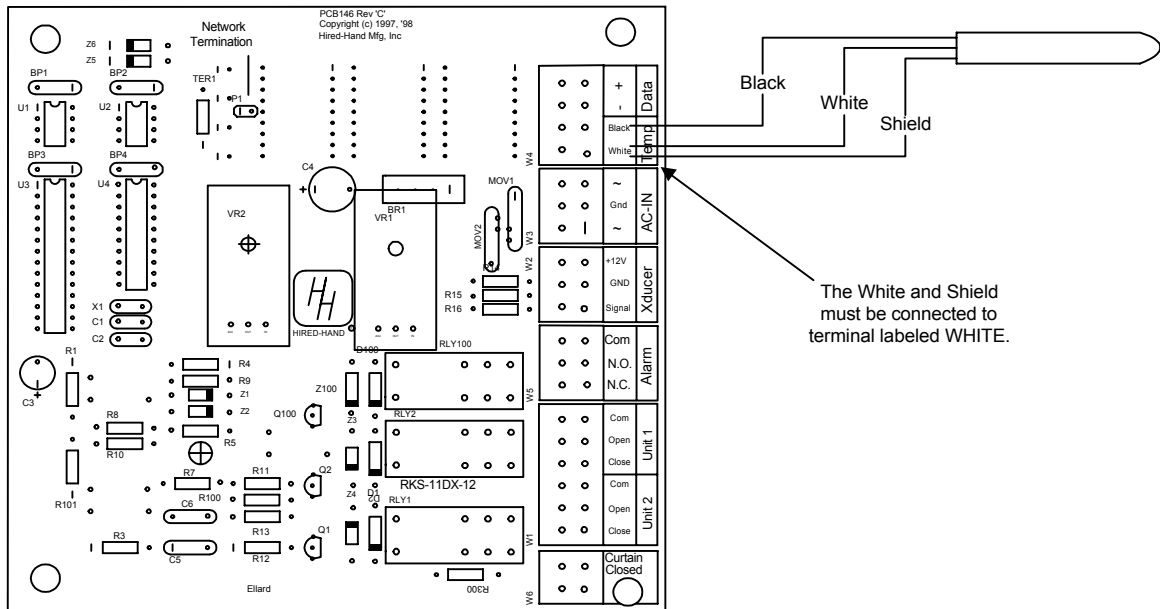
The controller ships with a jumper wire installed between both terminals on the circuit board. If your house has curtains, you need to remove the jumper, and wire the unit to the curtain machine as shown above.

Tunnel House – Wire from Farm Hand Power Vent to the Tunnel Inlet Machine.

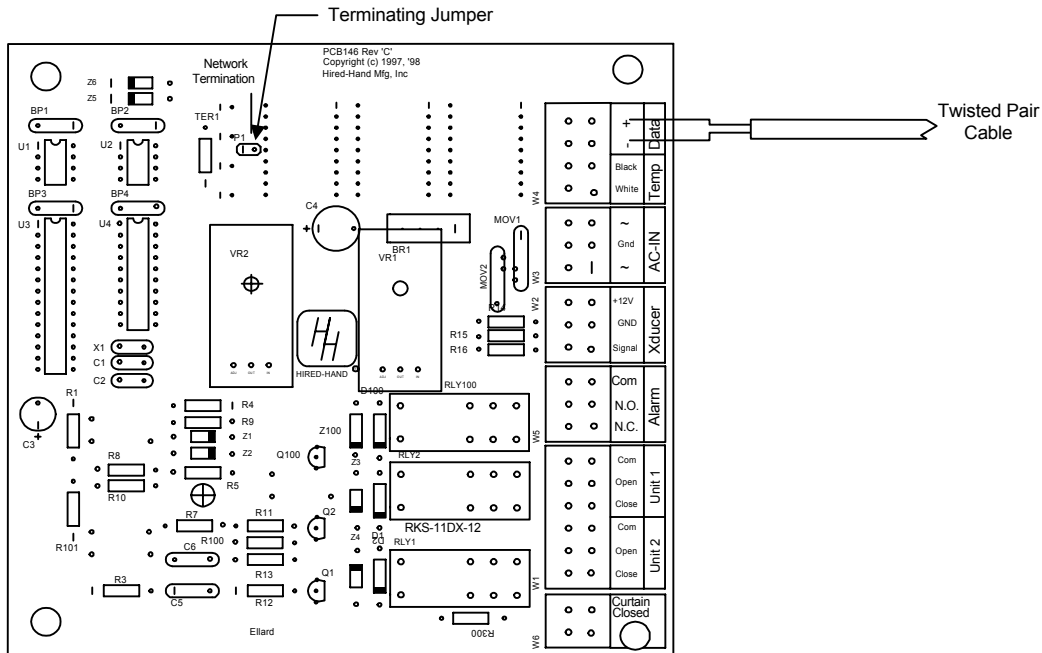
Conventional House – Wire from Farm Hand Power Vent to the Main Curtain Machine.

When the switch is opened, the low pressure alarm and the cycle alarm are disabled. The High Pressure alarm is functional regardless of switch position.

### 11.3. Connecting the Temperature Sensor to the Farm Hand Power Vent Controller



### 11.4. Connecting your controller to a PC through HHNet

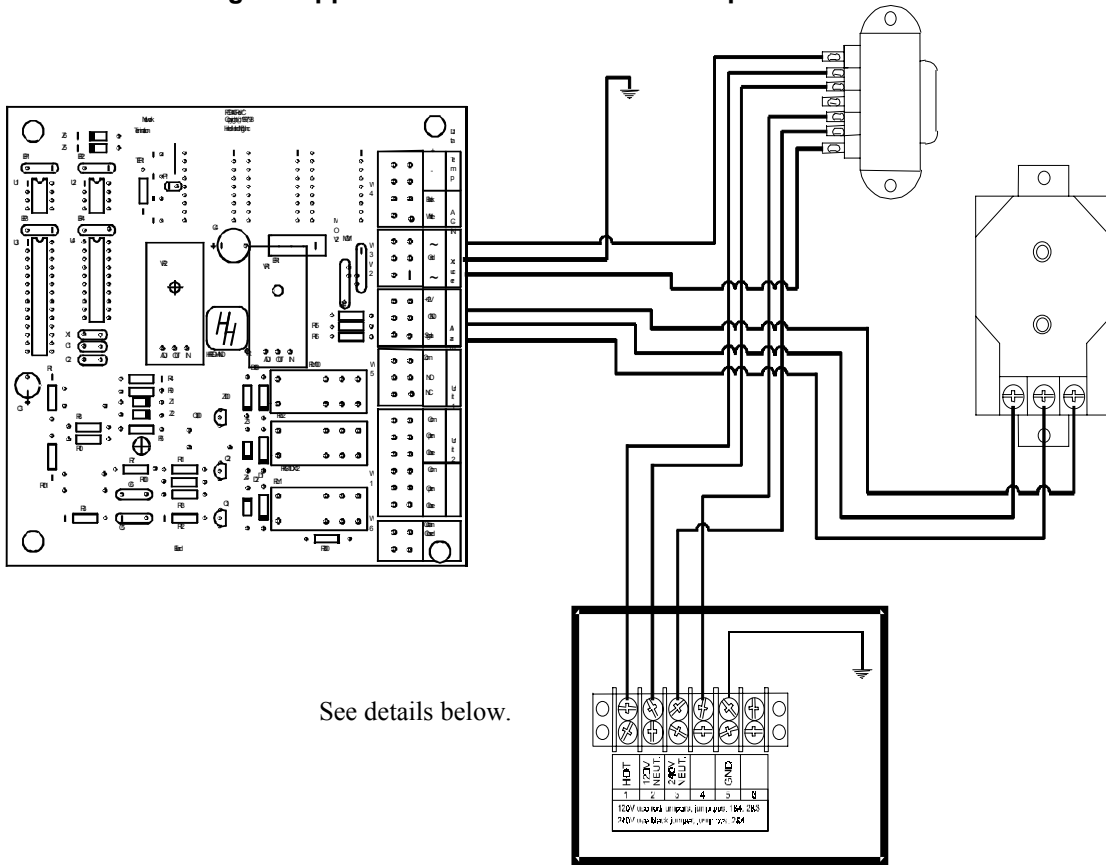


HHNet connects controllers in series along a single twisted pair. Be sure to connect all the + terminals to the same wire in the pair.

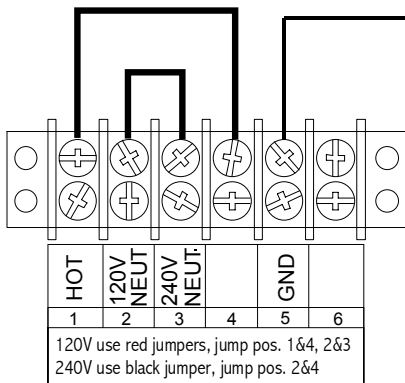
Note: The last controller along the net needs to have the terminating jumper installed. See above diagram for location of jumper.

## 11.5. Connecting AC Power To the Controller

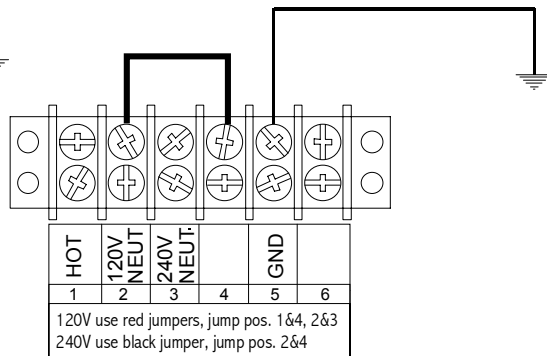
This diagram applies to Standard units without pre-installed cord sets.



Note: You must install jumper wires on the AC inputs as shown in the drawings below.

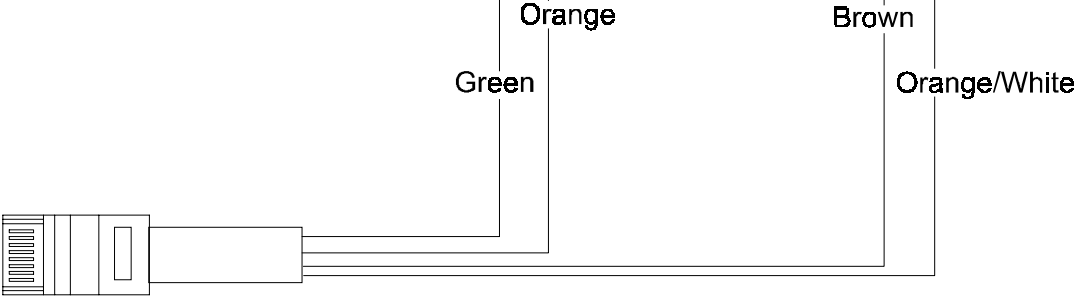
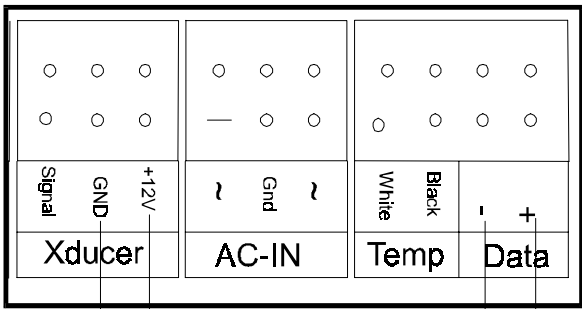
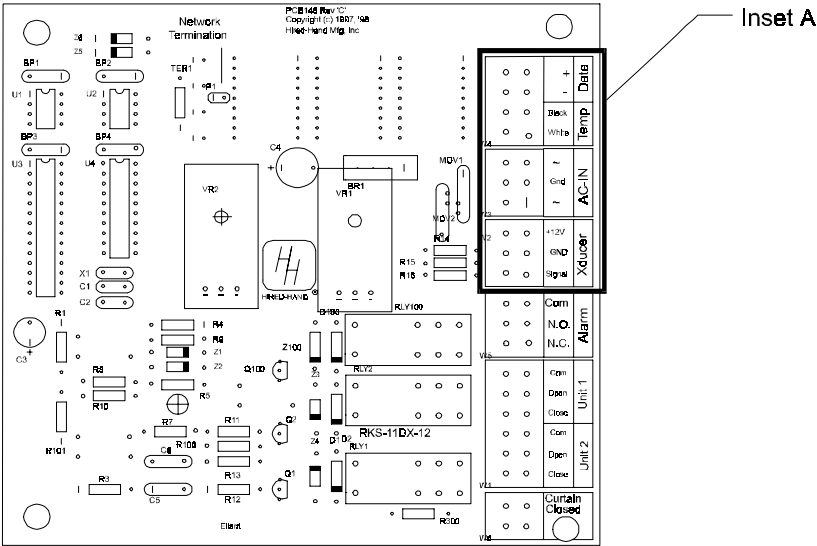


**120V**



**240V**

# 11.6 Connecting a Power Vent to a Data Shuttle





## 12. 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			

## 13. Program Parameters Listing

# *Programming*

**(Power Vent With Ramping)**

**P 1-9 Controller Status**

**P1 = Temperature Scale**  
0 = Fahrenheit  
1 = Celsius

**P2 = Pressure Units**  
0 = Inches of W.C.  
1 = Millimeters of W.C.  
2 = Pascals

**P 20-29 Vent Machine**

**P20 = Vent Reaction Delay (sec.)**

**P 30-39 Pressure Ramping**

**P30 = Pressure Ramping On**  
0 = Off  
1 = On

**P31 = High Temperature Limit**  
**P32 = High Temperature High Pressure**  
**P33 = High Temperature Low Pressure**  
**P34 = Low Temperature Limit**  
**P35 = Low Temperature High Pressure**  
**P36 = Low Temperature Low Pressure**

**P 40-49 Hired Hand Network**

**P40 = Network Address**  
**P41 = Software Version**  
**P42 = Controller Setup**

**P 60-69 Alarm Functions**

**P60 = Low Pressure Limit**  
**P61 = High Pressure Limit**  
**P62 = Cycle Time**  
**P63 = Cycle Pressure**

**PS Sensor Calibration**

**PS1 = Sensor 1**

4501-5027

## 14. Error Codes Listing

- E2 = Cycle Error
- E4 = High Pressure Error
- E6 = Cycle Error and High Pressure Error
- E8 = Low Pressure Error
- E10 = Cycle Error and Low Pressure Error
- E12 = Low Pressure and High Pressure Error
- E14 = Cycle Pressure, Low Pressure, and High Pressure Error

## 15. Program Data Sheet

Use this Data Sheet to record your personal settings for the Farm Hand Power Vent. Copy this sheet as needed.

# Farm Hand Power Vent

### No Ramping:

High Pressure Limit	
Low Pressure Limit	

### Explanation:

	Parameter	Setting
Temperature Unit	1	0= Fah. /1= Cel.
Pressure Parameters	P2	0=In.w.c. 1=Mill w.c. 2=Pascals
Time Delay	20	Sec.

### Ramping Function:

Ramping On or Off	P30	1=On / 0=Off
High Temperature	P31	
High Temp. - High Pressure	P32	
High Temp. - Low Pressure	P33	
Low Temperature	P34	
Low Temp. - High Pressure	P35	
Low Temp. - Low Pressure	P36	

### Network:

Network Address	P40	
Software Version	P41	
Controller Setup	P42	

### Alarm Function:

Low Pressure Limit	P60	
High Pressure Limit	P61	

### Cycle Alarm:

Cycle Time	P62	
Cycle Pressure	P63	

### Sensor Calibration:

Outside Sensor	PS1	
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