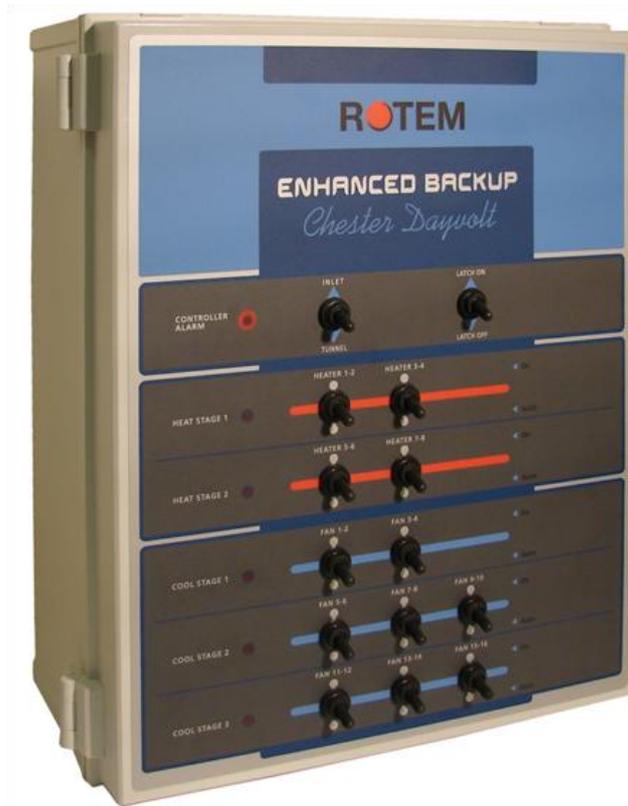


**ROTEM**<sup>®</sup>

Control & Management

**Enhanced Backup System**  
RBU-27-CD2/CD4



User Guide

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## **WARRANTY & LIMITATION OF LIABILITY**

1. ROTEM warrants that the product shall be free of defects in materials or workmanship and will conform to the technical specification for a period of 1 (one) year from the date of initial installation on site (the "warranty period").
2. Load cells are not covered by ROTEM's warranty.
3. ROTEM warrants that during said warranty period, any item/items or part/parts of equipment found defective with respect to materials or workmanship or which do not conform to the technical specification shall be repaired or replaced (at ROTEM's sole discretion), free of charge.
4. During the warranty period, in the event of an alleged defect, authorized resellers in relevant regions should be notified as soon as possible from the date of noticing the said defect, but no longer than thirty (30) days from such a discovery. The report shall include (1) a short description of the defects noticed (2) type of card / component and its matching serial number.
5. ROTEM's sole liability under this warranty is the repair or replacement of the defective item of product.

### **Conditions and Limitations**

1. ROTEM will not be responsible for any labor costs or expenses associated with replacement of defective items or other parts of the product or repair.
2. This warranty shall not cover: (i) product or part therein which has been modified (without prior written approval of ROTEM), or (ii) product or part therein which has not handled or installed by an authorized reseller of ROTEM or (iii) product or part therein which has either handled or installed not in strict accordance with ROTEM's instructions, (iv) products which were used for function other than agriculture industry.
3. This warranty will not apply in the following cases: (i) if all components of the product are not originally supplied by ROTEM (ii) the defect is the result of an act of nature, lighting strikes, electrical power surge or interruption of electricity (iii) the defect is the result of accident, misuse, abuse, alteration, neglect, improper or unauthorized maintenance or repair.

ROTEM warns and alerts all users that the Product is inherently complex and may not be completely free of errors. ROTEM's products are designed and manufactured to provide reliable operation. Strict tests and quality control procedures are applied to every product. However, the possibility that something may fail beyond our control exists. Since these products are designed to operate climate control and other systems in confined livestock environments, where failure may cause severe damage, the user should provide adequate backup and alarm systems. These are to operate critical systems even in case of a ROTEM system failure. Neglecting to provide such a backup will be regarded as the user's willingness to accept the risk of loss, injury and financial damage.

In no event will ROTEM be liable to a user or any third party for any direct, indirect, special, consequential or incidental damages, including but not limited to any damage or injury to business earnings, lost profits or goodwill, personal injury, costs of delay, any failure of delivery, costs of lost or damaged data or documentation, lost or damaged products or goods, lost sales, lost orders, lost income.

Except for the above express warranty, ROTEM makes no other warranties, express or implied, relating to the products. ROTEM disclaims and excludes the implied warranties of merchantability and fitness for a particular purpose. No person is authorized to make any other warranty or representation concerning the performance of the products other than as provided by ROTEM.

**Software Version:** 1.3.1

**Document Version:** 3.3



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## General Description

The RBU-27 has 27 heavy duty relays, up to 5 thermostats and 2 timers for CD2, or 4 timers for CD4. The RBU-27 system is designed to activate during a primary controller failure, or during extreme temperatures. The RBU-27 is a five stage backup consisting of 2 heating stages and 3 cooling stages. Each stage is powered from its own circuit breaker. LED indicators on the front panel indicate which stages are currently active. The system can be expanded for up to 8 heaters and 16 fans connected. The unique design provides a greater control in choosing the ventilation method, testing equipment, and emergency climate control (Latch ON/OFF).

## Functions of Enhanced Backup

The following are included in this section:

- Cool Weather
- Hot Weather
- Latch ON/OFF
- Main Controller Failure (PLATINUM PLUS Fail Safe Input)
- Inlet/Tunnel Power
- Front Panel
- Switch Functions
- Specifications
- Environmental Protection



## COOL WEATHER

For cold weather conditions: If the house temperature drops to the set temperature of thermostat 1, Heaters 1-2 and Heaters 3-4 start working. If the temperature continues to drop and reaches the set temperature of thermostat 2, then Heaters 5-6 and Heaters 7-8 start working in addition to heaters 1-4. Refer to Table 1.

Table 1: Heat Stages

Heat Stage	Thermostat	Active Devices
1	1	Heaters 1-4
2	2	Heaters 1-4 & 5-8

## HOT WEATHER

For warm weather conditions: If the house temperature rises to the set temperature of thermostat 3, the RBU-27 launches cooling stage 1. This means that Fans 1-2 and 3-4 begin working with either the Inlet or Tunnel option. If temperature continues to rise, the RBU-27 then launches cooling stage 2 (Fans: 5-6, 7-8, and 9-10) and if necessary the last, cooling stage 3 (Fans: 11-12, 13-14, and 15-16), is launched.

The cooling stages activation and timer delay are described in Table 2.

Table 2: COOL STAGE Timer Settings

Cool Stage	Thermostat	Active Devices	Timer Delay (default)	
			CD2	CD4
1	3	Fans 1-4	0 seconds	15 seconds
2	4	Fans 1-4 & 5-10	15 seconds	30 seconds
3	5	Fans 1-10 & 12-16	30 seconds	45 seconds

NOTE: The set default timer delays are ROTEM recommended, but may be adjusted as desired (15, 30, 45, or 60 seconds).

## LATCH ON/OFF

The **LATCH ON/OFF** acts as an override for the main controller. If the switch is set to the **LATCH ON** position, the Enhanced Backup will become the permanent operator.

This means that once the selected air source has been opened and cooling stages 1 and 2 have started, then fans 1 through 10 will continue to operate until the switch will be released manually to the **LATCH OFF** position.

## MAIN CONTROLLER FAILURE (PLATINUM PLUS FAIL SAFE INPUT)

In case of a main controller failure (Platinum Plus), the Enhanced Backup opens your selected air source (Inlet or Tunnel) and turns on fans 1-4 and the **CONTROLLER ALARM LED** turns on.

Define a relay in the Platinum Plus for the FAIL SAFE function as an extra system. An example for extra system setting for fail safe is seen in Figure 1.

EXTRA SYSTEMS				
System	1	2	3	4
Start Time	00:00	00:00	00:00	00:00
End Time	0:00	00:00	00:00	00:00
From Temp	50.0	0.0	0.0	0.0
To Temp	99.0	0.0	0.0	0.0
From Hum.	0	0	0	0
To Hum.	100	0	0	0
On (sec)	1	0	0	0
Off (sec)	0	0	0	0

Figure 1: Extra System Setting For Fail Safe Example

Define the following settings:

- Start/End Time – 00:00 to 00:00
- From/To Temperature – (between 10°C to 45°C or between 50°F to 110°F)
- From/To Humidity – 0 to 100
- On (sec) – Set to a value of '1'
- Off (sec) – Set to a value of '0'

The relay works on the temperature range defined above. If for some reason a Platinum Plus failure occurs or the temperature is out of its range, the relay drops out and the RBU-27 takes over (*RBU-27-CD4 has a default delay of 24 seconds*).

**NOTE:** DO NOT set the Fail Safe relay switch to ON position in the PLATINUM PLUS! By doing this, the relay will not be released in cases of controller failure therefore not allowing the Enhanced Backup Unit to operate! The ON position is set by the hardware and overrides the software. Position the switch to **AUTO**.

**NOTE:** A Dedicated FAIL SAFE relay is available from PLATINUM PLUS software version 3.0 and above.

## INLET/TUNNEL POWER

The Enhanced Backup supplies power to the OPEN Inlet/Tunnel of the Platinum Plus. If the Enhanced Backup has taken control of opening the Inlet/Tunnel, then it disconnects power to the Platinum Plus to avoid any conflict.

If the Enhanced Backup recognizes it has no power supply to either the Inlet or Tunnel 'L1' connections, it will operate Fans 1-4 and the 'Controller Failure' LED is lit.



## FRONT PANEL

The controllers' front panel is detailed in Figure 2.

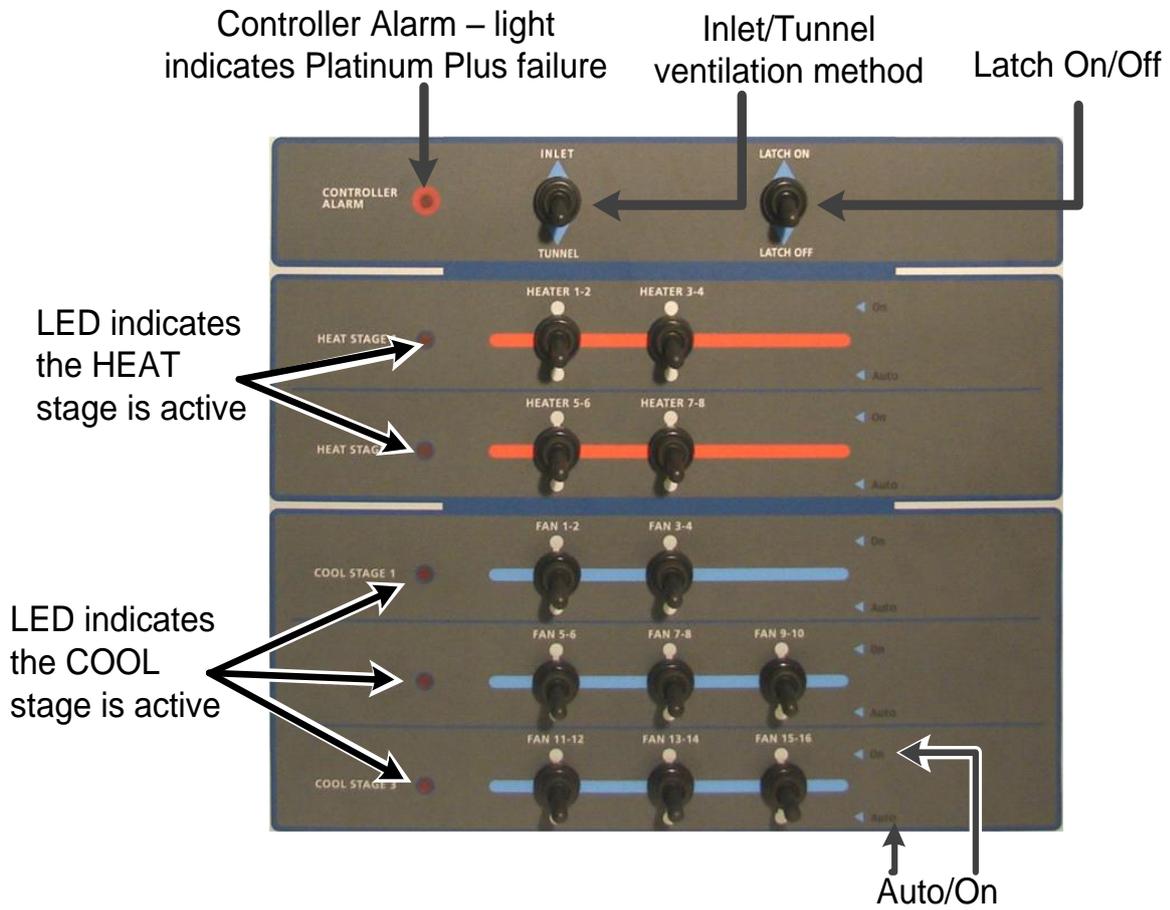


Figure 2: Controller Front Panel

## SWITCH FUNCTIONS

Available switch functions are summarized in Table 3.

**Table 3: Available Switch Functions**

Switch	Function	Comments
Inlet/Tunnel	<p>Toggles between ventilation methods:</p> <ul style="list-style-type: none"> <li>• <b>Inlet:</b> One or two vents open.</li> <li>• <b>Tunnel:</b> Tunnel curtain opens in case of backup operation</li> </ul>	Ventilation method depends on the age of the livestock and the equipment in the house.
Latch on/off	<ul style="list-style-type: none"> <li>• <b>Latch ON:</b> Once thermostat 4 (COOL STAGE 2) is activated, the Enhanced Backup permanently runs on COOL STAGE 2 (FANS: 1-10) until manually switched off.</li> <li>• <b>Latch OFF:</b> Enhanced Backup will run COOL/HEAT STAGES according to thermostats.</li> </ul>	
Heater 1 – 8 On/Auto	The ON option starts heater activity, so you can control the house manually or test the equipment. The AUTO option activates heaters only if the thermostat temperature set point has been reached.	Each stage has its own circuit breaker, and its own thermostat.
Fans 1 – 16	The ON option activates the fans manually. The AUTO option activates the fans according to temperature readings of the thermostat.	



## Specifications

### POWER SUPPLY

Mains voltage	Single phase 115 VAC 50 - 60 Hz
Mains frequency	50/60Hz

### RELAYS OUTPUTS

Resistive load	30A 277VAC
----------------	------------

### HOUSING

Polycarbonate	UL 94-5V IP 65
Dimensions (LxWxH)	500x400x200mm

### AMBIENT CLIMATE

Operating temperature range	-10 to +50 C° / (14 to 125 F°)
Operating Humidity range	0% to 100%
Storage temperature range	-10 to +70 C° / (14 to 158 F°)

### ENVIRONMENTAL PROTECTION



Recycle raw materials instead of disposing as waste. The controller, accessories and packaging should be sorted for environmental-friendly recycling. The plastic components are labeled for categorized recycling.

## Installation

### SAFETY INSTRUCTIONS

	<p><b>Caution! Risk of an electric shock</b></p> <ul style="list-style-type: none"> <li>• ONLY an authorized electrician may install the RBU-27.</li> <li>• Power must be disconnected to avoid electrical shock and damage.</li> <li>• To avoid exposing the Platinum to harmful gases or high humidity, it is recommended to install it in the service room.</li> <li>• Any use by manners unspecified by the manufacture can result an equipment protection impairing.</li> <li>• The device must be disconnected from power before opening the front enclosure door for any purpose.</li> </ul>
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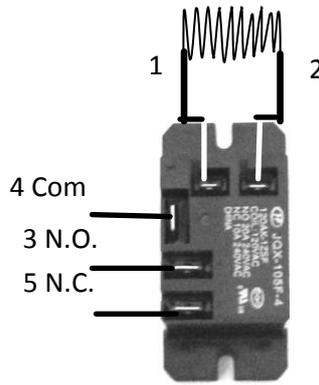
### CONNECTIONS

1. Connect equipment according to tags written on the PCB. Some of the connections can be seen in Figure 4.
2. Connect heaters to relays K24 through K27, and fans to relays K16 through K23. See Figure 7 for relay numbers. See Figure 4.
3. Make proper grounding connections.
4. Set thermostats to desired temperatures, and timers to desired delay time.
5. Perform a primary controller failure to make sure the backup system starts working. Make sure fans and heaters are working by moving switches to "ON" position.
6. Lower thermostats temp' set points and make sure they are functioning properly. Toggle between Inlet and Tunnel to see that they are also properly connected.
7. Toggle between LATCH ON/OFF while the backup is active and turn the controller on and off to make sure everything is connected properly.

	<p><b>REMEMBER:</b> If in LATCH ON position, the backup should function as the primary controller even if the controller starts working!</p>
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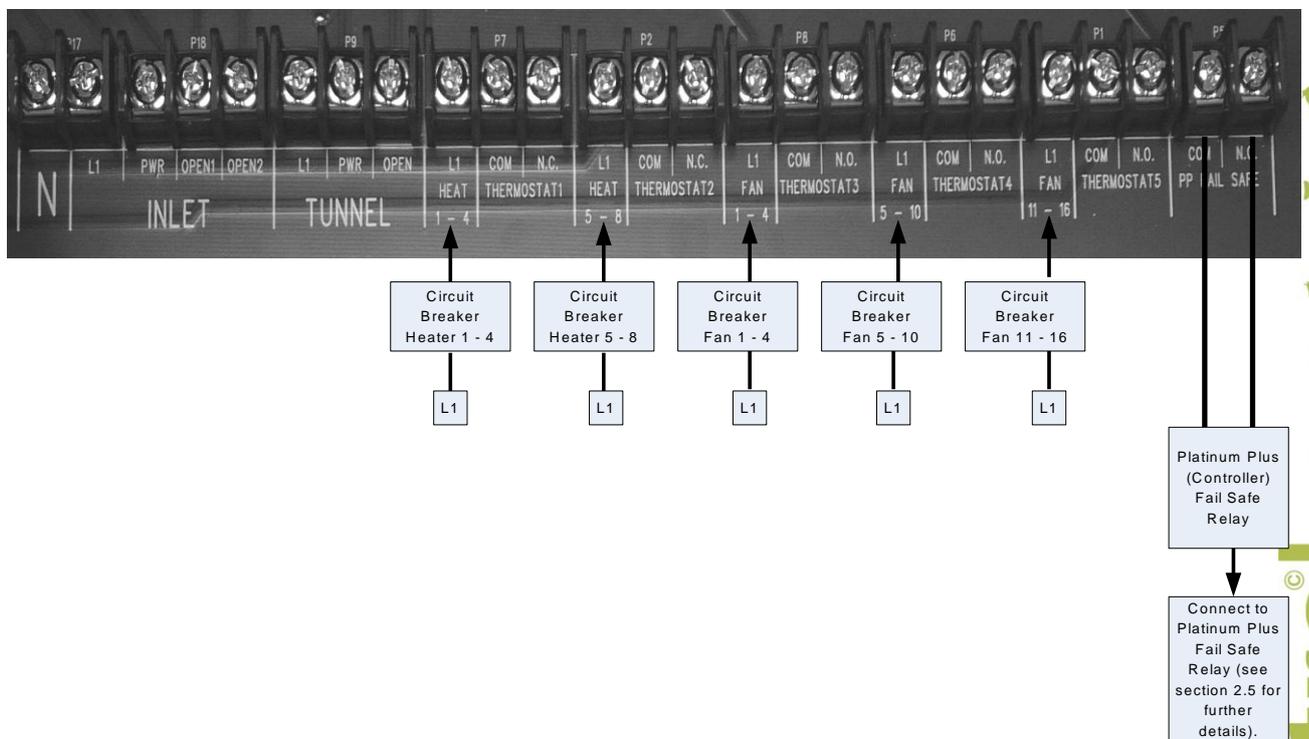
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**Figure 4: Pre-Wired Relays – Section 1**

The Pre-wired relays serve as the logic of the backup system.



**Figure 5: Relay Connections to Controller – Section 3**

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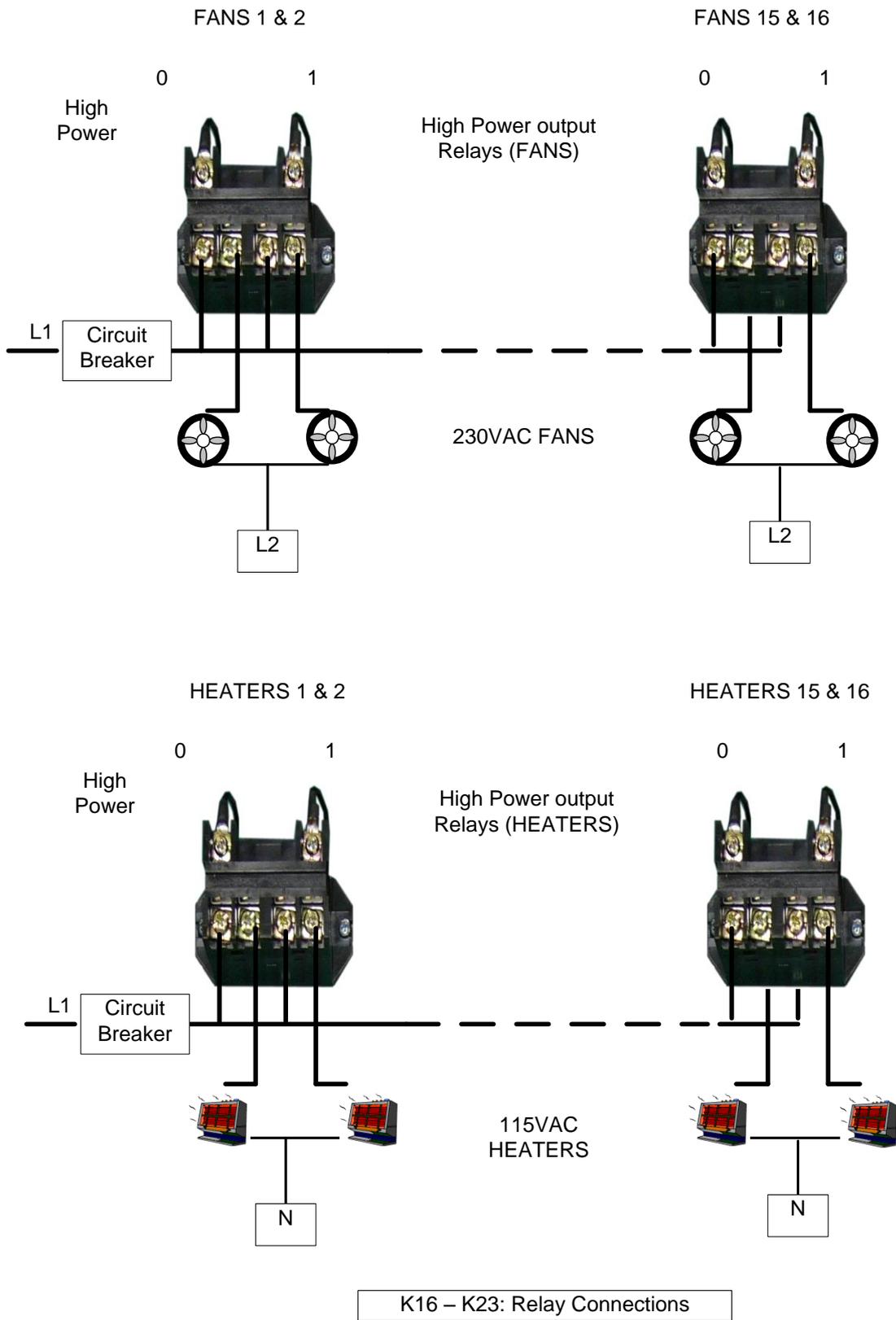


Figure 6: Relay Connections to Fans and Heaters – Section 2

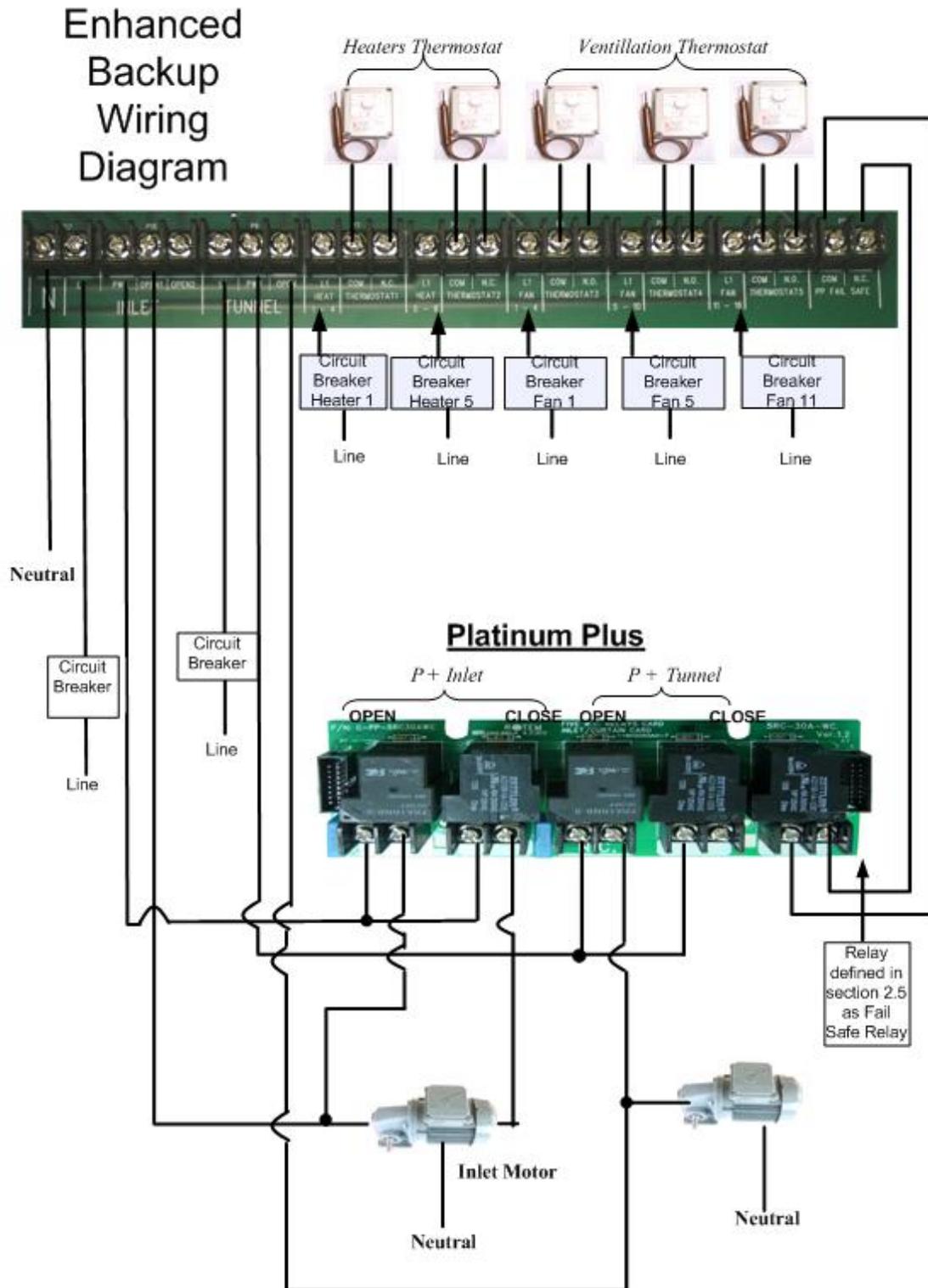


Figure 7: Relays Diagram – Inlet / Tunnel – Section 3

## WIRING DIAGRAM CLARIFICATION

- L1 goes from the Inlet/Tunnel terminals and PWR output to the P+ relays card.
- During normal operation the P+ is connected through the RBU-27 PWR output (L1). In case of a P+ failure or in case the RBU-27 thermostat reaches set point (main controller failure), the RBU-27 takes control and cuts the PWR output to the P+, and opens Inlet/Tunnel curtain.
- This feature prevents a conflict between RBU-27 and P+.

## PCB CONNECTIONS

The board connections are written on it in this order from left to right:

- Neutral
- Inlet Line
- Power Inlet
- Open
- Tunnel Line
- Power tunnel
- Heat line
- Thermostat common (TC)
- Thermostat normally closed (TNC)

A similar order applies for other heaters and fans. The last two connections as seen in the diagram below are connected to the platinum plus fail safe relay.

## ELECTRICAL GROUNDING FOR CONTROLLERS

Electrical equipment can be destroyed or slowly damaged by voltage spikes, lightning hits, etc. Proper electrical grounding in combination with the RBU-27 internal protections is essential to protect the system, reduce the risk of damage and prolong its lifetime. Correct selection and installation of equipment will protect your system and reduce the risk of human injury.

Proper grounding provides an easy path for electrical current to return to its source. A grounding system should tie all non-current carrying conductors to earth ground (0 volts). The grounding system should present a minimum resistance to current flow. Make sure all items used are in proper condition, for example, a corroded wire clamp attaching a ground wire to a ground rod might add 100 ohms or more resistance to a system. Less than 5 ohm is considered as a good ground.

## GROUND RODS

Ground rods are used to efficiently connect the system to earth where current may be dissipated in the soil.

- Material: Ground rods should be copper clad or galvanized steel.
- Diameter: Minimum 5/8", preferably 3/4". Generally the larger the rod diameter, the lower it's resistance to current flow.
- Length: Minimum 2.5 meters (8 feet), preferably 3-meter (10-foot). A longer ground rod will reach a soil with higher moisture content. Moist soil carries current much better than drier soil.
- Single grounding: It is important that there is only one grounding location where a rod or series of rods are connected to each other using a ground wire.
- Independent ground rods will increase the risk of current, from a lightning strike for example, being dissipated through one rod and reentering the system through an adjacent rod.
- Location: Close to the main circuit breaker panel and in moist soil. For example in an area that is usually wet from a drip or a low spot where water drains. Make sure the area is well protected from damage by lawnmowers, tractors, etc'.
- Rod installation: Drive the rod into the earth until about 10 cm (4 inches) is left above grade. If it is impossible to drive the rod to the proper depth, it is acceptable to lay the rod horizontally, 80 cm (2.5 feet) below grade.
- In case the rod is exposed to damage, for example by lawnmowers or tractors it can be installed in a hole, about 20 cm (8 inches) deep so that the rod is about 10 cm under grade and 10 cm above hole level.



The National Electric Code (NEC) mandates two ground rods unless you can show less than 10 ohms resistance with one rod.

## GROUND WIRE

The ground wire is a large copper wire that connects the main circuit breaker panel to the ground rod.

- Material: Ground rods should be copper clad or galvanized steel.
- Diameter: Typically, 16 mm (6-gauge) copper wire is sufficient. If the wire run is greater than 20 feet, 20 mm (4-gauge) wire should be used.
- Length: Minimum 2.5 meters (8 feet), preferably 3-meter (10-foot). A longer ground rod will reach a soil with higher moisture content. Moist soil carries current much better than drier soil.

The ground wire should be protected from damage by lawnmowers, tractors, etc. It should be buried minimum 15 cm (6 inches) under grade for protection and enter the house as soon as possible. It is important that the wire not be cut; it should remain continuous.



## GROUND CLAMPS

Ground wires should not be merely wrapped around a ground rod. Ground clamps are used to attach a ground wire to a ground rod. The most common clamp is known as an acorn clamp. Make sure the ground clamps you select are rated for outdoor use. Do not use pipe clamps rated for inside water lines or hose clamps to attach the ground wire. See Figure 8.



Figure 8: Ground Connection

## WHAT SHOULD BE GROUNDED?

Any equipment that is or could become energized, even accidentally, should be grounded. Current from lightning, strikes objects in a random fashion. Accounts of lightning strikes reveal scenarios most of us could not predict.

Electric circuits should be wired with a 3-wire conductor consisting of hot, neutral and grounding wires. The grounding wire should be attached cleanly and securely to devices or systems to be grounded. The other end of the grounding wire should be attached to the ground bus on the main panel

## Troubleshooting

### GENERAL ISSUES

Outputs and their related relays are described in Table 4. Refer to the 'Related Relay' column only after checking the following:

- Voltage
- Circuit breaker
- All other connections

If after checking, the output continues not to operate, follow the instructions in the matching row.

**Table 4: General Troubleshooting Issues**

#	Issue Description	Related Relay
1	Inlet open1 power fails	Replace K2
2	Inlet open2 fails	Replace K3
3	Tunnel open power fails	Replace K5
4	Fan 1 & 2 fails	Replace K16
5	Fan 3 & 4 fails	Replace K17
6	Fan 5 & 6 fails	Replace K18
7	Fan 7 & 8 fails	Replace K19
8	Fan 9 & 10 fails	Replace K20
9	Fan 11 & 12 fails	Replace K21
10	Fan 13 & 14 fails	Replace K22
11	Fan 15 & 16 fails	Replace K23
12	Heater 1 & 2 fails	Replace K24
13	Heater 3 & 4 fails	Replace K25
14	Heater 5 & 6 fails	Replace K26
15	Heater 7 & 8 fails	Replace K27



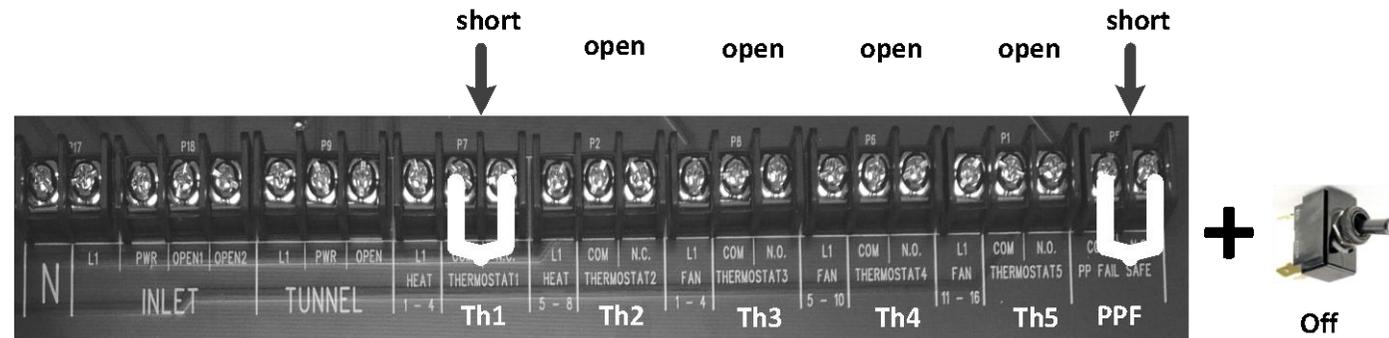
## CONTACTORS AND TERMINALS ISSUES

Detailed troubleshooting issues that concern contactors and terminals are detailed in Table 5, Table 6, and Table 7. For layout, refer to Figure 8.

### Contactor check and Terminals Example

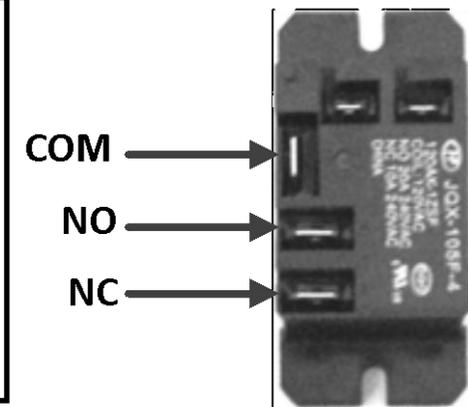
To check K4, ensure that the Inputs/Terminals settings are set as follows:

- TH1: short
- TH2: open
- TH3: open
- TH4: open
- TH5: open
- PP-F: short
- Latch: off



### To check internal contacts:

1. With the power off, disconnect the connector shoe from the COM, NO and NC relay terminals.
2. Turn the power back on.
3. Using an Ohm meter, check that the resistance between the COM and NO is zero (0), and the contact between COM and NC is open.
4. Turn the power OFF, and check that the contact between the COM and NO is open, and check that the resistance between COM and NC is zero (0).
5. Reconnect the connector shoe to COM, NO and NC relay terminals and turn the power back on.





**Table 5: Detailed Troubleshooting Issues I**

Inputs/Terminals							Contactors K1-10									
INLET, ALL SWITCHES-AUTO																
TH1	TH2	TH3	TH4	TH5	PP-F	Latch	K1	K2	K3	K4	K5	K6	K7	K8	K9	K10
short	open	open	open	open	short	off	115V	115V	115V	115V	115V	115V	115V	115V	115V	115V
open	short	open	open	open	short	off	115V	115V	115V	115V	115V	115V	115V	115V	115V	115V
open	open	open	open	short	short	off	115V	115V	115V	115V	115V	115V	115V	115V	115V	115V
open	open	open	open	open	open	off				115V	115V				115V	115V
open	open	open	short	open	short	off				115V	115V				115V	

**Table 6: Detailed Troubleshooting Issues II**

Inputs/Terminals							Contactors K11-20									
INLET, ALL SWITCHES-AUTO																
TH1	TH2	TH3	TH4	TH5	PP-F	Latch	K11	K12	K13	K14	K15	K16	K17	K18	K19	K20
short	open	open	open	open	short	off										
open	short	open	open	open	short	off										
open	open	open	open	short	short	off										
open	open	open	open	open	open	off	115V									
open	open	open	short	open	short	off		115V								

Table 7: Detailed Troubleshooting Issues III

Inputs/Terminals							Contactors K21-28							
<b>INLET, ALL SWITCHES-AUTO</b>														
TH1	TH2	TH3	TH4	TH5	PP-F	Latch	K21	K22	K23	K24	K25	K26	K27	K28
short	open	open	open	open	short	off				115V	115V			
open	short	open	open	open	short	off						115V	115V	115V
open	open	open	open	short	short	off	115V	115V	115V					
open	open	open	open	open	open	off								
open	open	open	short	open	short	off								

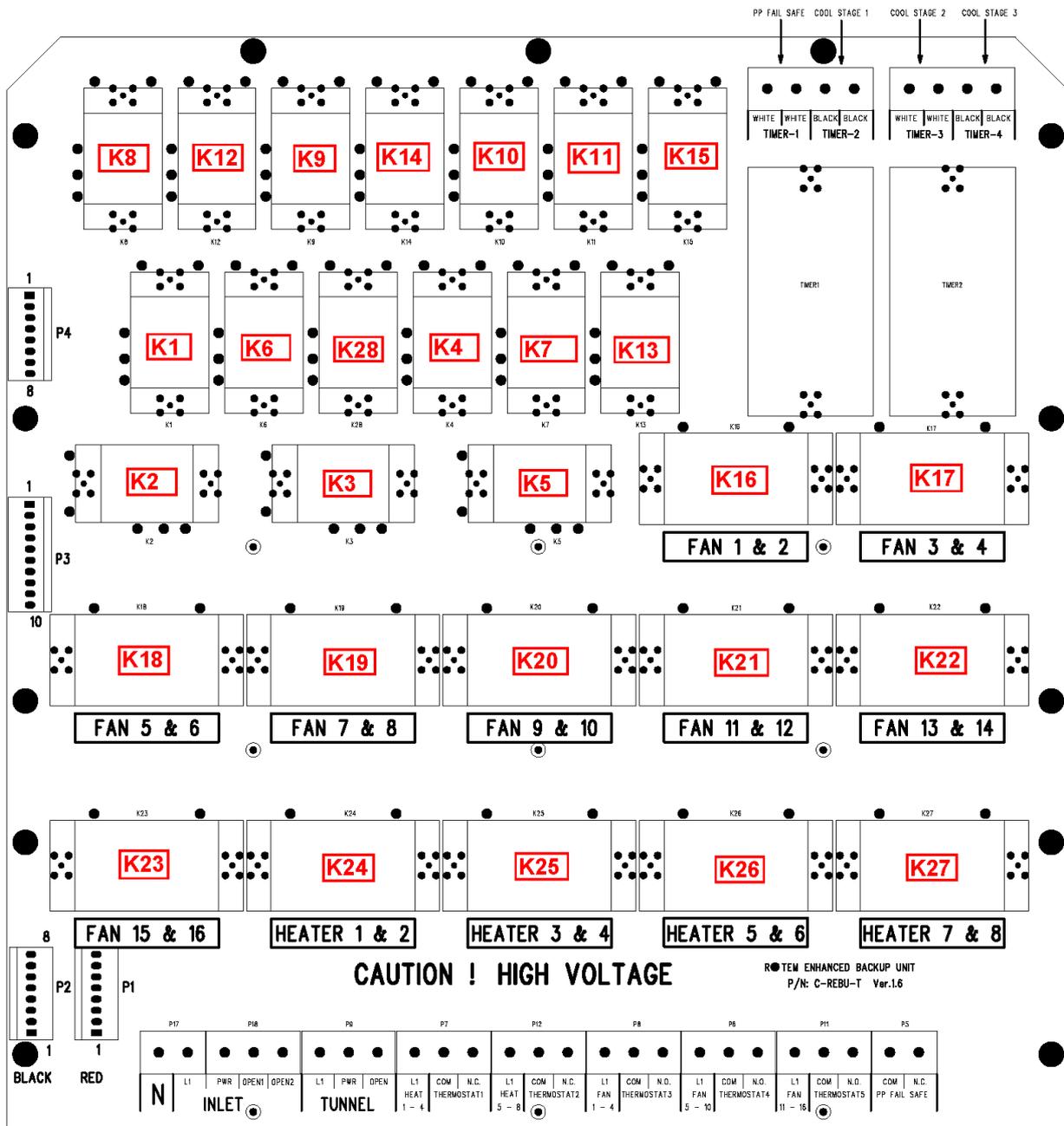
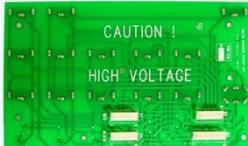


Figure 9: Contactor and Terminals Layout Map

## Enhanced Backup System RBU-27-CD2/CD4 Ordering Information

Part	Part Number	Part Description	Image
Controller	P-RBU-27CD2-V1	ENHANCED BACKUP STAGE 2-3 DLY UNIT 115V	
Controller	P-RBU-27CD4-V1	ENHANCED BACKUP STAGE 4 DLY UNIT 115V	
Card	C-RBU27-R	RBU-27 RELAY CARD (RELAYS INCLUDED)	
Card	C-RBU27-SC	RBU-27 SWITCH CARD	
Timer	SP-EB-T2	RBU-27 TIMER2 CARD	
Relay	300034	SMALL RELAY	
Relay	300035	LARGE RELAY	



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