

OPERATING MANUAL
MODEL 922 SWITCH HEATER CONTROL

230VAC/460VAC

MANUFACTURED
BY

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Table of Contents



1. Warnings, Cautions, and Notes	1
2. Part Number Description	2
3. Customer Connections.....	3
3.1. Incoming AC	3
3.2. Control.....	4
3.3. Indication.....	4
3.4. Heater Fault Resistors	4
3.5. Heaters.....	5
3.6. Fault Indication Light.....	9
3.7. Temperature Sensor.....	9
3.8. Optional Snow Detector	9
3.9. Optional Rail Temperature Sensor	9
4. Control Module.....	10
4.1. Description	10
4.2. Set-Up and Adjustments.....	11
4.3. Password 0 and 5 Menus	12
4.4. Push Buttons and LED Status Indication Lights	20
4.5. Master Connections.....	23
4.6. Operation	25
4.6.1. Wave Mode Operation.....	26
4.7. Fault Conditions	27
5. Output Module.....	30
5.1. Description	30
5.2. Set-Up and Adjustments.....	30
5.3. LED Status Indication Lights	31
5.4. Output Circuit Board Connections	32
5.5. Operation	33
6. Troubleshooting.....	34
6.1. Heater are not on when they should be	34

6.2. Control Module Does NOT Turn On	34
7. Specifications.....	35
8. Drawings.....	36
9. Limited Warranty	37

1. Warnings, Cautions, and Notes

Please read this manual completely before attempting to install, operate or service the model 922 Switch Heater Control System.

Read the information in the table below. Failure to observe the warnings and cautions can lead to equipment damage or personal injury.

Symbol	Description
	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate personal injury. It may also be used to alert against unsafe practices.
NOTE	NOTE indicates explanatory information that applies to the next step in the procedure. It is used to clarify and expand upon the importance of the procedural step when needed.



WARNING: THE MODEL 922 SWITCH HEATER CONTROL SYSTEM OPERATES ON HIGH VOLTAGE LEVELS. CONTACT WITH ELECTRICITY CAN BE HAZARDOUS, CAUSING SHOCK, BURNS, AND DEATH.



WARNING: HIGH LEAKAGE CURRENT. EARTH CONNECTION IS ESSENTIAL BEFORE CONNECTING SUPPLY.



WARNING: HEATER FAULT IS NOT FOR PERSONAL PROTECTION.



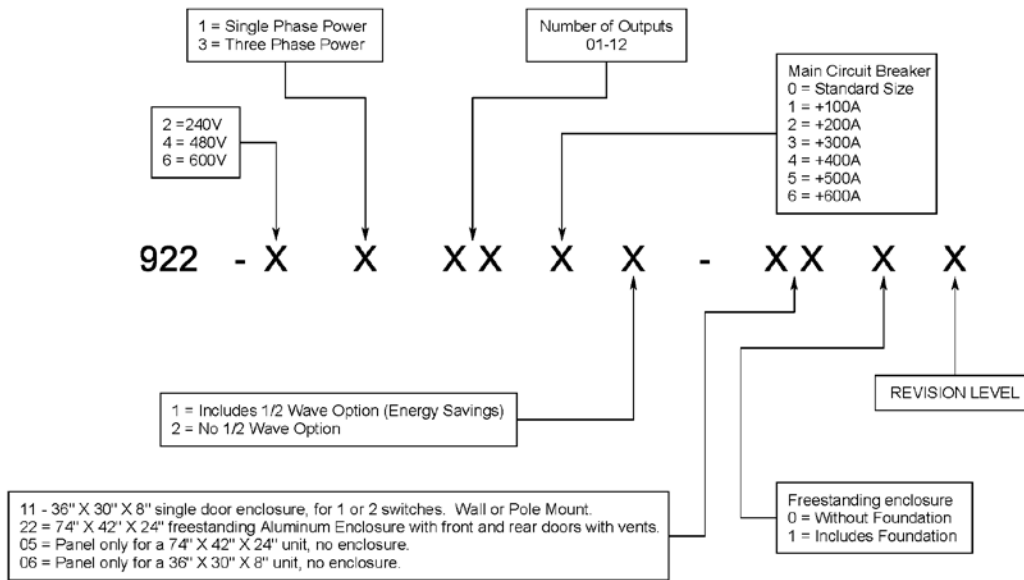
CAUTION: NUMEROUS COMPONENTS WITHIN THE CONTROL SYSTEM ARE ELECTRICALLY “HOT”. BE AWARE WHEN WORKING IN AND AROUND THIS SYSTEM.



CAUTION: THIS CONTROL SYSTEM CAN BE OPERATED REMOTELY OR BY SNOW DETECTOR. THEREFORE, OPERATION MAY BEGIN UNEXPECTEDLY.

2. Part Number Description

922 Electric Switch Heater Controller 36 kW per Output



3. Customer Connections

3.1. Incoming AC

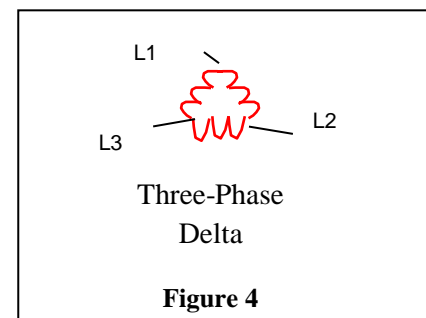
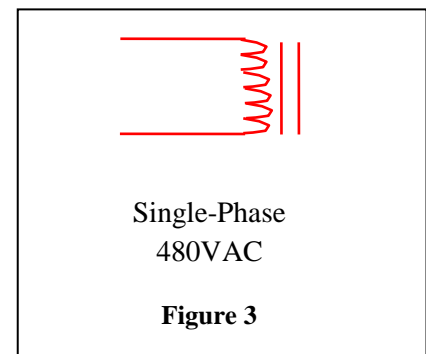
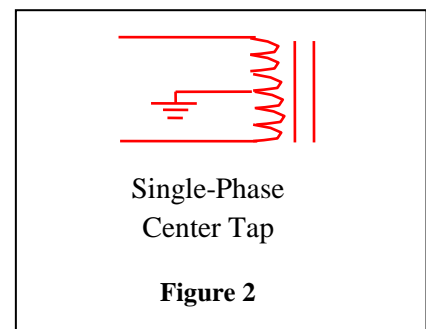
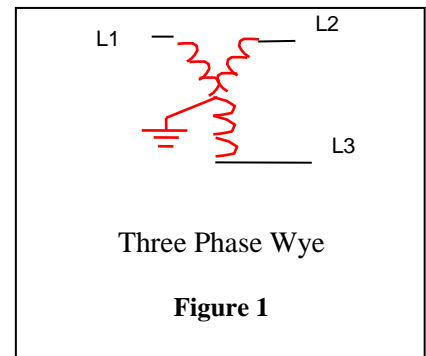
The incoming power, 460VAC/230VAC, 60Hz, 1 or 3 phase, should be connected directly to the main circuit breaker. The neutral should be connected to the ground lug located to the right of the circuit breaker. An earth ground should also be connected to the neutral bus bar.

NOTE: On some models, an adjustable main circuit breaker is factory-adjusted for the load of each specific panel. The panel nameplate will show what setting the circuit breaker is set for. Refer to print 9224-5413, in the back of this manual, for the various adjustments, in the event that changes are made to the panel.

NOTE: The heater fault detection will only work properly if the incoming power to the main panel is single-phase with a center tap or three-phase Y. This is because, to detect a heater fault, a return path through earth ground is necessary. Refer to figure 1 and 2.

The system will not work properly if the input power is single phase 460VAC without a center tap. Single-phase 460VAC can be used only if the control panel for the heaters is made by Railway Equipment and an additional jumper is used on the panel (refer to figure 3, and print 9224-5413 Note 1).

NOTE: The ground fault detection circuit will not work with a Three-Phase Delta, Figure 4. We do not recommend using a Three-Phase Delta.



3.2. Control

The system can be turned on by providing a circuit closure across terminals 1 and 2 on TB2.

3.3. Indication

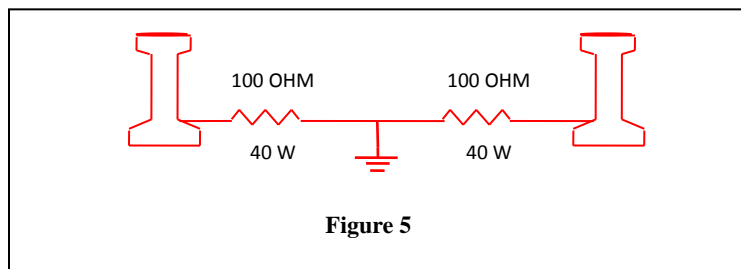
NOTE: Refer to print 9224-5413 for all indication connections.

A 115VAC indication signal can be obtained from terminals 3 and 6 on TB2 by placing a circuit closure between terminals 4 and 5 on TB2. This will provide 120VAC from terminals 3 and 6 on TB2, with terminal 3 “hot” and terminal 6 “neutral”. The electrical rating of this contact is 2 amps @ 125VAC. A “dry” contact indication can be obtained between terminals 3 and 4 by removing the circuit closure across 4 and 5.

The 115VAC can be changed to 24VDC by removing the jumper from TB2-4 and TB2-5 and adding the jumper between TB2-2 and TB2-3. The 24VDC indication will be between TB2-4 and TB2-9.

3.4. Heater Fault Resistors

A hard-wired connection should be made from each rail (at the switch) to a 100 ohm 40-watt resistor (customer provided), and then to a good earth ground. This will ensure that there is an electrical path from each rail to ground. This will allow the heater fault detection system to function while maintaining isolation between the rails (refer to figure 5).



3.5. Heaters

The heaters are connected to the three circuit breakers at the bottom of each output section. First, you will need to remove the two bolts holding the terminal cover on.



Once removed, you then can access the circuit breakers to connect the heater's wires to the circuit breakers. Insert the pair of wires for each heater into the breakers and tighten down the screw to secure them.

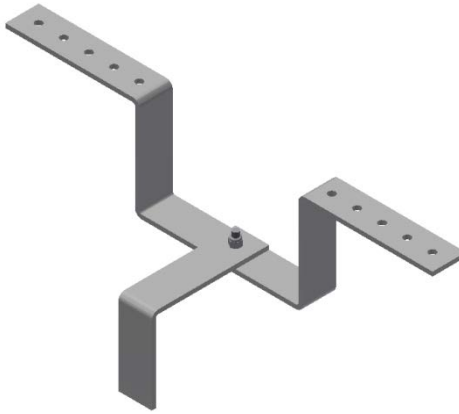
NOTE: Do not mix the heater wires to the different circuit breakers.



Pan Heater Wires	Rail 1 Wires	Rail 2 Wires
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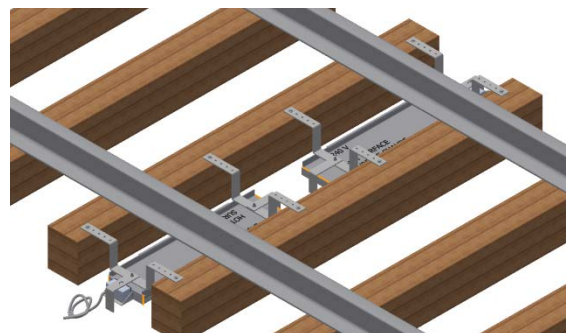
Pan Heater Bracket Installation:

Pan Heaters may come with mounting brackets, lag bolts, and washers. Install mounting bracket as shown below:



914130 **SUPPORT BRACKET**

Attach each bracket according to the picture below. Use at least two 2 lag bolts with washers to ensure proper bracket stability.



Pan Heater Wiring:

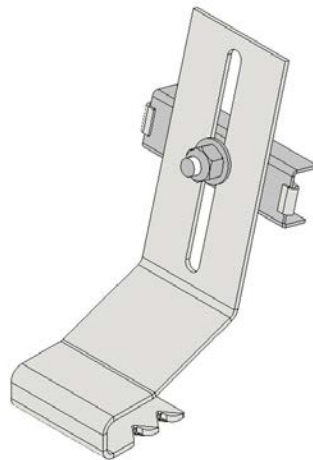
The Pan Heaters need to be wired back to the optionally supplied junction box, and then user supplied wire is connected at the junction box back to the control panel. From the junction box, the installer will need to provide the appropriate length of wire back to the Pan Heater Controller. Refer to drawing # UPFG9222111-20A.



WARNING: Make sure ground is hooked up before proceeding to turn on the unit.

Rod Heater Bracket Installation:

Each flat rod heater will need a bracket every 20-24 inches along the rail to support the heater. The flat rod heater must be placed against the bracket spring when the bracket is pounded onto the rail.



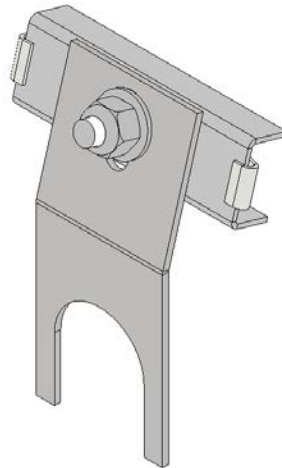
9226-1010 **FLAT HEATER TOOTH BRACKET**



9226-1010 brackets installed along a rail

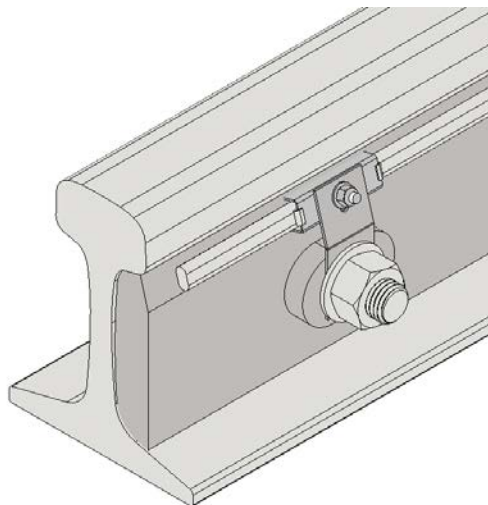
Rod Heater Angle Bracket Installation:

If a flat rod heater is being installed on a switch rail, a rod heater angle bracket should be used.



9226-1017 **ROD HEATER ANGLE BRACKET**

To install, loosen the nut on the bolt far enough to be able to slide the angle bracket on. Slide the bracket on behind the washer and nut. Place the heater rod against the bracket spring and tighten the nut until the heater rod is firmly pressed against the rail.



9226-1017 installed along a rail

Rod Heater Wiring:

The Rod Heaters need to be wired back to the optionally supplied junction box, and then user supplied wire is connected at the junction box back to the control panel. From the junction box, the installer will need to provide the appropriate length of wire back to the 922 Control Panel.

3.6. Fault Indication Light

A 115VAC, 40W fault indicating light (provided by customer) may be connected to 8 and 6 on TB2. Then put a jumper on TB2-5 and TB2-7 together.

3.7. Temperature Sensor

A hole in the bottom of the enclosure has been drilled for the probe of the air temperature sensor. Run the sensor wire up through the hole from underneath. Attach the probe to the enclosure by tightening the nut. Plug the temperature sensor connector into terminal J32 on the control module.

3.8. Optional Snow Detector

Either 1 or 2 sensing heads may be used. Each sensing head has three lead wires: black, white, and green. Connection is as follows:

Green: One, or both, connected to terminal post TB2-9

Black #1: Connected to terminal post TB2-11

Black #2: Connected to terminal post TB2-12

White: One, or both, connected to terminal TB2-10

Refer to the connection diagram 9224-5413 when connecting wires for the sensing heads. It is important to properly connect the sensing head wires. Improper connection of the sensing head wires may result in damage to the control board and/or the sensing heads.

3.9. Optional Rail Temperature Sensor

This is a one hardwire rail temperature sensor that can be connected to the control module. This sensor monitors rail temperature at one location and can be used to switch all outputs' power modes.

4. Control Module

4.1. Description

The 922 control module contains all of the elements and functions necessary for advanced snow melter operation. The unique single-chip microcomputer has been programmed with logic and timing sequences to provide complete heater control as well as operational control and system interface. Some of the many features included in the control module are:

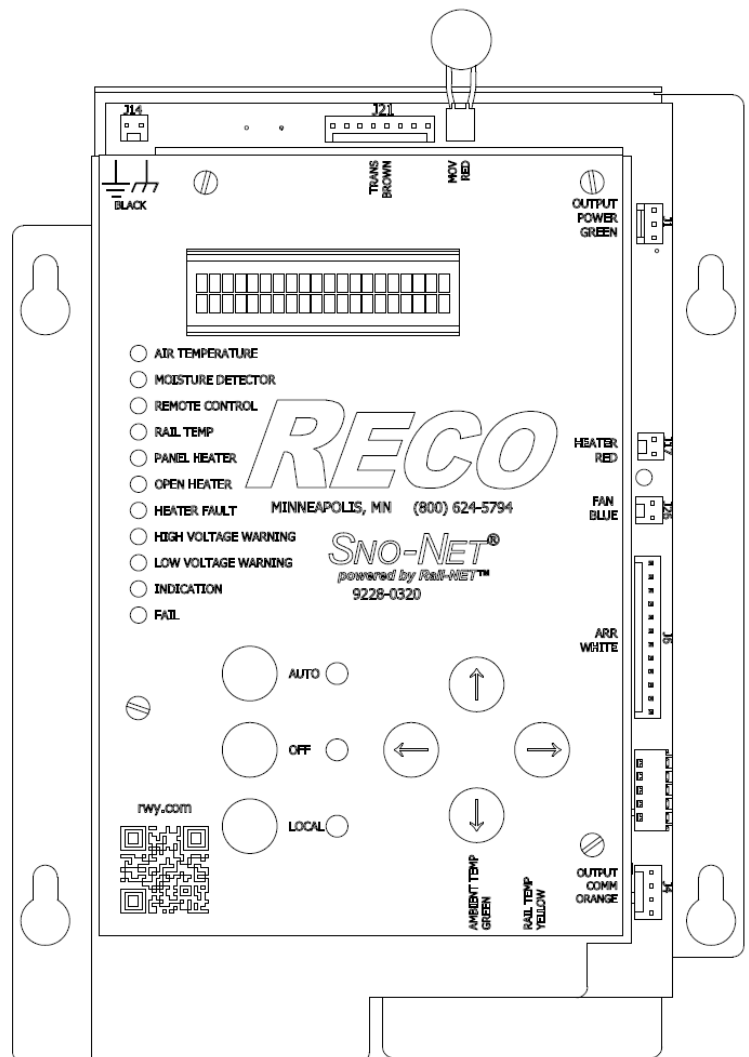
- Auto-Off-Local selector buttons
- Adjustable air temperature setting
- Built-in snow detector (requires optional snow detector head)
- Adjustable run timer for timed or continuous operation
- Adjustable snow detect timer for use with optional snow detector
- Operator control and indication
- Control Module LED Status Indicators:

Inputs:

- Air Temperature
- Moisture Detector
- Remote Control
- Rail Temperature

Outputs:

- Panel Heater
- Open Heater
- Heater Fault
- High Voltage Warning
- Low Voltage Warning
- Indication
- Fail



4.2. Set-Up and Adjustments

To change settings and adjust times, use the following buttons:

Right Arrow Button

Pushing the right arrow button will cycle forward through the menus. Each time you press the right arrow button, you will advance one menu selection.

Left Arrow Button

Pushing the left arrow button will cycle back through the menus. Each time you press the left arrow button, you will move back one menu selection.

Up Arrow Button

The up arrow button allows you to increase the values and switch through the menu categories.

NOTE: Values will be saved.

Down Arrow Button

The down arrow button allows you to decrease the values and switch through the menu categories.

NOTE: Values will be saved.

NOTE: When you do not touch any of the buttons for 15 seconds, you will see the following screen. This screen just lets you know that your current settings and values are being saved.



4.3. Password 0 and 5 Menus

NOTE: The following items listed below are for password 5 only. Password 0 has a similar set of categories, but it does not have all the items in each one. It will be denoted which ones you can only see with password 5.

4.3.1. Master

a. Default Screen

This screen will go into screen saver mode when the user controls have been idling for 60 minutes and the screen will go blank. To wake the screen up, simply press one of the four arrow buttons. Once the screen is awake, the screen will always display the current air temperature on the top line (if a sensor is installed). On the bottom line, it will display the preset value (temperature setpoint).

b. Fault Test All Outputs

This screen will allow you to initiate the heater fault test to all active outputs. To begin the test, push the up button. The test will continue to run until all the outputs have been tested (the 922 needs to either be switch to LOCAL or AUTO to access this).

c. Faults

If there currently is a fault, the screens will display which fault is occurring. If more than one fault is happening, the screen will scroll through them. To clear this, push the OFF button. You may also flip the main circuit breaker off, wait 30 seconds, and then back on to clear faults.

4.3.2. Output

NOTE: Each enabled output will have the next 7 menus. There can be up to 12 outputs enabled. Each output has three separate circuits. Each circuit consists of a power contactor with a 60 amp circuit breaker. The outputs are listed as Pan Heater, Rail 1, and Rail 2. The three outputs help in determining faults and open heaters. If a heater fault occurs, only the individual output (circuit breaker) with the fault will be locked out, the other ones will remain on. During an open heater fault, all outputs remain on.

a. Current

This shows the current that is being drawn by the output you have selected.

b. Auto Heater Setup

The auto heater measures the current of each breaker of the output and then saves the value to memory. When the outputs are running it compares the running current to the value in memory if the current is less than the value in memory it will trigger an open heater fault.

To initiate the auto heater setup for this individual output, make sure the mode is either Local or Auto, and then press the up arrow button. The test will take 30 seconds and check each of the heaters corresponding to the individual output. The contactor LED will light up on the output module and then turn off. It will display their currents on the screen.

c. Voltage

(Password 5)

This screen displays the voltage at the output and the power currently being consumed by the output in watts.

d. Diff I / Fault Set

Diff I is the difference between the current being drawn and the total current.

The fault current set is the amount of ground fault current that is leaking to ground from the heaters. The fault set current default is 30mA. If the fault current is above the set point for longer than the Differential Current Fault Timer it will lock out the individual circuit of the output that has the fault and a fault message will appear on the Master screen. The range is from 10mA to 500mA.

e. Fault Test

If the module or the output you wish to test is in a heater fault, you may not start the test and you cannot see the associate screens for the test. Press the Off button to clear the fault(s) or flip the main breaker on and off.

To initiate a fault test for this individual output, make sure that it is either in Local or Auto and press the up arrow button. The test is to check that the output can detect a leakage to ground.

After the test is completed, the output will have either passed or failed:

- PASS
 - For the test to pass, the outputs must see at least
 - 230mA +/- 35mA for 480V
 - 100mA +/- 35mA for 230V
 - You will see “Pass” on the display

- FAIL
 - The test will fail if it does not see at least 50mA of leakage current.
 - You will see “Fail” on the display

If failed, it will be in a state that will not allow it to run. To fix this, you need to clear the fault by first going to the OUTPUT menu, find which output(s) has a fault, find CLEAR FAULT, and then press the up arrow button. Or click the OFF button. All the lights that were on will then turn off.

NOTE: It is recommended to run the Fault Test for the output(s) every month.

f. Clear Faults

This screen will only show if there is a fault for the output you are on. Press the up button to clear all faults for this output.

g. Program Revision / Power Up Counter

(Password 5)

Shows the current program revision level and the date it was compiled.

Power up counter is the total number of times the output has turned on. This value is resettable by clicking either the up or down button.

h. Output Enabled / Disabled

NOTE: Enable is the default
(Password 5)

Options are output enabled or output disabled. To enable or disable, click either the up or down arrow button. Use this to disable any active output you do not wish to run or have any faults/indication for this output to be shown on the control module.

4.3.3. Fault History

NOTE: Some faults may not show up in the fault history until there is an actual fault. To reset the counters, press either the up or down arrow button.

a. Day Counter and Power Up Counter Master

The Day Counter is the number of days the unit has been powered up.

The Power up Counter is the total number of times the control module has been turned on.

b. Output 1-12 Open Heater Fault Counter

Output open heater fault counter increments every time the output senses an open heater fault.

c. Phase 3 Line Voltage Fault Counter

The total number of times the line voltage on phase 3 has been too high or too low.

d. Phase 2 Line Voltage Fault Counter

The total number of times the line voltage on phase 2 has been too high or too low.

e. Phase 1 Line Voltage Fault Counter

The total number of times the line voltage on phase 1 has been too high or too low.

4.3.4. Setpoints

NOTE: To change any of the setpoints, use the up or down arrow buttons.

a. Password

The default password is 0. Basic setpoints can be changed using 0; critical setpoints require 5 to be entered.

b. Number of Outputs

(Password 5)

This screen is used to tell the 922 control module how many outputs are connected to it. The range is from 1 to 12.

c. Select Temperature Setpoint

The ambient temperature below which the 922 unit will energize is set on this screen. When the outside temperature is below this setpoint, the 922 will be allowed to operate if requested. The factory default is 38°F. The range is from 10°F to 99°F.

d. Select Temperature for Pan Heater

This setting is used to enable the first breaker of each output to run pan heaters constantly when the air temp is below the set point. The pan heater mode can also be disabled by setting the temperature below the temperature set point. When the pan heater mode is disabled the first breaker on each output will only turn on if the unit is being called for.

e. Cabinet Temp

(Password 5)

This setting is used to set the temperature inside the 922 cabinet. When the inside temperature is below this setpoint, the 922 will be allowed to operate the heater inside the unit. The factory default is 60°F. The range is from 0°F to 99°F.

f. Differential Current Fault Set

(Password 5)

The fault current set is the amount of ground fault current that is leaking to ground from the heaters. The fault set current default is 30mA. If the fault current is above the set point for longer than the Differential Current Fault Timer it will lock out the individual circuit of the output that has the fault. The range is from 10mA to 500mA.

g. Differential Current Fault Timer

(Password 5)

This setting is used for setting the amount of time to pass before a fault will be trigger. The fault timer default is 100mSec. The range is from 100mSec to 1000mSec.

h. Select Run Timer Value

The run timer can be set from 0 to 1000 minutes. If 0 is selected, the 922 outputs will operate continuously, until control on is disabled. If another value is selected, the unit will run until the run timer counts down to zero, after which the unit will shut down and drop indication. The factory default setpoint is 60 minutes.

i. Select Snow Timer Value

The snow timer can be set from 10 to 1000 minutes. The snow time starts counting down when the moisture detector no longer detects snow. The factory default setpoint is 60 minutes.

j. Select Snow Sensor Speed

Snow sense speed sets the delay time after the moisture detector sees moisture and starts the snow cycle. The delay time can be set from 1 to 60 seconds. The moisture sensor must see moisture for the entire time to start a cycle.

k. Select Snow Sensor Indication

(Password 5)

The choices are OFF or ON. With snow indication OFF, the indication will remain off during snow time if no faults are present. With snow indication on, the indication will remain on during snow time if no faults are present. The default value is OFF.

l. Select Fault Indication

(Password 5)

The choices are OFF or ON. With fault indication OFF, the indication will remain off if faults are present. With fault indication ON, the indication will remain on if faults are present.

m. Wave Mode

(Password 5)

There are four different modes that output module can be in:

- **Full** - The entire sine wave will be sent to power the heaters. This will allow the heaters to operate at full power.

NOTE: This is the default wave mode.

- **Half** - The power is distributed between the outputs to balance the load and provide half power to the heaters. This will save energy when the heaters do not need to operate at full power.

- **Full Airtemp** – The output module(s) will run in half wave mode when the ambient air temperature is below the air temperature setpoint. The output module(s) will switch to full wave mode once the unit is called for.

- **Auto** - The control module will determine what mode the outputs should be in. To change operation mode, use either the up or down arrow buttons.

n. Rail Temp

(Password 5)

The rail temperature setpoint is selected on this screen. When the rail temperature is above this setpoint, the 922 will be allowed to operate in half power mode. The factory default is 60°F. The range is from 0°F to 280°F.

o. Unit Type

(Password 5)

Used to set the type of unit you have. The choices are:

- 1PH 230V
- 1PH 460V
- 3PH 230V
- 3PH 230V DELTA
- 3PH 460V
- 3PH 460V DELTA

NOTE: Selecting wrong unit type will result in the Low Voltage Warning LED to turn on.

p. Local With Air Temperature

(Password 5)

If this is set to “without air temperature”, then the local run cycle will start by simply pushing the “local” button. However, if it is set to “with air temperature”, the local button must be pushed, as well as the air temperature below the setpoint for the local run cycle to begin.

q. Remote With Air Temperature

(Password 5)

If this is set to “without air temperature”, then the cycle will run by simply turning on the remote. However, if it is set to “with air temperature”, then the remote has to be turn on and the air temperature has to be below the setpoint to run the cycle.

r. Select F or C

(Password 5)

Will change the temperature scale to Fahrenheit or Celsius, the default is Fahrenheit.

s. Machine S/N

(Password 5)

Machine serial number is the serial number of the 922 unit.

t. Program Rev

(Password 5)

Shows the current program revision and date it was compiled on.

4.3.5. Factory Defaults

Factory default is used to place all parameters back to factory default settings. To restore to factory default, select FACTORY DEFAULTS in the menu selection. Press the right arrow button to display “FOR FACTORY DEFAULTS PRESS DOWN BUTTON”, and then press the down arrow button to restore factory defaults.

4.4. Push Buttons and LED Status Indication Lights

4.4.1. Push Buttons

The three push buttons that control the operation mode for the 922 unit are described below:

a. AUTO

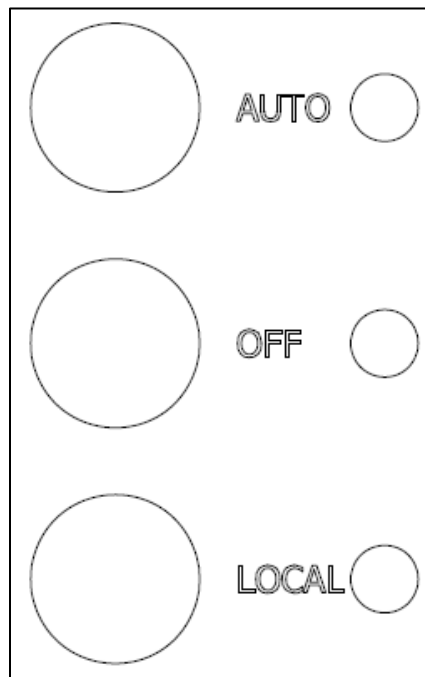
This will allow operation by placing a circuit closure across terminal posts 1 and 2. It will also allow operation by an optional snow detector. Both of these modes require the use of an air temperature sensor (and the air temperature to be below the setpoint). Another way the 922 can run is through the use of the internet. A message can be sent to the 922 instructing it to run for a given amount of time.

b. OFF

If the off button is pushed, the 922 cannot be run from remote control, snow detect, or the internet. Also, if the off button is pushed, it will turn off all outputs and clear all faults.

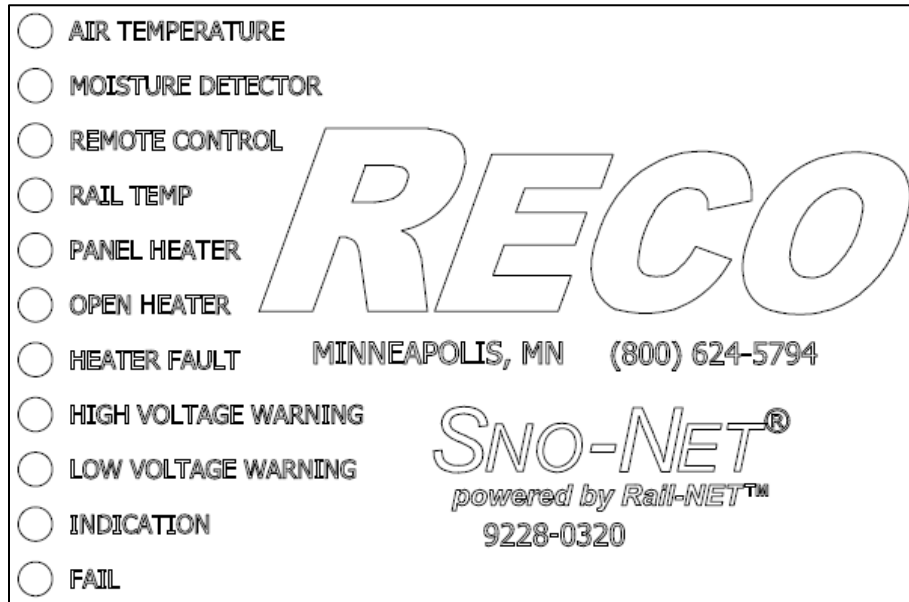
c. LOCAL

If the local button is pushed, it will activate the outputs regardless of control, or moisture. Local with air temperature is used to decide if the local switch is controlled by the ambient air temperature or not. The outputs will remain on until local is turned off.



4.4.2. LED Status Indication Lights

The LEDs on the front of the control module indicate what state the inputs, and outputs are in. Refer to **5.3 LED Status Indication Lights** in section **5. Output Module** for more information about the different status lights.



a. Air Temperature

Turns on when the ambient air temperature is below the setpoint.

b. Moisture Detector

Turns on when the optional snow detector sensing head(s) senses moisture.

c. Remote Control

Turns on when there is a circuit closure across terminal posts TB2-1 and TB2-2.

d. Rail Temp

Turns on when the rail temperature is above the setpoint.

e. Panel Heater

Turns on when the panel heater is activated.

f. Open Heater

Turns on when the heaters are not drawing enough current.

g. Heater Fault

Turns on when there is a fault for a heater.

h. High Voltage Warning

Turns on when the voltage is higher than the maximum voltage that is set.

i. Low Voltage Warning

Turns on when the voltage is lower than the minimum voltage that is set.

j. Indication

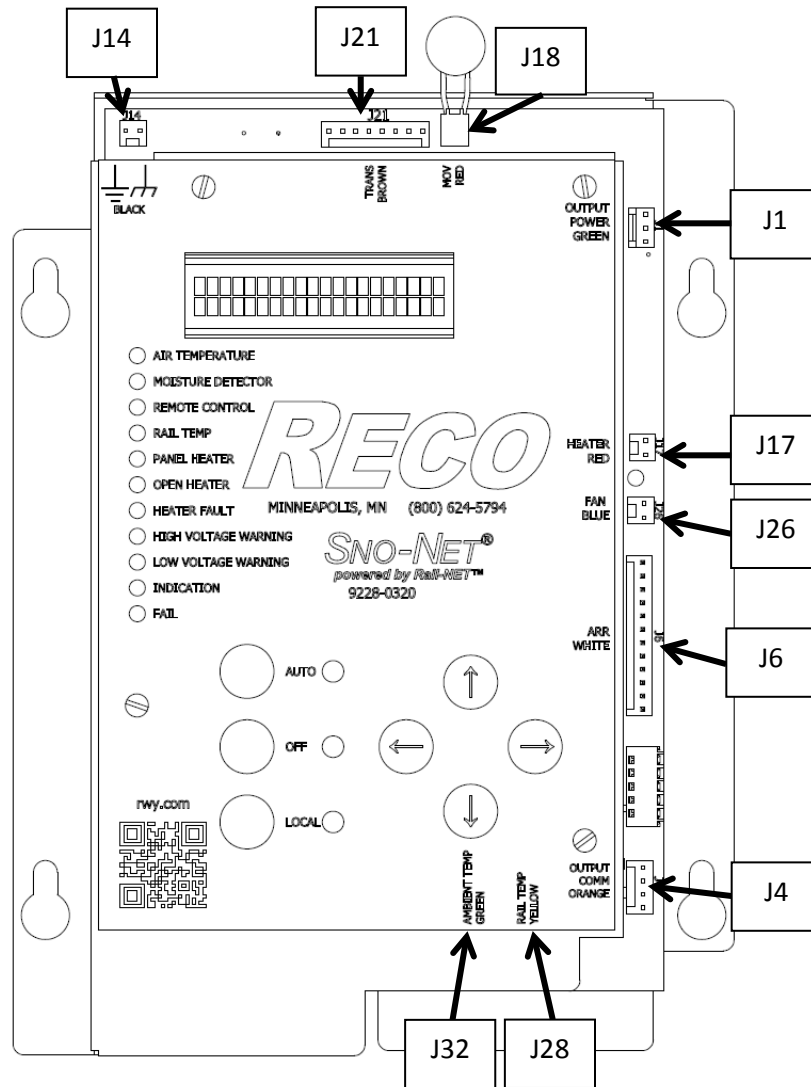
This LED may be on if one of the three buttons are pressed that are associated with either AUTO, OFF, LOCAL. It will be on if the 922 is running due to remote control (or snow detect if snow indication is turned on). If the unit is running in LOCAL, and a contact is closed between TB2-1 and TB2-2, it will be on. It will also be on if the 922 is in fault and remote control is off. When turned on, a dry contact will close between TB2-3 and TB2-4.

k. Fail

This LED is on whenever a fault is present on the control module or any output module. When on a dry contact will close between TB2-7 and TB2-8.

4.5. Master Connections

The control module has a variety of connections; some are necessary for operation, and some are optional for additional features. Here are all the different connections you could have, starting in the upper left-hand corner:



- a. **Earth Ground (J14)**
Required for use of earth ground by the 922.
- b. **Control Module Transformer (J21)**
Required for incoming power to the control module and output modules.
- c. **Mov (J18)**
- d. **Output Power (J1)**
Required for the outputs to have power coming from the control module.

- e. **Heater (J17)**
Power output (230VAC) for panel heater.
- f. **Fan (J26)**
Power output (230VAC) for panel heater fan.
- g. **A.R.R Post (J6)**
Required for the use of the A.R.R posts.
- h. **Output Comm (J4)**
This is for communication between the control module and the outputs.
- i. **Rail Temperature (J28)**
Optional (highly recommended) for the output modules to be able to automatically set half-wave or full-wave operation.
- j. **Ambient Air Temperature (J32)**
Required for the control module to run by remote control, or snow detect.
- k. **Additional connections if you have the optional communication board installed**
 - **Comm. Board (J19)**
This is an optional communication device. It is connected to the 24 pin connector on the backside of the control module.
 - **WIFI 12VDC**
Power supply for optional cell modem.
 - **Ethernet Port**
Optional connection for communication over the internet.
 - **Rail Temperature**
Optional connection to monitor rail temperature.
 - **Snow Detector**
Optional connection to monitor snow detection.
 - **SD Card Reader**
Optional card reader if you have an SD card to use.

4.6. Operation

When the AUTO button is pushed, the unit can be activated in three different ways.

NOTE: Any of these cycles can be stopped immediately by pushing the OFF button.

a. Run Cycle

- To Start
 - Introduce a circuit closure between TB2-1 and TB2-2
 - AND the ambient air temperature is below the setpoint

- To End
 - Remove the circuit closure between TB2-1 and TB2-2
 - OR the ambient air temperature rises above the setpoint
 - OR the run timer elapses (only if it set to a non-zero value)
 - If the run timer elapses, you **MUST** remove the circuit closure across TB2-1 and TB2-2 to begin the run sequence again

b. Snow Cycle (Optional snow detect head must be installed)

- To Start
 - The snow detector head senses moisture
 - AND the ambient air temperature is below the setpoint

- To End
 - The snow timer elapses
 - Only begins counting when it does not detect moisture or the air temperature is above the setpoint

c. NET Cycle (Optional internet connection must be established)

- To Start
 - The website sends a message to the 922, instructing it to turn on for a period of time

- To End
 - The net timer elapses

If the LOCAL button is pushed, the 922 will run until a different push-button is pushed, either OFF or AUTO.

Regardless of what cycle is being run, they all perform the same actions:

- The first output turns on immediately after the cycle has begun.
- The rest of the outputs will delay turning on, dependent on the delay time setting.
- Output modules always begin their cycles in full power mode.
- After 30 seconds, if no faults have occurred, the output module will enter its normal running mode, dependent on the setting chosen for the Wave Mode.

NOTE: The wave mode is an optional feature; the default is set to FULL.

4.6.1. Wave Mode Operation

- If **HALF POWER** is chosen, all the output modules will continue their entire run mode in half power. The outputs will turn on for a half of a second and then off for a half of a second.

NOTE: Half power is an optional wave mode function for the 922 unit.

- If **FULL POWER** is chosen, all the output modules will continue their entire run mode in full power.
- If **AUTO** is chosen, the rail temperature will determine if the output modules should run in half or full power. If no rail temperature sensor is installed, the air temperature sensor (and the rail temperature setpoint) is used to determine should the output should run.
- If **FULL AIRTEMP** is chosen, all the output module(s) will run in half power when the ambient air temperature is below the air temperature setpoint. The output module(s) will switch to full power once the unit is called for.

Some faults can cause the 922 output modules to halt their operation cycles. For a list of these faults and their effects on operation, see the next section (**4.7 Fault Conditions**).

When the cycle ends (regardless of what cycle it is, or how it ends), all outputs will turn off immediately.

4.7. Fault Conditions

If there are any faults active, the LED labeled “Fail”, on the control module, will be light up. The dry contact between TB2-7 and TB2-8 will also close. Faults will be displayed on the default screen, if there is more than one fault they will all scroll through on the default screen. All faults can be cleared by resetting the output module that is in fault.

4.7.1. Master Faults

These relate to faults occurring on the 922 control module:

a. Fuse #1 24VDC

24VDC fuse open indicates that fuse F1 is open.

- This could be caused by the remote control circuit. Check all connections to TB2-2.

b. Fuse #3 230VAC

Fuse #3 is open. This fuse controls the 230VAC that goes to the outputs. Check the interconnect wire between the control module and output 1. Check the interconnect wires between each output. Check the wiring to the panel heater, as well as the wiring to the fan. If all wiring is correct, check to make sure all of the components work. This is not a resettable fuse. It must be replaced if open.

c. Fuse #4 230VAC

Fuse #4 is open. Follow the same method, to fix the problem, as for Fuse #3.

d. Fuse #6 Snow Head #1

Fuse #6 is tripped. This fuse controls Snow Head #1. Check the wiring to that Snow Head. If the wiring is correct, the fuse should reset itself after a 1 minute power down.

e. Fuse #7 Snow Head #2

Fuse #7 is tripped. This fuse controls Snow Head #2. Check the wiring to that Snow Head. If the wiring is correct, the fuse should reset itself after a 1 minute power down.

f. Line Voltage High (or Low) Phase 1 (2 or 3)

This indicates that the voltage, on the indicated phase(s), is too high (or too low). A low voltage fault will cause the outputs to turn off. Contact your energy supplier to alleviate the problem.

4.7.2. Output Faults

These relate to faults occurring in the output module(s):

a. Open Heater Fault

This fault will only be checked while the output is running in full wave mode. This will tell you which breaker on an output is drawing less current than when the Auto Heater Setup was run. Refer to 4.3.2.b for running the Auto Heater Setup. Refer to the image below on an example of an open heater fault for an output that will be displayed on the Master Screen.



This fault message means that there is an Open Heater Fault coming from Output 1 on the “Pan Heater” and “Rail 1” circuit.

b. Heater Fault

This indicates there is a leakage current to ground (ground fault). This fault will turn off the power to the breaker on the output that has detected leakage current to ground and lock it into a fault state. It needs to see a fault current for a period of time greater than the Differential Current Fault Timer for the fault to come on. To clear this fault, press the OFF button. Refer to the image below on an example of a heater fault for an output that will be displayed on the Master Screen.



This fault message means that there is a Heater Fault coming from Output 1 on the “Rail 2” circuit.

c. Heater Test Failed

This fault occurs when the heater fault test fails due to a lack of simulated leakage current. Check to see if the test resistor is properly connected to the output board. This heater fault will cause the output to stay in the fault test mode. To clear this, navigate to the CLEAR FAULT under the OUTPUT menu, select the output that has a fault, and then press up. Or push the OFF button.

d. Comm. Loss Fault

This indicates that the output shown is failing to communicate to the control module.

- The interconnect between the master and output 1 may not be connected properly
- Interconnects between the individual outputs may not be connected properly
- The output board may be damaged and need to be replaced

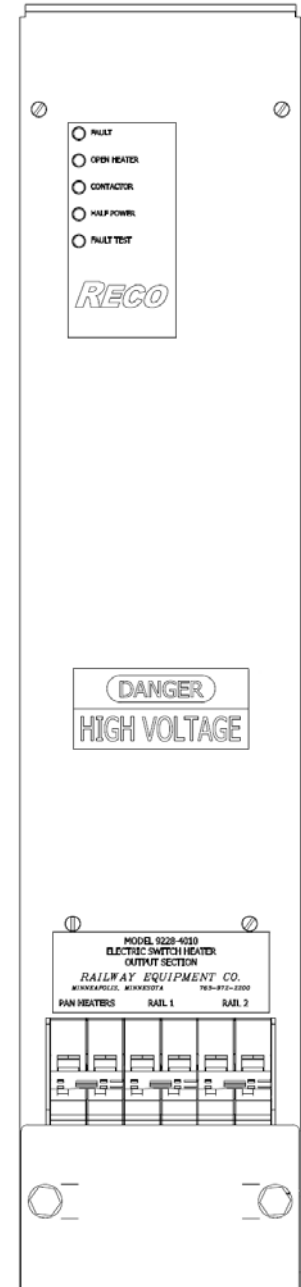
5. Output Module

5.1. Description

The 922 output module contains all of the functions necessary to control rail heaters. Some of the features of the output module are:

- Power contactor control
- Communications with control modules
- Output voltage and current, measuring
- Heater fault detection
- Rail temperature sensor (optional)
- Output Module LED Status Indicators:

- Fault
- Open Heater
- Contactor
- Half Power
- Fault Test



5.2. Set-Up and Adjustments

Refer to **4.2 Set-Up and Adjustment** in section **4. Control Module**.

5.3. LED Status Indication Lights

The following status lights exist on the output module depict what state the output module is in. Refer to **4.4. LED Status Indication Lights** in section **4. Control Module** for more information about the status lights.

a. Fault

This LED can indicate the output module is in one of three different states:

- **OFF** – Indicates that the output module is currently not experiencing any fault associated with leakage current.
- **ON** – Indicates that the output module is in fault due to a large leakage current.
 - Because a heater fault test has “passed”
 - Because a fault is occurring
- **BLINKING** – Indicates that a fault test has been initiated, and the output module has failed to see a large enough leakage current (see **4.7 Fault Conditions** for more information).

b. Open Heater

Turns on when the heater(s), on this output, are not drawing enough current (refer to **4.7 Fault Conditions** for more information).

c. Contactor

When the power contactor is closed, allowing current to flow to the heater(s), this LED is turned on.

d. Half Power

This LED indicates that the output is in half power mode when it is blinking.

e. Fault Test

This LED indicates that a heater fault test has been initiated.

5.4. Output Circuit Board Connections

a. Output Location (J6)

This is required for the control module to be able to communicate with this output module. These are numbered plugs that give the output module a unique identification. The output modules must be incrementally numbered, starting at 1 for the leftmost module (the one connected directly to the control module). No number may be used more than once, no number may be skipped.

b. Incoming Power and Communication (J6 & J11)

J6 is required for the incoming powering, while J11 RS485 is required for communicating with this output as well as any outputs further down the line.

c. Outgoing Power and Communications (J7 & J12)

J7 is required for the outgoing power to further output modules. J12 RS485 is required for outgoing communication.

d. Output Control and Sense (J2 & J8)

This connector interfaces the output board to the contactor, leak test resistor, and voltage sense lines. It is required for output operation and feedback.

e. Current Coils (J5)

This is required for monitoring for leakage current and open heater faults.

f. Rail Temperature Thermocouple (J13)

NOTE: This is optional

The rail temperature thermocouple can be placed on the control module (controlling all output modules from a single sensor), or on output modules (allowing each output module to use its own rail temperature sensor).

5.5. Operation

The output module operates dependent on instructions passed onto it by the control module. For detailed instructions on how to run the outputs, see **4.6 Operation** in section **4. Control Module**. There are no user-serviceable parts on the output module.

When an output module is instructed (by the control module) to turn on, it will always follow these steps:

- The output controller will turn on in full power mode to test for shorted heaters.
- The output will switch to half power mode to test for correct operation.
- After 30 seconds, the output will follow instructions (from the control module) as to which power mode to go in or be allowed to be controlled by the rail temp sensor.
- This run cycle will end depending on the control module settings.
- Any of these steps can be halted if the output module finds itself in specific fault situations (see section **4.7 Fault Conditions** for more information).

6. Troubleshooting

Before looking through this section make sure no faults exist and if any do, first refer to **4.7 Fault Conditions**. After going through this section and you cannot fix the problem, please call Railway Equipment Co. to resolve the problem.

6.1. Heater are not on when they should be

Many different causes could account for this problem, choose the symptoms that best describes the problem.

a. The LEDs on my output module DO turn on, but the heaters are not running

Make sure the wiring is correct from the output to its peripherals (leak test resistor, voltage sensor, and contactor coil). Check to see that the output circuit breaker is not tripped.

b. The LEDs on my output module DO NOT turn on

- Check to make sure proper run conditions are satisfied (see **4.5 Operation** in section **4. Output Module**)
- Check all wiring to the output
 - Interconnect wiring from the control module to output module 1 (or 7)
 - Check all output module to output module interconnect wiring in front of this output module
 - Check that the output location plug is correct
- Check to make sure the control module can communicate with the output module in question
 - Push the “off” button
 - Reset the breaker
 - Make sure you have set up the control module to communicate with the correct number of outputs on the display. Look for how many outputs you have selected in the SETPOINT’s menu.
 - Make sure the output module has not been disabled by looking under the OUTPUT menu and seeing it is enabled / disabled.

6.2. Control Module Does NOT Turn On

- a.** Check the circuit breaker, and line power going into it
- b.** Check the fuses feeding power to the control module
- c.** Check the wiring into the control transformer
- d.** Check the voltages coming out of the control transfer (T1)
- e.** Make sure the connector is properly plugged into J21
- f.** If all wiring is correct, replace the control module

7. Specifications

Input: 230VAC or 460VAC, 1 or 3 phase, 60Hz

Heater Fault to Ground Range: Minimum 20mA (user settable)

Open Heater Range: Minimum 5A loss on any output (user settable)

Indication: 115VAC (2A max) signal on TB2-3 and TB2-6, or
24 VDC (2A max) signal on TB2-4 and TB2-9, or
Dry Contact (2A @ 28VDC or 2A @ 230VAC) on TB2-3 and TB2-4

Air Temperature Setpoint Range: 0°F to 100°F. Normally set at 38°F.

Rail Temperature Setpoint Range: 0°F to 280°F. Normally set at 120°F.

Output Capacity: 36KW per switch

8. Drawings

ELECTRIC HEATER CONTROL	UPFG9222111-20B
922 SCHEMATIC/CONNECTION	R9224-5413
ELECTRIC SWITCH HEATER CONTROL 480V 3 PH	922-43N0412-221A
ELECTRIC HEATER CONTROL 240V 1PH 1 OUTPUT	922-21C0112-110A
ELECTRIC HEATER CONTROL 480V 1PH 2 OUTPUT	922-41C0212-110A
922 CONTROL MODULE	9228-0320
ASSY, OUTPUT SECTION NO HALF POWER	9228-4010
ASSY, OUTPUT SECTION WITH HALF POWER	9228-4009
922 MENU FLOW CHART	



9. Limited Warranty

LIMITED WARRANTY

Railway Equipment Co., Inc. (“Railway”) warrants all of its products to be free from defects in material and workmanship when used under specified operating conditions and within specified limits. Railway’s warranty shall extend for a period of two (2) years from the date of shipment to the original purchaser.

This warranty is expressly in lieu of and excludes all other expressed or implied warranties, including but not limited to warranties of merchantability and fitness for a particular purpose.

Railway, its agents, or representatives shall in no circumstance be liable for any direct, indirect, special, penal, or consequential loss or damage of any nature resulting from the malfunction of the product.

Remedies under this warranty are expressly limited to repair or replacement of the product at the sole discretion of Railway.

Before returning any defective product to Railway, contact the factory at the address or telephone number at the bottom of this article for a Return Merchandise Authorization number and instructions as to how and where the return is to be shipped. Materials received without this authorization will be returned at the customer’s expense.

Products returned to Railway under warranty must be shipped freight prepaid, and return freight charges for repaired or replaced products, in or out of warranty, will be at customer’s expense.

Railway reserves the right to reject any warranty claim on a product that has been altered by the user or damaged in shipping due to inadequate packaging or mishandling by freight carrier.

By returning a product to Railway the owner grants permission to Railway to open and disassemble the product as required for evaluation. Railway has the sole responsibility for determining the cause and nature of failure, and Railway’s determination with regard thereto shall be final. Railway reserves the right to repair or replace any unit at its sole discretion.

A returned product that is found, upon inspection by Railway, to be operational within specification is subject to an inspection and testing fee, regardless of its warranty period.

Railway’s liability on any claim of any kind (including negligence) for any loss or damage arising out of or resulting from this agreement, or from the performance of breach thereof, of from the products or services furnished hereunder, shall in no case exceed the price of the specific product or service which gives rise to the claim. All such liability shall terminate upon the expiration of the warranty period of two (2) years, as hereinabove stated.

The furnishing of advice or other assistance without separate compensation therefor will not subject Railway to any liability, either in contract, warranty, tort (including negligence) or otherwise.

Any alteration or modification of the product, or addition on non-Railway components to the product, unless expressly permitted by Railway in its documentation, will void warranty coverage.

This warranty is non-transferable, and warranty coverage is limited to initial user only.

Installation and/or use of the product shall demonstrate acceptance of the terms of this warranty.

Each of the foregoing paragraphs in this article will apply to the full extent permitted by law. The invalidity, in whole or part, of any paragraph will not affect the remainder of such paragraph or any other paragraph.

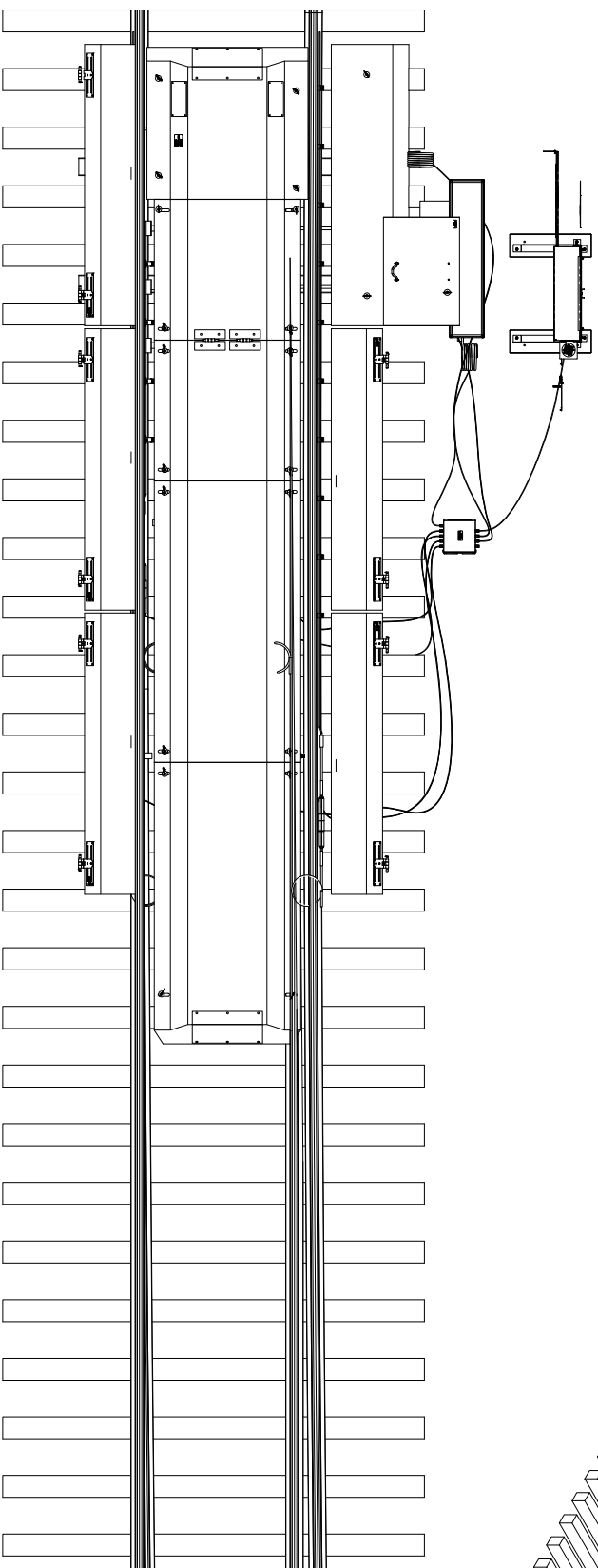
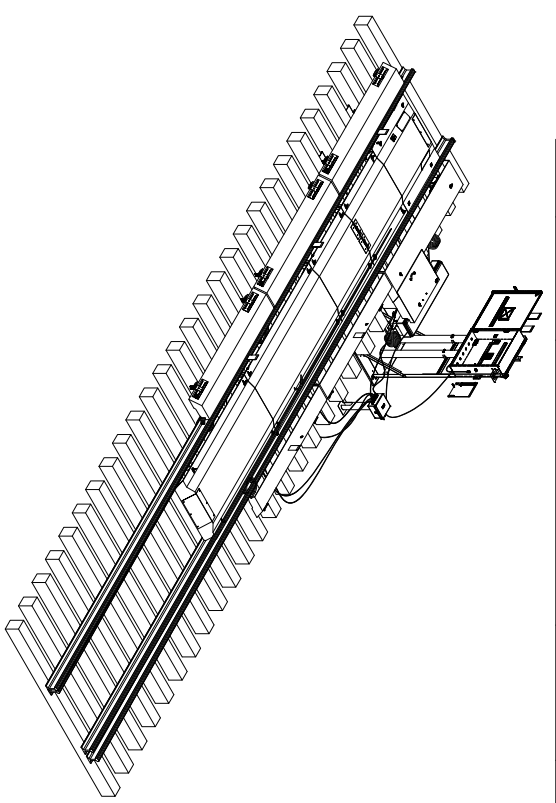
RAILWAY EQUIPMENT CO.

Minneapolis, Minnesota 55328 – USA – Tel. (763) 972-2200 Fax (763) 972-2900

E-Mail - mail@rwy.com

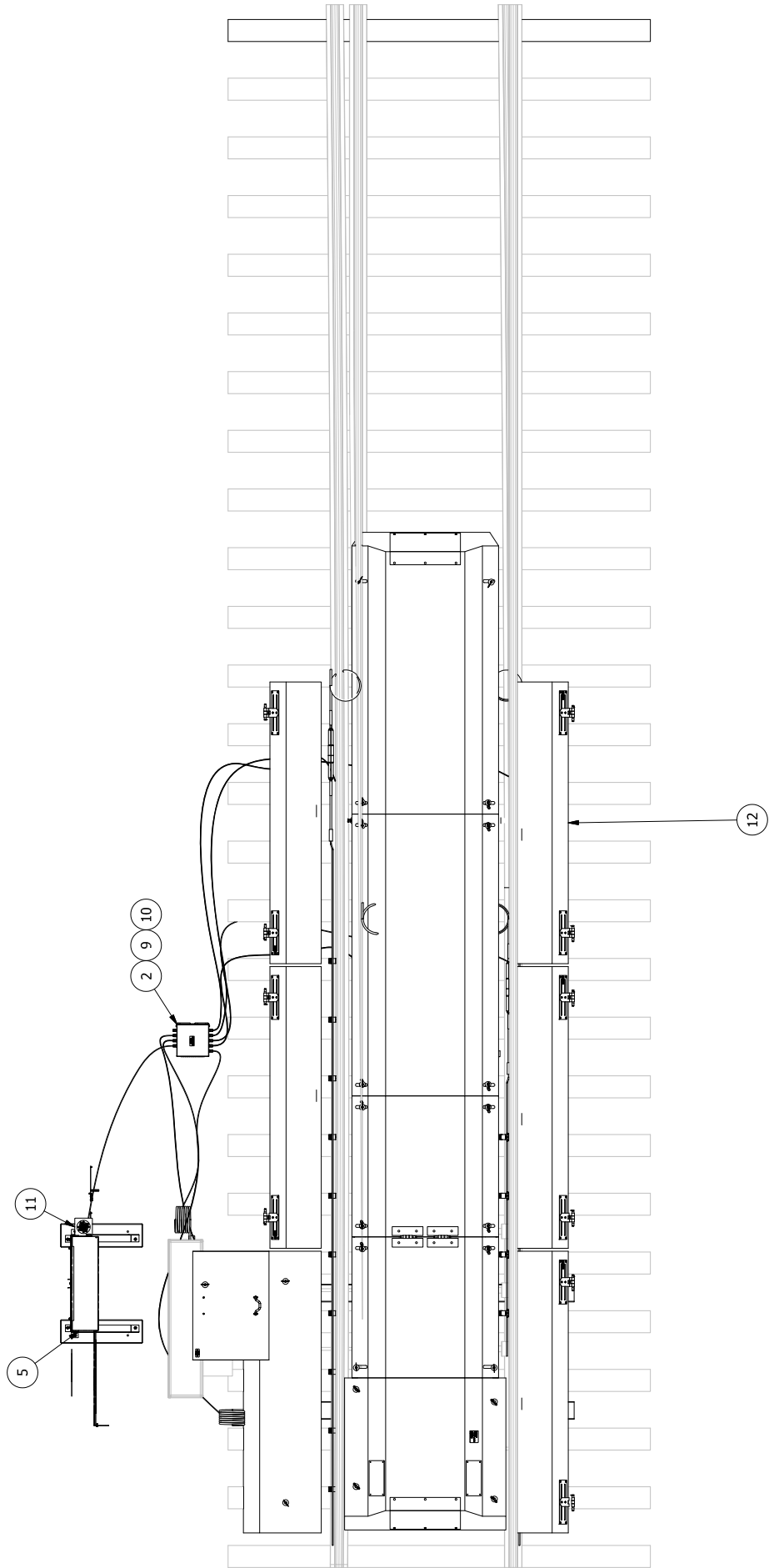
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1	60205	-	300	FT	HOSE, 3/4IN
2	8039-0806A	A	1	EA	LABEL, HIGH VOLTAGE
3	9148-0380A	A	1	EA	PAN HEATER, 3.5' 600W 240V 50' CABLE
4	9148-0880A	A	2	EA	PAN HEATER, 8.5' 1600W 240V 50' CABLE
5	922-210102-111A	A	1	EA	ELECTRIC HEATER CONTROL, 240 VAC, 1PH, 1 OUTPUT, NO 1/2 WAVE, W/ FOUNDATION
6	9225-2264A	A	2	EA	HEATER, 240V 2,100W 8' FLAT SINGLE ENDED WITH CONNECTORS, RODS ONLY
7	9225-2298A	A	2	EA	HEATER, 240V 5,700W 20' FLAT SINGLE ENDED WITH CONNECTORS, RODS ONLY
8	9226-1010B	B	28	EA	ASSY, FLAT HEATER TOOTH BRACKET, #136 ADJUSTABLE
9	9226-1065C	C	1	EA	JUNCTION BOX, 10.5L X 10.5W X 6.00D, SS, 24 TERM POST
10	922670A	A	1	EA	BASE, FABRICATED JUNCTION BOX
11	9258-0020F	F	1	EA	SNOW DETECTOR HEAD
12	9279-9021E	E	1	EA	TRACK SWITCH COVER 20FT FG W/ RACK

REVISION HISTORY				
REV	ECO #	DESCRIPTION	DATE	BY
A	-	NEW PART	3/30/2020	CA
B	-	UPDATED 922	5/6/2021	CA

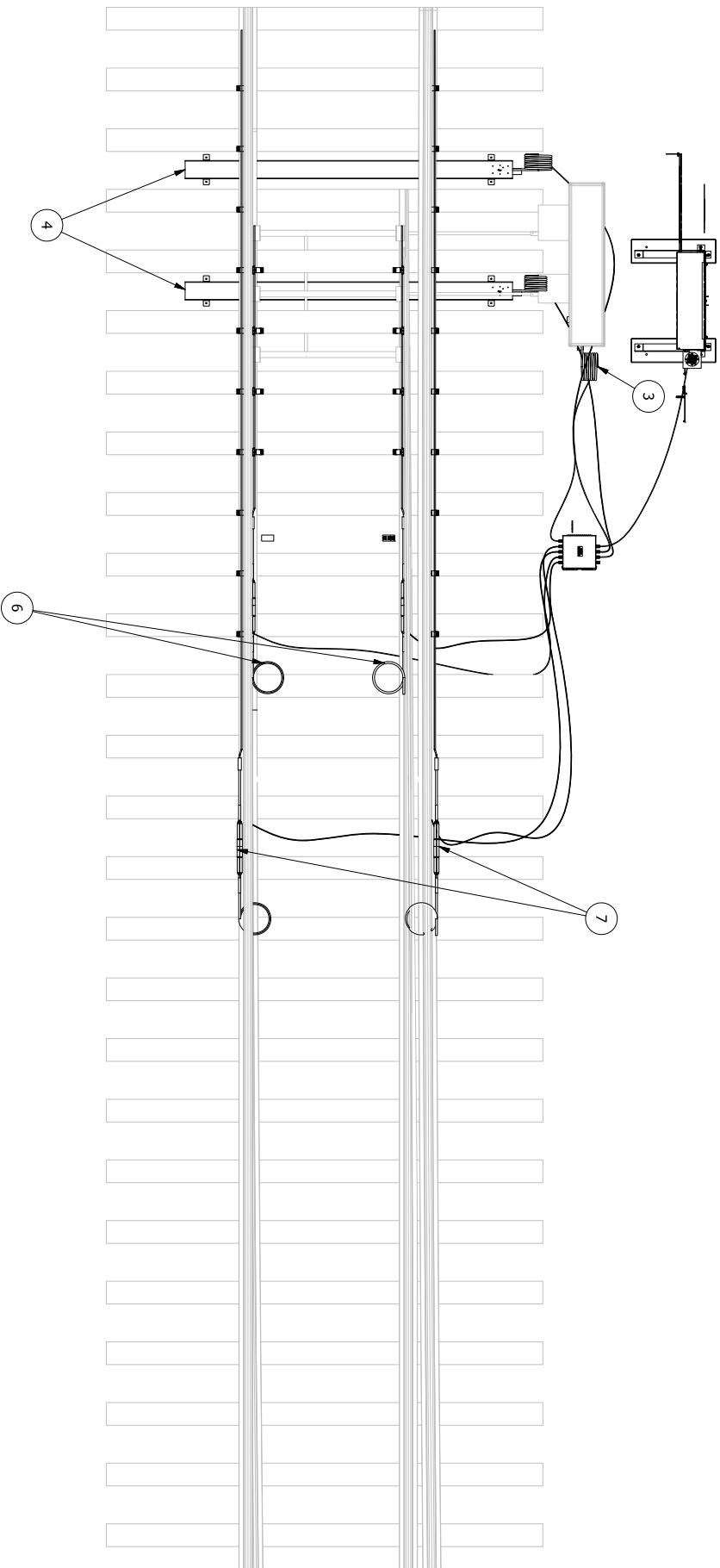


UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN INCHES
 DECIMALS ANGULAR
 X.X .001 FRACTIONS
 .XX .0001 SCALE DRAWINGS
 LAST UPDATE 5/6/2021
 TR cwarderson
 DWG NO: UPEG922111-208
 REV: B
 SHEET 1 OF 4

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RAILWAY EQUIPMENT CO.
 MINNEAPOLIS, MINNESOTA (763) 972-2200
 ELECTRIC HEATER CONTROL, 240V, #10/11/12
 SWITCH, 300W/FT ELECTRIC CONTROLLER,
 BLADES, FIBERGLASS COVERS, SNOW
 DETECTOR HEAD



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DECIMALS	THIRDS	RAILWAY EQUIPMENT CO.	
FRACTIONS	ANGULAR	MINNEAPOLIS, MINNESOTA	
.XX .000	FRACCTIONS	(763) 972-2200	
.0001	DO NOT SCALE DRAWING	TITLE	
LAST UPDATED	DATE	ELECTRIC HEATER CONTROL, 240V, #10/11/12	
BY:		SWITCH, 300W/FT ELECTRIC CONTROLLER, BLADES, FIBERGLASS COVERS, SNOW DETECTOR HEAD	
DATE:		DRAWING NO:	
3/6/2021		UPFG922211-208	
BY:		SCALE:	
cwarderson		B	
DATE:		SHEET 2 OF 4	
BY:		DRAWING SIZE:	
NA		B	
BEND ALLOWANCE:			

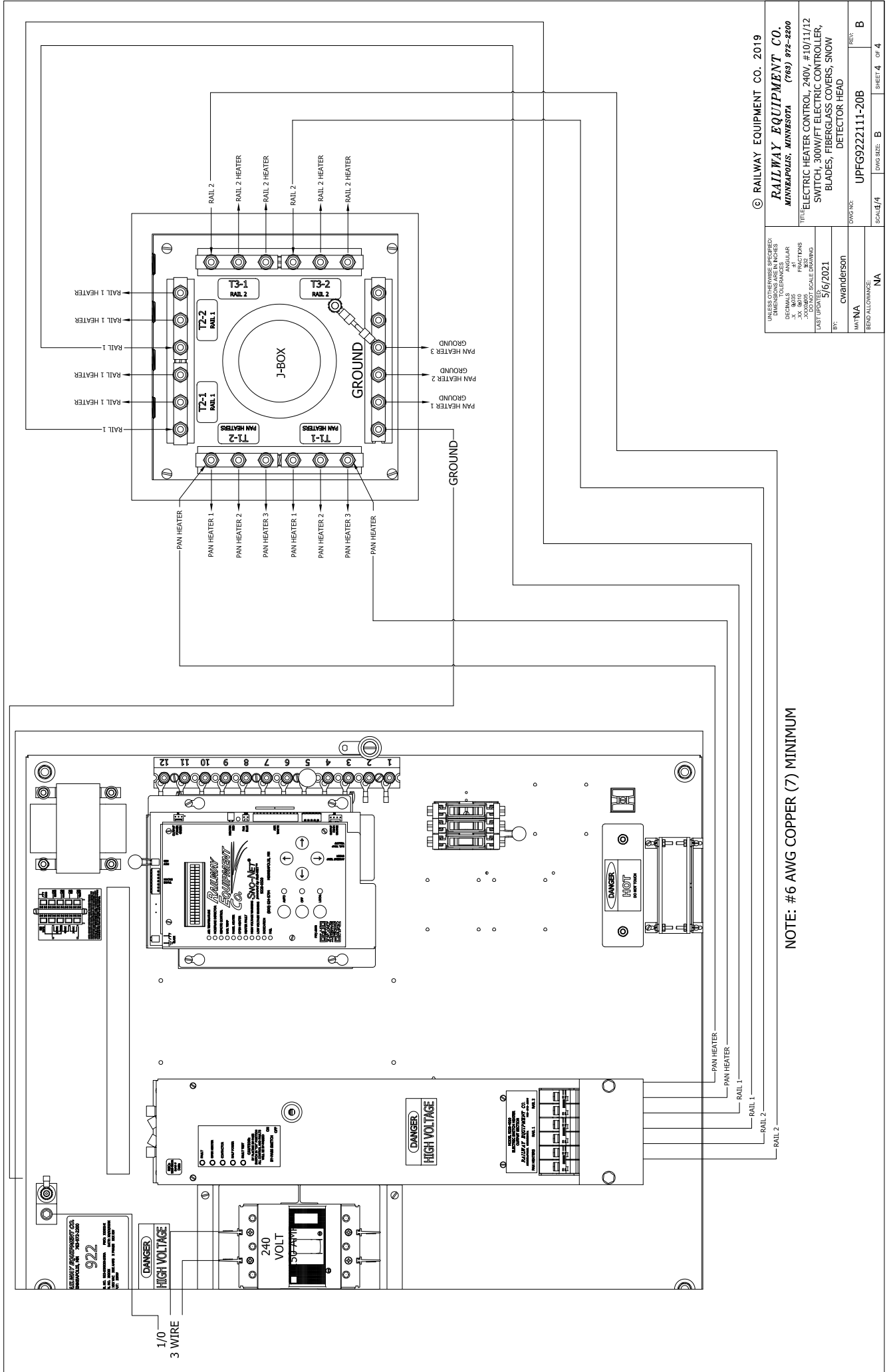


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cwarderson		5/6/2021	
DWG NO:		REV:	
UPFG922111-208		B	
SHEET 3 OF 4		SCALE: B	

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 MINNEAPOLIS, MINNESOTA (763) 972-2200

TITLE: ELECTRIC HEATER CONTROL, 240V, #10/11/12 SWITCH, 300W/FT ELECTRIC CONTROLLER, BLADES, FIBERGLASS COVERS, SNOW DETECTOR HEAD



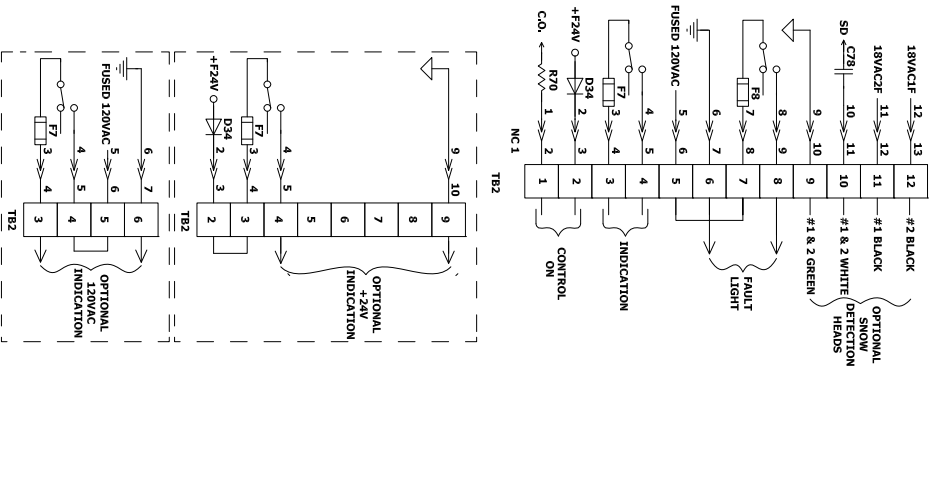
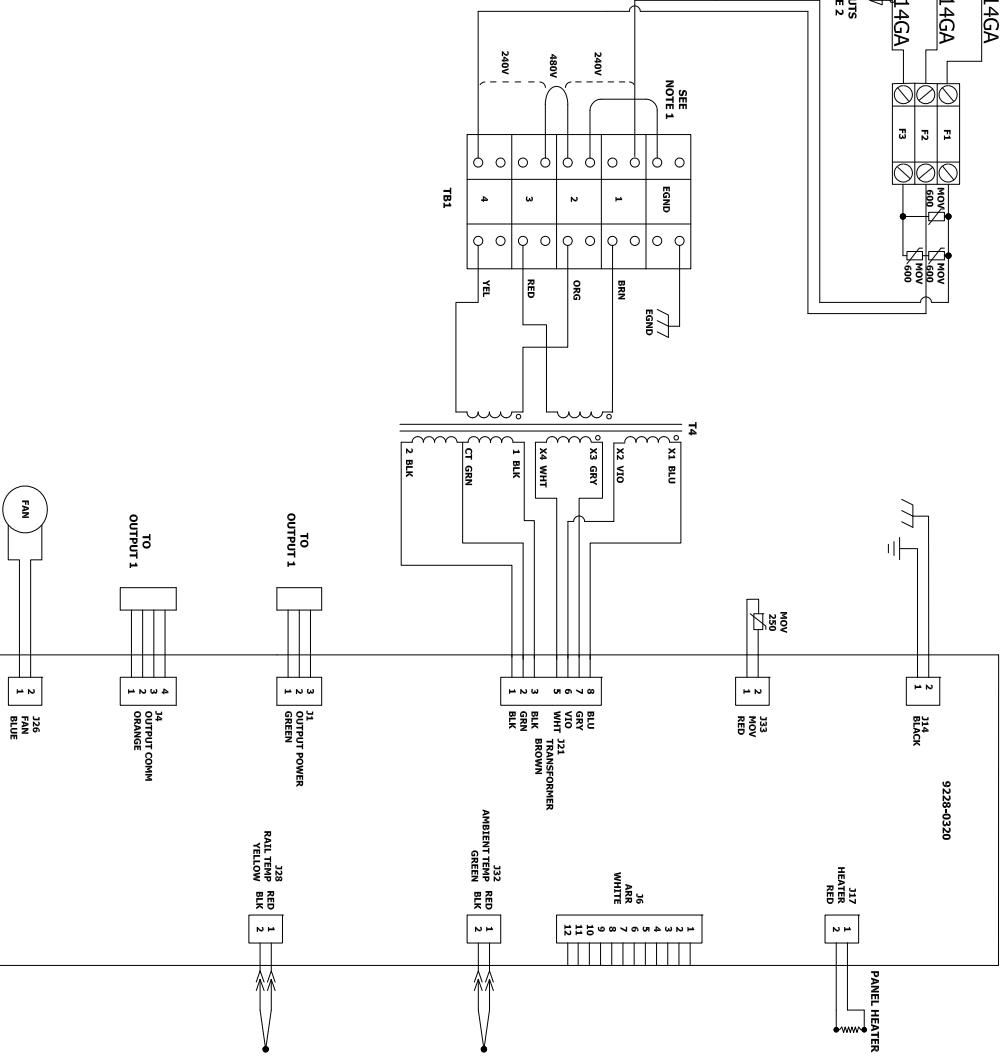
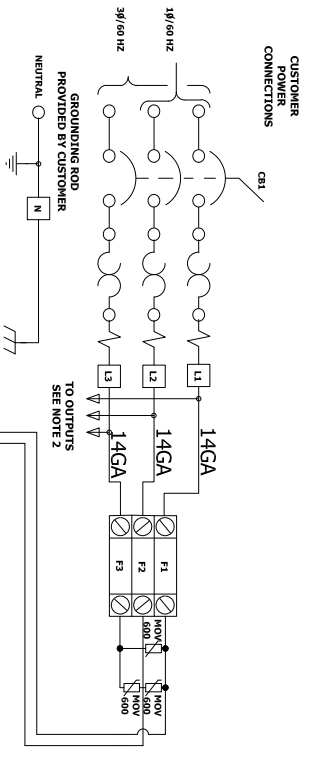
NOTE: #6 AWG COPPER (7) MINIMUM

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BY:	cwarderson
DATE:	NA
DWG NO:	UPFG922211-20B
SCALE:	4 OF 4
DWG SIZE:	B
SHEET:	B

RAILWAY EQUIPMENT CO.
MINNEAPOLIS, MINNESOTA (763) 972-2200
ELECTRIC HEATER CONTROL, 240V, #10/11/12 SWITCH, 300W/FT ELECTRIC CONTROLLER, BLADES, FIBERGLASS COVERS, SNOW DETECTOR HEAD

REVISION HISTORY			DATE	BY
REV	ECO #	DESCRIPTION		
A	-	NEW REV	4/23/2020	AK
B	-	UPDATED SCHEMATIC	9/3/2021	CA



NOTES:

- 1) CONNECT WIRE FROM EGRD TO POWER TERMINAL BLOCK #2 ONLY FOR 480VAC. 3Ø POWER WITH 0 (ZERO) WIRE SYSTEM AND 2 WIRE SYSTEM WITH 2 LEGS OF A 3Ø. CONNECT FOR 480VAC 3Ø THAT USES 2 LEGS OF A 3Ø.
- 2) THE POWER WIRING FOR EACH SECTION IS LISTED BELOW.
- 3) CONNECT WIRE FROM EGRD TO POWER TERMINAL BLOCK #2 ONLY FOR 480VAC. 3Ø POWER WITH 0 (ZERO) WIRE SYSTEM AND 2 WIRE SYSTEM WITH 2 LEGS OF A 3Ø. CONNECT FOR 480VAC 3Ø THAT USES 2 LEGS OF A 3Ø.
- 4) WIRE SYSTEM WITH A WYE NEUTRAL, DO NOT CONNECT FOR 3Ø POWER OR WHERE THERE IS 277VAC FROM ANY LEG TO GND OR NEUTRAL.

OUTPUT	1 PHASE	2	3 PHASE	1	2
1	L1	L2	L1	L1	L2
2	L1	L2	L1	L1	L2
3	L1	L2	L1	L1	L2
4	L1	L2	L1	L1	L2
5	L1	L2	L1	L1	L2
6	L1	L2	L1	L1	L2
7	L1	L2	L1	L1	L2
8	L1	L2	L1	L1	L2
9	L1	L2	L1	L1	L2
10	L1	L2	L1	L1	L2

2 X 6GA

NOTE: ALL WIRES ARE 18GA UNLESS SPECIFIED

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DIMENSIONS ARE ANGULAR
TOLERANCES:
FRACTIONS
DECIMALS
HOLE DIA.
HOLE DIA. NOT SCALE & DIMENSIONS

DATE: 9/3/2021

BY: CWanderson

TITLE: SCHEMATIC/CONNECTION

DIAGRAM, 922,

DWG NO: R9224-5413B

SCALE: 9:1

DWG SIZE: B

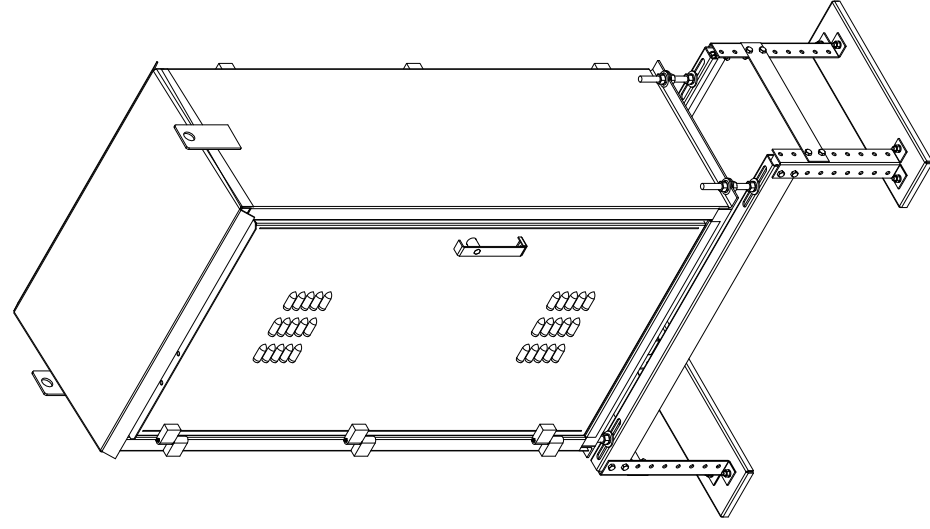
SHEET 1 OF 1

REV: A

REV	ECO #	DESCRIPTION	DATE	BY
A	-	NEW PART	9/9/2019	AK

REVISION HISTORY	
REV	ECO #
A	-

PARTS LIST			PARTS LIST								
ITEM	PART NUMBER	DESCRIPTION	REV	QTY	UOM	ITEM	PART NUMBER	DESCRIPTION	REV	QTY	UOM
1	1300751600	CIRCUIT BREAKER, 3 POLE, 400A, 600V, 35KA, 140G-KF3-D40, K FRAME	-	1	EA	54	5111-0602	FUSE, 2.5AMP 500V	-	3	EA
2	1300751601	CIRCUIT BREAKER LUG KIT, FRAME K, LOAD SIDE	-	1	EA	55	5122-0301	FUSEBLOCK, 600V 30A 1POLE	-	1	EA
3	1300751602	CIRCUIT BREAKER LUG KIT, FRAME K, LINE SIDE	-	1	EA	56	5122-0303	FUSEBLOCK, 600V 30A 3POLE	-	1	EA
4	1300751603	CIRCUIT BREAKER TERMINAL COVER, FRAME K	-	1	EA	57	5122-0401	FUSEBLOCK COVER 600V 30A	-	4	EA
5	14045	BAG, 12 X 15 4MIL ZIPTOP	-	1	EA	58	5300-0202	HEATER, STRIP 240V 250W	-	1	EA
6	1470-0201	FAN GUARD 6-182-033	-	2	EA	59	560168	TRANSFORMER, 922	-	1	EA
7	21018	CONNECTOR, HOUSING, 8 POS	-	1	EA	60	56040	TRANS, 240-480/120 75VA	-	3	EA
8	21019	STRAIN RELIEF, 8 POS	-	1	EA	61	60172	LUG, RING #10 22-18GA HI-TEMP	-	2	EA
9	21020	CONNECTOR, HOUSING, 2 POS	-	3	EA	62	6031-0100	LUG, FORK #8 16-14GA NYLON	-	16	EA
10	21021	STRAIN RELIEF, 2 POS	-	3	EA	63	6031-0107	LUG, FORK #8 22-18GA NYLON	-	10	EA
11	21205	P.LUG, KEYING	-	2	EA	64	6032-0201	LUG, BOX SLOTTED SCREW	-	2	EA
12	21207	STRAIN RELIEF, 5 POS	-	1	EA	65	6034-0111	LUG, PUSH-ON F .250 22-18GA	-	3	EA
13	21209	CONNECTOR, HOUSING, 5 POS	-	1	EA	66	6036-0208	LUG, RING 5/16 12-10 VINYL	-	24	EA
14	21228	TERMINAL BLOCK, 5 POS WAGO	-	1	EA	67	6037-0207	LUG, RING 5/16 12-10 VINYL	-	1	EA
15	26000-0301	FAN, AXIAL 230VAC .125A 117CFM	-	1	EA	68	60901	WIRE DUCT, 1.5IN X 4IN	-	25	IN
16	28004	NUT, #8-32 WING	-	2	EA	69	6093-0008	WIRE DUCT, 1 X 2 WHITE	-	24	IN
17	28009A	BRKT, L	-	4	EA	70	6093-0100	CABLE TIE, 4IN 0.10 WIDTH	-	12	EA
18	28029	TERMINAL ASSY, 1 X 12 POS	-	1	EA	71	6093-0302	WIRE DUCT, COVER 1 IN	-	24	IN
19	28090	CAP, TERMINAL POST INSULATING	-	1	EA	72	6093-0303	WIRE DUCT, COVER 1.5 IN	-	25	IN
20	28091	SHIELD, TERMINAL POST INSULATE	-	1	EA	73	680601	WIRE, 6GA BLACK 600V 105C	-	257	IN
21	2831211104	SCREW, #6-32 X 1/4 PAN SLT	-	4	EA	74	681401	WIRE, 14GA BLACK 600V 105C	-	64	IN
22	2831211106	SCREW, #6-32 X 3/8 PAN SLT	-	4	EA	75	681801	WIRE, 18GA 600V 105C BLACK	-	1	EA
23	2831211108	SCREW, #6-32 X 1/2 PAN SLT	-	5	EA	76	8039-0806A	LABEL, HIGH VOLTAGE	-	1	EA
24	2831211110	SCREW, #6-32 X 3/4 PAN SLT	-	2	EA	77	8039-0813A	LABEL, HOT DO NOT TOUCH	-	1	EA
25	2831311106	SCREW, #8-32 X 3/8 PAN SLT	-	8	EA	78	9220-0012C	COVER, PLEX WYE NEUTRAL	-	1	EA
26	2831411106	SCREW, #10-32 X 3/8 PAN SLT	-	12	EA	79	9220-0029A	CONTROL MODULE, SPACER, 922	-	1	EA
27	2831411110	SCREW, #10-32 X 5/8 PAN SLT	-	4	EA	80	922320A	CONTROL MODULE, SPACER, 922	-	1	EA
28	2831511110	SCREW, 1/4-20 X 3/8 PAN SLOT	-	16	EA	81	922600A	BASE, 922 BREAKER, FITS 1300751600, ALUM, FITS K FRAME BREAKERS	-	1	EA
29	2831541148	SCREW, 1/4-20 X 3 RND SLT	-	2	EA	82	922601A	BREAKER, 922, ADAPTOR FRAME, .063 ALUM, FITS K FRAME BREAKERS	-	1	EA
30	2831551110	BOLT, 1/4-20 X 5/8 HEX HEAD	-	2	EA	83	9228-0011B	PANEL, 32X46, 1-6 OUTPUT	-	1	EA
31	2831651120	BOLT, 5/16-18 X 1-1/4 HEX HEAD	-	2	EA	84	9228-0064A	ASSY, LINE SNUBBER, 480V	-	3	EA
32	2831851132	BOLT, 3/8-16 X 2 HEX HEAD	-	6	EA	85	9228-0070A	MOV ASSY, 600VAC	-	3	EA
33	2832-2101	NUT, #6-32 HEX	-	8	EA	86	9228-0320A	CONTROL MODULE, 922	-	1	EA
34	2832-5101	NUT, 1/4-20 HEX	-	14	EA	87	9228-0402B	ASSY, HARNESS, TERMINAL JUMPER	-	1	EA
35	2832-6101	NUT, 5/16-18 HEX	-	4	EA	88	9228-2201B	ENCLOSURE, 3-12 OUTPUTS, ALUM	-	1	EA
36	2832-8101	NUT, 3/8-16 HEX	-	6	EA	89	9228-3523A	OUTPUT TO OUTPUT POWER CABLE	-	3	EA
37	2833-2210	WASHER, #6 SPLIT LOCK	-	7	EA	90	9228-3524A	OUTPUT TO OUTPUT COMM CABLE	-	3	EA
38	2833-2410	WASHER, #6 INT. STAR	-	8	EA	91	9228-3525A	MODULE TO OUTPUT POWER CABLE	-	1	EA
39	2833-3110	WASHER, #8 FLAT SAE	-	12	EA	92	9228-3526A	MODULE TO OUTPUT COMM CABLE	-	4	EA
40	2833-3200	WASHER, #8 SPLIT LOCK	-	12	EA	93	9228-4010A	ASSY, OUTPUT SECTION 180A 3 BREAKER NO HALF POWER	-	1	EA
41	2833-4210	WASHER, #10 SPLIT LOCK	-	8	EA	94	9228-0328A	FOUNDATION ASSY, 922 ENCLOSURE 3-12 OUTPUT	-	1	EA
42	2833-5110	WASHER, 1/4 FLAT	-	4	EA	95	92919A	WASHER, 1/4 EXT. STAR	-	16	EA
43	2833-5211	WASHER, 1/4 SPLIT LOCK	-	16	EA	96	9508-0404A	AIR TEMPERATURE SENSOR 5' MAGNETIC	-	1	EA
44	2833-6110	WASHER, 5/16 FLAT SAE	-	2	EA	97	R8039-0807B	LABEL, ID	-	1	EA
45	2833-6210	WASHER, 5/16 SPLIT LOCK	-	4	EA	98	R8039-0810A	LABEL, AAR TERMINAL	-	1	EA
46	2833-6310	WASHER, 5/16 EXT. STAR	-	2	EA	99	R922-43N0412-221A	LABEL, 922 SERIAL	-	1	EA
47	2833-8040	RIVET, BUTTON HEAD PLATED STL	-	4	EA	100	R9220-0103D	MANUAL, SWITCH HEATER	-	2	EA
48	2833-8110	WASHER, 3/8 FLAT	-	12	EA	101	R92282A	LABEL, 922 ENCLOSURE SIDE	-	1	EA
49	2833-8210	WASHER, 3/8 SPLIT LOCK	-	6	EA	102	R92288A	LABEL, 922 TRANSFORMER CONN	-	1	EA
50	2841-0504	STANDOFF, M/M, #8-32 X 3 HEX	-	2	EA						
51	2841-0508	STANDOFF, M/M, #8-32, 1/4 X 1/4 HEX, BRASS NICKEL	-	2	EA						
52	32025	2" X 4" X 12" FOR PALLETIS	-	2	EA						
53	5111-0601	FUSE, 500V LAMP SLO-BLO	-	1	EA						



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UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
DIMENSIONAL TOLERANCES
X.X .0030 FRACTIONS
X.XX .0025 FRACTIONS
X.XXX .0015 FRACTIONS
DO NOT SCALE DRAWING

LAST UPDATED: 5/13/2020

BY: atollman

DWG NO: 922-43N0412-221A

MATERIAL: NA

BEND ALLOWANCE: NA

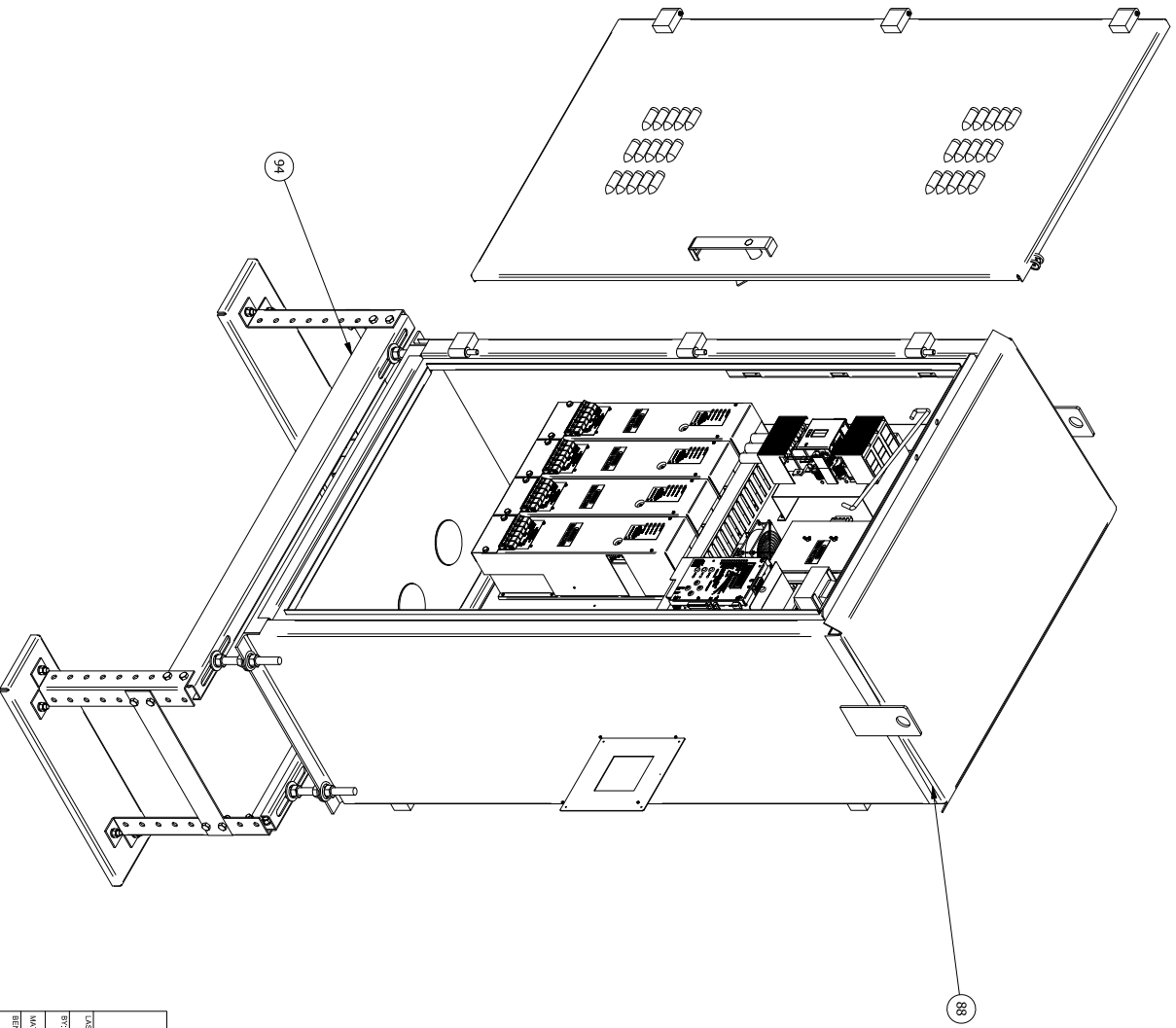
SCALE: 1 / 15

DWG SIZE: B

SHEET 1 OF 4

TITLE: ELECTRIC SWITCH HEATER CONTROL, 480V, 3 PHASE, 4 OUTPUT, FREE STANDING ALUM ENCLOSURE, W FOUNDATION

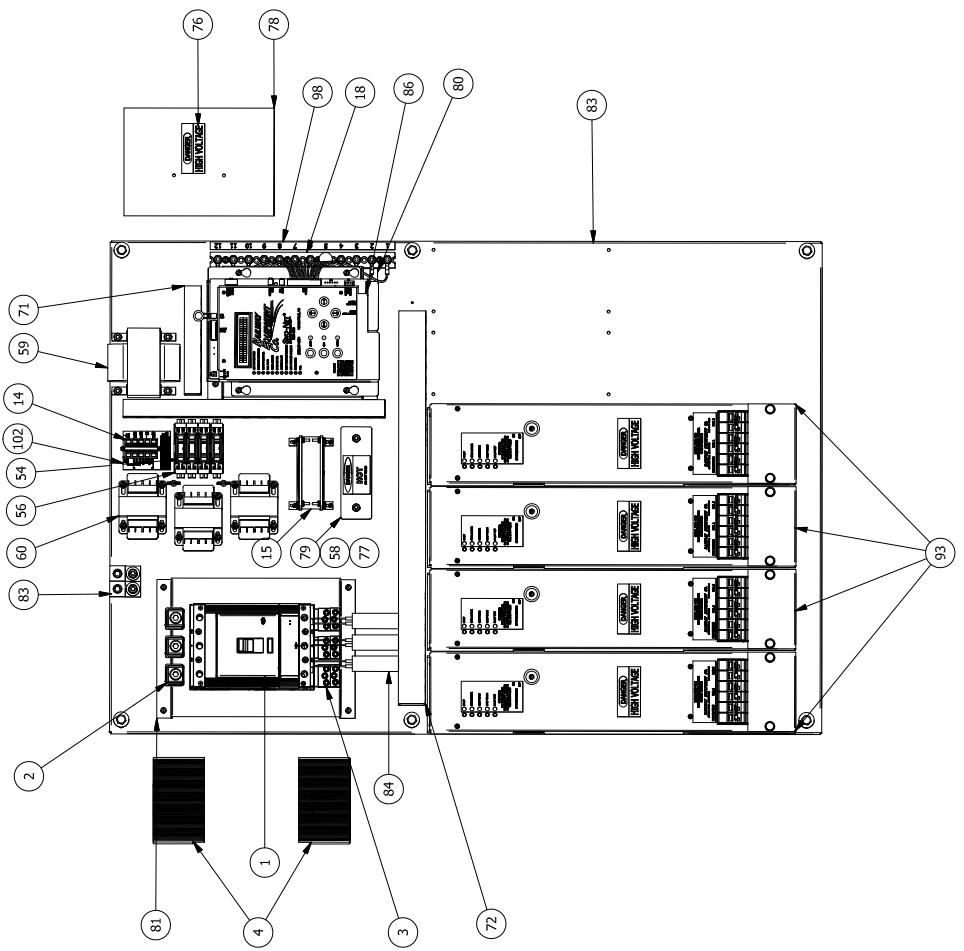
ENCLOSURE ASSEMBLY



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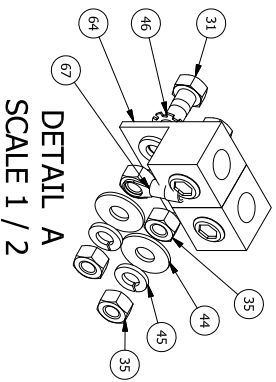
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES		DRAWING NO. 922-43N0412-221A		REV. A
DECIMALS	FRACTIONS	TITLE: ELECTRIC SWITCH HEATER CONTROL, 480V, 3 PHASE, 4 OUTPUT, FREE STANDING ALUMI ENCLOSURE, W FOUNDATION		
.XX 2/1000	ANGULAR	DWG NO. 922-43N0412-221A		
.XX 2/1000	FRACTIONS	DWG SIZE: B		
.XX 2/1000	FRACTIONS	SHEET 2 OF 4		
.XX 2/1000	FRACTIONS	SCALE: 1:12		
DO NOT SCALE DRAWING				
DATE: 5/13/2020				
TR: akollman				
WFLY: NA				
BRD ALUMINUM:				
NA				

PANEL COMPONENTS

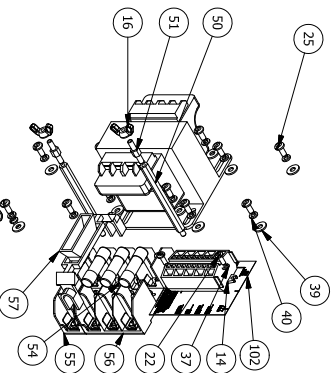


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RAILWAY EQUIPMENT CO. MINNEAPOLIS, MINNESOTA (763) 972-2200	
TITLE: ELECTRIC SWITCH HEATER CONTROL, 480V, 3 PHASE, 4 OUTPUT, FREE STANDING ALUM ENCLASURE, W FOUNDATION	
LAST UPDATE: 5/13/2020	BY: akollman
DWG NO: 922-43N0412-221A	REV: A
SCALE: 1:8	DWG SIZE: B
SHEET 3 OF 4	

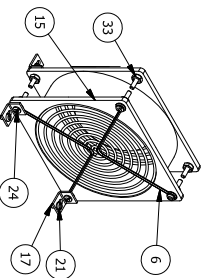
UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
DIMENSIONS IN PARENTHESES ARE ANGULAR
DECIMALS: .XX ± 0.010
FRACTIONS: ± 0.010
ANGLES: ± 0.010
DO NOT SCALE DRAWING



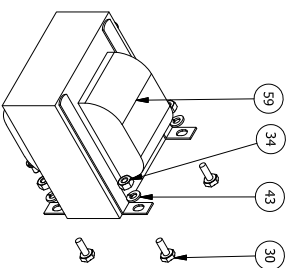
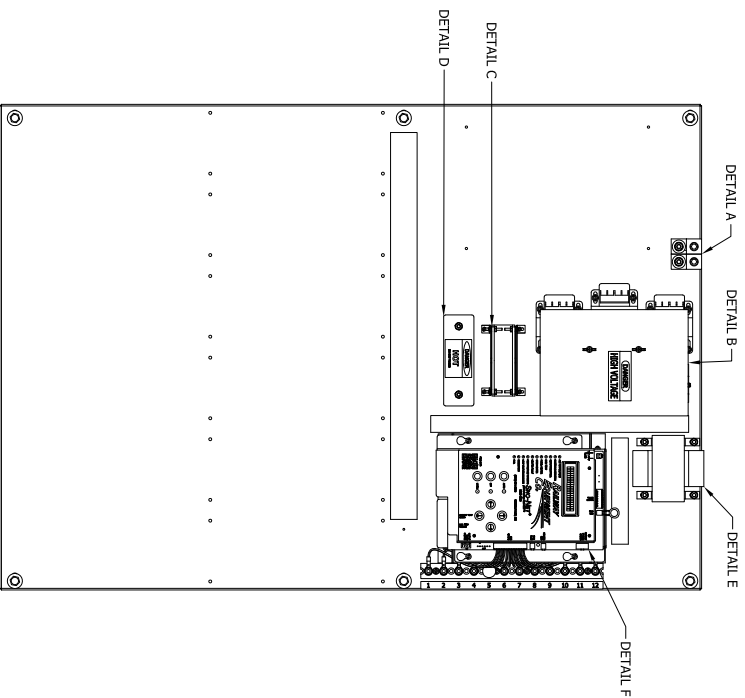
DETAIL A
SCALE 1 / 2



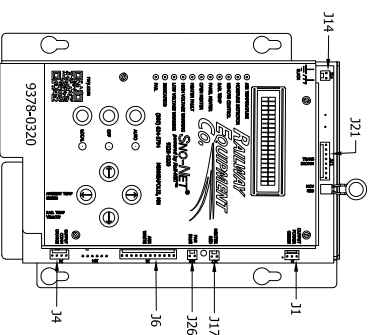
DETAIL B
SCALE 1 / 4



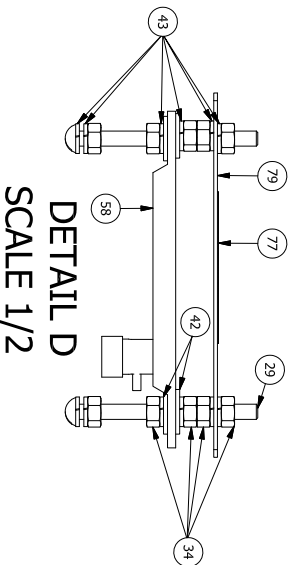
DETAIL C
SCALE 1 / 4



DETAIL E
SCALE 1 / 4



DETAIL F
SCALE 1 / 4



DETAIL D
SCALE 1 / 2

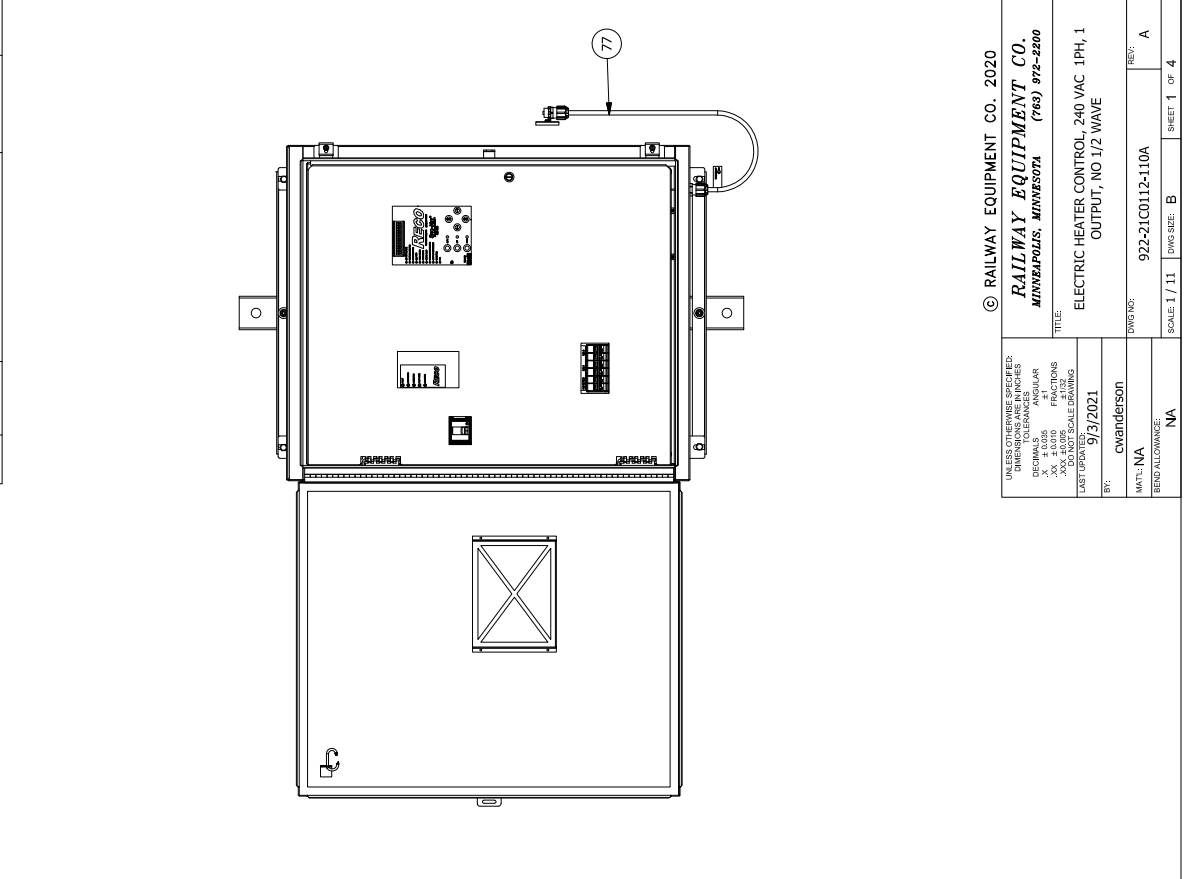
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES DIMENSIONS ARE IN MILLIMETERS		RAILWAY EQUIPMENT CO. 2019	
ORIGINALS	ANALOG	RAILWAY EQUIPMENT CO. MINNEAPOLIS, MINNESOTA (763) 972-2200	
SCALE	AS SHOWN		
DATE	5/13/2020		
BY	akollman		
REV			
DRAWING NO. 922-43N0412-221A		REV. A	
SCALE: 1:8		SHEET 4 OF 4	
PART: N/A		ENCLOSURE W FOUNDATION	
BIBO ALLOWANCE: N/A		ELECTRIC SWITCH HEATER CONTROL, 480V, 3 PHASE, 4 OUTPUT, FREE STANDING ALUMI	

PARTS LIST		REVISION HISTORY	
ITEM	DESCRIPTION	REV	ECO#
1	CIRCUIT BREAKER, 3 POLE, 150A, 600V, 25KA, 1 FRAME	-	-
2	CIRCUIT BREAKER LUG KIT, FRAME 1, LOAD SIDE, 3 LUGS INCLUDED	-	-
3	CIRCUIT BREAKER LUG KIT, FRAME 1, LINE SIDE, 3 LUGS INCLUDED	-	-
4	CIRCUIT BREAKER TERMINAL COVER, FRAME 1, 2 COVERS INCLUDED	-	-
5	BAG, 12 X 15 4MIL ZIPTOP	-	-
6	BAG, 3 X 4 2MIL ZIPTOP	-	-
7	FAN GUARD 6-182-033	-	-
8	CONNECTOR, HOUSING, 8 POS	-	-
9	STRAIN RELIEF, 8 POS	-	-
10	CONNECTOR, HOUSING, 2 POS	-	-
11	STRAIN RELIEF, 2 POS	-	-
12	PLUG, KEYING	-	-
13	TERMINAL BLOCK, 5 POS WAGO	-	-
14	FAN, AXIAL 230VAC .125A 117CFM	-	-
15	BRKT, L	-	-
16	TERMINAL ASSY, 1 X 12 POS	-	-
17	CAP, TERMINAL POST, INSULATING	-	-
18	SHIELD, TERMINAL POST INSULATE	-	-
19	SCREW, #6-32 X 1/4 PAN SLT	-	-
20	SCREW, #6-32 X 1/2 PAN SLT	-	-
21	SCREW, #6-32 X 3/4 PAN SLT	-	-
22	SCREW, #6-32 X 3/8 PAN SLT	-	-
23	SCREW, #10-32 X 3/8 PAN SLT	-	-
24	SCREW, #10-32 X 5/8 PAN SLT	-	-
25	SCREW, 1/4-20 X 3 RND SLT	-	-
26	SCREW, #6-32 X 1/4 PAN SLT	-	-
27	NUT, #6-32 HEX	-	-
28	NUT, 1/4-20 HEX	-	-
29	NUT, 5/16-18 HEX	-	-
30	NUT, 3/8-16 HEX	-	-
31	WASHER, #6 SPLIT LOCK	-	-
32	WASHER, #6 INT. STAR	-	-
33	WASHER, #10 SPLIT LOCK	-	-
34	WASHER, 1/4 FLAT	-	-
35	WASHER, 1/4 SPLIT LOCK	-	-
36	WASHER, 5/16 FLAT SAE	-	-
37	WASHER, 5/16 SPLIT LOCK	-	-
38	WASHER, 3/8 FLAT	-	-
39	WASHER, 3/8 SPLIT LOCK	-	-
40	CARABINER, STEEL, ZINC PLATED, 3/16 OD	-	-
41	LATCH, REQUIRES TOOL TO OPEN	-	-
42	MOV, V250LA20A GE	-	-
43	FUSE, BUSS FNG05	-	-
44	FUSEBLOCK, 600V 30A 3POLE	-	-
45	FUSEBLOCK COVER 600V 30A	-	-
46	HEATER, STRIP 240V 250W	-	-
47	TRANSFORMER, 922	-	-
48	LUG, RING #10 22-18GA HI-TEMP	-	-
49	LUG, BOX SLOTTED SCREW	-	-
50	LUG, PUSH-ON F 250 22-18GA	-	-
51	LUG, RING 5/16 6GA NYLON	-	-
52	LUG, RING 5/16" 12-10 VINYL	-	-
53	WIRE DUCT, 1IN W 3IN H	-	-

REV	ECO#	DESCRIPTION	DATE	BY
A	-	NEW	4/15/2020	AK
-	-	UPDATES PER MEETING	5/12/2020	AK
-	-	UPDATED WIRELENGTHS AND REMOVED LUGS	7/27/2020	AT

ITEM	DESCRIPTION	REV	QTY	UOM
54	CABLE TIE, .4IN 0.10 WIDTH	-	20	EA
55	WIRE DUCT, COVER 1 IN	-	14	IN
56	WIRE, 18GA WHT/BLK TWISTED PR. HIGH TEMP	-	45	IN
57	WIRE, 6GA BLACK 600V 105C	-	132	IN
58	WIRE, 12GA GREEN - HOOK UP	-	10	IN
59	WIRE, 14GA BLACK 600V 105C	-	4	FT
60	WIRE, 18GA THINWALL WHITE 300V	-	12	IN
61	WIRE, 18GA THINWALL GREEN 300V	-	12	IN
62	8039-0806A	A	1	EA
63	8039-0813A	A	1	EA
64	9220-0029A	A	1	EA
65	9220-1115A	A	1	EA
66	9220-1153A	A	1	EA
67	9220-3200A	A	1	EA
68	9228-0320C	C	1	EA
69	9228-0402C	C	1	EA
70	9228-1111C	C	1	EA
71	9228-2007F	F	1	EA
72	9228-3509A	A	1	EA
73	9228-3522A	A	1	EA
74	9228-4010A	A	1	EA
75	92919A	A	4	EA
76	9300-3356A	A	2	EA
77	9508-0404A	A	1	EA
78	R8039-0807B	B	1	EA
79	R8039-0810A	A	1	EA
80	R9220-0103D	A	1	EA
81	R92282A	A	1	EA
82	R92288A	A	1	EA

ITEM	DESCRIPTION	REV	QTY	UOM
1	CIRCUIT BREAKER, 3 POLE, 150A, 600V, 25KA, 1 FRAME	-	1	EA
2	CIRCUIT BREAKER LUG KIT, FRAME 1, LOAD SIDE, 3 LUGS INCLUDED	-	1	EA
3	CIRCUIT BREAKER LUG KIT, FRAME 1, LINE SIDE, 3 LUGS INCLUDED	-	1	EA
4	CIRCUIT BREAKER TERMINAL COVER, FRAME 1, 2 COVERS INCLUDED	-	1	EA
5	BAG, 12 X 15 4MIL ZIPTOP	-	1	EA
6	BAG, 3 X 4 2MIL ZIPTOP	-	1	EA
7	FAN GUARD 6-182-033	-	2	EA
8	CONNECTOR, HOUSING, 8 POS	-	1	EA
9	STRAIN RELIEF, 8 POS	-	1	EA
10	CONNECTOR, HOUSING, 2 POS	-	3	EA
11	STRAIN RELIEF, 2 POS	-	3	EA
12	PLUG, KEYING	-	4	EA
13	TERMINAL BLOCK, 5 POS WAGO	-	1	EA
14	FAN, AXIAL 230VAC .125A 117CFM	-	1	EA
15	BRKT, L	-	4	EA
16	TERMINAL ASSY, 1 X 12 POS	-	1	EA
17	CAP, TERMINAL POST, INSULATING	-	1	EA
18	SHIELD, TERMINAL POST INSULATE	-	1	EA
19	SCREW, #6-32 X 1/4 PAN SLT	-	4	EA
20	SCREW, #6-32 X 1/2 PAN SLT	-	4	EA
21	SCREW, #6-32 X 3/4 PAN SLT	-	8	EA
22	SCREW, #6-32 X 3/8 PAN SLT	-	4	EA
23	SCREW, #10-32 X 3/8 PAN SLT	-	8	EA
24	SCREW, #10-32 X 5/8 PAN SLT	-	4	EA
25	SCREW, 1/4-20 X 3 RND SLT	-	2	EA
26	SCREW, #6-32 X 1/4 PAN SLT	-	2	EA
27	NUT, #6-32 HEX	-	8	EA
28	NUT, 1/4-20 HEX	-	14	EA
29	NUT, 5/16-18 HEX	-	2	EA
30	NUT, 3/8-16 HEX	-	4	EA
31	WASHER, #6 SPLIT LOCK	-	4	EA
32	WASHER, #6 INT. STAR	-	8	EA
33	WASHER, #10 SPLIT LOCK	-	4	EA
34	WASHER, 1/4 FLAT	-	8	EA
35	WASHER, 1/4 SPLIT LOCK	-	16	EA
36	WASHER, 5/16 FLAT SAE	-	1	EA
37	WASHER, 5/16 SPLIT LOCK	-	1	EA
38	WASHER, 3/8 FLAT	-	4	EA
39	WASHER, 3/8 SPLIT LOCK	-	4	EA
40	CARABINER, STEEL, ZINC PLATED, 3/16 OD	-	1	EA
41	LATCH, REQUIRES TOOL TO OPEN	-	1	EA
42	MOV, V250LA20A GE	-	1	EA
43	FUSE, BUSS FNG05	-	4	EA
44	FUSEBLOCK, 600V 30A 3POLE	-	1	EA
45	FUSEBLOCK COVER 600V 30A	-	3	EA
46	HEATER, STRIP 240V 250W	-	1	EA
47	TRANSFORMER, 922	-	1	EA
48	LUG, RING #10 22-18GA HI-TEMP	-	2	EA
49	LUG, BOX SLOTTED SCREW	-	1	EA
50	LUG, PUSH-ON F 250 22-18GA	-	3	EA
51	LUG, RING 5/16 6GA NYLON	-	4	EA
52	LUG, RING 5/16" 12-10 VINYL	-	1	EA
53	WIRE DUCT, 1IN W 3IN H	-	14	IN



REV	ECO#	DESCRIPTION	DATE	BY
A	-	NEW	4/15/2020	AK
-	-	UPDATES PER MEETING	5/12/2020	AK
-	-	UPDATED WIRELENGTHS AND REMOVED LUGS	7/27/2020	AT

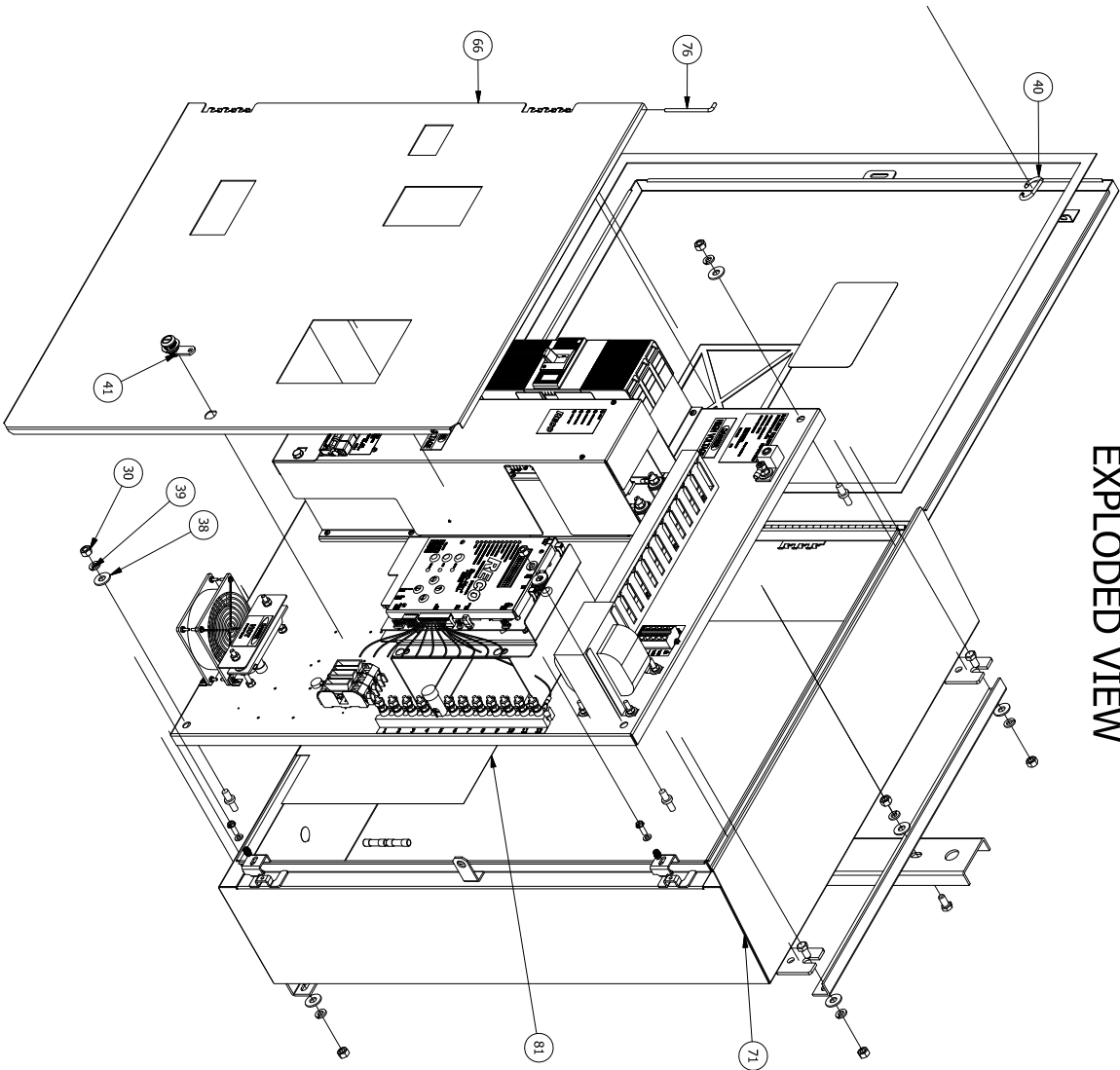
UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
DIMENSIONS IN PARENTHESES ARE ANGULAR
.XX = 0.010 FRACTIONS
ALL DIMENSIONS ARE TO CENTER UNLESS NOTED OTHERWISE
DO NOT SCALE DRAWING

LAST UPDATED: 9/3/2021
BY: cwarderson
MATERIAL: NA
REVISION: 922-21C0112-110A
DRAWING NO: 922-21C0112-110A
SCALE: 1/11
DWG SIZE: B
SHEET 1 OF 4

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TITLE: ELECTRIC HEATER CONTROL, 240 VAC 1PH, 1 OUTPUT, NO 172 WAVE

EXPLODED VIEW

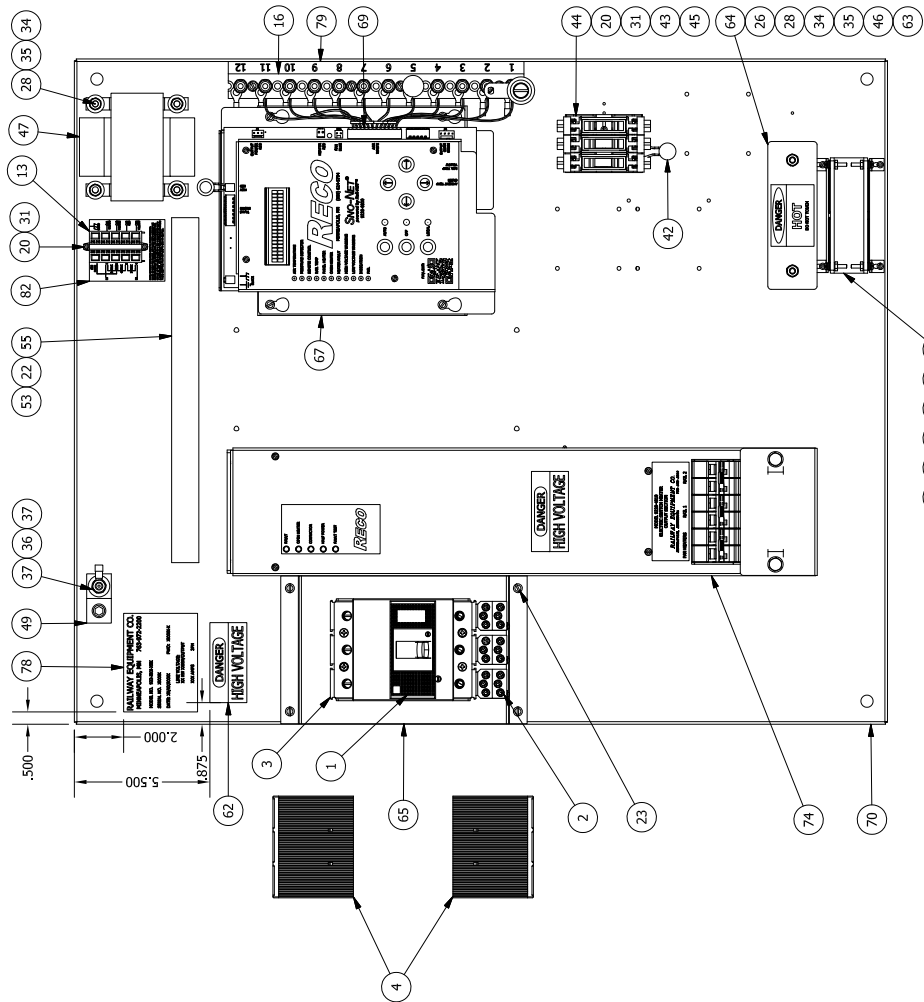


UNLESS OTHERWISE SPECIFIED:		DIMENSIONS ARE IN INCHES	
DECIMALS		FRACTIONS	
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.XXX 3/1000		XXX/16	
.0000 NOT SCALE DRAWING			
DATE:	9/3/2021	TITLE:	ELECTRIC HEATER CONTROL, 240 VAC, 1PH, 1 OUTPUT, NO 1/2 WAVE
TR:	cwAnderson	DWG NO:	972-21C0112-110A
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BRD ALCOMPOSE:	NA	DWG SIZE:	B
		SHEET:	2 OF 4
		REL:	A

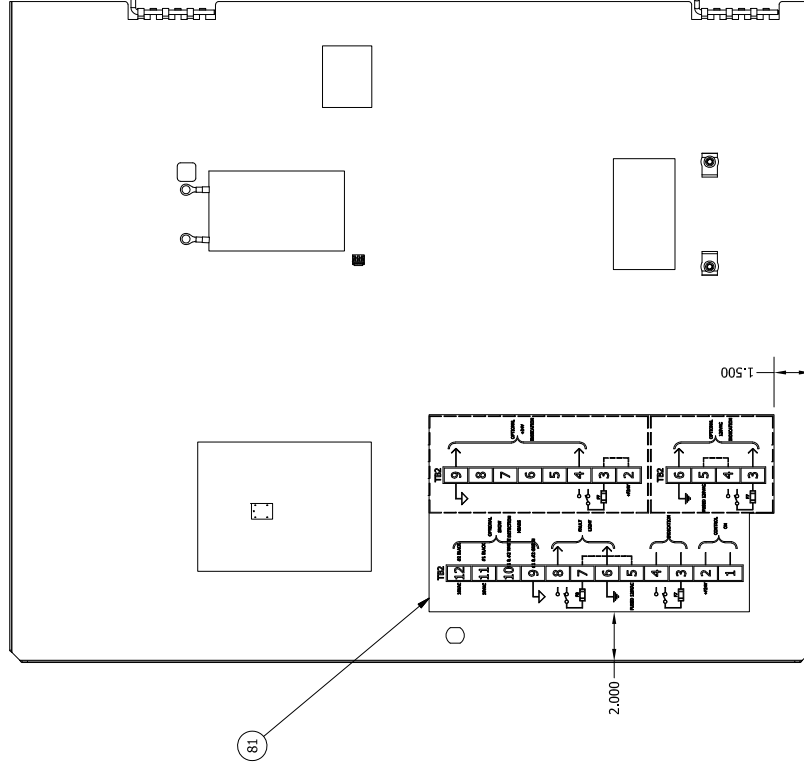
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PANEL VIEW

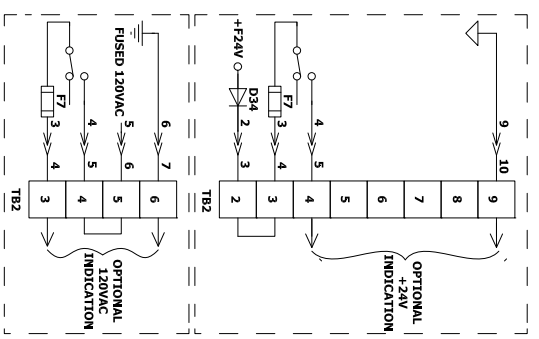
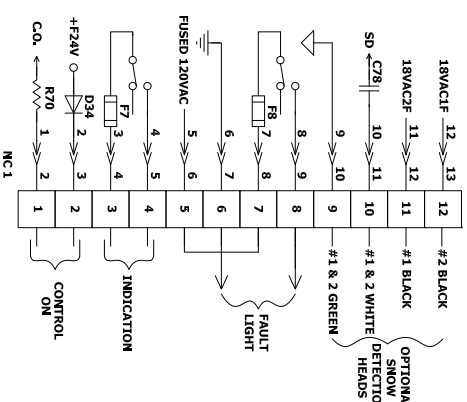
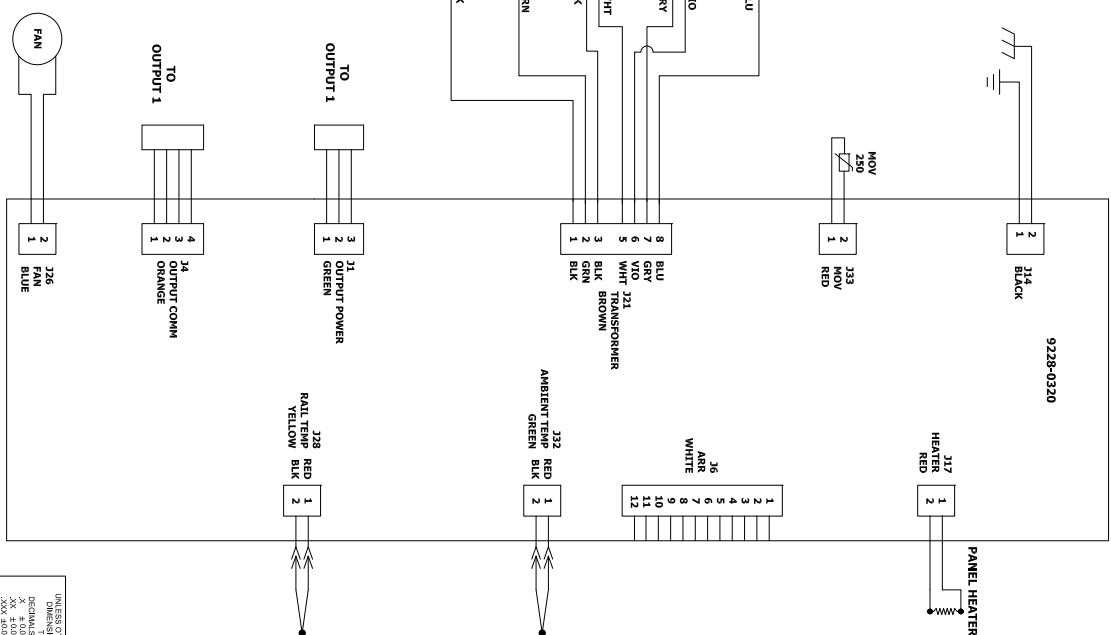
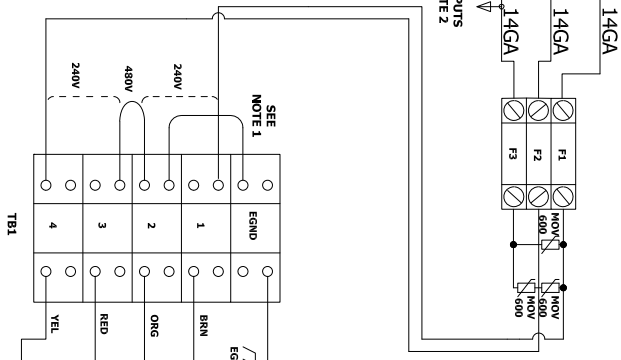
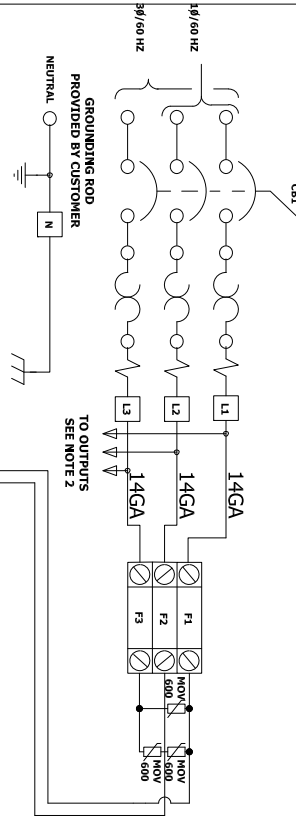


INSIDE INNER DOOR



NOTE: CUT LABEL 13" FROM THE BOTTOM AND PLACE AS SHOWN, ON INSIDE OF INNER DOOR.
 THEN PLACE BOTTOM OF LABEL ON LEFT OF DOOR, THEN PLACE TOP OF LABEL TO THE RIGHT OF BOTTOM LABEL.

CUSTOMER POWER CONNECTIONS



- NOTES:**
- 1) CONNECT WIRE FROM EGRND TO POWER TERMINAL BLOCK #2 ONLY FOR 480VAC. 1Ø POWER WITH 0 (ZERO) VAC FROM EITHER LEG TO NEUTRAL/GND. DO NOT CONNECT FOR 480VAC 1Ø THAT USES 2 LEGS OF A 3Ø.
 - 2) WIRE SYSTEM WITH A WIRE NEUTRAL. DO NOT CONNECT FOR 3Ø POWER OR WHERE THERE IS 277VAC FROM ANY LEG TO GND OR NEUTRAL.
 - 3) THE POWER WIRING FOR EACH SECTION IS LISTED BELOW.

OUTPUT	1 PHASE	2	3 PHASE	2
1	L1	L2	L1	L2
2	L1	L2	L1	L2
3	L1	L2	L1	L2
4	L1	L2	L1	L2
5	L1	L2	L1	L2
6	L1	L2	L1	L2
7	L1	L2	L1	L2
8	L1	L2	L1	L2
9	L1	L2	L1	L2
10	L1	L2	L1	L2

2 X 6GA

NOTE: ALL WIRES ARE 18GA UNLESS SPECIFIED

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
DECIMALS ANGULAR
X.X 0.010
X.XX 0.005
DO NOT SCALE DRAWING

DATE: 9/3/2021

DESIGNER: cwarden

SCALE: 1/1

DWG NO: R922-4-54138

REV: 8

TITLE: DIAGRAM, 922, SCHEMATIC/CONNECTION

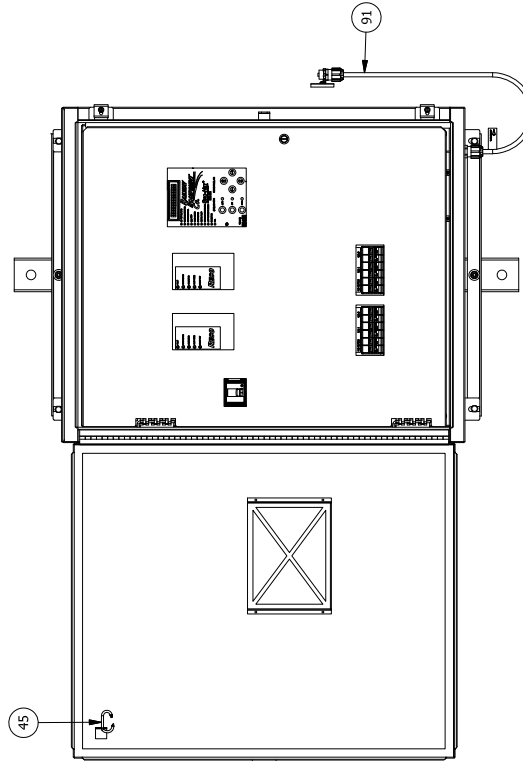
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RAILWAY EQUIPMENT CO.
MINNEAPOLIS, MINNESOTA
(763) 972-2200

REV	ECO#	DESCRIPTION	DATE	BY
A	-	NEW	5/13/2020	AK

REVISION HISTORY	
REV	ECO#
A	-

PARTS LIST				PARTS LIST							
ITEM	PART NUMBER	REV	QTY	UOM	DESCRIPTION	ITEM	PART NUMBER	REV	QTY	UOM	DESCRIPTION
1	1300751200	-	1	EA	CIRCUIT BREAKER, 3 POLE, 200A, 600V, 25KA, 1 FRAME	54	60172	-	2	EA	LUG, RING #10 22-18GA HI-TEMP
2	1300751201	-	1	EA	CIRCUIT BREAKER LUG KIT, FRAME 1, LOAD SIDE, 3 LUGS INCLUDED	55	6031-0107	-	10	EA	LUG, FORK #8 22-18GA NYLON
3	1300751202	-	1	EA	CIRCUIT BREAKER LUG KIT, FRAME 1, LINE SIDE, 3 LUGS INCLUDED	56	6032-0201	-	1	EA	LUG, BOX SLOTTED SCREW
4	1300751203	-	1	EA	CIRCUIT BREAKER TERMINAL COVER, FRAME 1, 2 COVERS INCLUDED	57	6034-0111	-	3	EA	LUG, PUSH-ON F. 250 22-18GA
5	14045	-	1	EA	BAG, 12 X 15 4MIL ZIPTOP	58	6036-0206	-	4	EA	LUG, RING #10 6GA VINYL
6	14047	-	1	EA	BAG, 3 X 4 2MIL ZIPTOP	59	6036-0208	-	4	EA	LUG, RING 5/16 6GA NYLON
7	1470-0201	-	2	EA	FAN GUARD 6-182-033	60	6037-0207	-	1	EA	LUG, RING 5/16" 12-10 VINYL
8	21018	-	1	EA	CONNECTOR, HOUSING, 8 POS	61	6093-0003	-	14	IN	WIRE DUCT, 1IN W 3IN H
9	21019	-	1	EA	STRAIN RELIEF, 8 POS	62	6093-0100	-	20	EA	WIRE DUCT, COVER 1 IN
10	21020	-	4	EA	CONNECTOR, HOUSING, 2 POS	63	6093-0302	-	14	IN	WIRE, 18GA WHT/BLK TWISTED PR. HIGH TEMP
11	21021	-	4	EA	STRAIN RELIEF, 2 POS	64	680002	-	45	IN	WIRE, 6GA BLACK 600V 105C
12	21205	-	4	EA	PLUG, KEYING	65	680601	-	132	IN	WIRE, 12GA GREEN - HOOK UP
13	21228	-	1	EA	TERMINAL BLOCK, 5 POS WAGO	66	681205	-	10	IN	WIRE, 14GA BLACK 600V 105C
14	2600-0301	-	1	EA	FAN, AXIAL 230VAC .125A 117CFM	67	681401	-	4	FT	WIRE, 18GA 600V 105C BLACK
15	2600975000	-	4	EA	BOLT, #10-32 X 3/8, HEX SERRATED FLANGE HEAD, STEEL, GRADE 5, ZINC	68	681801	-	64	IN	WIRE, 18GA THINWALL BLACK 600V
16	28009A	A	4	EA	BRKT, L	69	681812	-	80	IN	WIRE, 18GA THINWALL WHITE 300V
17	28029	-	1	EA	TERMINAL ASSY, 1 X 12 POS	70	681833	-	12	IN	WIRE, 18GA THINWALL GREEN 300V
18	28090	-	1	EA	CAP, TERMINAL POST INSULATING	71	681837	-	12	IN	WIRE, 18GA THINWALL WHITE 300V
19	28097A	A	1	EA	SHIELD, TERMINAL POST INSULATE	72	8039-0806A	A	2	EA	LABEL, HIGH VOLTAGE
20	2831211104	-	4	EA	SCREW, #6-32 X 1/4 PAN SLT	73	8039-0813A	A	1	EA	LABEL, HOT DO NOT TOUCH
21	2831211108	-	6	EA	SCREW, #6-32 X 1/2 PAN SLT	74	9220-0012C	C	1	EA	COVER, PLEX WVE NEUTRAL
22	2831211112	-	8	EA	SCREW, #6-32 X 3/4 PAN SLT	75	9220-0029A	A	1	EA	COVER, HEAT SHIELD
23	2831311106	-	18	EA	SCREW, #8-32 X 3/8 PAN SLT	76	9220-1115A	A	1	EA	SPACER, BREAKER, 922, 2 OUTPUT ENCLOSURE, FRAME 1
24	2831411106	-	8	EA	SCREW, #10-32 X 3/8 PAN SLT	77	9220-1115A	A	1	EA	ENCLOSURE, INNER DOOR, 922 CONTROL, 2 OUTPUT
25	2831411110	-	4	EA	SCREW, #10-32 X 5/8 PAN SLT	78	9220-3200A	A	1	EA	SPACER, CONTROL MODULE, 922, 2 OUTPUT ENCLOSURE, INNER DOOR
26	2831511110	-	8	EA	SCREW, 1/4-20 X 3/8 PAN SLOT	79	9228-0070A	A	1	EA	MOV ASSY, 600VAC
27	2831541148	-	2	EA	SCREW, 1/4-20 X 3 RND SLT	80	9228-0320A	A	1	EA	CONTROL MODULE, 922
28	2832-2101	-	8	EA	NUT, #6-32 HEX	81	9228-0402C	C	1	EA	ASSY, HARNESS, TERMINAL JUMPER
29	2832-5101	-	14	EA	NUT, 1/4-20 HEX	82	9228-1111C	C	1	EA	PANEL, 922, 1-2 OUTPUT, W/ PEM
30	2832-6101	-	2	EA	NUT, 5/16-18 HEX	83	9228-2007F	F	1	EA	ENCLOSURE, ASSY, 922, 2 OUTPUT, W/ POLE MOUNT
31	2832-8101	-	4	EA	NUT, 3/8-16 HEX	84	9228-3509A	A	1	EA	MODULE TO OUTPUT POWER CABLE
32	2833-2210	-	6	EA	WASHER, #6 SPLIT LOCK	85	9228-3522A	A	1	EA	MODULE TO OUTPUT COMM CABLE
33	2833-2410	-	8	EA	WASHER, #6 INT. STAR	86	9228-3523A	A	1	EA	OUTPUT TO OUTPUT POWER CABLE
34	2833-3110	-	12	EA	WASHER, #8 FLAT SAE	87	9228-3524A	A	1	EA	OUTPUT TO OUTPUT COMM CABLE
35	2833-3200	-	12	EA	WASHER, #8 SPLIT LOCK	88	9228-4010A	A	2	EA	ASSY, OUTPUT SECTION 180A 3 BREAKER NO HALF POWER
36	2833-5110	-	8	EA	WASHER, 1/4 FLAT	89	92919A	A	8	EA	WASHER, 1/4 EXT. STAR
37	2833-5211	-	16	EA	WASHER, 1/4 SPLIT LOCK	90	9300-3356A	A	2	EA	ENCLOSURE, INNER DOOR, HINGE PIN, 3/16 OD, SS, 3"
38	2833-6110	-	1	EA	WASHER, 5/16 FLAT SAE	91	9508-0404A	A	1	EA	AIR TEMPERATURE SENSOR 4" MAGNETIC
39	2833-6210	-	2	EA	WASHER, 5/16 SPLIT LOCK	92	R8039-0807B	B	1	EA	LABEL, ID
40	2833-6310	-	4	EA	WASHER, 5/16 EXT. STAR	93	R8039-0810A	A	1	EA	LABEL, AAR TERMINAL
41	2833-8110	-	4	EA	WASHER, 3/8 FLAT	94	R9220-0103D	A	1	EA	MANUAL CSX922 SWITCH HEATER
42	2833-8210	-	4	EA	WASHER, 3/8 SPLIT LOCK	95	R92282A	A	1	EA	LABEL, 922 ENCLOSURE SIDE
43	2841-0501	-	2	EA	STANDOFF, 8-32 X 3/8 WALD60854	96	R92288A	A	1	EA	LABEL, 922 TRANSFORMER CONN
44	2841-0504	-	2	EA	STANDOFF, M/F 8-32 X 3 HEX						
45	2900312500	-	1	EA	CARABINER, STEEL, ZINC PLATED, 3/16 OD						
46	3000022500	-	1	EA	LATCH, REQUIRES TOOL TO OPEN						
47	5111-0602	-	5	EA	FUSE, 2.5AMP 500V						
48	5122-0301	-	1	EA	FUSEBLOCK, 600V 30A 1POLE						
49	5122-0303	-	1	EA	FUSEBLOCK, 600V 30A 3POLE						
50	5122-0401	-	4	EA	FUSEBLOCK COVER 600V 30A						
51	5300-0202	-	1	EA	HEATER, STRIP 240V 250W						
52	560168	B	1	EA	TRANSFORMER, 922						
53	56040	-	3	EA	TRANS, 240-480/120 75VA						

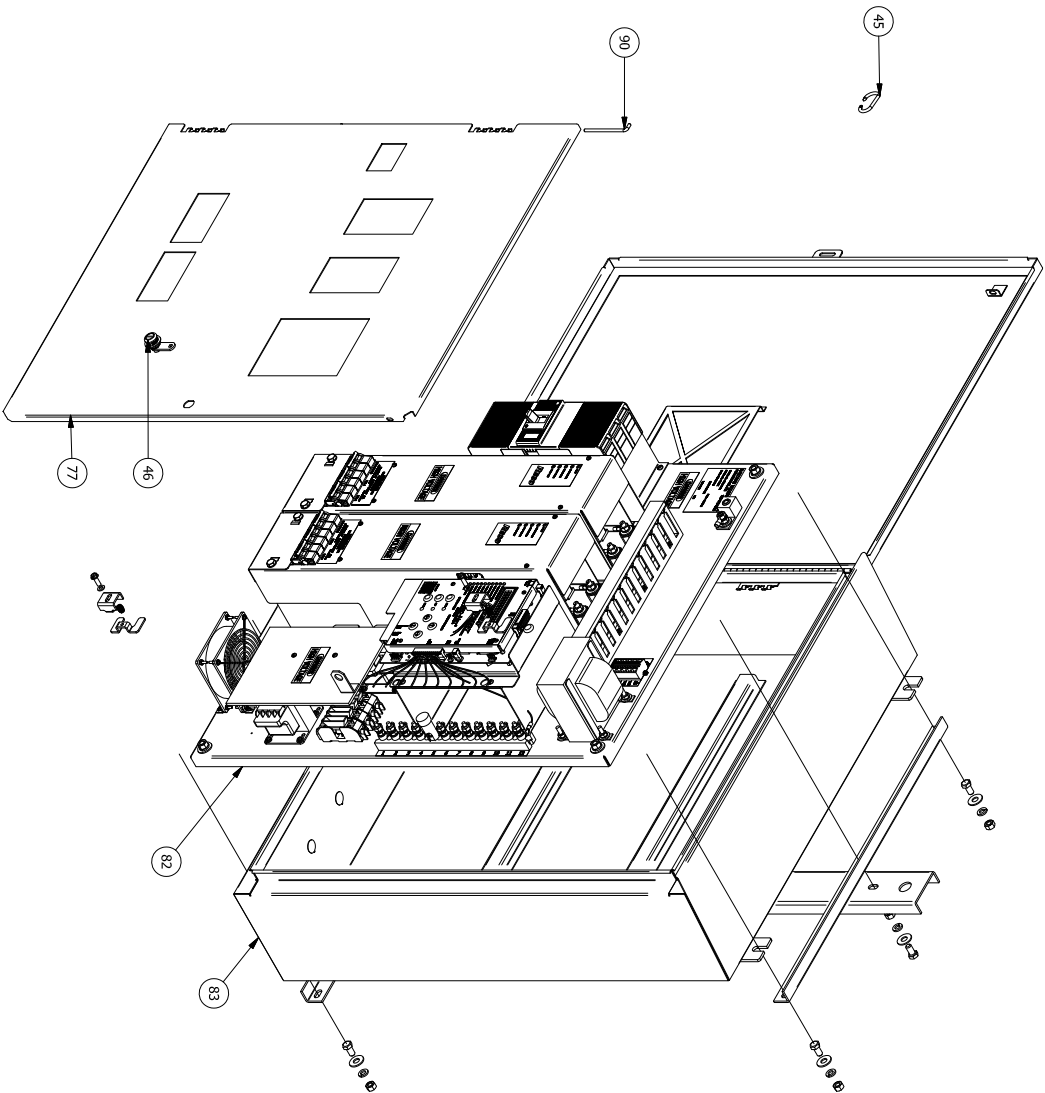


UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES	
DECIMALS	ANGULAR
.XX	FRACTIONS
1/32	DO NOT SCALE DRAWING
LAST UPDATED: 9/7/2021	
BY:	cwarderson
DATE:	9/7/2021
SCALE:	AS SHOWN
REV:	A
DESCRIPTION:	922-41C0212-110A
SHEET:	1 OF 4

RAILWAY EQUIPMENT CO. 2020	
RAILWAY EQUIPMENT CO.	
MINNEAPOLIS, MINNESOTA (763) 972-2200	
TITLE: ELECTRIC HEATER CONTROL, 922, 480V, 1PH, 2 OUTPUT, W/ POLE MOUNT ENCLOSURE	

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES	
DECIMALS	ANGULAR
.XX	FRACTIONS
1/32	DO NOT SCALE DRAWING
LAST UPDATED: 9/7/2021	
BY:	cwarderson
DATE:	9/7/2021
SCALE:	AS SHOWN
REV:	A
DESCRIPTION:	922-41C0212-110A
SHEET:	1 OF 4

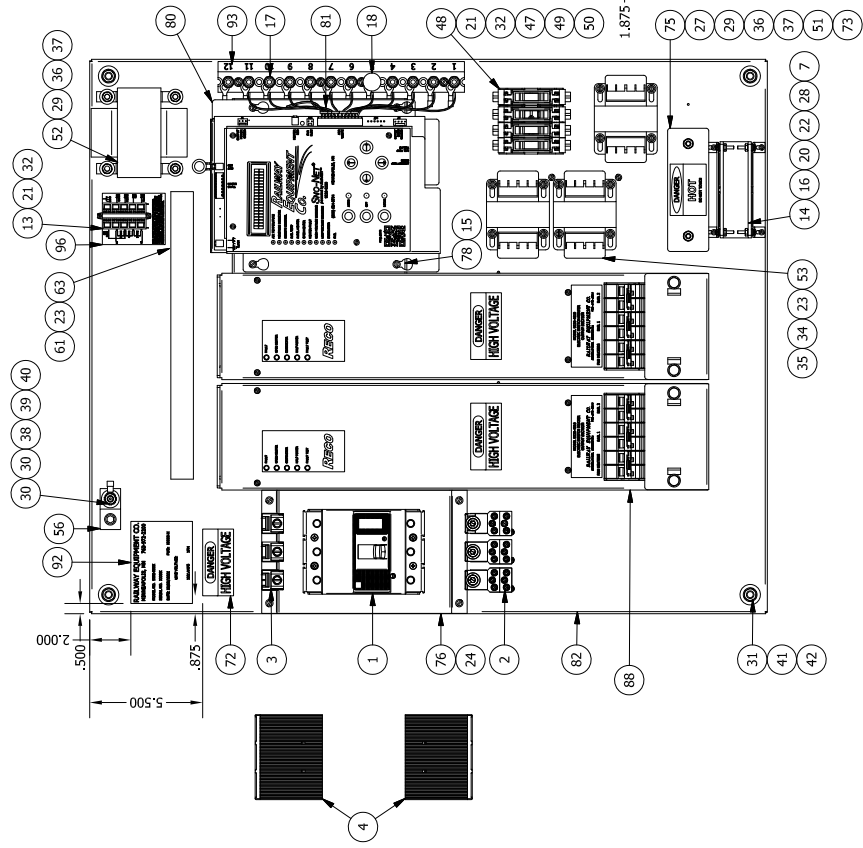
ASSEMBLED VIEW



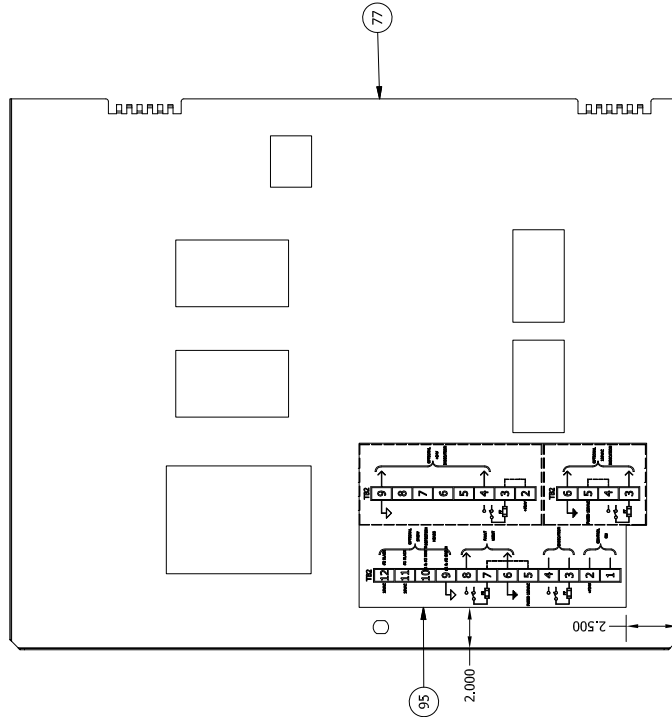
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UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES		DRAWING NO. 922-41(GD)12-110A		REV. A
DECIMALS	ANGULAR	MINNEAPOLIS, MINNESOTA (763) 972-2200		
.XX 1/16	FRACTIONS	TITLE: ELECTRIC HEATER CONTROL, 922, 480V, 1PH, 2 OUTPUT, W/ POLE MOUNT ENCLOSURE		
.XX 1/32	FRACTIONS	DATE: 9/7/2021		
.XX 1/64	FRACTIONS	DRAWN BY: cvanderson		
DO NOT SCALE DRAWING		APP. BY:		
W.P.T. NA		SCALE: 1/8" = 1"		
BRD. ALLOWANCE:		DWG. SIZE: B		
NA		SHEET 2 OF 4		

PANEL VIEW



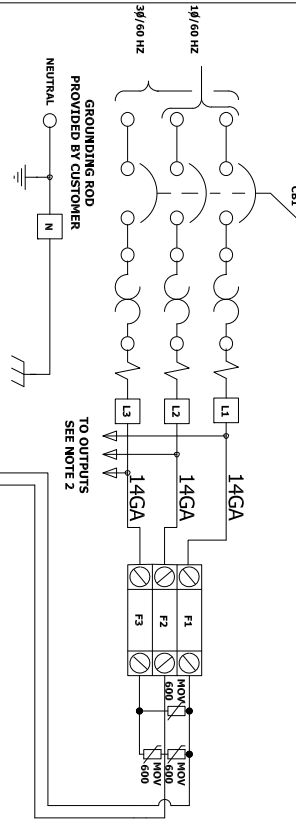
INSIDE INNER DOOR VIEW



NOTE: CUT LABEL 1.3" FROM BOTTOM, ON THE LINE AND PLACE ON INSIDE OF INNER DOOR AS SHOWN

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES DECIMALS TO TWO PLACES .XX ± 0.010 .XXX ± 0.005 FRACTIONS TO NEAREST 1/32" DO NOT SCALE DRAWING		© RAILWAY EQUIPMENT CO. 2020	
RAILWAY EQUIPMENT CO. MINNEAPOLIS, MINNESOTA (763) 972-2200		DRAWING NO: 92-41C0212-110A	
TITLE: ELECTRIC HEATER CONTROL, 922, 480V, 1PH, 2 OUTPUT, W/ POLE MOUNT ENCLOSURE		DWG SIZE: B	
LAST UPDATED: 9/7/2021		SHEET 3 OF 4	
BY: cwarderson		REVISION: A	
MATERIAL: NA		SCALE: 1/6	
BEND ALLOWANCE: NA			

CUSTOMER POWER CONNECTIONS

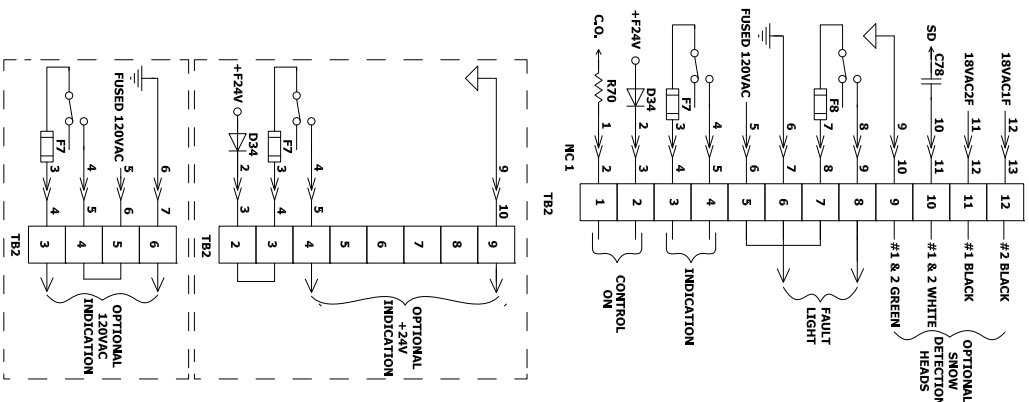
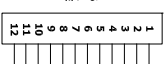
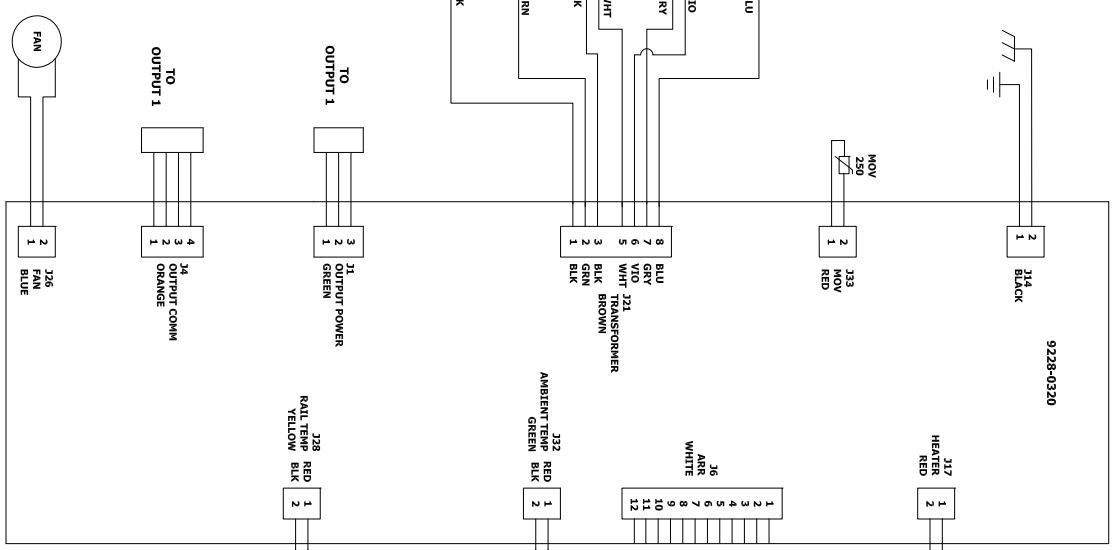
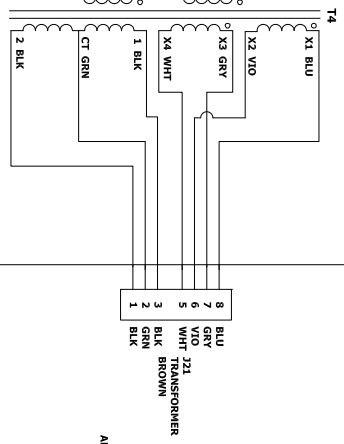
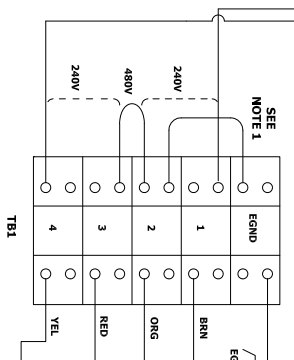


TO OUTPUTS
SEE NOTE 2

- NOTES:**
- CONNECT WIRE FROM EGN2D TO POWER TERMINAL BLOCK #2 ONLY FOR 480VAC. 1Ø POWER WITH 0 (ZERO) VAC FROM EITHER LEG TO NEUTRAL/GND. DO NOT CONNECT FOR 480VAC 1Ø THAT USES 2 LEGS OF A 3Ø.
 - WIRE SYSTEM WITH A WYE NEUTRAL. DO NOT CONNECT FOR 3Ø POWER OR WHERE THERE IS 277VAC FROM ANY LEG TO GND OR NEUTRAL.
 - THE POWER WIRING FOR EACH SECTION IS LISTED BELOW.

OUTPUT	1 PHASE	2	3 PHASE	2
1	L1	L2	L1	L2
2	L2	L1	L2	L1
3	L1	L2	L3	L1
4	L2	L1	L2	L1
5	L1	L2	L3	L2
6	L2	L1	L1	L2
7	L1	L2	L1	L2
8	L2	L1	L2	L3
9	L1	L2	L3	L1
10	L2	L1	L2	L2

2 X 6GA



NOTE: ALL WIRES ARE 18GA UNLESS SPECIFIED

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
DECIMALS ANGULAR
X.X 0.010 FRACTIONS
.X DO NOT SCALE DRAWING

DATE: 9/7/2021

DESIGNER: cwarden

DATE: 9/7/2021

SCALE: 1:1

DWG NO: R9224-54138

REV: 8

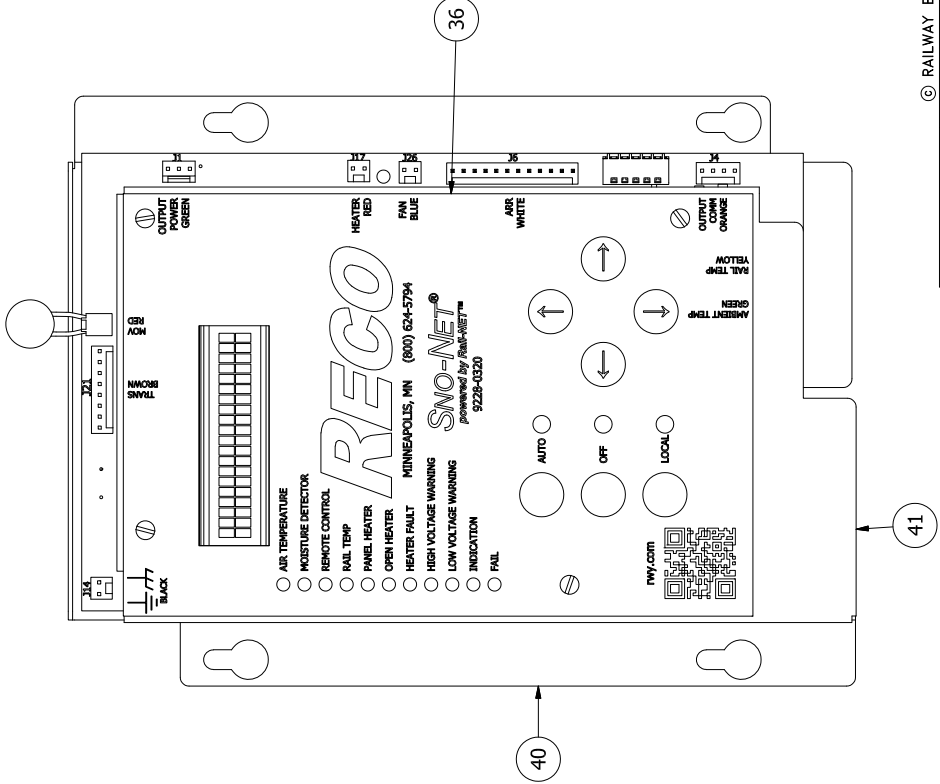
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MINNEAPOLIS, MINNESOTA
(763) 972-2200

DIAGRAM, 922, SCHEMATIC/CONNECTION

PARTS LIST					
ITEM	PART NUMBER	REV	QTY	UOM	DESCRIPTION
1	14155	-	1	EA	BAG, 12" X 18" 6 MIL ANTI-STATIC POLY
1	15019	-	1	EA	CAP, 470uF/63V 20% RADIAL
2	15074	-	2	EA	CAP, 4700uF 35V RADIAL
3	15078	-	1	EA	CAP 1500uF 25V TH 20% RADIAL
4	21013	-	1	EA	HEADER, 8 POS
5	21014	-	1	EA	HEADER, 3 POS
6	21082	-	1	EA	HEADER, 6 POS
7	21084	-	1	EA	CONNECTOR, HEADER, 24 POS
8	2120-0512	-	1	EA	CONNECTOR, HEADER, 12 POS
9	2120-0524	-	1	EA	CONNECTOR, HEADER, 16 POS DUAL
10	21211	-	1	EA	CONNECTOR, HEADER, 4 POS
11	21213	-	4	EA	CONNECTOR HEADER, 2 POS
12	2600913600	-	2	EA	STANDOFF, 8-32 X 7/16", 1/4" HEX STANDOFF
13	2800140000	-	1	EA	FUSE, 10A
14	28044	-	4	EA	STANDOFF, 6-32X1/4X1 M/F
15	2831211106	-	4	EA	SCREW, #6-32 X 3/8 PAN SLT
16	2831311104	-	2	EA	SCREW, #8-32 X 1/4 PAN SLT
17	29091	-	2	EA	NUT, #8-32 KEPS
18	31216	-	2	EA	CONNECTOR, HEADER THERMOCOUPLE
19	4500051200	-	1	EA	ISOLATED MODULE DC DC CONVERTER 3.3V 500MA THRU
20	45194	-	1	EA	RELAY, 2 POLE 24VDC
21	45196	-	4	EA	RELAY 24VDC SPDT
22	47123	-	2	EA	RES, 15K 2W 5% AXIAL
23	48069	-	4	EA	RECTIFIER, SILICON 10A
24	5111-0151	-	1	EA	FUSE, RESETTABLE, 60V 1.6AMP
25	5111-0157	-	2	EA	FUSE, RESETTABLE 72V 2.5AMP
26	51168	-	1	EA	FUSE, MINI HOLDER
27	5121-0500	-	4	EA	FUSE HOLDER, 3AG HORIZONTAL
28	651326	-	4	EA	FUSE MDA 6AMP
29	8410017100	-	1	EA	RES 2.49K 1/2W 1% TH AXIAL
30	8420004200	-	4	EA	COVER, FUSE 3AG VINYL
31	8460018000	-	1	EA	CON 25 PIN HEADER CONNECTOR 0.050" (1.27MM) TH
32	8460019400	-	1	EA	CON RECEPT 6POS 18AWG
33	8460019500	-	1	EA	CONN STRAIN RELIEF COVER 6POS
34	8490004000	-	1	EA	INRUSH CURRENT LIMITER 50 OHMS ±25% 4A 0.906"
35	8490004200	-	4	EA	BRD SPT SNAP LOCK NYLON 16MM
36	9221-0025C	C	1	EA	922 MODULE MEMBRANE OVERLAY
37	9228-0061A	A	1	EA	MOV ASSY, 922 CONTROL
38	9228-3607C	C	1	EA	922 MASTER GEN 3
39	9330-0028A	A	1	EA	MODULE DISPLAY
40	933448C	C	1	EA	BASE, CONTROL MODULE W / TC
41	933456C	C	1	EA	COVER, CONTROL MODULE

REVISION HISTORY				
REV	ECO #	DESCRIPTION	DATE	BY
A	-	NEW PART	7/22/2019	VMAS
B	-	CHANGED TO BASE WITH PEM'S	11/1/2019	AK
C	-	9228-3607B TO 9228-3607C	4/27/2020	AK
-	-	9221-0025B TO C	05/25/2021	AK



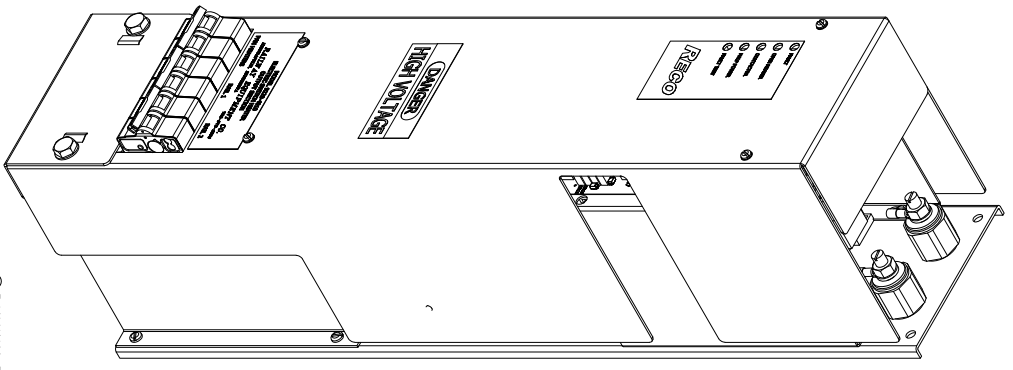
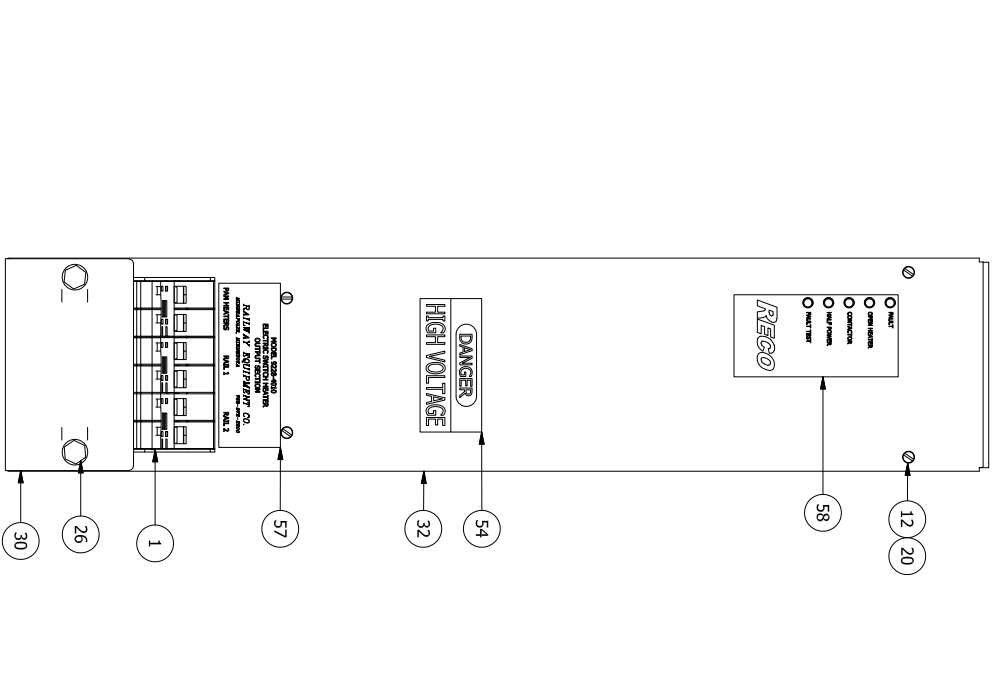
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RAILWAY EQUIPMENT CO.
 MINNEAPOLIS, MINNESOTA (763) 972-2200
 TITLE: CONTROL MODULE, 922
 UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN INCHES
 DECIMALS: 1/1000 INCHES
 FRACTIONS: 1/16, 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1 1/8, 1 1/4, 1 1/2, 1 3/4, 1 7/8, 2, 2 1/4, 2 1/2, 2 3/4, 3, 3 1/4, 3 1/2, 3 3/4, 4, 4 1/4, 4 1/2, 4 3/4, 5, 5 1/4, 5 1/2, 5 3/4, 6, 6 1/4, 6 1/2, 6 3/4, 7, 7 1/4, 7 1/2, 7 3/4, 8, 8 1/4, 8 1/2, 8 3/4, 9, 9 1/4, 9 1/2, 9 3/4, 10
 TOLERANCES: DIMENSIONS: ±0.005 INCHES
 HOLE DIA: ±0.005 INCHES
 LAST UPDATED: 3/25/2021
 BY: akollman
 MAT'L: N/A
 BEND ALLOWANCE: N/A
 SCALE: 1/1.75 DWG SIZE: B
 SHEET 1 OF 3

ITEM	PART NUMBER	REV	UOM	QTY	DESCRIPTION
1	1300748900	-	EA	3	CIRCUIT BREAKER, 2 POLE, .63 AMP 480 VOLT RESISTIVE
2	21019	-	EA	1	STRAIN RELIEF, 8 POS
3	21023	-	EA	1	STRAIN RELIEF, 3 POS
4	21205	-	EA	1	PLUG, KEYING
5	2600904300	-	EA	2	STANDOFF, 6-32X1/4X2 MIF STEEL
6	2600979300	-	EA	2	NUT, 1/4-20, CLIP ON STEEL, BLACK PHOSPHATE
7	28104	-	IN	5	DIN MOUNTING RAIL 35MM
8	28145	-	EA	6	STANDOFF, 6-32 X 1/2 F.F. STEEL
9	28146	-	EA	2	STANDOFF, 6-32X1/4X1 MIF STEEL
10	28147	-	EA	4	STANDOFF, 6-32 X 1/2 F.F. STEEL
11	2831211104	-	EA	6	SCREW, #6-32 X 1/4 PAN SLT
12	2831211106	-	EA	6	SCREW, #6-32 X 3/8 PAN SLT
13	2831311104	-	EA	8	SCREW, #8-32 X 1/4 PAN SLT
14	2831311106	-	EA	3	SCREW, #8-32 X 3/8 PAN SLT
15	2831311108	-	EA	2	SCREW, #8-32 X 1/2 PAN SLT
16	2831311110	-	EA	6	SCREW, #8-32 X 5/8 PAN SLT
17	2831641118	-	EA	2	SCREW, 5/16-18 X 1-1/4, SET
18	2832-6101	-	EA	2	NUT, 5/16-18 HEX
19	2832-6301	-	EA	2	NUT, #6-32 KEYS
20	2833-2410	-	EA	10	WASHER, #6 INT, STAR
21	2833-3110	-	EA	12	WASHER, #8 FLAT SAE
22	2833-3310	-	EA	2	WASHER, #8 EXT, STAR
23	2833-6110	-	EA	2	WASHER, 5/16 FLAT SAE
24	2833-6210	-	EA	2	WASHER, 5/16 FLAT SAE
25	2841-0601	-	EA	2	STANDOFF, 5/16-18 INSULATED 60AMP CHGR
26	29051	-	EA	2	BOLT, 1/4-20 X 1/2 WITH 1/2 HD
27	29091	-	EA	2	NUT, #8-32 KEYS
28	29104	-	EA	2	CLAMP, DIN MOUNT END
29	39220A	-	EA	1	CHASSIS PLATE, OUTPUT SECTION
30	39221B	-	EA	1	REMOVABLE TERMINAL COVER
31	39223B	-	EA	1	OUTPUT SECTION CB MOUNT
32	39224B	-	EA	1	COVER OUTPUT SECTION FULL
33	4000074200	-	EA	1	CONNECTOR, HOUSING 8 POS, .156 ALIGNMENT TAB
34	4000074400	-	EA	1	CONNECTOR, HOUSING 3 POS, .156 ALIGNMENT TAB

ITEM	PART NUMBER	REV	UOM	QTY	DESCRIPTION
53	681831	-	IN	143	WIRE, 18GA 600V THINWALL BLACK
54	8039-0806A	-	EA	1	LABEL, HIGH VOLTAGE
55	9220-0021A	-	EA	1	922 CONTACTOR SHIELD
56	9228-3513A	-	EA	1	OUTPUT SECTION PC BD ASSY 3 CIRCUIT
57	R9228-4010B	-	EA	1	LABEL, 922 OUTPUT SECTION
58	R92291B	-	EA	1	LABEL, OUTPUT SECTION

ITEM	PART NUMBER	REV	UOM	QTY	DESCRIPTION
35	4745-0101	-	EA	1	RES, 1200 OHM 40W
36	48603	-	EA	3	MOV, 600VAC 6500A
37	5400489900	-	EA	3	CONTRACTOR, 4POLE 32 AMP 230V COIL 9 AMP INDUCTIVE
38	5400491000	-	EA	3	RC SUPPRESSOR 110-280V
39	56052	-	EA	1	TRANSFORMER, CURRENT COIL
40	56062	-	EA	1	CURRENT COIL 100A AC
41	6031-0101	-	EA	2	LUG, FORK #6, 16-14GA NYLON
42	6031-0102	-	EA	4	LUG, FORK #6-22, 18GA NYLON
43	6032-0111	-	EA	1	LUG, RING #10, 16-14GA NYLON
44	6034-0111	-	EA	1	LUG, PUSH-ON F, 250 22-18GA
45	6034-0113	-	EA	1	LUG, PUSH-ON F, 250 16-14GA
46	6034-0200	-	EA	12	LUG, RING 5/16 22-18GA NYLON
47	6037-0207	-	EA	2	LUG, RING 5/16" 12-10 VINYL
48	6090-0102	-	EA	2	CABLE TIE MOUNTS
49	6093-0100	-	EA	6	CABLE TIE, 4IN 0.10 WIDTTH
50	6093-0102	-	EA	2	TY-RAP
51	681001	-	IN	261	WIRE, 10GA BLACK 600V 105C
52	681601	-	IN	5	WIRE, 16GA GREEN - HOOK UP

REV	ECO #	DESCRIPTION	DATE	BY
A	-	NEW PART	6/7/2019	CA
-	21-018	ADDED LOCATION FOR PC BD ASSEMBLY LABEL, PN 39221A TO B, 39224A TO B	1/28/2021	AK
-	-		5/21/2021	CA



UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN INCHES
 DIMENSIONS IN ANGULAR
 DECIMALS ARE TO BE IN
 FRACTIONS
 .XX AND .0100 ARE TO BE
 TO NOT SCALE DRAWING
 DRAWN: JTHEISEN
 DATE: 9/6/2019
 WRT: N/A
 TENG: VALZAINCZE
 N/A

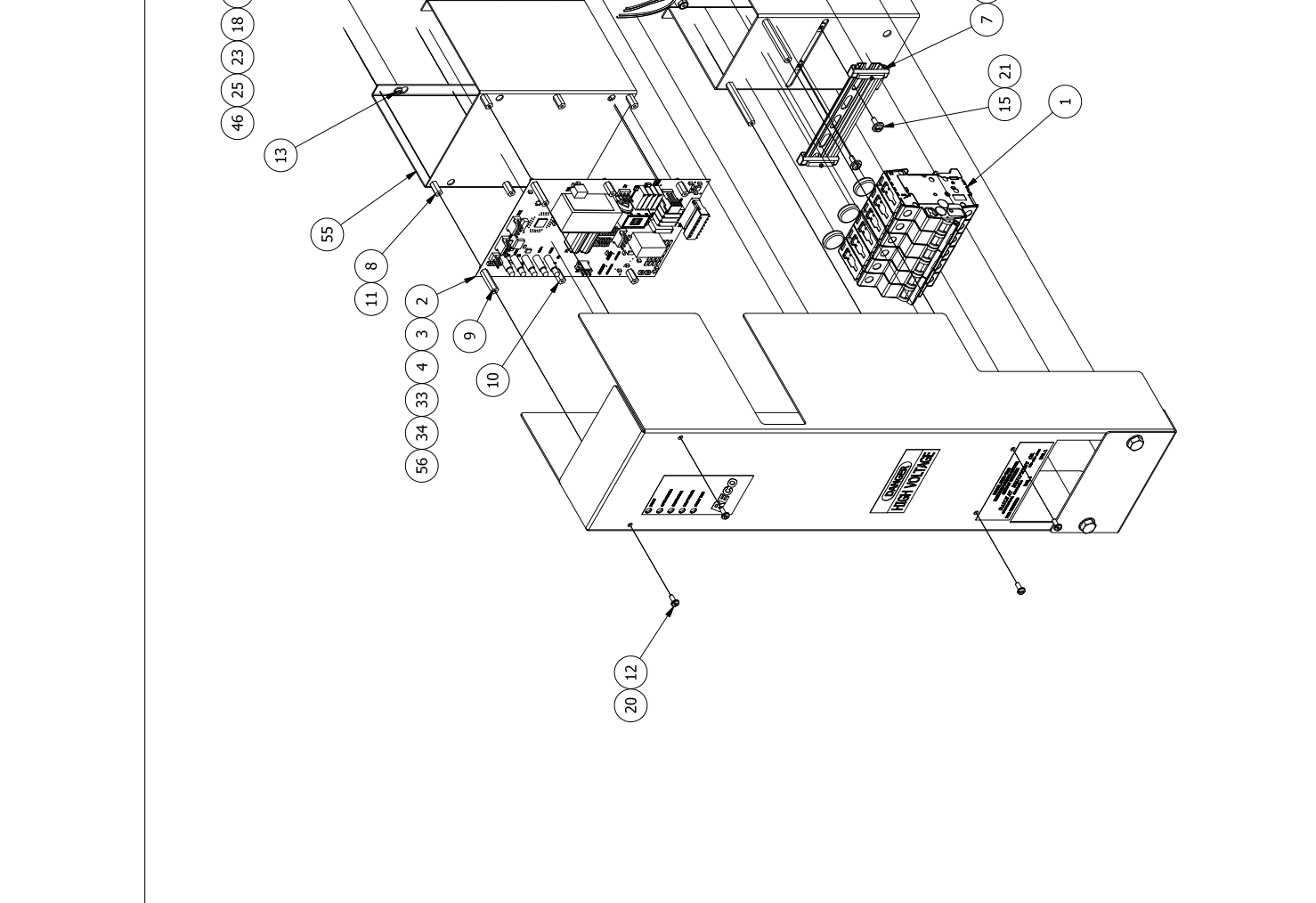
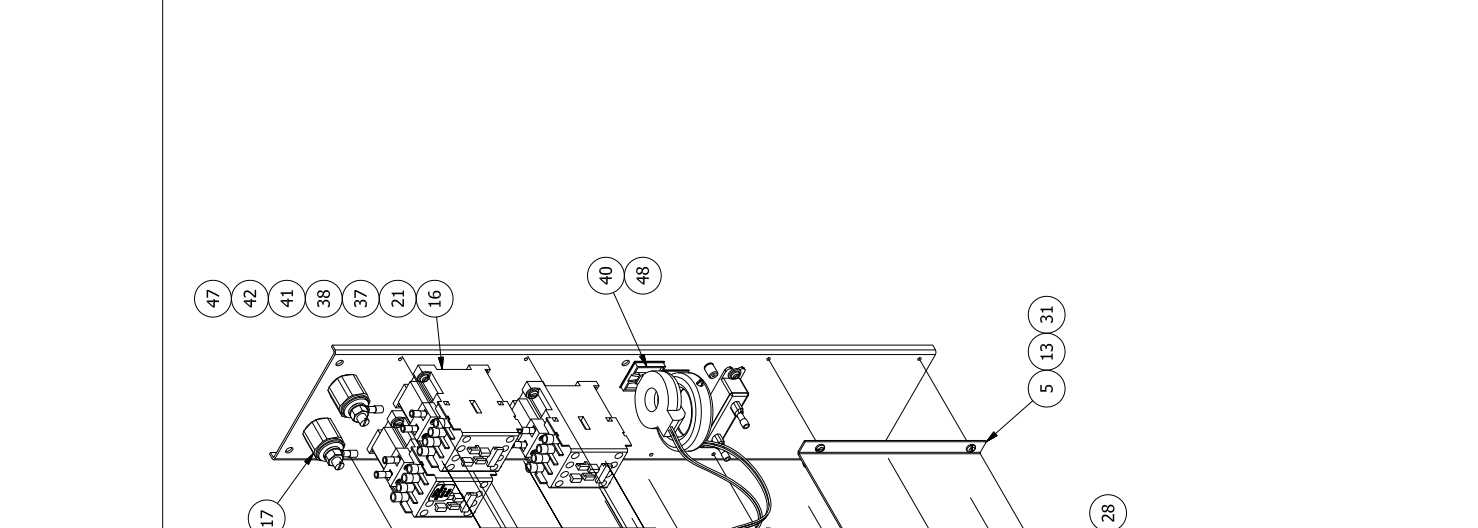
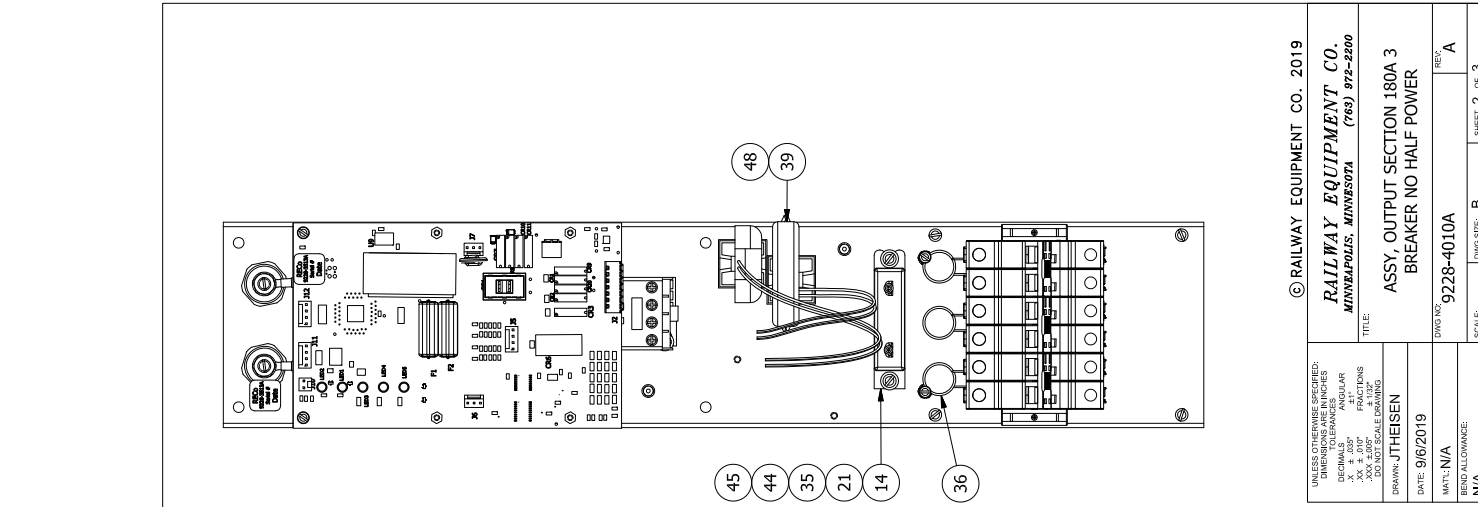
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RAILWAY EQUIPMENT CO.
 MINNEAPOLIS, MINNESOTA (763) 872-4200

TITLE:
 ASSY, OUTPUT SECTION 180A 3
 BREAKER NO HALF POWER

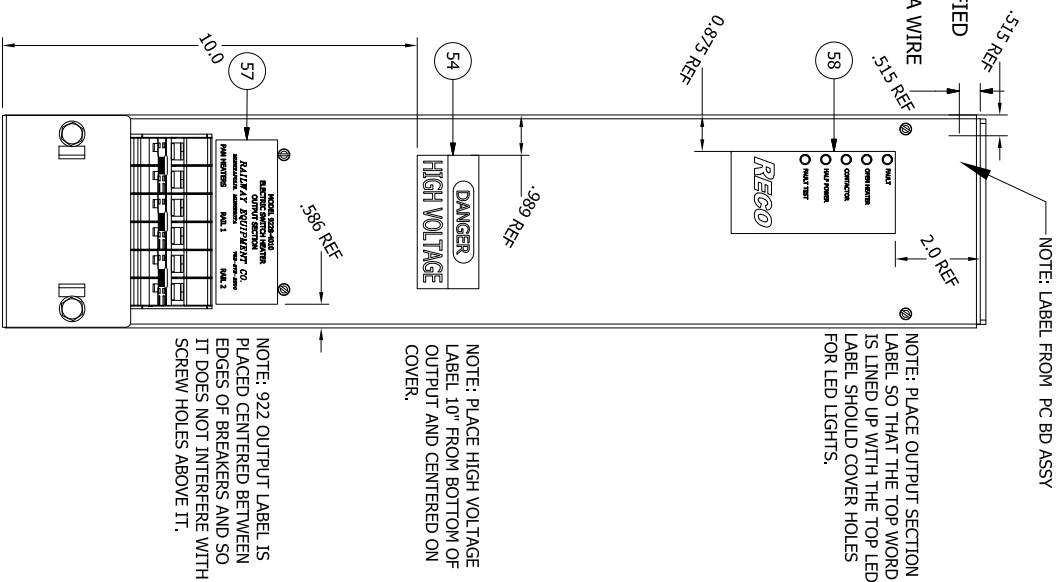
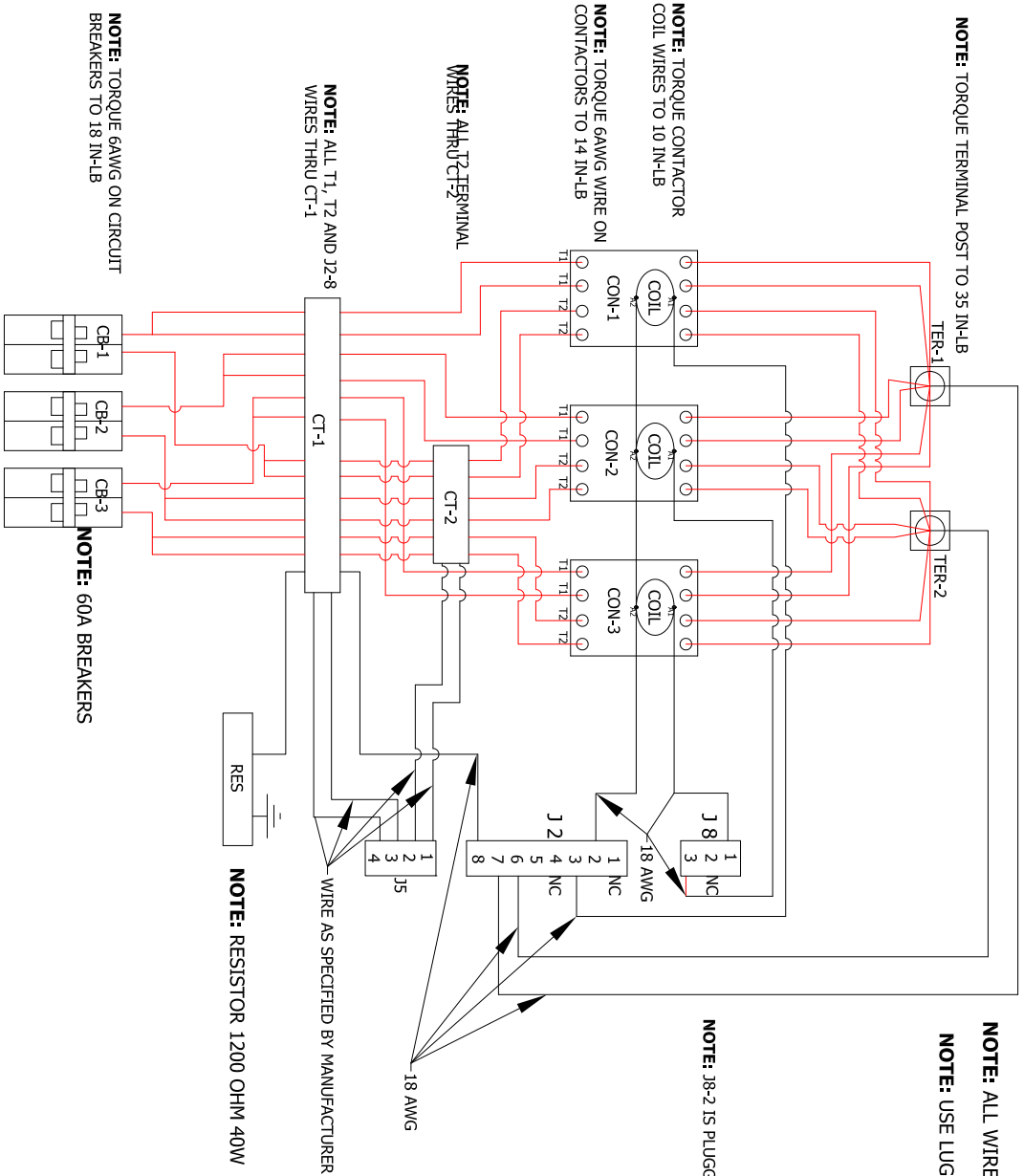
DWG NO: 9228-4010A
 SCALE: 1/3
 DWG SER: B
 SHEET 1 OF 3
 REC: A

UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN INCHES
 DECIMALS - FRACTIONS
 ANGULAR - ANGULAR
 .XX, .X, .010" - FRACTIONS
 .XX, .X, .010" - FRACTIONS
 .001 NOT SCALE DRAWING
 .001 NOT SCALE DRAWING

DATE: 9/6/2019
 DWG NO: 9228-4010A
 TITLE: ASSY, OUTPUT SECTION 180A 3 BREAKER NO HALF POWER
 DRAWN: JTHEISEN
 CHECKED: [blank]
 SCALE: [blank]
 SHEET 2 OF 3



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 MINNEAPOLIS, MINNESOTA
 (763) 972-2200
 TITLE:
 ASSY, OUTPUT SECTION 180A 3
 BREAKER NO HALF POWER
 DWG NO: 9228-4010A
 DATE: 9/6/2019
 DRAWN: JTHEISEN
 CHECKED: [blank]
 SCALE: [blank]
 SHEET 2 OF 3



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES DECIMALS .0005" ANGULAR XX, 4 010" FRACTIONS 300 KNOT SCALE DRAWING		RAILWAY EQUIPMENT CO. MINNEAPOLIS, MINNESOTA (763) 972-4200	
DRAWN: JTHEISEN		TITLE: ASSY, OUTPUT SECTION 180A 3 BREAKER NO HALF POWER	
DATE: 9/6/2019		DWG NO: 9228-4010A	
WRT: N/A		REV: A	
TEND: ALCORINCE		SCALE: 1/3	
M/A		DWG SER: B	
		SHEET 3 OF 3	

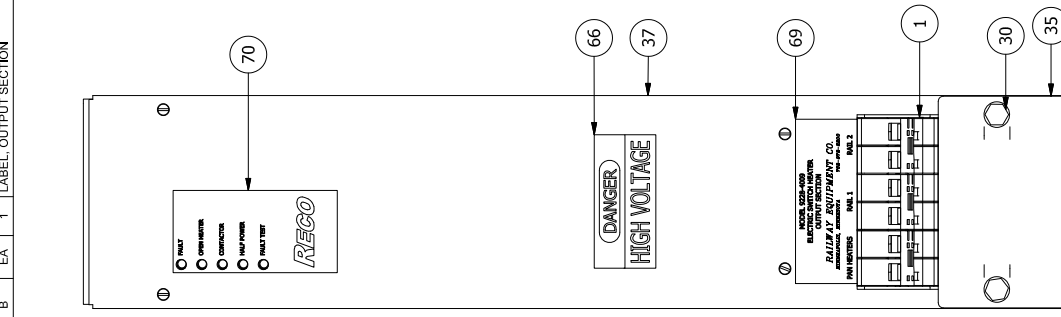
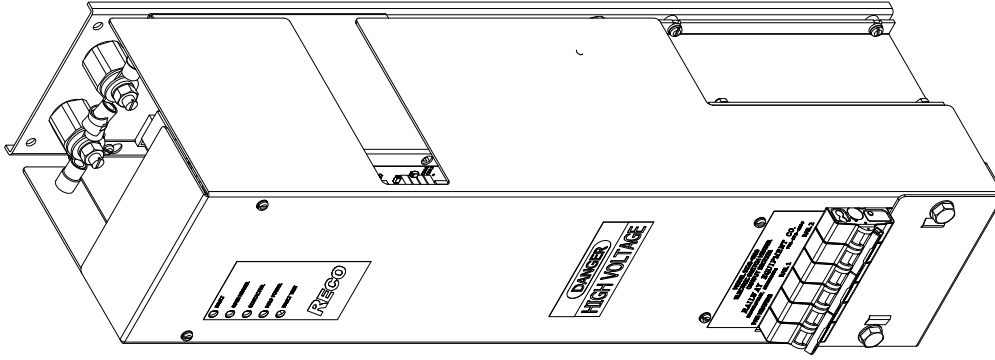
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REV	ECO #	DESCRIPTION	DATE	BY
A	-	NEW PART	6/7/2019	CA
-	-	ADDED LOCATION FOR PC BD ASSY LABEL	01/28/2021	AK
-	-	PN 39221A TO B, 39224A TO B	5/21/2021	CA

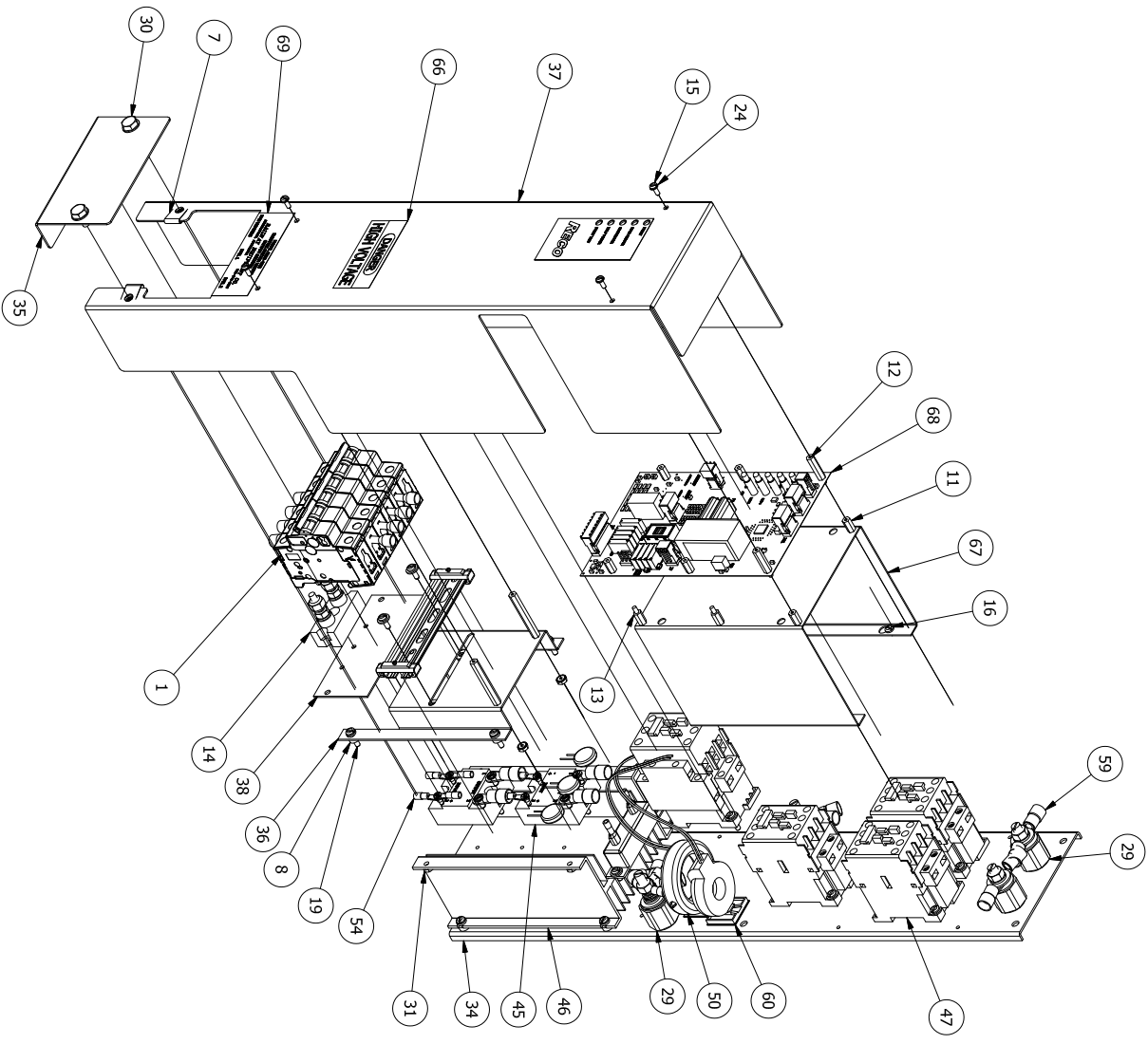
ITEM	PART NUMBER	REV	UOM	QTY	DESCRIPTION
66	8039A0806A	A	EA	1	LABEL, HIGH VOLTAGE
67	9229-0021A	A	EA	1	922 CONTACTOR SHIELD
68	9228-3513A	A	EA	1	OUTPUT SECTION PC BD ASSY 3 CIRCUIT
69	R9228-4009B	B	EA	1	LABEL, 922 OUTPUT SECTION
70	R92291B	B	EA	1	LABEL, OUTPUT SECTION

ITEM	PART NUMBER	REV	UOM	QTY	DESCRIPTION
1	1300749900	-	EA	3	CIRCUIT BREAKER, 2 POLE, 65 AMP 480 VOLT RESISTIVE
2	21019	-	EA	1	STRAIN RELIEF, 8 POS
3	21021	-	EA	1	STRAIN RELIEF, 2 POS
4	21023	-	EA	2	STRAIN RELIEF, 3 POS
5	21222	-	EA	3	STRAIN RELIEF, 4 POS
6	2600904300	-	EA	2	STANDOFF, 6-32X1/4X2 MIF STEEL
7	2600979300	-	EA	2	NUT, 1/4-20, CLIP ON, STEEL, BLACK PHOSPHATE
8	280066	-	EA	4	WASHER, .37 X .21 X .16 NYLON
9	29087	-	EA	8	BUSHING, NYLON, #8 X 1/4
10	28104	-	IN	5.5	DIN MOUNTING RAIL, 35MM
11	28145	-	EA	6	STANDOFF, 6-32 X 1/2 P/F STEEL
12	28146	-	EA	2	STANDOFF, 6-32X1/4X1 MIF STEEL
13	28147	-	EA	4	STANDOFF, 6-32 X 1/2 F.M. STEEL
14	28175A	A	EA	1	TERMINAL ASSY, 2 POS AAR
15	2831211106	-	EA	12	SCREW, #6-32 X 3/8 PAN SLT
16	2831311104	-	EA	4	SCREW, #6-32 X 1/4 PAN SLT
17	2831311106	-	EA	3	SCREW, #6-32 X 3/8 PAN SLT
18	2831311108	-	EA	10	SCREW, #6-32 X 1/2 PAN SLT
19	2831311110	-	EA	12	SCREW, #6-32 X 5/8 PAN SLT
20	2831411108	-	EA	2	SCREW, #10-32 X 1/2 PAN SLT
21	2831641118	-	EA	4	SCREW, 5/16-18 X 1-1/4, SET
22	283246101	-	EA	4	NUT, 5/16-18 HEX
23	283246301	-	EA	2	NUT, #6-32 KEPS
24	2833-2410	-	EA	10	WASHER, #6 INT, STAR
25	2833-3110	-	EA	14	WASHER, #8 FLAT SAE
26	2833-3310	-	EA	2	WASHER, #8 EXT, STAR
27	2833-6110	-	EA	4	WASHER, 5/16 FLAT SAE
28	2833-6210	-	EA	4	WASHER, 5/16 SPLIT LOCK
29	2841-0601	-	EA	4	STANDOFF, 5/16-18 INSULATED 60AMP CHGR
30	29051	-	EA	2	BOLT, 1/4-20 X 1/2 WITH 1/2 HD
31	29091	-	EA	6	NUT, #6-32 KEPS
32	29104	-	EA	2	CLAMP, DIN MOUNT END
33	3100103900	-	EA	8	LUG, FERRULE, #6GA, 18MM INSULATED
34	39220A	A	EA	1	CHASSIS PLATE, OUTPUT SECTION
35	39221B	B	EA	1	REMOVABLE TERMINAL COVER
36	39222B	B	EA	1	OUTPUT SECTION CB MOUNT
37	39223B	B	EA	1	COVER OUTPUT SECTION FULL
38	39225A	A	EA	1	OUTPUT, TERMINAL MOUNTING PLATE, 16 GA GALV
39	4000074000	-	EA	3	CONNECTOR, HOUSING 4 POS, 156 ALIGNMENT TAB
40	4000074200	-	EA	1	CONNECTOR, HOUSING 8 POS, 156 ALIGNMENT TAB
41	4000074500	-	EA	2	CONNECTOR, HOUSING 3 POS, 156 ALIGNMENT TAB
42	4000074500	-	EA	1	CONNECTOR, HOUSING 2 POS, 156 ALIGNMENT TAB
43	4745-0102	-	EA	3	RES, 600 OHM 40W
44	48603	-	EA	3	MOV, 600VAC 6500A
45	48906	-	EA	2	SCR, 75A 480V 4-30/DC
46	53105B	B	EA	1	HEATSINK, 922 OUTPUT
47	5400469900	-	EA	3	CONTRACTOR, 4 POLE 32 AMP 230V COIL 9 AMP INDUCTIVE
48	5400490100	-	EA	1	CONTRACTOR, 4 POLE 65 AMP 230V COIL 30 AMP INDUCTIVE
49	5400491000	-	EA	3	RC SUPPRESSOR, 110-280V
50	56052	-	EA	1	TRANSFORMER, CURRENT COIL
51	56062	-	EA	1	CURRENT COIL, 100A AC
52	60175	-	IN	2	TUBING, 18 GA ID
53	6032-0117	-	EA	8	LUG, RING 1/4 12-10GA VINYL
54	6032-0121	-	EA	6	LUG, RING #6 22-18GA VINYL
55	6034-0125	-	EA	2	LUG, RING #8 22-18GA VINYL
56	6034-0111	-	EA	4	LUG, PUSH-ON F, 250 22-18GA
57	6036-0206	-	EA	4	LUG, RING #10 6GA VINYL
58	6036-0207	-	EA	8	LUG, RING 1/4 6GA VINYL
59	6036-0208	-	EA	4	LUG, RING 5/16 6GA NYLON
60	6090-0102	-	EA	2	CABLE TIE MOUNTS
61	6093-0100	-	EA	6	CABLE TIE, .4IN 0.10 WIDTH
62	6093-0102	-	EA	2	TY-RAP
63	680001	-	IN	28	WIRE, 18GA WHITBLK TWISTED PR.
64	681001	-	IN	38	WIRE, 10GA BLACK 600V 105C
65	681812	-	IN	111	WIRE, 18GA THINWALL BLACK 600V

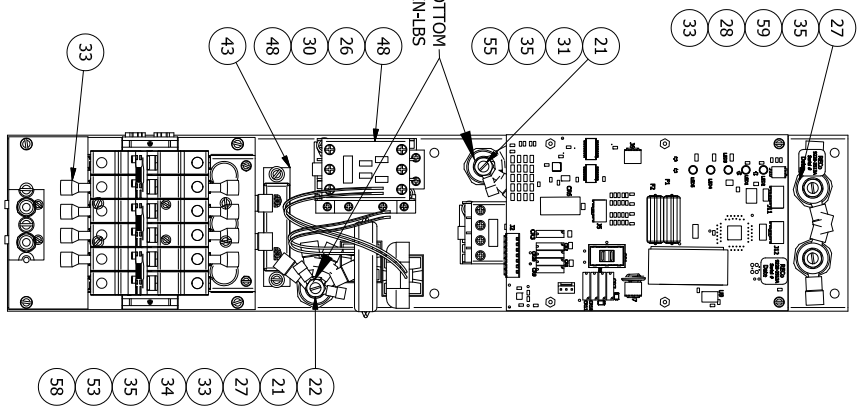
PARTS LIST					
ITEM	PART NUMBER	REV	UOM	QTY	DESCRIPTION
66	8039A0806A	A	EA	1	LABEL, HIGH VOLTAGE
67	9229-0021A	A	EA	1	922 CONTACTOR SHIELD
68	9228-3513A	A	EA	1	OUTPUT SECTION PC BD ASSY 3 CIRCUIT
69	R9228-4009B	B	EA	1	LABEL, 922 OUTPUT SECTION
70	R92291B	B	EA	1	LABEL, OUTPUT SECTION



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES DECIMALS TO TWO PLACES FRACTIONS TO 1/32" DIMENSIONS IN PARENTHESES ARE FOR INFORMATION ONLY DRAWN: CWANDERSON		© RAILWAY EQUIPMENT CO. 2020	
TITLE ASSY, OUTPUT SECTION 240V, 180A 3 BREAKER W HALF POWER		RAILWAY EQUIPMENT CO. MINNEAPOLIS, MINNESOTA (763) 972-2200	
DATE: 6/11/2019	DWG NO: 9228-4009A	REV: A	
MATERIAL: N/A	SCALE: 1/3	DWG SIZE: B	SHEET 1 OF 3



APPLY RED LOCTITE ON BOTTOM
BOLT. TORQUE TO 35 IN-LBS



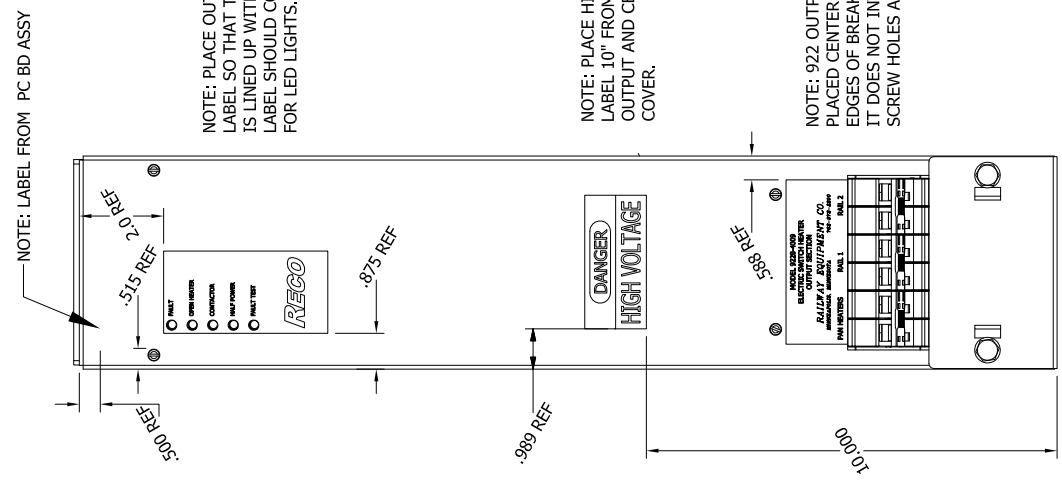
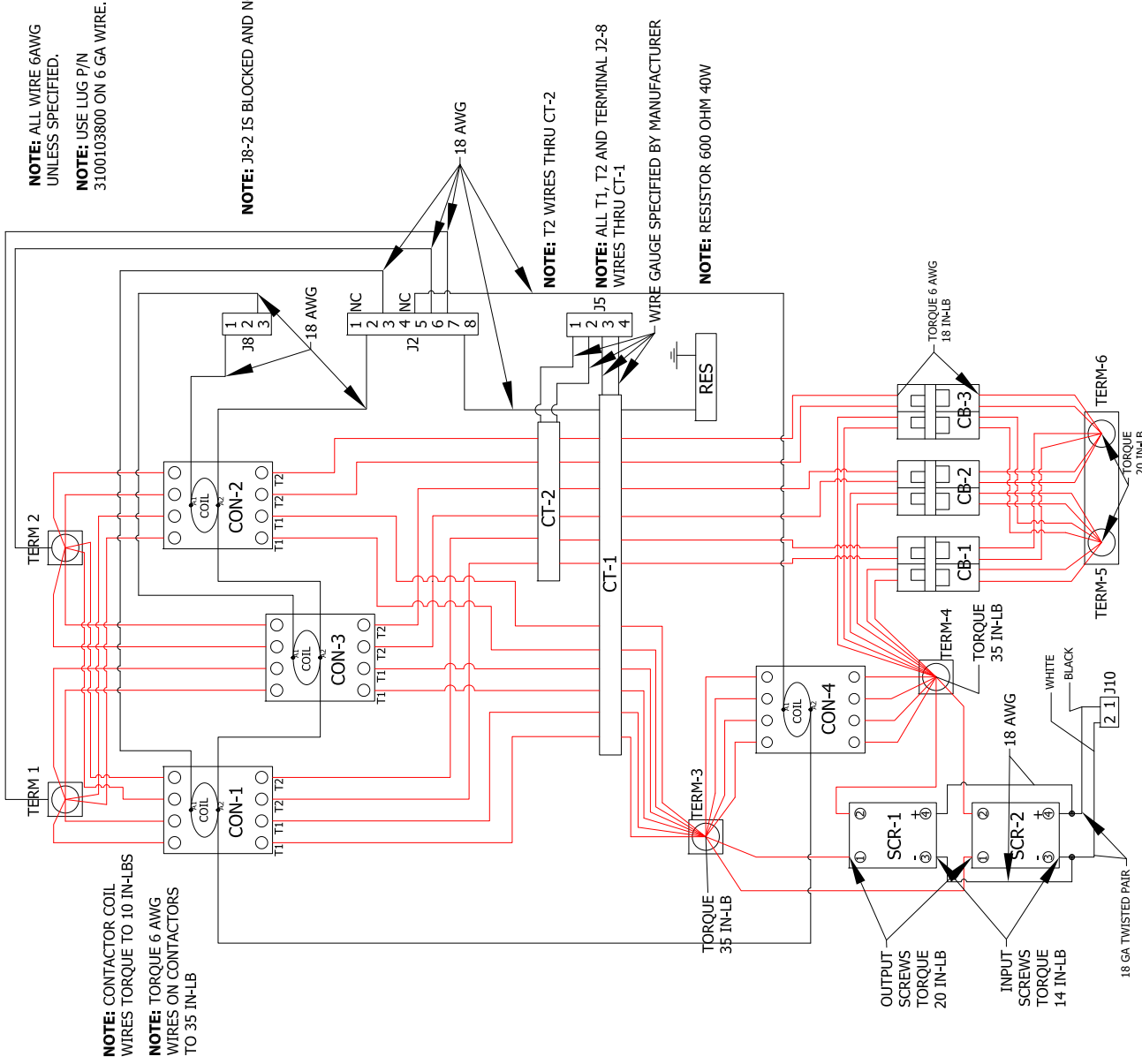
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MINNEAPOLIS, MINNESOTA (763) 972-4200

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
DECIMALS .0005 ANGULAR
X.X 4 010° FRACTIONS
30.000 SCALE DRAWING
DRAWN: GWANDERSON

DATE: 6/11/2019
TITLE: ASSY, OUTPUT SECTION 240V 1800A 3 BREAKER w/ HALF POWER

WARRANTY: N/A
TOLERANCE: N/A
DWG NO: 9228-4009A
SCALE: B
DWG SER: B
SHEET 2 OF 3
REV: A



UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN INCHES
 DECIMALS - FRACTIONS
 .XX - .99" FRACTIONS
 .XX - .99" FRACTIONS
 .00 NOT SCALE DRAWING

DRAWN: CWAnderson

DATE: 6/11/2019

REV: N/A

SCALE: N/A

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RAILWAY EQUIPMENT CO.
 MINNEAPOLIS, MINNESOTA (763) 972-2200

TITLE: ASSY, OUTPUT SECTION 240V 180A 3 BREAKER W HALF POWER

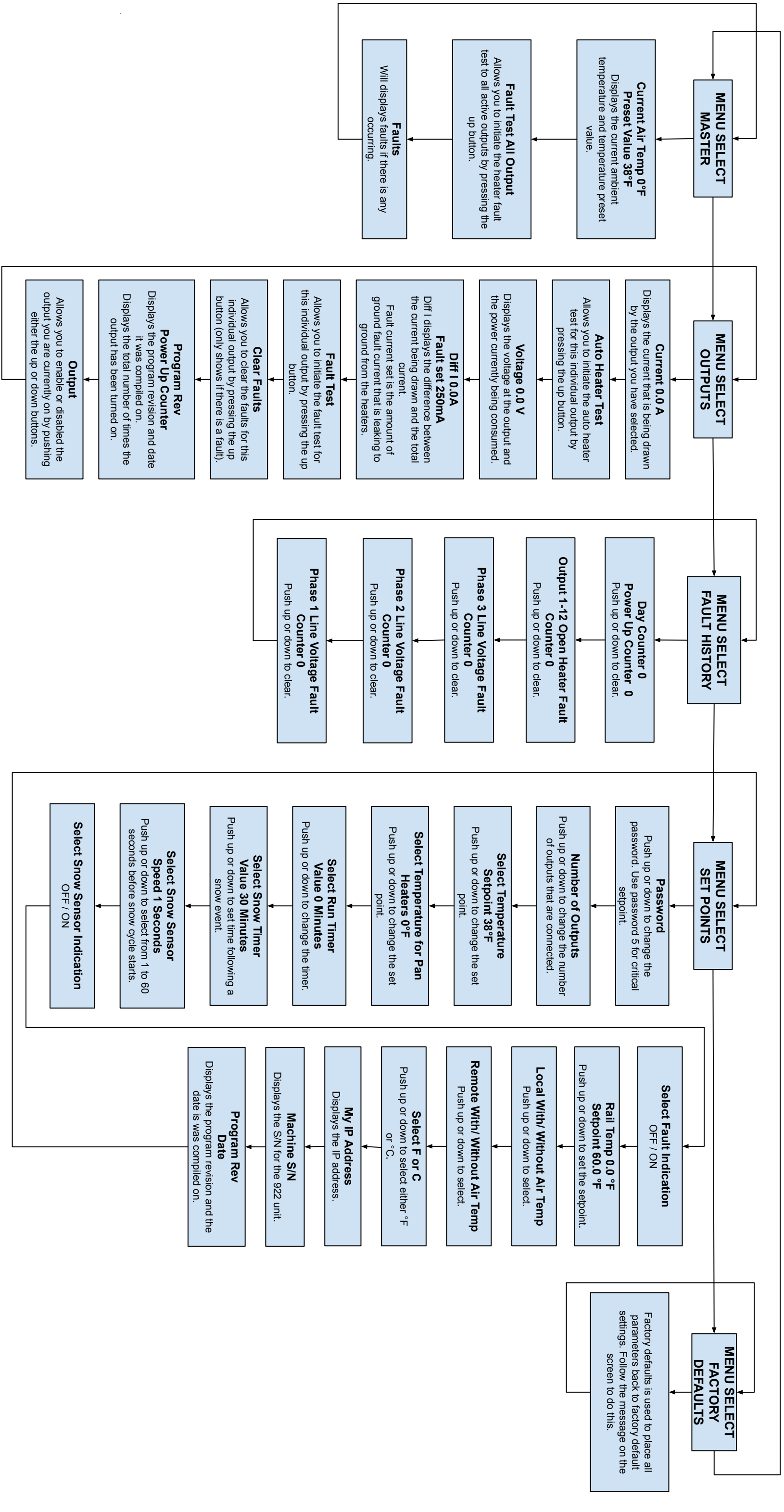
DWG NO: 9228-4009A

REV: A

SCALE: 1/3

DWG SIZE: B

SHEET 3 OF 3



MENU SELECT MASTER

MENU SELECT OUTPUTS

MENU SELECT FAULT HISTORY

MENU SELECT SET POINTS

MENU SELECT FACTORY DEFAULTS

Current Air Temp 0°F
Preset Value 38°F
Displays the current ambient temperature and temperature preset value.

Fault Test All Output
Allows you to initiate the heater fault test to all active outputs by pressing the up button.

Faults
Will displays faults if there is any occurring.

Current 0.0 A
Displays the current that is being drawn by the output you have selected.

Auto Heater Test
Allows you to initiate the auto heater test for this individual output by pressing the up button.

Voltage 0.0 V
Displays the voltage at the output and the power currently being consumed.

Diff I 0.0A
Diff I displays the difference between the current being drawn and the total current.
Fault current set is the amount of ground fault current that is leaking to ground from the heaters.

Fault Test
Allows you to initiate the fault test for this individual output by pressing the up button.

Clear Faults
Allows you to clear the faults for this individual output by pressing the up button (only shows if there is a fault).

Program Rev Power Up Counter
Displays the program revision and date it was compiled on.
Displays the total number of times the output has been turned on.

Output
Allows you to enable or disabled the output you are currently on by pushing either the up or down buttons.

Day Counter 0
Power Up Counter 0
Push up or down to clear.

Output 1-12 Open Heater Fault Counter 0
Push up or down to clear.

Phase 3 Line Voltage Fault Counter 0
Push up or down to clear.

Phase 2 Line Voltage Fault Counter 0
Push up or down to clear.

Phase 1 Line Voltage Fault Counter 0
Push up or down to clear.

Password
Push up or down to change the password. Use password 5 for critical setpoint.

Number of Outputs
Push up or down to change the number of outputs that are connected.

Select Temperature Setpoint 38°F
Push up or down to change the set point.

Select Temperature for Pan Heaters 0°F
Push up or down to change the set point.

Select Run Timer Value 0 Minutes
Push up or down to change the timer.

Select Snow Timer Value 30 Minutes
Push up or down to set time following a snow event.

Select Snow Sensor Speed 1 Seconds
Push up or down to select from 1 to 60 seconds before snow cycle starts.

Select Snow Sensor Indication
OFF / ON

Select Fault Indication
OFF / ON

Rail Temp 0.0 °F
Setpoint 60.0 °F
Push up or down to set the setpoint.

Local With/ Without Air Temp
Push up or down to select.

Remote With/ Without Air Temp
Push up or down to select.

Select F or C
Push up or down to select either °F or °C.

My IP Address
Displays the IP address.

Machine S/N
Displays the S/N for the 922 unit.

Program Rev Date
Displays the program revision and the date it was compiled on.

Factory defaults is used to place all parameters back to factory default settings. Follow the message on the screen to do this.