OEM Product Supplement

Aqua-Hot®

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Introduction

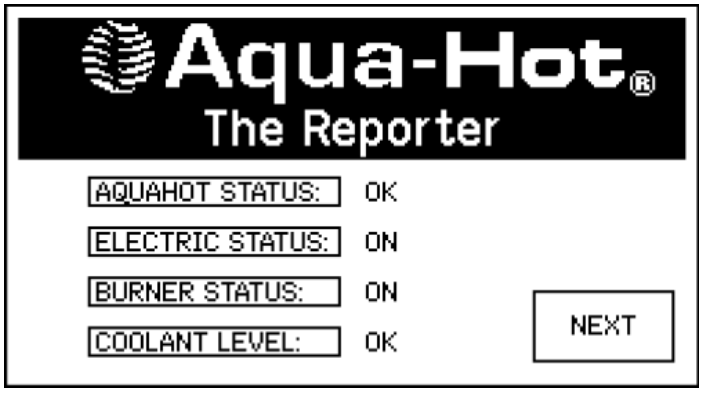
The Aqua-Hot Reporter is a replacement for our previous electronic controller. This unit controls all functions of your Aqua-Hot heating unit. In addition, the Reporter contains a host of diagnostic, testing, and fault detection tools in the event of operational issues. The use of these features is explained in detail in the next several pages.

Functionality

The Reporter was designed with a touch screen interface to simplify use. Screen navigation and access is completely standardized across all Aqua-Hot units containing a Reporter. Using this touch screen, it will be possible to log, diagnose, and test various functions of the Aqua-Hot heater.

Figure 1

Home Screens

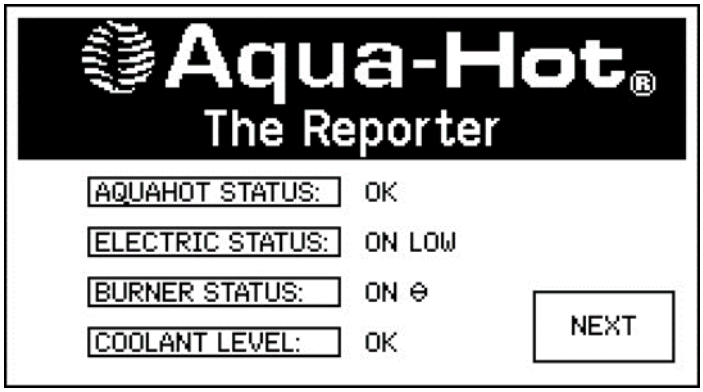


This screen indicates the current operational status of Aqua-Hot 400D and 450D units. This screen may show a Greek symbol theta (Θ) denoted next to burner status. This indicates that the unit is up to temperature, and not producing heat (standby.) Select "NEXT" to access the landing page. This is the "standby" or "time out" screen of the Reporter.

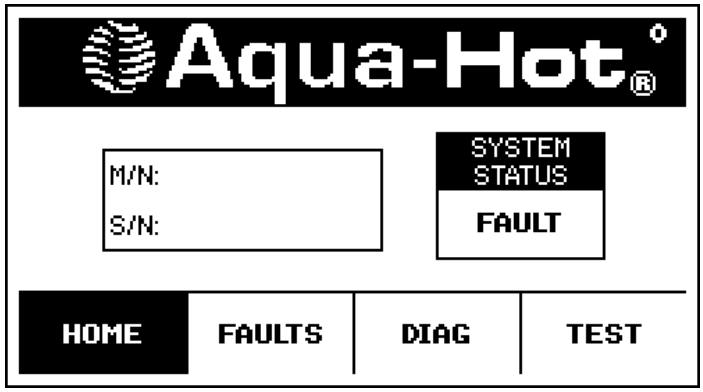
Features

The new Aqua-Hot touch screen diagnostic interface has been designed for ease of use by standardizing customer and technician facing diagnostics in an easy to understand format. The Reporter includes the following features

- Aqua-Hot model and serial number information
- Fault status
- Coach-side I/O diagnostic information
- Aqua-Hot I/O diagnostic information
- Heat testing
- Pump testing
- Fan testing
- Fault log



The status page for the Aqua-Hot 600D and 675D differs slightly from the 400D and 450D, as it includes "LOW" or "HIGH" indicating the current electric status of the electrical heating system.



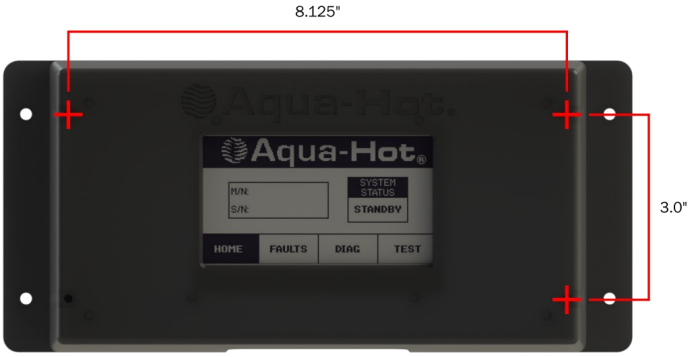
Depicted above is the landing screen. From here, you can access all of the Reporter's features, and access the model and serial numbers. This screen will be displayed upon wake-up.

Technical Information

Installation

The Aqua-Hot Reporter has been designed for two mounting positions within your coach. Dimensions for both surface mounting, and recessed mounting have been included below.

Surface mount dimensions shown above. Mount with #10 screw or larger



Recessed mount dimensions shown above. Mount with #6 screw.

Basic Electrical Characteristics

The Reporter contains a single Amphenol ATP family connector that serves as the power connection to your coach's 12V DC electrical system. It is to be operated within the below listed specifications.

Minimum Voltage:	11.0V DC
Maximum Voltage:	15.0V DC
Minimum Current:	75mA
Maximum Current:	15A

Input Load Currents

Zone thermostats (each)	appx. 1mA
Diesel-Burner switch	appx. 1mA
Electric Element switch	appx. 1mA
Low-level cutoff switch	appx. 8mA
Control thermostat	appx. 1mA
Low-temperature cutoff switch	appx. 1mA

Output Current Capacity

Zone fans (each)	2.0A max
Circulation pumps (each)	2.0A max
AC relay	500mA max
Burner power	6.0A max
Burner master control	2.0A max
Burner thermostat control	1.0A max

CAUTION

Wiring shall conform to illustrations, diagrams, and specifications in this manual. Deviations from the specification may damage or provide unsatisfactory operation and may void the warranty.

Connection Terminal Information

RVC Mating Connection		
Manufacturer	Part Number	Description
3M	37104-A165-00E-MB	RVC Mating Connector

12V DC Mating Connections		
	Deutsche	Amphenol
Pins:	1060-12-0222	AT60-12-0222
Housing:	DPT04-2P	ATP04-2P
Wedge:	WP-2P	AWP-2P

Manufacturer	Part Number	Description	Mate
TE	1-480706-0	09P UMNL PLUG	J1
TE	1-480710-0	15P UMNL PLUG	J2
3M	37104-2165-000 FL 100	CONN PLUG 2MM 4POS 20-22 AWG	J3
TE	1-480708-0	12P UMNL PLUG	J7
TE	1-480704-0	06P UMNL PLUG	J8
TE	640582-1	08P UMNL PLUG	J9
Pins			
Manufacturer	Part Number	Description	Mate
TE	350550-1	UMNL SOK 20-14 TIN/PHBZ L/P	J1, J2, J7, J8, J9

Fault Conditions

The Reporter contains five distinct categories of fault condition which will low-voltage, over-temperature, and over-voltage fault conditions will be accompanied by the component which triggered the fault. It is best practice to record all conditions at the “FAULT” screen. Fault conditions are also recorded in the fault log on the “TEST” tab. When using the fault log, it is important to know that this log cannot be cleared, and may contain information on faults not pertaining to a present issue. Reference Figure 1 for an example.

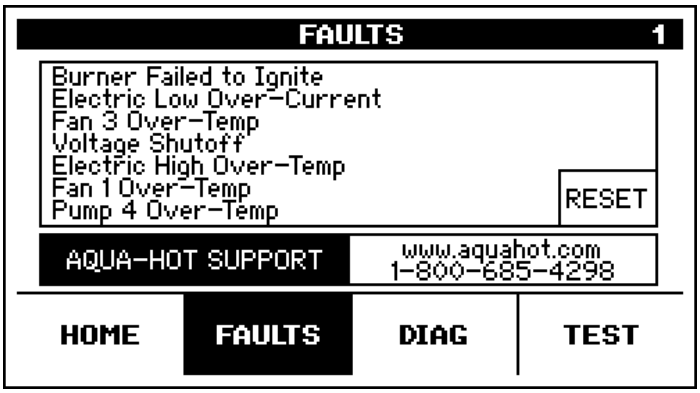


Figure 2

Over-Current

An over-current fault condition occurs when too much current is drawn by a component (output channel,) usually a fan or pump. When an over-current condition occurs, the Reporter will deactivate the Aqua-Hot heater as a safety measure to prevent damage. This fault can only be cleared once the Reporter has been reset. Please note, that if the responsible component is not repaired or replaced, it can continually cause over-current fault conditions, thereby impacting the functionality of the 400-D03.

Over-Temperature

The over-temperature fault condition will trigger if the tank temperature reaches 215°F to 221°F. This fault occurs as a result of uncontrolled combustion and will deactivate your heater to prevent damage. If this fault occurs, begin diagnosing the unit by investigating the heating sub-system for any non-functional components.

Low-voltage

The Reporter is designed to operate between 11V Direct Current (DC) and 16V DC. If the Reporter detects that it is receiving less than 11.8V DC it will display a low-voltage fault. If the Reporter drops below 11.2V DC for more than 30 seconds, a safety mechanism will activate, shutting down the 400D.

Low-level cut off

Aqua-Hot 400-D03 series units require 5.5 gallons of propylene glycol generally-recognized-as-safe (GRAS) anti-freeze solution for the tank, and an additional 3 to 4 gallons to fill the heating zone lines. Keep in mind that the exact fluid volume may differ depending on the layout of your coach. If the heater drops below the minimum fill level as indicated on the expansion bottle, the Reporter will shut down all fans, pumps and heat sources until the unit has been refilled and the Reporter has been reset.

Ignition failure

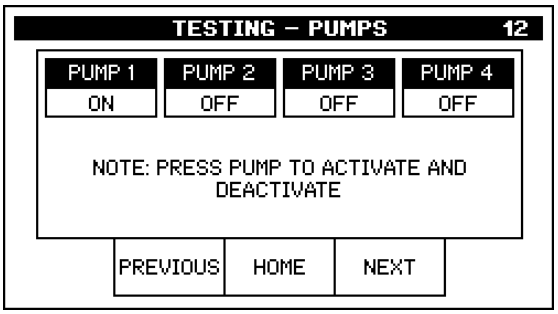
Ignition failure fault conditions will occur if, for some reason the burner inside your heater fails to ignite. This is all the fault condition will display. Precise diagnosis herein will require in-depth troubleshooting.

Testing

The Reporter retains the functionality to independently activate certain components and sub-systems within the Aqua-Hot heater. The systems that can be independently activated are the burner, electric heater, and the burner indicator light. For testing procedures, only one system can be activated at any given time. Multiple fans and pumps can be activated as independent components. These components and sub-systems will remain active for only five minutes, and are NOT a substitute for normal operation. Aqua-Hot Heating Systems is not liable for damages resulting from attempting to use testing functions in place of standard operation.

Pumps

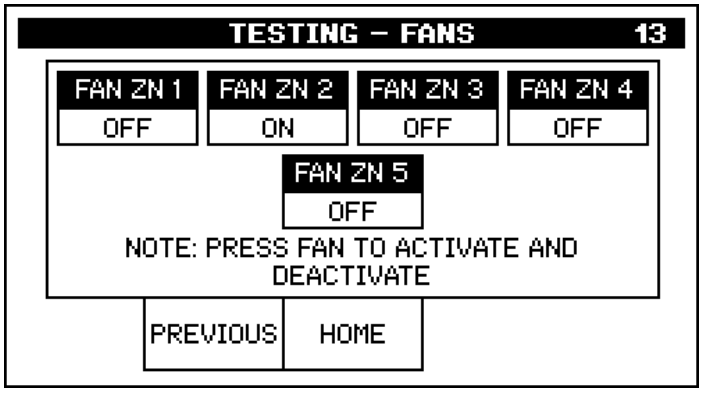
Pumps on your heater can be independently activated using the Reporter. These can be used to verify functionality, or to purge fluid lines of air. Select each pump from the screen to activate. If you would like to purge fluid lines of air, please follow the procedure entitled *“Fluid Line Purge Procedure”* on page 8.



Testing

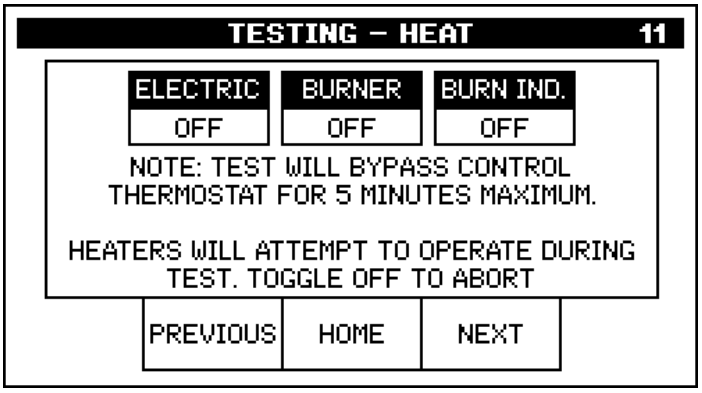
Fans

Using the “FANS” screen, it is possible to activate fans in each zone to test for functionality. This is similar to the pumps screen, allowing you to activate one, or multiple fans at the same time by selecting the desired fan.



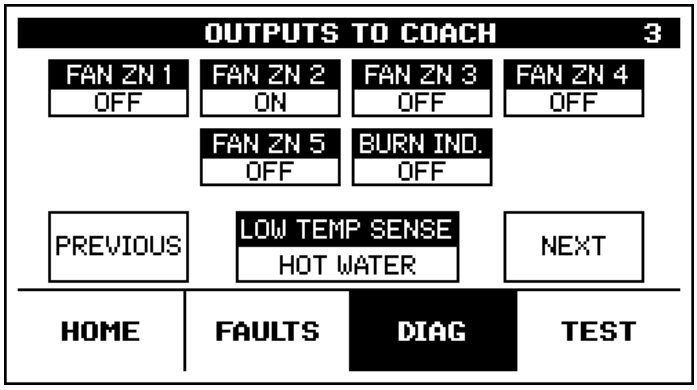
Heating

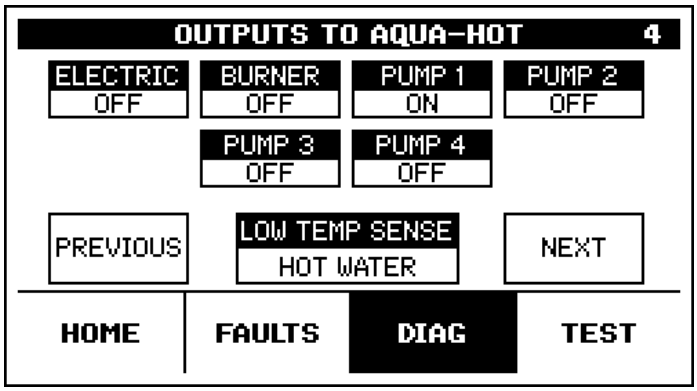
The heating tab will allow the burner, burner indicator light, and the electric element to be activated and run for five minutes to test for functionality. During this time, inputs from the control thermostat are ignored to allow the test to take place. Do NOT activate the burner heat test without allowing the unit to cool. Not doing so could complicate further diagnosis and may cause damage to the Aqua-Hot.

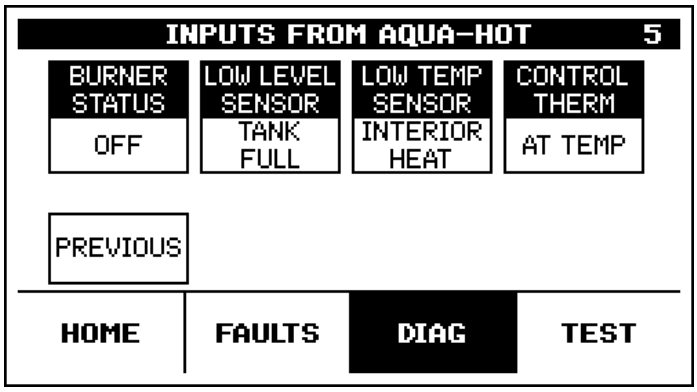


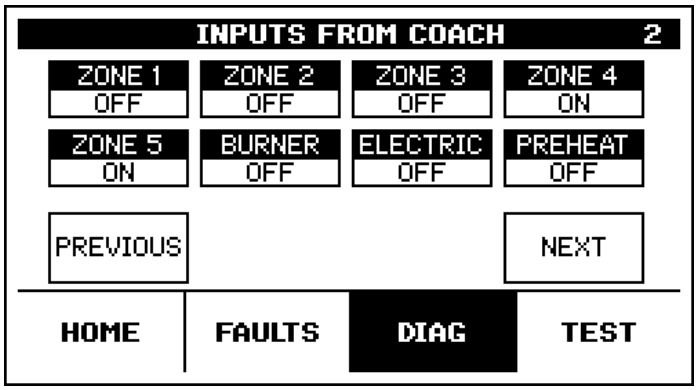
Diagnostic

The “DIAG” tab of the Reporter allows the user or technician to access input and output information to record communication information within the Aqua-Hot heater, and between the heater and the coach. This tab is read-only and will not allow the manipulation of the elements listed. There are four screens maintained under this tab, Inputs from Coach, Outputs to Coach, Inputs from Aqua-Hot, and Outputs to Aqua-Hot.









Pin-out Information

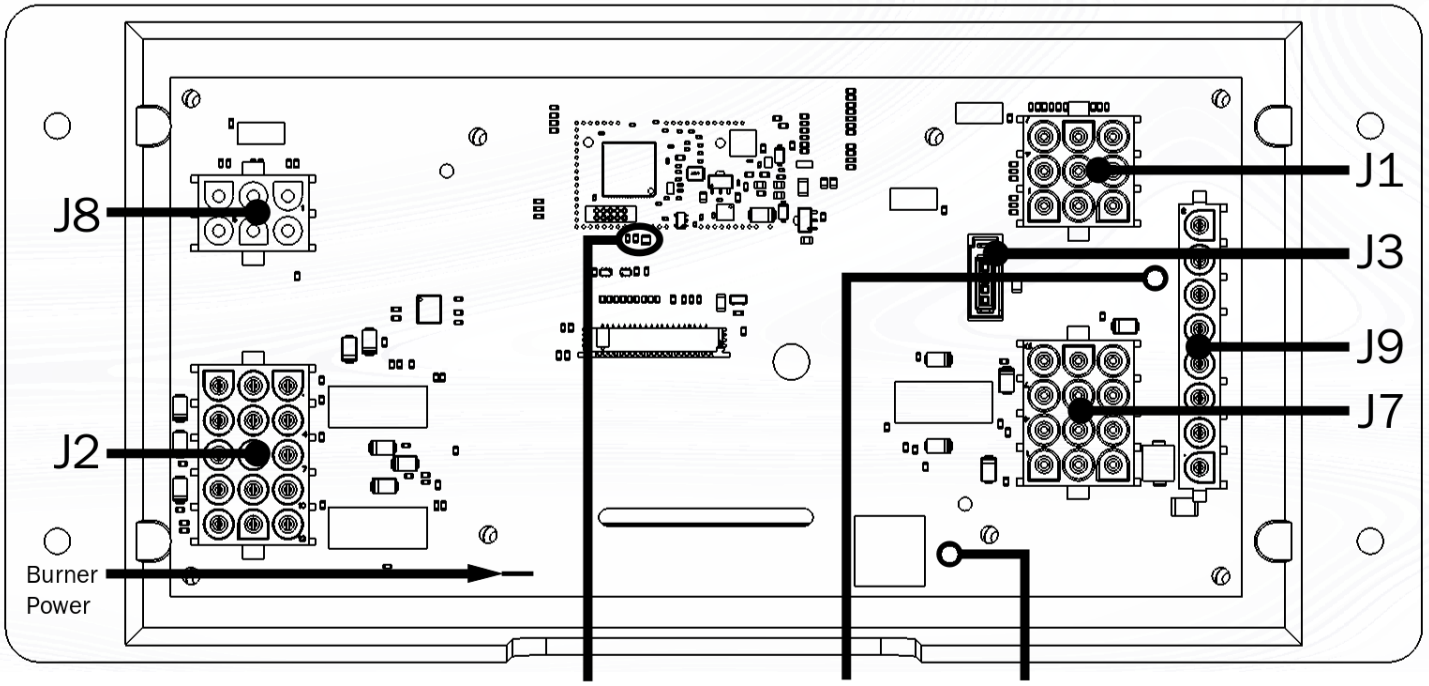
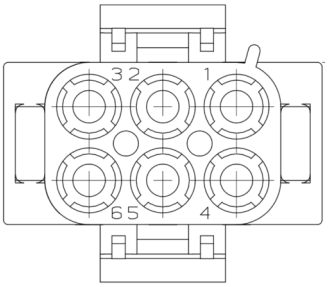


Figure 5

J8

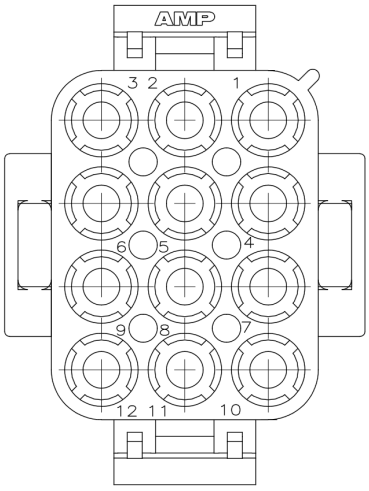
Plug J8 controls sensor monitoring of the Aqua-Hot unit in your coach, and is standardized across all of our units.



J8 Pin Number	Description	Wire number
1	Low-Level Sensor Input	16
2	Low-Temp Sensor Input	10
3	Control Thermostat Input	14
4	Low-Level Power Supply (12V+)	15
5	Low-Temp Power Supply (12V+)	9
6	Control Thermostat Power Supply (12V+)	13

J7

Plug J7 controls zone fans and the burner indicator light.

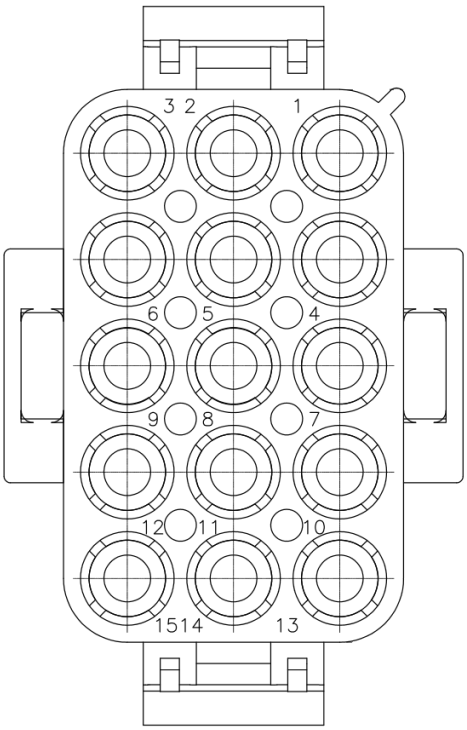


J7 Pin Number	Description	Wire number
1	Zone Fan 4 (Switched 12V+)	80
2	Zone Fan 2 (Switched 12V+)	88
3	Burner Indicator Light	56
4	Zone Fan 4 Ground	56
5	Zone Fan 2 Ground	77
6	Ground	6
7	Zone Fan 5 Ground	78
8	Zone Fan 3 Ground	85
9	Zone Fan 1 Ground	93
10	Zone Fan 5 (Switched 12V+)	76
11	Zone Fan 3 (Switched 12V+)	84
12	Zone Fan 1 (Switched 12V+)	92

Pin-out Information

J2

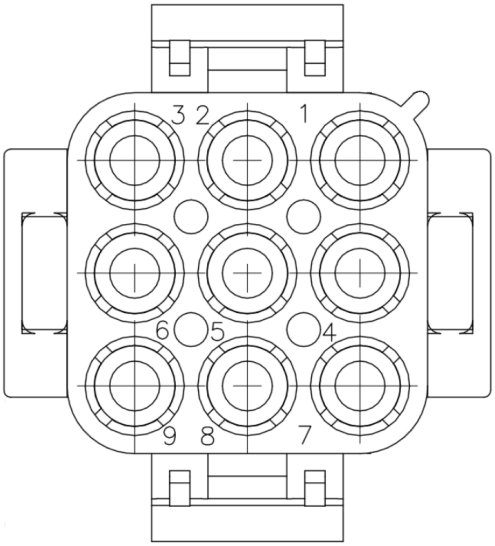
Pin J2 is responsible for returning signals to the Aqua-Hot in your coach.



J2 Pin Number	Description	Wire number
1	Pump 1 Output (12V+)	5
2	Pump 1 Ground	6
3	Spare	-
4	Pump 2 Output (12V+)	3
5	Pump 2 Ground	4
6	Power on signal	24
7	Pump 3 Output 12V+ (450, 600, 675 Only)	1
8	Pump 3 GND (450, 600, 675 Only)	2
9	Electric High On-Signal	39
10	Pump 4 Output 12V+ (450, 600, 675 Only)	7
11	Pump 4 Ground (450, 600, 675 Only)	8
12	Electric Element On-Signal	11
13	AC Ground	12
14	Burner Ground	21
15	Diesel Burner Status Input	19

J1

Pin J1 is responsible for heating zone inputs from the coach.

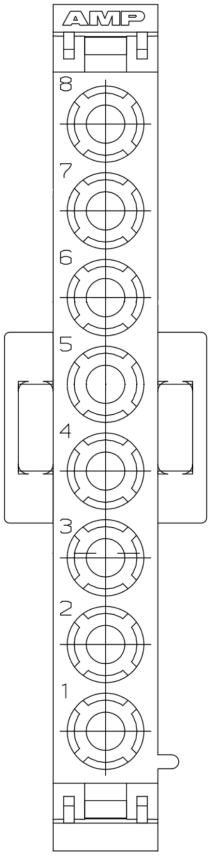


J1 Pin Number	Description	Wire number
1	Diesel Input	51
2	Electric Low Input	53
3	Electric High Input (600, 675 Only)	40
4	Engine Preheat Input (450, 600, 675 Only)	55
5	Zone 1 Input	95
6	Zone 2 Input	91
7	Zone 3 Input	87
8	Zone 4 Input	83
9	Zone 5 Input	79

Pin-out Information

J9

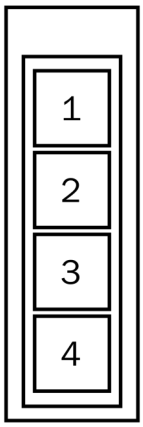
Plug J9 is an optional-use terminal that provides constant 12V+ DC current to any attachments which may be added to the coach.



J9 Pin Number	Description	Wire No.
1	Engine Preheat	54
2	Electric	52
3	Diesel 12V Switch	50
4	Zone 5 Thermostat	78
5	Zone 4 Thermostat	82
6	Zone 3 Thermostat	86
7	Zone 2 Thermostat	90
8	Zone 1 Thermostat	94

J3

J3 serves as the RVC connection terminal, linking the Reporter to systems within your coach.



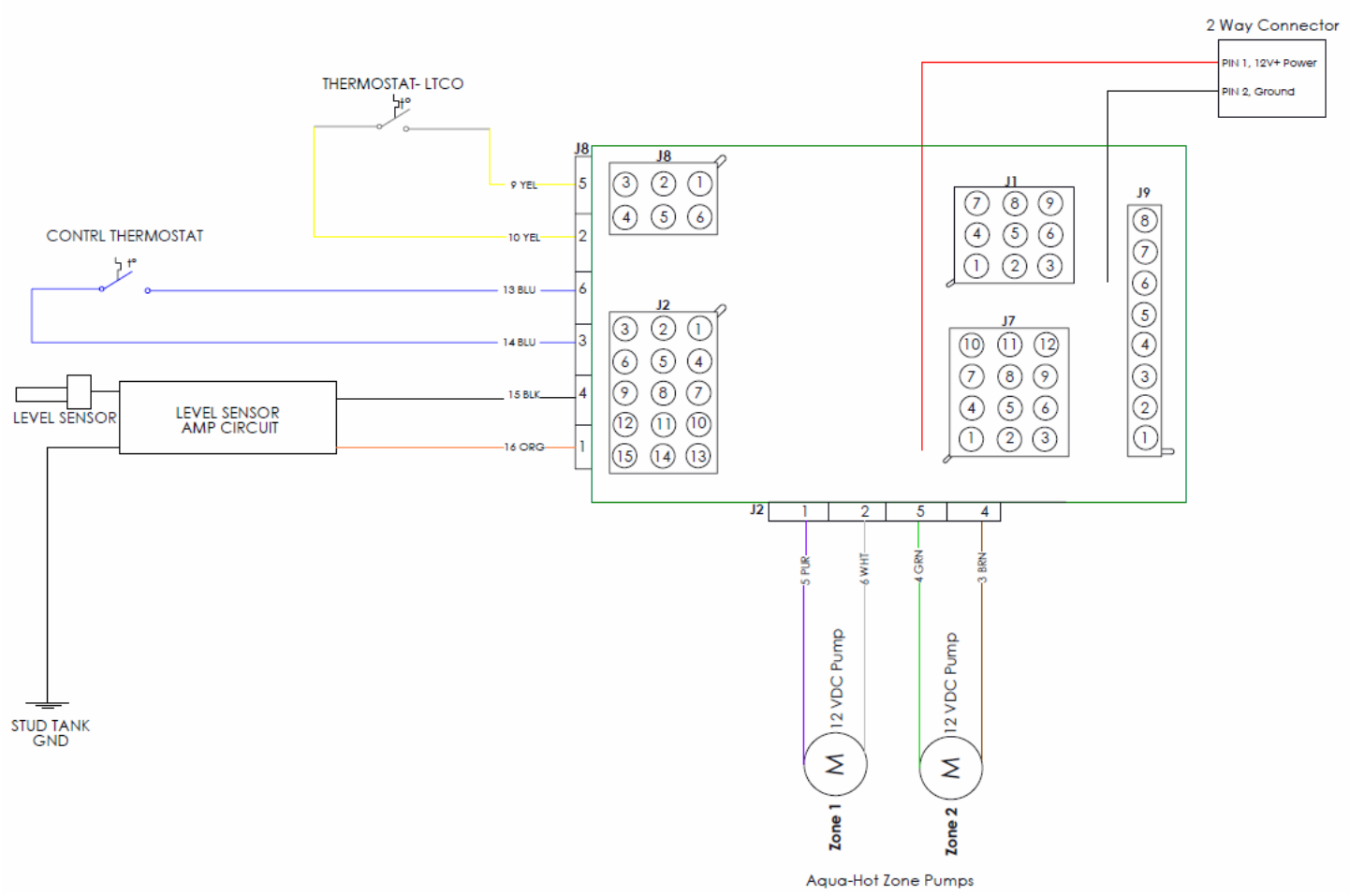
J3 Pin Number	Description
1	12V+ DC Current Out (Optional)
2	CAN-HIGH
3	CAN-LOW
4	Ground

RVC Indicator Light

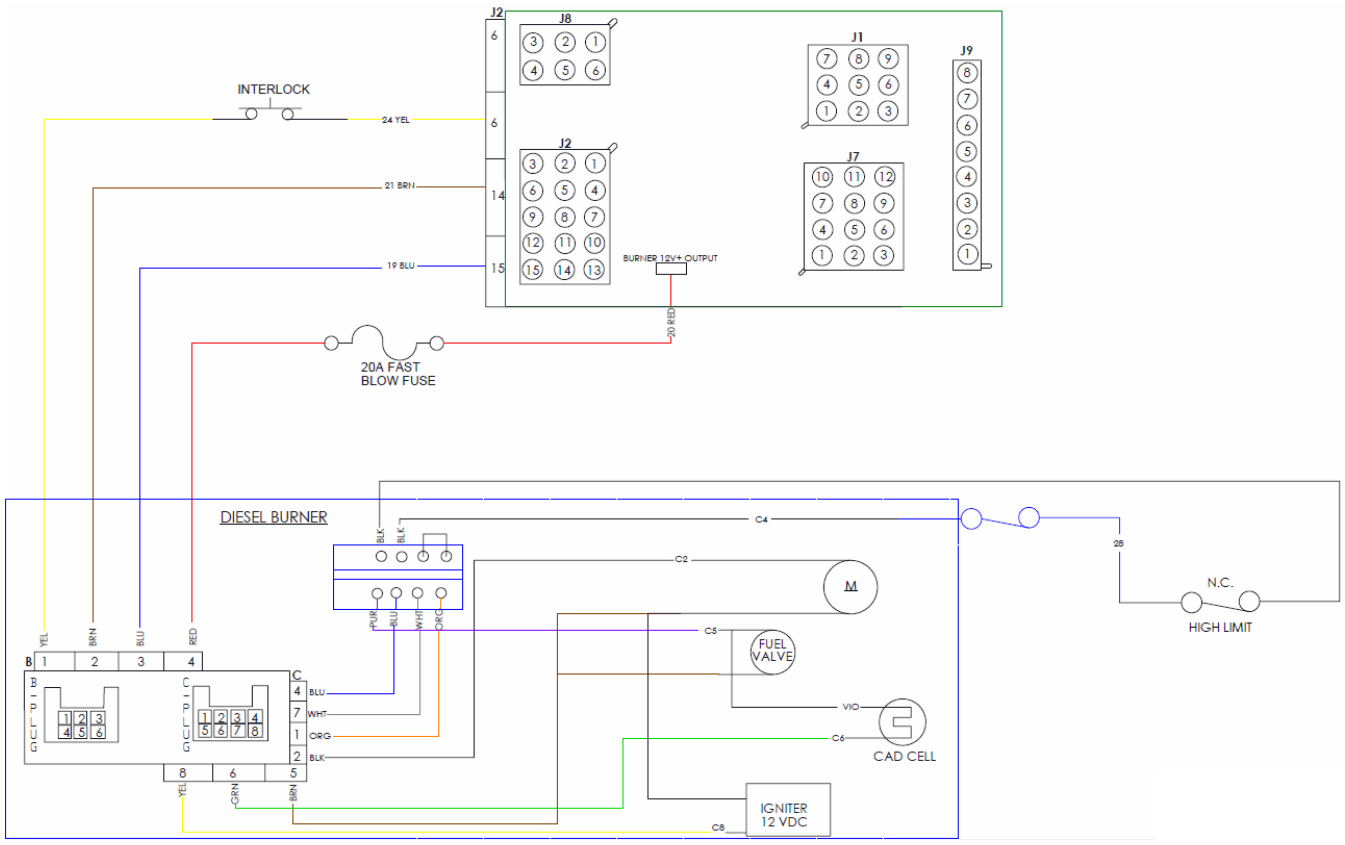
The indicator light of the Reporter is designed so as to provide at-a-glance information concerning the Reporter and its connection to the RVC network. Please note that your coach manufacturer may or may not use RVC in your coach. The table below demonstrates all conditions that can be denoted by the indicator light.

LED Activity			Status
		Solid Green	Device is connected to network and communicating properly
		Off	Device has no power or has failed completely
		Solid Red	Device has gone offline and is not connected to network
		Flashing Green (4 times/second)	Device is attempting to make initial connection to the network
		Flashing Green (1 time/second)	Device was online, but has not seen a valid network message for 5 seconds
		Alternating Red & Orange	Device has gone offline and is attempting to re-connect (within 30 seconds)
		Alternating Green & Orange	Device is currently online but has gone offline 2 or more times

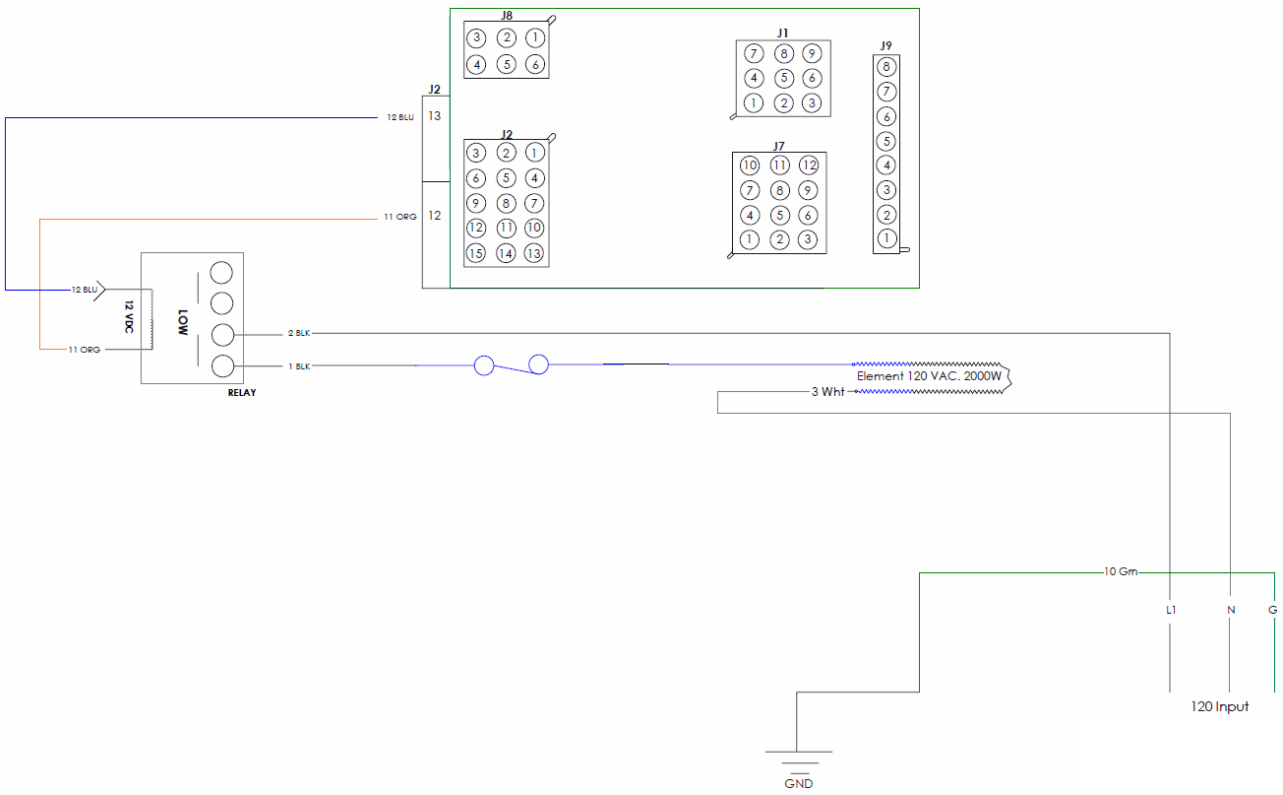
400-D03 Power Input, Pumps, Safeties and Controls



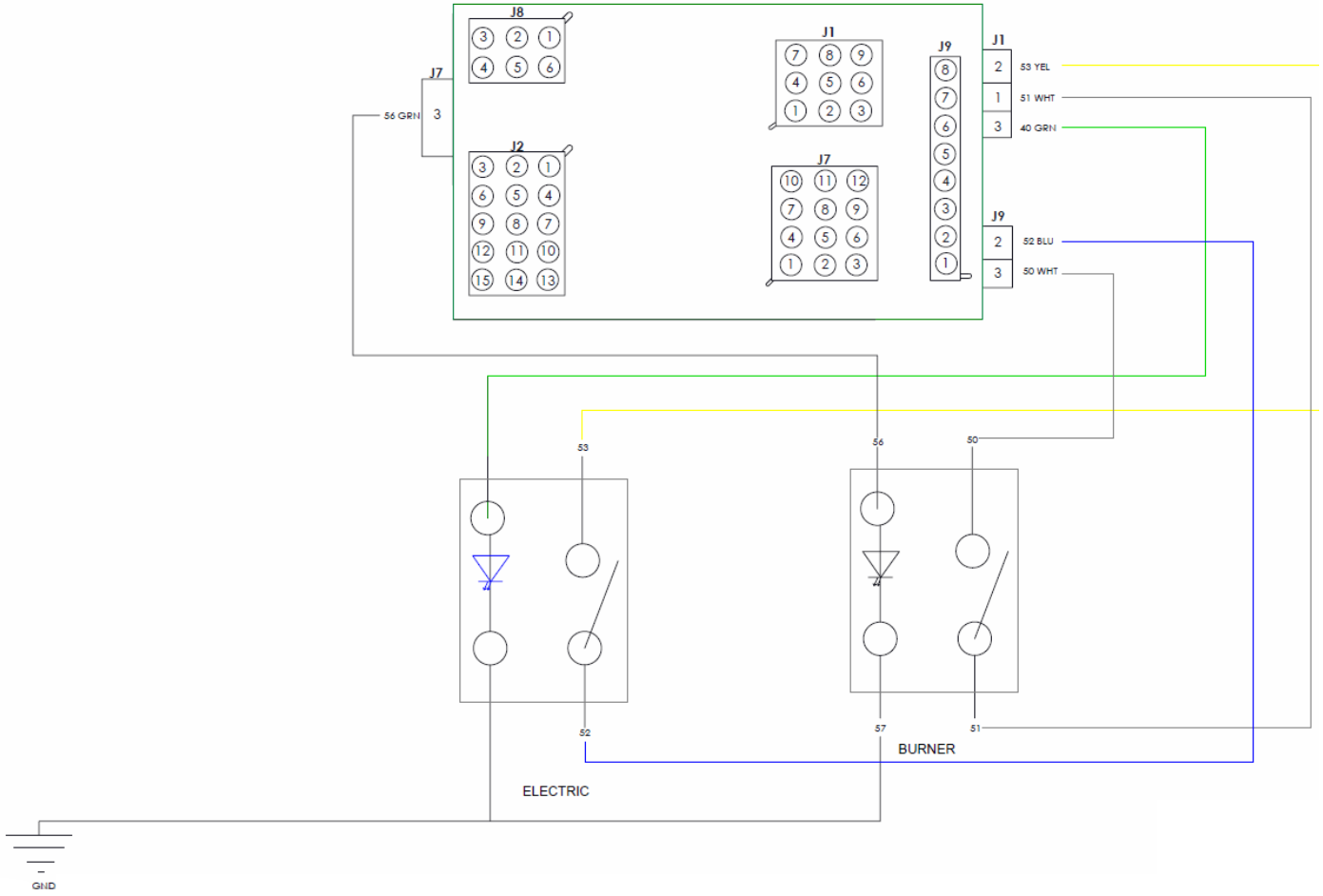
400-D03 Burner



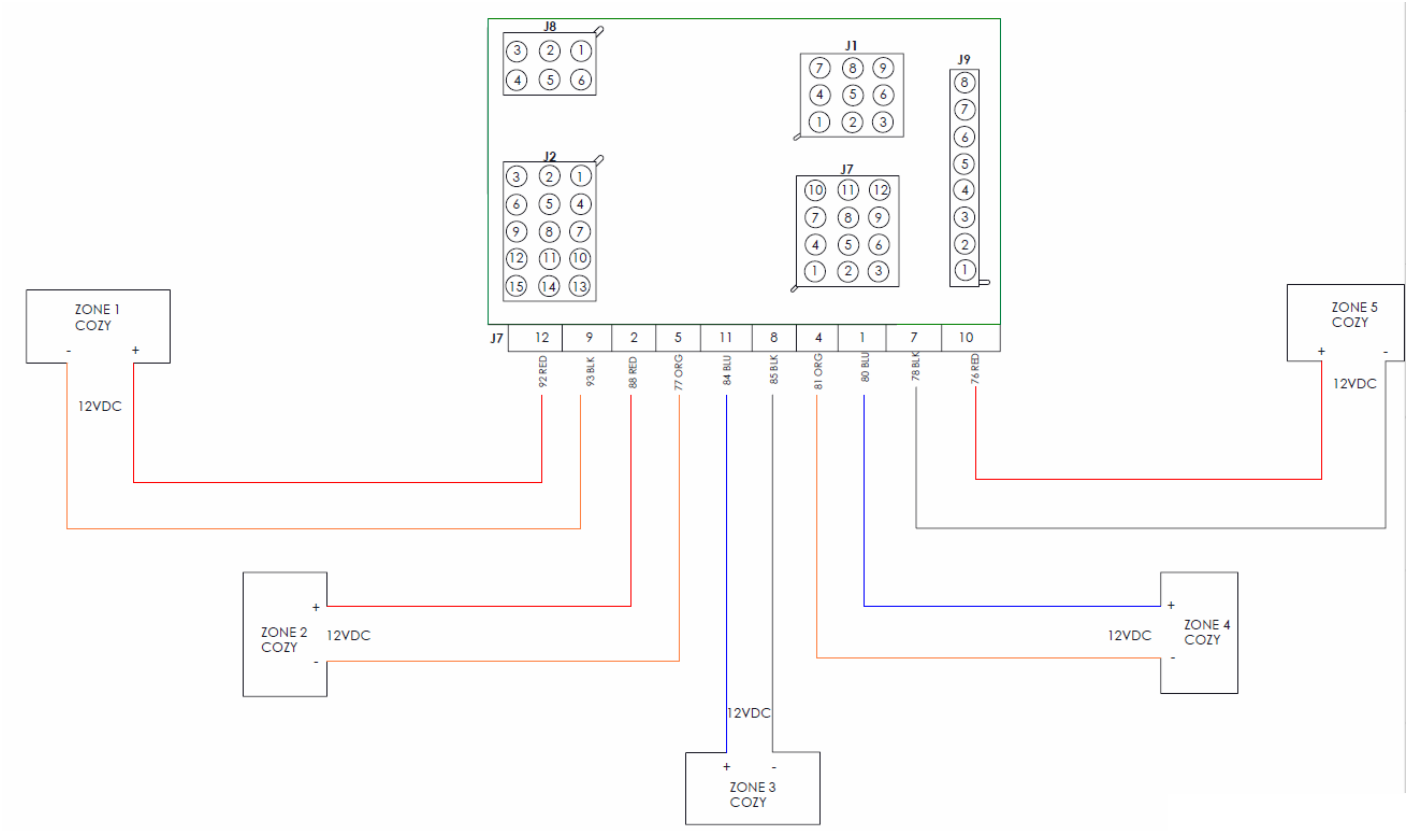
400-D03 Electric Elements, High Limit Thermostats



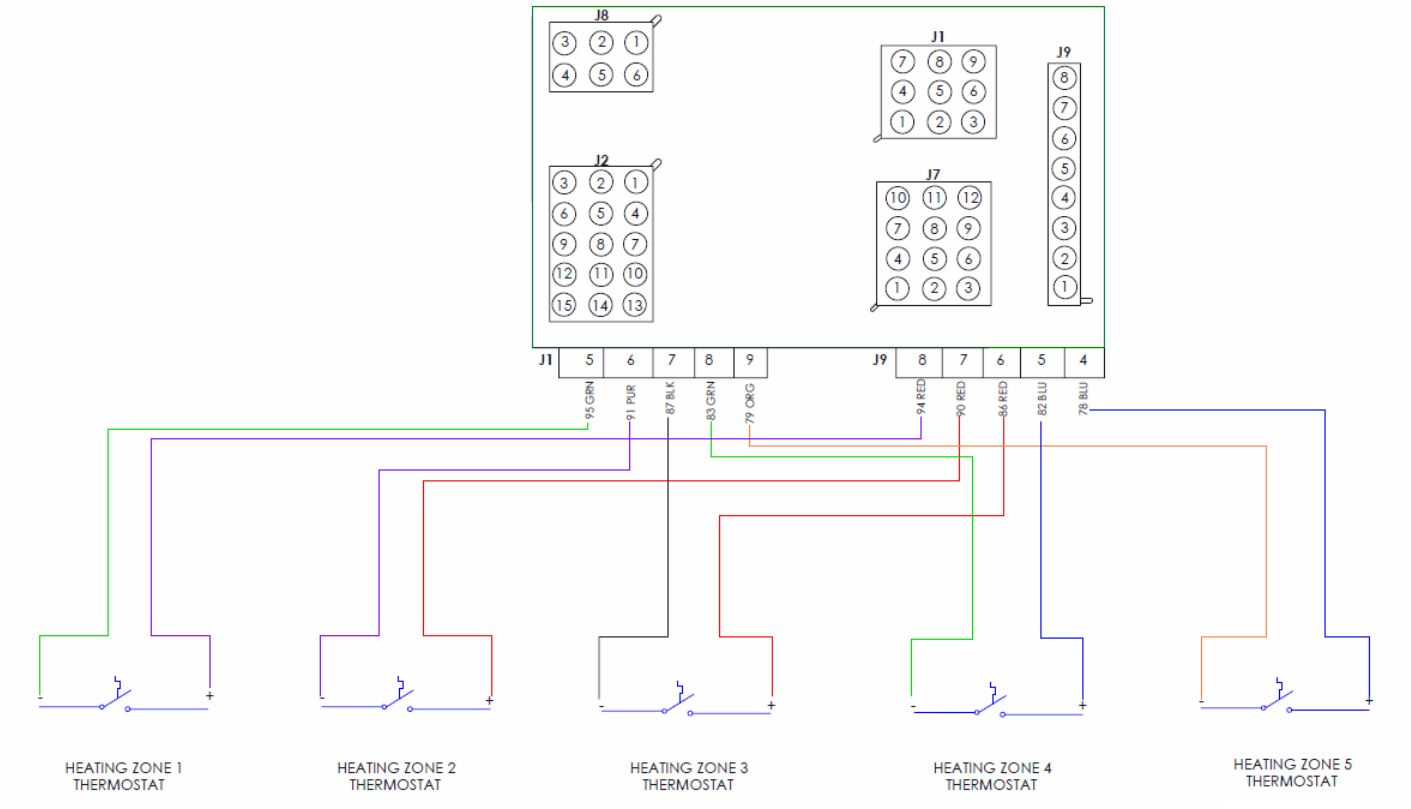
400-D03 Switch Panel



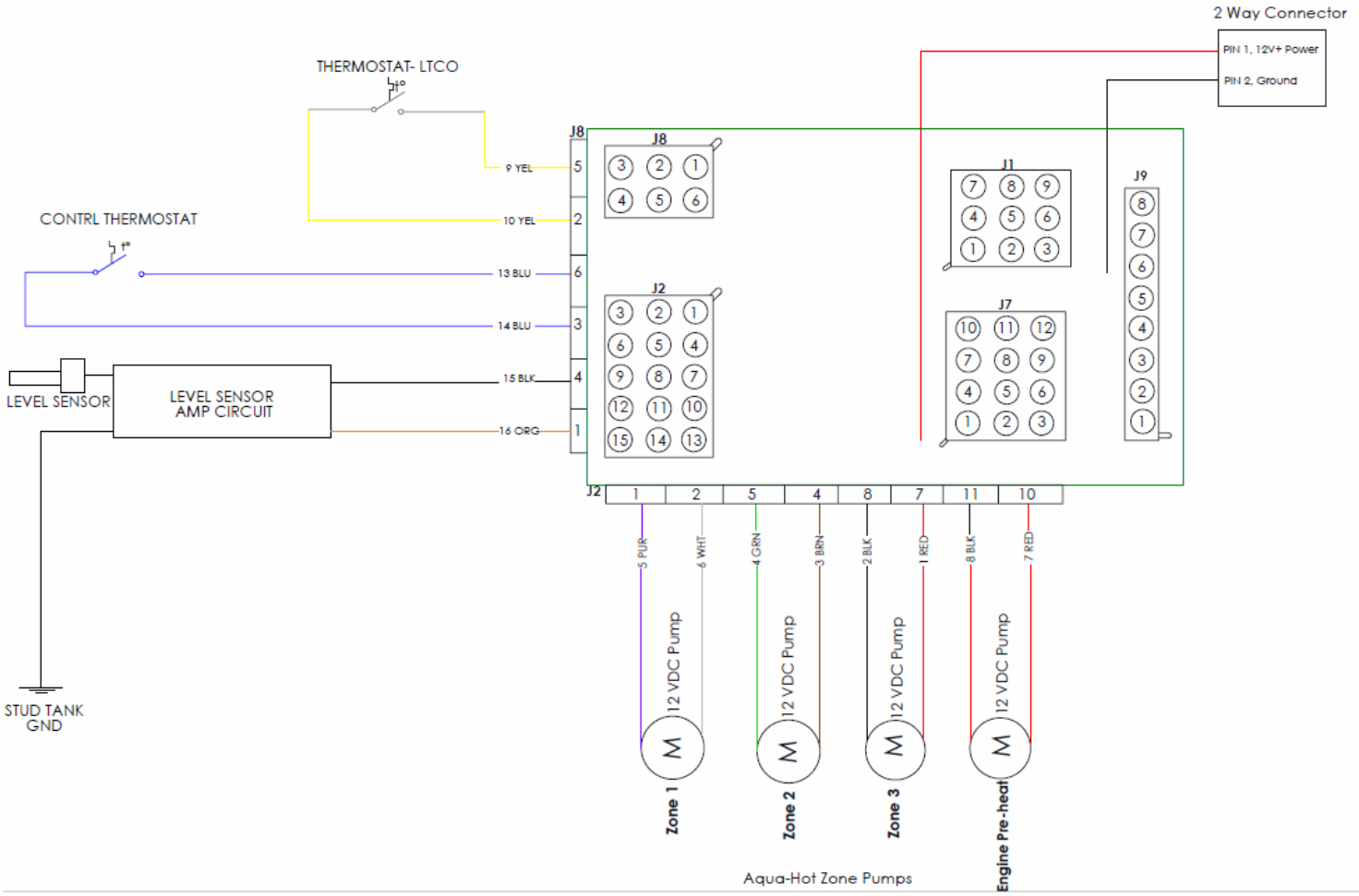
400-D03 Heat Exchangers



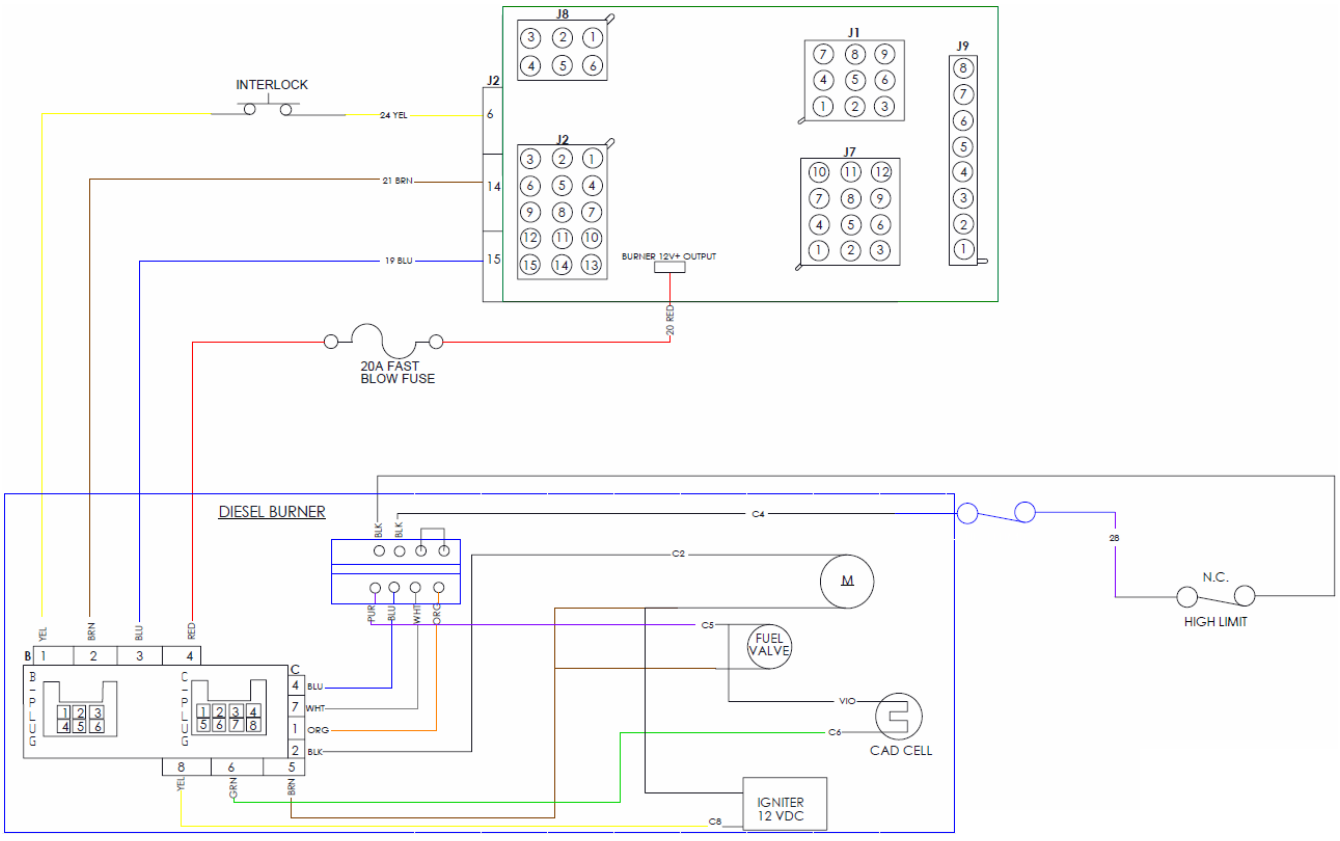
400-D03 Heating Zone Thermostats



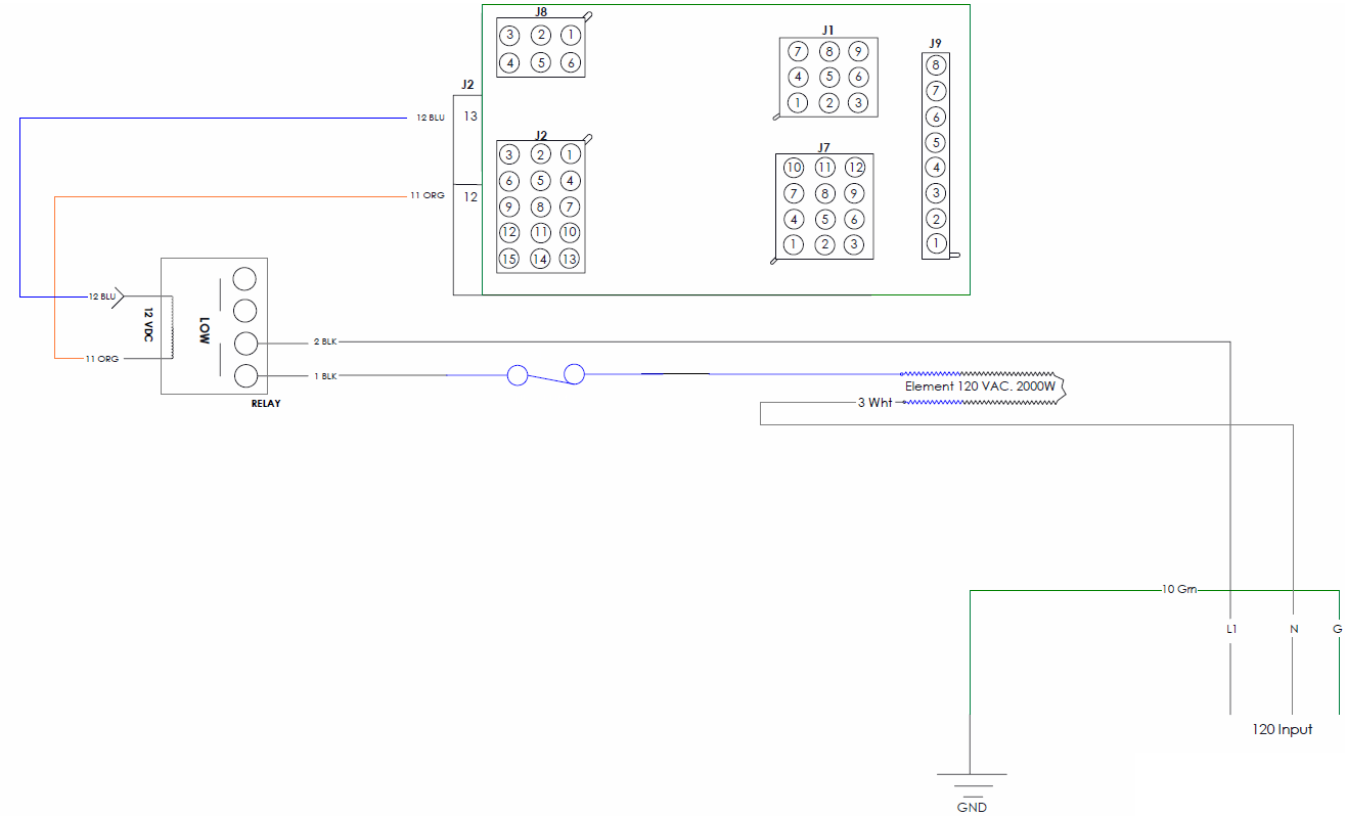
450-D05 Power Input, Pumps, Safeties and Controls



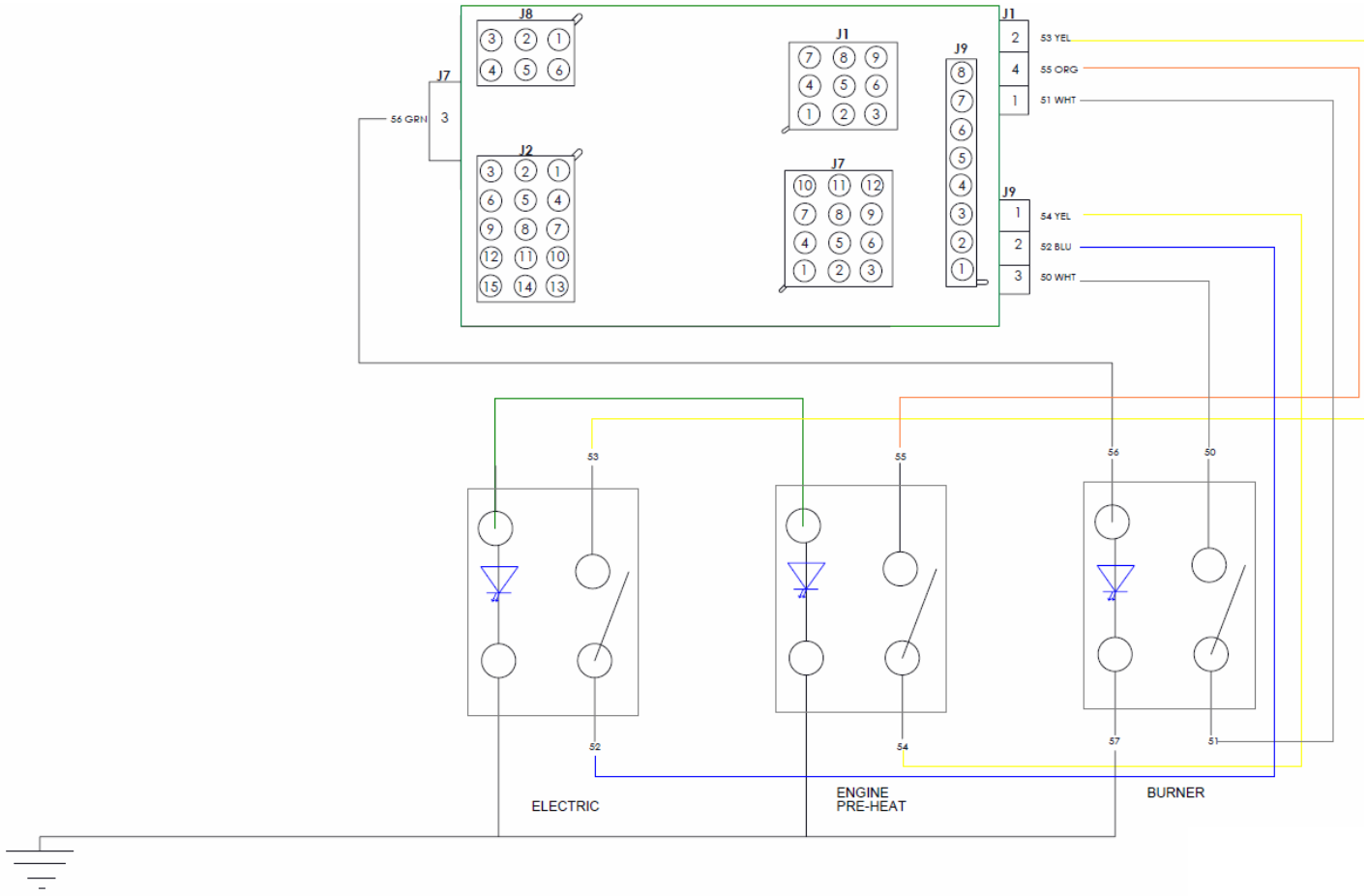
450-D05 Burner



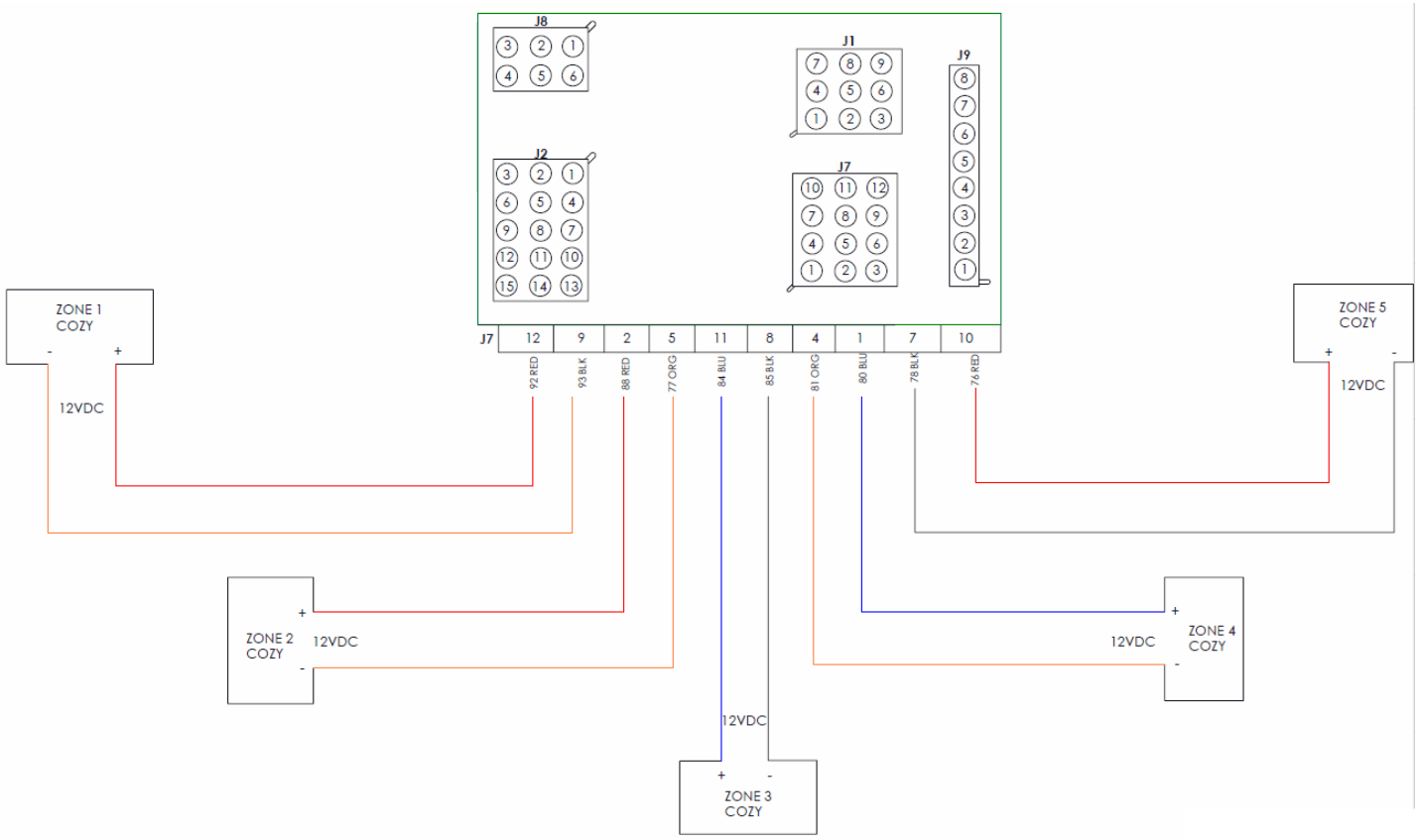
450-D05 Electric Elements, High Limit Thermostats



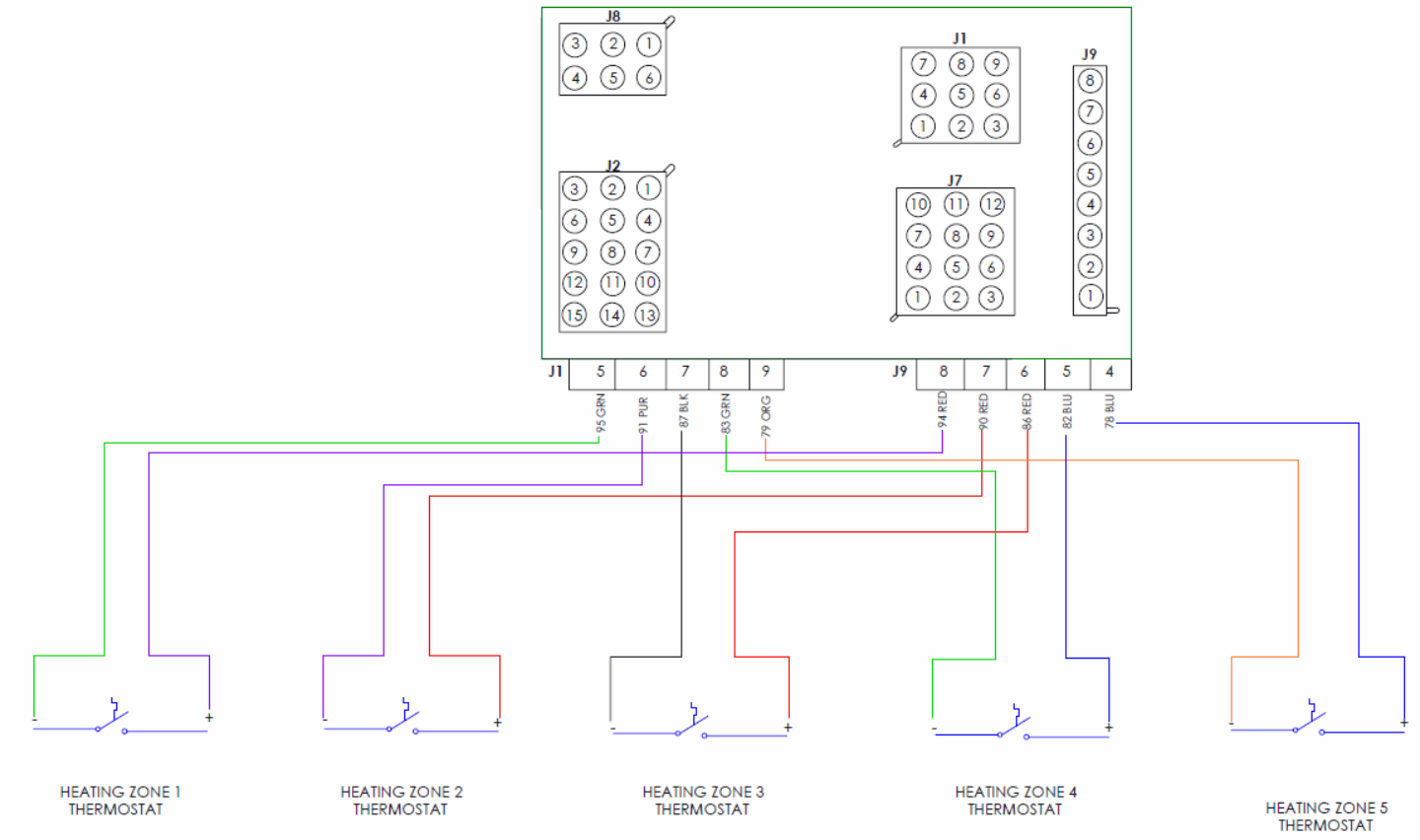
450-D05 Switch Panel



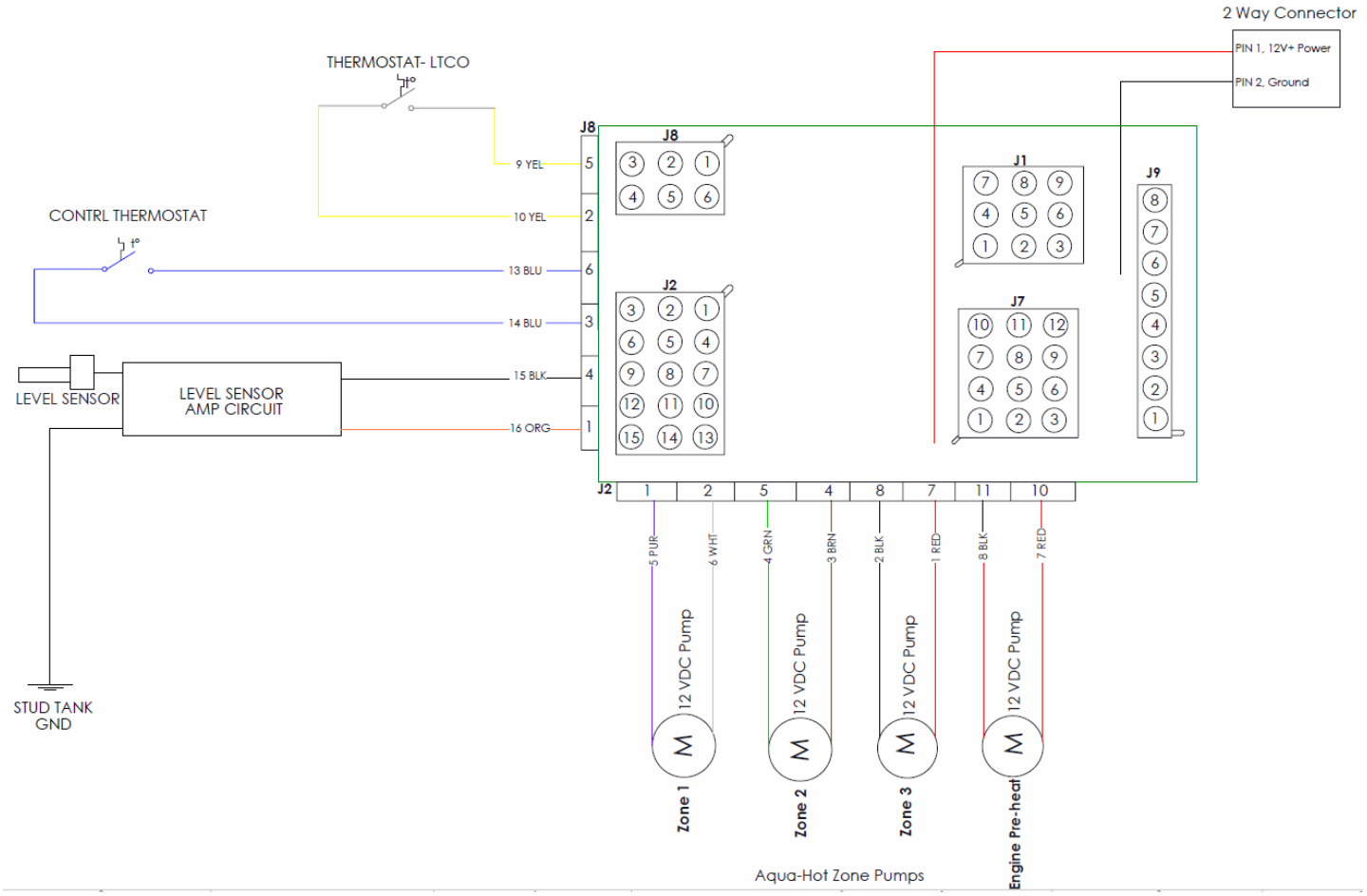
450-D05 Heat Exchangers



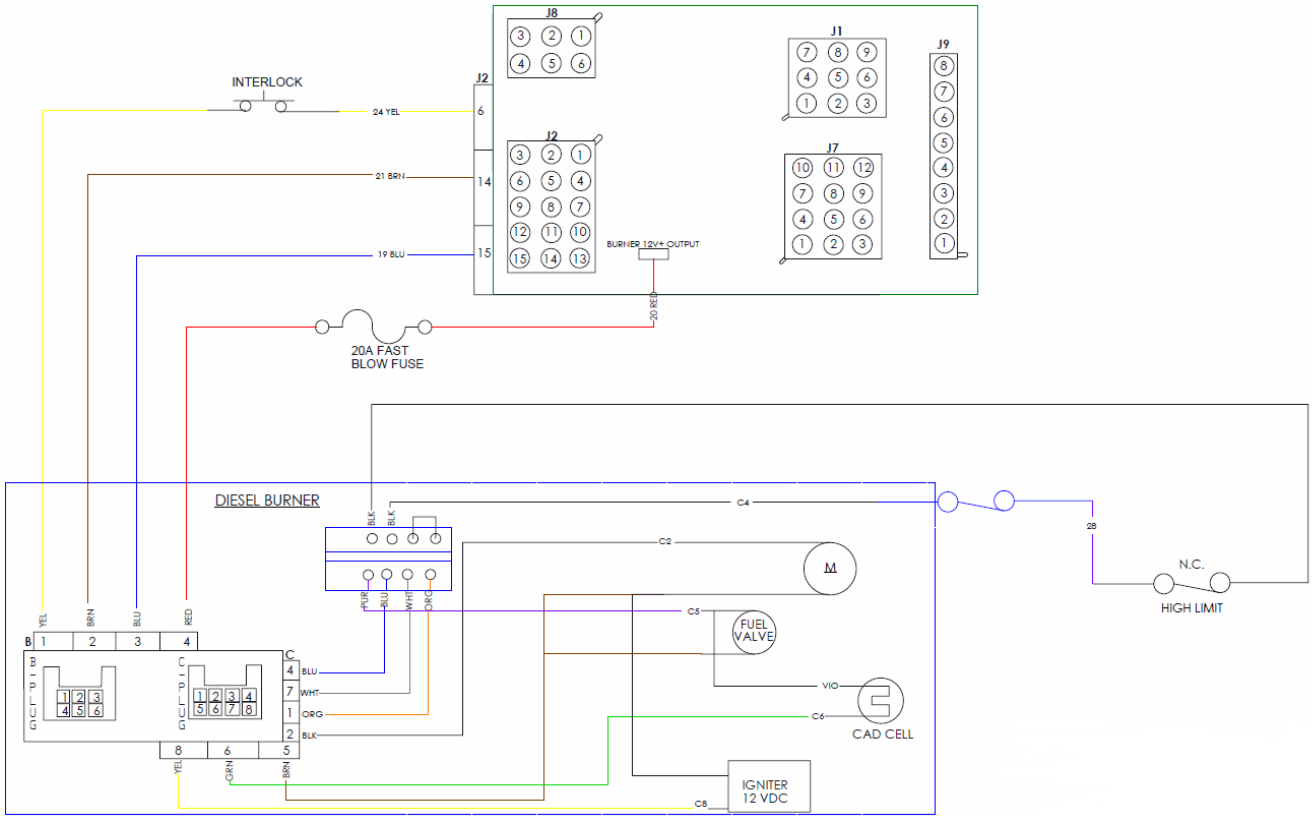
450-D05 Heating Zone Thermostats



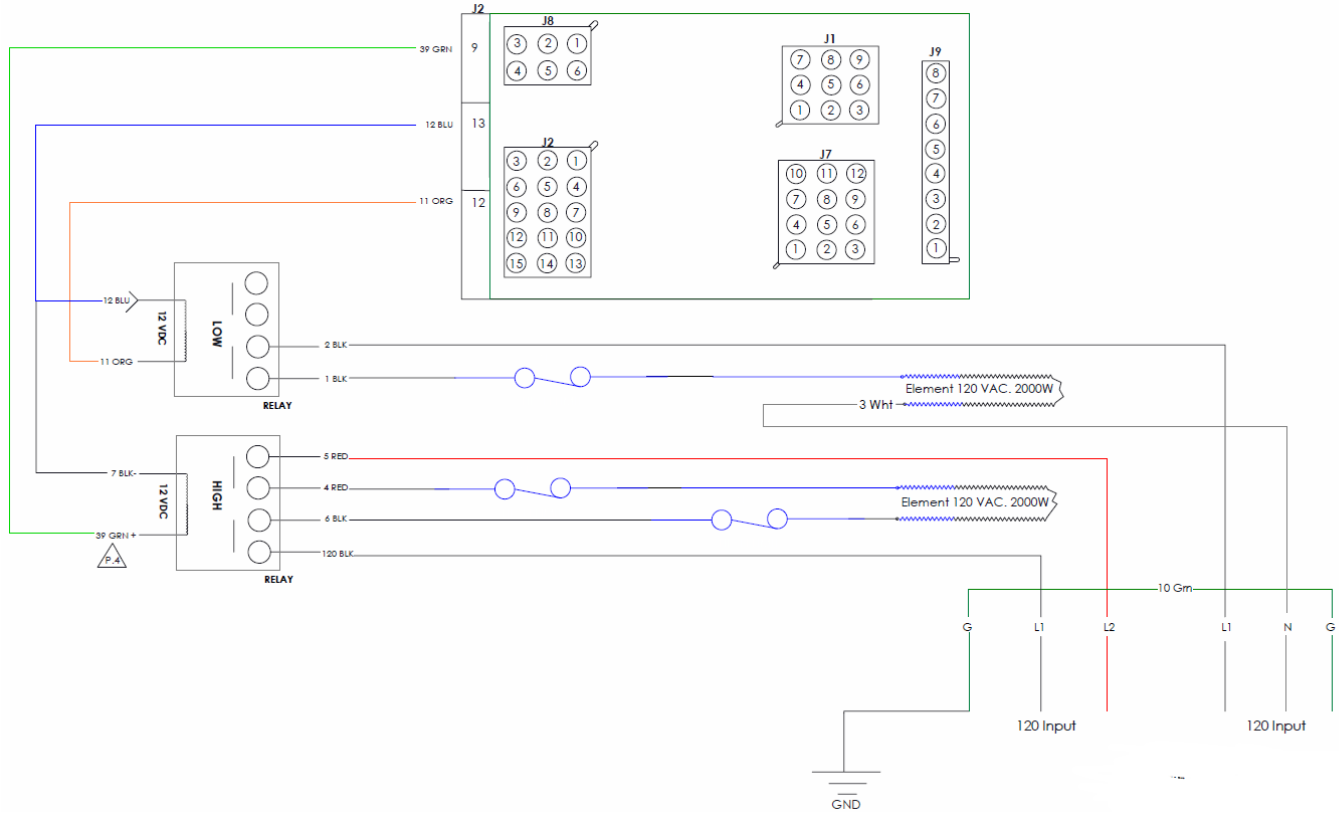
600-D03 Power Input, Pumps, Safeties and Controls



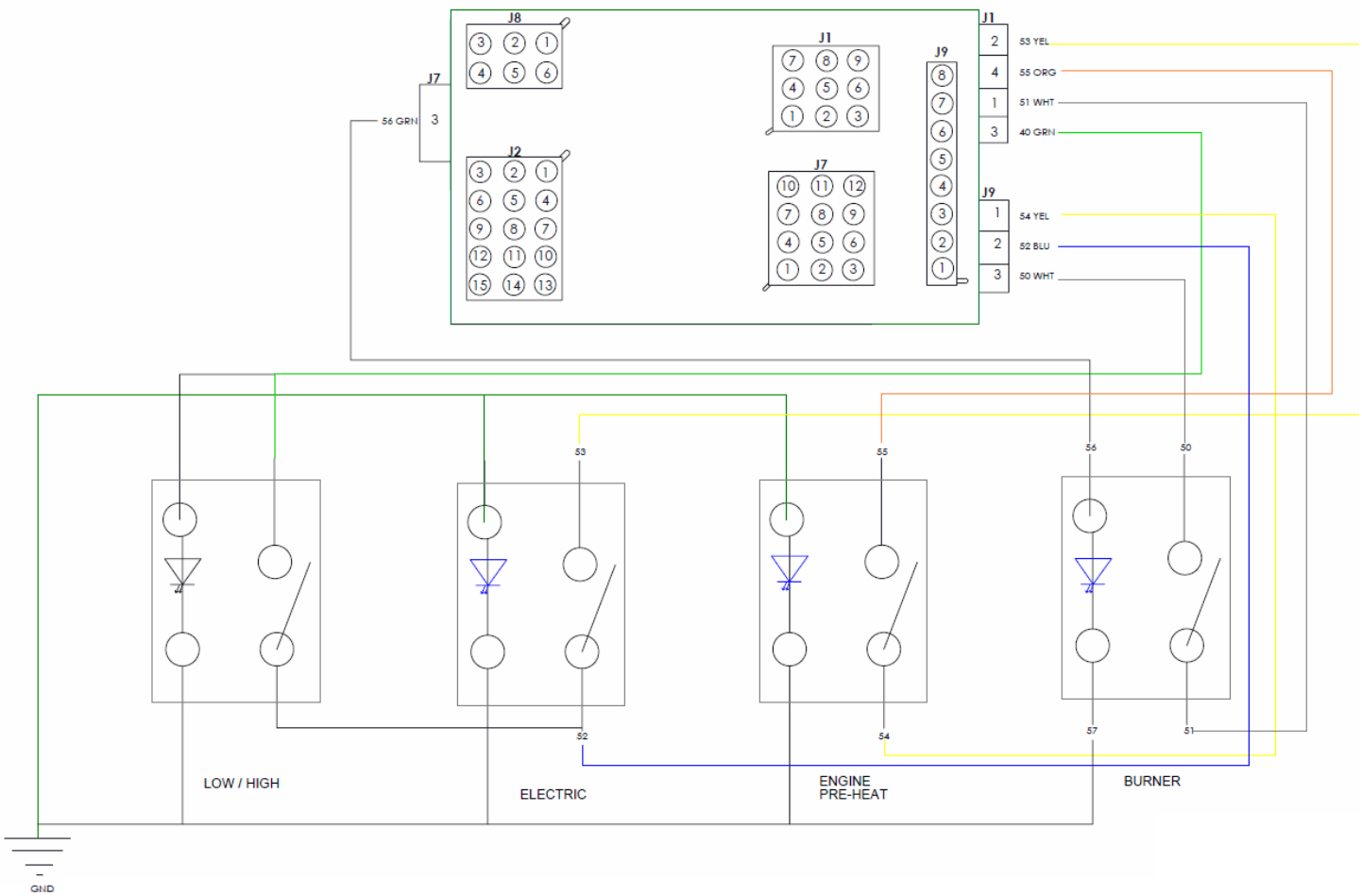
600-D03 Burner



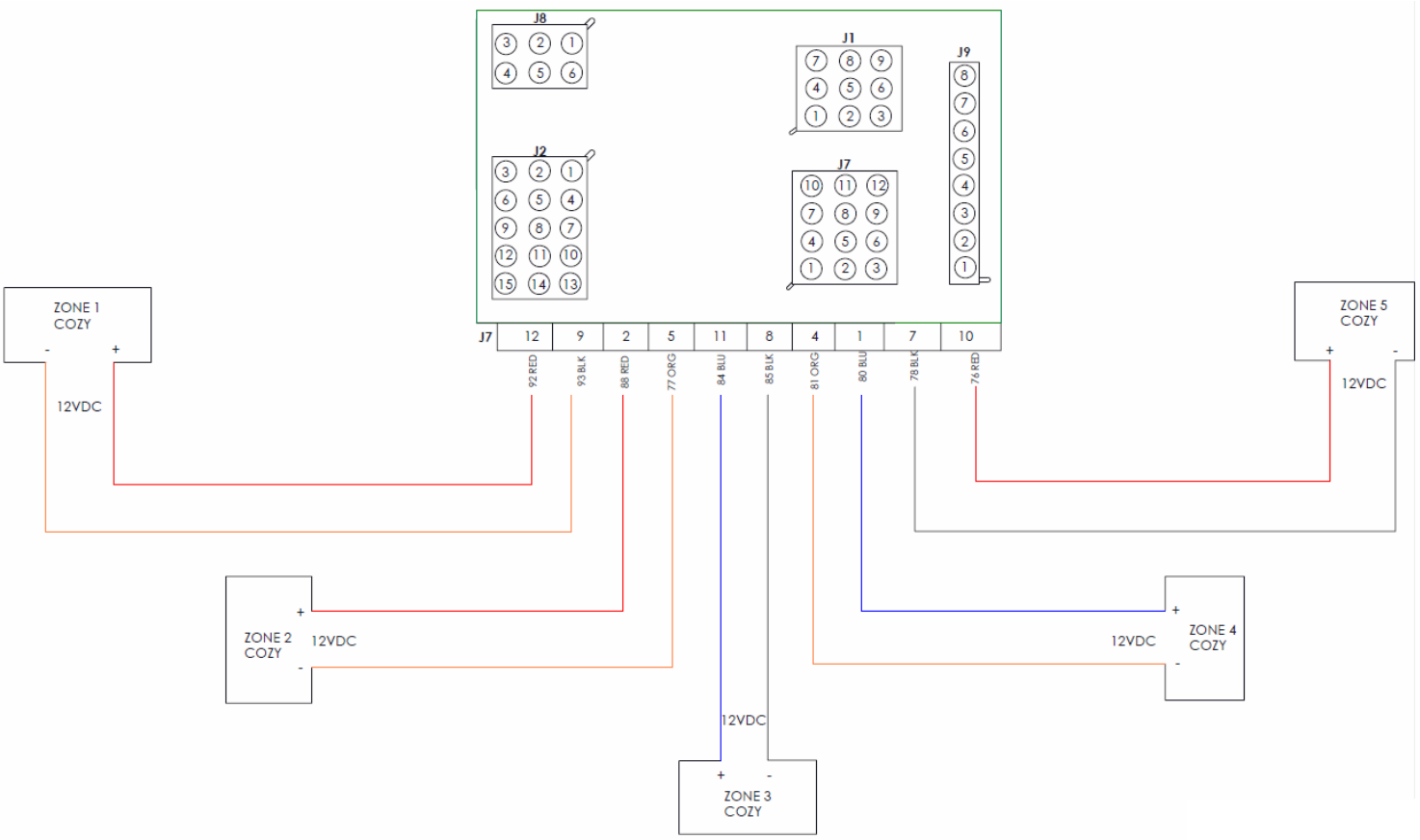
600-D03 Electric Elements, High Limit Thermostats



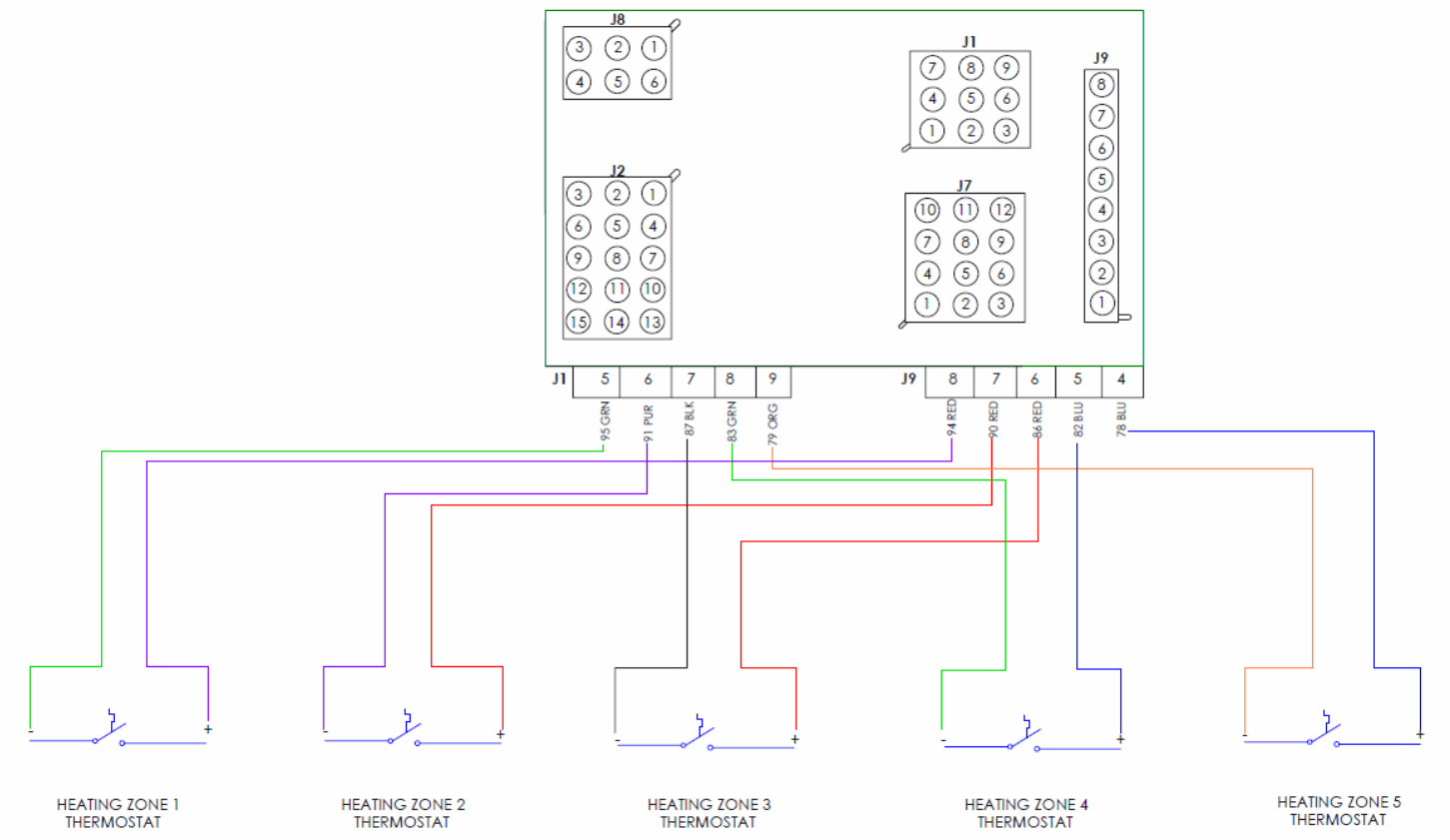
600-D03 Switch Panel



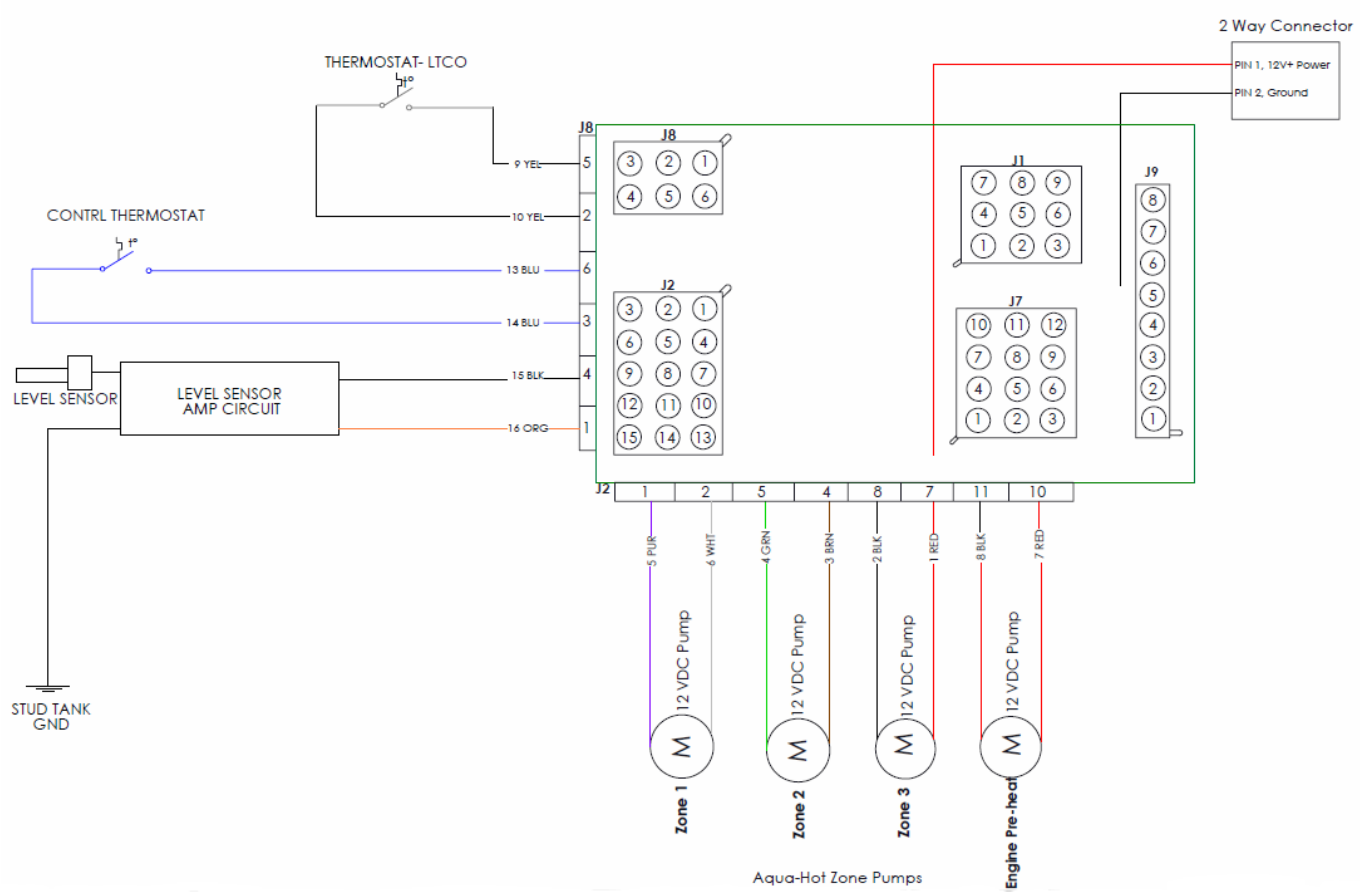
600-D03 Heat Exchangers



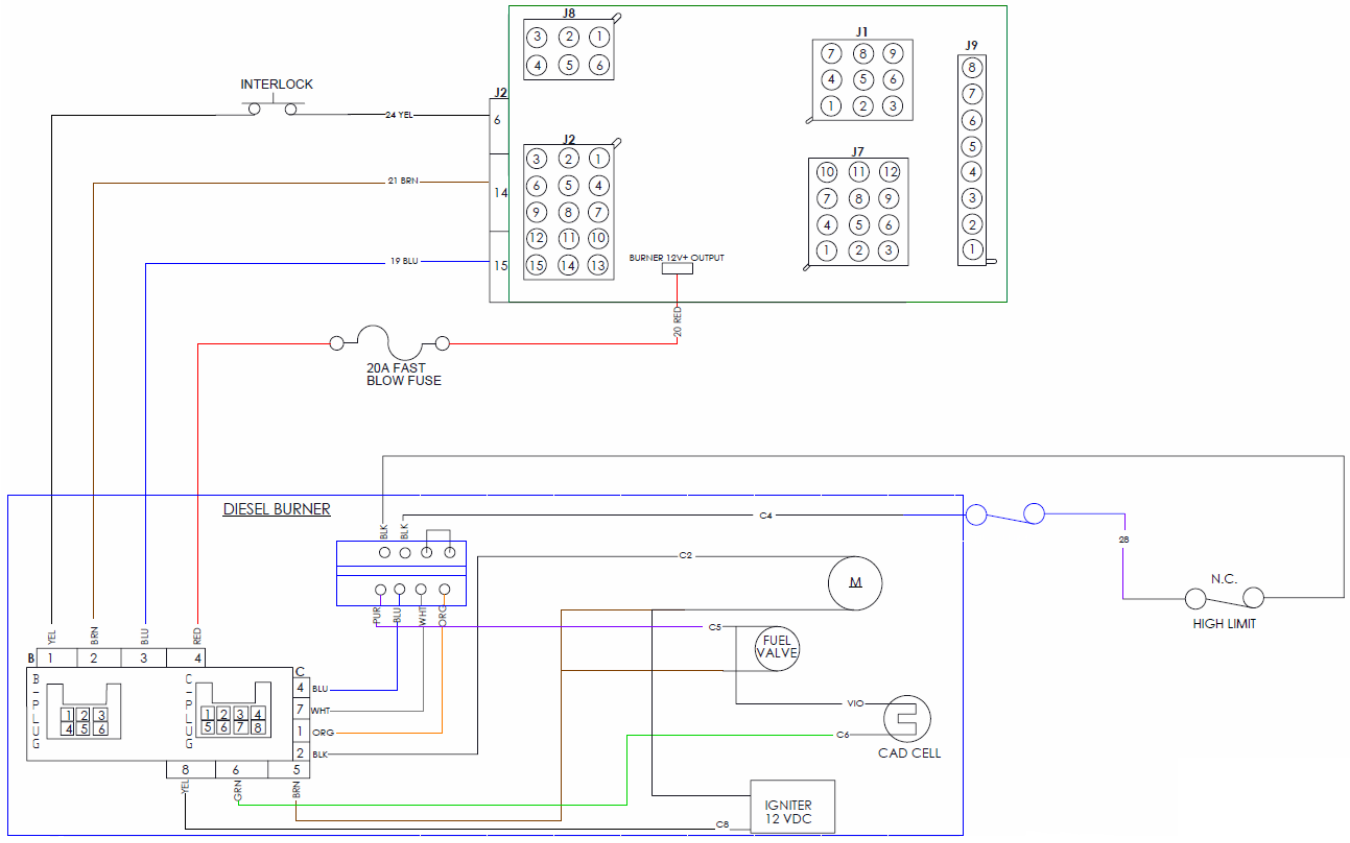
600-D03 Heating Zone Thermostats



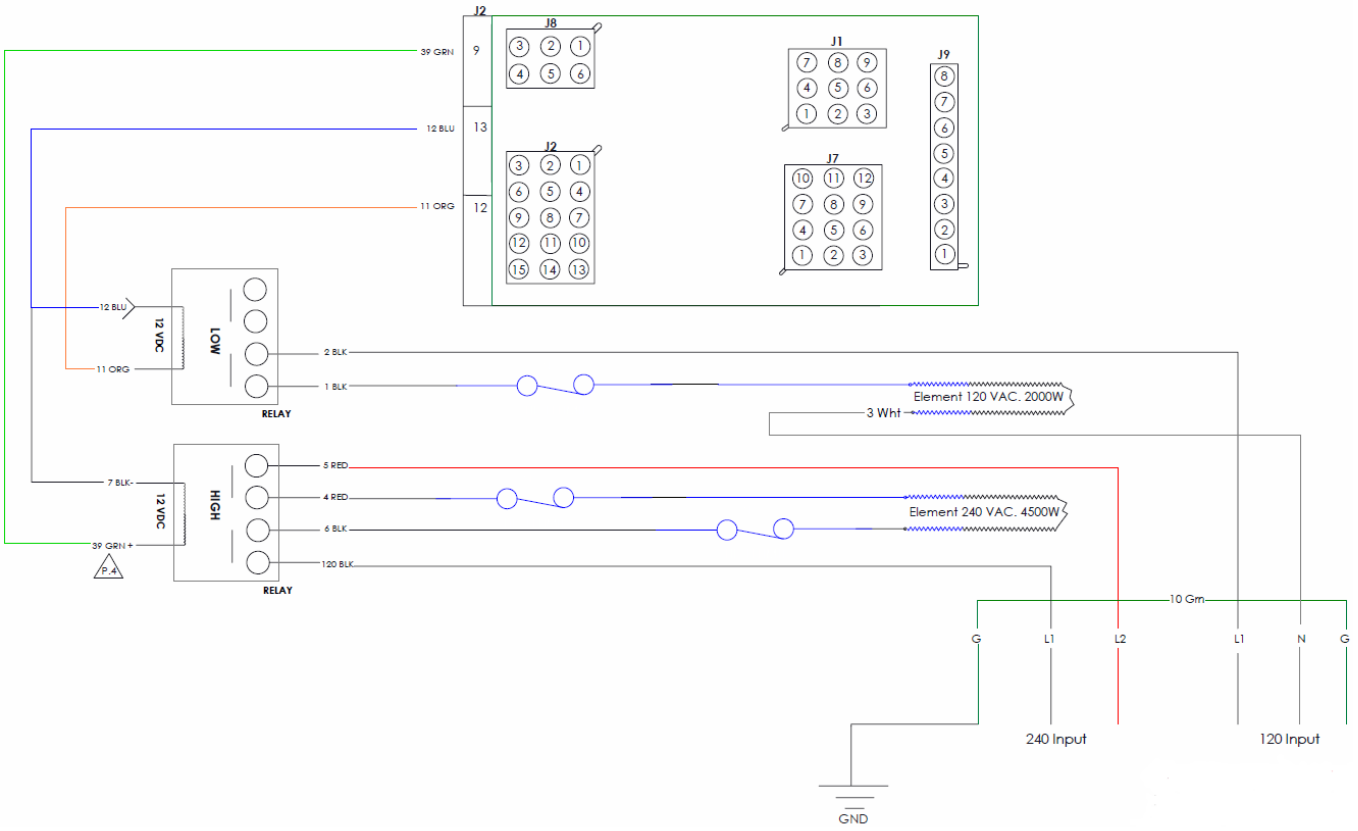
675-D03 Power Input, Pumps, Safeties and Controls



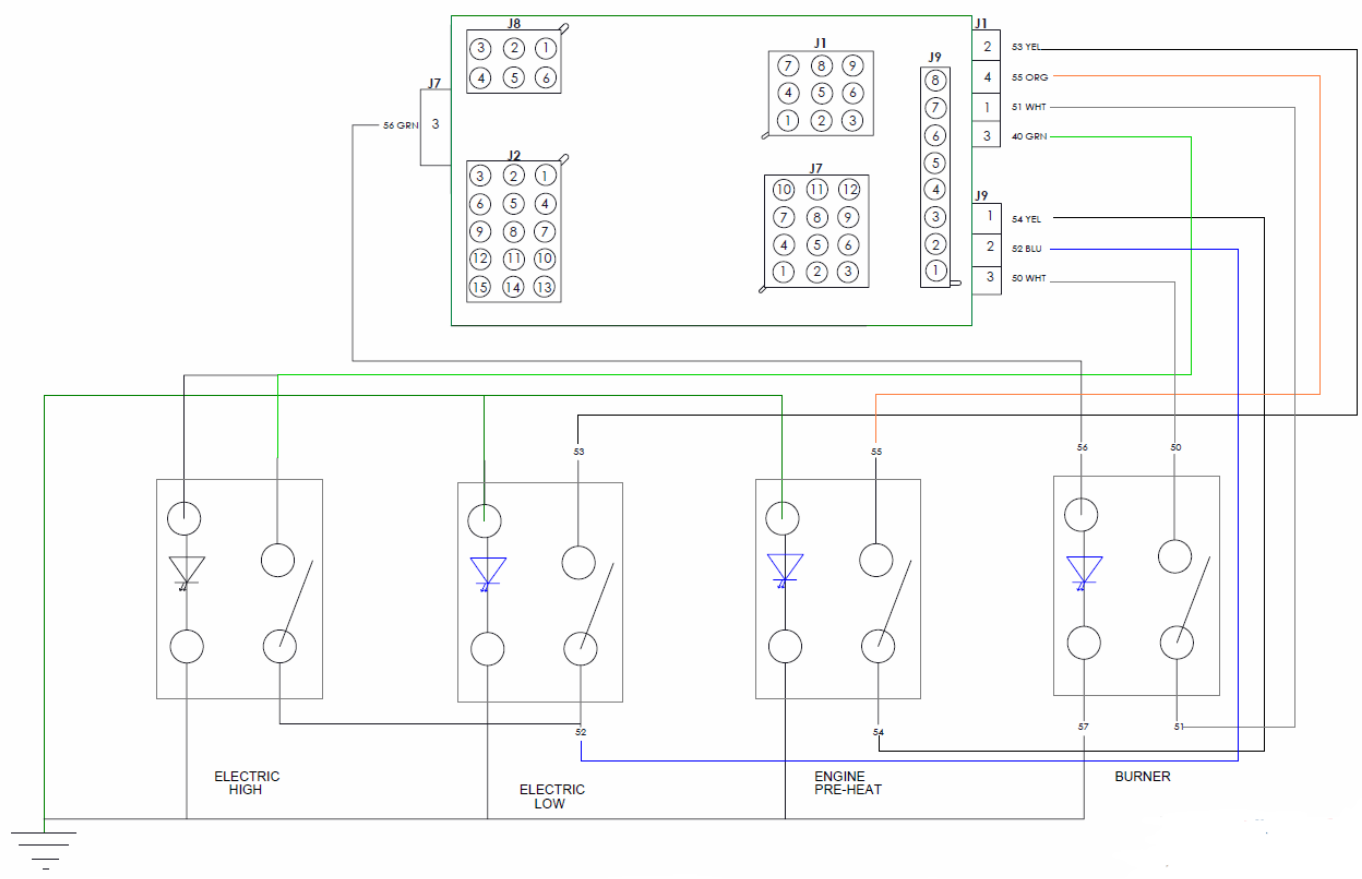
675-D03 Burner



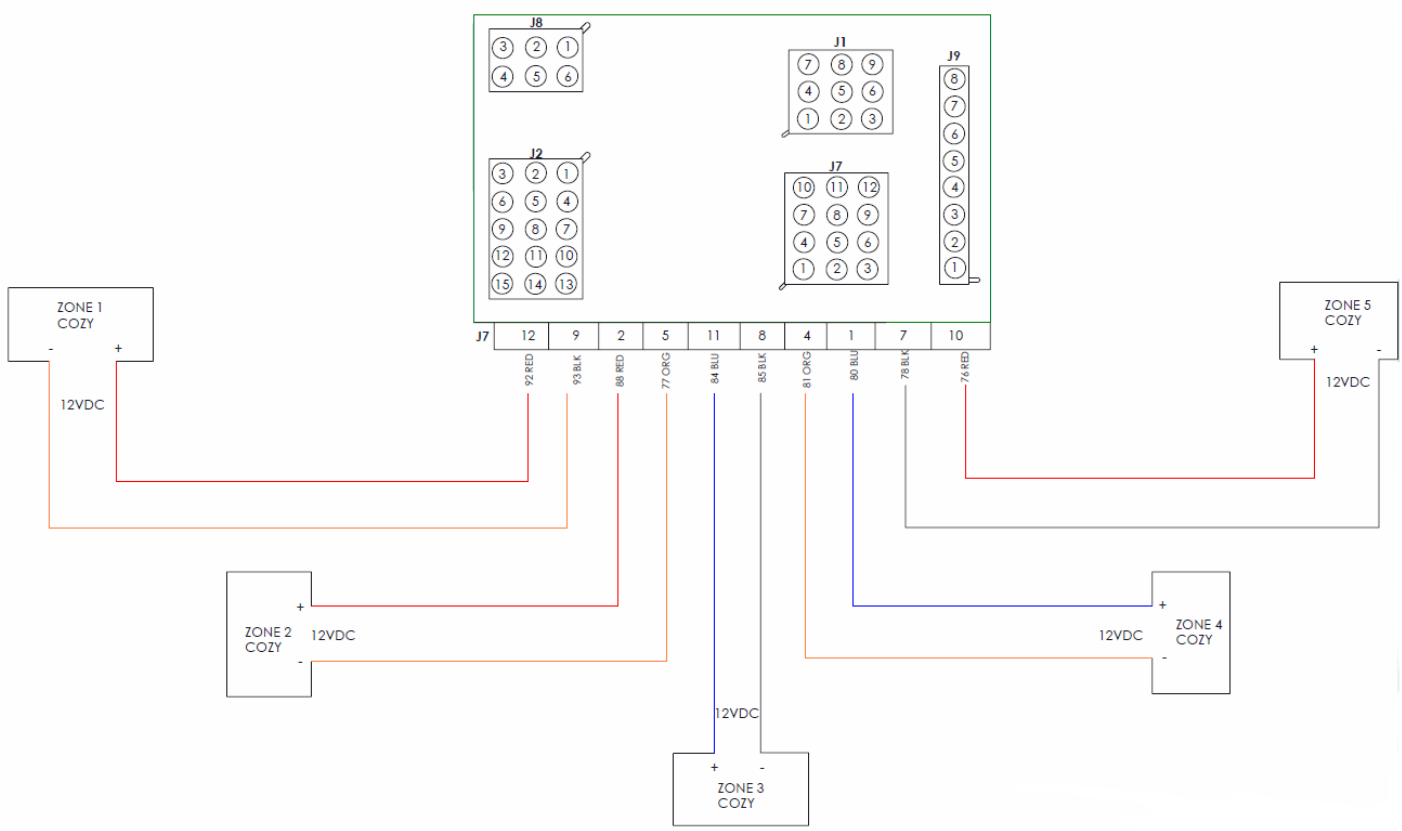
675-D03 Electric Elements, High Limit Thermostats



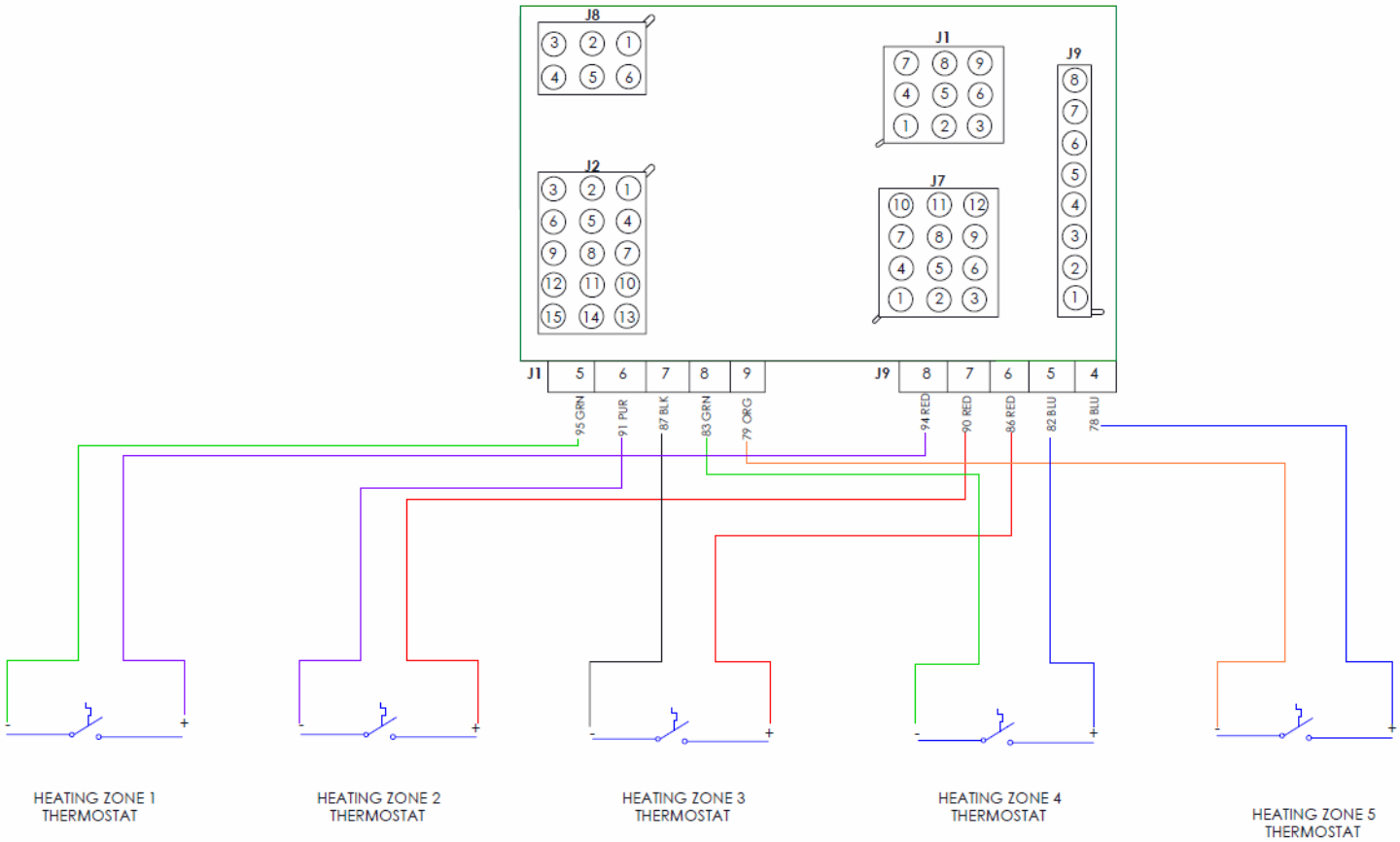
675-D03 Switch Panel



675-D03 Heat Exchangers

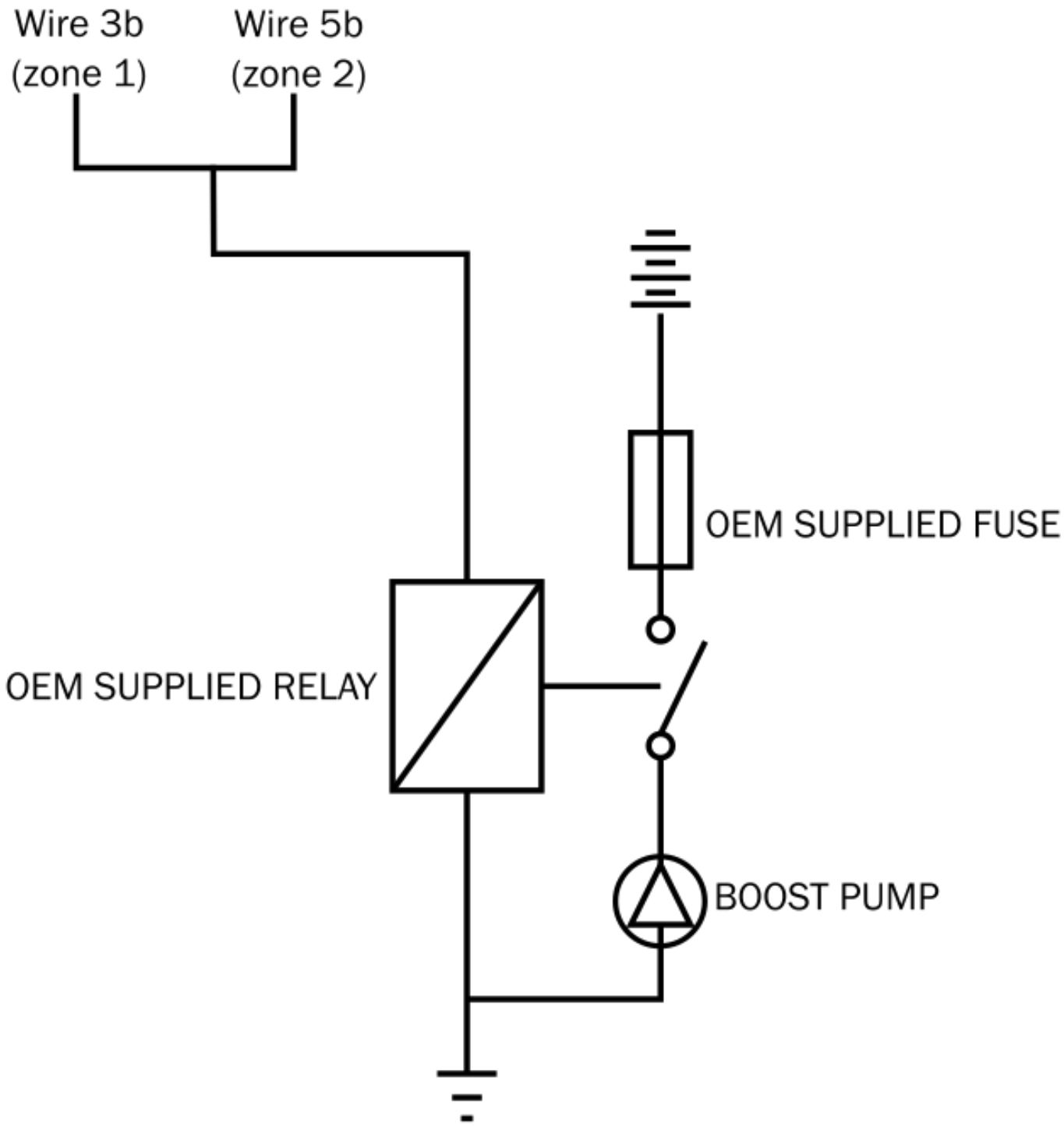


600-D03 Heating Zone Thermostats



Boost Pump Relay Circuit

The Aqua-Hot heating system allows the use of boost pumps to increase the flow rate of your heat exchanger system. The Aqua -Hot harness cannot support the current of an additional boost pump in the electrical system, so a relay circuit must be built to accommodate additional boost pumps. A diagram below illustrates how this relay circuit should function. Connect the boost pump relay to the correct wire number depending on which zone the boost pump is installed on. Note, a relay circuit will need to be constructed for each boost pump used in the coach.



OEM Product Supplement

Aqua-Hot®

Aqua-Hot Heating Systems, Inc.
7501 Miller Drive, Frederick, CO 80504

Visit us on line at www.aquahot.com
Call us at (800) 685-4298 or (303) 651-5500