

Main Frame Installation & Operation Manual
Standard 15 Amp System
5, 8 & 12 Zones
VC-5F-1, VC-8F-1 and VC-12F-1

PCS Module Mainframe

OPERATING INSTRUCTIONS

ELECTRICAL LOCKOUT
FEATURES
INPUT POWER
SITE SELECTION
ELECTRICAL INSTALLATION
POWERING UP
SHUT DOWN
MAIN FRAME TO MOLD CONNECTIONS
ANTI-ARCING FEATURE
SPECIFICATIONS
DRAWINGS

****Please read these instructions thoroughly before using this system****

IMPORTANT: Make sure the mainframe circuit breaker is "OFF" before inserting or removing control modules.

Main Frame Installation & Operation Manual

Standard 15 Amp System

5, 8 & 12 Zones

ELECTRICAL LOCKOUT:

THE ELECTRICAL POWER SOURCE MUST BE LOCKED OUT WHENEVER ANYONE IS WORKING ON THE EQUIPMENT.

Each maintenance person should have a personal padlock, with only one key. When working on any equipment this person should use the padlock to lock out the electrical controls. It is most important that the only available key for the lock be in the pocket of the person who is working on the temperature control equipment. If other persons work on the same equipment, each should use their own different lock at a separate lockout station for the controls of the equipment. Accidental startup of the equipment may have tragic results.

In no case should the removal of or work be performed on the temperature control modules or main frames without following proper electrical lockout procedures.

LIFTING APPARATUS:

Temperature control equipment, like any other type of equipment, requires normal periodic maintenance or relocation if the user is to get the most for the investment in the equipment. One of the most flagrant of safety violations is the use of inadequate and unsafe lifting equipment. The temperature control equipment or parts thereof should be assembled, disassembled and moved with lifting facilities that have the capability of gently and slowly lifting and lowering the equipment or various parts.

WHEN USING A CRANE OR FORK LIFT, OPERATE WITHIN ITS RATED CAPACITY, THE SAFE RATED CAPACITY INCLUDES WEIGHT OF HOOKS, BLOCKS, AND ANY OTHER HANDLING DEVICES, SUCH AS CABLES, SLINGS, SPREADER BARS, ETC. CONSIDER THE WEIGHT OF ALL THESE AS PART OF THE LOAD TO BE LIFTED.

WARNING:

When inserting or removing control modules from the main frame, power must be turned off on both the module and main frame. If the module is inserted or removed while under a load, severe damage will result to both the control module and the main frame. Before replacing the module, the main frame must be inspected for damage by a qualified technician. Damage caused to control module and main frame as a result of improper insertion or removal, will not be covered under warranty.

PLANT SAFETY:

The safety procedures mentioned here do not eliminate all safety hazards found in the area of operation. However, they do highlight some procedures that have been found through long experience to improve safety conditions around temperature control systems. International Temperature Control Inc. welcomes inquiries about other suggested safety procedures for use around their equipment.

OUT OF SERVICE:

When the system is out of service, both the control module and main frame must be turned off.

Main Frame Installation & Operation Manual

Standard 15 Amp System

5, 8 & 12 Zones

PCS Company modular 15 amp temperature control systems are designed to accurately manage the temperature of multi-zone applications. In the PCS system, individual temperature control modules are installed in a main frame. Each temperature control module works with one “J” or “K” type thermocouple and one heater in a closed loop system.

WARNING:

In most applications, only one heater element can be used per temperature control module. Current draw can fluctuate dramatically if multiple heater elements are wired together. If heaters are wired in parallel, care must be taken to insure that the total wattage of the heaters do not exceed the modules rating. If multiple heaters are wired in series, the effective wattage of the circuit drops dramatically. The use of more than one heater in a circuit should only be contemplated if a qualified electrical engineer designs the circuit.

It is highly recommended that a qualified electrician perform the input power wiring for this control system.

DESCRIPTION:

Unless otherwise specified, main frames are shipped from the factory wired to accept 208/240vac, 50/60 Hz, 3-Phase, power source. This is a 4-wire arrangement using 3 power wires plus a ground wire. If you are unsure of the voltage available, do not connect input power to this system without clarification as you may cause severe damage to the unit.

Units that will operate from 480vac power source will require a step down transformer to convert 480vac to 240vac before it enters the main frame. If the step down transformer is ordered from PCS Company it will be pre-wired to the main frame.

SITE LOCATION:

- Location of the main frame is important for proper operation and dependable service.
- Ventilation - The main frame must be located so air can move freely in and out of the housing and must not be exposed to excessive heat (maximum operating ambient air temperature 100° F).
- The main frame must be located to minimize dust, dirt, moisture, vibration caustic vapors and excess heat, as they all have a detrimental effect on the equipment.
- The unit must be positioned so the front and rear are readily accessible for setup, adjustment and service.
- Unit must be placed close enough to the mold so all cables can be conveniently run and connections made without undo strain on cables or connectors.
- Place main frame so it will not be damaged by normal plant activities.

POWER CONNECTION:

All electrical connections and servicing must only be performed by qualified electrical technicians. All electrical connections and servicing must be done in accordance with safe electrical practices. Consult your local electrical code prior to electrical installation. Follow proper lockout & tag out procedures before any work is done on the unit.

On units shipped without a power transformer, it is the user’s responsibility to supply proper input power cable.

Main Frame Installation & Operation Manual

Standard 15 Amp System

5, 8 & 12 Zones

Select Proper Power Cable:

PCS normally supplies with the main frame, a cord grip suitable of 8/4 SO cord, rated for 50 amps. It is recommended that a qualified electrical engineer determine the proper cable size for your application.

NOTE: It is recommended that a fused disconnect box be installed. This will provide a convenient means to implement lock out and tag out procedures and completely disconnect all input power to the mainframe.

ELECTRICAL INSTALLATION: (Reference enclosed drawing)

WARNING: Never attempt to perform any wiring or service to this unit with the input power cable connected to a power source. Disconnect the input power cable from the power source before attempting any service on this unit.

- Remove the back cover panel from the main frame.
- Strip back approximately 3 inches of the input cables outer jacket.
- Strip back approximately $\frac{1}{4}$ inch of insulation from each individual lead.
- Insert input power cable through the cable grip located on the side of the main frame. Check to make sure there is no tension on the individual leads. Tighten screw on the cable grip
- Wire the input power cable into the input power terminal block located inside the main frame.
- When connecting the power cable, be sure to attach a proper ground lead opposite the green ground wire on the input power terminal block. Make sure that the ground lead is attached to a good earth ground and test housing to ground.
- Make sure that the input power leads are securely attached to the proper input terminal block and that there are no loose wire strands sticking out of the terminals.
- An input power cord grip is normally supplied with each unit. It is very important that the grip is checked for tightness in the main frame and that the input power cable is secured in the grip so that it cannot be accidentally pulled out.
- After the input power cable had been properly installed in the main frame, securely replace the back cover panel on to the main frame with a screw at each location.
- Connect the input power cable to a 240vac service disconnect box (3-Phase for 3 & 6 zone systems and 1-Phase for 1-zone systems) and attach leads to the fused side of the switch. Check to make sure disconnect box is off before opening the box. The ground lead must be attached to a good earth ground and checked.
- Install appropriate size fuses in the main disconnect service box.

WARNING:

All three power leads on three phase systems are electrically hot to ground. Wiring errors at either end of the cable can make the metal enclosure electrically hot and extremely hazardous. Make sure ground is properly and securely attached. Test connection to earth ground.

NOTE: Exposed electrical leads can cause shock or electrocution. Do not connect, apply power or operate when any cover is open, removed or electrical connection is exposed.

POWERING UP:

1. Turn "ON" external power fused disconnect switch to provide power to main frame.
2. Turn "ON" main frame by pushing up on the circuit breaker handle on the front of the main frame. Phase indicators (L1, L2 & L3) will light up, indicating which leg has power. If any of the phase indicator lights do not come on, turn off the power to the main frame and contact a qualified electrical technician.

Main Frame Installation & Operation Manual

Standard 15 Amp System

5, 8 & 12 Zones

3. Whenever ever the main frame is powered up, make sure the cooling fan is working. You should be able to feel a substantial amount of air being expelled from the fan louvers on the right side of the cabinet. The bottom of all main frames must be free from obstructions to allow air to enter freely. If air flow to the unit is impeded, it could cause premature failure to the main frame or control module.
4. Turn "ON" the individual temperature control modules by depressing the power button on the bottom of the module face plate.

NOTE: Prior to operating system thoroughly read and understand the operating manual for the module being used.

WARNING:

When inserting or removing control modules from the main frame, power must be turned OFF on both the module and main frame. If modules are inserted or removed while under a load, severe damage can result to both the control module and main frame. Damage caused to control module and main frame as a result of improper insertion or removal, will not be covered by warranty. Before replacing the module, the main frame must be inspected for damage by a qualified technician.

NOTE: It is recommended that a fused disconnect box be installed. This will provide a convenient means to implement lockout & tag out procedures and completely disconnect all input power to the mainframe.

TO SHUT SYSTEM DOWN:

1. Turn "OFF" each individual module
2. Turn "OFF" main frame by pushing down on the circuit breaker handle on the front of the main frame.
3. Turn "OFF" the external power disconnect box.

MAIN FRAME TO MOLD CABLE CONNECTIONS:

POWER CONNECTORS: Multi-pin (female) power connectors are built into left side of standard main frame to interface with the mold power cable.

THERMOCOUPLE CONNECTORS: Multi-pin (male) thermocouple connectors are built into the left side of standard main frames to interface with the mold thermocouple cable.

THERMOCOUPLE CABLES: Individual mold thermocouple cables are the same as used in out standard 15 amp systems, (Connector on main frame end {female} & connector on mold end {female}).

- Caution must be taken so that power and thermocouple cables are installed in the proper connectors.
- Standard PCS main frame connectors and mold cables are engineered to reduce the possibility of inadvertent installation of the power cable into the main frame thermocouple connector or the thermocouple cable into the main frame power connector. Still caution must be taken to ensure proper installation.
- Reference enclosed drawing for standard power and thermocouple wiring arrangement.
- Temperature control module in main frame zone #1 location will control heater in mold cavity #1, etc.
- Connect power and thermocouple cables to main frame and mold. Firmly set retaining latches to prevent the cables from pulling out of the connectors. Reference enclosed drawing for description of installation.

INSERTING AND REMOVING MODULES:

1. Inserting or removing modules while module and main frame is on could expose the operator to dangerous electrical power. It could also destroy the module and damage the main frame

Main Frame Installation & Operation Manual Standard 15 Amp System 5, 8 & 12 Zones

2. Turn "OFF" the module and main frame. Lockout & tag out power to the main frame prior to removing or installing temperature control modules.
3. To insert a module, first line up the top and bottom of the card with the card guides located on the top and bottom of the slot.
4. Push module gently, but firmly into main frame card guides until it is fully seated in the edge connector located at the back of the main frame.
5. To remove a module from main frame, grasp the handle and gently, but firmly pull straight out.

CAUTION:

Install Main Frame Blank Plates (MFBP) over any empty slots. **NEVER** operate the system with an uncovered slot, since it will expose you to dangerous electrical power which can cause severe electrical shock.

WARNING:

Phone: 800-521-0546 E-mail: sales@pcs-company.com Fax: 800-505-3299
www.pcs-company.com

When inserting or removing control modules from the main frame, power must be turned OFF on both the module and main frame. If modules are inserted or removed while under a load, severe damage can result to both the control module and main frame. Damage caused to control module and main frame as a result of improper insertion or removal, will not be covered by warranty. Before replacing the module, the main frame must be inspected for damage by a qualified technician

ANTI-ARCING FEATURE

This temperature control system is equipped with our innovative **Anti-arcing** feature that will help prevent damage to the control module and main frame in the event the module is inadvertently removed under load. This feature should not be considered a substitute for proper handling procedures, but rather a supplemental protection mechanism.

If a PCS control module is inserted into a main frame not equipped for **Anti-arcing**, the instrument will not provide power to the heater and a “tOh” error code will be displayed. If this condition occurs, the **Anti-arcing** jumper can be moved from the #2 & #3 enabled position to the #1 & #2 disabled position. By repositioning the jumper in the **Anti-arcing** disabled position, the module will function in main frames not equipped with the **Anti-arcing** feature. **Disabling the anti-arcing feature can void your two-year warranty in the event the module is removed from main frame under load, as a resulting in damage to printed circuit board traces.**

- NOTE:** This feature will only work with PCS’s main frames, and should not be considered a substitute for proper handling procedures. Disabling the anti-arcing feature could void your two-year warranty if damage occurs.
- NOTE:** The **Anti-arcing** feature will not prevent damage if the jumper is not in the enabled position.
- NOTE:** The **Anti-arcing** feature of this module will not prevent damage if the module is used in a main frame not properly equipped for **Anti-arcing**.

Main Frame Installation & Operation Manual

Standard 15 Amp System

5, 8 & 12 Zones

SPECIFICATIONS:

Voltage: 208 to 240vac, three phase

Frequency: 50/60 Hz

Maximum Amperage per Zone: 15 Amps

Over Current Protection: 50amp 3-leg circuit breaker with phase indicator

Physical Configuration: Modules plug in for easy interchangeability

Compatibility: Compatible with "G" Series Controllers

5-Zone Main Frame Size: 9" High x 14-1/4" Wide x 11-1/2" Deep
Weight: 15 pounds approx.

8-Zone Main Frame Size: 9" High x 20-1/4" Wide x 11-1/2" Deep
Weight: 15 pounds approx.

5-Zone Main Frame Size: 9" High x 28-1/4" Wide x 11-1/2" Deep
Weight: 15 pounds approx.

Construction: Welded Aluminum

Special Features Anti-Arching Capability with proper PCS module

Main Frame Installation & Operation Manual

Standard 15 Amp System

5, 8 & 12 Zones

MAIN FRAME TO MOLD CONNECTOR

Before connecting the control system to the mold make sure that all mold wiring is correct and that no wires are pinched or shorted to the mold. Check heater wiring for proper resistance between heater wires and from heater wires to mold at the connector. Check for proper thermocouple polarity at the connector. This should be done prior to setting the mold as well.

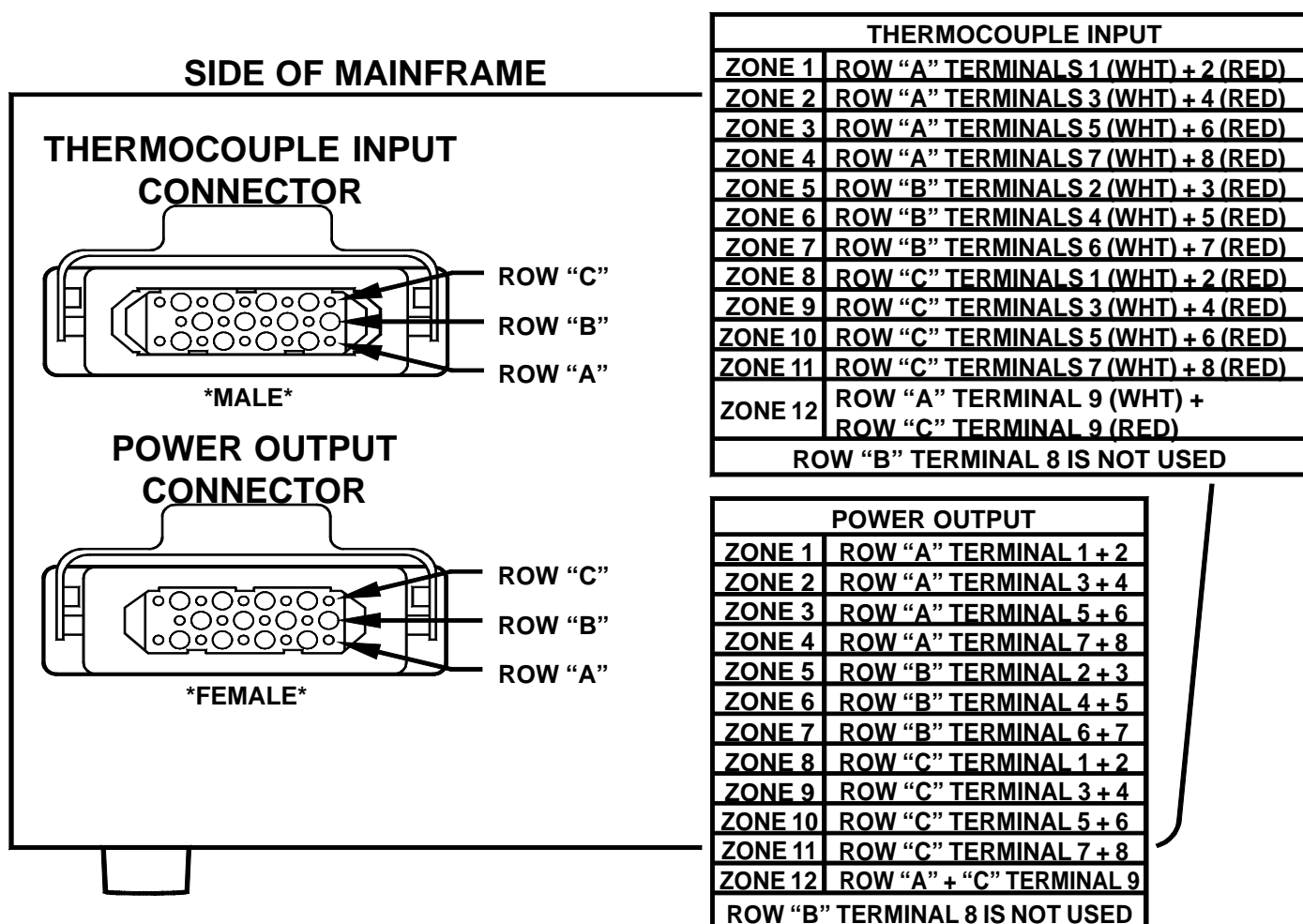
When connecting the mold interface cables, disconnect the control system input power cable from the power source to prevent possible electric shock. This is important for your own protection.

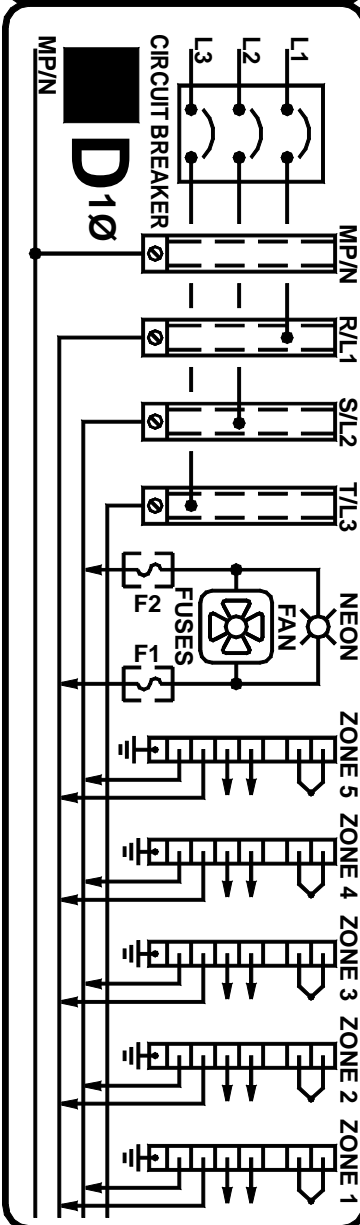
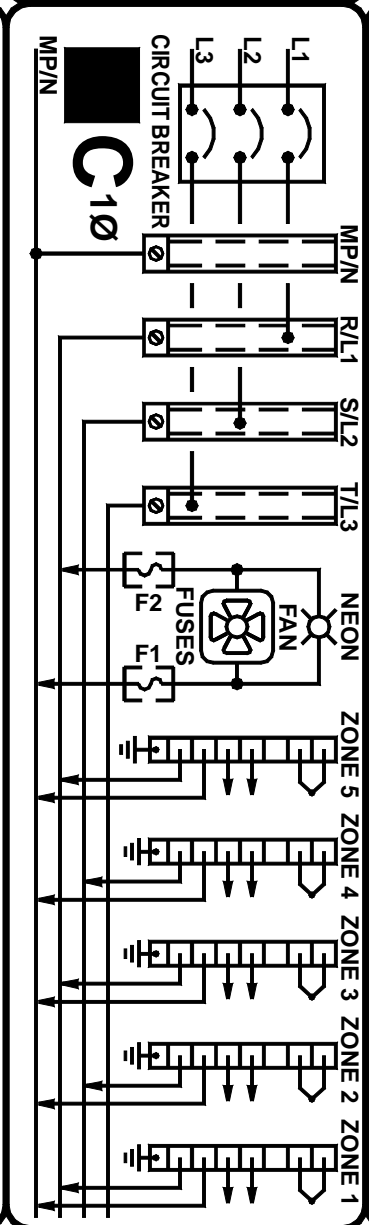
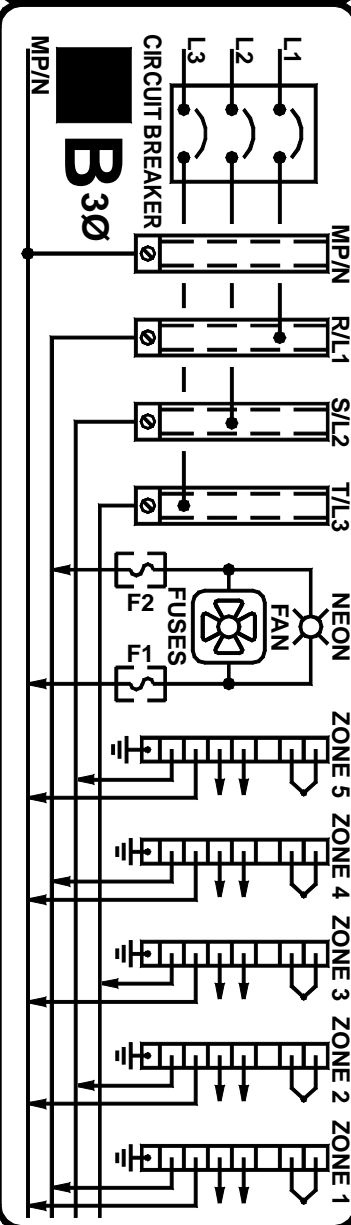
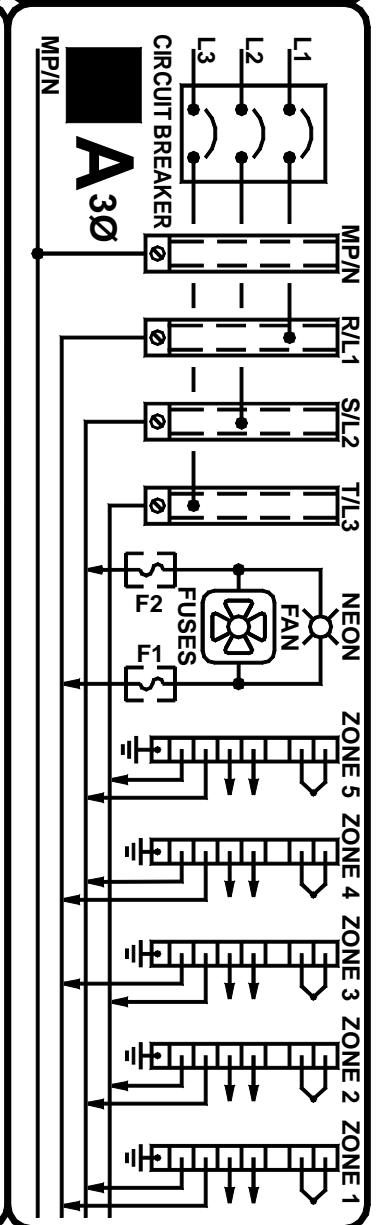
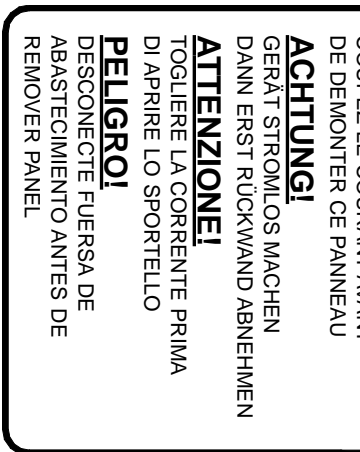
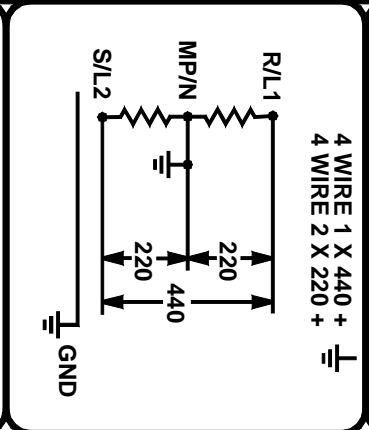
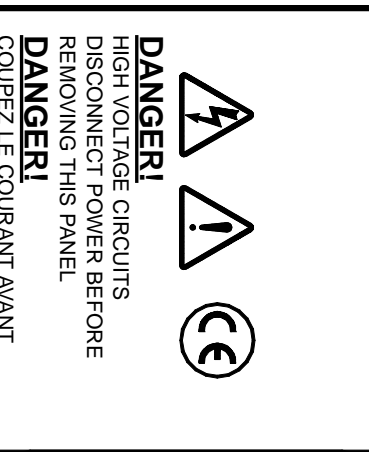
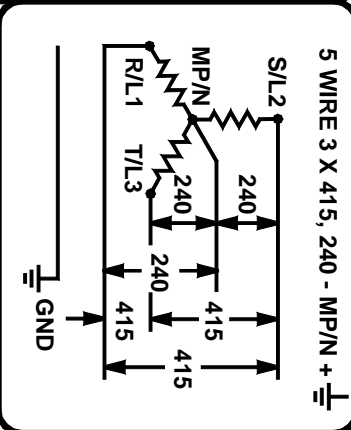
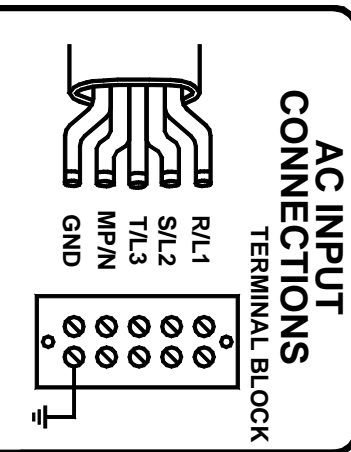
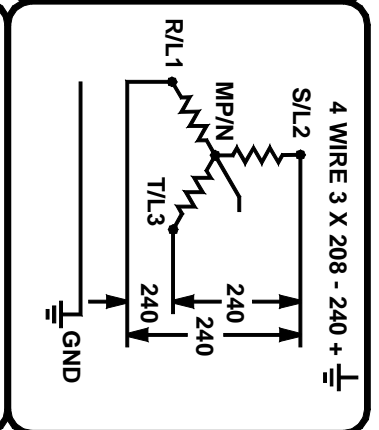
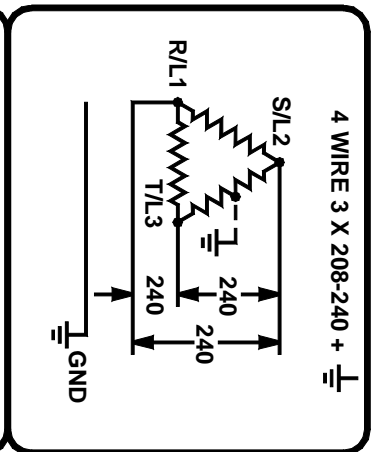
When mating connectors make sure that you have the proper match. Check to make sure none of the pins are bent or misaligned. You should never have to force connectors together; properly mated connectors will fit together easily.

The power connectors on the mold should be wired following the same pattern as the power connectors on the main frame. Standard mold power connectors are supplied with 6-inch leads that are numbered according to the zone number. These leads should be butt spliced to the corresponding heater wires on the mold. It is very important that these wires are firmly spliced together.

Standard mold thermocouple connectors are physically different from the other connectors. This is to prevent improper connections of power and thermocouple connectors. Thermocouple connectors are also different from each other depending on the number of zones required. All thermocouple connectors follow the same basic wiring pattern with pin #1 being positive (white wire) connection for zone #1 and the opposite pin in the second row being the negative (red wire) connection for zone #1. Pin #2 is the positive connection for zone #2 and the opposite pin in the second row is the negative connection for zone #2. All subsequent zones follow this pattern.

STANDARD MAINFRAME CONNECTOR WIRING DIAGRAM

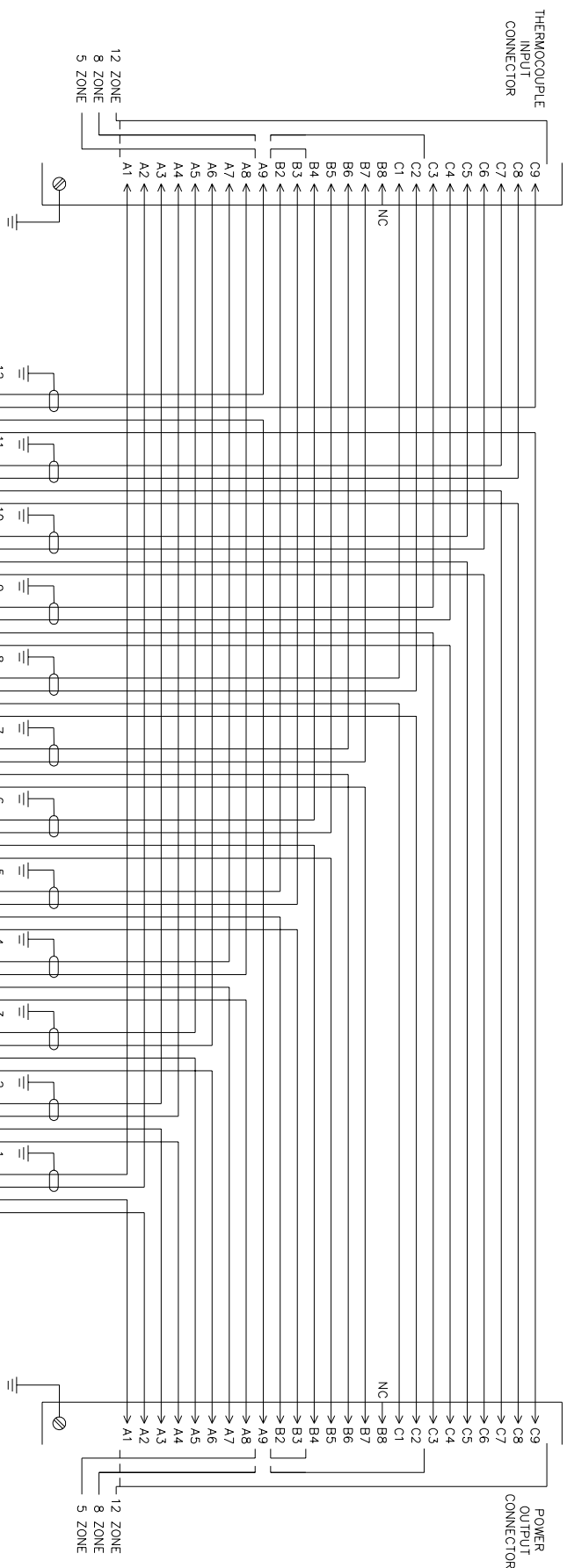




MAINFRAME WIRING CONFIGURATIONS

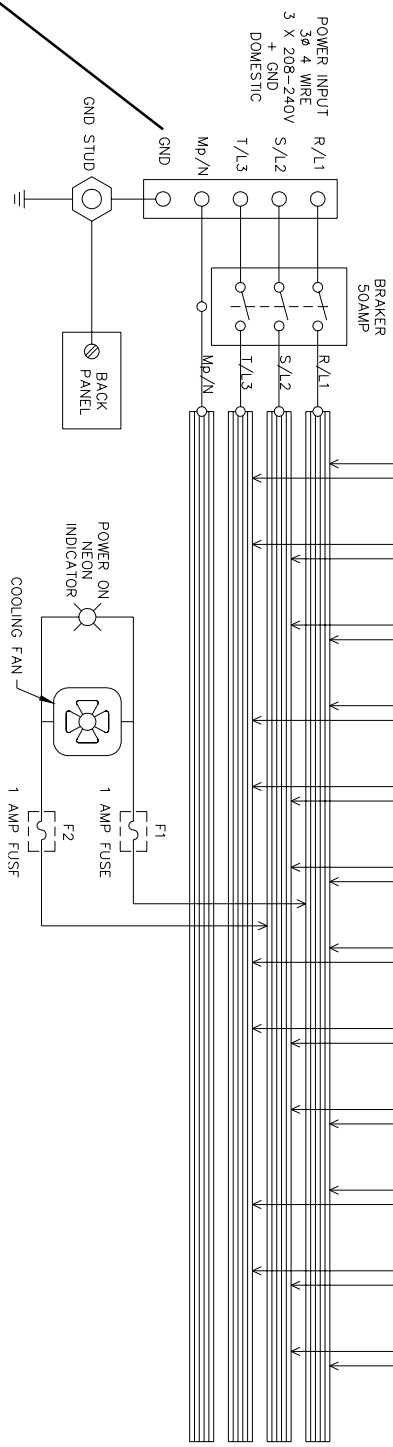
- A: 3 PHASE, 4 WIRE - 208-240 VAC (Primarily North America)
- B: 3 PHASE, 5 WIRE - 380-415 VAC (Primarily Continental Europe)
- C: 1 PHASE, 4 WIRE - 440 VAC
- D: 1 PHASE, 3 WIRE - 208-240 VAC (Standard Single Phase Configuration - North America or Continental Europe)

THERMOCOUPLE INPUT
COMMON TO ALL CONFIGURATIONS



MOLD POWER OUTPUT
COMMON TO ALL CONFIGURATIONS

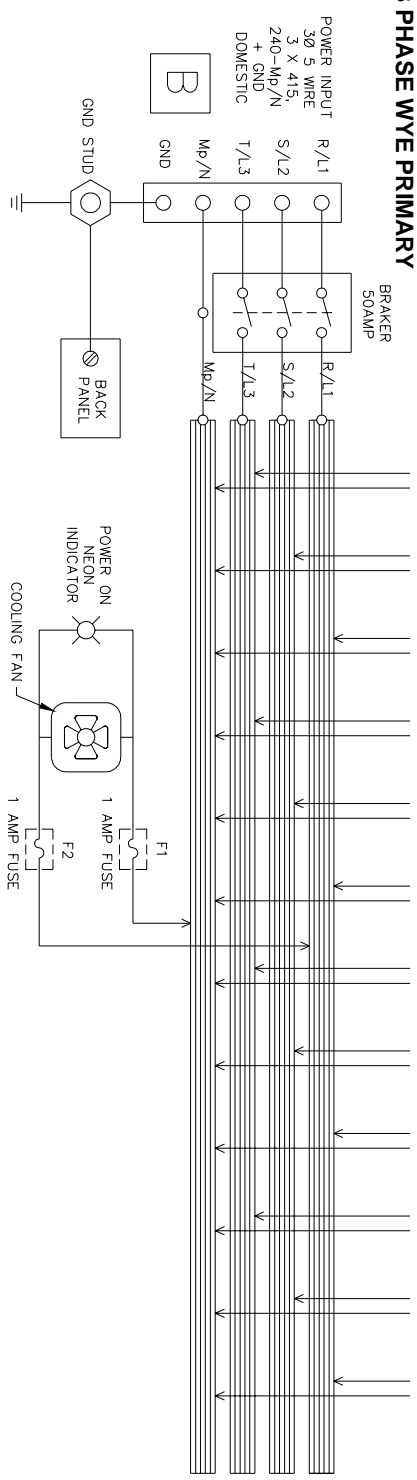
NORTH AMERICA STANDARD
3 PHASE DELTA PRIMARY



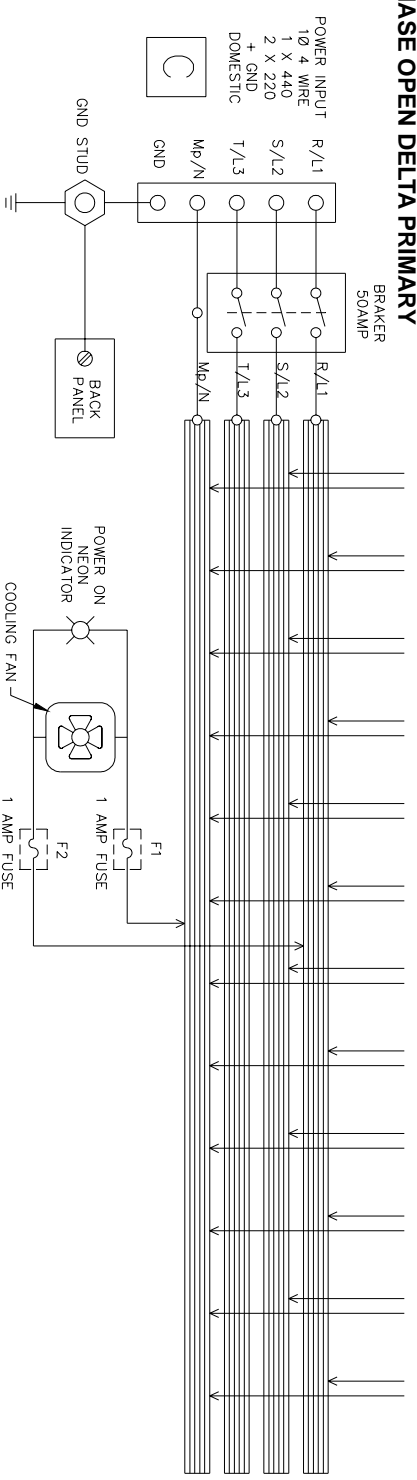
NOTE: CUSTOMER MUST INSURE OF PROPER CONNECTION TO EARTH GROUND!

STANDARD MAINFRAME
INTERNAL WIRING DIAGRAM
STANDARD CONFIGURATION - STYLE "A"

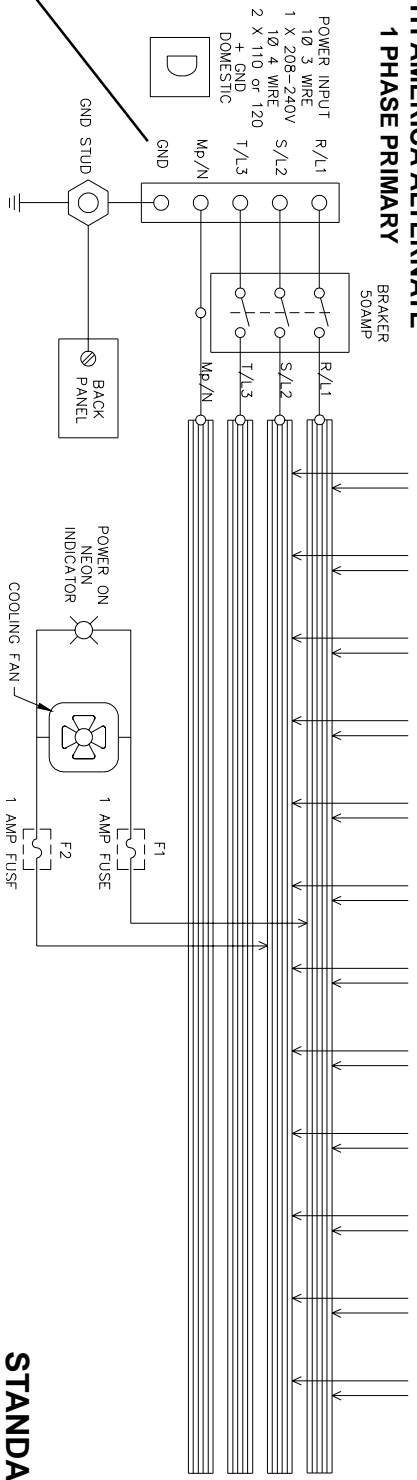
**EUROPEAN STANDARD
3 PHASE WYE PRIMARY**



1 PHASE OPEN DELTA PRIMARY



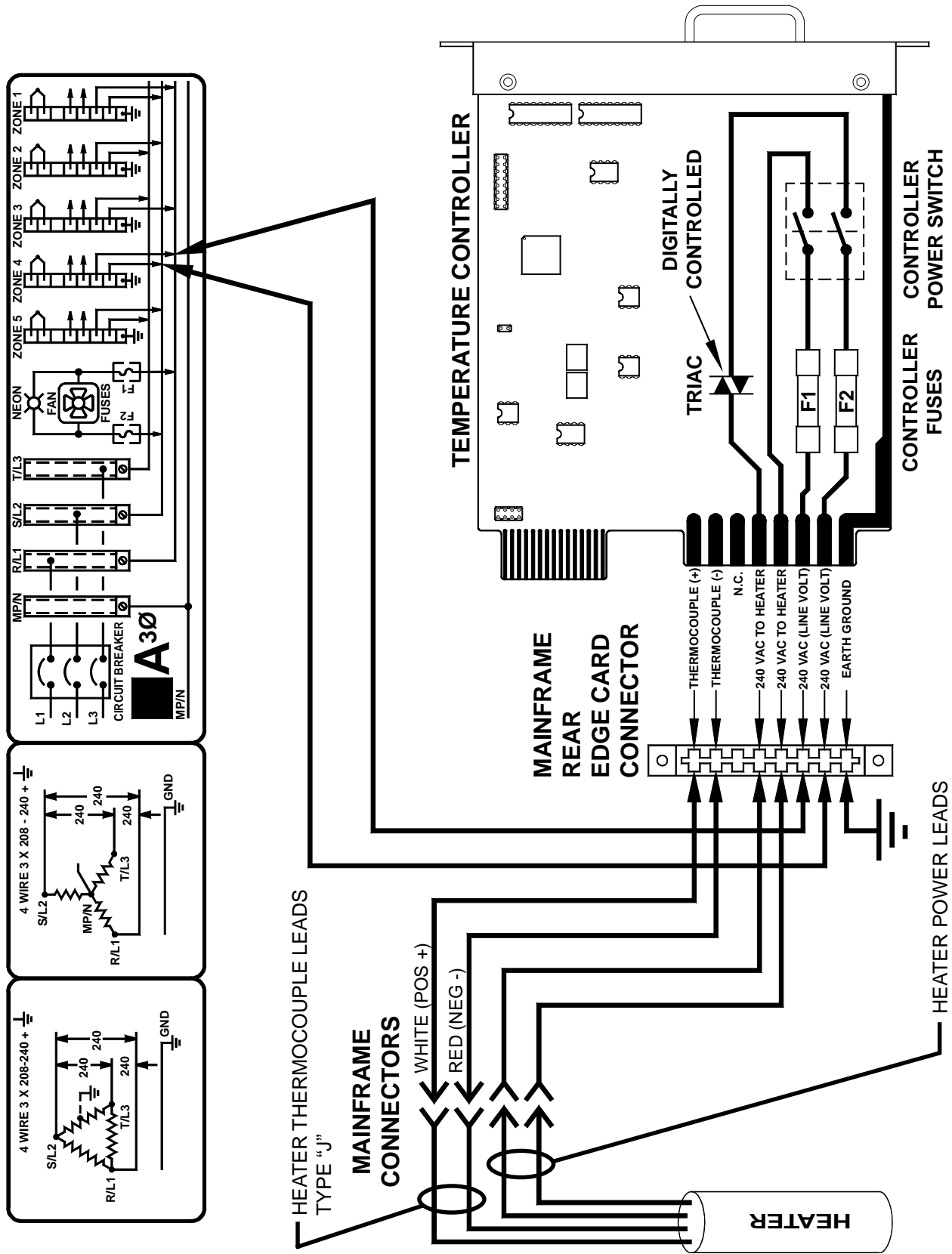
**NORTH AMERICA ALTERNATE
1 PHASE PRIMARY**



**NOTE: CUSTOMER MUST INSURE OF PROPER
CONNECTION TO EARTH GROUND!
** ALL WIRING CONFIGURATIONS ****

**STANDARD MAINFRAME
INTERNAL WIRING DIAGRAM
INTERAL WIRING STYLES "B", "C" & "D"*****

TYPICAL SYSTEM "ZONE" WIRING DIAGRAM



5, 8 & 12 Zones

MAIN FRAME CONTROL MODULE CONNECTOR AMP - CR

