MFP5G, MFP8G, & MFP12G
DME Smart Series®
Mainframes

User's Manual
DME Company

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WARRANTY

DME Company warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If any such product proves defective during this warranty period, DME Company, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. DME Company shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than DME Company representatives to repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; or c) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

SAFETY

DME Company products have been designed to be safe and simple to operate. As with any electronic equipment, you must observe standard safety procedures to protect both yourself and the equipment.

To Prevent Injuries:

- To avoid electrical shock or fire hazard, do not apply voltage to a terminal that exceeds the range specified for that terminal.
- To avoid mechanical injury, electrical shock or fire hazard, do not operate this product with covers or panels removed.
- To avoid electrical shock or fire hazard, do not operate this product when wet.
- To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.

To Prevent Product Damage:

- Do not operate this product from a power source that applies more than the voltages specified.

DME Smart Series®
Mainframes

MFP5G, MFP8G, MFP12G

GENERAL DESCRIPTION

This manual describes the installation, operation, servicing and safety procedures for the DME Smart Series Mainframe.

The DME Smart Series Mainframe is designed as a closed-loop power distribution and temperature controlling system. When it is used in conjunction with DME temperature controls, this system provides the user with premier temperature control capabilities. DME offers several different types of temperature control modules to every budget. These types of temperature controls provide the operator with superb operator interface, ease of use, and simplicity.

The power output connector and the thermocouple input connector, located on the left side of the unit, are designed to maximize the power output capabilities of this temperature control system. It is designed to deliver 15 amps of current, which will support the needs of most situations.

Figure 1 - Power Connector (Bottom) & Thermocouple Connector (Top)

This unit also has a built-in cooling fan, a circuit breaker and power input terminal block (see figure 3), making interface easy. Neon indicators illuminate advising that power is on (see figure 4).

FEATURES

Each mainframe is constructed with heavy-duty steel framework and includes a built-in cooling fan, connectors for control modules, multi-pin power output connector, and a multi-pin thermocouple input connector for interfacing with your mold. Interfacing is accomplished through a power output cable and a thermocouple input cable for each frame. D-M-E can also supply special temperature control systems to meet your special requirements.

Mainframes can be equipped with a communications strip that allow temperature control modules to communicate with a TAS-05-02 or a CIM-01-02 module. This communication strip employs a serial communications link which is used to receive and transmit data between the temperature control modules and various accessory modules. This communications link can also interface with various host computers for control and monitoring purposes via the CIM-01-02 module. This communication feature is accomplished through a communications motherboard (strip) which is mounted on the mainframe connector mounting plate just above the edge card connectors. Although the features and communications capability will be continually added to and upgraded, the communications scheme and hardware will remain constant. This communications strip is optionally installed at the factory. Notice that each zone in the mainframe has its own discrete address. With the address scheme

used, it is possible to have up to 64 discrete addresses. Addressing is accomplished by cutting the solder links in the address lines, located on the rear of the communications strip. When a link is cut, it represents a binary 1; when it is not cut, it represents a binary 0. The standard numbering scheme is as follows: Looking at the back of the motherboard, we start at the extreme right with zone #1 which is coded in binary as "0001". Moving to the left, zone #2 is coded "0010" and zone #3 is "0011". etc., up through binary #63, with the 64th zone being coded binary "0000".

WORLDWIDE WIRING CAPABILITIES

Unless otherwise specified, all Smart Series mainframes will be supplied to accept 240 VAC, 3 phase, 4 wire, input power. Wiring diagrams included in this manual are also located on the back panel of the mainframe. Wiring diagrams illustrate the variety of other voltage, phase and load balancing arrangements possible (such as 380-415 VAC, 3 phase; 208-240 VAC, single phase; and 110-120 VAC, single phase). These wiring adjustments can be performed in the field to suit the requirements of the application. Or, if specified at the time of original order, D-M-E will supply the mainframe configured to suit your input power application requirements.

UNPACKING AND INSPECTION

1. After unpacking, inspect your mainframe and check for any damage that may have occurred during shipment.

2. Check the circuit breaker disconnect and neon phase voltage indicators for damage.

3. Check for proper operation of circuit breaker by flipping breaker on and off with no voltage applied.

4. Check power output connector and thermocouple input connector for any physical damage.

5. Check AC input power wiring. The power input diagram is located on the back panel of the mainframe. This diagram indicates the input voltage configuration that was prewired at the factory. Make sure it matches what you ordered.

SAFETY

SERVICE AND INSTALLATION OF THIS EQUIPMENT SHOULD ONLY BE PERFORMED BY QUALIFIED SERVICE PERSONNEL FAMILIAR WITH HIGH VOLTAGE ELECTRICAL CIRCUITS.

NOTE: ALL NATIONAL AND LOCAL ELECTRICAL CODES MUST BE FOLLOWED WHEN CONNECTING THIS EQUIPMENT.

WARNING: When connecting AC power input cable, it is necessary to remove the mainframe back panel. Do not apply power to this cable or the unit when the back panel is removed.

DANGER: Do not connect AC power input cord to your in-plant power distribution system until mainframe back panel is securely in place.

DANGER: Do not attempt to insert low voltage modules into high voltage zones. Certain catastrophic failure of the module and possible injury to humans in the area may result.

DANGER: Do not attempt to defeat the rejection scheme on low voltage modules as certain catastrophic failure of the module and possible injury to humans in the area may result. Do not remove the rejection rod on the module. (See figure 2)

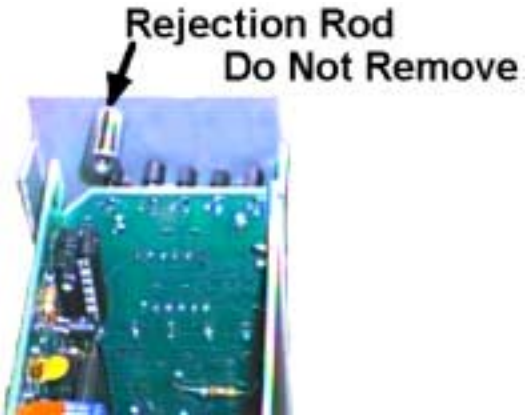


Figure 2 - Rejection Rod on Low Voltage Modules (Do Not Remove)

DANGER - HIGH VOLTAGE

If it becomes necessary to service this equipment after AC input connections are complete, make sure that your in-plant disconnect mechanism is in the "OFF" position and is secured in the "OFF" position by a padlock or other means provided by the manufacturer of the disconnect mechanism. A **"LOCK-OUT"** mechanism is recommended to prevent power from being accidentally turned-on.

INSTALLATION

1. You are installing a piece of electronic equipment which is delicate and should not be subjected to any physical or environmental abuse. Select a cool, dry, well-ventilated, environmentally clean location, away from heat, moisture and liquid carrying lines, i.e.: water cooling hoses, hydraulic hoses, etc.

2. Mainframes are shipped from the factory pre-wired for 240 VAC, 3 phase. Other voltage configurations are available on request (e.g. 240 VAC, single phase; 120 VAC. single phase).

3. Select the supply line input wire size according to national and local electrical codes. Refer to mainframe serial number label for amperage rating of circuit breaker in your mainframe.

   a) Remove mainframe back panel by removing screws around the perimeter of the panel.

   b) Insert input cable through access hole provided on the right side of the mainframe.

4. Connect your AC input cord to the input terminal block as shown on the rear panel, for the input voltage configuration you are attaching to.

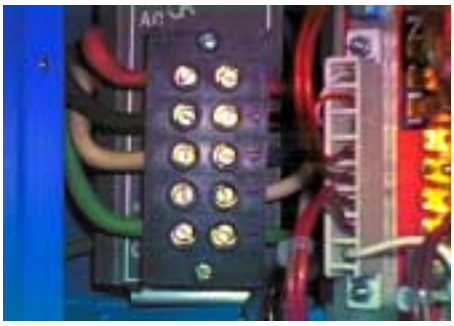


Figure 3 - Power Input Terminal Block

   a) **WARNING:** Make sure that the chassis has been earth grounded before applying power.

   b) Take up excess slack in cable and secure with strain relief clamp provided on outside of cabinet.

5. If it becomes necessary to change to a voltage configuration other than what the system was prewired for at the factory, it will be necessary to follow the following instructions:

   a) For 208-240 VAC, 3 phase, refer to Figure 16.

   b) For 380-415 VAC, 3 phase, refer to Figure 17.

   c) For 240 VAC, single phase, refer to Figure 18.

d) For 120 VAC, signal phase, refer to Figure 19.

6. Make sure mainframe back panel is securely in place before connecting power to mainframe.

7. Route AC input cable to a branch circuit (service) disconnect switch and attach leads to fused side of switch. Be sure ground lead is attached to a good earth ground.

8. Where required, insert appropriate fuses in fused disconnect box.

9. Connect power & thermocouple cables to mainframe and mold.

10. Refer to Module Specifications sheets supplied with module for front panel controls and module operation for the specific module being used.

WARNING: BEFORE APPLYING POWER, MAKE SURE ALL NATIONAL AND LOCAL ELECTRICAL CODES HAVE BEEN FOLLOWED AND ALL SAFETY PRECAUTIONS ARE TAKEN.

IMPORTANT: For mold wiring and heater connection information, refer to mold connector wiring diagram.

OUTPUT CURRENT LIMITATIONS

Each Smart Series mainframe is equipped with a three-pole, fast-acting 50 amp magnetic circuit breaker, (see figure 4). This circuit breaker limits the maximum input and output current of the mainframe and protects the mainframe internal wiring. The output current limitation for each frame is determined by the size of the circuit breaker in the mainframe.

An optional Current Voltage Monitor is available. It monitors line voltages or the current of a particular zone (see figure 4).

WARNING: Before inserting or removing any modules from the mainframe, turn the power "OFF" by flipping the circuit breaker handle to the "OFF" position. Otherwise, certain module damage will occur.

Figure 4 - Current Voltage Monitor (Optional - Top) & Standard Circuit Breaker Panel (Bottom)

MAINFRAME WIRING

Provided in this booklet, (Figure 23), is a schematic diagram of a standard 12 zone mainframe. Connectors J1 through J12 in a 12 zone mainframe, J1 through J8 in an 8 zone mainframe, and J1 through J5 in a 5 zone mainframe, are the module edge card connectors shown with their respective interconnections. Refer to edge connector for printed circuit board connections (see figure 5). Note that the AC input power

contact #6 and #7 on the edge card connector are specifically designated for 240 VAC in zones 1 through 12.

The module output power is connected to the mainframe power output connector, located on the left side of the mainframe, via contact #4 and #5 of the edge card connector.

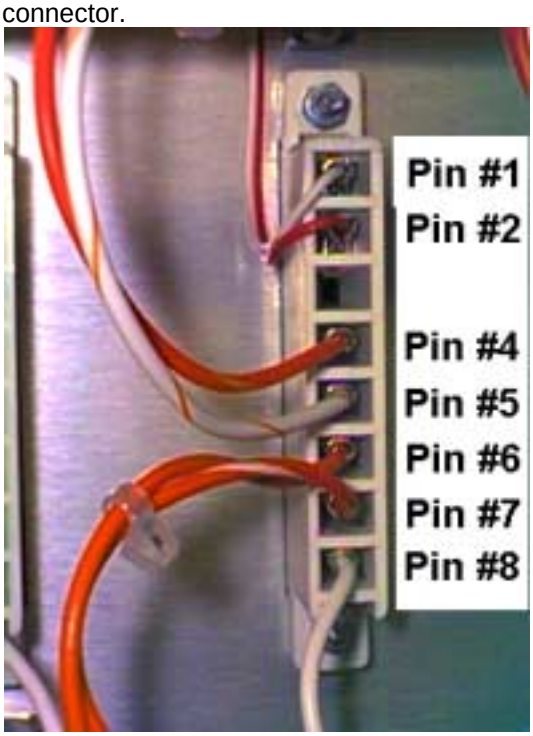


Figure 5 - Rear View of Edge Card Connector

Thermocouple (T/C) input is accomplished by connecting the cable to the thermocouple input connector located on the left side of the mainframe. The T/C signal is attached to the appropriate module via T/C extension wires connecting the T/C input connector to contacts #1 and #2 on the appropriate module edge card connector. Refer to figure 5, and note that thermocouples are connected to contact #1 which is positive (white wire) and contact #2 which is negative (red wire). A schematic of the mainframe power output connector as well as the thermocouple input connector is also provided in this booklet (see Figure 23).

Altering the wiring in the rear cabinet to configure the mainframe for a different voltage or phasing situation is accomplished by using “Push-On” terminals. These terminals provide a fast and easy method for configuring the mainframe for alternate wiring configurations that can be easily adjusted in the field (see figure 6).

PIN ASSIGNMENTS OF THE EDGE CARD CONNECTOR:

Please refer to figure 5 for location of pins.

Pin 1 From Thermocouple Positive (+)
Pin 2 From Thermocouple Negative (-)
Pin 3 (not used)
Pin 4 To Heater Load
Pin 5 To Heater Load
Pin 6 From Applied Line Voltage
Pin 7 From Applied Line Voltage
Pin 8 From Earth Ground

Figure 6 - "Push-On" Terminals

TEMPERATURE CONTROL SYSTEM CONSIDERATIONS:

There are many factors to consider when employing a temperature control system. All power requirements should be examined to make sure that the control system is matched to the heaters that are intended to be controlled:

1. Are the heaters 240 VAC or 120 VAC?

2. What is the wattage of the heater? Is the module's output amperage capability adequate for the heater to be controlled?

3. Is the control system sized adequately for all heaters that need to be controlled?

4. Is the input power three phase or single phase?

5. Does the wiring configuration of the mainframe match the power distribution system that is to be used?

TEMPERATURE CONTROL THEORY CONSIDERATIONS:

In any temperature control system, it is important to minimize the lag time between the heat source (heater) and the heat sensor (thermocouple). The lag time is the time it takes for the heat to travel from the heater to the thermocouple. It is very important to keep the physical distance between the heater and the thermocouple at an absolute minimum. Best results are obtained when the heater and thermocouple are in an integral unit, such as DME's "HCTC" series heaters. The greater the distance between heater and sensor (thermocouple), the greater the control error and difficulty.

Make sure that the heater to be used has adequate power (wattage) to elevate the material to be heated to the desired temperature.

If you have any questions or require additional information, contact your local DME representative.

CONNECTORS AND CABLES:

DME inventories standard mold power cables and standard thermocouple cables that interface with 5, 8 or 12 zone mainframes. They are available in 10 or 20 foot lengths, or special lengths on request.

TERMINAL MOUNTING BOXES:

DME also inventories terminal mounting boxes to provide an easy and economical method of mounting the power / thermocouple connectors on the mold.

TRANSFORMER KITS:

DME inventories three standard sizes of step-down transformers: 6, 9 and 15 KVA. Each transformer steps voltage down from 480 VAC, 3 phase, to 240 VAC, 3 phase, in 6, 9 and 15 KVA ratings. Other transformer sizes are also available on special request.

ACCESSORIES TO COMPLETE YOUR MOLD DESIGN:

To complete your temperature control system, the following accessories are suggested:

- Mold power input connectors and panel mount base, (see below).

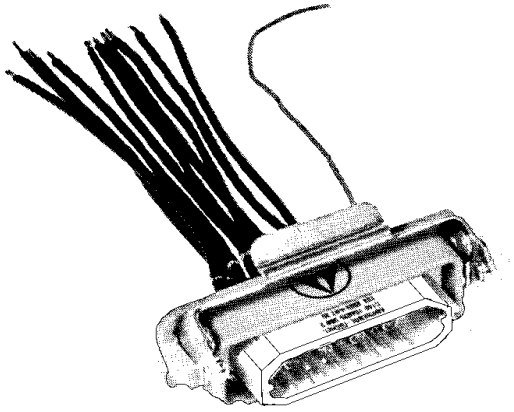


Figure 7 - Mold Power Input Connector (PIC Type)

NUMBER OF ZONES	CATALOG NUMBER
5	PIC5G
8	PIC8G
12	PIC12G

- Mold thermocouple output connectors and panel mount base, (see below).

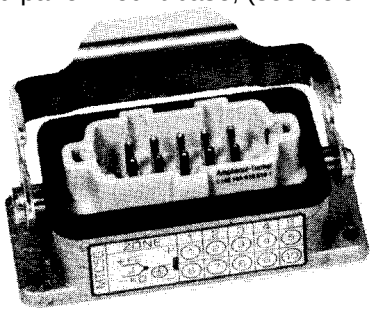


Figure 8 - Mold Thermocouple Connector (MTC Type)

NUMBER OF ZONES	CATALOG NUMBER
5	MTC5G
8	MTC8G
12	MTC12G

- Terminal mounting box, (see below).

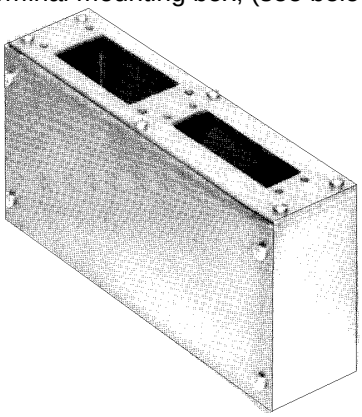
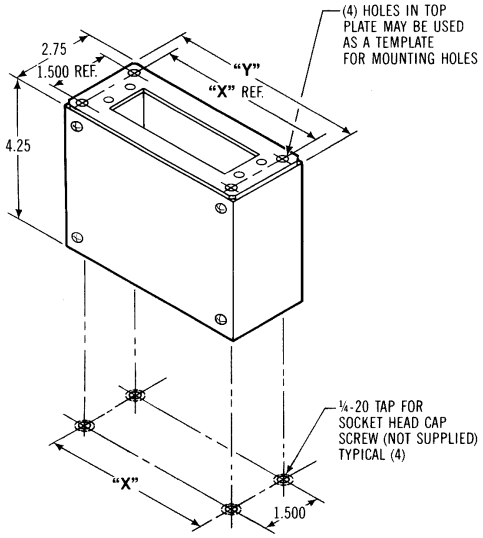


Figure 9 - Terminal Mounting Box (Combo Box Shown)

CATALOG NUMBER	"X"	"Y"
MOLD POWER INPUT		
PIC512TBG	4.250	4.875
MOLD THERMOCOUPLE OUTPUT		
MTC5TBG	4.250	4.875
MTC8TBG	4.990	5.614
MTC12TBG	6.052	6.676
COMBO POWER/THERMOCOUPLE		
PTC5TBG	8.031	8.655
PTC8TBG	8.843	9.467
PTC12TBG	9.906	10.530

TERMINAL MOUNTING BOXES



NOTE: Overall dimensions shown include allowances for hardware (assembly screws) but not connectors.

Figure 10 - Terminal Mounting Box (Mounting Dimensions)

- Mold power cables in 10 foot or 20 foot lengths (see below). A schematic diagram of these cables is shown in Figure 24.

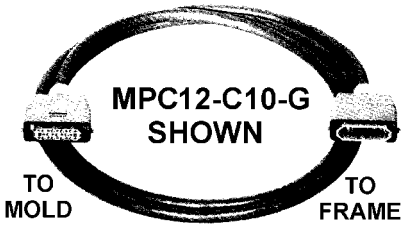


Figure 11 - Mold Power Cable

	10 FOOT LONG	20 FOOT LONG
NUMBER OF ZONES	**CATALOG NUMBER**	**CATALOG NUMBER**
5	MPC5C10G	MPC5C20G
8	MPC8C10G	MPC8C20G
12	MPC12C10G	MPC12C20G
REPAIR KITS		
DESCRIPTION		**CATALOG NUMBER**
MOLD END KIT FOR 10 OR 15 AMP (FEMALE)		CKPF112BG
FRAME END KIT FOR 10 OR 15 AMP (MALE)		CKPM112BG

- Thermocouple cables in 10 foot or 20 foot lengths (see below). A schematic diagram of these cables is shown in Figure 25.

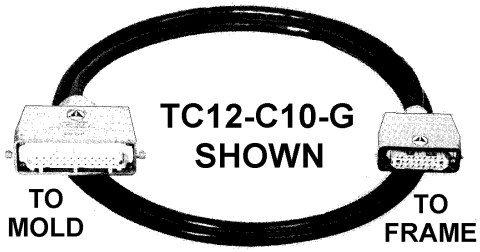


Figure 12 - Thermocouple Cable

	10 FOOT LONG	20 FOOT LONG
NUMBER OF ZONES	**CATALOG NUMBER**	**CATALOG NUMBER**
5	TC5C10G	TC5C20G
8	TC8C10G	TC8C20G
12	TC12C10G	TC12C20G
REPAIR KITS		
DESCRIPTION		**CATALOG NUMBER**
MOLD END KIT 5 ZONE (FEMALE)		CKTF15G
MOLD END KIT 8 ZONE (FEMALE)		CKTF18G
MOLD END KIT 12 ZONE (FEMALE)		CKTF112G
FRAME END KIT ALL FRAMES (FEMALE)		CKTF112AG

- Temperature control modules. **NOTE: Temperature control modules are not included with this mainframe, they must be ordered separately.** One module is required for each zone of temperature control. Any of DME's standard 15 Amp temperature controllers will operate in the mainframe.

- For safety considerations, all unused zones must be covered with blank panels. Use one DME #MFBP-10G blank panel for every zone that is not used.

REPLACEMENT PARTS:

Replacement parts listed below:

CATALOG NUMBER	DESCRIPTION
SSS101	#10-32 Set screw for protective shield
MPS0005	Protective shield 5-zone
MPS0008	Protective shield 8-zone
MPS0012	Protective shield 12-zone
CBD50	50 amp circuit breaker
CBD70	70 amp circuit breaker
PIN0114	Male pin for mold power input connectors PIC type **(14 AWG)**
PIN0214	Female socket for mold power input connectors PIC type **(14 AWG)**
PIN0116	Male pin for mold power input connectors PIC type **(16 AWG)**
PIN0216	Female socket for mold power input connectors PIC type **(16 AWG)**
PIN0120	Male pin for mold power input connectors PIC type **(20 AWG)**
PIN0220	Female socket for mold power input connectors PIC type **(20 AWG)**
RPM0004	Amber neon light used on breaker panel
RPM0044	Card guide
RPM0046	Replacement pins for edge card connector
RPM0047	Extraction tool for all PIC type (PINXXXX) connector pins
RPM0048	Extraction tool for edge card connector pins
WHT1919	Crimp tool for PIC type (PINXXXX) pins
MFBP10G	Blank panel to cover unused zones
CKF312G	Edge card connector kit (connector & 7 pins)

Figure 13 - Edge Card Connector Kit, CKF312G (includes pins). Use RPM0046 to order pins separately.

TROUBLESHOOTING:

If the fuses in a module clear upon initial power up, the heater output(s) are probably grounded.

FAN & NEON FUSE BOARD:

This board distributes power to the fan & neon lamps only. It is wired into the back of the mainframe where the wiring for the fans and neon lamps are attached to the terminal strips on this board. **DO NOT WIRE CONTROL ZONES TO THIS BOARD**. Use exact replacement fuses.

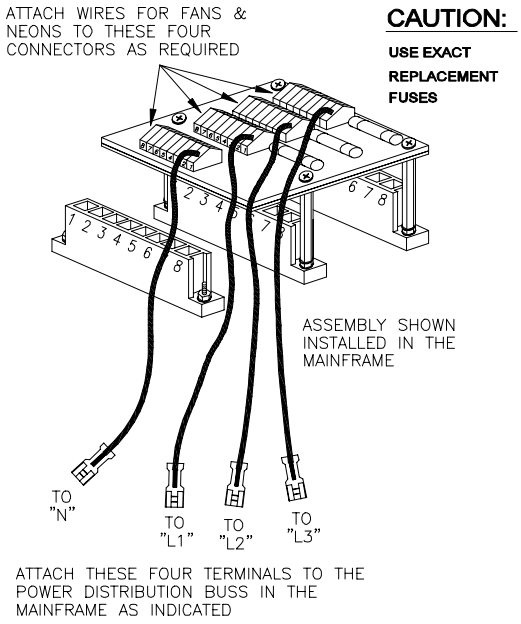


Figure 14 – Fan & Neon Fuse Board

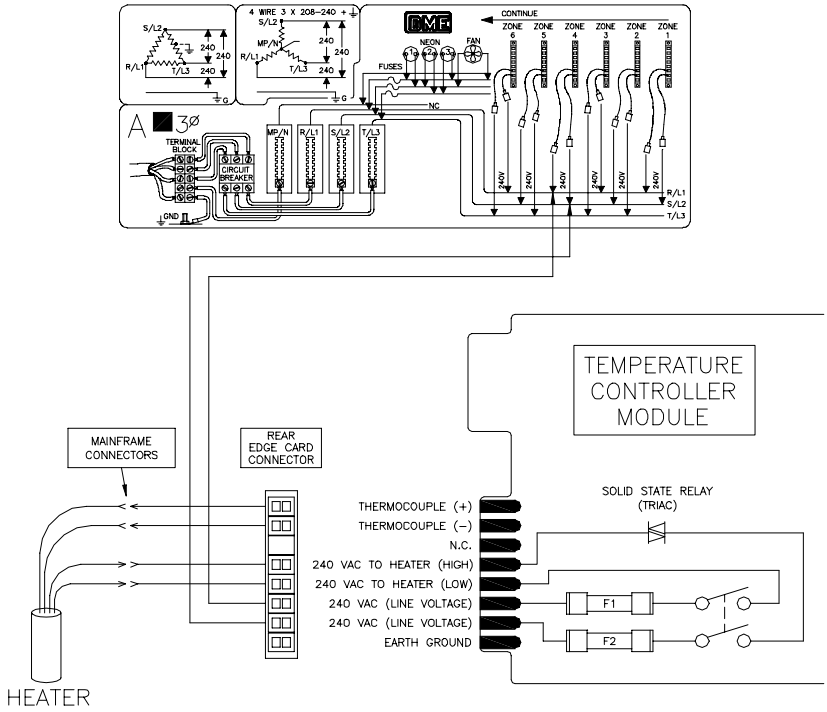


Figure 15 - Typical System Wiring Diagram

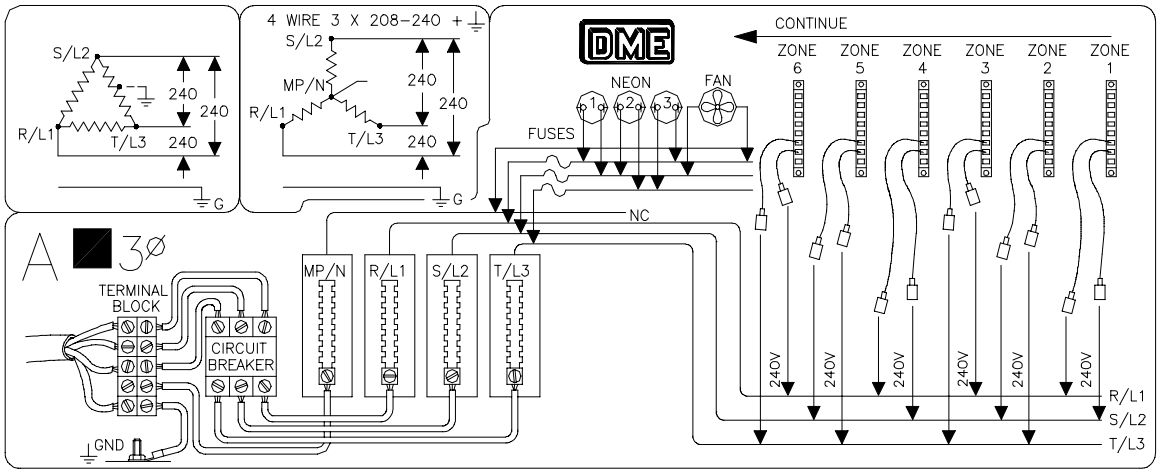


Figure 16 - Back Panel Wiring, Diagram A

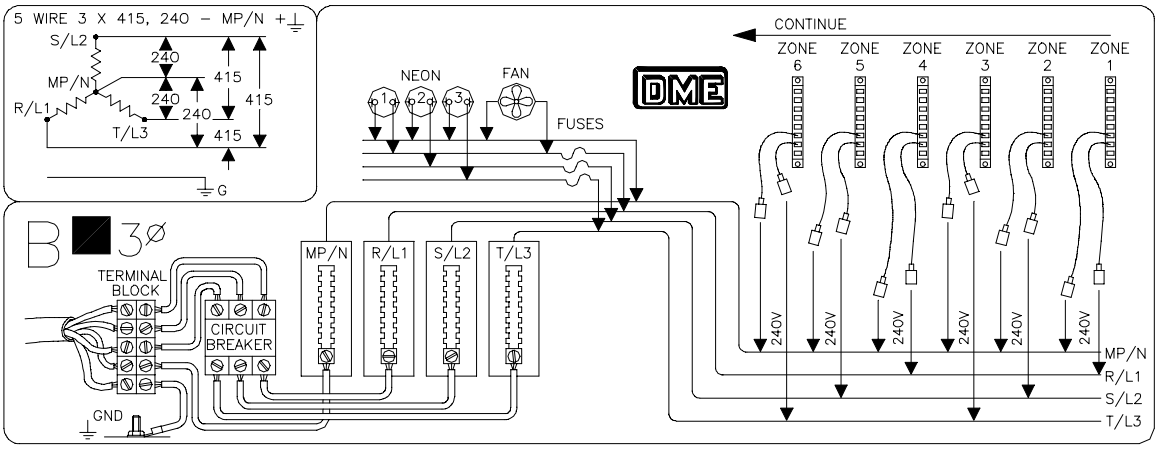


Figure 17 - Back Panel Wiring, Diagram B

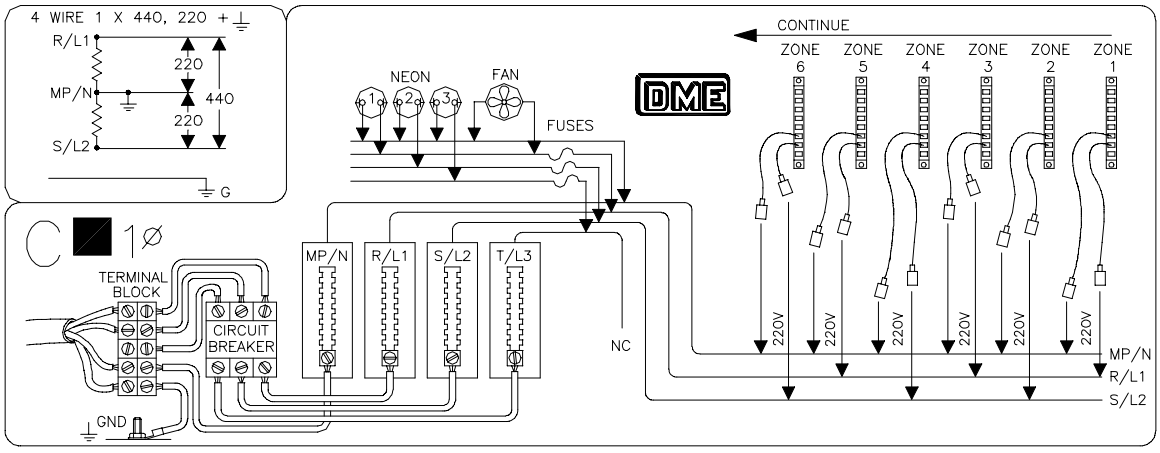


Figure 18 - Back Panel Wiring, Diagram C

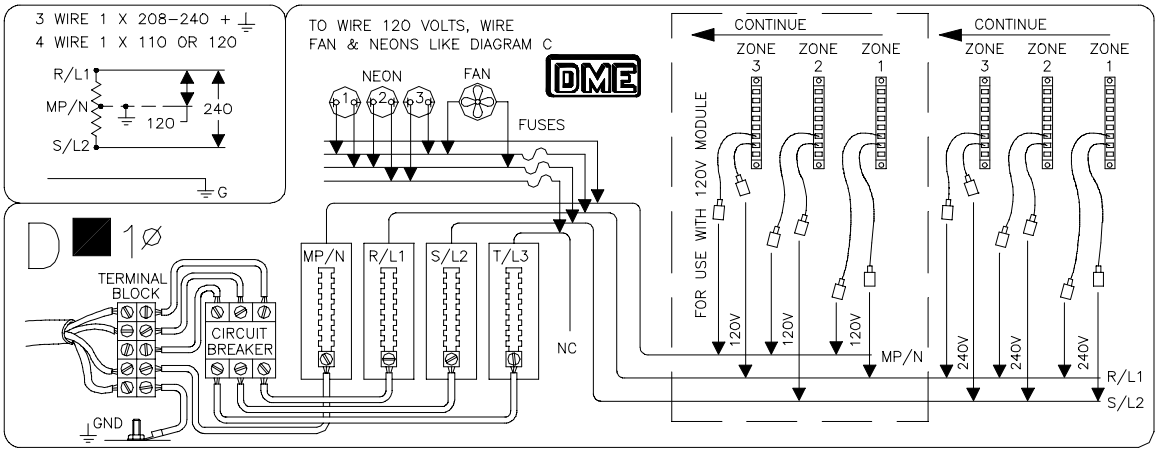


Figure 19 - Back Panel Wiring, Diagram D

EUROPEAN CONFORMITY (CE) REQUIREMENTS:

DME mainframes are shipped with 3MM x 10MM screws that are to be used to secure DME modules to the mainframe for the purpose of satisfying CE requirements. When the modules are screwed down securely, they are considered to be CE certified (compliant). **NEVER REMOVE OR INSERT MODULES WHEN MAINFRAME CIRCUIT BREAKER POWER IS ON.**

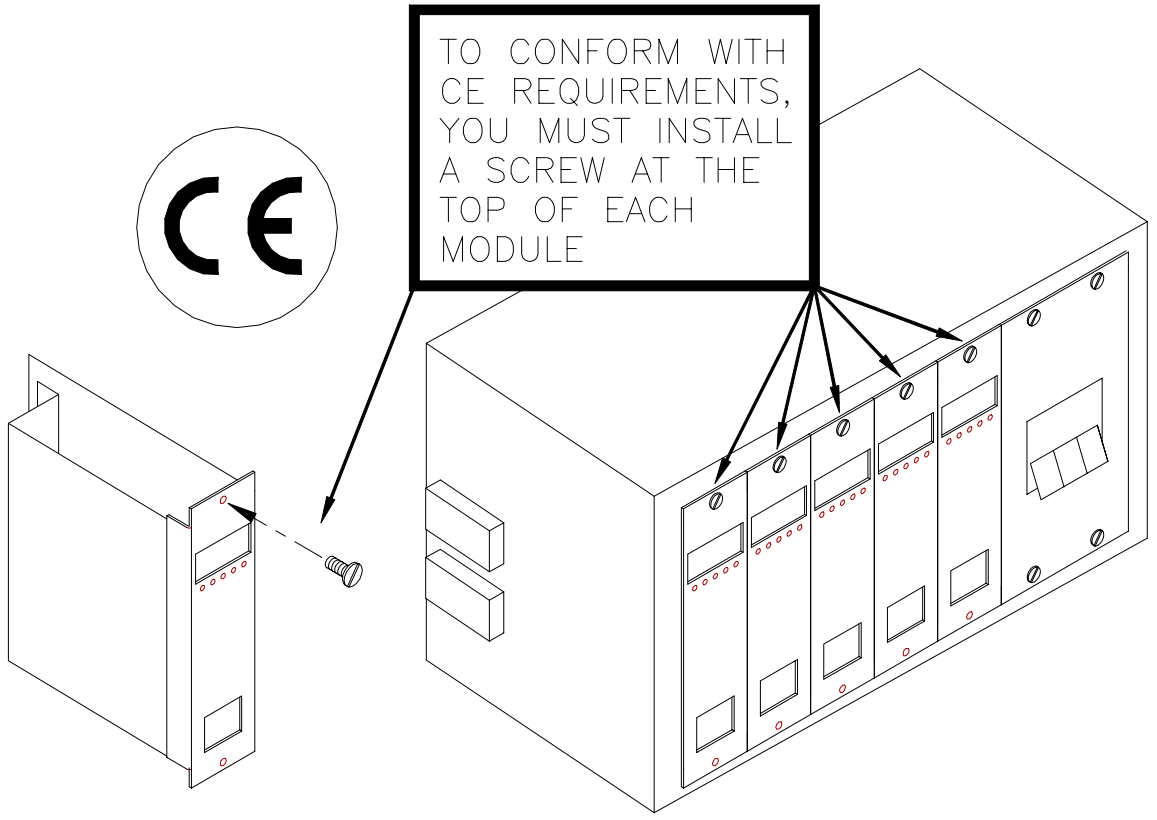


Figure 20 - European Communities Conformity Requirement

NOTE:

1. Mating cable connectors are wired the same as frame connectors shown
2. Wires in frames are color coded for reference when rewiring of frame connectors is necessary (see owners manual). Even so, additional coding of these wires to connector(s) being replaced is suggested to expedite rewiring and insure proper reconnection.
3. All grounds must be connected to ensure operator safety.

Figure 21 - Mainframe Connector Wiring (5, 8, & 12 Zone Mainframes)

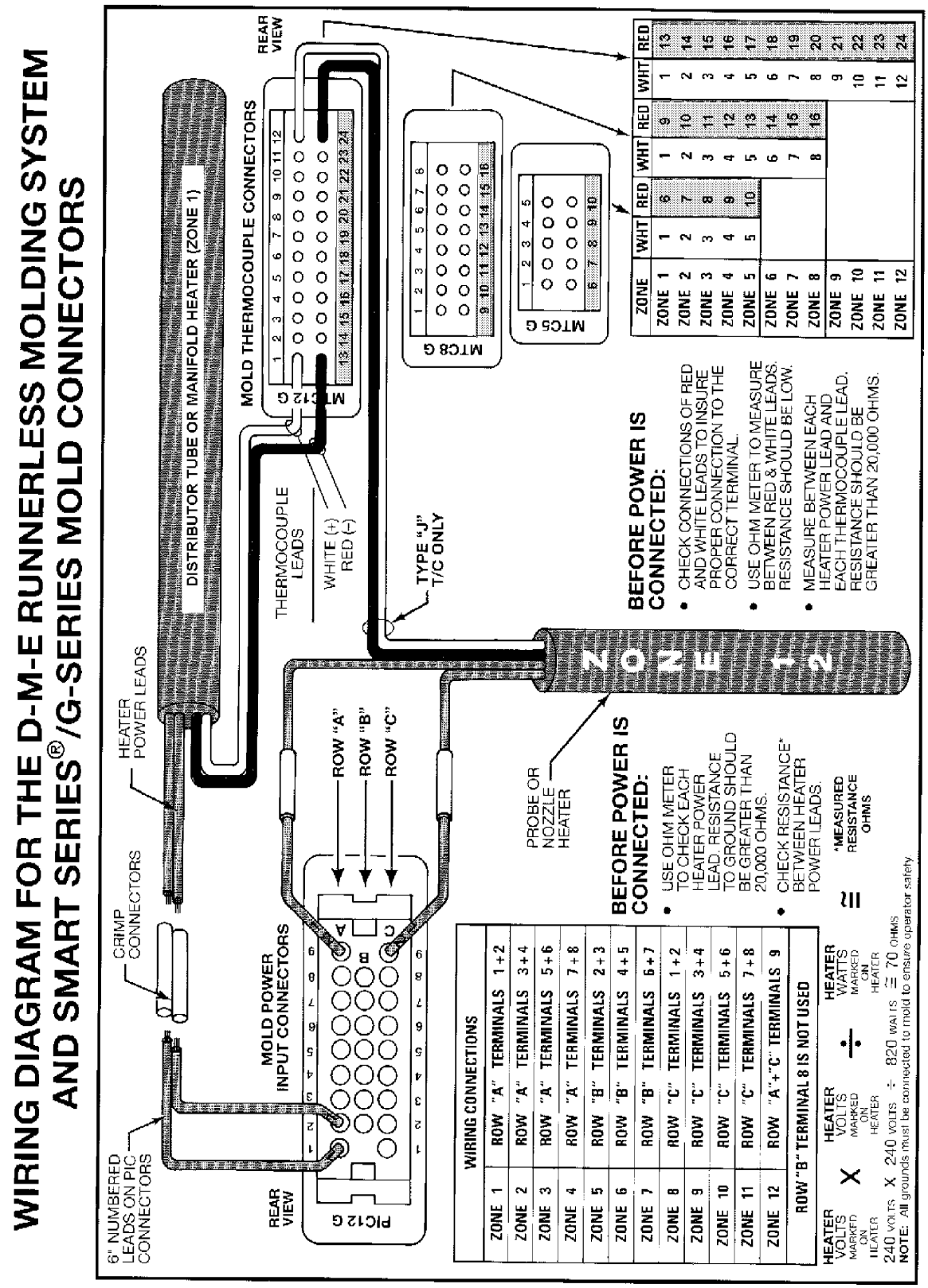


Figure 22 - Mold Power & Thermocouple Connections

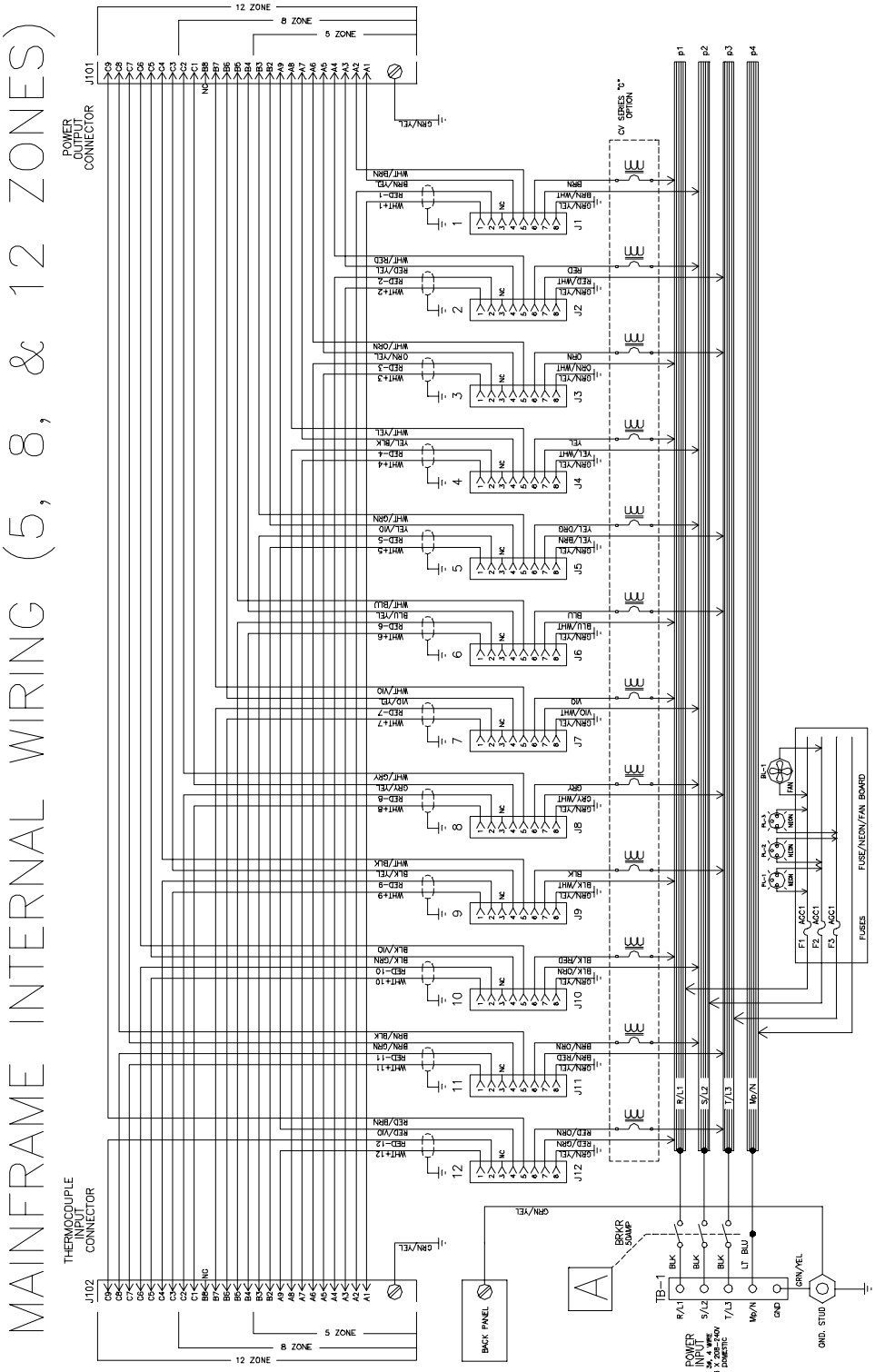


Figure 23 - Power Connector & Thermocouple Connector (Mainframe)

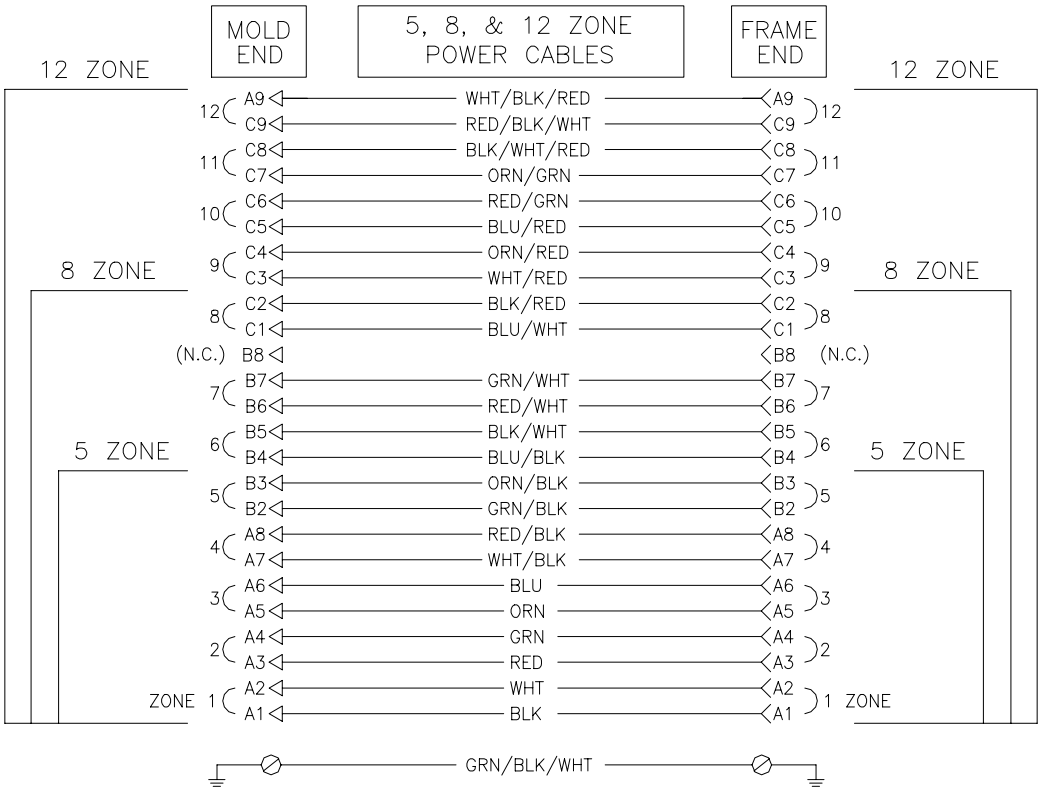


Figure 24 - Schematic of 5, 8, & 12 Zone, 15 Amp, Power Cables

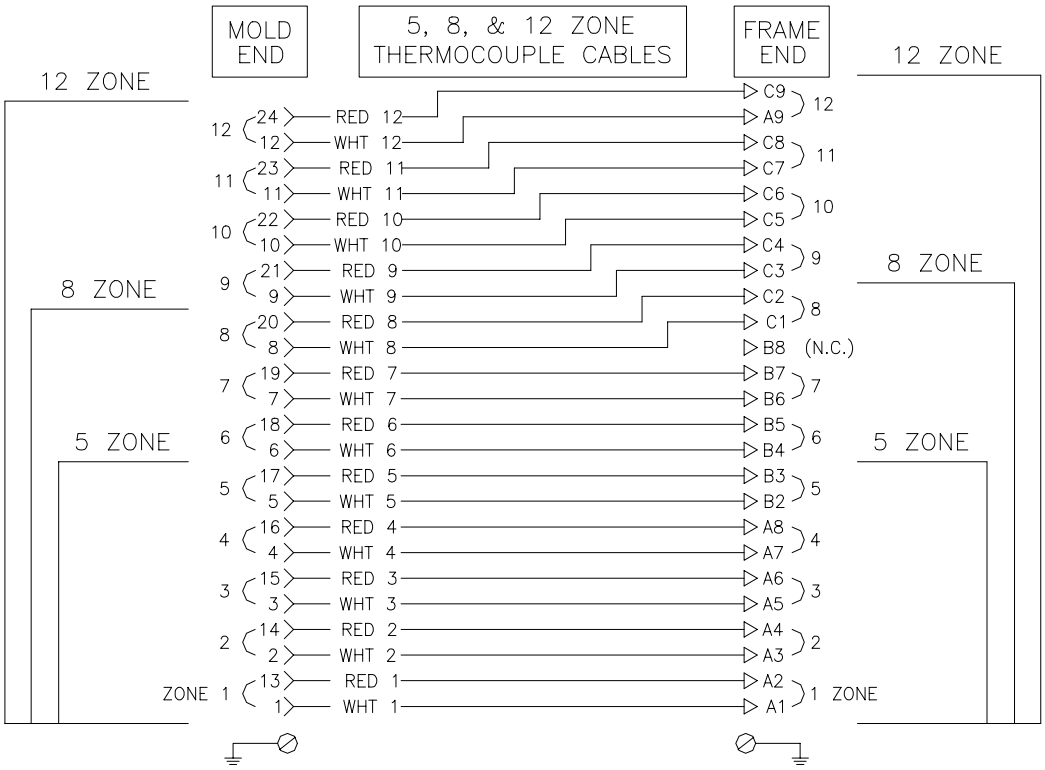


Figure 25 - Schematic of 5, 8, & 12 Zone, Thermocouple Cables

NOTES:

ECN'S:

ECN-0480 March 21, 1997
Update user manual
Remove mentions of wire color on input connector
Correct wire color on wiring diagram
Add notations for CE where necessary

ECN-0517 September 8, 1999
Update diagrams A, B, C, & D, Frame to Mold diagram, & Wiring Schematic to reflect the addition of the Fan & Neon Fuse Board.
Add fan & neon fuse board diagram.
Add dialog to support fan & neon fuse board.

APPROVAL:

SENIOR PRODUCT ENGINEER: _____ DATE: _____

MANAGER OF ELECTRONICS: _____ DATE: _____