SKUTT CERAMIC PRODUCTS

GlassMaster 700 Board Addendum

The New 700 GlassMaster Controller may look the same on the outside but on the inside it has a host of great new features.

Ease of Use
- Easier to read 14 segment display
- Menu Options organized for quick access.

Troubleshooting
- Current Sensing - Read voltage and amperage directly from your display without having to hire a technician or buy expensive test equipment.

Safety
- Optional 2 key press start to avoid accidental starting.
- Set max programmable temperature to help prevent overfires due to operator error.
- Configure an additional output to run an automatic dialer to call you if there is an error in the firing.

New Menu Layout

With the exception of the new green 14 segment LED display, you will notice that the board and all of the function keys look exactly the same. All of the changes have been made in the "MENU" key.

There are now 4 Option Headings under the "MENU" key. They are:

- "SET" Settings
- "dIAG" Diagnostics
- "CNFG" Configurations
- "- - - -" Other

For an overall look at the menu tree of each of these features see Appendix 1.

Since we have added a current sensor to all new GlassMaster controllers we need to show them in the wiring diagrams. Appendix 2 lists all of the new wiring diagrams. If you are adding a GlassMaster 700 Board to kiln with a previous board version you may not have access to the current sensing features.

PROGRAMMING OPTIONS

GENERAL PROGRAMMING TIPS

To access the Menu Headings press “MENU”.

You can toggle though the Menu Headings by continuing to press the “MENU” key. When you reach the one you wish to access press “ENTER”. This will take you to the first Option in that submenu. As before, if you want to toggle through the various Options under the selected Heading, press “MENU”. When you reach the Option you wish to access, press “ENTER”.

When you select an Option you are asked to either:

Toggle the Option ON/OFF
Enter a Value
Choose a Value

To toggle Options On/Off press the “1” key. When you get to the desired setting press “ENTER”.

To enter a value such as a Delay time or an Alarm temperature, input the value and press “ENTER”.

To select a value press the “MENU” key until your selection is displayed and then press “ENTER”

OPTIONS

“SET”

“SET”, or Set-Up, is where all of the commonly used Options are located. The following Options are available under the “SET” Heading menu.

dELA (Delay)

This feature allows you to enter a delayed start in the firing program. This feature is most commonly used to delay the start of the kiln so it will be finishing at a time when you will be present. To use this feature enter the delay in Hours and Minutes. Hours are to the left of the decimal point and minutes are to the right. (See pg. 15 of your manual for programming instructions).

ALRM (Alarm)

The Alarm feature allows you to enter a temperature at which you wish an alarm to sound. This can be helpful to alert you when the program has reached the Process Phase of the program so you can monitor the heatwork and make adjustments if needed. To stop the alarm without affecting the program press the “ENTER” key. If you don’t want the ALARM to sound at any temperature, input a value of “9999”. (See pg. 15 of your manual for programming instructions).

CHG ° (Change from Fahrenheit to Celsius Scale)

The controller can display temperature values in Fahrenheit or Celsius. If the scale is set to display in Celsius an LED dot will illuminate in the bottom right hand corner of the display. To select a new scale press “ENTER” and it will automatically toggle to the alternate scale. “ °C ” represents Celsius and “ °F “ represents Fahrenheit.

PROGRAMMING OPTIONS CONTINUED

16-S (16 Segment)

This option links the Ramp and Hold programs stored in memory positions 5 and 6 to create a 16 segment program. Normally a program is limited to 8 segments. (See pg. 13 of your manual for programming instructions).

MGF (Modify GlassFire Mode)

Modify GlassFire Mode is a feature that can be toggled on or off. When it is toggled "ON" the controller will display the preset Process Temperature and Process Hold Times when you input a GlassFire Mode program. When these values are displayed you have the option of adjusting them. If the programs are working well for you and you do not want you or other users adjusting these values than you may want to toggle this feature "OFF". (See pg. 15 of your manual for programming instructions).

dIAG (DIAGNOSTICS)

"dIAG", or Diagnostics, is where all of the diagnostic tools are located. The following Options are available under the "dIAG" menu.

ERTF (Err Temp & Time of Last Firing)

This feature will display the temperature and the point of time in the firing at which the last Error occurred. Often times this information is helpful in troubleshooting the problem which created the error. Once "ERTF" is selected it will first flash the temperature at which the error occurred and then the time into the firing it occurred. The ERTF information will also appear automatically when an error alarm sounds and the program is terminated. Pressing any key at this will show the temperature and elapsed time at which the error occurred.

VOLT (Voltage)

This feature is used to test the voltage supply to your kiln. It tests the voltage first with the elements off , "No Load" and then again with the kiln on, or "Full Load". Select "VOLT" from the "dIAG" menu after the "NOLd" reading is displayed press "ENTER" to receive the "FLLd" reading.

The power to the kiln will be switched on for a brief moment when the voltage under load is checked, **BE SURE THAT THE CONTROL BOX AND KILN LID ARE CLOSED BEFORE YOU USE THIS FEATURE TO AVOID ELECTRICAL SHOCK**.

Our technicians can use this information to help you troubleshoot voltage related problems over the phone. When the voltage readings appear on your display write them down. Often times voltage related problems can happen only at certain times of day so try to obtain the readings at the same general time your kiln would be firing.

AMPS (Amperes)

This is probably the most useful diagnostic tool available to you. All GlassMaster kilns produced after 2006 are equipped with a current sensor in the control box. This allows us to test the current of each output to the kiln. This is very helpful in determining if a relay or element needs replacing. **BE SURE THAT THE CONTROL BOX AND KILN LID ARE CLOSED BEFORE YOU USE THIS FEATURE TO AVOID ELECTRICAL SHOCK**.

PROGRAMMING OPTIONS CONTINUED

AMPS (Amperes) continued

When you select “AMPS” under the “dIAG” menu it will give you an ampere reading for each output of the kiln (except the accessory and safety output). Which elements these ouputs control will vary by model. If your kiln uses only 1 or 2 outputs it will still give you 3 readings but the unused outputs will give a reading of zero.

LEd (LED Display)

This feature when activated lights up all of the segments in the LED display. This is helpful in locating any segments in the display that may have gone bad and may explain why some indicated readings are not correct.

bd T (Board Temperature)

The electronics on the controller’s circuit board may be damaged if the board exceeds 160 °F. This should not occur under normal conditions. However, if the kiln is located in a small enclosure with poor ventilation or in areas where the temperatures are unusually hot, it is possible. Using this feature will tell you if your controller temperature is approaching potentially harmful levels.

If you find that your board temperature is consistently over 150 °F you may want to consider improving air circulation to the kiln room.

SW V (Software Version)

At Skutt we are continually working on ways of improving our products. This feature will indicate the software version your controller is using.

OUTS (Output Test)

There are 4 outputs that can be used on the board. There are 3 designated for elements and 1 designated to run an accessory. This feature allows you to test each output individually to see if it is operating correctly.

When activated this feature will test each output beginning with output 1 and ending with output 4. It will cycle each output on for approximately 8 seconds. To see if the elements are cycling on you can place a small piece of paper on each element. If the paper is burned than the element came on.

BE SURE THAT THE CONTROL BOX AND KILN LID ARE CLOSED BEFORE YOU USE THIS FEATURE TO AVOID ELECTRICAL SHOCK.

CNFG (CONFIGURATION)

CAUTION: BE SURE TO CONSULT WITH A SKUTT TECHNICIAN BEFORE MAKING ANY CONFIGURATION SETTING CHANGES. UNADVISED CHANGES CAN CAUSE PERMANENT DAMAGE TO YOUR KILN AND THE WARE INSIDE IT.

"CNFG", or Configuration, is where all of the controller configuration tools are located. The following Options are available under the "CNFG" menu.

ERCd (Error Codes ON/OFF)

Error codes are designed to help protect you, your kiln, and your ware when something goes wrong with the firing. There are times however where you may wish to try a new technique which would trigger an error code under normal conditions. When error codes are turned off the following codes are disabled. For a complete list of Error Codes see Appendix 3

Error 1 - Terminate firing when kiln temperature increasing at a rate slower that 12 °F/hr.
Error 2 - Kiln Temperature 50 degrees above hold temperature.
Error 3 - Kiln Temperature 50 degrees above hold temperature.
Error 4 - Kiln Temperature 50 degrees above previous hold when ramping down.
Error 5 - Kiln Temperature 50 degrees below traveling set point when ramping down.
Error D - Kiln Temperature 50 degrees above traveling set point.

TCOS (Thermocouple Offset)

This feature allows you to calibrate the thermocouple when it is reading consistently and predictably incorrect. It is extremely important to consult with a Skutt technician before making thermocouple offset adjustments. Incorrect adjustments to the thermocouple offset can cause permanent damage to your kiln. Adjustments made to the thermocouple offset will affect all Ramp and Hold and GlassFire Programs.

If you are experiencing problems with GlassFire Mode check to see if the ending temperature and hold time of the programs you are running have not been significantly altered from the factory programs before making thermocouple offset adjustments. See the section on Modify GlassFire Mode in your manual.

Access the "TCOS" setting through the "CNFG" menu. The display will flash " °F05 " alternately with the current offset setting. " °F05 " represents degrees Fahrenheit Offset. If the controller was programed to display in Celsius the "F" would be replaced by a "C". If there is currently an offset entered this could be the problem. To be safe make adjustments in small increments and then run a test fire with scrap glass.

To Make The Kiln Fire Hotter
Enter "00" followed by the number of degrees you wish to offset the thermocouple. Press ENTER.
Ex: "0010" makes the kiln fire 10 degrees hotter.

To Make The Kiln Fire Cooler
Enter "90" followed by the number of degrees you wish to offset the thermocouple. Press ENTER.
Ex: "9010" makes the kiln fire 10 degrees cooler.

PROGRAMMING OPTIONS CONTINUED

ZONE (Zone Control Options)

Zone control is a feature that comes standard on the Production line of GlassMaster kilns. This line includes the following models: GM1227, GM1018, and the GM818. Zone Control is feature that allows the controller to independently fire sections on multiple section kilns to ensure even temperature top to bottom.

There are 3 optional setting configurations for Zone Control which can be accessed through the "ZONE" feature under the "CNFG" menu..

A. "NOTC"
B. "PId"
C. "SHTO"

"NOTC" (Number of Thermocouples)
Your kiln should be properly programmed for the correct number of thermocouples before it leaves the factory. A GM818 and GM1018 should be set at 2 and the GM1227 should be set at 3. All other GlassMaster kilns will be set at 1 thermocouple. You cannot set a kiln to fire in more than one zone unless it is configured in the factory as a Zone Control kiln. If you try you will receive a "FAIL" error code.

To change the number of zones on a zone control kiln access the "ZONE" setting through the "CNFG" menu then use the menu key to toggle to the "NOTC" feature and press "ENTER". The controller will display the current "NOTC" setting. Enter the desired value and press "ENTER".

"PId" (Proportional Integral Derivative)
PID is a zone control setting that uses the center section elements to help the bottom and top sections when necessary. In most kilns the center section is usually the hottest section. The PID option is designed to help speed up the firing when the top or bottom section is cooler and lagging behind the other sections.

When the top or bottom section is on full power (it is lagging behind), then output 2 comes on as a percentage of output 1 or output 3. The middle section will fire hotter and help the top and or bottom section catch up. The percentage can be set from 0 (zero) to 150. It is factory preset at 85%.

"SHTO" (Shutoff)
Shut off is a zone control feature that attempts to make firings more consistent. For 2 and 3 zone controllers, when shutoff is "off", the controller uses the average of all three thermocouples to transition from one segment to the next or to shut off the kiln. When "on" the kiln turns off, or transitions, when any one of the thermocouples reaches temperature. FOR ALL DOWN RAMPS, the controller transitions from one segment to the next as if shut off "SHTO" were turned ON, i.e., when any one section reaches the next segment temperature.

Id (Control Interface System ID)

CIS is an optional accessory that allows you to program and monitor multiple kilns from a PC. Each kiln hooked up to the CIS system needs to be identified with a unique number so the software can distinguish it from the other kilns. To set the identifying CIS number for each kiln access the "Id" setting through the "CNFG" menu, select a number between 1 and 99 and press "ENTER".

If you are interested in purchasing a CIS system for your kiln, contact Skutt or your local distributor.

PROGRAMMING OPTIONS CONTINUED

OUT4 (Output 4 Settings)

There are 3 standard outputs, 1 safety output and one accessory output on your Skutt GlassMaster controller. The accessory output is designated as Output 4 and can control a number of optional accessories including vents, alarms and autodialers. Output 4 will cycle these accessories on and off at different times depending on the program you are running and the way you configure it under the "OUT4" feature setting. There are 5 different option for OUT4.

Note: "ALR4" is the factory default setting. When you access the Output 4 feature the feature options will appear in the order listed below. The first option listed is not neccessarily the current setting.

"OP A" (Option A)
When option A is selected Output 4 will turn on during segments 1,2,3 and 6 of a GlassFire Mode program. Output 4 will not turn on at anytime during a Ramp and Hold Program. This program is designed to vent out fumes during the beginning of the program and allow for faster cooling from the process temperature down to the annealing temperature.

"OP b" (Option B)
When option B is selected Output 4 will turn on only during segment 6 of a GlassFire Mode program. This program is designed to limit a fan from coming on when fusing extremely sensitive large pieces of glass. It will come on between the process temperature and the annealing temperature to help prevent devitrification.

When a Ramp/Hold program is entered it will ask whether you want the fan (or other accessory) on for each segment you program. After you enter the hold time for each segment the display will show "FAN" along with the number of the segment you are programming. Alternately it will flash the current setting, either "OFF" or "ON". To change the setting toggle it with the "1" key and press "ENTER" to select that setting.

"OP C" (Option C)
When Option C is selected Output 4 does not come on during any portion of a GlassFire Mode program. When a Ramp/Hold program is entered it will ask whether you want the fan (or other accessory) on for each segment you program. After you enter the hold time for each segment the display will show "FAN" along with the number of the segment you are programming. Alternately it will flash the current setting, either "OFF" or "ON". To change the setting toggle it with the "1" key and press "ENTER" to select that setting.

"ALR4" (Alarm 4)
This is the factory default setting. If Output 4 is not being utilized this is the setting that should be selected. This feature can also control an external alarm or autodialer to initiate if an Error Code is generated or if the internal temperature of the kiln reaches the temperature programmed for the ALARM setting of the program. To deactivate the alarm press "ENTER".

"PCT" (Percent On)
Output 4 can be programmed to be on for a percent of the time output 3 is on. This option is used when output 4 controls floor or lid elements. To ensure output 4 stays off at all times, use this option and set the percentage to zero. The percent can be set from 0 to 150. There are currently no Skutt Kiln designs that can utilize this feature.

PROGRAMMING OPTIONS CONTINUED

MAX (Maximum Programmable Temperature)

The Maximum Programmable Temperature setting is a great feature to use when other people may be programming the kiln. It helps protect against an overfire by not allowing the programmer to input any value over the designated limit. To set your firing limit access the "MAX" setting through the "CNFG" menu, enter your desired limit and press "ENTER".

Note: We do not recommend exceeding 1800 °F when the kiln has an element in the lid.

2KEY (2 Keys to Start Kiln)

The "2KEY" feature allows you to set the controller so it takes 2 key presses to start the kiln. This helps protect against accidentally starting the kiln. When activated it will be necessary to press "START" then "ENTER" to start the program. To activate this feature access the "2KEY" setting through the "CNFG" menu, use the "1" key to toggle the setting to "ON" and press "ENTER". Now when you press "START" to begin the program you will see "- - - -" on the display. At this point press "ENTER" to begin the program.

dTCT (Detect Current Sensor Rating)

This feature indicates the maximum amperage rating for the current sensor installed in your kiln. The current sensor is the hardware installed in your kiln which allows the controller to read the current from the outputs. This feature should not be modified without consulting a Skutt technician. Changing this setting will alter how the board interprets the current signal and will cause the board to produce erroneous current readings.

RSET (Reset To Factory Settings)

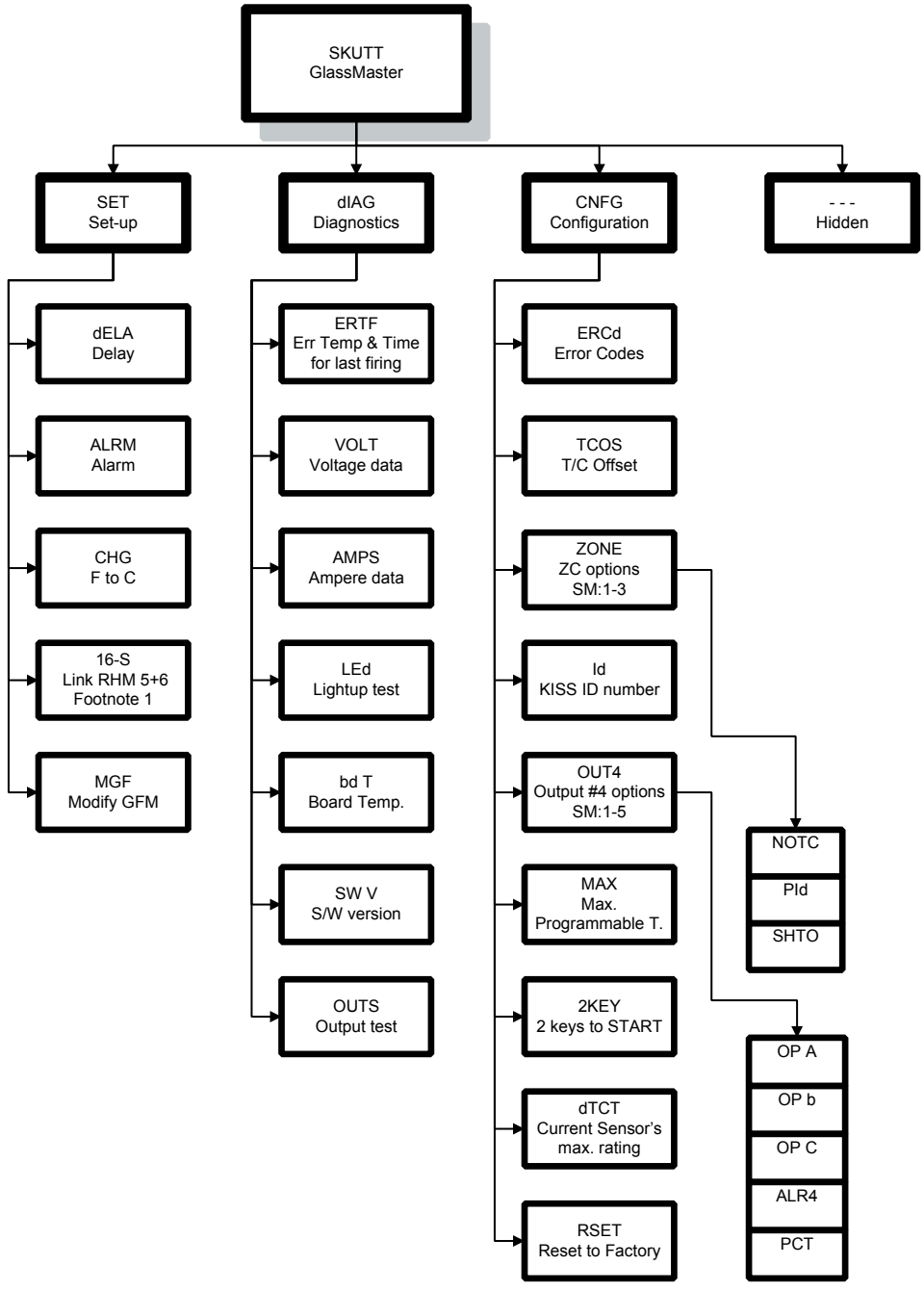
Sometimes it is difficult to diagnose a kiln problem when factory settings have been modified. To reset the factory settings access the "RSET" setting through the "CNFG" menu and press "ENTER". The following settings will be restored.

1. Error codes on
2. TC offset set to zero
3. MGF times and temperatures set to default.
4. Firing program is set to ramp hold user 1.

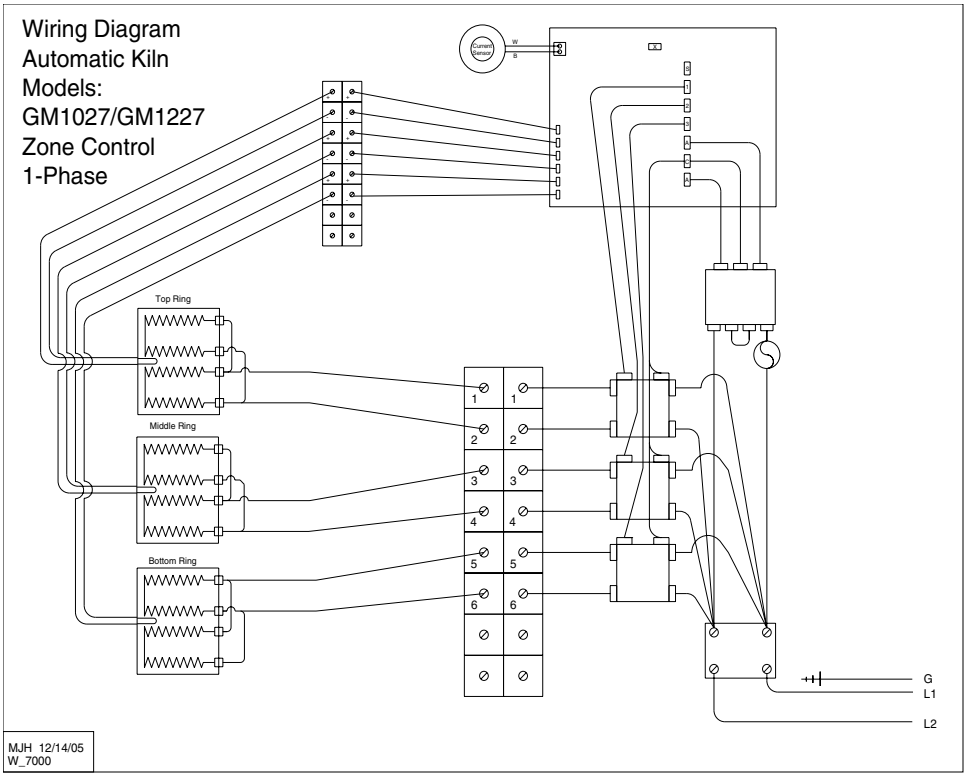
" - - - - " (OTHER)

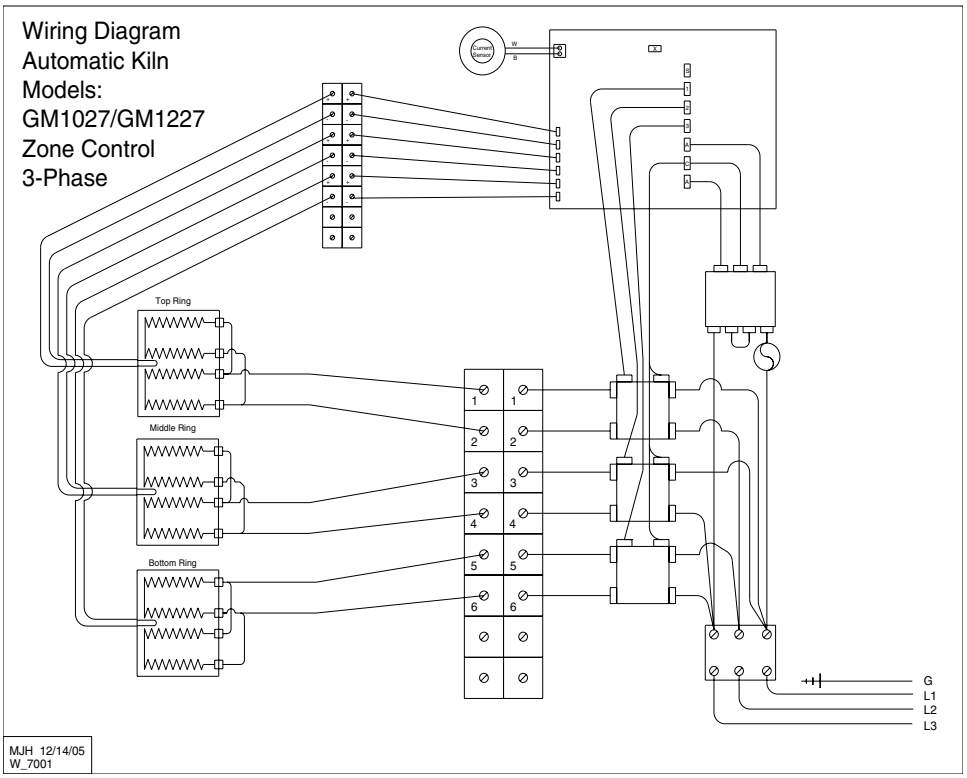
The features contained in this menu heading are accessible only through direct contact with a Skutt technician. If you change from a Type S thermocouple to a Type K thermocouple or vice-a-versa you will need to change a feature setting in this menu section.

APPENDIX 1 - MENU TREE



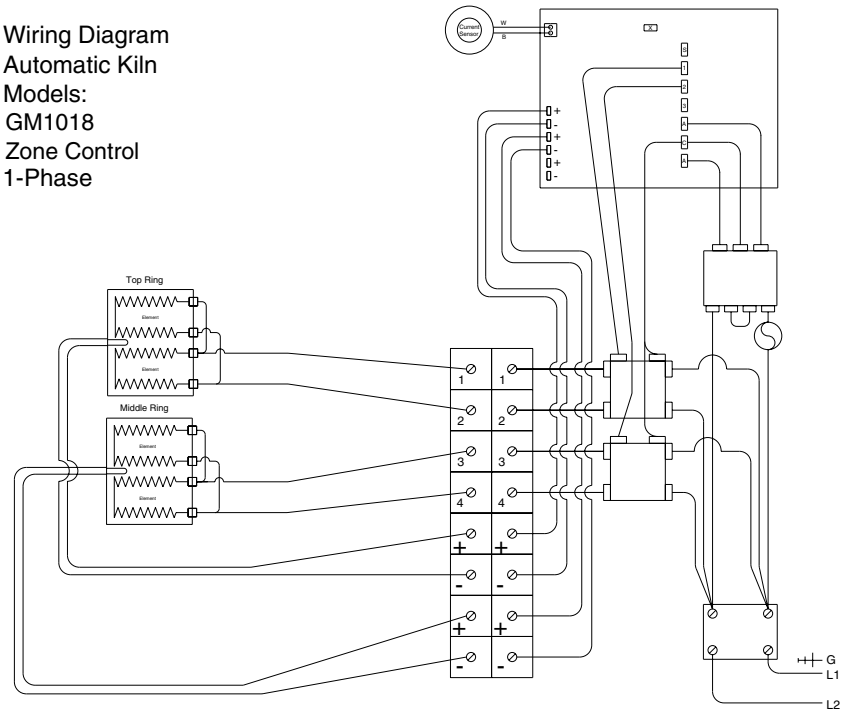
APPENDIX 1 - WIRING DIAGRAMS





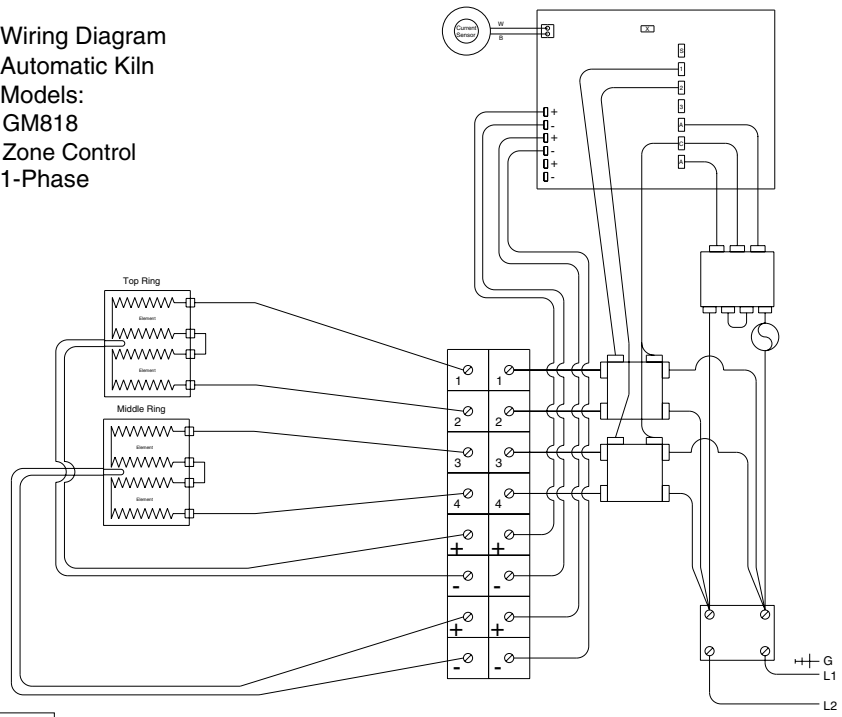
WIRING DIAGRAMS

Wiring Diagram
Automatic Kiln
Models:
GM1018
Zone Control
1-Phase



MJH 12/15/05
W_7002

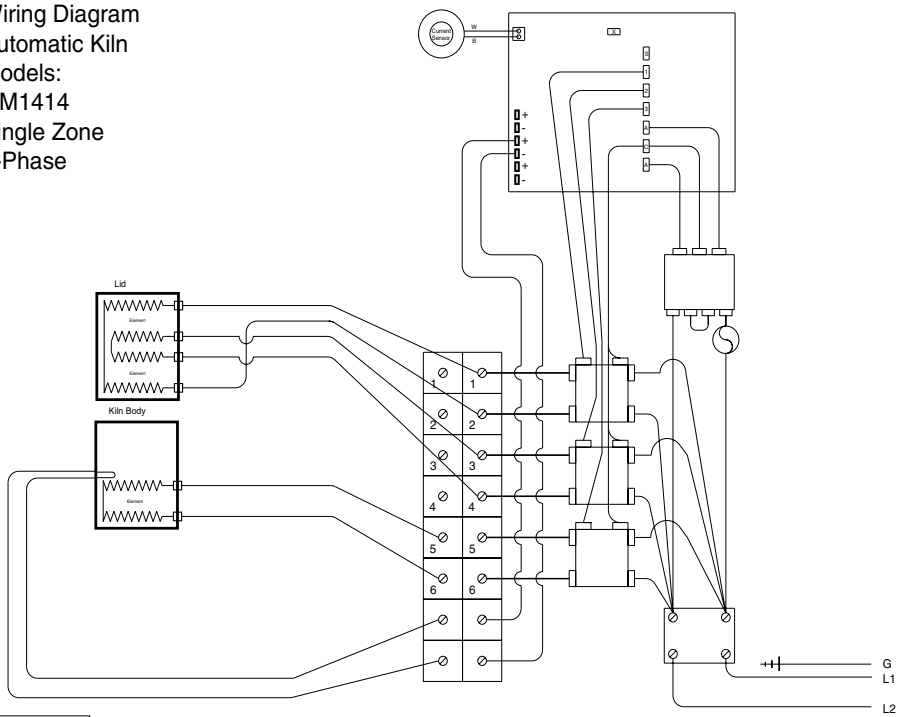
Wiring Diagram
Automatic Kiln
Models:
GM818
Zone Control
1-Phase



MJH 12/15/05
W_7003

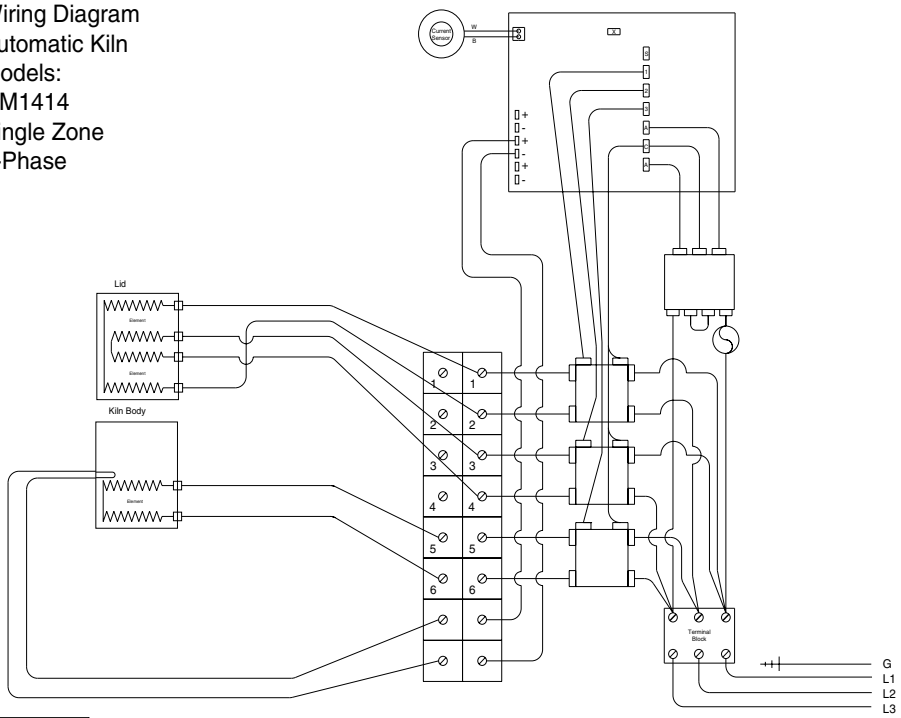
WIRING DIAGRAMS

Wiring Diagram
Automatic Kiln
Models:
GM1414
Single Zone
1-Phase



MJH 12/15/05
W_7004

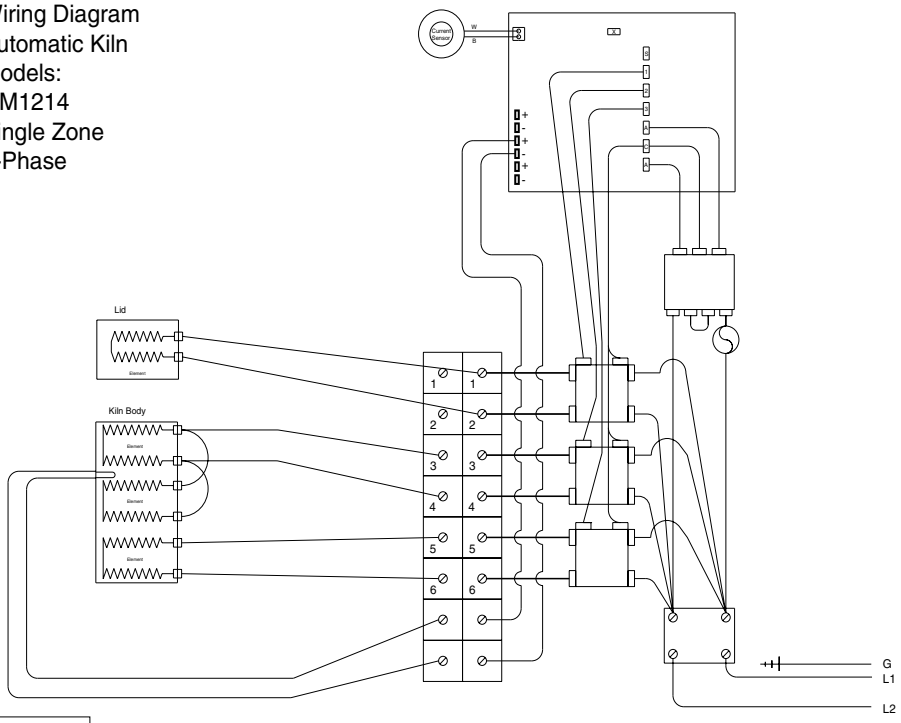
Wiring Diagram
Automatic Kiln
Models:
GM1414
Single Zone
3-Phase



MJH 12/15/05
W_7005

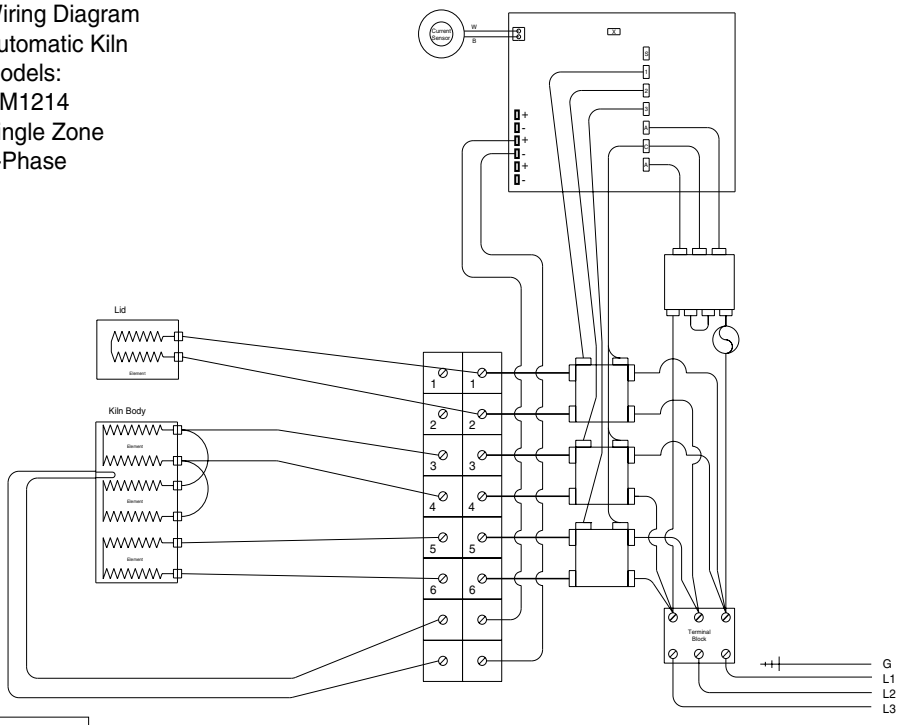
WIRING DIAGRAMS

Wiring Diagram
Automatic Kiln
Models:
GM1214
Single Zone
1-Phase



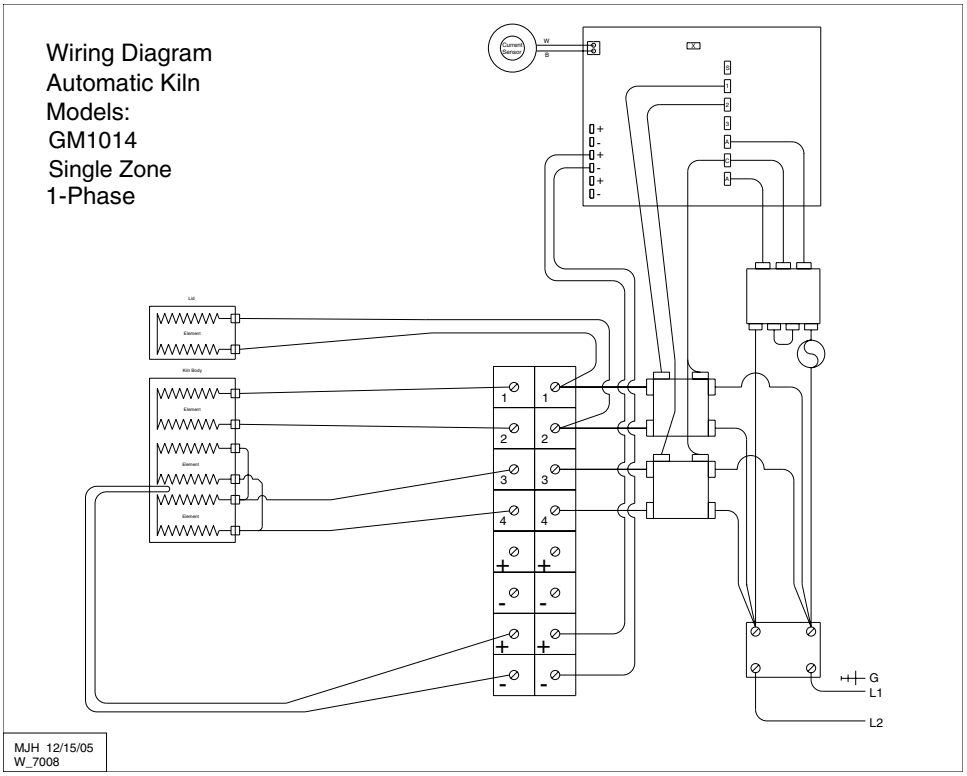
MJH 12/15/05
W_7006

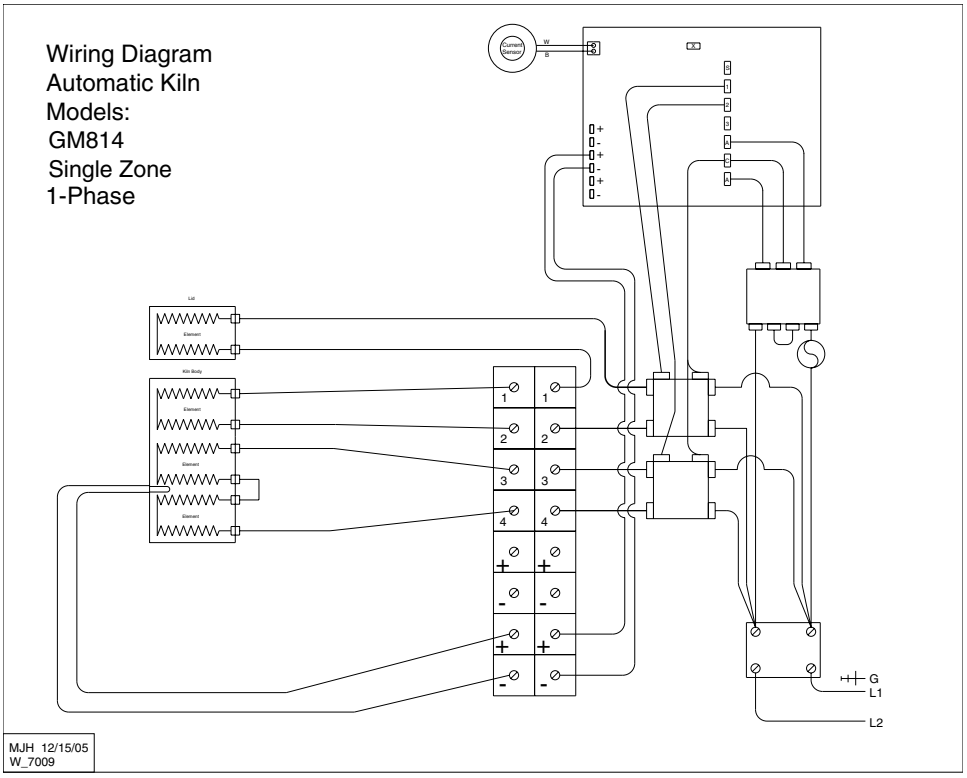
Wiring Diagram
Automatic Kiln
Models:
GM1214
Single Zone
3-Phase



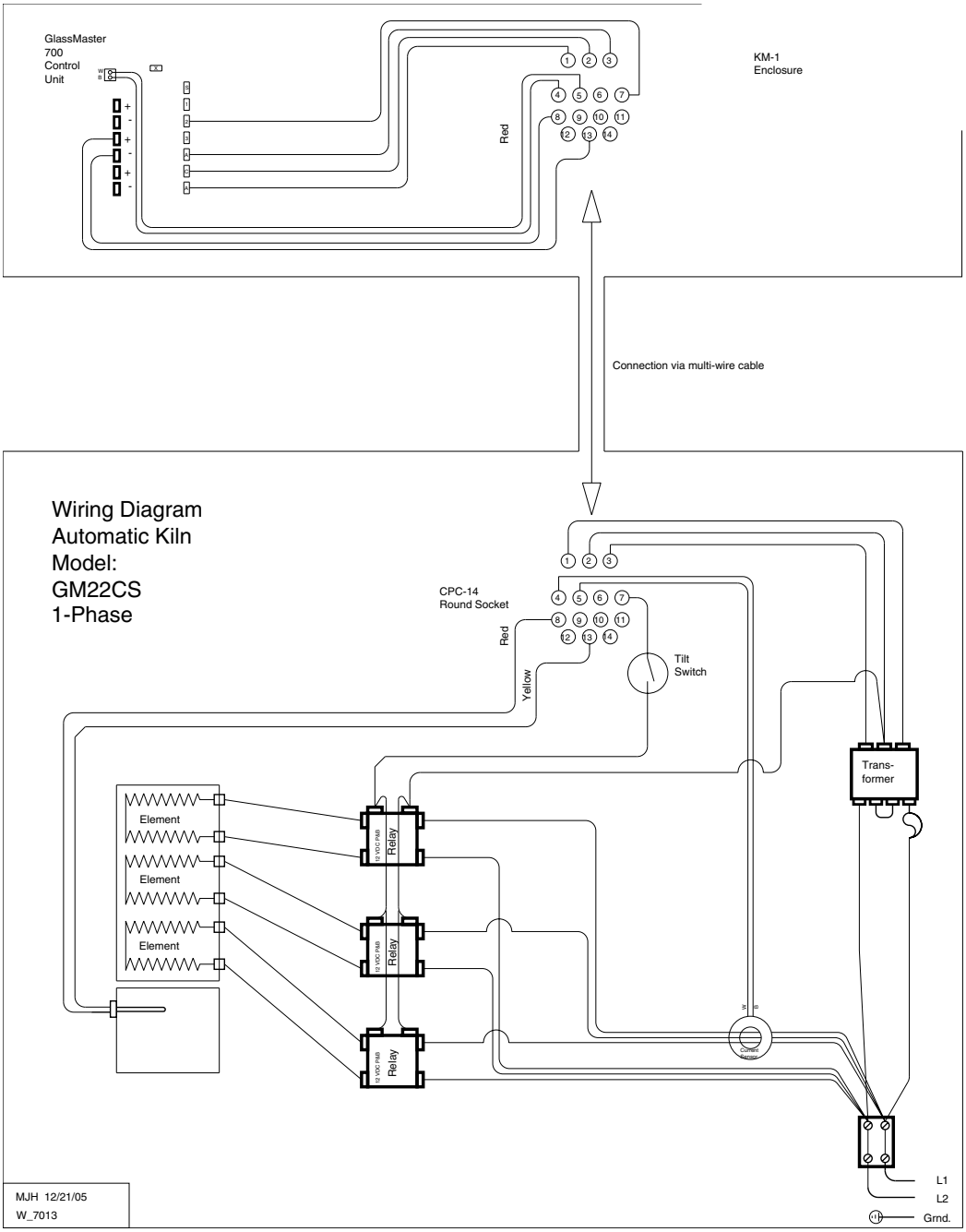
MJH 12/15/05
W_7007

WIRING DIAGRAMS

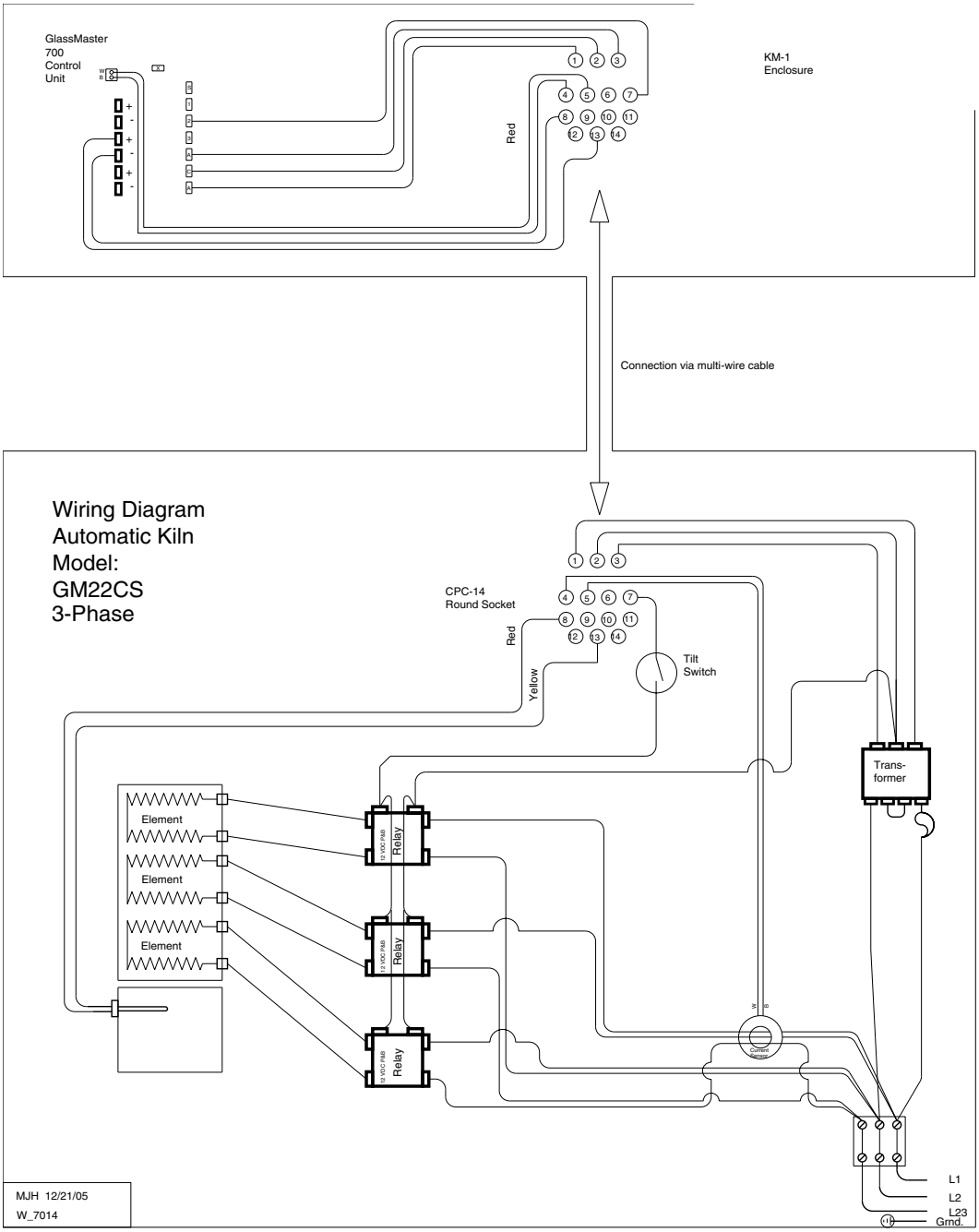




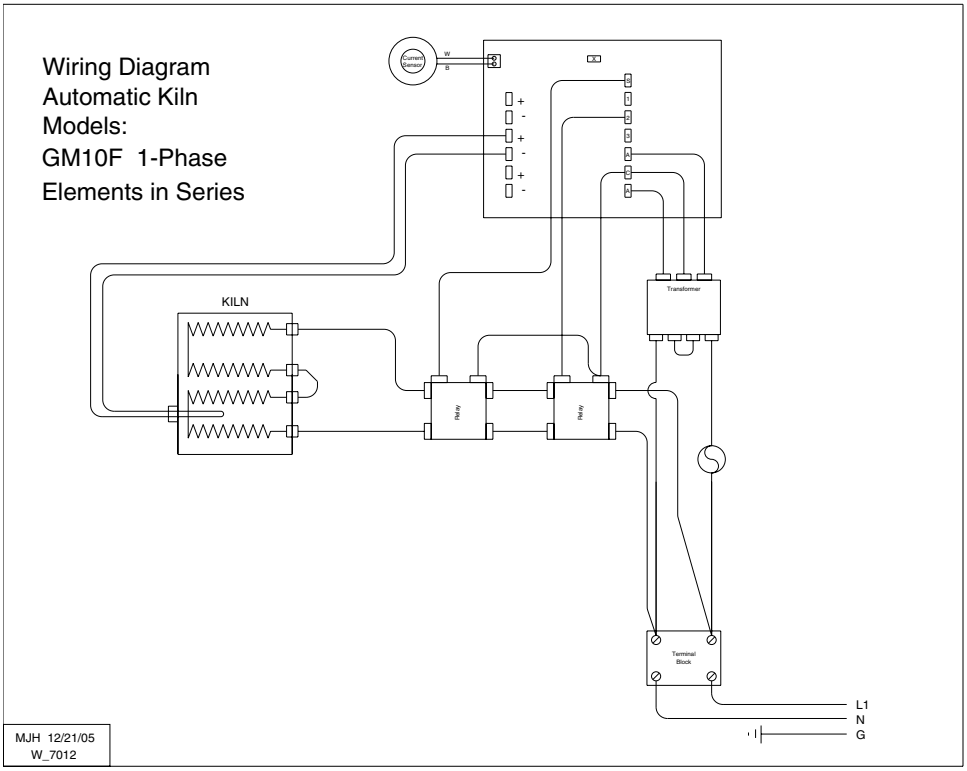
WIRING DIAGRAMS



WIRING DIAGRAMS



WIRING DIAGRAMS & ERROR CODES



APPENDIX 3 - 700 BOARD ERROR CODES

These errors will only be detected if error codes are on:

E- 1 - kiln temperature increasing slower than 12 F per hour when ramping up (22.5 min)

E- 2 - kiln temperature 50 F above hold temperature (18 seconds)

E- 3 - kiln temperature 50 F below hold temperature (18 seconds)

E- 4 - kiln temperature 50 F above previous hold when ramping down (18 seconds)

E- 5 - kiln temperature 50 F below traveling set point when ramping down (18 seconds)

E- D - kiln temperature 50 F above traveling set point

The error code setting does not affect these errors:

E- 6 - reversed thermocouple leads

E- 7 - mode is idle and performing firing ops

E- 8 - in cone fire temperature decreasing in last segment

E- 9 - wrong thermocouple hardware/software setting

E-bd - Board temp