Start-Up Procedure For Model EM-810

Prior to starting the furnace, be sure to insert the control thermocouple into the furnace lid, through the thermocouple bracket assembly. (See picture below.)

NEVER OPEN THE LID WITHOUT FIRST LOOSENING THE SET SCREW AND RAISING THE THERMOCOUPLE ENOUGH TO CLEAR TOUCHING THE FURNACE BODY.

Your new model EM-46 or EM-810 has been equipped with a 1/16th DIN, digital, microprocessor based, PID controller. This instrument is accurate to within +/- .1 % of span and will provide excellent control of your heat treat or melting process.

To operate your new furnace, turn on the toggle switch located on the front control panel. When the switch is tripped, you should see the indicator light come on. This means that the unit is powered. To enter a set-point, press either the up or down arrow keys to enter the desired set point. Once the set point is entered, the furnace will begin to heat up, no further adjustments will be necessary.

The control parameters of the instrument are entered into the memory here at MIFCO and then access is locked out to prevent changes to them. Should it become necessary to make changes, please consult the factory.

An operating manual from the instrument manufacturer is included with this operating manual. Please read it for further information on the instrument's capabilities.

SPEEDY MELT ELECTRIC FURNACE
MODEL EM-810

Furnace Operation and Start Up:

Locate the crucible block in the center of the furnace chamber. Always use the correct size base block and never place the crucible on the floor of the furnace. Doing so causes a cold spot at the bottom of the crucible and retards melting. The block locates the crucible at the proper height for the hottest reflected heat. To prevent the crucible from sticking to the base block, apply fine graphite or silica flour to the top of the block, or wet a piece of cardboard and drop on the base block just before the crucible is set. If the furnace is cold, use the cardboard dry. The paper will char and form a parting layer between the block and the crucible.

Protection of Furnace Elements:

Proper care should be taken to insure long element life. The EM-46 and EM-810 heating elements are coated with refractory coating. This coating makes the elements more abrasion resistant plus it acts as an added protection from the corrosive properties inherent in fluxes used in the melt. Avoid over fluxing of the metals. Fluxes, and especially those containing acid, destroy the heating elements and the insulation that surrounds them. The elements are covered under warranty for workmanship only.

The use of flux in aluminum is usually not needed if the metal is clean to start with. After the initial charge of aluminum has melted, about 1/3 teaspoon of aluminum cover flux may be added to keep down oxidation. Aluminum scrap or ingot may be added at this time.

The melting of brass or bronze needs a cover flux, but again, it is best to add the flux in a small amount after the initial charge of metal has melted.

The following points should be kept in mind to protect the elements during operation of the furnace:

1. As a Safety Precaution, turn off the power to the elements when charging crucible or removing the crucible at the end of the melt.

2. Avoid contact with the chamber walls while inserting or removing the crucible. Scraping the chamber walls repeatedly will result in a loss of refractory coating and insulation which cover the electric element. This will eventually cause element breakage or electrical shock if the tongs come into contact with the bare elements.

3. Periodic inspection should be made of the elements to insure that the refractory coating is intact. If any areas are showing excessive wear, this refractory coating is available from MIFCO, for recoating or spot coating of the element walls.

4. Do not over-fill the crucible. Over-flow of either hot metal or flux directly onto the elements or heat chamber, even with the protective coating intact, will cause damage.

The Use and Care of Foundry Crucibles

Composition - Types of Material:

Crucibles are manufactured in two basic compositions: the CLAY GRAPHITE / CERAMIC BONDED, and the SILICON CARBIDE / CARBON BONDED types. Both types utilize the refractory materials, graphite and silicon, as conductors of heat and for structural strength. Graphite is predominant in the composition of the clay graphite crucible, while silicon carbide predominates in the silicon carbide crucible. Due to its higher heat conductivity and greater strength, the silicon carbide crucible is more popular in industry. The less expensive clay graphite crucible is generally used in the School shop. Crucible failure in School shops is generally due to mishandling by inexperienced students, so the benefits of the more expensive silicon carbide crucible often are not realized.

Either type crucible can be used for melting aluminum or brass. However, different metals should not be melted in the same crucible. This practice will cause contamination of each metal and it will be very difficult to get good castings. Different crucibles should be used for each type of metal melted. DO NOT USE JUST "ANY SIZE" CRUCIBLE IN YOUR FURNACE, USE THE SIZE FOR WHICH THE FURNACE WAS DESIGNED.

Receiving and Storage:

A great deal of emphasis has been put on the proper care of crucibles for maximum service life and safety. Several factors are important and should be carefully considered.

DO NOT STORE crucibles as received in their original container. Examine the container, UNPACK CRUCIBLES IMMEDIATELY, and inspect each crucible for cracks or damage. "SOUND" each crucible by tapping lightly with a hammer handle. If cracked, the crucible will have a dull sound. Undamaged crucibles will have a clear ring. If the shipment contains damaged pieces, have the delivering carrier acknowledge the damage on your delivery receipt, or notify the carrier of hidden damage and call for immediate inspection.

After inspecting the crucibles, they should be STORED IN A WARM, DRY PLACE. If it is necessary to stock the crucibles in an exposed, unheated location, they should be moved to a warm area for two or three days prior to using. EXCESS MOISTURE SHOULD BE REMOVED PRIOR TO TEMPERING.

Drying and Annealing New Crucibles:

All crucibles should be properly annealed before being put into production. Annealing relieves all strains set up in the crucible during manufacture. This also DEVELOPS A FULL ELASTIC PROPERTY TO WITHSTAND THERMAL SHOCK during service. The crucible should be dried as outlined previously, and placed in a warm furnace. Set the temperature control instrument to 200 F for the first 30 minutes. Raise the setpoint 200 degrees every 15 minutes to gradually raise furnace temperature to 1200 F. Total heating cycle should cover a period of about 2 hours. After the crucible has reached a red heat, it can be removed from the furnace, charged with metal, and put into immediate service.

Charging the Crucible with Metal:

Crucibles are usually charged with metal before they are placed in the furnace chamber. The part of the charge consisting of gates and risers, or of clean scrap of equivalent size, is charged first. Ingots and bars are charged last. Turnings or very light scrap should be added into the crucible after the initial charge has become molten. Otherwise, the turnings and light sections will be attacked by the furnace atmosphere, and will be oxidized excessively before the melting temperature is reached. These oxides and impurities are carried into the casting metal, resulting in porous and unsound castings. Heat is transmitted to the light scrap more rapidly by the molten metal with a minimum of oxidation. ALWAYS BE POSITIVE THAT ANY METAL ADDED TO A MOLTEN BATH IS DRY, otherwise explosion will occur, because of steam generation in the molten bath. Ingots should be thoroughly dry, and added to the molten charge with long handled pickup tongs.

Adding Ingot or Pig to the Crucible:

Heavy sections of the charge should not protrude above the lip of the crucible or they will be subjected to furnace atmosphere and excessive oxidation. THE INGOTS AND BARS SHOULD BE CUT TO A LENGTH SHORTER THAN THE INSIDE DIAMETER OF THE CRUCIBLE. This is particularly true when adding bars or pig to crucibles of molten metal. Long pieces, when added, will sink and come to rest in a horizontal position. They then expand before melting and press out the sides of the crucibles, causing cracks and premature failure.

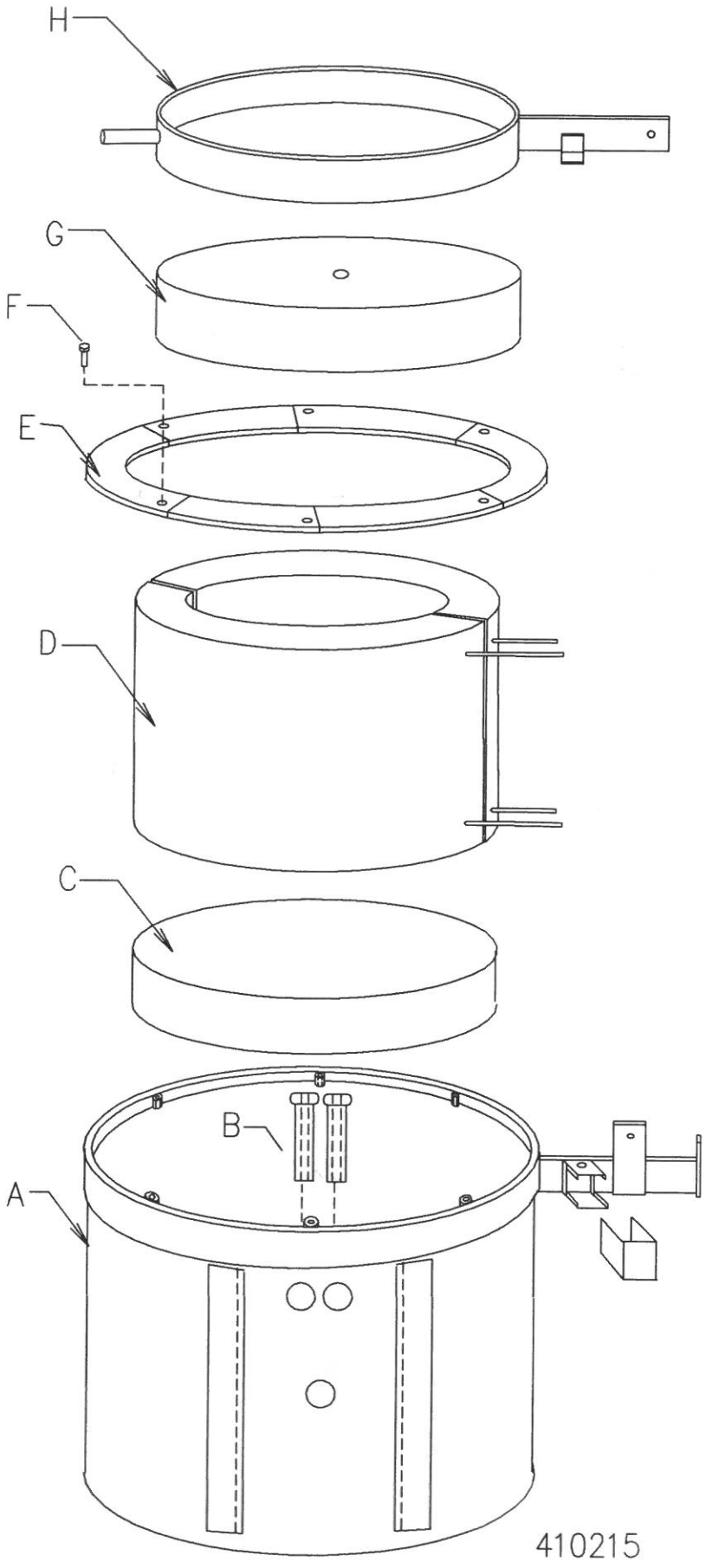
Preheating Charge Metal:

It is very poor practice to preheat scrap or bars by placing them across the lid of the furnace. The ceramic fiber lid is not constructed to support any extra weight. Placing ingots on the lid could cause the fiber lid to crack.

EM-810 Parts List- updated 09/14/2017

Part No.	Description	Qty	
040093	Black Plastic Handle	1	
004041	8" Thermocouple	1	
004339	2" Blanket Insulation 15" x 65"	1	
004085	Watlow EZ-ZONE Control Instrument PM6C1EA-AAAAAAA	1	
003600	Buss Fuse Holder	1	
003624	2A Glass Fuse	1	
003906	Red Indicator Light	1	
003666	Toggle Switch	1	
003936	3 Pole Contactor	2	
003917	Micron Transformer	1	
004087	LVC6KW00002250A Watlow hi limit Instrument	1	
003636	FLNR40ID Fuses	2	
003878	14" x 12" x 6" Enclosure	1	
004036	Temperature Sensor (high limit thermocouple)	1	
008402	6" x 2" High Alumina Base Block (if melting aluminum)	1	
008241	6" x 2" Silicon Carbide Base Block (if melting brass)	1	
(refer to diagram on following page for parts listed below)			
	Shell	1	A
004086	Insulators 2"	3	B
008047	Bottom brick 3" thick x 17" OD	1	C
EM810	Heater Half - "A" & "B"	2	D
410107R	Top seal	6	E
000900	5/16-18 x 1 fhsc	6	F
008039	Fiberboard top with hole 3" thick x 17"	1	G
190055	Lid Band 3/16" x 2 1/2" x 17"	1	H

EM 8-10



Watlow EZ-ZONE Temperature Controllers

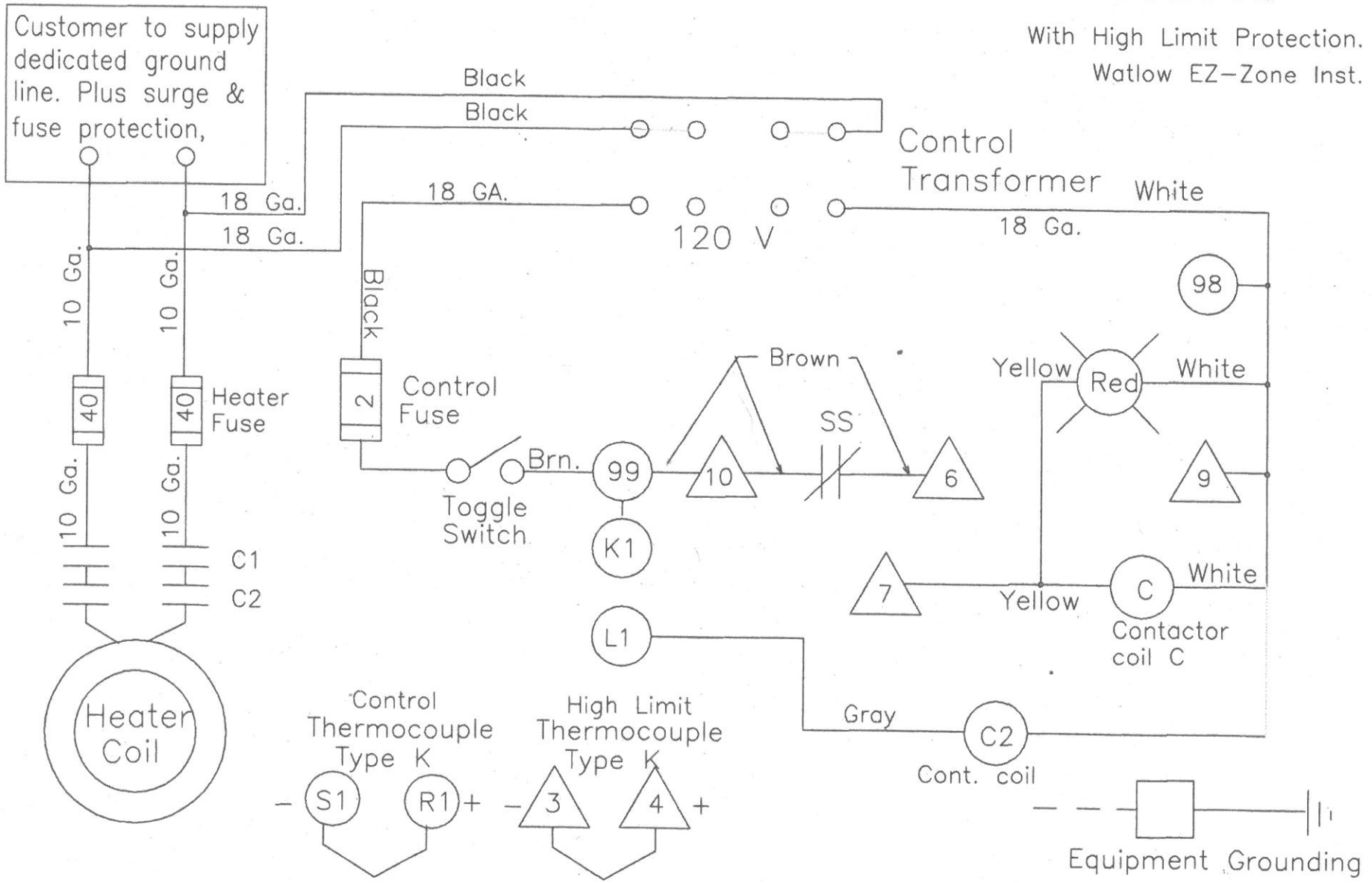
The HTE-46, E4-0 and the EM-810 furnaces are equipped with the Watlow EZ-ZONETemperature controller. These are pre-tuned at the factory for optimum performance and the furnace is tested at two temperature setpoints. When you receive your unit, all you need to do is apply power, turn the toggle switch to the on position, and the unit will begin heating to one of the last setpoints from the factory. The instrument has an upper and a lower display. The upper display is the process temperature or chamber temperature, and the lower display is the current setpoint. All that is needed to change the setpoint is to depress the upper or lower arrows on the right hand side of the instrument and the setpoint in the lower display will begin to change up or down. The speed of change will increase the longer the button is depressed.

There is no need for further tuning of the instrument, but if you wish to, please consult the supplied operating manual (on CD) from Watlow before attempting to do so.

220 V – 60 Hz – 1 Ph

EM-810 Electric Melter

With High Limit Protection.
Watlow EZ-Zone Inst.



Control instrument term.

High limit instrument term.

WD-0040 Rev.2

EM-810 Electric Melter
Wiring Diagram With Watlow Control Inst.
M I F C O 4/20/2013

EM810 Cabinet Listing 9/2018

A 004085 PM6C1EA-AAAAAAA Watlow controller

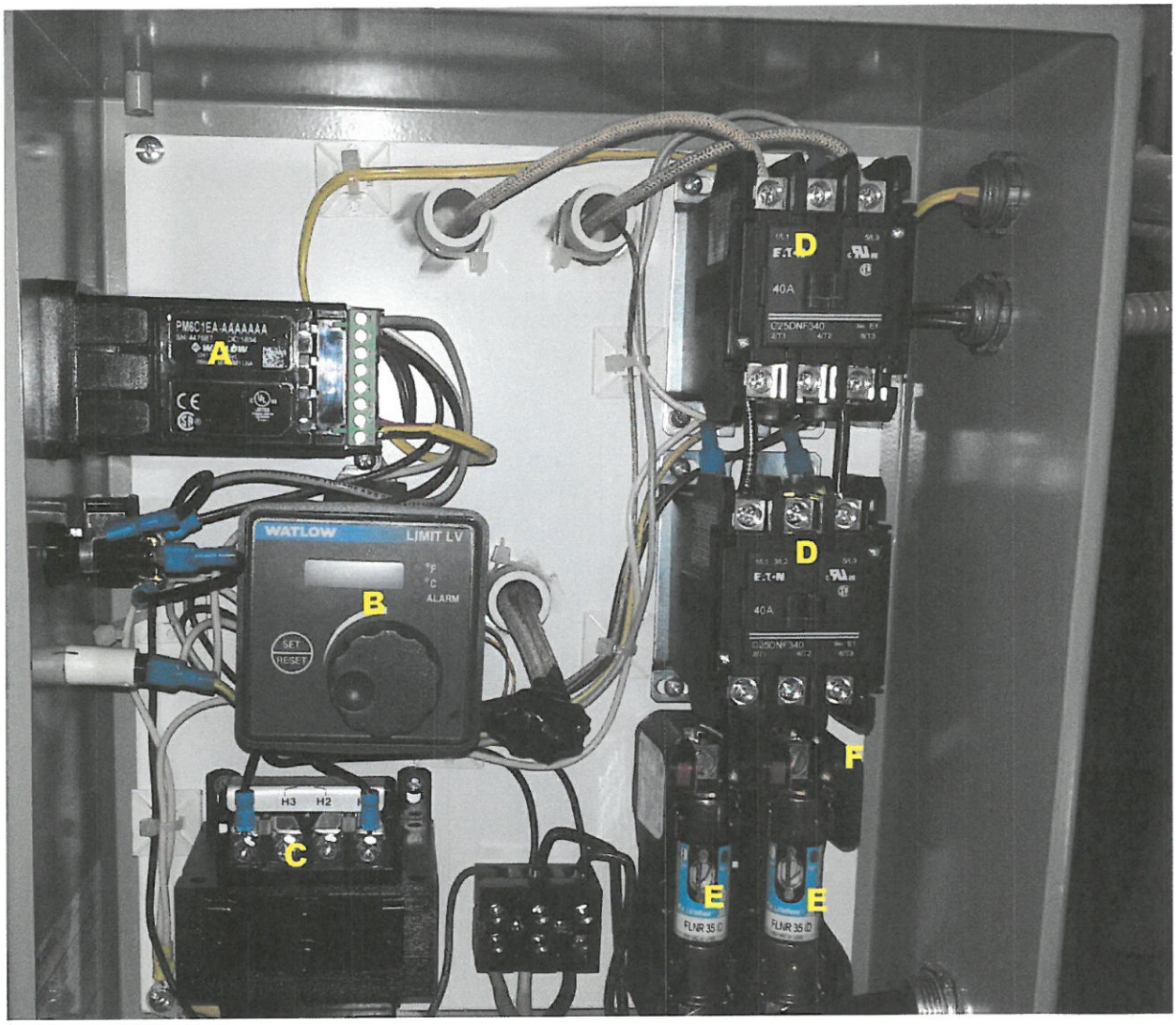
B 004087 LVC6KW00002250A Watlow high limit controller

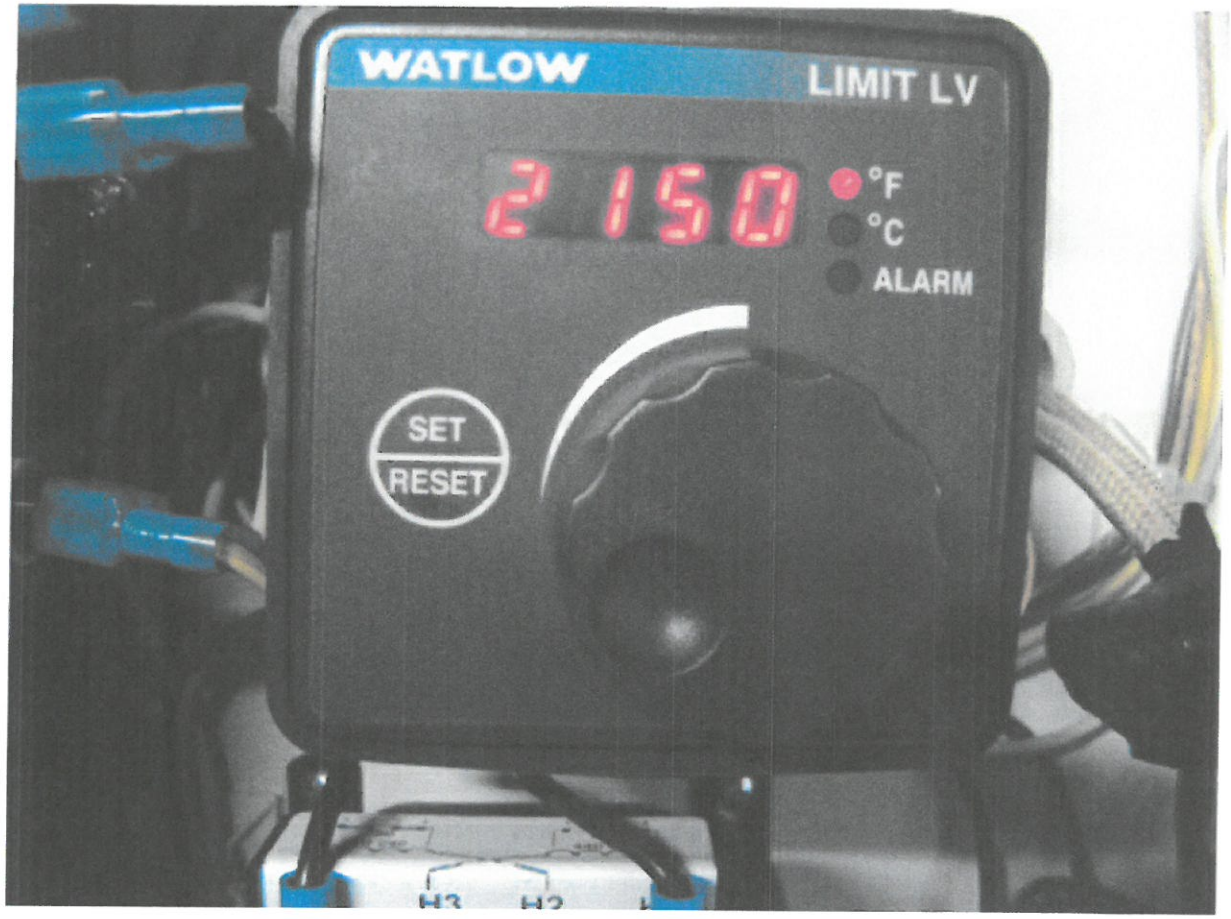
C 003917 Transformer B100BTZ13JK

D 003936 Contactor C25DNF340A 3 pole 40A

E 003635 FLNR035ID fuse

F 003605 LH25060-2C fuse block





Troubleshooting:

If the unit on light is not on, or will not heat, or temperature drops, open the cabinet door and press the reset button on the high limit instrument and then check to see if the unit on light is now lit.

Make sure high limit set point reads 2150 deg F.

Lid must be closed for unit to heat up.

Open the cabinet and check the 2 fuses in the lower right hand corner with a continuity tester.

Check continuity of both heating elements- are they both heating?