



MTSCR Furnace  
MA# 100092

Congratulations on your purchase of a MELLE Furnace. In order to assist in your scientific procedures, please consult this manual prior to unpacking and installation.

Please contact technical support at the MELLE Company:  
40 Chenell Drive  
Concord, NH 03301  
phone 603-228-2929  
Fax 603-228-5727

E-mail [info@mellencompany.com](mailto:info@mellencompany.com) with additional questions.



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Safety Data Sheets are attached to printed copies from MELLENN  
Diagrams, Spare Parts List, etc are in the back pocket of hard copies from MELLENN

## **Furnace Information**

All MELLEN furnaces are labeled with an information sticker allowing the user to access necessary information concerning the furnace.

The serial number for the MELLEN Furnace is located on a MELLEN furnace plate primarily located on the cage on the furnace. Attached to this plate, you will conveniently find the Furnace Model Number, Serial Number as well as contact data for the MELLEN Company.

The furnace plate also contains wattage and voltage information, zone configuration and any special adaptations on this furnace.

## **Important Safety Information**

- Never place any part of the body in the furnace or touch the furnace while activated or while cooling.
- Use proper ventilation at all times, do not inhale fumes from a bake-out procedure or a run. Do not approach the furnace without a mask.
- Never have food or drink near the furnace.
- Apply proper voltage to the heaters.
- Provide at least ½" clearance between furnace surface and any conductive parts.
- Take necessary precautions when handling high temperature materials.
- Do NOT exceed the recommended temperature ratings.
- Do not modify or drill holes to the heaters without consulting MELLEN (603-228-2929).
- Do NOT support the furnace by any electrical parts.
- Do NOT bury any electrical interconnections between the furnace and any equipment.
- Furnace should be level and free from vibrations.
- Furnace should be installed and grounded in accordance with national and local codes.
- Avoid contact between furnace and any metallic object.
- Always wash hands after coming in contact with furnace and components.
- Do not place any combustible components inside the furnace.
- Do not hold furnace by the knobs used to open and close the furnace.

## Unpacking Instructions

Remove furnace from box or crate.

Inspect furnace for any damage.

Report any damage to the delivering carrier immediately to insure a proper claim.

Remove any packaging material from the bore, paying attention not to damage the insulation.

Do not drop box or furnace.



## **Initial Run and Bake-Out Instructions**

Please follow the appropriate Bake-Out Instructions, either Single Zone Bake-Out Procedure (for furnaces with one heating zone) or Bake-Out Procedure for Multiple Zone Furnaces (for furnaces with more than one heating zone).

The furnace contains carefully selected insulation to permit the best possible operation. This insulation inherently contains moisture that must be slowly and completely removed before the furnace can be fully utilized. During this drying period, a small quantity of smoke and vapors from the binders in the embedding cement will also be emitted. The smoke will have a bad odor, so provide adequate ventilation.

Please inspect the furnace prior to the bake-out procedure. Please be sure that the furnace core is empty, that nothing is inside of it (ie. no papers, office supplies, tools etc). Please be sure that nothing is on the exterior of the furnace as well. Remove plastic protective wrap adhering to furnace skins. This protective layer is intended for shipping purposes only and must be removed prior to operation.

Please follow the recommended procedure(s) to properly dry out the furnace insulation for maximum operating success. ....

### **Single Zone Bake-Out Procedure**

1. If your furnace is a horizontal furnace, please raise one end to up to 30 degrees and not less than 5 degrees. If you can not raise one end of the furnace, contact MELLLEN to verify that it is OK to run the bakeout in its fixed position.
2. At the furnace ends, place the furnace plugs slightly inserted, in order for furnace to reach required temperature. Be sure to leave a gap, an opening for the smoke to escape during bake-out.
3. Vent the smoke outside through the use of a hood or exhaust collector.
4. Make certain that the bore is empty.
5. Check the furnace power leads for possible shorts.
6. Raise the temperature of the furnace to 800° in three steps:  
STEP A 200° C for one hour  
STEP B 400°C for two hours  
STEP C 800° C for one hour

The furnace may now be cooled down and is ready for use.

### **Multiple Zone Bake-Out Procedure**

1. If your furnace is a horizontal furnace, please raise one end to up to 30 degrees and not less than 5 degrees. If you can not raise one end of the furnace, contact MELLEN to verify that it is OK to run the bakeout in its fixed position.
2. At the furnace ends, place the furnace plugs slightly inserted, in order for furnace to reach required temperature. Be sure to leave a gap, an opening for the smoke to escape during bake-out.
3. Vent the smoke outside through the use of a hood or exhaust collector.
4. Make certain that the bore is empty.
5. Check the furnace power leads for possible shorts.
6. On the first firing, the power should be applied to every other zone, never to two adjoining zones at the same time. It is recommended that in a three zone furnace, that the middle zone (zone 2) be fired or baked-out first. Then, upon completion of zone 2 bake out procedure, that zones 1 and 3 can be baked out together.
7. Raise the temperature of the zones being fired to a minimum of 1000° C in four steps
  - 200° C for one hour
  - 400°C for one hour
  - 800°C for one hour
  - 1000°C for one hour

After this bake-out has been completed, turn off the zones. The remaining zones may now be baked-out following the same procedure, (zones 1 and 3). It is recommended that this procedure be done in succession, that is baking out the remaining zones, before the furnace cools. In the case that this is achieved, skip to step 3, 800°C for 1 hour, and begin baking zones 1 and 3 at this step. Then, continue as normal and bake at 1000° C for 1 hour. The bake-out is now complete.

After the initial drying out run, the furnace should be run approximately 10°C - 40°C above the normal operating temperature, without exceeding the rated temperature, to fully stabilize the furnace. Under no circumstances should the rated temperature of the furnace be exceeded.

**WARNING: Multi-zone furnaces – SERIOUS DAMAGE may result if steps 6-7 are not followed when baking out multi-zone furnaces.**

**WARNING:** Due to the possibility of combustible gases being given off by the refractory cement binders as the furnace is heated, Mellen recommends operating the furnace in a tilted or vertical position prevent local hot spots an possible damage to the heating elements or element. Both ends of the bore should be open (or slightly ajar with furnace plugs) and the bore empty. After the initial run, the furnace can be operated normally.

## Basic Operation

The furnace should be brought to temperature as slowly as is practical for your applications. During prolonged periods of inactivity, the furnace should be shut off or idled at approximately 1000° F (538°C).

The furnace should be level and free from vibrations.

Check the furnace for shorts from inputs to ground. Check the resistance of the heating element(s) to see that the connections are tight and free of oxides. The resistance should be checked across the two end terminals

Although the furnace has a nominal rating, the furnace should never be connected to a line without an automatic or manual voltage control in front of it.

### CAUTION:

The furnace, transformer (if required), and control cabinet should be installed and grounded in accordance with National and local codes.

Multi-Zone Furnaces are supplied with one grounding wire and two power leads for each zone.

## Thermocouple Installation



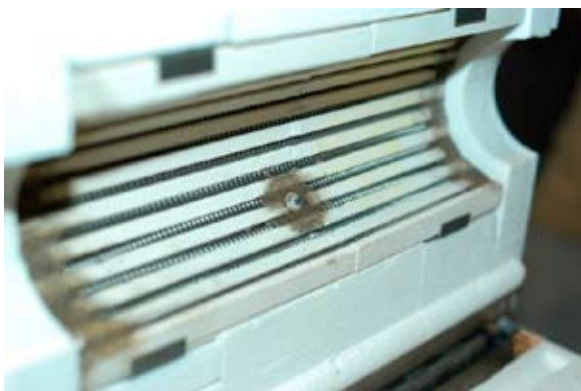
The furnace can use various thermocouples depending on application - type K, S or R. The thermocouple or TC is inserted in the backside of the furnace in the TC holder.

Insert the thermocouple carefully, as thermocouples are fragile.

Loosen the bolt on the top of the TC and hold the washer to the top of the bolt away from the TC holder.

Slide the thermocouple into the furnace, keeping the washer outside the holder.

Using a screwdriver, gently tighten the bolt to hold the thermocouple in place.



The thermocouple slides into the furnace and just barely protrudes from the inside of the furnace.



## Element Replacement

### Tools Required:

1/8" Allen wrench  
replacement element(s)  
needle nose pliers  
Wire cutters

Be certain that furnace and elements are completely cool and at room temperature before replacing any MELLEEN elements. Wear a protective mask when handling elements.



### To replace the BOTTOM element:

1. Remove the screw using the Allen wrench located on the side of the furnace as shown in the photo above.

2. Gently slide out the insulation on the side of the element as shown in the photos on the right. Gently set aside.

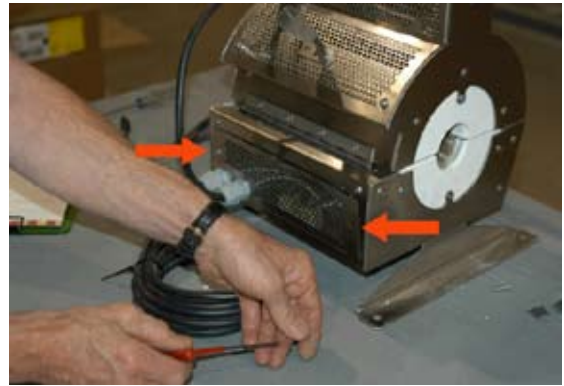
3. Using the needle nose pliers, slide the metal clip sideways holding the element in place.



4. Remove all 4 clips following the same procedure and set clips aside.



5. Gently close the furnace.



6. Remove two screws holding the perforated screen onto the furnace. Set screws aside.



7. Cut the wire connections on the leads of the element.

8. Slide out element. Set aside.



Replace new element in the furnace with the leads inserted through to the back of the furnace.



1. Slide an element clip between the element and the insulation.

2. Repeat with three remaining clips.

3. Replace insulation on the side of the furnace between element and furnace skin.

4. Replace screw on the side of the furnace.

5. Gently close the furnace.

5. Attach leads in the back of the furnace by crimping with a buttsplice to the wire.

6. Replace perforated cage on the back of the furnace.

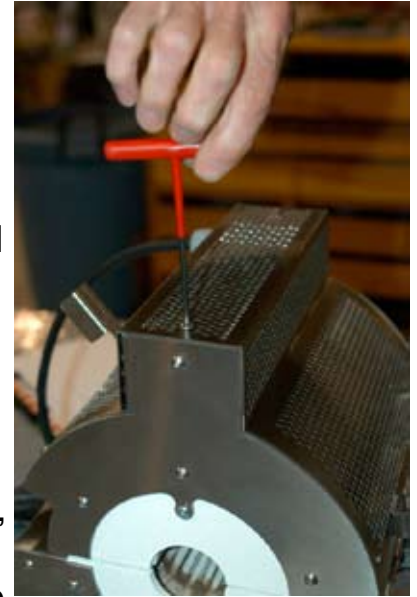
To Replace the element on the TOP of the furnace, follow the same procedure for replacing the bottom element, but remove the cage on the top of the furnace. Remove the two screws on the top of the furnace to remove the cage.

Clip the wires as shown before removing element clips and insulation.

Open the furnace and remove insulation, then element clips, then slide out element.



To replace element, slide element leads through the furnace and replace clips and insulation then attach the leads.



## Thermocouple Care

TC's should be handled with care. The ceramics are fragile and thus can be broken easily. A broken ceramic can lead to broken or twisted wires which may cause a second junction to be formed resulting in incorrect temperature readings.

Exposing the TC to arsenic or any other corrosive material may contaminate the TC. The TC should be cleaned or replaced if the TC appears to be corroded or attacked in any way.

Thermocouples wear out through normal use and should be replaced as needed. Thermocouples placed inside the furnace improperly will most likely be damaged and need to be replaced sooner than expected.

### WIRING

See accompanying wiring control diagram included in the rear pocket of this manual (if applicable).

Connect the required line voltage to the controller

Connect the thermocouple extension wire between the controller and the furnace. Each TC, labeled Zone 1, Zone 2, Zone 3, etc connects to the corresponding TC wire, which in turn connects to the corresponding labeled zone in the power supply. (Be certain that zone 1 corresponds to TC zone 1 etc). In order to connect the TC wire to the TC, gently, but firmly grasp the TC and carefully connect the TC prongs to the plug of the wire. The connection will be flush when fully connected.

Connect the controller power-out to the furnace or immediate transfer input, whichever is applicable (see wiring diagram).

Be sure that the furnace and controller are properly grounded.

Observe local and National Codes for wiring and electrical.

## Controller Overview

The controller is set up at MELLEN and the instruments are ready to operate upon set up. If you wish to change the set setpoint please follow these procedures.

Further instruction is included in the OMEGA controller manual.



To turn the unit on, switch the white ON/OFF switch as illustrated in the photo above.

To change the setpoint on the controller, use the instrument on the left hand side. Press and hold the star button (far left) and while holding it down, press the up or down arrow keys to change the setpoint.



To shut the unit off, simply shut the ON/OFF switch.

## Over-Temperature Controller

The Over-temperature (OT) setpoint is set at the maximum temperature for your unit. MELLEN recommends setting this *no more than 100° over the operating temperature of your furnace, NEVER to exceed the maximum operating temperature of the furnace.*

If you wish to change the OT setpoint, follow these instructions:

1. Press the UP arrow & the SETUP key at the same time.
2. Use the ▲ or ▼ to scroll through 4 choices on the screen (OPTR, SETP, CONF, INFO). Stop scrolling when you see SETP.
3. Press the SETUP key. ULOC will show up on the screen.
4. Using the ▲ and ▼ keys, press until the number 10 appears onscreen. This is the unlock code.
5. Once you have the number 10 onscreen, press the SETUP key and the SET-POINT will be displayed.
6. Using the ▲ and ▼ keys, choose your new setpoint.
7. Once you have your desired number onscreen, press RESET.
8. Press the SETUP key to scroll to the next screen.
9. Press SETUP & ▲ at the same time to return to the main menu.
10. Select OPTR by scrolling with the ▲ key.
11. Press SETUP and you will now be in operator mode (OPTR) and the new setpoint will be active.



## Troubleshooting Guide



LED Display doesn't light up –  
Check to make sure unit is plugged in. Check power connections.

FURNACE DOESN'T HEAT –  
Heating element burned out.  
SCR burned out.  
Call MELLEEN for technical support  
(603 228-2929) [info@mellencompany.com](mailto:info@mellencompany.com)

FURNACE EMITS SMOKE after bake-out-  
Shut unit off.  
Check for combustible substances inside furnace bore.  
Determine if smoke is coming from controller or furnace bore. If coming from  
controller, call MELLEEN technical support immediately.

TC NEEDS REPLACEMENT –  
Call MELLEEN (603 228-2929)

ELEMENTS NEED REPLACEMENT  
Call Mellen (603 228-2929)

















