DME Company Application Note: Temp. Controls Not Heating Up/ SHI / Anti-Arc Clips Problems

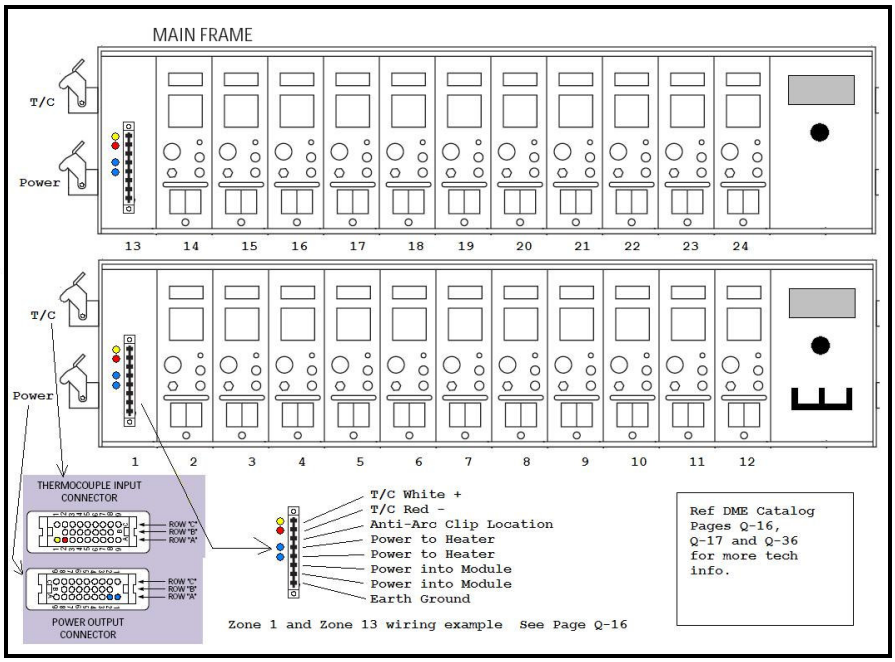
This application note will try to cover common customer questions which relate to temperature control zones not heating up. Most of this information is covered in the user manuals but is put in one place to handle this common question.

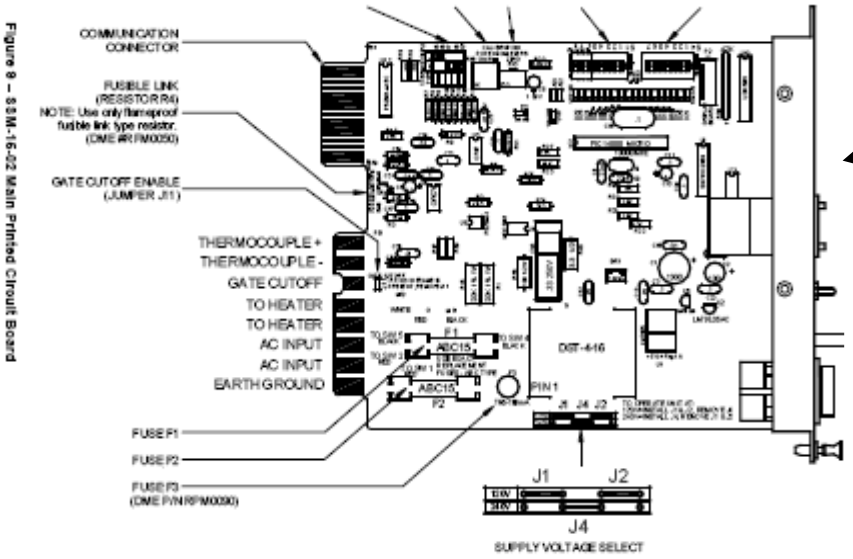
- First thing to always try when a problem occurs, if possible, is to swap the problem zone controller with a know working controller to see if the problem follows the zone or the controller. This is a major benefit of a modular control system.

1) Anti-Arc Clips : Pin Required to be installed in the Mainframe for module to work.

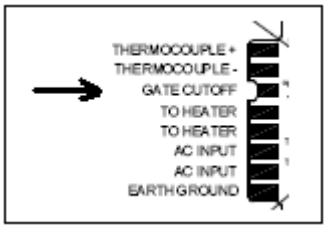
DME has introduced an Anti-Arc feature for all of our current temperature control modules. It requires an extra pin to be installed from the rear of the mainframe while power is removed completely from the mainframe. The clip simply "snaps in" when properly installed. It does NOT connect or have any wires going to it. It simply connects one side of the circuit board to the other side. This was implemented to help prevent permanent damage to the controllers circuit boards that occasionally occurs while customers plug and unplug modules into mainframes under power. The controllers sometimes draw an arc to the 240Vac line voltage when the module is plugged in and out when the mainframe is powered and under rare conditions the arc spreads to neighboring modules and causes burn marks or burn damage to the circuit boards. DME has indented one of the gold plated fingers on the back of the board which prevents the triac control from firing. It simply connects one side of the circuit board to the other side. It is shorter so the power to the heater starts LAST and the power ends to the heater FIRST.

This is the label that DME ships with every temperature control module "out of the box" and is placed over the display of the module. Insert pin where shown.





NOTE SSM 1501 Circuit Board Lower Left connector with indented pin labeled "GATE CUTOFF". This is where the anti-arc clip engages when the module is inserted into a DME Mainframe. Not recommended, but jumper could be installed on module to disable the effect of this feature.



2) Fuses or Open heater or Bad Control Modules.

Fuses: All current DME modules have 3 fuses. Two large Load fuses and one small module fuse. Legacy DME controllers such as the SSM15G only had the Two large Load Fuses. When a load fuse clears, the module will stay powered up. One or both of the Large load fuses could have opened up.

Open heaters: The heater has failed to an Open condition. The heater needs to be replaced. With Power removed from the system, the ohms of the heater can be read by an electrician and verified. A typical 500 Watt, 240VAC heater will read about Power = Volts ^2 / Resistance or Resistance in Ohms = Volts^2 / Watts, Resistance of this 500 Watt heater would be = 240^2 / 500 Watts = 115.2 Ohms within typically +/- 20%.

Bad Control Module: Module Circuit has damage, typical replaceable components are listed as Replacement Parts in their users manuals. The triac and triac driver components can be the cause. Also, the Fuseable Link Flame Proof Resistor can cause issues in DME controllers. DME offers repair and calibration services.

3) Alarm Diagnostics Shuts Module Power Off, Zone of Control will NOT Heat Up.

(ie - Shorted Thermocouple – SHI, etc.)

Intent of This Alarm Diagnostics: This feature can prevent very expensive mold repair problems. It helps prevent a temperature control zone from applying 100% power to a heater with minimum or no response from the thermocouple. In this case, the controller would continue 100% power output until something would over-heat and fail. Several factors can cause this problem. The most common are listed below. The heater and/or the mold can get excessively hot while the thermocouple would show room temperature and the heater could turn red hot, could burn plastic in the mold, cause mold warpage /damage, etc. Typical Alarm condition would occur if there is less than 3 Degrees F increase in 60 Seconds when controller applying 100% to heatup load, Optional settings would trigger if there was less than 3 Degrees F increase in 250 seconds when the controller is applying 100% to heatup the load. Some controllers can disable this feature as an option. In these cases, DME controllers have features which de-sensitize the alarm condition. The DSS module has a Fast and Slow Load setting. The SSM1502/1512 has switch settings for SHO long (short) and SHO Disable (enable) of this feature. See individual controller manuals for using these type features. The most common causes of this condition follows.

Under Wattage/Powered Heater Design Problems: Sometimes molds are designed with marginal or not enough wattage to heat them up in a reasonable time. DME Designers target 32 to 40 Watts / cubic inch of Wattage to steel ratio on custom manifolds as a general rule of thumb. (This gives good temperature response – heat up rates in typically less than 15 minutes.) Note: A mold running at 240 Vac may not run at 208 Vac since the plant voltage drop will effectively remove 25% of the available power from the heater. Example, a 1000Watt heater designed and running at 240Vac will only be able to produce 750 Watts at 208 Vac Plant conditions. Moving a working mold from a plant with 240 Vac may not work as well in a plant with line voltage at 208 Vac. You typically want the control range to reach steady state from 15% to 85% Percent Power Output at the desired control temperature.

Cross Wired Zones: This is obvious, one zone's thermocouple is wired to another zone's heater. Heating up zone 2 causes zone's 1 temperature to rise, but zone 2 never heats up unless zone 1 is started. The controllers get confused. An electrician needs to diagnose the problem and fix the wiring problems in the mold. Turn one zone on at a time and watch if only this zone heats up. If another zone heats up instead, that zone is suspect.

Shorted Thermocouple: This is obvious, the thermocouple has a junction other than where it was designed to sense temperature. Typically, the t/c reads close to room temperature and the issues are pinched thermocouple wires in the mold, shorted thermocouple wiring somewhere to ground, other than where it was designed to be. Failed Thermocouple which needs replacement. This is difficult to diagnose since visually inspecting the wiring means tearing apart the mold. First place to check is the mold terminal box to make sure no wires are touching anything or there are no "Frayed" stranded wires touching ground. Since there are grounded and ungrounded t/c's, you can't typically just measure the t/c for an OPEN condition. The t/c junction itself is a very low voltage battery in the milli-volt range (0.000 to 20.000 milli-Volts) and looks like a short circuit to a typical ohm meter.

Thermal Lag: Try always to minimize thermal lag – the response of a step response to the heater to the time the sensor starts seeing a rise in temperature. Heater design, Heater Contact to the heated surface, placement of the thermal sensor and contact of the thermal sensor to the heated surface are critical. A good rule of thumb would be less than a couple of seconds from power ON till t/c starts increasing. Any greater than this could cause oscillation.