

“MI” HEATING SYSTEM
INSTALLATION, OPERATION & MAINTENANCE MANUAL
MI.IOM.R1

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INDEX

<i>I</i>	<i>Product Specification</i>
<i>II</i>	<i>Storage Instructions</i>
<i>III</i>	<i>Inspection</i>
<i>IV</i>	<i>Heater Installation</i>
<i>V</i>	<i>Operating Instructions</i>
<i>VI</i>	<i>Maintenance Instructions</i>
<i>VII</i>	<i>Securing Method for MI Blankets</i>

I - PRODUCT SPECIFICATION

Model

Type MI Heating Systems

Mineral Insulated metal sheathed heating cable. The insulant is magnesium oxide surrounding an electrically resistive wire.

The MI heater is factory terminated with metal sheathed cold leads and pig tails.

The MI heater can be supplied as a circuit or secured to a metal mesh preformed to a pre-designed shape.

II – STORAGE INSTRUCTIONS

Introduction:

The type MI Heater is an electrical resistance type heater designed for operating voltages up to 600 VAC.

As with all electric items the units should be stored in dry areas.

The following storage procedure is recommended:

- 1) Store all heaters indoors, unopened, and in their original shipping crates until ready for installation.
- 2) Do not store heaters directly on concrete, cement or earth floors.
- 3) Store heaters on pallets or shelves.
- 4) Heaters should be stored and kept in dry environments only.
- 5) Shipping crates should be handled with care. Damage to the shipping crate caused by dropping, fork lift arms or abuse of any description should be investigated prior to installation of the heaters.

III - INSPECTION

All heaters are 100% inspected and tested before shipment. However, to ensure minimum delay in scheduling and heating system integrity, all heaters should be inspected and tested at key milestones:

- 1) After delivery to job site.
- 2) Before and after installation.
- 3) Before thermal insulation is applied over the heaters.
- 4) Before heating system start-up.
- 5) Periodically after heating system commissioning.

The extent of inspections should depend on the condition of heaters and packaging. However, in general the following should be performed at the above times:

- 1) Check outer packaging for signs of physical damage or exposure to water.
- 2) Check all heaters for identification markings.
- 3) Check all heaters for physical damage.
- 4) Check all heaters with ohmmeter for electrical continuity and correct DC resistance values between the cold leads (refer to job drawings). DC resistance values should be within +/- 10%.
- 5) Check all heaters with a 500 VDC “megohm meter” for sufficient insulation resistance between shorted cold leads and “ground”.

Minimum acceptable value is 5 megohms.

NOTE: Do not install damaged heaters. If damaged, replace heaters complete with cold leads.

IV – HEATER INSTALLATION

- 1) Inspect the surface to be heated. Ensure it is clean, free from weld spatter and any paint or coating which could burn off during operation.
- 2) Orientate the drawing to the hopper noting any protrusions such as manways, poke tubes, vibrators, strike plates, etc. Ensure the location of any protuberances agrees with the drawing.
- 3) Install the recommended securing means. This can be mounting channels or speed clips. For mounting channel securing consult the drawings supplied. For speed clips, weld the pins to the parent metal ensuring a secure joint. Check the weld by applying hard pressure to the pins.
- 4) Place the MI/mesh to the heated surface ensuring the MI cable is to the surface to be heated. Press to obtain good contact.
- 5) Slide the clip over the pin and press down until resistance is obtained and the heater is flush with the surface.
- 6) Push down on all clips to ensure the whole heater is in intimate contact with the heated surface.
- 7) Carefully route the leads to the junction box, ensuring the heater leads are not sharply bent near any joint. The leads can be supported or clipped as the heating cable.
- 8) Connect the heater pigtails onto the terminals in the junction boxes.

Refer to Section III for Inspection.

NOTE: When using any friable thermal insulation with MI heaters, a metallic covering must be applied over the heater to prevent any insulation becoming trapped between the MI and the object being heated.

V - OPERATING INSTRUCTIONS

- 1) Type MI heaters are designed for heating metal plate structures in dry locations. It is recommended that all systems be thermally insulated immediately following heater installation. Thermal insulation should be dry and in an undamaged condition. The overall thermal insulation systems should be weather-proofed with an external cladding skin, all seams and joints being sealed.
- 2) Prior to energizing the heaters the following should be completed:
 - a) Check that all “heaters to power” connections are correct (refer to relevant job schematic).
 - b) Ensure all terminals are clamped properly.
 - c) Ensure all heater cold leads penetrating thermal insulation cannot be damaged
- 3) Each heating system should be controlled separately. This should be achieved using a proper temperature sensor/controller combination. Instrumentation ranging from a local mounted thermostat to remote sensor/electronic controller are acceptable. Only approved instrumentation should be used with an MI system. If in doubt, contact Hotfoil, Inc.
- 4) Refer to system layout drawings for correct temperature sensor location. Temperature sensor must be held firmly in position, in direct contact with hopper surface. Incorrect installation and/or location can result in poor system performance and excessive power consumption. If in doubt, consult Hotfoil, Inc.
- 5) Temperature control unit should be wired into the entire control/heating system to provide automatic, temperature controller switching of the heaters. Generally, this should be as follows: a) When the temperature at the sensor is BELOW the control set point, heating system should be energized (“ON”); b) When the temperature at the sensor is ABOVE the set point, systems should be de-energized (“OFF”). To identify proper controller connections refer to system drawings or manufacturer’s installation instructions.
- 6) All temperature controllers have a specific temperature range and maximum operating/exposure temperature. These must not be exceeded or temperature controller may be miscalibrated or permanently damaged.
- 7) All temperature controllers have specific electrical current and voltage ratings. These must not be exceeded, since permanent damage to the unit may result causing unsafe or potentially dangerous heating system operation. For applications where total heater electric current or voltage to be switched exceeds the temperature controller ratings, the use of power contactor is required.

- 8) Where due to specific conditions of the application over-heating may result, an override (high temperature limit) temperature controller must be used. Override temperature controller “set point” must be set below the maximum “safe” temperature.
- 9) In critical applications where control failure may endanger life, limb or property, a backup controller should be used.
- 10) Before heating system is energized, all temperature controllers must be adjusted to appropriate temperature set point, and checked that the automatic temperature control/switching system is operating properly.
- 11) Proper, periodic maintenance program for all electrical components of the heating system, temperature control and power distribution, must be set up and implemented. Refer to specific equipment manufacturer’s instructions for recommendations.

VI - MAINTENANCE INSTRUCTIONS

MI heaters, once properly installed, are virtually maintenance free. However, to verify that heaters are “electrically sound” a periodic electrical check is recommended.

Frequency of inspections and tests should depend on severity of environment and operating conditions but should be performed at least once a year.

- 1) Check thermal insulation over the heaters for physical damage since heaters beneath it may have been damaged also. Replace entire heater if any part affecting its electrical integrity is damaged.
- 2) If thermal insulation is removed from the hopper/vessel check heaters and wiring for secure mounting, good physical contact or any other abnormalities. Correct problems before re-applying thermal insulation
- 3) Check heater electric continuity and correct DC resistance:
 - a) De-energize heating system.
 - b) Disconnect individual heater from terminal block.
 - c) Measure and record DC resistance with an ohm meter.
 - d) Verify against corresponding job drawings that DC resistance is within +/- 10%.
- 4) Check heater insulation resistance (while the heater is still connected):
 - a) Connect a 500 VDC megohm meter between shorted heater cold leads and the hopper/vessel (ground) on which installed.
 - b) Apply test voltage for 60 seconds.
 - c) Read and record insulation resistance value (5 megohms minimum).
 - d) Reduced values may indicate excessive moisture present within the heater.
- 5) Check all wiring for correct and tight interconnections.
- 6) Check all thermal insulation, cladding, cladding seals and joints to ensure weatherproof integrity.