

MFH-1
SINGLE ZONE TEMPERATURE CONTROLLER
Installation, Operation, & Maintenance Manual

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TEMPERATURE CONTROL SYSTEM
OPERATING
INSTRUCTIONS

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****Please read these instructions thoroughly before using this instrument.****

***IMPORTANT:** Make sure the control system power switch is “OFF” and the input power circuit breaker is “OFF” before performing any maintenance on the system.*

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ELECTRICAL LOCKOUT:

THE ELECTRICAL POWER SOURCE MUST BE LOCKED OUT WHENEVER ANYONE IS WORKING ON THE EQUIPMENT.

Each maintenance person should have a personal padlock, with only one key. When working on any equipment this person should use the padlock to lock out the electrical controls. It is most important that the only available key for the lock be in the pocket of the person who is working on the temperature control equipment. If other persons work on the same equipment, each should use their own different lock at a separate lockout station for the controls of the equipment. Accidental startup of the equipment may have tragic results.

In no case should the removal of, or work be performed on, this temperature control system without following proper electrical lockout procedures.

LIFTING APPARATUS:

Temperature control equipment, like any other type of equipment, requires normal periodic maintenance or relocation if the user is to get the most for the investment in the equipment. One of the most flagrant of safety violations is the use of inadequate and unsafe lifting equipment. The temperature control equipment or parts thereof should be assembled, disassembled and moved with lifting facilities that have the capability of gently and slowly lifting and lowering the equipment or various parts.

WHEN USING A CRANE OR FORK LIFT, OPERATE WITHIN ITS RATED CAPACITY, THE SAFE RATED CAPACITY INCLUDES WEIGHT OF HOOKS, BLOCKS, AND ANY OTHER HANDLING DEVICES, SUCH AS CABLES, SLINGS, SPREADER BARS, ETC. CONSIDER THE WEIGHT OF ALL THESE AS PART OF THE LOAD TO BE LIFTED.

WARNING:

Before performing any work on this system, power must be turned off and secured. Before replacing fuses the cause of the problem must be found and corrected and the system must be inspected for damage by a qualified technician. Damage caused to system as a result of improper fuses will not be covered under warranty.

PLANT SAFETY:

The safety procedures mentioned here do not eliminate all safety hazards found in the area of operation. However, they do highlight some procedures that have been found through long experience to improve safety conditions around temperature control systems. International Temperature Control Inc. welcomes inquiries about other suggested safety procedures for use around their equipment.

OUT OF SERVICE:

When the system is out of service, the control system must be turned off.

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STANDARD OPERATING FEATURES

NORMAL OPERATIONS: Auto Keys

When the power switch on the front of the cabinet is turned on, the control system will look at the existing zone temperature and determine if the “SOFT START” cycle is needed. The “SOFT START” cycle will be activated any time the zone temperature is below 212° Fahrenheit when the module is turned on. Upon completion of the “SOFT START” cycle the system will automatically switch to the automatic control mode. At this time the control system will apply the necessary power to bring the process temperature up to the set point temperature and maintain it, if set point temperature is above 212° Fahrenheit.

SETTING OPERATING TEMPERATURE: Up & Down Key

The set point temperature is normally preset at 400° Fahrenheit at the factory. You can change the set point temperature at any time by pressing the “UP” arrow or “DOWN” arrow keys. The control system will remember the last entered set point temperature when it is shut off.

SOFT START:

The “SOFT START” cycle applies a reduced output power to the heater at start up. The controller only activates “SOFT START” if the initial process temperature at start up is below 212° F. The output power is gradually increased while the zone temperature is below 212° F. The “SOFT START” cycle time is factory set at 5 minutes. The time duration may be changed by scrolling through the MENU for the “SSt” parameter. (range 0 to 30 minutes)

MANUAL OPERATION KEY:

To operate the controller manually, press the “MAN” key. The percentage of output power will be displayed in the set point window. Push the “UP” or “DOWN” arrow keys to change the output percentage. If thermocouple feedback is not available the process temperature window will show the error code “tCO” or “tCr”. When switching from “AUTO” to “MAN” operating mode, there is a bump less transfer of power.

NOTE: Other Alarms will not operate in the manual mode.

AMPS KEY:

When the “AMPS” key is pressed the process temperature (left) window will display the amperage draw of the heater circuit. To display process temperature press the “AMPS” key again.

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ERROR CODES & ALARMS INDICATORS:

ERROR CODES - Displayed in process temperature (upper) window:

Error Code	Description
tCO	An open thermocouple condition. Activates if there is a break within the thermocouple circuit which prevents a complete circuit from being made. Module switches to "APO" mode if selected, otherwise "OFF".
tCr	Thermocouple wires are reversed. Activates if the control has detected a thermocouple wired backwards. System will disable power to the heater.
tCs	The thermocouple is shorted. Activates when there is a condition within the thermocouple, or thermocouple wiring which is causing a short. Module switches to "APO" mode if selected, otherwise "OFF".
tOh	The controller triac or the heater circuit is open. controller will disable power to the heater.
tSh	Main triac is shorted. An over temperature condition has occurred and current flow is detected. The system will disable power to the heater.
HiC	High Current overrun. The control system detects current greater than the value set in the MENU "HcL" parameter and will disable power to the heater.

ERRORS & ALARMS INDICATORS:

OPEN SHORTED THERMOCOUPLE PROTECTION:

In the event a thermocouple fails in the open condition after reaching set point temperature, the control system will automatically control temperature with stored APO (Average Power Output) information if the MENU feature "tcb" is set to "APO", otherwise power is disabled. This feature only operates at set point temperature.

REVERSED THERMOCOUPLE PROTECTION

The controller will scrutinize actual voltage through the thermocouple. In the event a negative voltage is detected, the "tCr" error code will be displayed, and power will not be applied to the heater.

SHORTED THERMOCOUPLE INDICATION:

In the event a thermocouple fails to detect a rise in temperature while power is being applied to the heater, the control unit will activate an alarm, and the "tCS" error code will be displayed. The module activates "APO" if selected, otherwise "OFF".

OPEN TRIAC/OPEN HEATER:

The controller will alert the operator in the event of an open triac or heater, by displaying a "tOh" error message in the upper window. This condition is detected if the heater fails to maintain temperature or rise to set point temperature and there is an absence of current flowing to the heater. Control unit will disable power to heater.

SHORTED TRIAC PROTECTION:

Within the circuitry of the control system are relays which disable power to the heater in the event the main triac

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is shorted. In a situation when power to the heater is detected when the temperature is well above the set point, the system will disable power to the heater. A “tSh” error code will then be displayed in the left window so damage to the mold or heater can be averted.

HIGH CURRENT WARNING:

To help protect valuable molds and other related equipment, a safety device will alarm if a heater is drawing current above its rated capacity. To set a current value, scroll through the **MENU** for the “**HCL**” feature, using the “up” or “down” keys set a value just above the heaters maximum current draw. The control system will trigger an alarm and disable power to the heater if current exceeds the set value. Utilizing this feature can save time and expense by calling attention to a problem before damage occurs. In **MENU** the range may be set between 1.0 and 16.0 amps.

HIGH AND LOW TEMPERATURE ALARM:

The high and low temperature alarms have been factory set at +/- 30° F. If the zone temperature drops 30° below the set point or if the temperature exceeds 30° above the set point, the alarm will activate and the “**HIGH**” or “**LOW**” LED will activate.

MENU MODE

MENU MODE OPERATING PROCEDURE:

1. To enter the “**MENU**” mode, press the “**MENU**” key to scroll through menu until the desired option appears in the process temperature (left) window. As you scroll through the menu, the current setting of each option will be displayed in the set point (right) window.
2. To scroll through the menu, continue to press the **MENU** key until the desired feature code appears in the left window.
3. To change the setting of a parameter displayed in the left window, press the “**UP**” or “**DOWN**” arrow key.
4. To set the parameter and exit the “**MENU**” mode, continue to press the “**MENU**” key until you reach the end of the menu of features. The controller will restart after storing the new values.

CAUTION: While in the “**MENU**” mode, the system will not control temperature. Therefore it is recommended that any changes be made at start up.

MFH-1 “MENU” Parameter Chart

CODE	FUNCTION	SETTINGS
C-F	Temperature display mode	°C or (°F)
AL	Audible Alarm	(On) or OFF
tCb	T/C break option (open/short)	(APO) – Average Power Output or OFF
SSt	Soft Start Time	0-30minutes (5)
HCL	Maximum Current	1.0 – 16.0 Amps (16.0)
J-K	Thermocouple Type	(J) or K
SSL	Soft Start Lock	(ON) or OFF
FPL	Front Panel Lockout	ON or (OFF)

Factory settings in parenthesis.

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“MENU” - PARAMETER SETTINGS:

- C-F CELSIUS OR FAHRENHEIT SETTING:**
This parameter allows selection of either “C” or “F” temperature ranges – select “C” or “F”.
- AL AUDIBLE ALARM SETTING:**
Build in alarm – Select “ON” or “OFF”.
- tCb THERMOCOUPLE OPEN PARAMETER SETTING:**
(APO – Average Power Output). If this option is set to “APO” and thermocouple input is lost during operation the control module will alarm and indicate that the thermocouple input is open. However, instead of disabling power to the heater, the instrument will continue to apply the same average power to the heater as applied just prior to losing the thermocouple signal. Factory set to “APO” but may be turned “OFF”.
- SSt SOFT START SETTING:**
Select 0 to 30 minutes. Factory set at 5 minutes.
- HCL HIGH CURRENT LIMIT SETTING:**
Select 1 – 16 amps. Factory set at 16 amps. If the control system detects a current draw that exceeds the set value, it will cut power to the heater and display an “HiC” warning. This option allows for setting a current warning level just above the maximum draw of the heater. When the instrument detects a current greater than the set value, it will alarm and shut off power to the heater.
- J-K THERMOCOUPLE TYPE:**
This parameter allows the operator to select either “J” to “K” type thermocouple, depending on the requirements. Factory set to “J”.
- SSL SOFT START LOCK:**
This parameter prevents the Soft Start parameter from being overridden from the front panel. The Soft Start cycle must be completed prior to entering either manual or automatic control mode. Factory set to “ON” or select “OFF”.
- FPL FRONT PANEL LOCK SETTING:**
This parameter locks the front panel keys with the exception of “AMPS” & “MENU”. This lockout prevents accidental changing of temperature settings, etc. Select “ON” for lock or “OFF” for un-lock. Factory set to “OFF”.

TROUBLE SHOOTING

NOTE:

It is assumed that the MFH-1 hot runner temperature control system has been installed in accordance to the proper instructions, that all wiring is correct and that power to the system is as specified on the controller.

Normally problems have two basic forms:

First, relate to the Controller, Wiring, Heaters or Thermocouples. These problems usually present themselves as abnormal indications on the control system, i.e. absence of or blinking lights & displays and error codes.

Second, revolve around the design and/or manufacturing of the mold, the hot runner system (manifold), or the actual processing conditions. These problems are often more difficult to identify and not covered in this manual.

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PROBLEMS:

The system will not turn on:

Temperature won't settle on set point:

Lights on unit dim:

Tool is unusually cold:

Temperature above set-point:

Tool overheats:

Open thermocouple:

Reversed thermocouple:

Control Unit blows fuses:

Temperature Oscillation:

SOLUTIONS:

1. Check input power.
2. Check power cord connections.
3. Check that system is turned on.
4. Check fuses (Bussman ABC-15), if blown check for wiring short.
5. Return defective system for repairs.

1. Give the control system more time to settle on set point.
2. Molding process may have a wide variation in temperature. Check to see if changes in display temperature are in the same cycle as molding process.

1. Check actual input voltage, it should be same as the units rating.

1. Allow tool to warm up in Soft Start mode.
2. Check thermocouple/heater wiring.
3. Thermocouple/Heater not wired to proper zone.
4. Thermocouple/Heater defective.
5. Make sure input power voltage is correct.
6. Return defective unit for repairs.

1. Thermocouple shorted or not wired correctly.
2. Triac shorted.

1. Temperature range set to F° or C°
2. Check thermocouple.
3. Replace triac.
4. Return defective unit for repairs.

1. Check thermocouple & mold wiring.
1. Correct thermocouple mold wiring.

1. Make sure heater size does not exceed the rating of the control unit.
2. Make sure this is not the result of a shorted heater or a short in the tool wiring. Do not replace unit's fuses until problem is corrected as damage may result.

NOTE: Blown fuses are not caused by the control system, they are caused by an outside factor.

1. This is usually caused by the location, or the thermocouple being too far from the heater it is controlling. Proper procedures dictate that the heater & thermocouple should be within 1/2" of each other.
2. Oscillation can also be caused when the melt

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temperature is significantly above or below the set point.

Temperature too high:

1. Normally this is caused by heat from adjacent zones.
2. The melt temperature of the plastic is hotter than the set point for the zone.
3. Thermocouple may not be wired to the same controller as the heater.

No heat indication:

1. Heater is not connected.
2. Heater is too small.
3. Heater is burned out.
4. Heater is too far from thermocouple.

It is also possible something has occurred electrically to upset the microprocessor within the control system. It indicates that there is more interference in the power line to the control system than the filtering in the power supply can accommodate. A random occurrence is not cause for concern. The solution usually is to connect the controller as close to the electrical service supply as possible, and not to the molding machine, where motors, solenoids, etc can cause interference.

OTHER FALSE ALARMS:

- You may experience false alarms due to the time settings of certain options. The factory time settings may not be the proper setting for your particular heating characteristics.
- Zones that heat slowly may need extended time for open heater (**tOh**) and shorted thermocouple (**tcS**) detection. Conversely you may want to decrease the time for zones that heat to rapidly.
- If you are in a situation where mold changes are frequent and you do not want to take the time to adjust these settings to the mold characteristics, you can set all of the settings to the highest level or in some cases turn them off. However, this will substantially reduce the control system's many diagnostic benefits and its ability to prevent heater runaway and mold damage.

If an instrument is not functioning properly or needs calibration, we highly recommend that you return it to ITC for service. In most cases your unit will not be correctly repaired at other facilities.

Please call us if you need assistance with any problem.

Phone: (989) 876-8075

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PRODUCT SPECIFICATIONS:

Voltage	208 to 240vac, single phase
Current.....	15 amps
Frequency.....	50/60 Hz
Wattage.....	3600
Physical Configuration	An inclusive self contained system
Size	6-1/2" Wide, 1-1/2" High, 10" Deep,
Weight	3 #
DC Power Supply.....	Internally generated regulated and compensated
Control Systems Power Usage.....	Less than 5 watts, excluding load
Set point Range.....	0° to 999° F (537° C)
Control Accuracy.....	+/- 1° F (0.5° C) dependent on total thermal system
Calibration Accuracy	Better than 0.2% of full range
Operating Temperature Range.....	32 to 120 degrees F
Thermocouple.....	Type J, or Type K grounded or ungrounded
External Thermocouple Resistance.....	High impedance potentiometer input allows long distance T/C wiring
Thermocouple Isolation.....	Isolate from ground & supply voltage
Output Drive.....	Internal solid state triac, zero crossing AC pulses
High/Low Temperature Alarm.....	Factory set @ +/- 30 degrees F
Overload Protection.....	Fuses on both sides of AC line
Transient Protection.....	dv/dt and transient pulse suppression
Shorted Triac Heater Protection	Highly sensitive, fast acting relays cut power to load
Power Line Isolation.....	Optically and transformer isolated from AC lines. Isolation voltage greater than 2500 volts
Display.....	Dual LED displays, 3-digit, 7-segment
Manual Mode.....	Maintains constant output power to within 1% of manual set power. Adjustable from 0 to 100%
Soft Start.....	Variable stepped voltage, phase fired
Soft Start Duration.....	5 Minutes (Adjustable) up to 212 degrees F
Soft Start Override Temperature	212° F
Operational Modes.....	Soft Start precedes Auto Mode. Thermocouple break overrides Soft Start and Auto Mode. Reversed or shorted thermocouple overrides Soft Start and Auto Mode. Manual Mode overrides thermocouple break, reversed, shorted thermocouple and Auto Mode. Output is disabled during all fault conditions.
Cold Junction Compensation.....	Automatic, better than 0.02°F/F° (0.01°C/C)
Open Thermocouple Protection.....	Automatically disables power to heater or Average Power Output (APO). Selectable
Reversed Thermocouple Protection.....	Automatically disables power to heater.
Shorted Thermocouple Protection.....	Automatically disables power to heater or Average Power Output (APO). Selectable
Warranty.....	2-Years

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