



# METICOM CIS-1/CIS-2

## Hot-Runner Temperature Controller

### User Guide



## WARRANTY

We warrant that this product will be free from defects in materials and workmanship for a period of two (2) years from the date of shipment. If any such product proves defective during this warranty period, we, at our option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. We shall not be obligated to furnish service under this warranty: a) to repair damage resulting from attempts by personnel other than our representatives to repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; or c) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

**This warranty excludes replacement of fuses, triac, calibration, contact points and damage to the module from the use of improper styles of fuses. (Use only fast-acting fuses.) The maximum allowable fuse rating is 15 amps. Lower ratings may be used for improved protection.**

## SAFETY

Our products have been designed to be safe and simple to operate. As with any electronic equipment, you must observe standard safety procedures to protect both yourself and the equipment.

### To Prevent Injuries:

- To avoid electrical shock or fire hazard, do not apply voltage to a terminal that exceeds the range specified for that terminal.
- To avoid mechanical injury, electrical shock or fire hazard, do not operate this product with covers or panels removed. All unused slots of a main frame must be covered with the appropriately sized blank panels.
- To avoid electrical shock or fire hazard, do not operate this product when wet.
- To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.

### To Prevent Product Damage:

- Do not operate this product from a power source that applies more than the voltages specified.

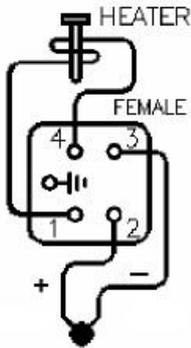
## OPERATION

### 1. Specifications

- ◆ Power requirements: AC85~265V, 50/60Hz
- ◆ Sensor type: J or K thermocouple
- ◆ Setting range: 0°C~450°C (32°F~842°F)
- ◆ Measurement accuracy: ±0.1%F.S
- ◆ Cold-junction compensation accuracy: ±1°C
- ◆ Control Mode: Auto PID or Manual
- ◆ Control Accuracy: ±0.1% of full scale
- ◆ Control Output Device: Triac.
- ◆ Load Capability: 10A /15A per zone, 240Vac
- ◆ Operating Temperature: 0°C~55°C(32°F~131°F)
- ◆ Operating Humidity: 10~80%, non-condensing

- ◆ Storage Temperature: -20°C~70°C (-4°F~158°F)

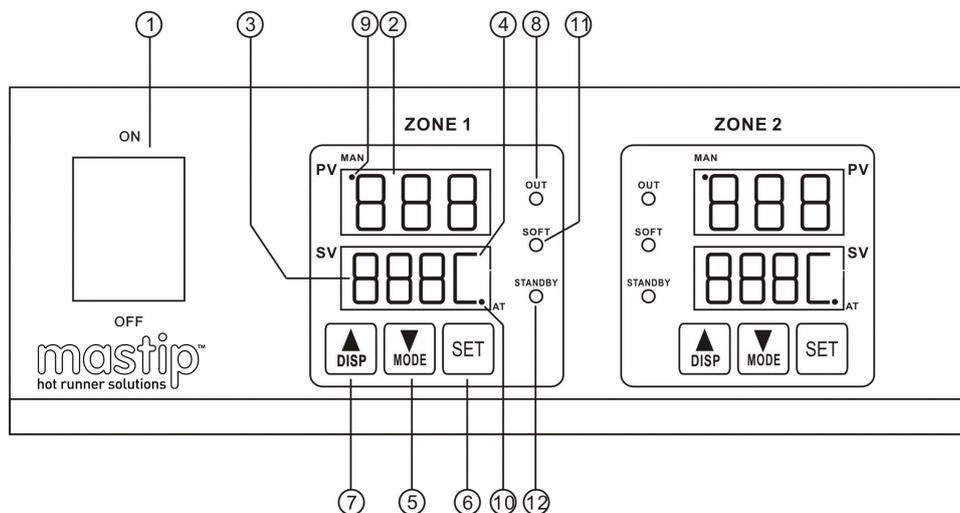
## 2. Default Connector Wiring (5 Pin)



## 3. Features

- ◆ Display unit: 3-digit red LED (PV)  
4-digit green LED (SV)
- ◆ Sensor type can be changed by shortcuts
- ◆ Over-voltage protection
- ◆ Reverse of sensor and heater protection
- ◆ Fuse blowout alarm
- ◆ Triac breakdown alarm
- ◆ Overload alarm
- ◆ Thermocouple open alarm
- ◆ Thermocouple reverse alarm
- ◆ Temperature high alarm
- ◆ Temperature low alarm
- ◆ Heater fault alarm

## 4. Faceplate



- ① **Power Switch:** Turn on or turn off.
- ② **PV:** a) Normal mode: Present value.

- b) Parameter mode: Parameter name.
- c) Alarm mode: Error code about input.

- ③ **SV:** a) Normal mode: Setting value/Power output(%)/Load current (A), selected by DISP key.  
b) Parameter mode: Parameter value.  
c) Alarm mode: Error code about output.
- ④ **Temperature Unit:** Celsius (C) or Fahrenheit (F);  
**Power output:** P (%);  
**Load current:** A (Amps).
- ⑤ **Down/ Mode Key:**  
a) Parameter mode: Used for decrease setting number.  
b) Normal mode: Press it >3s to switch control mode: Normal (Auto, no indicator) \ Standby \ Manual \ AT (Auto Tune)  
**\*\* When switch to AT mode, press SET key in 3s to start auto-tuning, or the controller auto-back to normal mode.**  
c) Turn off / Turn on the zone: Press it with Up key >3s.
- ⑥ **SET Key:** Used for parameter Calling up/Registration.
- ⑦ **Up/Disp Key:**  
a) Parameter mode: Used for increase setting number.  
b) Normal mode: Used for switch SV display (Press it >1s): Setting value /Power output (%) /Load current (Amps).  
c) Alarm mode: Press it to keep buzzer silence until new alarm happens.  
d) Turn off / Turn on the zone: Press it with Down key >3s.
- ⑧ **Out indicator:** Light up when output is on (always-on in phase control mode).
- ⑨ **Manual indicator:**  
Light up when controller is in Manual mode.
- ⑩ **AT indicator:** Light up in AT mode.
- (1) **Soft indicator:** Light up in soft start mode.  
(2) **Standby indicator:** Light up in Standby mode.
- Note:** ②~⑫ are for Zone #1, Zone #2 is same as Zone

## 5. Operating modes

### ◆ Normal mode:

After power on self-test, controller starts to work in normal mode.

PV displays present temperature value, and SV displays setting temperature value (Auto) or power output percent (Manual).

*Note: Auto/Manual control mode, and the output percent of Manual control when power on, see parameter "nSL".*

In this mode, you can

- 1) Change setting temperature value (Auto control): Press **SET** to enter the setting temperature value adjustable state (no temperature unit display), then press **▲**、**▼** to change it and press **SET** to save it.
- 2) Change power output percent setting (Manual control): Press **SET** to enter the setting value adjustable state (no percent symbol "P" display), then press **▲**、**▼** to change it and press **SET** to save it.
- 3) Enter the parameter setting mode: Press **SET** >3sec.
- 4) Switch control mode (Auto-Standby-Manual-AT): Press **MODE** >3sec.  
**\*\* When shift to AT mode, press SET key in 5sec. to start auto-tuning, or the controller auto-back to normal mode.**
- 5) Switch SV display (Setting value / Power output% / Load current): Press **DISP** >1sec.

### ◆ Parameter mode:

By pressing **SET** >3sec. in normal mode, the controller enters the parameter mode.

PV displays parameter name and SV displays the parameter's value. In this mode, you can

- 1) Change the parameter value: Press **▲**、**▼** to modify the value, and press **SET** to save it, then the next parameter and its value are displayed.
- 2) Look over the parameters: Press **SET** to shift the parameters.
- 3) Exit the parameter mode with saving: Press **SET** >3sec.

If there's any operation in 60sec., the controller will exit the parameter mode without saving automatically.

### ◆ Alarm mode:

The controller displays the corresponding fault code.

## 6. Control modes (selected by MODE key)

### ◆ Normal (Auto PID) mode:

This type of control is a "closed-loop" system and requires a thermocouple feedback signal.

The controller's PV displays present temperature value, and SV displays setting temperature value (power output % and load current can be selected by DISP key).

The controller uses a PID algorithm to determine the required output power to hold the present temperature value

equal to setting temperature value.

◆ **Standby mode:**

This type of control operates similar to auto mode. It is a “closed-loop” system requiring a thermocouple feedback signal. The controller’s PV displays present temperature value, and SV displays standby temperature value (70% of setting temperature value; power output % and load current can be selected by DISP key).

The controller uses a PID algorithm to determine the required output power to hold the present temperature value equal to standby temperature value.

◆ **Manual mode:**

This type of control is an “open-loop” system and requires no thermocouple feedback signal. It can be used when thermocouple is failed or without thermocouple in system.

The controller’s PV displays present temperature value, and SV displays power output percent (load current can be selected).

*Note: The output percent initial value, see parameter “A-n” and “nSL”.*

The controller regulates output power according to the power output percent setting.

The setting can be adjusted: Press **SET** to enter the setting value adjustable state (no percent symbol “P” display), then press **▲**、**▼** to change it and press **SET** to save it.

◆ **AT (PID Auto Tune) function:**

This function is for getting the optimal PID value for a system.

It is a “closed-loop” system and requires a thermocouple feedback signal.

Generally, AT function only needs to be executed when PID factory setting cannot meet the system requirements.

After finished auto tuning, the optimal PID value is saved, and the controller returns to normal (auto PID) mode.

When SuP < 900, the controller executes auto-tune function by making 80% of setting value as target.

When SuP > 900, the controller executes auto-tune function by making setting value as target.

## 7. Soft start (dehumidify) function

To avoid humidity making the heater burn out prematurely, the soft start function heats the system slowly to remove excess moisture from the heater.

During soft start, the output power step's up slowly from 0% to the setting (Manual control) or will make the temperature rise to 100°C (212°F) slowly and hold it (Auto control).

When soft start time is over, the controller will return to auto or manual control mode according to the setting.

**Soft start condition:**

- a) The soft start function is on (parameter Sot=1~10).
- b) The process temperature is less than 100°C (212°F).

## 8. PID self-adjusting function (when SuP=453 or 845)

The controller will start to learn the system after power up (process temperature should be less than 90% of set point). Once the controller finishes “learning” the system, it returns to a standard PID control with the heat PID values automatically set.

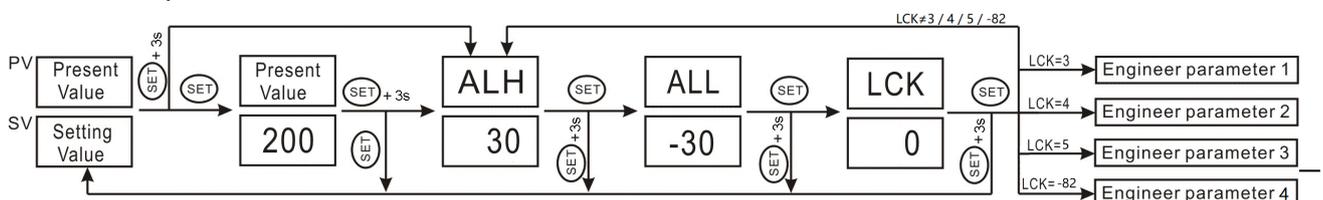
## 9. Turn off Zone #1 or Zone 2#

Pressing Down & Up keys together more than 3sec, you can turn off / turn on the zone.

When you turn on the zone by this mode, the zone will work in auto control mode.

## 10. Parameters

### 10-1. General parameters



When present value > SV+ALH, the buzzer is beeping, and the output is shut off.  
 No alarm when power on or after modifying the setting until new alarm happens.

3) **ALL**: low deviation alarm value.

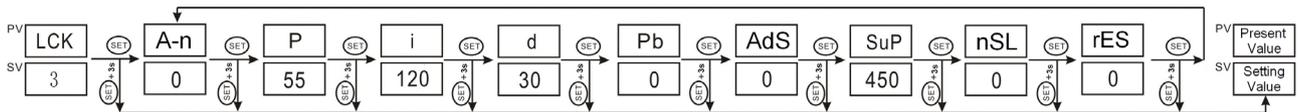
When present value < SV+ALL, the buzzer is beeping.

No alarm when power on or after modifying the setting until new alarm happens.

4) **LCK**: parameter setting lock.

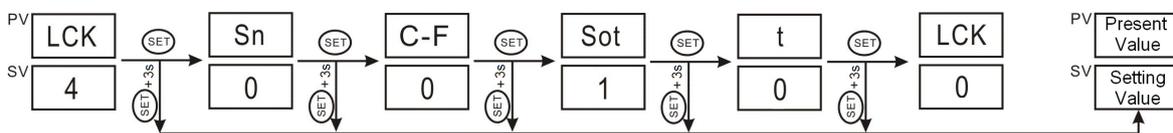
0: Off; 1: On, all parameters cannot be changed; 11: On, all parameters cannot be changed except SV.

**10-2. Engineer parameters 1**



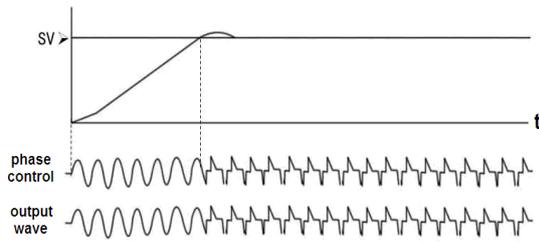
- 1) **A-n**: initial power output percent for manual control, 0~100%, used with parameter nSL.  
 Note: When A-n is effective, its value is auto-refreshed by latest manual output percent.
- 2) **P**: control proportional band, 1~999.
- 3) **i**: integral time, 0~999s.
- 4) **d**: differential time, 0~999s.
- 5) **Pb**: PV bias, -120~120. Sensor correction is made by adding Pb to measured value (PV).
- 6) **AdS**: ambient temperature (internal mainframe) high alarm value, temperature unit is same as parameter C-F setting.  
 When AdS=0, this function is off.
- 7) **SuP**: SV setting upper limit / AT target setting (see AT function) / PID self-adjusting (see Section 7), full scale.  
 SuP ≤ 900, the controller executes auto-tune function by making 80% of setting value as target.  
 SuP > 900, the controller executes auto-tune function by making setting value as target.  
 SuP = 453 or SuP = 845, PID self-adjusting function is on.
- 8) **nSL**: Manual/Auto control mode.  
 0: Auto mode when power on; initial power output is same as auto mode when shift to manual mode.  
 1: Auto mode when power on; initial power output is same as parameter A-n when shift to manual mode.  
 2: Manual mode when power on; initial power output is 0%.  
 3: Manual mode when power on; initial power output is same as parameter A-n.  
 4: If auto mode when power off, same as nSL=1 when power on;  
 If manual mode when power off, same as nSL=3 when power on.
- 9) **rES**: initialize controller.  
 0: Off.  
 1: All parameters are reset to factory setting after power-on.

**10-3. Engineer parameters 2**

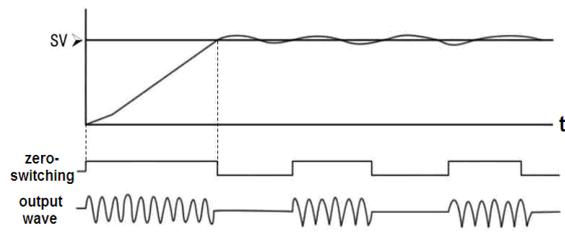


- 1) **Sn**: sensor type.  
 0: J type thermocouple; 1: K type thermocouple.
- 2) **C-F**: temperature unit.  
 0: °C; 1: °F.
- 3) **Sot**: soft start (heater dehumidify) function.  
 0: Off; 1~10: On, soft start time= Sot×80s  
 Notes: The rest of soft start time reduced to one-third if the process temperature reached 100°C(212°F).
- 4) **t**: output control type.  
 0: phase control output;

1~10: zero-switching control output, proportional cycle =  $t \times 1s$

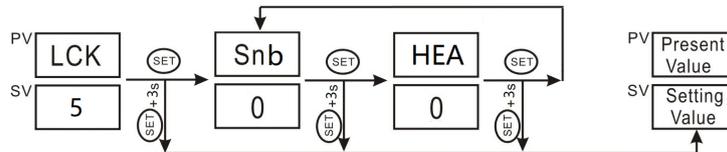


phase control



zero-switching control

### 10-4. Engineer parameters 3



1) **Snb**: diagnostic function for misconnection of heater and thermocouple.

0: Off.

1: Checking the heater after power on, if the controller judges it as a thermocouple, the alarm will sound and cut off output to protect it.

*Notes: It may cause a false alarm if the heater power is large. When identified as false alarm, please set Snb=0.*

2: Reserved

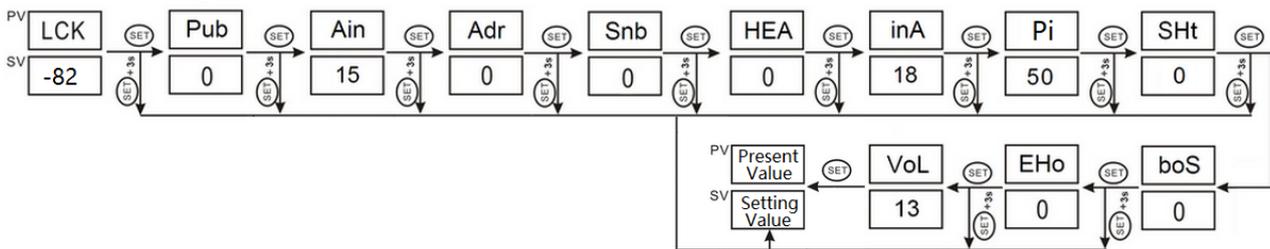
2) **HEA**: diagnostic function for heater (It is used as HEA=1 in manual mode, no matter the setting is) .

0: Off.

1~10: Checking the load current when output is HEA×10%, if the controller judge's the heater is faulty, it will alarm.

Recommended setting is HEA=3~5.

### 10-5. Engineer parameters 4



1) **Pub**: high limit of output percent, 0~99%.

0: Off.

2) **Ain**: rated load current, 1~40A, can be set according to the heater's real power and used to diagnose the heater; when the load current is higher than Ain, the controller will alarm and the current display will flash.

3) **Adr**: Reserved.

4) **Snb**: See 9-4

5) **HEA**: See 9-4

6) **inA**: high limit of load current, 1~40A, can be set according to the heater's real power.

When the load current is higher than inA, the controller will limit it by decrease the power output.

7) **Pi**: Filtering value, used to reduce the influence of interference.

*Notes: The larger the value is, the slower the controller responded. When it is too large, the controller may be out of control.*

8) **SHt**: diagnostic sensitivity for load shorted, 0~100. The greater the value is, the lower the sensitivity.

Recommended setting is SHt=0.

9) **boS**: Reserved.

10) **EHo**: diagnostic function for heat invalid.

0: Off;

1~999: When output percent is 100%, if the temperature does not rise in EHo seconds, the controller will judge heating invalid, alarm and adjust output percent to 0%.

11) **VoL**: over-voltage alarm setting, 6~30.

When the power supply voltage is over about  $(VoL \times 4.5 + 210)$  V, the controller will alarm and cut off output.

Recommended setting is VoL=13 (over-voltage is about 270Vac).

## 11. Default of parameters

Parameter Name	Default	Parameter Name	Default	Parameter Name	Default
Setting Value	200	SuP	450	Snb	1
ALH	30	nSL	0	HEA	4
ALL	-30	rEs	0	inA	18
LCK	0	Sn	0	Pi	50
A-n	0	C-F	0	Sht	0
P	55	Sot	2	boS	0
i	120	t	1	EHo	0
d	30	Pub	0	VoL	13
Pb	0	Ain	15		
Ads	0	Adr	0		

## 12. Alarm messages

Alarm Code	Related Parameter	Cut-off Output	Troubles	Solution
S E r	Snb	Yes	Misconnection of thermocouple & heater	Check the wiring, make Snb=0 if the connection is right.
E r H	---	Yes	Thermocouple open	Check the sensor, or switch to manual control mode.
E r L	---	Yes	Thermocouple inverse	
H E A	HEA	No	Heater fault	Check the heater.
t r S	---	Yes	Triac error	Replace the triac.
A L H	ALH	Yes	High deviation alarm	Check the controller & the sensor.
A L I	ALL	No	Low deviation alarm	Check the system thermal insulation, or switch to manual control mode.
Current in SV flash	Ain	No	Overload	Check the load.
S H t	Sht	Yes	Short load	Check the load.
H E r	EHo	Yes	Thermocouple is out of its position	Check the thermocouple.
H o t	AdS	No	Ambient temperature is too high	Check the fans of mainframe.
H H H	VoL	Yes	Over voltage	Check the power supply.
F u S	---	Yes	Fuse Blowout	Check the load and replace the fuse.