

# HOT RUNNER TEMPERATURE CONTROLLER

## USER'S MANUAL

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EH 300S



**TEMP CARD**

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Ver. 3.51

Please read the instructions carefully before any operation

## 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.

This warranty shall not apply to any defect, failure or damage caused by improper use 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

The 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.

### DANGER

- To avoid electrical shock or fire hazard, do not apply voltage to a terminal that exceeds the range specified for that terminal.
- 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.

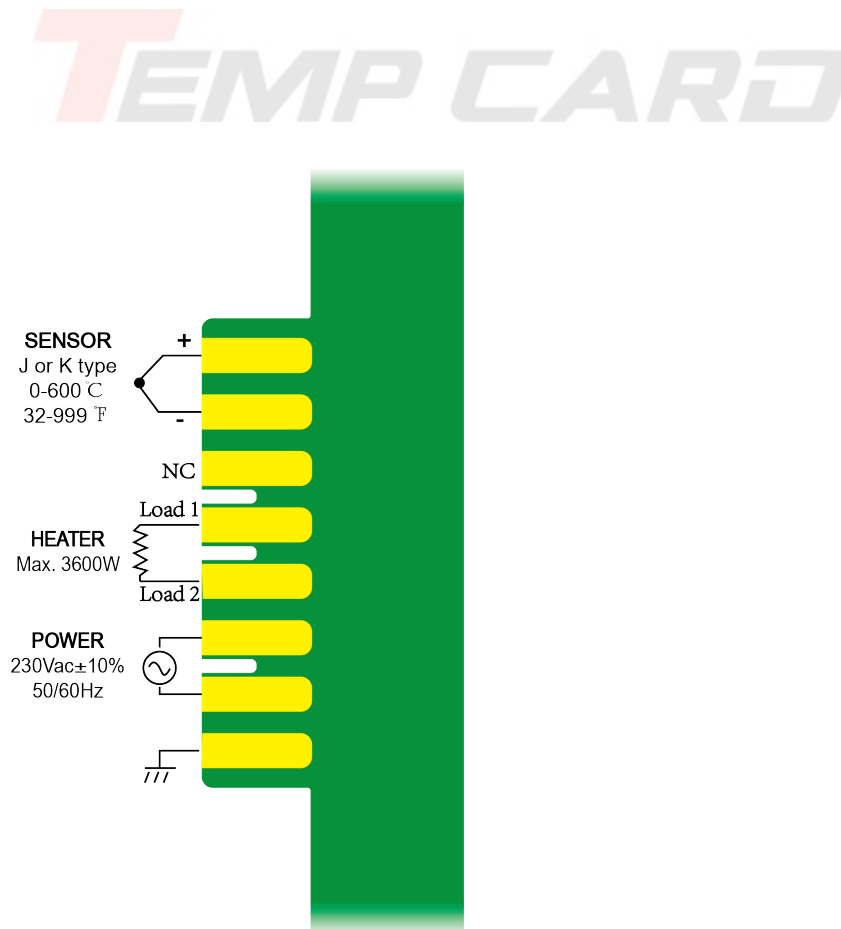
### WARNING

- Do not operate this product from a power source that applies more than the voltage specified.
- Do not operate this product from an injection signal input that mismatches the setting.
- Do not operate this product from a solenoid valve that its power source specified mismatches the gate output type setting.

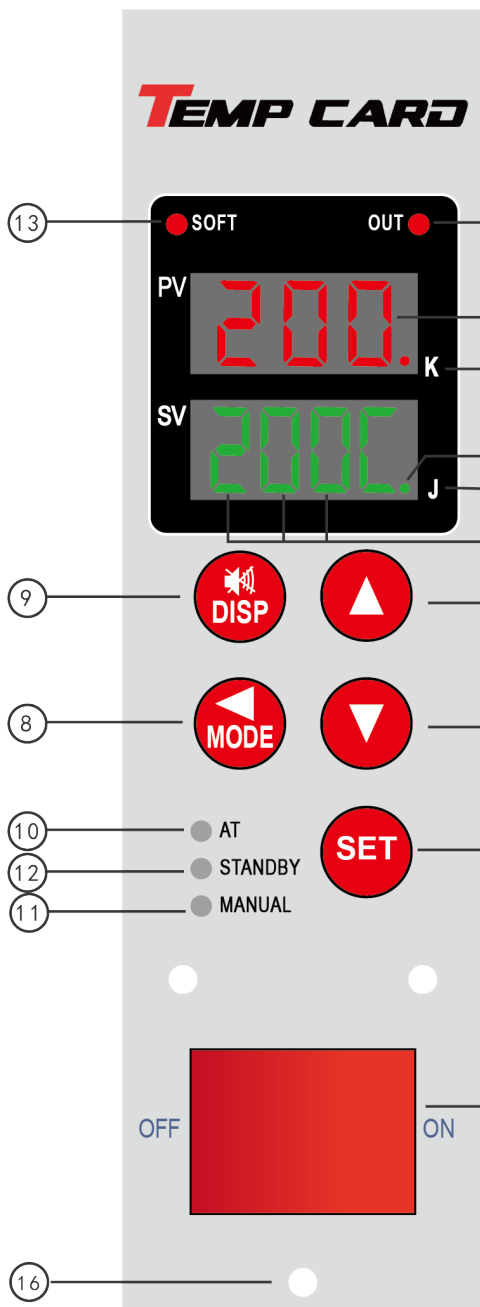
## SPECIFICATIONS

- Power requirements: AC85~250V, 50/60Hz
- Sensor type: J or K thermocouple
- Setting range: 0°C ~450°C (32 °F ~842 °F )
- Measurement accuracy:  $\pm 0.25\%$ F.S.
- Cold-junction compensation accuracy:  $\pm 1^{\circ}\text{C}$
- Control mode: Auto PID or Manual
- Control accuracy:  $\pm 0.1\%$ F.S.
- Control output device: Triac
- Load capability: 15A, 50W~1650W(110V), 100W~3600W(240V)
- Operating temperature: 0°C ~55°C (32 °F ~131 °F )
- Operating humidity: 10~85%, non-condensing
- Storage temperature: -20°C ~70°C (-4 °F ~158 °F )

## WIRING



## FACEPLATE



- 1) Power Switch: On/Off.
- 2) PV: i) Normal mode: Present value.  
ii) Parameter mode: Parameter name  
iii) Alarm mode: Error code.
- 3) SV: i) Normal mode: Target value/Power output (%) / Load current (A).  
ii) Parameter mode: Parameter value.  
iii) Alarm mode: Error code
- 4) Display Unit: C- °C , F- °F , P-%, A-Amps
- 5) Down Key: Used to decrease setting number
- 6) Up Key: Used to increase setting number
- 7) SET Key: Used to parameter Calling up/Registration
- 8) Mode Key:
  - i) Normal mode: Used for switch control mode (Press it >3s):
  - \* New control mode will be active after 5s.
  - \*When switch to AT mode, press SET key in 5s to start.
  - ii) Soft start process: Press it to terminate soft start (when boS=1).
  - iii) Press it to start the BOOST function (when boS=1).
- 9) DISP Key:
  - i) Press it to switch SV display: Setting value/Power output (%) / Load current (A)
  - ii) Press it to keep silence when the buzzer is beeping.
  - iii) Press it >9s to change sensor type
- 10) AT indicator: Light up in AT mode
- 11) Manual indicator: Light up in Manual mode.
- 12) Standby indicator: Light up in Standby mode.
- 13) Soft indicator: Light up if in soft-start process
- 14) Out indicator: Light up if is not in soft-start process
- 15) Sensor type indicator: K- T.C K, J- T.C J
- 16) Mounting hole

## OPERATION MODE

### 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 control) or power output percent (Manual control).

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):

Mode A (parameter SVP=0): Press SET to enter target value adjustable state (parameter SV), press UP/DOWN to change and press SET for saving.

Mode B (parameter SVP=1): Press UP/DOWN to change settings, new setting will be active after 3s.

2) Change power output percent (Manual control): Press UP/DOWN to increase or decrease

3) Enter the parameter 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. Otherwise the controller auto-back to normal mode.

5) Switch SV display (Setting value / power output% / load current): Press DISP.

6) End soft start process: Press MODE (when boS=1).

7) Activate BOOST function: Press MODE (when boS=1, and soft start process end).

8) Change sensor type: Press DISP > 9sec.

### Parameter mode

By pressing SET > 1sec. in normal mode, the controller enters the parameter mode.

It displays parameter name and its value. In this mode, you can

1) Change the parameter value: Press  $\Delta$  、  $\nabla$  、  $<$  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 faulty code.

## 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 displays present temperature value and setting temperature value.

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 is similar to auto mode. It is a "closed-loop" system and requires 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.

Standby mode can be activated or stopped by an external signal (when Std's number in the hundreds place  $\neq 0$ ).

## CONTROL MODES (selected by MODE key)

### 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 setting. The setting can be adjusted by pressing.

### AT (PID Auto Tune) function

This function is for getting the optimal PID value in some system.

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

Generally, AT function is only been executed when PID factory setting cannot meet the system requirements.

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

When  $SuP \leq 900$ , 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.

## SOFT START (dehumidify) function

To avoid the humidity make the heater burn out, the soft start function could heat slowly to make dehumidify action when turn on the power.

During soft start time, the output power step up slowly from 0% to the setting (Manual control) or to 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).

Terminate soft start process:

The soft start process can be terminated by pressing MODE key (when boS=1).

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

The controller will start to learn the system after power up (the 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 as a result of self-adjusting.

## Boost (speed up heating) function (when boS=1)

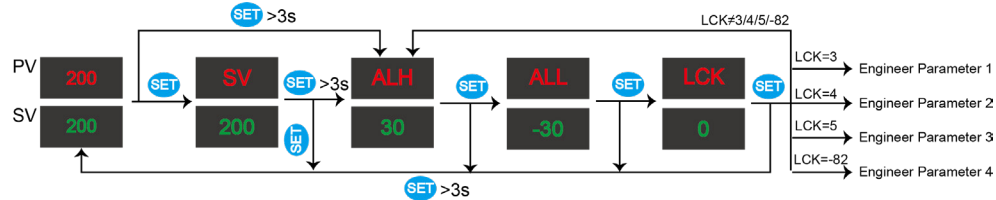
In normal (auto PID) control mode (soft start process is over or terminated), press MODE key can activate the boost function.

For the next 15 seconds (or until you press the MODE key again, whichever is sooner), 20% is added to the controller output (100% output or parameter Pub limited maximum).

Normal indicator flashes.

## PARAMETERS

### •General parameter flow chart



#### 1) Setting Value: full scale.

Notes : It can be set by pressing  $\wedge$  /  $\vee$  /  $<$  directly and the modified value will become effective after 3sec., or press SET to make it effective at once.

#### 2) ALH: high deviation alarm value.

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.

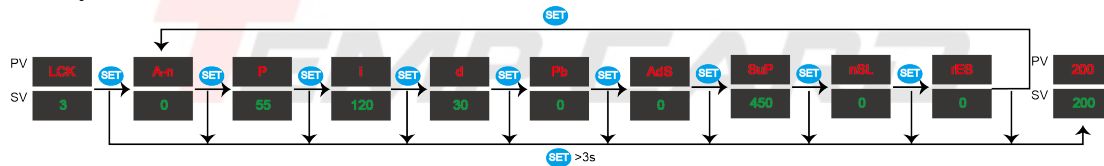
When present value  $<$  SV+ALL, the buzzer is beeping.

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 setting value.

### •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 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.

$SuP \leq 900$ , 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%.

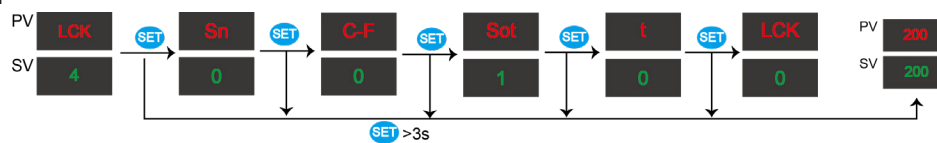
3: Manual mode when power on; initial power output is same as parameter A-n.

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.

## •Engineer parameters 2



1) Sn: sensor Type.

0: J type thermocouple; 1: K type thermocouple.

Notes: It can be changed quickly by press DISP key >9s

2) C-F: temperature unit.

0: °C ; 1: °F .

3) Sot: soft start (heater dehumidify) function.

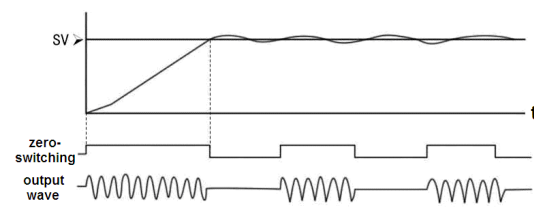
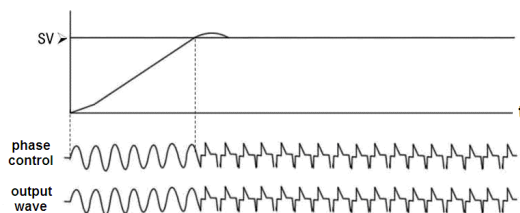
0: Off; 1~10: On, soft start time= Sot×80s

Notes : The rest of soft start time reduced to one-third if the process temperature reached 100°C (212 °F ).

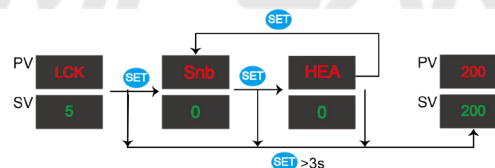
4) t: output control type.

0: phase control output;

1~10: zero-switching control output, proportional cycle = t×1s



## •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 judge it as thermocouple, alarm 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

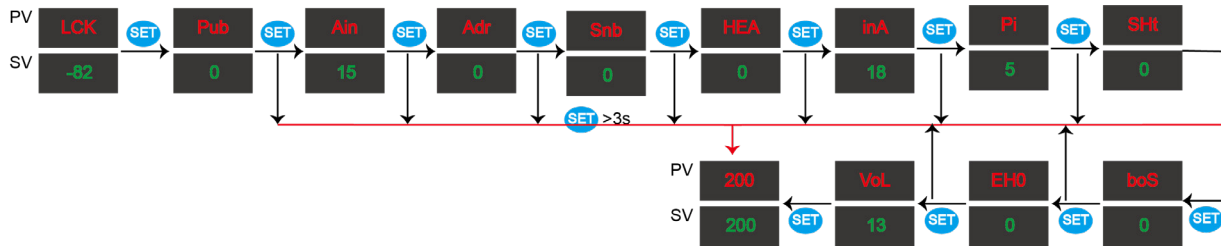
2) HEA: diagnostic function for heater ( It is used as HEA=1 in manual mode, no matter the setting is ) .

0: Off.

1~10: Checking the load current when output is HEA×10%, if the controller judge the heater fault, it will alarm. Recommended setting is HEA=3~5.



## •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 Engineer parameters 3

5) HEA: See Engineer parameters 3

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.

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: soft-start process termination & Boost function.

0: Disable; 1: Enable.

10) EH0: diagnostic function for heat invalid.

0: Off;

1~999: When output percent is 100%, if the temperature does not rise in EH0 seconds, the controller will judge heating invalid, show alarm code "HER" 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).

## DEFAULT PARAMETERS

Parameter	Default	Parameter	Default	Parameter	Default	Parameter	Default
SV	200	Pb	0	t	1	SHt	0
ALH	30	AdS	0	Pub	0	boS	0
ALL	-30	Sup	450	Ain	15	EHo	0
LCK	0	nSL	0	Adr	0	VoL	13
A-n	0	rES	0	Snb	1		
p	55	Sn	0	HEA	4		
i	120	C-F	0	inA	18		
d	30	Sot	2	Pi	5		

## ERROR MESSAGES

Alarm Code	Related Parameter	Cut off output	Troubles	Solution
SEr	Snb	Y	Misconnection of T.C & heater	Check the wiring, make Snb=0 if connector is right
ErH	-----	Y	Thermocouple open	Check the sensor, or switch to manual control mode
ErL	-----	Y	Thermocouple inverse	
HEA	HEA	N	Heater fault	Check the heater
trS	-----	Y	Triac error	Replace triac
ALH	ALH	Y	High deviation alarm	Check the controller & the sensor
ALL	ALL	N	Low deviation alarm	Check the system thermal insulation, or switch to manual control mode
Current in SV flash	Ain	N	Over load	Check the load
SHt	SHt	Y	Short load	Check the load
Hot	AdS	N	Ambient temp. is too high	Check M.F fans
HHH	VoL	Y	Over voltage	Check power supply
HEr	EHo	Y	T.C is out of its position	Check T.C
FuS	-----	Y	Fuse blowout	Check the load and replace fuse