

HRTC-B

Hot-Runner Temperature Control Module

USER'S MANUAL



For avoid wrong operation to make human injured or machine damage, please read this instruction carefully before use the instrument.

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. 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:

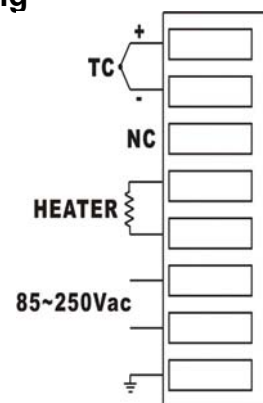
- Do not operate this product from a power source that applies more than the voltages specified.

OPERATIONS

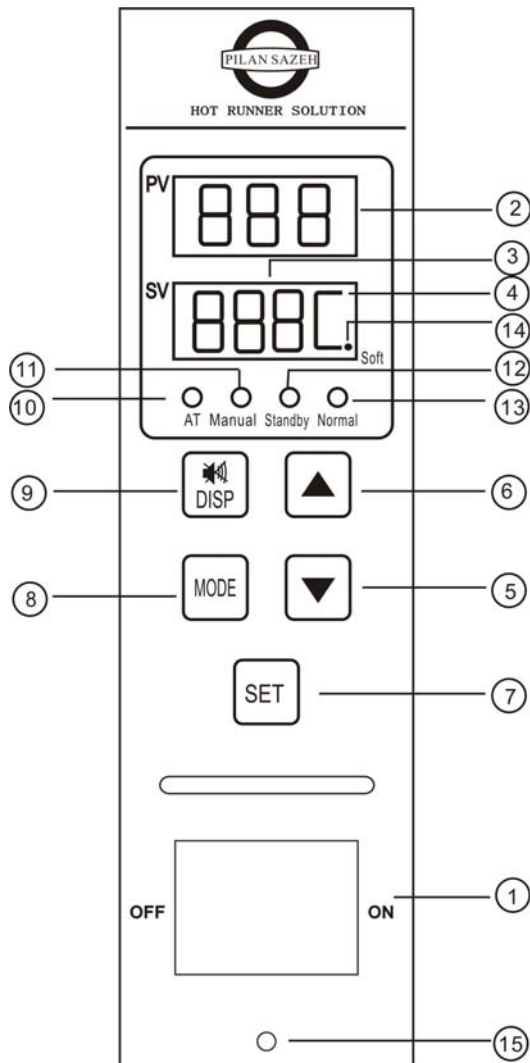
1. Specifications

- ◆ Power requirements: AC85~265V, 50/60Hz
- ◆ Sensor type: J or K thermocouple
- ◆ Setting range: 0°C~450°C (32°F~842°F)
- ◆ Control Accuracy: $\pm 0.25\%$ of full scale
- ◆ Control Mode: Auto PID or Manual
- ◆ 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: 10~80%, non-condensing
- ◆ Storage Temperature: -20°C~70°C (-4°F~158°F)

2. Wiring



3. Faceplate



- ① **Power Switch:** Turn on or turn off.
- ② **PV:**
 - a) Normal mode: Present value.
 - b) Parameter mode: Parameter name.
 - c) Power output mode: Present value.
 - d) Alarm mode: Error code about sensor.
- ③ **SV:**
 - a) Normal mode: Setting value.
 - b) Parameter mode: Parameter value.
 - c) Power output mode: “u”+ power output (%)
 - d) Alarm mode: Error code about triac or load.
- ④ **Temperature Unit:** Celsius (C) or Fahrenheit (F).
- ⑤ **Down Key:** Used to decrease setting number.
- ⑥ **Up Key:** Used to increase setting number.
- ⑦ **SET Key:** Used for parameter Calling up/Registration.
- ⑧ **Mode Key:**
 - a) Parameter mode: Used for select adjustable digit.
 - b) Normal mode:
 - 1) Press it to start the BOOST function (when SuP>900)
 - 2) Press it >3sec. to switch control mode (when unlocked):
Normal (Auto) \ Standby \ Manual \ AT (Auto Tune).
 - ** When shift to AT mode, press SET key in 3s to start auto-tuning, or the controller auto-back to normal mode.**
 - 3) Press it to terminate soft start process (when SuP>900).
- ⑨ **Disp Key:**
 - a) Press it for more than 3sec. to switch display mode:
Normal mode: PV and SV display;
Power output mode: PV and power output (%) display
Control mode locked: disable to switch control mode.
 - b) Press it to keep silence when the buzzer is beeping.
- ⑩ **AT indicator:** Light up when controller is in AT mode.
- ⑪ **Manual indicator:** Light up when controller is in Manual mode.
- ⑫ **Standby indicator:** Light up when controller is in Standby mode.
- ⑬ **Normal indicator:** Light up when controller is in Normal mode.
When the BOOST function is activated, the indicator flashes.
- ⑭ **Soft indicator:** Light up when controller is in soft start process.
- ⑮ **Mounting hole .**

4. Operating modes

■ Normal mode:

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

It displays present temperature value and setting temperature value (Auto control) or setting power output percent (Manual control). In this mode, you can

- 1) Change setting temperature value (Auto control and SVP=2) or setting power output percent (Manual control): Press \wedge 、 \vee 、**MODE** to modify the setting, then press **SET** to make it effective.
- 2) Change setting temperature value (Auto control): Press **SET** to enter the parameter SV, then press \wedge 、 \vee 、**MODE** to change its value and press **SET** to save it.
- 3) Enter the parameter mode: Press **SET** >3s.
- 4) End soft start process: Press **MODE** when Sup>900.
- 5) Activate BOOST function: Press **MODE** when Sup>900 and soft start ended.

6) Switch control mode (when unlocked): Press **MODE** >3s.

**** When shift to AT mode, press SET key in 5s to start auto-tuning, or the controller auto-back to normal mode.**

7) Switch setting value or power output (%) display, and lock / unlock control mode: Press **DISP** >3s.

■ **Parameter mode:**

By pressing **SET** >1s 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 \wedge 、 \vee 、**MODE** 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** >3s.

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

■ **Alarm mode:**

The controller displays the corresponding alarm code.

5. Control modes

■ **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 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 standby temperature value ($SV \times (StS-P)\%$).

After the standby time (Stb-t) is over, the controller returns to the PID mode automatically.

■ **Manual mode:**

This type of control is an “open-loop” system and requires no thermocouple feedback signal.

The controller displays present temperature value and setting power output percent.

The controller regulates output power according to the setting. The setting can be adjusted by pressing \wedge 、 \vee 、**MODE** keys.

■ **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.

Notes: To start PID auto-tuning function, present temperature value should be lower than setting temperature value.

6. Soft start (dehumidify) function

To avoid the humidity make the heater burn out, the soft start function could output a lower current (**by phase control type**) to make dehumidify action when turn on the power.

During soft start time, the output power step up from 0% to 30%.

When 100°C (212°F) has been achieved or soft start time is over, the controller will return to normal (auto) control mode.

Soft start condition:

- a) The controller is set for Normal (Auto) Control mode.
- b) The soft start function is on (parameter SoF=0).
- c) The process temperature is less than 100°C (212°F).

Terminate soft start process (when sup>900) :

The soft start process can be terminated by pressing **MODE** key.

7. Boost (speed up heating) function (SuP>900, boost can be activated.):

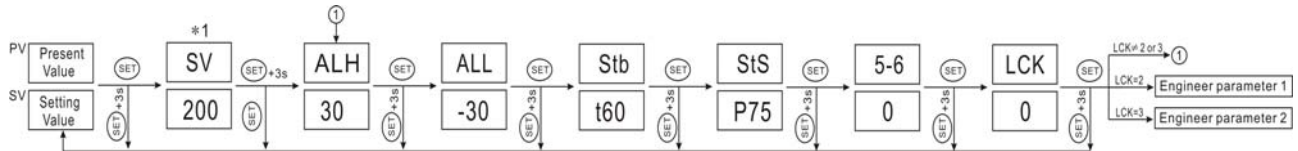
In normal (auto PID) control mode, press **MODE** key to start the boost function.

Normal indicator flashes.

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 maximum).

8. Parameters

8-1. General parameter flow chart



*1: When engineer parameter SVP = 0, "PV" & "SV" display as flow chart, and the setting value can be set by $\wedge \vee$ MODE.

When SVP = 1, "PV" displays present value, "SV" displays flashing setting value and the setting value can be set by $\wedge \vee$ MODE.

When SVP = 2, the setting value can be set by $\wedge \vee$ MODE directly when the controller is in normal mode.

1) SV: setting value.

range: 0 ~ Sup (engineer parameter 2).

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) Stb-t: standby time.

range: 0~600 minutes.

5) StS-p: standby temperature (the percentage of setting value).

Example:

if

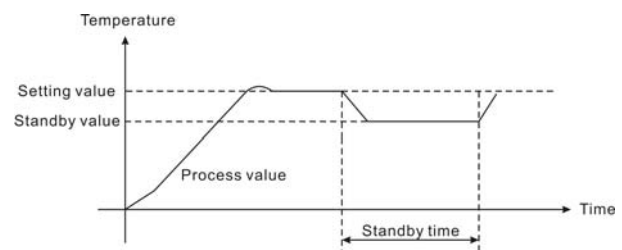
SV=200°C, Stb-t=60, StS-P=75,

then

standby time is 60 minutes,

standby temperature is 150°C

(i.e. 200°C×75%).



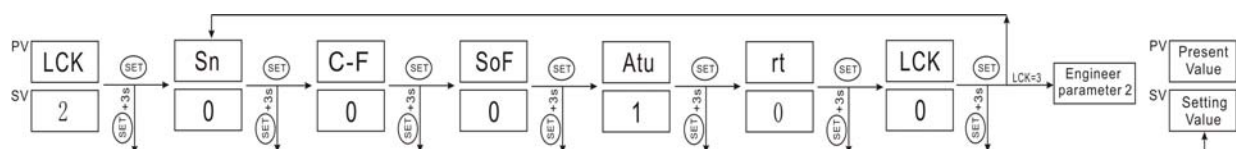
6) 5-6: power frequency.

0: 50Hz; 1: 60Hz.

7) LCK: parameter setting lock.

0: Off; 1: On, all parameters cannot be changed; 111: On, all parameters cannot be changed except target setting.

8-2. Engineer parameter 1 flow chart



1) Sn: sensor Type.

0: J type thermocouple; 1: K type thermocouple. 2: E type thermocouple.

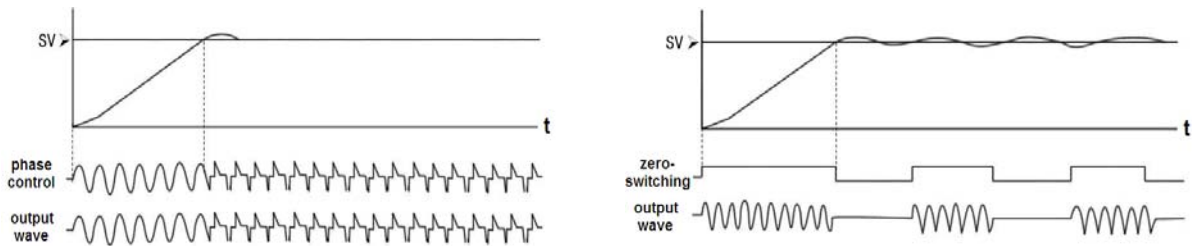
2) C-F: temperature unit.

0: °C; 1: °F.

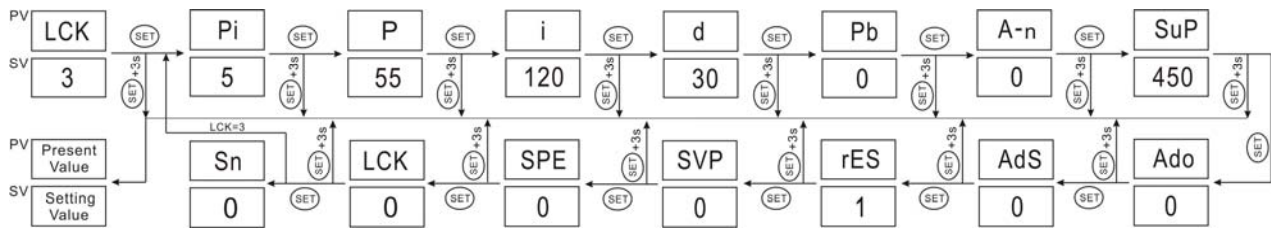
3) SoF: soft start (heater dehumidify) function.

0: On (soft start time see parameter "rt"); 1: Off.

- 4) Atu: PID Auto-tuning / Manual regulator mode.
- 0: Auto-tuning at setting value;
 - 1: Auto-tuning at 80% of setting value;
 - 2: Fast Auto-tuning after power on;
 - 3: Manual regulator mode 1 (0% output when power on);
 - 4: Manual regulator mode 2 (the output percentage is the last one of manual output when power on);
 - *** When use the controller as a manual regulator (Atu = 3 or 4), soft start function should be off (SoF=1).
 - 5: The control mode (auto or manual) when power on depends on the mode before power off, and the output percentage at manual mode is the last one of manual output.
- 5) rt: output control type / soft start time / proportion cycle.
- 0: phase control output;
 - soft start time = auto (40s ~ 133s), when SoF=0;
 - 1~10: zero-switching control output & proportion cycle = rt×1s;
 - soft start time = auto(40s ~133s) + rt×20s, when SoF=0

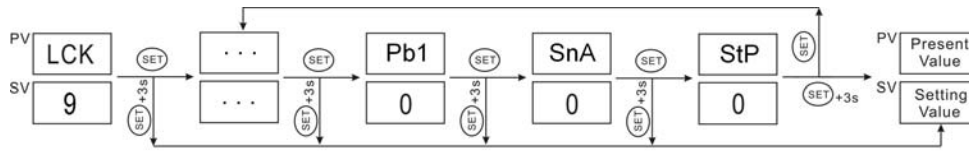


8-3. Engineer parameter 2 flow chart



- 1) Pi: filtering value. Used to reduce the influence of interference.
Note: The larger the value is, the slower the controller responded. When it is too large, the controller may be out of control.
- 2) P: proportional band, 1 to span.
- 3) i: integral time, 1~3600s.
- 4) d: differential time, 1~3600s.
- 5) Pb: PV bias. Sensor correction is made by adding Pb to measured value.
- 6) A-n: power output percent when auto to manual mode.
0: 0% 1: the last one of manual output.
- 7) SuP: SV upper limit.
>600: soft indicator flashes when controller is in soft-start process.
>900: enable to activate boost & terminate soft-start process.
- 8) Ado: time to judge heating invalid, 30s+Ado×60s.
- 9) AdS: cold-junction (internal mainframe) temperature high alarm value (this function is off when AdS=0).
- 10) rES: initialize controller.
0::heating invalid alarm is on
1: heating invalid alarm is off
2: All parameters recovery to default value after power on.
- 11) SVP: setting value modification mode.
0: Press **SET** key to enter general parameter setting mode, controller displays parameter “SV” and its value.
1: Press **SET** key to enter general parameter setting mode, controller displays PV and setting value flashes.
2: Press **∧ ∨ MODE** keys to adjust the setting value and press “SET” key to make it effective.
- 12) SPE: speed of temperature rise.
0: auto n (n>0): n (°C/min) or n (°F/min)

8-4. Administrator parameter flow chart



1) Pb1: PV bias. Sensor correction is made by adding Pb to measured value.

2) SnA: diagnostic function for misconnection of heater and thermocouple.

0: Off.

1: Checking the thermocouple after power on, if the controller judge it as heater, alarm and not start output; otherwise, checking the heater, if the controller judge it as thermocouple, alarm and cut off output to protect it.

Notes: It may cause a false alarm if thermocouple's cable is long or the heater power is large.

When identified as false alarm, please set SnA=0.

3) StP: soft-start (dehumidify) time extended

0: Off.

1~10: In soft start process, when the temperature over 80°C, the controller will hold the soft-start time, and start the extended time (StP×20s, and 90°C is the target in this period). At the end of extended time, the controller will continue the soft start timing.

9. Default of parameters

Parameter Name	Default	Parameter Name	Default	Parameter Name	Default
SV	200	SoF	0	SuP	450
ALH	30	Atu	1	Ado	0
ALL	-30	rt	1	AdS	0
Stb-t	60	Pi	5	rES	1
StS-P	75	P	55	SVP	0
5-6	0	i	120	SPE	0
LCK	0	d	30	Pb1	0
Sn	0	Pb	0	SnA	0
C-F	0	A-n	0	StP	0

10. Error message

Error Code	Troubles	Solution
HHHc	Over voltage	Check the connection of power supply
HEAt	Heating invalid	Check the sensor, the sensor's position or the heater.
ErH	Thermocouple open	Check the sensor, or switch to manual control mode.
ErL	Thermocouple inverse	
SErr	Thermocouple Error	Check the connection of sensor & heater.
SHrt	Over load	Check the heater.
AL-H	High deviation alarm	Check the controller.
AL-L	Low deviation alarm	Check the system thermal insulation, or switch to manual control mode.