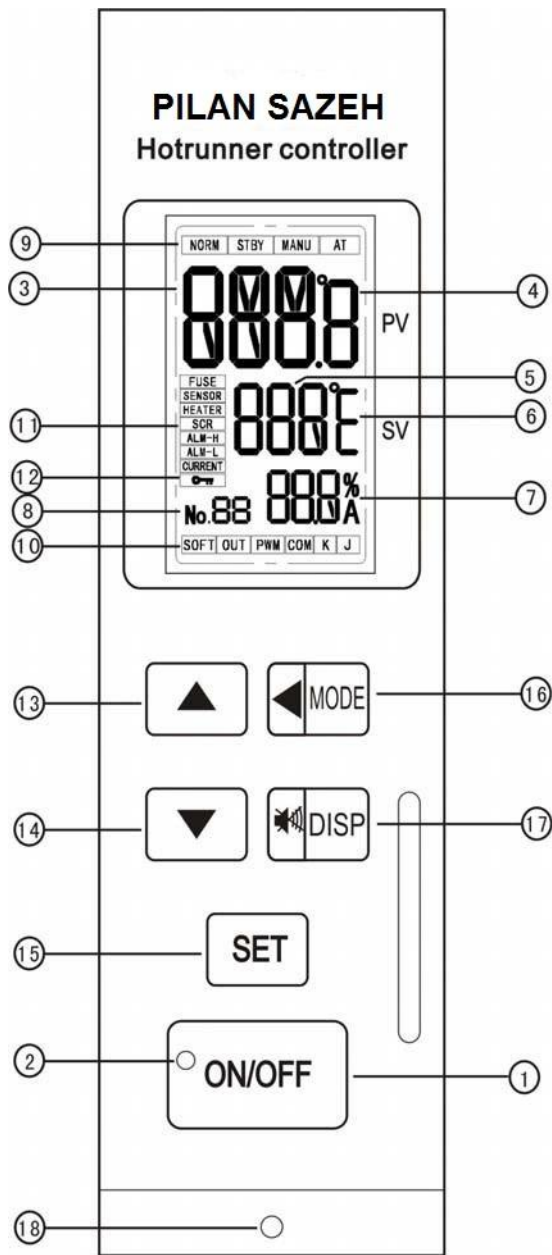# HRTC-G
Hot-Runner Temperature Control Module

USER'S MANUAL

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

1. Faceplate

① **ON/OFF key**: Turn on or turn off the module.　　② **Power indicator**:

　　a) Flashing when module is powered up but in off state.

　　b) Light up when module is turned on. ③ **Display unit of present value**:

a) Normal mode: Present temperature value.

b) Parameter mode: Parameter name.

④ **Temperature unit** or **decimal digit of present value**:

　　a) Temperature unit (℃/℉) when resolution is 1(℃/℉).

　　b) Decimal digit when resolution is 0.1(℃/℉).

　　　　　* Selected by parameter "Poi".

⑤ **Display unit of setting value**:

　　a) Normal mode: Setting temperature value (Auto control).

　　　　　　　Setting power output percent (Manual control)

　　b) Parameter mode: Parameter value. ⑥ **Temperature unit**: ℃/℉.

　　　　　* Selected by parameter "C-F".

⑦ **Display unit of load current** (Amps) or **power output** (%) .

　　　　　* Selected by **DISP** key.

⑧ **Display unit of zone number**. * Set by parameter "Adr".

⑨ **Display area of control mode**:

　　⊙ **NORM**: Auto PID mode.

　　⊙ **STBY**: Standby mode.

　　⊙ **MANU**: Manual mode.

　　　⊙ **AT**: PID auto tune.

⑩ **Display area of working status**:

⊙ **SOFT**: Soft start.

　　　　* Selected by parameter "Sot".

⊙ **OUT**: Output state when output control type is zero-switching.

⊙ **PWM**: Output control type is phase control.

* zero-switching or phase control is selected by parameter "t".

⊙ **COM**: Communication status (reserved) ⊙　**K**: Sensor is K type thermocouple.

⊙ **J**: Sensor is J type thermocouple.

　　　* K or J is selected by parameter "Sn".

⑮ **SET key**: Used for parameter Calling up/Registration.

⑯ **MODE key**:

　　a) Parameter mode: Used for select adjustable digit.

　　b) Normal mode: Press it >1sec. to switch control mode:

　　　Normal (Auto) \ Standby \ Manual \ AT (Auto Tune).

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

　　c) Soft start process: Press it to end soft start.

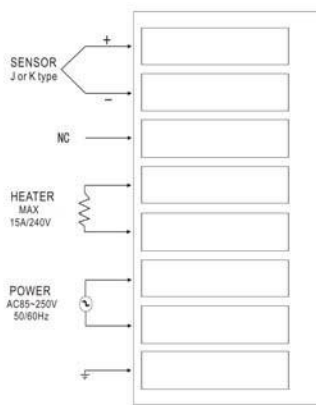　　d) Press **SET & MODE** key to enter parameter "Sn".

⑰ **DISP key**:

　　a) Press it >1sec. to switch load current / power output percent display.

　　b) Press it to keep silence when the buzzer is beeping.

⑪ **Display area of alarms**:

　　⊙ **FUSE**: Fuse blown out.

　　⊙ **SENSOR**: Sensor error.

　　⊙ **HEATER**: Heater fault.

　　⊙ **SCR**: Triac breakdown.

　　⊙ **ALM-H**: High deviation alarm. ⊙ **ALM-L**: Low deviation alarm..

　　⊙ **CURRENT**: Over load.

⑫ **Parameters' Lock**: Parameters cannot be changed.
　　* Selected by parameter "Lck".

⑬ **UP key**: Used to increase setting number.

⑭ **DOWN key**: Used to decrease setting number.

⒅ **Mounting hole** .

2. Wiring

3. Specifications

SENSOR
J or K type

+

−

NC

HEATER
MAX
15A/240V

POWER
AC85~250V
50/60Hz

◆ Power requirements: AC85~265V, 50/60Hz

◆ Sensor type: J or K thermocouple

◆ Setting range: 0℃~450℃ (32℉~842℉)

◆ Control Accuracy: ±0.25% of full scale

◆ Control Mode: Auto PID or Manual

◆ Control Output Device: Triac.

◆ Load Capability: 15A / 240Vac

◆ Operating Temperature: 0℃~55℃(32℉~131℉)

◆ Operating Humidity: 10~80%, non-condensing

◆ Storage Temperature: -20℃~70℃ (-4℉~158℉)

4．Operating description

4-1. Operating modes

④ **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) Press ↑ ↓ ← to change setting temperature value (Auto control) or setting power output percent (Manual control), and the modified value will become effective after 5sec., or press SET to make it effective at once.

2) Press SET to enter the setting temperature value adjustable state (flashing), then press ↑ ↓ ← to change it and press SET to save it.

3) Press SET >1sec. to enter the parameter mode.

4) Press MODE to end soft start process.

5) Press MODE >1sec. to switch control mode.

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

6) Press DISP >1sec. to switch load current (Amps) or power output (%) display.

7) Press SET & MODE to enter the parameter "Sn".

④ **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) Press ↑ ↓ ← to change the parameter value, and press SET to save it, then the next parameter and its value are displayed.

2) Press SET to enter the next parameter.

3) Press SET >1sec. to exit the parameter mode with saving.

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

4-2. Control modes

④ **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. ④ **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 standby temperature value (75% of 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. ④ **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 ↑ ↓ ← keys.

④ **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.*

4-3. 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.

Notes：The soft start process can be ended by pressing MODE key.

Soft start condition:

a) The controller is set for Normal (Auto) Control mode.

b) The process temperature is less than 100°C (212°F).

4-4. General parameters
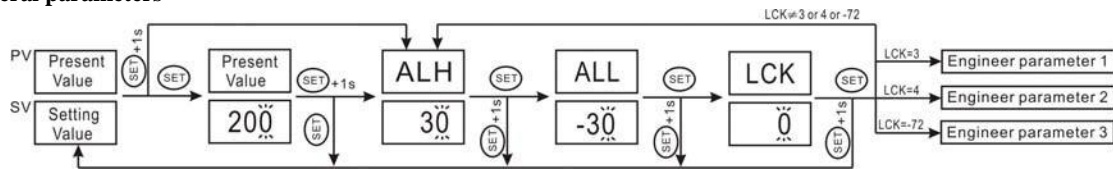
1) Setting Value: 0 ~ Sup (engineer parameter 2).

Notes：It can be set by pressing ↑ ↓ ← directly and the modified value will become effective after 5sec., or press SET to make it effective at once.

2) ALH: high deviation alarm value.

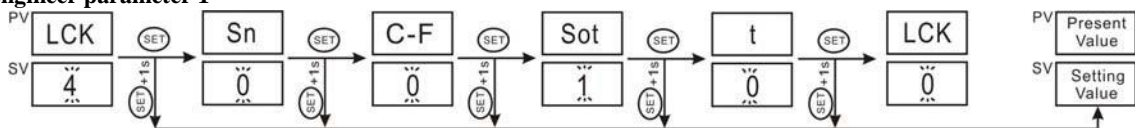When present value > SV+ALH, the buzzer is beeping and the output is shut off.

3) ALL: low deviation alarm value.

When present value < SV+ALL, the buzzer is beeping. It initializes when the process temperature reaches setpoint.

4) LCK: parameter setting lock.

0: Off;   1: On, parameters cannot be changed.

4-5. Engineer parameter 1

1) Sn: sensor Type.

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

Notes：Press SET & MODE can enter the parameter directly in normal mode.
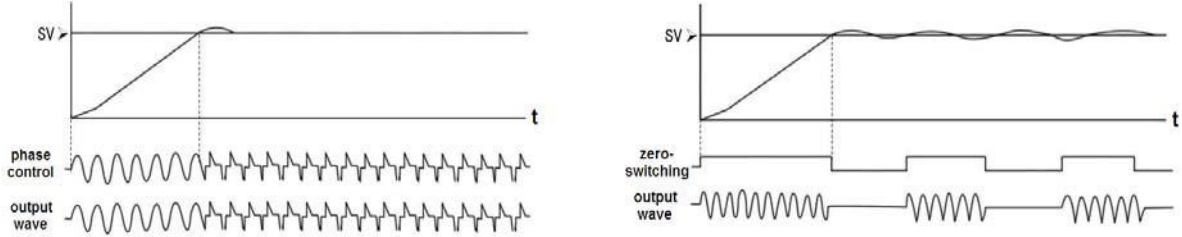
2) C-F: temperature unit.
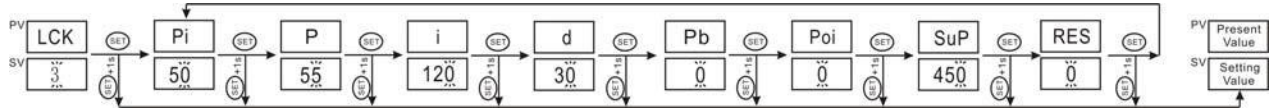
0: ℃;   1: ℉.

3) Sot: soft start (heater dehumidify) function.   0: Off;   1~10: On, soft start time= Sot×28s   4) t: output control type.

0: phase control output;

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

4-6. Engineer parameter 2

1) 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.

2) P: control 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 (PV).

6) Poi: Present temperature display resolution.

0: 1 unit   1: 0.1unit.

7) SuP: SV high limit.

8) RES: initialize controller.

0: Off.

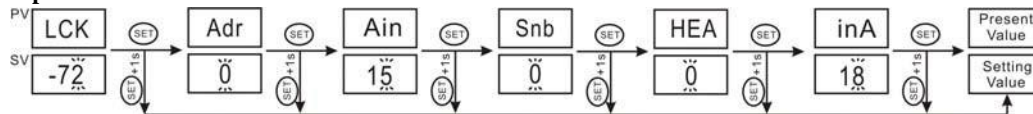1: All parameters recovery to default value after re-power on.

2: Reserved.

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 (RES =3 or 4), soft start function should be off (Sot=0)*

4-7. Engineer parameter 3

1) Adr: zone number displayed.

2) Ain: rated load current, 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) Snb: diagnostic function for misconnection of heater and thermocouple.

0: Off.

1: Checking the heater's resistance after power on, if it is less than 14Ω, the controller will judge it as thermocouple, alarm and cut off output to protect it.

2: Checking the thermocouple's resistance after power on, if it is more than 55Ω, the controller will judge it as heater, alarm and not start output; otherwise, the controller will check the heater's resistance same as Snb=1.

3: After finish the checking of Snb=2, checking the temperature rise, if the temperature doesn't rise in a reasonable period, the controller will judge the thermocouple as faulted, alarm and cut off output.

4) HEA: heating invalid alarm; 0: Off.

      1~10: Checking the temperature rise at 10%~100% power output.

5) inA: high limit of load current. when the load current is higher than inA, the controller will limit it by decrease the power output.

5. Alarm message

Alarm Code	Present Value	Current Value	Troubles	Solution
FUSE	Temperature		Fuse Blowout	Check the load and replace the fuse.
SENSOR	Temperature		Misconnection of thermocouple & heater	Check the wiring, make Snb=0 if the connection is right.
	ErH		Thermocouple open	Check the sensor, or switch to manual control mode.
	ErL		Thermocouple inverse	
HEATER	Temperature		Heating invalid	Check the sensor and heater.
SCR	Temperature		Triac error	Replace the triac.
ALM-H	Temperature		High deviation alarm	Check the controller.
ALM-L	Temperature		Low deviation alarm	Check the system thermal insulation, or switch to manual control mode.
CURRENT	Temperature	flash	Over load	Check the load.

6. Default of parameters

Parameter Name	Default	Parameter Name	Default	Parameter Name	Default
Setting Value	200	Pi	50	Adr	0
ALH	30	P	55	AiN	15
ALL	-30	i	120	Snb	0
LCK	0	d	30	HEA	0
Sn	0	Pb	0	inA	18
C-F	0	Poi	0		
Sot	1	SuP	450		
t	0	RES	0		

7. Safety Warning

⚠ **The high voltage required operating this temperature controller and the high temperatures created by its operation can cause serious injury or death, and presents a potential fire hazard.**

    Installation and operation of this equipment should only be performed by qualified individuals and all directions should be carefully followed. Caution should be taken to guarantee that only the rated voltage is applied to this unit and appropriate limiting control devices should be used for safe operation.

        DISCONNECT THE MAIN POWER FROM THE CONTROL SYSTEM BEFORE SERVICING!
        Hazardous voltage is present on the inside of the controller and mainframe system.

    Standard safety procedures should be followed. Additionally, the following guidelines will help prevent personal injury and product damage:
⌘ **Do not apply a voltage greater than that specified on the product nameplates.** ⌘ **Do not operate controllers or mainframe systems without appropriate supply ground connections.** ⌘ **Do not insert or remove controllers into mainframe systems with power applied.**

⌘ **Do not operate any controller or mainframe system without all covers in place and properly secured.**

⌘ **Do not operate this product when wet or in a damp environment. ⌘ Do not operate this product in an explosive atmosphere.**