

TC5A Hot Runner Temperature Controller

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Version: Ver.A (English)



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1. Safety Regulations and Attentions

In order to use the hot runner temperature controller TC5A safely, and takes its full functions. Before use TC5A, please read this manual detailedly. Observe all the warnings and operation instruction in the manual.

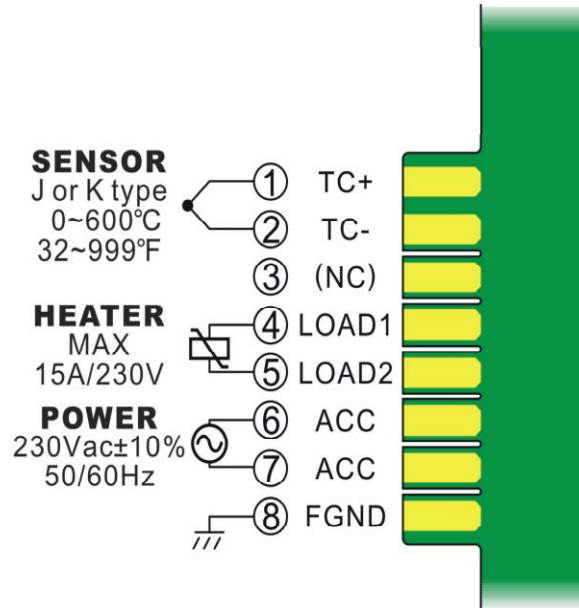
Attentions before use:

1. It should be installed on water-level floor and in well ventilated location. Avoid installing it in damp, dusty and high-temperature environment. Otherwise, it would get into trouble easily or even lead to fire by miss-operation.
2. Before TC5A connected to power supply, must pay attention to the mode of the power supply, the voltage and the power capacity. Any power input is not conform to the regulation would damage the system badly. If there is no reaction after main power supply turned on, must cut off the supply at once and check the power distribution is correct or not.
3. Before TC5A main power supply turned on, must confirm the system has connected to ground or not. Grounding without confirmation would lead to personal electric shock or equipment damage.
4. Before TC5A connected to mould cables, must confirm the connection method of them is matched or not. TC5A connection method is not conform to the mould would lead to personal electric shock and equipment damage.
5. Check operation condition of TC5A heat dissipation blower at any time. If there's dissipation problem by blower blocking, must clean up and make through it at any time.
6. Non-professional mustn't modify or transform the controlling system. Any incorrect modification would lead to personal electric shock, human injured, equipment damage or the fire etc. and other dangers.
7. During TC5A operation, if there's smoke, spark, unusual smell or noise, must cut off the main power at once and call for the professionals to check it. Before the troubleshooting, don't turn on the main power.

8. TC5A only can be repaired by professionals. Turn off the main power supply before the repairing, disassemble TC5A with power supply on would lead to personal electric shock easily.

2. Installation

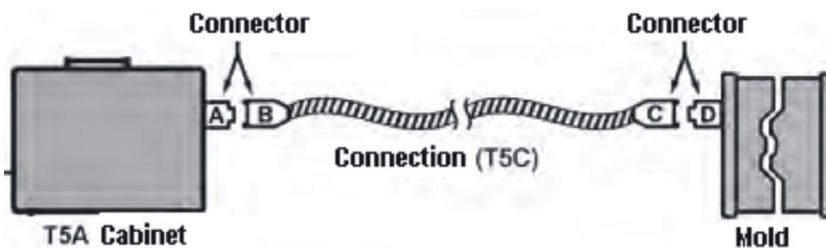
2.1 Wiring Description



Picture 2-1: Wiring Description

2.2 Connection Description

Connection method

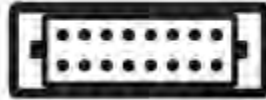


Picture 2-2: Connection Method

Connector type



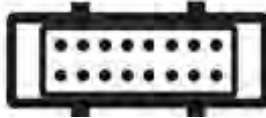
a: single hook



b: single button



c: dual hook



d: dual button

Table 2-1: Wiring method

Connector		A	B	C	D
Name		Housing	Housing	Housing	Housing
		T5E	T5F	T5E	T5F
Type		Socket	Plug	Socket	Plug
combination	1*	a	b	b	A
	2	c	d	d	C
	3	d	c	c	d

*standard equipment. **T5A01 can only use the 1st type.

3. General Description



Read this manual carefully before operation to prevent damage of the machine or personal injuries.

Temperature controller, being used in hot runner system, is a device which maintains the required temperature value for the hot runner via. PID control. It consists of temperature control card, circuit breaker, cabinet, fan, terminal blocks and cables. The temperature control card in the cabinet controls the temperature of the hot runner and the temperature accuracy of system. Self-protection and fault tolerance depends on the function of the temperature control card. At present, temperature controller is necessary in the application of hot runner molds.



Temperature Controller

3.1 Characteristic Description

- LCD module display
- One-key start / stop the heat preservation function (optional)
- Set buzzle function inside
- It possesses over-voltage protection, to avoid miss-wiring leading to module burned.
- Heater with short circuit protection (optional)
- Heater break detection
- TRIAC short circuit protection (optional)
- Thermocouple break, reverse detection
- Fuse break detection
- Current, output percentage, display function (current is optional)
- Dual optional selection of touch-output (phase/ zero)
- Intelligent (SOFT START) function
- Thermocouple fault transform to manual output function.
- Automatic/ manual control function
- PID automatic temperature control
- Output percentage limitation setup
- Thermocouple display conversion (J/K)
- Temperature display conversion (°C/°F)
- Six optional alarm output
- Temperature range: K TYPE: 0~600°C (0~999°F) / J TYPE: 0~600°C (0~999°F)
- RS485 communication function: ASCII & RTU mode (optional)

3.2 Specification

Module Group

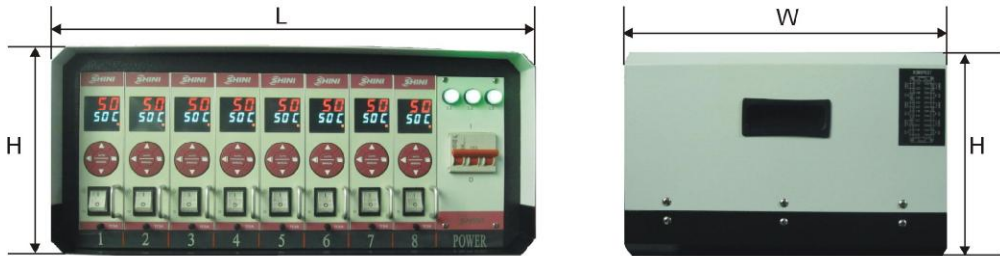
1. Power supply input: 230Vac \pm 10%, 50/60Hz
2. Power consumption: 230Vac: 3W
3. Power output: 3450W, 230Vac/15A
4. Thermocouple input: J/K type
5. Temperature control range: 0~600°C/ 32~999
6. Control accuracy: \pm 0.25%FS
7. Measurement accuracy: \pm 0.25%FS
8. Storage temperature: -20~70°C/ -4~158
9. Working temperature: -10~50°C/14~122
10. Working humidity: 0~80%RH (no condensation)
11. Output method: zero/phase
12. Fuse: rapid ceramic type 250Vac/20A 30mm
13. Detection function: current/ fuse break/ TRAIC short circuit
14. Communication mode: RS-485(standard MODBUS)optional
15. Communication speed: 9600/19200/38400/57600/115200

3.2.1 Machine Dimension

Table 3-1: Machine Dimension

Cabinet	L(mm)	W(mm)	H(mm)
1 zone	100	280	220
2 zones	230	350	250
4 zones	340	350	250
6 zones	440	350	250
8 zones	540	350	250
12 zones	400	350	440
24 zones	750	350	440
30 zones	630	350	700
36 zones	730	350 </td <td>700</td>	700

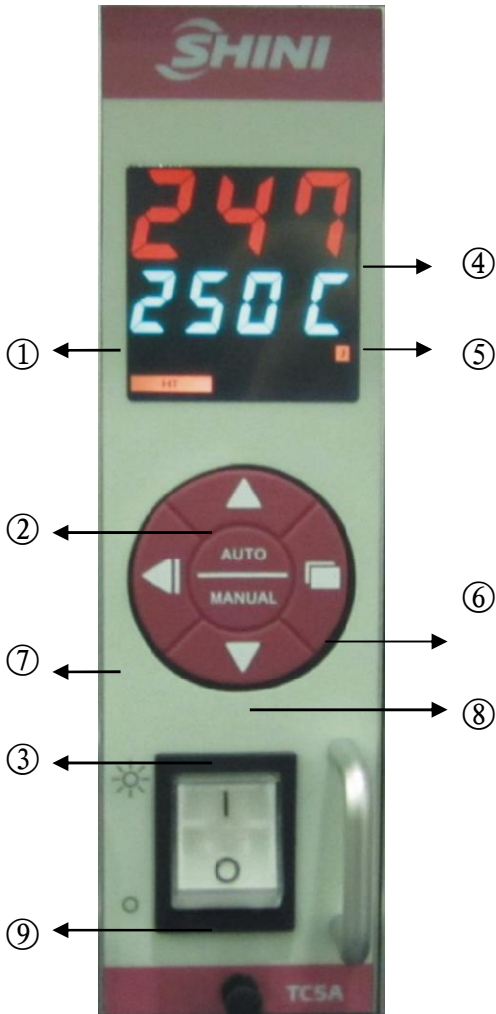
3.2.2 Durline Drawing



Picture 3-1: Durline Drawing

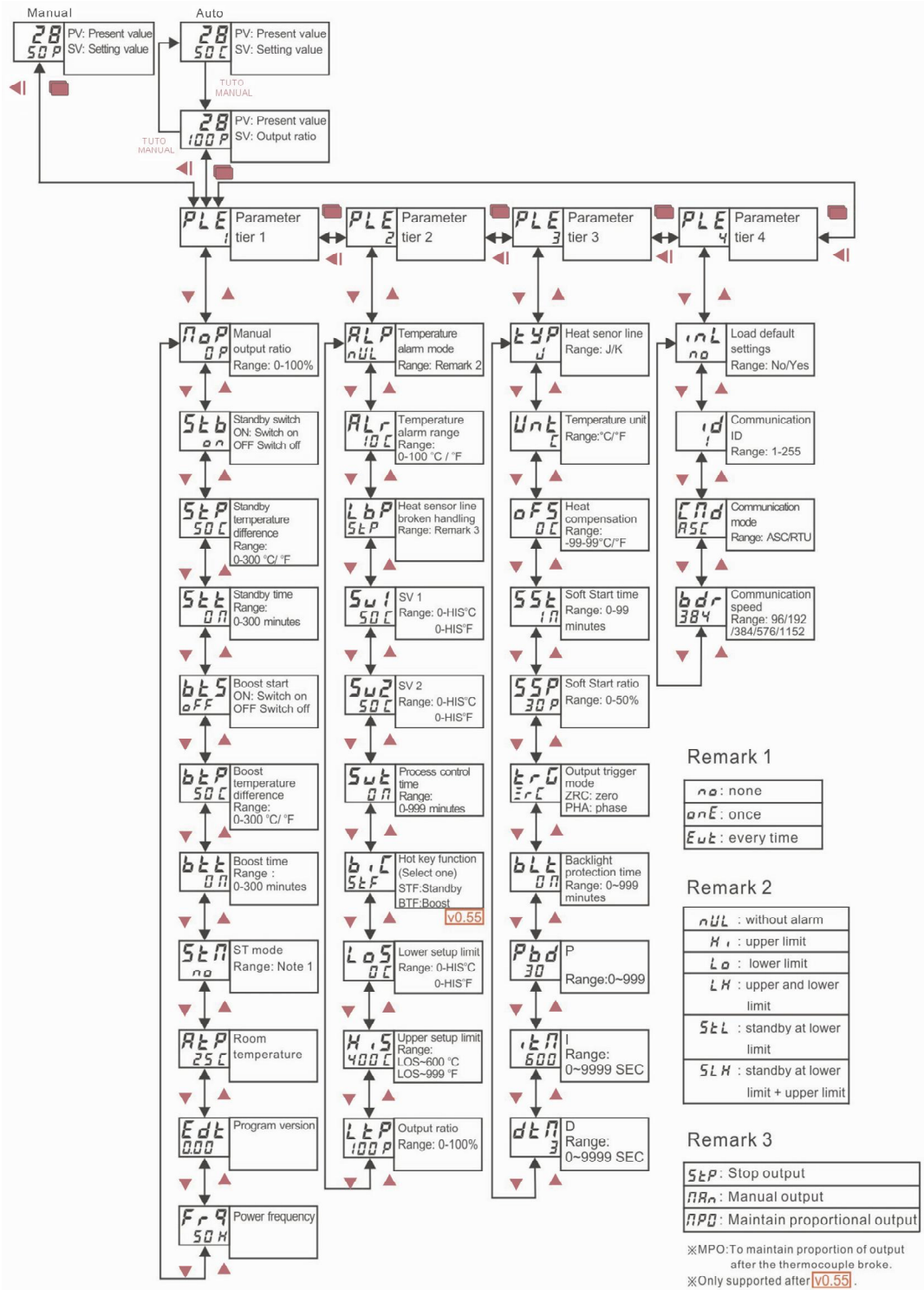
4. Operation

4.1 Control Panel




- ① setup/output proportion/current value
- ② add value
- ③ lessen value
- ④ present value
- ⑤ unit
- ⑥ F key (function key)
- ⑦ setup key
- ⑧ automatic/manual/setup value/output proportion/current switch key
- ⑨ power switch

4.2 Parameter Flow Chart



4.3 Function Description

4.3.1 Control Mode

1. Automatic control mode: the controller operates PID automatic temperature control according to set value.
2. Manual control mode: in some condition (e.g. thermocouple break), the controller can adjust the output proportion to keep the temperature.
3. Switch method: 

4.3.2 (SOFT START) Dehumidification Function

In order to prevent heater from getting the large current caused by damp, and lead to heater burnt. Use SOFT START(dehumidification) function can perform low current dehumidification operation to the heater and protect it.

1. SOFT START condition: must set the output proportion (SST) and operation time (SSP). Set present temperature value lower than 60°C/140°F, and ensure the manual output & automatic calculus (PID) functions are closed. Re-start system after the setups. If there' s no need SOFT START, set SST value to zero, the next start would without SLOW START .

2. SOFT START stops on midway: 

4.3.3 Thermocouple Troubleshooting

1. Hot runner model has lots of zones as its precise structure and temperature control, so in the production there would be thermocouple fault some times (e.g. the nozzle). In this case, production would be affected by machine stopped & the repairing.
2. TC5A provides with circuit-opening control mode. When there's thermocouple fault, it can switch to manual output mode automatically. (It needs to set manual output proportion ahead of time.) In this way, TC5A can keep up the production without machine stopped, and then process the repairing after the production is finished.

4.3.4 Heat Preservation Function

When machine needs to stop temporarily, and if the plastics long term in runner with high temperature, they would approximate to deterioration. In this case, utilizing the function can lower the temperature to keep material's quality. The functions possess one-key start/close & separately start/ close function:

1. One-key whole system start / close switch method:
(optional)(the primary module is closest to left side)



2. Separately start/close function:



4.3.5 Heating Function

When TC5A sprue works but it blocked, this function could higher the point temperature temporarily and melting blocking plastic to get out the blocking.

4.3.6 Overcurrent Protection Specification (optional)

1. normal status: actual current $\leq 15A$
2. fault status: When actual current $>17A$, stop output process and start alarm.

4.3.7 PID Control Automatic Operation Regulation Specification

1. ST: In order to make controller to figure out heating system PID optimum value, PID automatic calculus function could be operated before controller initial utilization or heating system transformation. After the PID automatic calculus function stops, controller will save the newest PID value in the memory and will take the newest PID value as the optimum temperature value in control.
2. Automatically regulate PID value start condition: set temperature (SV)-present temperature (PV) must above $30^{\circ}C$ or $86^{\circ}F$. Present temperature (PV)- inside the room below $30^{\circ}C$ or $86^{\circ}F$. Adjustment can be processed only above two points both are met.
3. AT: As for special circumstance, when system may not start ST operation or temperature in vibration, AT would take the advantage of temperature stop heating when it get to SV value , figures out the rest temperature up & down curve to get P.I.D value.

4.3.8 RS-485 Communication Function (optional)

1. Communication mode: Modbus ASCII and RTU mode (original value: ASCII)
2. Communication baud: 9600/19200/38400/57600/115200 (original value: ASCII)
3. Communication ID: 1-250 (original value: 1)

5. Alarm Message and Troubleshooting

5.1 Alarm Message Instruction

Messages	Marks	Instruction
---	---	thermocouple break
TCr	TCR	thermocouple reverse
TCS	TCS	thermocouple reverse
HTS	HTS	heater short circuit
LPA	LPA	return-circuit fault control
oLd	OLD	output overload
FSb	FSB	Fuse circuit-opening
EEP	EEP	EEPROM trouble
Hi	HI	up limit alarm
Lo	LO	lower limit alarm

5.2 Simple Troubleshooting

Issues	Check Items
1. No operation after power supply turned on.	<ul style="list-style-type: none"> ● TC5A has installed in correct place or not. ● Power supply wiring is regular or not. ● Main power supply is in trouble or not. ● Power supply wiring (method) is correct or not. ● TC5A is in trouble or not.
2. Display "---"	<ul style="list-style-type: none"> ● TC5A has installed in correct place or not. ● Thermocouple break or not. ● Extension line is loose, broken or not. ● TC5A is in trouble or not.
3. Display "000"	<ul style="list-style-type: none"> ● Thermocouple reverse or not. ● TC5A is in trouble or not.
4. No normal temperature or unstable temperature displaying after power supply turned on.	<ul style="list-style-type: none"> ● Same as item No.2 ● Electric leakage is there or not. ● Grounding is complete or not.
5. Unstable temperature control	<ul style="list-style-type: none"> ● Please operate PID automatic calculus according to 4.3.7.
6. After normal operation, temperature can't rise.	<ul style="list-style-type: none"> ● TC5A has installed in correct place or not. ● Extension line is loose, broken or not ● Heater is in trouble or not. ● TC5A (TRIAC) is in trouble or not.
7. Thermocouple break / reverse alarm.	<ul style="list-style-type: none"> ● Please check it is broken or reversed.
8. Thermocouple short circuit alarm.	<ul style="list-style-type: none"> ● Thermocouple configuration place is regular or not. ● Thermocouple is short circuit or not.
9. Return-circuit fault control alarm	<ul style="list-style-type: none"> ● Heater break or not. ● Wiring is loose or not. ● Control module is in trouble or not (TRIAC) ● Change the control module.
10. Fuse break alarm	<ul style="list-style-type: none"> ● Change the fuse.
11. Communication break	<ul style="list-style-type: none"> ● Control module is loose or not. ● Control module is in trouble or not. ● Control module has communication function or not. ● ID setup is correct or not.