## Plug and Play Temperature Controller



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#### 1. Safety Precautions

- Ensure the product using within the specification. • Do not touch the terminals at least while power is being supplied. Doing so may occasionally result in injury due to
- electric shock. • Do not allow pieces of metal, wire clippings, or fine metallic shaving or filings from installation to enter the product. Doing so may occasionally result in electric
- shock, fire, or malfunction. Do not use the product where subject to flammable or
- explosive gas. Otherwise, injury from explosion may occasionally occur. • Never disassemble, modify or repair the product or touch
- any of the internal parts. Electric Shock, fire, or malfunction may occasionally occur. If the output relays are used over their life expectancy, contact fusing or burning may occasionally occur. Always
- consider the application conditions and use the output relays within their rated load and electrical life expectancy.

#### 2. Overview

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#### What is ITC-310T-B?

5.5 Setup Flow Chart

ITC-310T-B is a dual-relay outlet thermostat with programmable timer function, which can be set to automatically control 12 periods timer stages with different temperatures. This ITC-310T-B can be mainly used to control temperature during fermentation process of beer and wine brewing, also widely used in home brewing, aquarium, pet breeding, hatching, barbecue, boiler temperature control, geothermal temperature control, heating pump constant temperature cycle, strain culture fermentation, seed sprouting, electric heating, electric oven, over-temperature protection and automatic temperature control system of all kinds of electrical equipment, etc.

This plug-n-play product with dual relay, can be connected with refrigeration and heating equipment easily to realize ideal temperature control. It's equipped with dual LED display, and offers display options of Centigrade and Fahrenheit, enabling more humanized temperature control. With large output power 1,200W (110V) /2,200W (220V), it's suitable for most applications

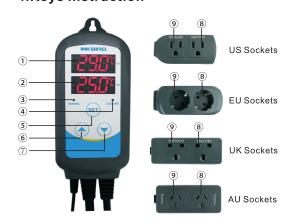
### Main features

- Programmable, 12 temperatures in 12 periods of time;
- Constantly control 12 stages of temperatures by setting
- Wide timer setting range: 1~999(min/hr), 1~90(days);
- Can be set single or cycle control mode;
- Plug and play design, easy to use; Dual relays, heating and cooling outputs;
- F / C temperature display;
- Easy to set, PV and SV dual display screen; • User calibration;
- Delay protection for refrigeration control; • Can be set high and low temperature alarms;
- Alarm when over-temperature and sensor error.

#### 3. Specification

Temperature Control Range	-50~120 °C / -58~248 ° F
Temperature Resolution	0.1 ° C / 0.1° F
Temperature Accuracy	±1°C (-50 ~ 70°C) / ±1°F (-58 ~ 160° F
Temperature Control Mode	On/Off Control, Heating and Cooling
Input Power	100~240VAC, 50Hz/60Hz
Temperature Control Output	Max. 10A, 100V ~240V AC
Buzzer Alarm	High and Low Temperature Alarm
Timing Accuracy	24hour±1.7s
Cycle Setting	1-999 times cycle, or 00 infinte cycle
Sensor Type	NTC sensor (Including)
Sensor Length	2m / 6.56ft
	Heating (10A, 100-240VAC)
Relay Contact Capacity	Cooling (10A, 100-240VAC)
Input Power Cable Length	1.5m ( 5ft )
Dimension (Main Body)	140x68x33mm (5.5x2.7x1.3 inch)
Storage	Temperature: -20~ 60 ° C / -4~ 140 ° F
Storage	Humidity: 20~85% (No Condensate )
Ambient Temperature	-30~ 75 ° C / -22~ 167 ° F
Warranty	1 Year
a.ray	2

#### 4. Keys Instruction



① PV: Process Value, under running mode, display current temperature; under setting mode, display menu code

② SV: Setting Value. under running mode, display setting

temperature; under setting mode, display setting valu ③ Heating Indicator Lamp: when the light is on, start

④ Cooling indicator Lamp: when the light is on, start refrigeration; when the light is flickering, the compressor is under delay protection.

(5) **SET Button**: Press and hold SET button for 3 seconds to enter setting menu, then press and hold SET button for more than 3 seconds to quit and save the settings during the setting process; Under running mode, if TR=1 or TR=2, three continuously press the SET button in one second will start the operation at the stage set in SST(if SST set to 5, will

(6) UP Button: When TR=1 or TR=2, press the UP button then power on will start the operation at the first stage S01; Under running mode, when TR=1 or TR=2, press this button can view the left working timeof current stage; Under setting mode, press this UP button can increase the setting value.

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DOWN Button: Press the DOWN button then power on, all the settings will revert back to default; Under running mode, when TR=1 or TR=2, press this button can view the specific current working stage; Under setting mode, press this DOWN button can decrease the setting value

® Heating Device Socket: for heating output.

8.1 Technical Assistance ......

8.2 Warranty

#### 

5. Key Operation Instruction

5.1 Revert back to default Press the " $\blacktriangledown$ " button then power on, all the settings will revert back to default.

5.2 Start the operation at the first stage S01 When TR=1 or TR=2, press the " $\blacktriangle$ " button then power on will start the operation at the first stage S01.

5.3 Button function under running mode When controller works normally, if TR=0, there will be no reaction by shortly pressing "▲" or "▼" button; If TR=1 or 2, short press "A" button once then release, will display the left working time of current stage; short press "▼" button once then release, will display the specific current working stage and then return to normal temperature displaying mode

after 3 seconds. If TR=1 or TR=2, three continuously press the SET button in one second will start the operation at the stage set in SST.

5.4 How to set parameters

When controller works normally, press and hold "SET" key for more than 3 seconds to enter into the modify parameter mode, PV window displaying the first code "TS" in menu, if TR=1 or 2, there will be second mode "HD" displaying and the related setting value displaying in SV window. Press "SET" button to save the set value and go to next setting, then press "A" or "Y" button can change the current value. After setting, keep pressing "SET" button for 3 seconds at any status will save the changed value and then return to the normal temperature displaying During setting, if there is no operation for 10 seconds, system will automatically quit the menu and return to the normal temperature displaying mode with automatically save the modified settings

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Press "SET" key for over 3 seconds to enter paramerers set up mode Time Unit D(Day), H(Hour), or M(Minute) SET MD Cycle Mode 1~999 MD=0 Infinite Cycle TR=0? When power off, restar TS the operation mode 0->Manul 1->Auto 25°C ▼ SET STA Stage Value 1~12 HD 2.0°C SST Start Stage Value CD 2.0°C ▼ SET S01 Stage1 Temperature Set Value ΑН Alarm Hig 25°C 99 °C SET H01 Stage1:Duration Length AL Alarm Low 10 -40°C SET Stage1:User Defined Alert at the end of U01 PT stage1 SET CA S12 Stage12: Temperatur Set Value 0.0°C 25 °C SET CF H12 Stage12: Duration 10 Stage12: User Defined
Alert at the end of stage12
U1~U12: TR=0? TR=0: Simpl Mode TR=1: Continious Timer Mode TR=2: Brew Timer S: Stop Program Working Normally

# 6. Set Menu and Temperature Control Instruction

#### 6.1.1 When setting temperature in Centigrade(FC $\rightarrow$ C).

Symbol	Symbol Code Function		Setting range	Default setting	Remarks
٤5	TS	Temperature Set Value	-50.0~120°C	25.0°C	
HG	HD	Heating Differential Value	0.3~15.0°C	2.0°C	in heating
디	CD	Cooling Differential Value	0.3~15.0°C	2.0°C	in cooling
RH AH Alarm High Limit		-50.0~120°C	100°C		
7 Temperature		-50.0~120°C	-40°C		
		Compressor Delay	0~10 minutes	0 minutes	
			-15.0°~15.0°C	0.0°C	
			С		
Ł۲	TR	Timer Setting	0、1 or 2	0	0->off; 1 or 2->on

# 6.1.2 When setting temperature in Fahrenheit(FC→C)

Symbol	Code	Function	Setting range	Default setting	Remarks
ŁS	TS	Temperature Set Value	-50.0~248°F	77.0°F	Min unit: 1°F
Hd	HD	Heating Differential Value	1.0~30.0°F	3.0°F	Min unit: 1°F
Cq	CD	Cooling Differential Value	1.0~30.0°F	3.0°F	Min unit 1°F
RH AH A		Alarm High Limit	-50.0~248°F	212°F	Min unit: 1°F
RL	AL	Alarm Low Limit	-50.0~248°F	-40°F	Min unit: 1°F
PE PT		Compressor Delay	0~10 minutes	0 minutes	
ER	CA	Temperature Calibration	-15.0°~15.0°F	0.0°F	
Fahrenheit or Centigrade			С		
۲r	TR	Timer Setting	0 1 or 2	0	0->off; 1 or 2->on

#### 6.1.3 When TR=1 or TR=2.

Symbol Code Function		Setting range	Default setting	Remarks
UT Time Unit Setting		D, H, M	D	D: Day H: Hour M: Minute
MD	Cycle Setting Mode	0-999	1	00, Infinite Cycle
뭐는 AT Auto Mode		0 or 1	0	0: Manual 1:Auto
5EE STT Stage Setting Value		1~12	1	Find the below chart.
SST	Start Stage Setting Value	1~12	1	The stage start to work
	UT MD AT STT	UT Time Unit Setting  MD Cycle Setting Mode  AT Auto Mode  STT Stage Setting Value  Start Stage	UT Time Unit Setting D, H, M  MD Cycle Setting Mode 0-999  AT Auto Mode 0 or 1  STT Stage Setting Value 1~12  Start Stage 1-12	Code         Function         range         setting           UT         Time Unit Setting         D, H, M         D           MD         Cycle Setting Mode         0-999         1           AT         Auto Mode         0 or 1         0           STT         Stage Setting Value         1~12         1           Start Stage         1~12         1

## 6.1.4 When setting STA=12, menu codes as below chart.

Symbol Code		Function	Default setting	Remarks
50 (	S01	Stage 1 Temperature 25.0°C c Set Value 77.0°F		Same setting range as TS.
HO I	H01	Control Duration	10	
UO I	U01	Finished Alarm of Stage 1	n	Note 6.2.6
502	S02	Stage 2 Temperature Set Value	25.0°C or 77.0°F	
H05	H02	Control Duration	10	
U02	U02	Finished Alarm of Stage 2	n	Note 6.2.6
503 soa Sta		Stage 3 Temperature Set Value	25.0°C or 77.0°F	
H[]] H03 Control Duration		Control Duration	10	
U03	UD3 Finished Alarm of Stage 3		n	Note 6.2.6
504	Stage 4 Temperature Set Value		25.0°C or 77.0°F	
HD4	H04	Control Duration	10	
U미닉 U04 Finished Alarm of Stage 4		n	Note 6.2.6	
Substitution Stage 5 Temperature Set Value		25.0°C or 77.0°F		
H05	H05	Control Duration	10	
UOS	U05	Finished Alarm of Stage 5	n	Note 6.2.6
Sign Stage 6 Temperature Set Value		25.0°C or 77.0°F		

H06 H06		Control Duration	10	
U□E ∪06		Finished Alarm of Stage 6	n	Note 6.2.6
507	S07	Stage 7 Temperature Set Value	25.0°C or 77.0°F	
רםא	H07	Control Duration	10	
רםט	U07	Finished Alarm of Stage 7	n	Note 6.2.6
508	S08	Stage 8 Temperature Set Value	25.0°C or 77.0°F	
H08	H08	Control Duration	10	
U08	U08	Finished Alarm of Stage 8	n	Note 6.2.6
509	S09	Stage 9 Temperature Set Value	25.0°C or 77.0°F	
H09	H09	Control Duration	10	
U09	U09	Finished Alarm of Stage 9	n	Note 6.2.6
S 10	S10	Stage 10 Temperature Set Value	25.0°C or 77.0°F	
H IO	H10	Control Duration	10	
U ID	U10	Finished Alarm of Stage 10	n	Note 6.2.6
511	S11	Stage 11 Temperature Set Value	25.0°C or 77.0°F	
H 1 1	H11	Control Duration	10	
U 1 1	U11	Finished Alarm of Stage 11	n	Note 6.2.6
S 12	S12	Stage 12 Temperature Set Value	25.0°C or 77.0°F	
H 12	H12	Control Duration	10	
U 12	U12	Finished Alarm of Stage 12	n	Note 6.2.6

# 6.2 Temperature Control

# 6.2.1 Temperature control set(TS, HD, CD, S01~S12).

When controller works normally, PV screen displays current measuring temperature; SV screen displays current set temperature and automatically switch working modes of cooling and heating.

When TR=0 Normal temperature control: Under normal temperature control mode, when measured temperature  $PV \ge TS$  (Temperature Set Value) + CD (Cooling Differential Value), entering into cooling mode with cooling indicator lamp on and cooling relay start working; when the Cooling Indicator Light flickering, cooling device is being in the status of compressor delay

protection; when measured temperature PV ≤ TS (Temperature Set Value), cooling indicator light off,

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cooling relay stop working. When measured temperature  $PV \leq TS$  (Temperature Set Value)-HD (Heating Differential Value), entering into heating mode with heating indicator light on and heating relay start working; when measured temperature  $PV \ge TS$ (Temperature Set Value), heating indicator light off, heating relay stop working.

For example, Set TS=25.0°C, CD=2.0°C, HD=3.0°C: if measured temperature  $\geqslant$  27.0°C(TS+CD), cooling will turn on; if measured temperature  $\leq 25.0^{\circ}$ C, cooling will turn off. If measured temperature ≤22.0°C(TS-HD), heating will turn on; if measured temperature ≥25.0°C, heating will turn off.

Special temperature control: When TR=0, under plug in or exit setting mode, no need to compare the current measured temperature with the heating or cooling differential values but only compare directly with

the TS value. For example, when plug in or exit setting mode, Set TS=25.0°C, CD=2.0°C, HD=3.0°C: if measured temperature > TS(25.0°C), cooling will turn on; if measured temperature  $\leq$  25.0°C, cooling will turn off and then return to normal temperature control mode. If measured temperature <TS(25.0°C), heating will turn on; if measured temperature ≥25.0°C, heating will turn

off and then return to normal temperature control mode.

When TR=1 (Continuous Timer mode) With this setting, the TS(temperature set value) will be invalid and the controller will work based on the setting values of S01~S12, H01~H12 and U01~U12. For example, when periods of time within the range of the control duration of H01, if measured temperature PV ≥ (Temperature Set Value )TS1+(Cooling Differential Value) CD, then cooling on with cooling indicator light on and cooling relay start workingand start the timer. About the condition that the interval time between two refrigeration operations shorten than PT(compressor

delay time), please note 6.2.3. About how to set the timer and control temperature, please note 6.2.6.

When TR=2 (Target Timer mode) With this setting, the TS(temperature set value) will be out of action and the controller will work based on the setting values of S01~S12, H01~H12 and U01~U12. For example, when periods of time within the range of the control duration of H01, if measured temperature PV ≥ Temperature Set Value )TS1+(Cooling Differential Value) CD, then cooling on with cooling indicator light on and cooling relay start working. NOTE: The control duration of each stage start timing only

when the current temperature reach or drop to the setting temperature in current stage. If the current measuring temperature has not reach or drop to the set temperature of current stage, the SV screen will display the set temperature value with flickering in every 2 seconds, reminding that controller has not started timer yet. About the condition that the interval time between two refrigeration operations shorten than PT(compressor delay time), please note 6.2.3.

About the difference between TR=1 and TR=2, please refer to the chart below with 3 stages of the temperature:

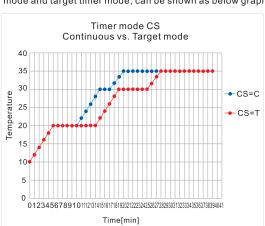
About how to set the timer and control temperature, please

Stage X (N=1~12)	Stage X (N=1~12) (°C)		UAX(X=1~12)
Stage1	20.0	10	n
Stage2	30.0	7	n
Stage3	35.0	12	n

	TR = 1 Continuous Timer mode		TR = 2 Target Timer modes	
Time [minutes]	Temp [°C]	Stage	Temp [°C]	Stage
0	10	1	10	
1	12	1	12	
2	14	1	14	
3	16	1	16	
4	18	1	18	
5	20	1	20	1
6	20	1	20	1
7	20	1	20	1

8	20	1	20	1
9	20	1	20	1
10	20	1	20	1
11	22	2	20	1
12	24	2	20	1
13	26	2	20	1
14	28	2	20	1
15	30	2	22	
16	30	2	24	
17	30	2	26	
18	32	3	28	
19	34	3	30	2
20	35	3	30	2
21	35	3	30	2
22	35	3	30	2
23	35	3	30	2
24	35	3	30	2
25	35	3	30	2
26	35	3	32	
27	35	3	34	
28	35	3	35	3
29	35	3	35	3
30			35	3
31			35	3
32			35	3
33			35	3
34			35	3
35			35	3
36			35	3
37			35	3
38			35	3

#### Above chart is the difference between the continuous timer mode and target timer mode, can be shown as below graph:



The graph show when TR=1, the continuous timer mode as blue line: the current stage control time of  $H01\sim H03$  is counted continuously and total time of  $0\sim 10$ ,  $11\sim 17$  and 18~29 is 29 minutes; when TR=2, the target timer as red line: the current stage control time od H01~H03 will only start to count down when the current measured temperature has been reached the set temperature of current stage and total time of 5~14, 19~25 and 32~35 is 39 minutes.

6.2.2 Alarm High/Low Limit Setting (AH, AL) When measured temperature PV ≥ AH, alarm with "BI-BI-BIII" sound, press any button will close the buzzer but the AH alarming status will not be removed until the measured temperature < AH. When measured temperature PV  $\leq$  AL, alarm with

"BI-BI-BIII" sound, press any button will close the buzzer but the AH alarming status will not be removed until the measured temperature > AL. When the buzzer alarming, output of heating or cooling will

keep working follow the settings.

Note: when setting the values of AH and AL, AH could not lower or same as AL; AL could not higher or same as AH.

6.2.3 Compressor Delay (PT) Under cooling mode, first time to power on, when measured temperature PV  $\geq$  TS (Temperature Set Value) + CD (Cooling Differential Value), device won't start cooling immediately, but waiting for a delay time (PT). When the interval time between two refrigeration operations is longer than the delay time, device will start cooling immediately. When the interval time between two refrigeration operations is shorter than the delay time, device will start working until there is no delay time left. Delay time will start counting when cooling output turned off.

**6.2.4 Temperature Calibration (CA)** When there is temperature difference off between measured temperature and actual temperature, user can set CA for calibration to get the measured temperature value same as the actual temperature value. The calibrated temperature = the measured temperature value + calibration value (positive value, 0 or negative value)

6.2.5 Display in Fahrenheit or Centigrade unit (CF) Users can select the temperature reading in Fahrenheit or Centigrade temperature value, the default setting is in Centigrade. If need to change the temperature reading in Fahrenheit, then set CF to F. Attentions: when CF value changed, all the setting will be recovered to factory default setting with a short buzzer

6.2.6 Timer-Temperature Set Values (TR, UT, STT, SST,

S01~S12, H01~H12, U01~U12)
TR: a value to set timer, set to 0, timer off and set to 1, timer on. When TR=0, timer function will be off, there will not display the other set values follow TR and no need to set them; when TR=1 or TR=2, timer function will be activated, user can set the time and the control temperature values as required, with these settings, TS will be invalid and the the controller will work based on the set temperature of the

timer stages. UT: a value to set the time unit, can be set to day, hour or

minutes as required. STT: a value to set stages of controlled temperature, can be set to max 12 stages: 12 temperature set values and each temperature set value respectively corresponded to a continuous periods of time; when need to control different temperature in different time, SST can be set to max 12 stages with 12 temperatures as required. SST: a value to set start stage to control temperature, can be

set to the required stage to start the temperature control. **S01~S12:** values to set the desired controlled temperature, when TR=1, the values of S01~S012 will replace the TS value as the temperature control values.

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H01~H12: values to set continuous timer, if UT (time unit) set to hour and set H01 to 12, then the controller will control the set temperature of S01 for 12 hours U01~U12: values to set the alarm, set to n=NO Alert;

without alarming.

UX=A: if set to A in current stage, when completed the continuous timer, there will be alarming with PV screen displaying the current stage value  $UX(X=01\sim12)$  and SV screen displaying the A in 1Hz flickering. Buzzer will be alarm shortly in every 2 seconds and then go to next stage

continuous timer, there ill be alarming with PV screen displaying the current stage value UX(X=01~12) and SV screen displaying the A in 1Hz flickering. Buzzer will be alarm shortly in every 2 seconds but still controlling the temperature of current stage, only by pressing any button will go to the next stage control.

UX=S: if set to S in current stage, when completed the continuous timer, there ill be alarming with PV screen displaying the current stage value  $UX(UX=01\sim12)$  and SV

6.2.7 Cycle and Auto Mode (MD, AT)

1~999: specific time of operation. The default value is 1, means the controller will stop running and turn off all the outputs after a single cycle operation, PV displays current temperature and SV displays End. A cycle of operation starts from SST(Start Stage) and end at SST; if SST is not the first stage but compulsively start from the first stage, there will be also a cycle operation end at SST. AT: value to set the operation mode when re-plug after power off. AT=0: Manual mode, the controller will stop working when re-plug after power off; user need to reset the setting values by entering the menu, the controller will

and re-plug based on the operation time and status of H01~H12 and U01~U12, then run to the corresponding stage

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A=Alert; C=Confirm and S=Stop Program. **UX=n:** if set to n in current stage, when completed the continuous timer, the controlling will go to the next stage

control. UX=C: if set to C in current stage, when completed the

screen displaying the Ain 1Hz flickering. Buzzer will be alarm shortly in every 2 seconds with all output control

turned off, only by pressing any button will go to next stage

MD: value to set the operation time of timer and temperature set values, 00: infinite cycle;

restart working after re-plugged. **AT=1:** Auto mode, when TR=1, if there is a power failure or

outage, the timer will continue to work; when re-plug in, the controller will automatically count the time during power off

For example, set S01(Stage 1)=25.0°C, H01=4H, S02(Stage 2) =30.0°C, U02=0 or A; if there is a 3 hours power failure when the controller has worked on Stage1 for 2 hours, in this case, the controller will default the 2+3=5 hours to the operated time; when re-plug in, if U01 =n or A, the controller will work on Stage 2, if U01=C or S, the controller will stop working on Stage 1 with Note: when TR=2, when re-plug in, the controller will return to the operated stage before the power off.

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# 7. Error Description

Sensor fault alarm: when temperature sensor being in short circuit or open loop, the controller will initiate the mode of sensor fault, and cancel all the operations. Buzzer alarming with displaying ER code. Press any keys can stop the alarm, and return to the normal working mode after remove the sensor fault

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# 8. Technical Assistance and Warranty

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8.1 Technical Assistance If you have any problems installing or using this thermostat.

please carefully and thoroughly review the instruction manual. If you require assistance, please write us to support@ink-bird.com. We will reply your emails in 24 hours from Monday through Saturday. You can also visit our web site www.ink-bird.com to find the answers of the common technical questions.

**8.2 Warranty** INKBIRD TECH. C.L. warrants this thermostat for one years from the date of purchase when operated under normal condition by the original purchaser (not transferable), against defects caused by INKBIRD's workmanship or materials. This warranty is limited to the repair or replacement, at INKBIRD's discretion, of all or part of the thermostat. The original receipt is required for . warranty purposes.

INKBIRD is not responsible for injury property damage or other consequential damages or damages of third parties arising directly from an actual or alleged in mater of workmanship of the product. There are no representations, warranties, or conditions. express or implied, statutory or otherwise, other than

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