INSTRUCTION MANUAL

FOR LABEC PORTABLE INCUBATORS

DH Series
PORTABLE INCUBATOR
(Intelligent PID temperature controller)

User Manual

Content

I. Summary

It is applied in laboratories in industrial and mining enterprise, universities and colleges,, research institutions , Medicine & Health and other units for storage and culturing.

II. Structure features

1、High quality cold rolling steel electrostatic spraying exterior.

2、Stainless Steel inner chamber, semicircular arcs at corners for easy cleaning.

3、Intelligent PID temperature controller, with timing, alarm indicates, Temperature deviation trimming, self–tuning and etc. Cut off the power automatic, when over-temperature limited ,ensure the safety of experiments and personnel.

4、Equipped with a handle, portable for outdoor emergency, vehicle transportation and other venues used, with a door hanger to ensure the door stay closed when moving.

5、High temperature silicone seal for good leak-tightness. Good heat insulation for preventing the loss of heat too quickly. Green, energy efficient, low carbon and environmental protection.

III. Technical Parameter Table

model	DH2500AB
Supply Voltage(V)	100-120/60HZ
Temperature range	RT+5-50℃
Temp. fluctuation	±1℃
Working Temperature	5-40℃
Input power(W)	200
Inner chamber size （mm）	180×140×230
Exterior size （mm）	300×300×300
Timing	0-9999min

VI. Inner Chamber temperature distribution map
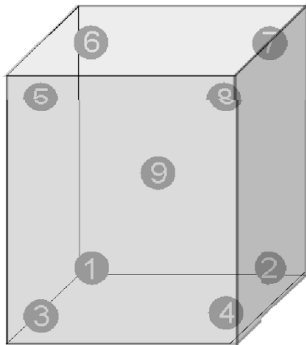
Temperature point	Temperature℃	Temperature point	Temperature℃
①	37.26	⑤	36.50
②	36.30	⑥	37.21
③	36.07	⑦	36.40
④	35.95	⑧	36.41
		⑨	36.63

Note: the measured value has a little difference because of different models

V. Working conditions

1. Environment temperature：5℃~40℃
2. Relative humidity：≤80%RH
3. Pressure: 80-106Kpa
4. No violent shake and corrosive gas around the incubator.
5. Avoid direct sun or effect from other cooling and heating sources.
6. There is no high concentration dust around the instrument except keeping horizontal installation.
7. Reserve particular space between equipment and wall.
8. Install it in adequate ventilation place.

VI. Safety information

1. In order to ensure the safety of equipment and experiment, please install external grounding protection and supply power according to requirement of nameplate of equipment.
2. Don't test the inflammable and explosive materials, noxious goods and strong corrosive articles by this equipment.
3. Ensure the horizontal installation.
4. Laypeople must not demount and maintain.
5. Don't make compulsory startup, must eliminate the alarm reminder.
6. Read this instruction carefully before operate this equipment

VII. Operation cautions

1.   For the initial startup, don't modify internal parameter of program controller except the permission in the instruction.

2.   The workroom adopts vertical ventilation cycle. Each tray can not place too much, total area of test load can not large than 1/3 of tray.

3.   The environment temperature must 5ºC lower than setting temperature, then it can work in normal.

4.   Don't use acid, alkali and other corrosive articles to scrub the internal surface and external surface. The neutral washing detergent could be used for regular cleaning, then wipe by dry cloth.

5.   When the equipment stops, cutoff the power and keep interior and exterior dry and clean.

VIII. Controller operation instruction

i. Overview

The series of TS-1000 temperature contronller, adapt to laboratory and analysis instrument,operate very easily.Temperature controller adapt to "super fuzy PID control",much other than traditional PID control.Comparaed to tradition controller ,it has following advantages:

1. it has less temperature overshoot,more quickly steady time,better precise temperature.
2. Usually without PID self-tuning, different types of equipment need suitable paramenter according to illusition changing the parameters of P, I, D;
3. If want to achieve better effect of temperature control, do PID self-tuning, typically of full range with only one PID self-tuning;
4. no gating switch, controller automatic judgment to open the door, after open the door temperature overshoot achieve smaller, stable time faster.

ii. Product code

TS-1 □□□—□
      ①②③ ④

Code	Representation of contents	Said method
①	Sensor type	1：PT100 ; 0：CU50 ;
②	Digital color	0: up red and down red;1:up red and green;
③	Output mode	0：SCR output（Load power≤1 KW）； 1：Solid state output； 2：Relay output（Load power ≤700W）； 3：External SCR output（Load power≤3KW）
④	Special function	

iii. **Brief introduction**
1. Shape size：109mm*125mm;
2. Range of temperature**:** 1）TS-10xx：0～100.0℃;
   Range of time: 0～9999 Minute(Hour);
3. Temperature display value of basic error: < 0.5%;
4. Working environment:
   Main board Power：220V±10% AC;
   Environmental temperature：0～50℃;
   Relative Humidity：<85%RH;
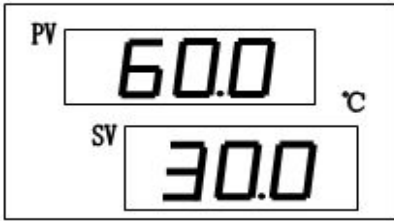
iv. Panel Instructions
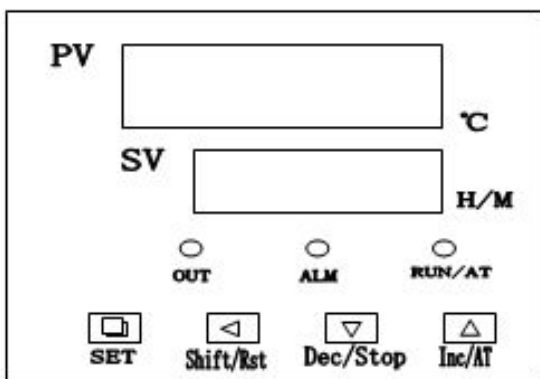
v. **Indicator definition**
  1) "RUN/AT"indicator: This indicator is bright when the controller is running, when the runtime is over, this indicator is not bright. When the controller enters the auto-tuning of PID, this indicator is flashing.
  2) "OUT" indicator: If the heater output turns on, this indicator is bright, else this indicator is not bright.
 3) "ALM" indicator: When the over-temperature alarm occurs, this indicator is bright.

vi. **Operation and using**
  1) When the controller is switched on, display windows show "InP"" and the value of temperature range for 3 seconds, then it starts running.
  2) Temperature and time settings:
      Press the "Set" button, the controller runs into the temperature setting state. Re-press the "Set" button, the controller runs into the time setting state. In setting state, you can use the "◄" , "▼" and "▲" buttons to get the required settings. Press the "set" button again, it returns from the setting state and the settings are saved automatically.
      If the time is set as "0", the controller will run continuously, the display window of "SV" will display the set point temperature. If the time set value is not equal "0", timers start time when the measuring temperature reaches the set point temperature, the display window of "SV" will display the runtime. When the runtime is over, the "sV" window will display "End", the buzzer will sound for 30s, Press the button "▼" for 3s, the program will restart.
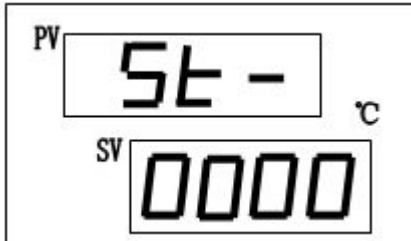
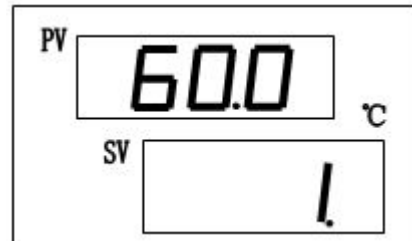（1）The normal display   (2) the temperature setting state

| PV | 60.0 | ℃ |
| SV | 30.0 | |

| PV | SP - | |
| SV | 060.0 | |
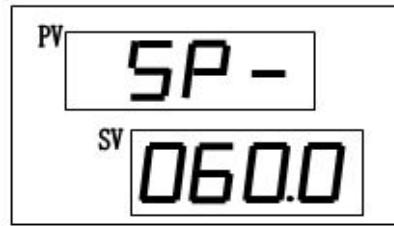
（3）the time setting state   （4）Timing display

| PV | 5t - | ℃ |
| SV | 0000 | |

| PV | 60.0 | ℃ |
| SV | l | |

3) When temperature alarm, the buzzer will sound," ALM" lights. If a change in temperature setting and over-temperature alarm," ALM" lights up, but no songs buzzer.

4) When the buzzer sounds, it can be muted by pressing any button.

5) "◂" button: In the setting state, it can shift the set value by pressing the button.

6) "▼" button: In the setting state, it can reduce the set value by pressing the button. If press and hold the button, the set value will reduce continuously. The timing state, long press the button for 3 seconds and can make the program stop.

7) "▲" button: In the setting status, it can increase the set value by pressing the button. If press and hold the button, the set value will increase continuously.

8) In setting state, the controller will return to run status if without any key press in one minute.

9) If the display window shows "----", it indicates the fault of temperature.

vii. **AT function**

When the temperature control effect is not ideal for system tuning. Self tuning process temperature can have bigger overshoot, the users in a system setting before please consider this factor.

In not running state, the controller will enter the auto-tuning of PID by pressing the "◂" button for 6s,"RUN/AT" indicator flashes, it will be not bright when the auto-tuning of PID is completed.In the state, compressor into normally open mode,when the auto-tuning of PID after the end of a group of PID parameter, parameter automatic save and return to the normal mode of operation. When running the auto-tuning of PID, it can be stopped by pressing the "◂" button for 6s again.

In the auto-tuning of PID state,if emperature alarm, no songs buzzer and" ALM" don't light ,but heating alarm relay automatic disconnect.And" set" keys to effective. In the system self tuning process regardless of whether there is a constant temperature time setting, controller display window lower always display the temperature setting value.

viii. Internal parameters settings

Press the "Set" button for 3 seconds, controller will display the password prompt "Lc". Adjust the password to the required value, then press the "Set" button again, it will run into the internal parameter setting state. if press the "Set" button for another 3 seconds, it will return to the running state.

Parameter list-1:

| Parameter indicator	Name	Instruction of the Parameter's function	(Setting range) factory set value
Lc-	Password	when Lc=3 ,then we can see and modify parameters	0
AL-	Alarming setting	When temperature is beyond "SP+AL", the Alarm indicator turns on. The buzzer sounds and the heater output turns off.	(0～100℃) 5
T-	Control cycle	The heat control cycle of temperature	(1～60S) 5S
P-	Proportional band	Adjustment of proportional parameter.	(1.0～rH) 26.5
I-	Integration time	Adjustment of integration parameter.	(1～1000S) 415
d-	Differential time	Adjustment of differential parameter.	(0～1000S) 415
Pb-	Zero point adjust	When the zero error comparatively larger, to update this value should be needed. Pb=measure value –actual value	(-12.0～12.0℃) 0.0
PK-	Full point adjust	When the full point error also comparatively larger, to update this value should be needed. PK=1000×（measure value –actual value）/ actual value.	(-999～999) 0
Et-	Timing function	When ET = 0, no timing function; 1 electric start timing, 2 to the value set start timing.	(0～2) 2

Parameter list-2:

Parameter indicator	Name	Instruction of the Parameter's function	(Setting range) factory set value
Lc-	Password	when Lc=9,then we can see and modify parameters	0
Co-	Turn off the heat output deviation	when"PV≥SP+Co", Turn off the heating output。	(0.0～50.0℃) 5.0
Hn-	Constant temperature time mode	0：minutes time；1：hours time	(0～1) 0
En-	End of operation temperature	En = 0 end of run off output; En = 1 end run to constant temperature;	(0～1) 1
rH-	Range of temp setting	The value of temperature setting.	(0～100.0℃) 70.0
SPL-	Lower limit	Temperature set value minimum value.	(0 to highest limit) 0
SPH-	Highest limit	Temperature setting value maximum value.	(lower limit to Highest limit) 70.0

English name and parameter indicating the symbol table

Parameters indicating	SP	St	Lc	AL	Γ	P	I	d
English Name	SP	St	Lc	AL	T	P	I	d
Parameters indicating	Pb	Pk	Co	Hn	oP	rH		
English Name	Pb	Pk	Co	Hn	oP	rH		

ix. Wiring
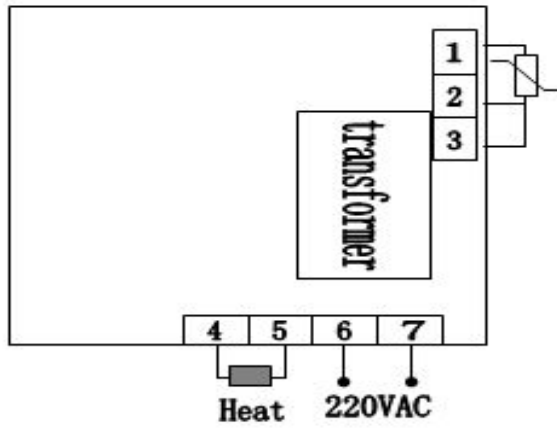
Figure 1 （TS-1xx0）

IX. Fault analysis

Fault site	Cause analysis	Treatment method
Power indicating lamp is not working.	No power	Check the outlet
The temp. controller displays "0000"	The fuse is fused	Replace the fuse
The temp. cannot go down	The sensor is not work	Replace the sensor
The evenness degree is not good	The controller is not work	Replace the controller
The control sometimes good and sometimes bad	The environment temp. is too high	Reduce the environment temp.
The temperature can not go up	The sample is heating	Reduce the supply quantity of sample
The temperature over shot is too large	The supply power doesn't need the demand	Adjust the power
	The voltage is unstable	Steady the power input.
	The instrument setting is too low	Set the temperature correctly
	The heating light of instrument is light but no output	Replace the meter
	The heating has output but the heater has no heating	Replace the heater
	The sensor is not work	Replace the sensor with same specification
	The related parameter's setting of instrument is not correct.	Consult the instruction and adjust again
	The heater output is not stop	Replace controller
	The internal PID is not correct.	Start self-tuning