



Constant Temperature Drying Oven

LB-10CTO

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1. Safety Measures

- Install outer ground protection to ensure the safety of the machine and experiment; supply power as the machine nameplate requires.
- This equipment is forbidden to use in inflammable and explosive, poisonous, and strong corrosive experiments.
- Make sure the installation is in a horizontal position.
- Non-professionals are not allowed to disassemble and repair this machine
- Pay attention to the setting temperature when dealing with inflammable matters.
- Make sure to dry the resin container, if the temperature is setting too high by accident, the container will dissolve and then fall on the heater, which will cause a fire.
- An overfilled sample will lead to overheating in a working room under part, which will resolve the inflammable material and cause a fire.
- While the machine is working, don't touch the device top, as well as observation.
- Window and exhaust port to keep away from high-temperature burns.
- Read the instruction book before the operation.

2. Introduction

Constant temperature drying oven LB-10CTO is equipped with a rapid heating and working temperature of 300°C. Built-in silicate insulated layer prevents heat loss. Natural air convection with vertical air flow facilitates sterilization and drying. PID-controlled dual temperature modes with over-temperature protection and touch button setting for user ease. Internal parameter locking prevents unwanted changes.

3. Features

1. Natural air convection with vertical airflow for sterilization and drying
2. Homogenous temperature distribution and/or rapid dynamic response
3. Cold rolled steel electrostatic sprayed exterior
4. Transparent window provision for sample process viewing
5. Exhaust hole for unpleasant fume removal
6. Anti-hot door handle for user safety
7. Overheating is prevented by automatic circuit shut-off
8. Over-temperature and over-current protection
9. Audio visual alarm for system dysfunctionality

4. Specifications

Model No.	LB-10CTO
Chamber volume	30 L
Number of shelves	6
Inner chamber size (W x L x H)	310 x 310 x 310 mm
Temperature range	RT +1 0 °C to 300 °C
Cycle mode	Natural convection
Temperature resolution ratio	0.1°C
Temperature motion	± 1°C
Temperature uniformity	± 3.5 %
Inner chamber	Mirror stainless steel
Outer shell	Cold-rolled steel electrostatic spraying chamber
Insulation layer	Silicate heat preservation board
Heater	Stainless steel heater
Exhaust hole	Φ 28 mm top (with test hole function)
Display mode	LED
Timer	0 – 9999 min (time wait function)
Operational function	Fixed temperature operation, timing function, auto stop
Sensor	Pt 100
Load per rack	15 kg
Shelf space	35 mm
Power	0.8 kW
Power supply	AC 220V/ 3.6 A
Exterior dimension (W x L x H)	460 × 510 × 695 mm
Weight	33 kgs

5. Applications

Used in biochemistry, chemical, pharmaceutical, medical and health, agricultural scientific research, environmental protection, research and application fields, for powder drying, baking, disinfection and sterilization of all kinds of glass containers.

6. Instrument Introduction



Figure-1

7. Operations

1. Put the material that needs drying into a container (advice: the size of the drying material should not be over 2/3 of the shelf); then close the container door switch power, and next switch on the blower.
2. **Heating:**
Set the temperature as needed (find details in meter instruction), then the temperature starts to rise; when the temperature inside the working room reaches the set point, the indication light will go out, and after a constant temperature for 30min, the working room goes into a constant temperature state.
3. **Working time:**
Decide the drying time according to the humidity of the sample after finishing drying, turn OFF the power, and then bring the sample out. Keep the drying oven clean. If the oven is unused for a long time, daub neutral grease or Vaseline on galvanized parts to prevent corrosion; cover the oven with a plastic dust cap and store it in a dry room to keep the electric device from getting wet.

7.1 Panel Instruction

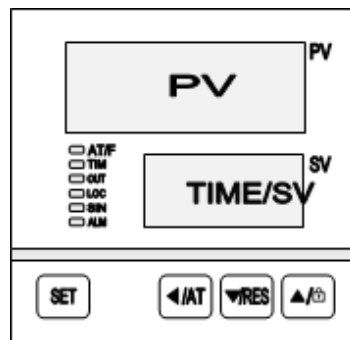


Figure-2

a) key definition

- [Set]: Set key, in the main screen state, click this key to enter the temperature and time target value Setting state, and long press this key for 3 seconds to enter the internal parameter Setting state.
- [◀/AT]: Shift / Auto-tuning, in the setting state, click this key to change the setting value. In the main screen state, long press this key for 6 seconds to temperature auto-tuning selection state.
- [▼/RST]: Decrease/rerun key, in the Setting state, click or long press this key to decrease the setting value. In the main screen state, long press this key for 3 seconds to restart the run.
- [▲/LCK]: Increase/lock screen key, in the Setting state, click or long press this key to increase the setting value. In the main screen state, click this key to lock or unlock the screen.

b) LED indicators

- **【AT/F】 Indicator:** The lamp will be on when the temperature unit is degree Fahrenheit. The lamp will flash in auto-tuning, it will flash. In other states, it will be **OFF**.
- **【TIM】 Indicator:** The lamp will be on when there is a timing Setting, it will flash in reservation timing, and it will be off when no timing function.
- **【 OUT 】 Indicator:** The lamp will be on when there is heating output, otherwise it will be **OFF**.
- **【LOC】 Indicator:** The lamp will be on when the screen is locked, otherwise it will be **OFF**.
- **【SIN】 indicator:** Invalid reservation.
- **【ALM】 Indicator:** The lamp will be **ON** when there is a temperature deviation alarm or abnormal.

7.2 Operation and Usage

a) Controller power on display

After all the displays are on for about 3 seconds, the PV area displays SV displays version number for about 1 second, and then enters the normal display state.

b) Reference and setting of temperature and time

1. No-timing function

In the main screen state, click the **【Set】** to enter the temperature Setting state, the PV area displays prompt SP, and the SV area displays the temperature Setting value, which can be modified to the required Setting value through the **【shift】** , **【increase】** , **【decrease】** , then click the **【Set】** to exit the setting state, and the setting value will be saved automatically.

2. Timing function

- In the main screen state, click the **【Set】** to enter the temperature Setting state, the PV area displays the prompt SP, the SV area displays the temperature Setting value, and the modification method is the same as above; then click the **【Set】** to enter the time Setting state, the PV area displays the prompt ST, TIME area displays the time Setting value; then click **【Set】** to exit the setting state and the Setting value will be saved automatically.
- When the Setting time is "0", it means continuous operation.
- When the Setting time is not "0" before the timing starts if the timing direction is count-down, the TIME area will display the timing time; if the timing is count-up, the TIME area will display "0".
- When the timing starts, the "indicator" will flash.
- When the time is up, the operation will end.

- The TIME area will display End, and the buzzer will beep for EST second.
- At this time, long press the 【decrease】 for 3 seconds, and the operation can be restarted.

3. Reservation function

When a reservation time is set, heating operation is prohibited.

4. Abnormal temperature measurement alarm

- If the PV area displays it means that the temperature sensor is faulty, or the temperature exceeds the measuring range or the controller itself is faulty.
- The controller will automatically disconnect the heating output, the buzzer will sound continuously, and the alarm light will be on.
- Kindly check the temperature sensor and it's wiring carefully.

5. Deviation over temperature alarm

- When the upper deviation over temperature alarm occurs in the process, the buzzer beeps, the alarm light is continuously **ON**, and the heating output is disconnected.
- When the lower deviation over temperature, the alarm will occur and flash. If the over-temperature alarm is generated due to changing the temperature setting value, the alarm light will be **ON**, but the buzzer will not sound.

6. Lockscreen function

- Three screen locking modes are provided. See the parameter table for details.
- **Password unlocking:** In the lock screen state, click the 【increase】 , the input password prompt PA is displayed in the PV area, and the password is displayed in the SV area.
- After entering the correct password, click the 【Set】 to unlock.

7. When the buzzer sounds, press any keys to silence.

7.3 Auto-tuning system

- a) When the temperature control effect is not ideal, the system can be auto-tuned. There will be a large overshoot in the process of auto-tuning. Kindly consider this factor before the system auto-tuning.
- b) In the running state and the main screen state, long press the 【shift】 for 6 seconds to enter the system auto-tuning selection state.
- c) The PV area displays the auto-tuning prompt AT, and the SV area displays "0". You can click the 【increase】 or 【decrease】 to select the display "1", and then click the 【Set】 to enter the system auto-tuning state.
- d) When the AT light flashes after the auto-tuning is completed, the AT light stops flashing.

- e) The controller will get a better set of PID parameters and save them automatically. In the process of system auto-tuning, long press the **【shift】** for 6 seconds to stop the auto-tuning program.
- f) In system auto-tuning, if there is an over-temperature alarm of upper deviation, the alarm light will not be on, and the buzzer will not sound. Still, the alarm relay will be automatically disconnected. In the process of system auto-tuning, the **【Set】** is invalid.

Parameter Table 1

The Indicator	Parameter Name	Description of the parameter function	(Range) Initial value
Lc	Password.	Lc=3, parameter values can be viewed and modified	0
ALH	Upper Deviation Over- temperature	PV>SP+ALH, over-temperature alarm of upper deviation	(0 ~ 100.0℃) 20.0
ALL	Lower Deviation Over-temperature Alarm	PV < SP-ALL, over-temperature alarm of upper deviation Description: ALL=0, the lower deviation alarm is invalid	(0 ~ 100.0℃) 0
Pb	Temperature Measurement Deviation Correction	Used to correct errors in temperature measurement. Pb = Actual temperature - PV	(-50.0 ~ 50.0℃) 0
PL	Temperature Measurement Slope Correction	It is commonly used to correct errors arising from high-temperature measurements. $PL = 1000 * (\text{Actual temperature} - PV) \div PV$ Description: In Parameter 【TABLE - 4】 , En=1 This feature is invalid.	(-999 ~ 999) 0
ndT	Timing Mode	0: No-timing; 1: Constant temperature timing; 2: Run timing.	(0 ~ 2) 1
Tdn	Timing Direction.	0: Count-up; 1: Count-down	(0 ~ 1) 0
Hn	Time Unit.	0: Minute ; 1: Hour	(0 ~ 1) 0
SPd	Constant Temperature Deviation	SP - SP d ≤ PV ≤ SP + SP d, Enter a constant temperature state.	(0.1 ~ 50.0℃) 0.5
EST	End Timing Prompt Time	When the timing is over, the buzzer will prompt the time. Note: EST = 9999, indicates a permanent prompt.	(0 ~ 9999s) 60

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EH	End Timing Constant Temperature Controller	0: Turn OFF the heating output after timing. 1: Keep constant temperature control after timing	(0 ~ 1) 0
LF	Lock Screen Function	0: Lockless screen function. 1: Lock screen function, unlock without password. 2: The lock screen function, needs a password to unlock.	(0 ~ 2) 0
LdT	Lock Screen Delay	In the main screen state, if no key is pressed in the delay LDT time, the controller will automatically lock the screen. Description: LDT = 600, the delay screen locking function is invalid	(10 ~ 600s) 30
PAd	Unlock	The password must be entered.	(0 ~ 9999) 1
Add	Mail Address	Description: It has no communication function.	(1 ~ 32) 1

Parameter Table 2

The Indicator	Parameter Name	Description of the parameter function	(Range) Initial value
Lc	Password	Lc=6, parameter values can be viewed and modified	0
dP	Demarcation Point	High and low-temperature PID control demarcation point. When $SP \leq DP$, it is low-temperature control, otherwise, it is high-temperature control.	(0 ~ M°C) M
T	Control period	Heating control period.	(1 ~ 30s) 5
P1	Proportional band 1	The time proportion regulation in low-temperature control. Description: P1=0, it is digit controlling.	(0 ~ 300.0°C) 35.0
11	Integral time 1	Integral regulation in low-temperature control.	(1~2000s) 300
d1	Differential time 1	Differential regulation in low-temperature control.	(0 ~ 1000s) 200
nP1	Power Output 1	Maximum power percentage of heating output at low-temperature control.	(0 ~ 100%) 100
nH1	Heating Off Deviation 1	In low-temperature control, if $PV \geq SP + nh1$, it will turn off the heating. Description: Kindly use this parameter with caution!	(0 ~ 50.0°C) 50.0
P2	Proportional Band 2	The time proportion regulation in high-temperature control. Description: P2 = 0, it is digit controlling.	(0 ~ 300.0°C) 35.0

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I2	Integral Time 2	Integral regulation in high-temperature control.	(1 ~ 2000s) 300
d2	Differential Time 2	Differential regulation in high-temperature control.	(0 ~ 1000s) 200
nP2	Power Output 2	Maximum power percentage of heating output at high-temperature control.	(0 ~ 100%) 100
nH2	Heating Off Deviation 2	In high-temperature control, if $PV \geq SP + nh2$, it will turn off the heating. Description: Use this parameter with caution!	(0 ~ 50.0°C) 50.0

Parameter Table 3

The Indicator	Parameter Name	Description of the parameter function	(Range) Initial value
Lc	Password.	Lc=9, parameter values can be viewed and modified	0
doT	Display Decimal point	0: No decimal point for temperature measurement and set value. 1: The temperature measurement and the set value have 1 decimal point.	(0 ~ 1) 1
oPn	The door Control Function	0 : No use ; 1 : Use	(0 ~ 1) 0
SPL	Minimum Set value	The minimum value of the temperature setting.	(-50.0 ~ 20.0°C)
SPH	Maximum Set value	The maximum value of the temperature setting.	(20.0 ~ M°C) 300.0
ouT	Heating. Output Mode	0: normal state. 1: The alarm relay output (normally opening point) is changed to heating output, and the original heating output is invalid.	(0 ~ 1) 0
db	Nonsense Region	The nonsense region of the temperature measurement.	(0 ~ 5.0)
ndo	Switch Output Mode	0: At the end of timing. 1: Over-temperature alarm. 2: Enter the constant temperature state	(0 ~ 2) 1
ndA	Temperature Alarm Mode	0: Only the temperature deviation over the temperature alarm. 1: Temperature up and down deviation over temperature alarm concurrently.	(0 ~ 1) 0

Parameter Table 4

The Indicator	Parameter Name	Description of the parameter function	(Range) Initial value
Lc	Password.	Lc=12, parameter values can be viewed and modified.	0
En	Correction Enable	0: Disable multi-segment correction function; 1: Enable Note: when En = 1, 【parameter table 1】 is invalid.	(0 ~ 1) 0
U1	Correction Point 1	If $PV \leq U1$, use E1 to correct the temperature slope.	(0-MMC)) M
E1	Correction Point 1	$E1 = \text{Actual temperature} - PV$	(Note4) 0
U2	Correction point 2	If $PV \leq U2$, use E2 to correct the temperature slope.	(U1-M-C)) M M
E2	Correction point 2	$E2 = \text{Actual temperature} - PV$	(Note4) 0
U3	Correction point 3	If $PV \leq U3$, use E1 to correct the temperature slope.	(U2-M-C)) M M
E3	Correction point 3	$E3 = \text{Actual temperature} - PV$	(For4) 0

Parameter table 5

The Indicator	Name	Description of the parameter function	(Range) Initial value
Lc	Password	Lc=27, parameter values can be viewed and modified at Lc s27.	0
Fc	Temperature unit	0: Celsius; 1: Fahrenheit.	Note5

Parameter table 6

The Indicator	Name	Description of the parameter function	(Range) Initial value
Lc	Password	Lc=81, parameter values can be viewed and modified	0
APT	Reservation Time	Set power-up time Description: APT = 0, this function is invalid.	(0 ~ 9999min) 0

Parameter table 7

The Indicator	Name	Description of the parameter function	(Range) Initial value
Lc	Password	Lc=567, parameter values can be viewed and modified	0
rST	Factory Reset	0: Cancel ; 1 : Conform	(0 ~ 1) 0

8. Troubleshooting

Phenomena	Causation	Treatment Method
No power supply	- The plug is in poor contact or the line broke. - The fuse protector is broken.	- Connect the plug and line. - Change the fuse protector.
No temperature rising inside the container	- Low setting temperature. - Heater is broken. - The temperature controller is breaking - The temperature sensor is loose. - The temperature sensor is broken.	- Readjust and set temp. - Change the heater. - Change the temperature controller. - Screw up the sensor nut. - Change the temperature sensor.
No temperature-raising alarm	- Setting the tempo of Detach them limiter is low. - The detached temperature limiter sensor is broken.	- Readjust the temp. 30°C above setting temp. - Change the detached temperature limiter sensor.
Temperature cannot reach the setting point.	- The exhaust port is fully opened. - The container is overfilled; hot air cannot convert.	- Shut off the exhaust port. - Decrease the amount of sample to improve convection conditions.
The fan does not work.	The fan motor is broken.	Stop work and check electric capacity and motor.
Displaying	The sensor is broken.	Change the sensor.
Display STOP	Time-up.	Press the program key for 3s to start.

9. Accessories

1) Standard Accessories

Accessory No	Accessory	Quantity
1.	Shelf	2
2.	Shelf frame	4

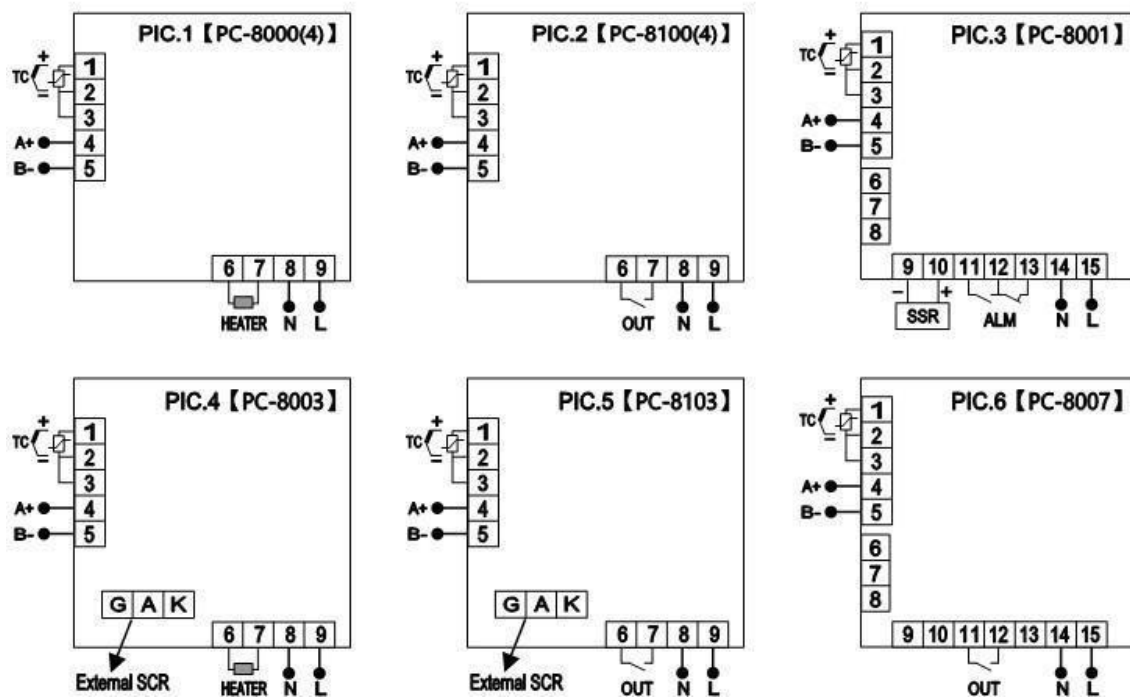
2) Optional Accessories

Accessory No	Accessory
1.	RS485 interface
2.	Printer
3.	Remote control
4.	Wireless SMS alarm
5.	USB data storage

10.Circuit Diagram

"": Represents the charged output, should be directly connected to the load.

"": Represents the switch output without charge.



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