Operation Manual

BOVA 300 Series

Vacuum Oven

Thank you for Choosing Biolab products. Please read the “Operating Instructions” and “Warranty” before operating this unit to assure proper operation.

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01 Summary

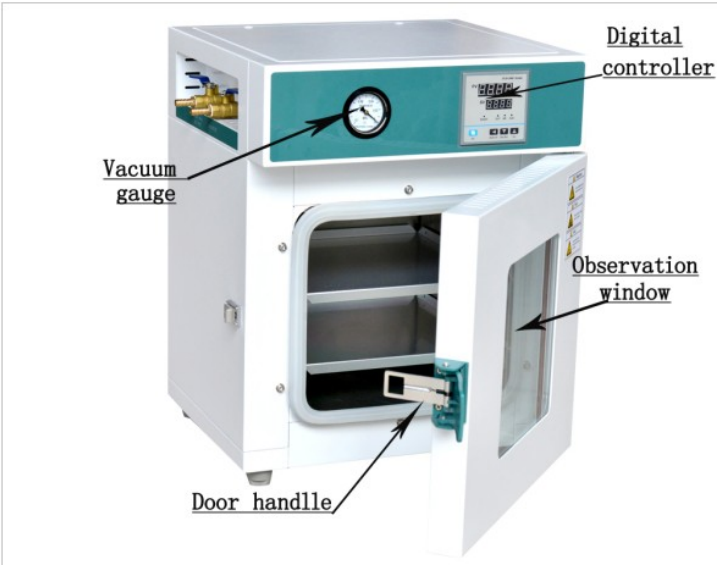
The Vacuum Drying Oven is widely used in the field of biochemistry, chemical pharmacy, agricultural research and environment protection for drying and heating powder articles, as well as disinfecting and sterilizing of glass containers. It is specially designed for dryness of heat-sensitive material, decompose-prone and oxidation-prone material in high efficiency.

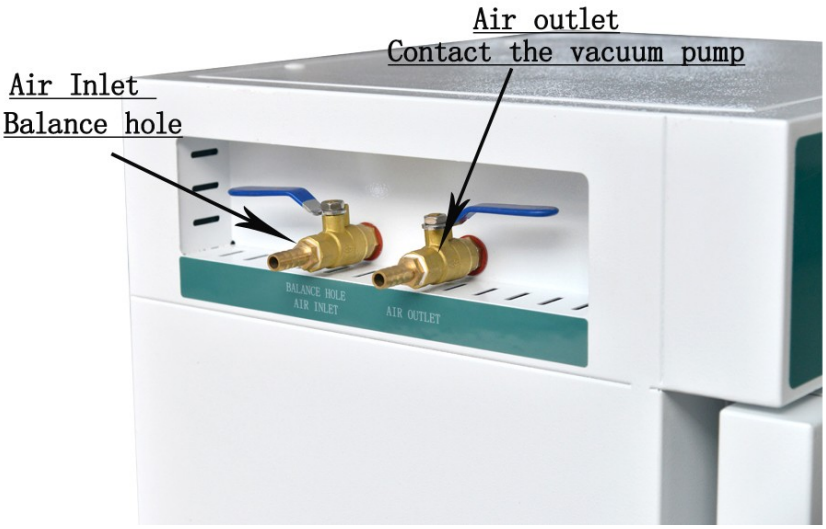
02 Structure Features

1. High-quality cold-rolled sheet chamber with electrostatic spraying surface ensures the aesthetics and longevity of the product.
2. Rectangular working tank maximized working volume and foursquare semicircle transition which is durable and convenient for cleaning.
3. PID micro-computer intelligent temperature controller, which has functions of timing, temperature set, setting time dual screen display, and over-temperature alarm.
4. Double-glass door structure, the interior door adopts tempered glass spring bracket structure to ensure good sealability and permissibility, by surpassing pressure of spring, the expanding air is leaked out. The outer door is made of bullet-resisting glass, which is easy to observe material inside working room.
5. Adopt heat resisting silicon rubber strip by one-time casting mould to greatly improve the sealability of working room.
6. Air-tightness adjustable buckle lock ensures excellent vacuum degree.

03 Product Structure Diagram and Parameters

i. Structure diagram



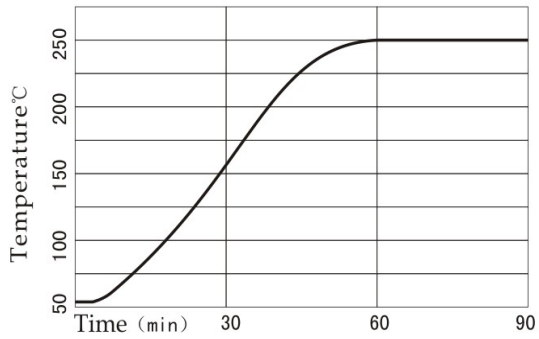


ii.Main technical parameters

Model	BOVA-301	BOVA-302	BOVA-303
Supply voltage	AC220-240V 50-60Hz		
power(w)	800W	1400W	2000W
Temp. range	RT+10~250°C	RT+10~250°C	RT+10~250°C
Temp. fluctuation	±1%	±1%	±1%
Inner Chamber Size W*L*H(mm)	300x300x270	415x345x370	450x450x450

Vacuum degree(Pa)	< 133Pa	< 133Pa	< 133Pa
Number of Shelf	2	2	2
Fuse specification	10A	15A	20A

iii. Temperature profile



Note: according to the different model type, the time of warming up is different.

04 Working Condition

The vacuum oven works under the following conditions:

1. Temperature ranges between 5~40°C;

2. Relative humidity less than 50% RH;

3. Power: voltage 220-240V, frequency 50-60Hz;

4. No violent vibration and corrosive gas surround the oven.

05 Attentions

1. Install the outer ground protection to ensure safety of machine and experiment; supply power as the machine nameplate required.

2. This equipment is forbid to use in inflammable and explosive, poisonous and

strong corrosive experiments.

3. Make sure horizontal installation.

4. Non-professionals are not allowed to disassemble and repair this machine.

5. When it is alarming, try to resolve, forced running is not allowed.

6. In normal working process, if vacuum air bleeder is not fully filled with air or pressure of working room does not reach the constant point, it is not allowed to open the door of working room in any way or by force to prevent accident.

7. If the treated material is inflammable goods, make sure the temperature is cooled down below burning point, and then put the air in, or else it will cause oxidation reaction and burning.

8. Read the instruction book before operation.

06 Operational Instruction

1. Put the material needs drying into container (advice: size of drying material should not over 2/3 of the shelf); then shut off air bleeder, close the container door and switch on vacuum valve, and next switch on vacuum pump to exhaust air, at the same time, watch vacuum meter. Screw the door handle slightly, anticlockwise running of vacuum meter pointer indicates it is pumping the air out. When the vacuum meter points to -0.1mpa, close the vacuum valve, and shut off vacuum pump and power.

Note: When vacuum oven is pumping air, close vacuum valve first, and then shut off vacuum pump, otherwise the vacuum pump oil will back up into workroom.

2. Heating

Turn on the power, and set temperature as needs (find details in meter instruction), then the temperature starts to rise; when temperature inside working room reaches the set point, the heating indication light will go out; in general, working within 120min, the internal shelf layer goes into constant temperature state.

Note: Heating switch has high and low gears, when the working temperature over 100°C, switch it to high gear.

3. Working time

Decide the drying time according to humidity of sample. If the drying time is too long, degree of vacuum will be decreased, then exhaust air again to revert vacuum degree. The operation method is open up the vacuum pump, and then the vacuum valve.

Note: when drying the material with large humidity, add vacuum transition dryer in inlet pipeline of vacuum pump to ensure long service life of vacuum pump.

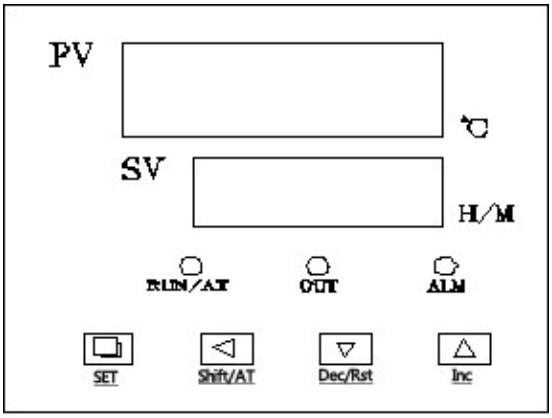
4. When finishing drying, shut off the power, and turn the air bleeder, after5 min, it eliminate the vacuum state, then open the door and take the material out.

Note: After eliminating the vacuum, the seal gasket will be sucked to glass door; it is not easy to open up at once, wait for a moment till the seal gasket returns to natural form, and then open the door.

5. Keep the drying oven clean, wipe the container sealing rubber strip by soft cloth and clear the dirt out; avoid cleaning it by chemical solution to prevent chemical reaction damage on sealing rubber strip.

6. If the oven is unused for a long time, daub neutral grease or Vaseline on galvanized parts to prevent corrosion; cover the oven with plastic dust cap, and store it in the dry room to keep the electric device against wet.

07 Instrument Operation Instruction



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.

Operation and using

1) When the controller is switched on, display windows show “In index (P, C, K, S)"” 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.

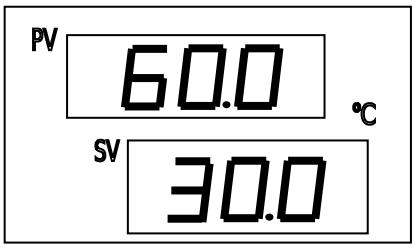
Press the “set” button again, it returns from the setting state and the settings are saved automatically.

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.

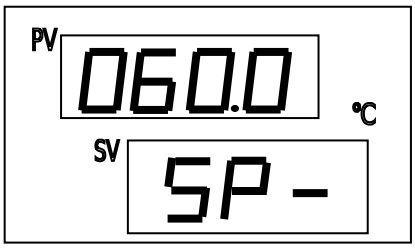
If En = 0, when the runtime is over, the “sV” window will display “End”, the buzzer will sound for 30s, off all outputs;

If En = 1, when the runtime is over, the “sV” window don’t show “End”, the buzzer sounds for 30 seconds, temperature Continue to constant temperature; After the end of operation, long press" shift / run" button for 3 seconds can restart the timer operation.

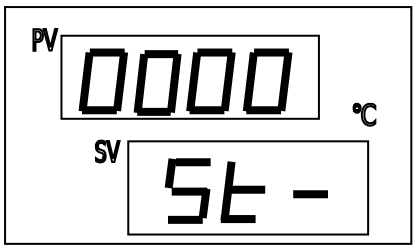
(1)The normal display



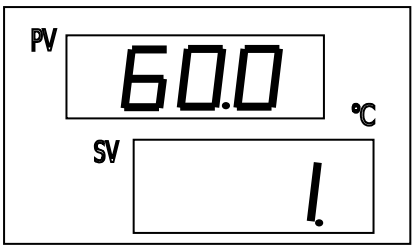
(2) the temperature setting state



(3)the time setting state



(4)Timing display



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.
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.

3

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 temperature 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.

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°C) 5
T-	Control cycle	The heat control cycle of temperature	(1～60S) Note 1
P-	Proportional band	Adjustment of proportional parameter.	(1.0～rH) 30
I-	Integration time	Adjustment of integration parameter.	(1～1000S) 400
d-	Differential time	Adjustment of differential parameter.	(0～1000S) 200
Pb-	Zero point adjust	When the zero error comparatively larger, to update this value should be needed. Pb=measure value –actual value	(-50～50°C) 0
PK-	Full point adjust	When the full point error also comparatively larger, to update this value should be needed. PK=1000x（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) Note 2

Note 1：If the selection of relay output, heating control cycle should be selected in 20 seconds, the other models for 5 seconds.
Note2：if FCD-300X series, a timing function for 2, other models for 0.
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	when“PV≥SP+Co”，Turn off the	(0.0～50.0°C) 5.0

	heat output deviation	heating output。	
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) 0
Lt-	Maximum power output	The heating output maximum power percentage;	(0～100)100
rH-	Range of temp setting	The value of temperature setting.	Note 3

Note3：FCD-30XX**:** 0～400.0°C(300°C); FCD-31xx:0～100.0°C(100°C);
FCD-3Kxx:0～1200°C(1200°C); FCD-3Sxx:0～1600°C;(1500°C)

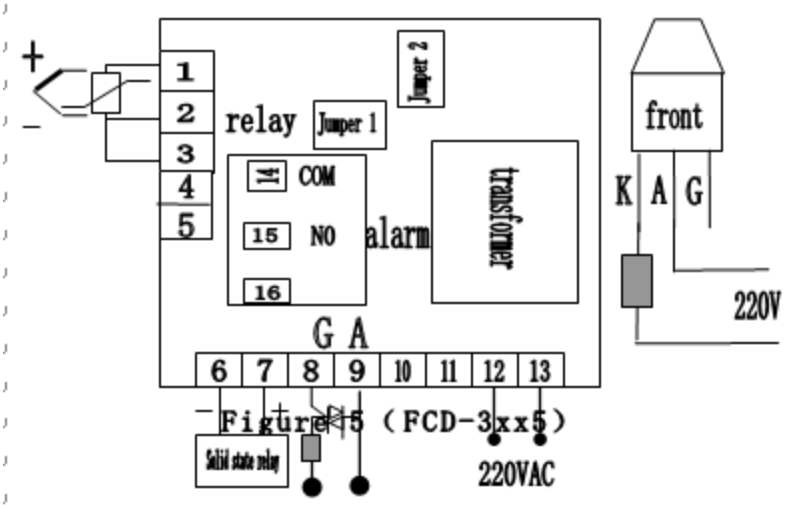
Parameter list-3:(LCD series this parameter table as the standard, digital series this parameter table for matching)

Parameter indicator	**Name**	**Instruction of the Parameter's function**	**(Setting range) factory set value**
Lc-	Password	when Lc=23,then we can see and modify parameters	0
Fc	Fahrenheit temperature switch	1: for Fahrenheit temperature display; 0: Celsius temperature display	(0～1)0
bd	internal parameters	Custoners should according to the Initial value	(0～1)0
ad	Address	Communication address	(0～32)1
p-t	Print interval	When p-t=0,no print	(0～9999s)0s

English name and parameter indicating the symbol table

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

08 Wiring Diagram



09 Fault Analysis

Phenomena	Causation	Treatment Method
1.No power supply	1.Plug is poorly contacted or the line is broken	1. Connect the plug and line.
	2. Fuse protector is broken.	2. Change the fuse protector.
2. No temperature rising inside container	1. Low setting temperature	1. Readjust and set temperature
	2. Heater is broken.	2. Change the heater
	3. Temperature controller is broken.	3. Change the temperature controller
	4. Temperature sensor is loose.	4. Screw up the sensor nut.
	5. Temperature sensor is broken.	5. Change the temperature sensor.
3. No vacuum-pumping	1. Air bleeder on panel is on.	1. Close the air bleeder
	2. Air valve on panel is on.	2. Close the vacuum valve.
	3. Vacuum pump exhaust tube is poorly connected.	3. Connect the pump exhaust
	4. Vacuum pump is broken.	4. Change vacuum pump.
	5. The chamber door is not fastened.	5. Fasten the chamber door.
	6. Rubber seal does not work.	6. Change the rubber seal.
	7. Vacuum meter on panel is broken.	7. Change the vacuum meter.
4. Displaying-------	The sensor is broken.	Change the sensor
5. Display STOP	Time-up	Press the program key for 3s to start.

6.It cannot reach -0.1Mpa	Vacuum pump is burn-in.	Repair or change the parts
7. Vacuum degree is decreasing.	Rubber seal does not work, or the exhaust tube is leaking.	Repair or change the parts
8.Vacuum meter can’t back to 0	Vacuum pump is burn-in.	Repair or change the parts
9. Vacuum meter is out of range.	Vacuum pump is burn-in.	Repair or change the parts

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