Operation Manual

BOVA-201/202

Vacuum Oven

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

Index

Notices

- In order to ensure safety to use this equipment , please read this instructional manual carefully
- Make sure put this manual in convenient place for later use
- Our company doesn't provide a safe guarantee if not use according to this instruction manual
- This manual only for user and authorized technician, should be properly kept.
- No notice if any changes because of product improvement.
- No right to copy this manual without our company authorization

Safety and Warning signs, label explication

This manual has important use information, user should comply with it.
Put this manual in convenient place for later use.

The symbols appear to the equipment and the manual will guide you safely and correctly to operate this equipment,
avoiding the possible harm

"Warning" symbol

It will cause serious harm or fatal accident if not comply with warning.

"Attention" symbol

It will cause human injury, equipment damage and loss of relative property if not comply with attention

- The meaning of symbols：

Prohibit
Must follow

- Symbols on equipment

AC
Protective conductor terminal
Power is connected

Power is disconnected
Warning, Attention, Caution and Danger

Safety operation and Preventive measure

Warning
Do not place this equipment outdoors. if it exposed in the rain, it may cause creepage and electric shock.
Only professional person have qualification to install this equipment. If not, it may cause electric shock or fire.
Should place this equipment on the firm ground in case of tumble. If not, it may cause injury because it capsizes.
Do not place equipment in humid environment or a place with dripping water. Otherwise it may cause creepage or electric shock
Do not place equipment near flammable materials and volatile substance. Otherwise it may cause explosion or fire.
Do not place equipment in the area where surrounded by acidic or corrosive gas, Otherwise it may cause creepage or electric shock
Please use power supply socket with protective conductor terminal in case electric shock. If power socket without protective conductor terminal, it is necessary to install it by licensed technician.
Do not connect protective conductor terminal through gas, water pipe, telephone line or lighting arrester which will cause electric shock.
Please use specified power supply. If not, it may cause electric shock or fire.
Do not put volatile and inflammable substances in the inner chamber of equipment if it cannot be sealed, or it may cause explosion or fire.
Do not insert nail or wire and similar metal objects into any inlet or outlet of equipment, or it may cause electric shock or injury
Please operate this equipment in safe area if it stores any toxic ,harmful and radioactive substances, or it may do harm to human and environment.
Make sure to cut off power supply before maintaining equipment in case it causes electric shock or injury .

Safety operation and Preventive measure

Do not touch any electric components or switch with wet hand, or it may cause electric shock
Make sure wear mask when maintaining the equipments to prevent any harmful drug substance and airborne particle.
Do not splash water onto the equipment, or it may cause electric shock or short circuit .
Do not place container which is filled of water on the top of equipment, or it may cause creepage or electric shock.
Do not drag, twine or bind power cord. Do not damage power plug, or it may cause electric shock or fire hazard.
Do not use loose power plug, or it may cause fire or electric shock
Do not dismantle, repair or refit equipment without authorization and guidance from our company. It may cause fire or injury due to the improper handling.
Please unplug the power if equipment is malfunctioning. It may cause fire or electric shock if it continues.
Press power plug instead of pulling the power cord when you want to unplug the power from power socket, or it may cause electric shock or fire hazard because of short circuit.
Should unplug the power before moving equipments. Do not damage power cord. Damaged cord may cause electric shock or fire.
Should unplug power plug if it’s not used for long period, or it may lead to electric shock, leakage or fire because of wear and tear of insulator.
Keep out of reach of children and the door unsealed if the equipment is not supervised or not used for a long period.
Should inform authorized technician when you dispose the equipment. Should dismount the equipment door to prevent suffocation and such accident.
Keep out of reach of children with the wrapping plastic.

01 Introduction

Application

KZ-G series Vacuum oven is a thermostatic equipment of heating and vacuum control, highly precise and advanced, widely used for drying heat sensitive or easy oxidation material, especially for powder or granular samples, and shorten drying time effectively. It is used for vacuum drying, preservation, disinfection and sterilization in biological pharmaceutical industry, medical career, agricultural scientific research institution and biological chemistry, universities & colleges, scientific research and other fields.

Working principle

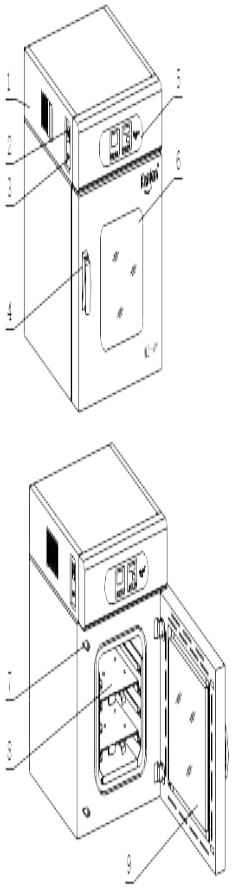
KZ-G series vacuum oven transfers actual temperature detected from temperature sensor into signal, through microcomputer to heater towards required temperature. Manually operate vacuum pump to reach required vacuum degree.

Technical Parameters

Temperature range : +5~250℃
Vacuum range: 99.99~0kp
Temperature resolution: 0.1℃
Temperature fluctuation: ±0.5℃(+10℃~240℃)
Power supply: AC 220V/50Hz ;
Timing range: 0~99H,0~9999M(adjustable)
Type of equipment: I
Working ambient: Temperature 10℃~30℃ humidity ≤70%RH

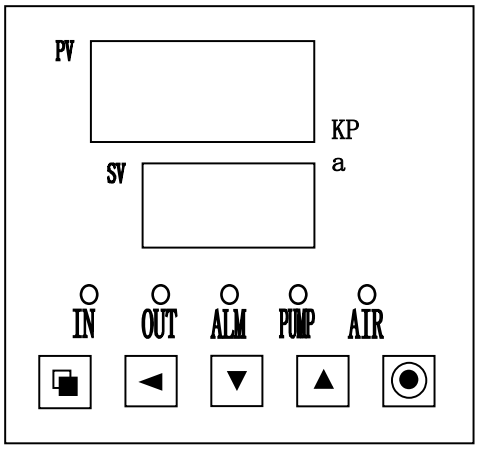
02 Structure

Parts



1 controller 2 power supply switch 3 485 interface
4 door switch 5 control panel 6 organic glass
7 door lock 8 shelf 9 tempered glass

Vacuum Controller



1. PV (measured value) : show the measured vacuum degree at present.
2. SV (set value) : show the set vacuum degree in normal state.
3. IN (air inflow) : its lightening means the inlet solenoid valve is switched on, and the vacuum degree will increase .
4. OUT (air exhaust) : its lightening means the outlet solenoid valve is switched on, and the vacuum degree will decrease .
5. ALM (alarm): its lightening means the set value can not be achieved in considerable time, users need to check the instrument.
6. PUMP: its lightening means pump is working.
7. AIR (air escape) : its lightening means the air escape solenoid valve is switched on,and the vacuum degree will decrease quickly, normally, this situation means the whole experiment complete, you can press on the button to trigger this situation.
8. button (set) : setting of vacuum degree and timing.(SP means vacuum degree setting value, ST means timing setting value, click on the buttons with arrow to set the required value).
Press on this button for 3 seconds to enter inner parameters setting mode , click on this button in setting mode to shift different parameter, click on the buttons with arrow to set the required value, and then press on this button for 3 seconds to quit setting mode, the new parameter values will be saved.
9. button (step) : click on this button to inquire total steps and current step, click on this button to shift the digit position in setting mode.
10. button (cycle): inquire total cycles and current cycle in normal state, decrease the setting value in setting mode.
11. button (restart) : press on this button for 3 seconds to restart the program, increase the setting value in setting mode.
12. button (air escape) : press on this button in normal state to switch on the air escape valve ; and restart the program with another 2-second pressing.

03 Operation

All the indicators keep shining for 3 seconds after power on, the controller enter running mode. PV window displays current measured vacuum value · SV window displays setting vacuum value.

When dS (total step)=1:
In normal mode, click on the button to enter vacuum and timing setting mode. Setting range of vacuum degree is 0~9999 Kpa, timing range is 0~9999 minutes(if the timing value is 0, the controller will keep working until power off), after setting click on the button to quit this mode, the new setting value will be saved.
In setting mode, if there is no operation in 30 seconds, the controller will quit setting mode automatically, the new setting value will not be saved.
While the setting vacuum degree achieved, the timer starts to work; after the timing program, the buzzer tweets, the window displays “End”, meanwhile, the air escape switch on automatically. You can click on any button to mute.
When dS≥2:
In normal mode, click on the button to set vacuum and time value in order:
SV1、ST1、SV2、ST2……SVn、STn · n=dS

Inner parameters

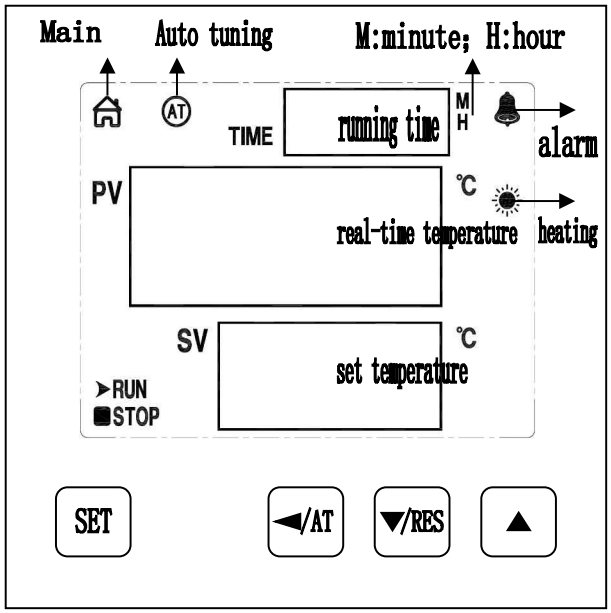
In normal state, press on button for 3 seconds, and change the “Lc” value to 3 or 9 to enter inner parameter setting mode. Then click on the button to shift different parameters. After setting, press on the button for 3 seconds to quit setting mode.

parameters	name	instruction	range (factory value)
Lc=3			
dS	Step setting	To set available segment numbers	1～2 (1)
cc	Cycle setting	Valid only if “dS”=2 A whole cycle means SP1, ST1, SP2, ST2 all complete for one time, if “cc”=0, the controller will work continuously.	0～99 (0)
Al	Failure time alarm	If the set vacuum degree can not be achieved in AL time, the buzzer tweets to remind user.	2～100 (20)minutes
Pon	Power fail safeguard	0: restart from beginning when power on again	0~1 (0)

		1: restart from the power fail point when power on again	
Lc=9			
OuP	Air outflow valve-on threshold value	When the measure vacuum value≥SP+ ouP, the air outflow valve switch on	-9.00~9.00 (0.10)KPa
Odn	Air outflow valve-off threshold value	When the measure vacuum value≤SP+ odn, the air outflow valve switch off.	-9.00~9.00 (-0.10)KPa
IuP	Air inflow valve-off threshold value	When the measure vacuum value≥SP+ iuP，the air inflow valve switch off.	-9.00~9.00 (0.00)KPa
Idn	Air inflow valve-on threshold value	When the measure vacuum value≤SP+ iuP，the air inflow valve switch on.	-9.00~9.00 (-0.50)KPa
Cdt	Pump off delay	When the air outflow valve turned off, the pump will stop working in Cdt time, (if Cdt=0, pump will keep working)	0~999 (10) minutes
Odt	Outflow delay	The air outflow valve allowed to restart after “odt” timee	0~999 (120) second
Pb	Zero adjustment	Charge the sensor error of vacuum degree. Pb =real value-displayed value	-5.00～5.00 (0) KPa
PL	Full point adjust	PL=1000× (actual value - measure value) /measure value.	(-999～999) 0
dEP	Filtering depth	The smaller the value of dEP is, the slower the vacuum value changes	(1~200) 100
SPd	Timing threshold value	Timer start working while measured value achieve set value ±SPd	(0.01~10.00 KPa) 0.5

parameters	name	instruction	range (factory value)
Lc=567			
rST	Reset to factory values	0： cancel to reset to default value; 1： confirm to reset to default value.	(0 ~ 1) 0

04 Temperature Controller



3. Operation and using

1) When the controller is switched on, display windows show the version number and controller model for 2 seconds, then it starts running.
2) "◄" button: In the setting state, click on the button to shift the set value. In normal mode, press on this button for 6 seconds to enter into Auto-tuning procedure.
3) "▼" button: In the setting state, click on the button to reduce the set value. If you keep pressing on the button, the set value will reduce continuously. In normal mode, press on this button for 3 seconds to restart the contoller when the setting time is over.
4) "▲" button: In the setting status, click on the button to increase the set value. If you keep pressing on the button, the set value will increase continuously. In the Normal status, click on the button to open or close the back light lamp.
5) In the setting mode, If no button is pressed within 60s, the controller will automatically return to normal display.
6) Temperature and time setting

- No timing function

Press the "SET" button in the non-set state, windows display the prompt "SP" and temperature set value. Using the "SHIFT"、"DEC" and "inc" buttons, user can modify the settings to the desired value, then press the "SET" button again, controller will return to the normal display, the setting value will be saved automatically.

- With timing function

Press the “SET” button in the non-set state, windows display the prompt “SP” and temperature set value. Re-press the “SET” button, windows display the prompt “ST” and time set value. Press the “SET” button again, controller will return to the normal display, the setting value will be saved automatically.

When the time is set to “0”, it indicates the timer is inoperative, the controller will run continuously. If there is time set, the under window of controller will display temperature setting value or the running time according to the value of “ndt” in Parameters table 2. When display the running time, the unit decimal point is lit, Start timing when the measured temperature reaches to the setting value, When the run time is over, the under window of controller will display “End”, the buzzer will sound for “EST” seconds (parameter table 2), it can be muted by pressing any button, press the “RST” button for 3s at this time, the controller will restart.

7) When Over-temperature alarm, the buzzer beeps continuously, "ALM" warning light is lit.
8) When the buzzer sounds, press any key to mute.
9) If the middle zone of controller panel displays “----”, you will learn the temperature sensor or the controller fails, therefore, please carefully check the temperature sensor and wiring.

4. Auto-tuning of PID

Use auto-tuning function when the temperature control is not good.

In the non-set state, press the “◄/AT” button for 6s,the window displays ‘AT’ and ‘0’,change ‘0’ to ‘1’ by ‘▼’ or ‘▲’ button, and click on the set button, then the controller will run the auto-tuning program, the “AT” symbol flashes, after auto-tuning end, the light stops flashing, a new group of PID parameter value is saved automatically. In the auto-tuning process, press the “AT” button for another 6s, the controller will stop the auto-tuning program.

In the auto-tuning process, the “SET” button is invalid, the under window always displays temperature set value.

Action please: the temperature is not precisely controlled when you start an auto-tuning program,there must be over-temp situation,please take out your stuffs from the oven before auto-tuning.

5. Internal parameters settings

In normal mode, Press on the “Set” button for 3s, 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 3s, it will return to the running state, the setting value will be saved automatically.

Parameter table 1

Parameter prompt	Name	Instruction of the function	(Setting range) factory set value

Lc-	Password key	When Lc=3, enter the next parameters.	0
ALH-	Over-temp alarm	If “SV>(SP+ALH)”, the “ALM” light turns on. The buzzer sounds and the heating output turns off.	(0～100.0℃) 20.0
ALL-	Under-temp alarm	If “SV<(SP-ALL)”, the “ALM” light flashes, the buzzer sounds.	(0～100.0℃) 0
P-	Proportional band	Adjustment of proportional function.	(1～400.0℃) 35.0
I-	Integration time	Adjustment of integration function.	(1～2000S) 200
d-	Differential time	Adjustment of differential function.	(0～1000S) 200
T-	Control cycle	The temperature control cycle.	(1～60S) 5
Pb-	Zero point adjust	When the zero error comparatively larger, to update this value should be needed. Pb= actual value – measure value	(-50.0～50.0℃) 0
PL-	Full point adjust	When the full point error also comparatively larger, to update this value should be needed. PK=1000× (actual value – measure value) / measure value.	(-999～999) 0
Addr	Address	The communication address. invalid	(1～32) 1
Loc	Setting lock	0:you are allowed to alter the set value of temperature and time; 1:the set value of temperature or time is not allowed to alter	0(0~1)

Parameter table 2

Parameter prompt	Name	Instruction of the function	(Setting range) factory set value
Lc-	Password key	When Lc=9, enter the next parameters.	0
ndA-	Temp alarm mode	0: Only over-temp alarm is valid. 1: Both over-temp alarm and under-temp alarm are valid	(0～1) 0
doT	Temperature radix point	0: invalid 1: valid	(0～1) 1

ndt-	Timer mode	0: No timer function. 1: The timer get to work as soon as the set temperature value is achieved. 2: The timer start to work as soon as the controller gets to work.	(0～2) 1
Hn-	Timer unit	0: Minute. 1: Hour.	(0～1) 0
SPD	Timer parameter	When measured value of temperature >SPD+set value of temperature,timer get to work	(0.1～50.0℃) 0.5
SPT	Constant temperature tip time	In timing mode(set value of temperature is achieved),the buzzer reminds you when the tip time you've set is achieved.	(0～9999S) 0
EST	Tip after timing	When timing program is over,the buzzer reminds you as soon as the tip time you've set is achieved	(0～9999S) 60
EH-	Timer end mode	0: Continue to maintain the constant temperature when the running time is over. 1: Stop the temperature control when the running time is over.	(0～1) 0
ndo-	Switch-output	0: when timing program is over 1: when over-temperature alarm occurs 2:when the timer starts to work	(0～2) 0 Only valid in PCD-8201 Model
opn	Gating judgement	0: invalid 1: valid	(0～1) 0
nP	Output power	Output power percentage of heating	(0～100%) 100
Co	Heating prohibit point	When PV≥SP+Co, heating output will be cut off	(0～50.0℃) 50.0
SPL-	Minimum set point	The minimum temperature set value.	(-50.0～50.0) 0
SPH-	Maximum set point	The maximum temperature set value.	(SPL～400.0) 300.0

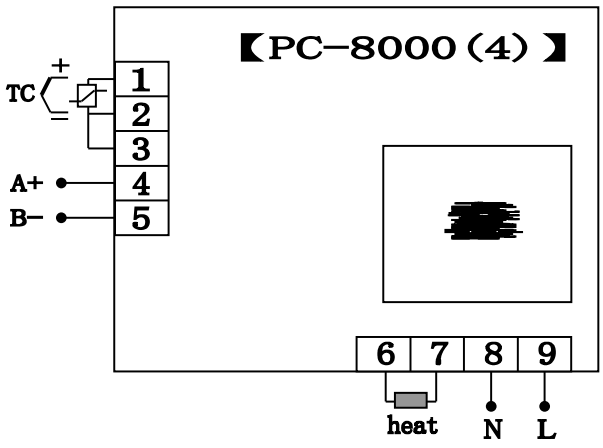
Parameter table 3

Parameter prompt	**Name**	**Instruction of the function**	**(Setting range) factory set value**
Lc-	Password key	When Lc=27, enter the next parameters.	0
FC	Temperature unit	0:Centigrade 1:Fahrenheit	(0~1)0

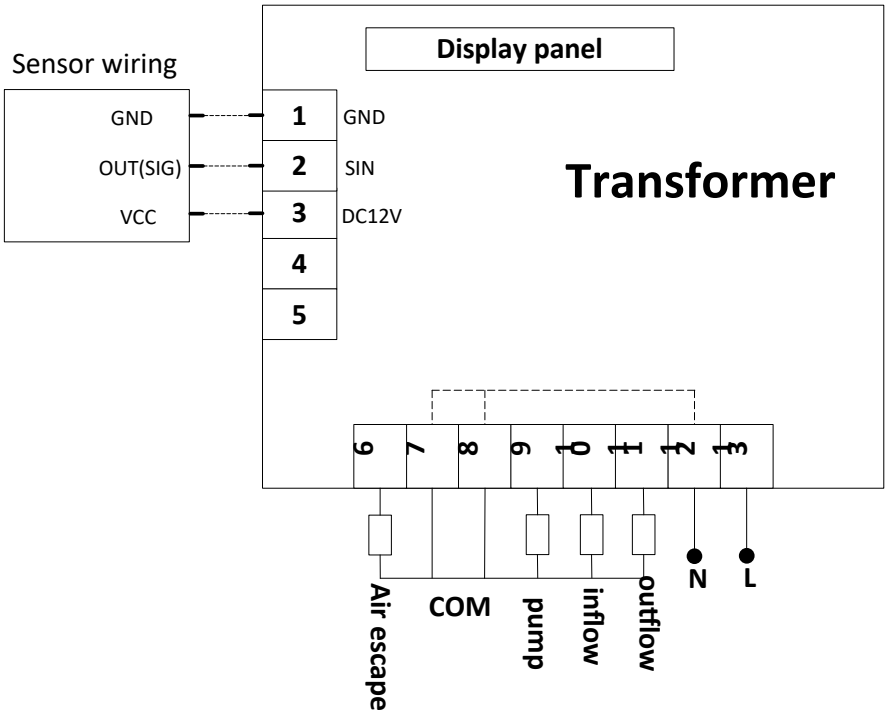
Parameter table 4

Parameter prompt	Name	Instruction of the function	(Setting range) factory set value
Lc-	Password key	When Lc=567, enter the next parameters.	0
rST	Recover Factory Set value	0:cancel 1:confirm	(0~1)0

Wiring (temperature controller)



Wiring (vacuum controller)



In order to optimize the performance of equipment, please install the equipment in the following condition:

Attention: ambient temperature 10~30℃ ;relative humidity less than 70%

1. Avoid exposure to the sunlight.

Do not place it in direct sunlight, or it won't reach predicted performance

2. An efficient ventilative place

If you operate this equipment in a narrow and concealed room, it may lead to over-heating and malfunctioning. Minimum safe distance between equipment and wall is 10CM

1. Keep away from heat source

Don't install the equipment near heating source. External excess heat will affect performance of the equipment and may cause malfunctioning

2. Flat and firm ground

Make sure to install it in flat and firm ground. Uneven surface or leaning installation may damage equipment or injure people. Proper installation can avoid shaking and noise

3. Avoid humid place

Install the equipment in a place where humidity is less than 70%. Otherwise it may cause creepage or electric shock.

Warning
Do not place this equipment outdoors. If it exposed in the rain, it may cause creepage and electric shock.
Do not place equipment in humid environment or a place with dripping water. Otherwise it may cause creepage or electric shock

Otherwise it may cause explosion or fire. Do not place equipment in the place where has acidic and corrosive gas, or corrosion will cause creepage, electric shock or equipment damage.

05 Installation

1. Unpacking
Remove packing materials, open the door for ventilation. Please use neutral detergent to clean if the shell and panel is dirty. Then wipe with wet cloth and at last with dry clean cloth
2. Level equipment
Fix equipment with the front brake-wheel after installation in case equipment moves.
To prevent shaking on uneven ground, pads maybe needed.
3. Protective conductor thermal

Warning
Please use power socket that has protective conductor terminal in case of electric shock. If it is not connected, has to install protective conductor terminal by licensed technician.
Do not connect protective conductor terminal through gas, water pipe, telephone line or lighting arrester which will cause electric shock.

4. Idle equipment
Before setting equipment aside, empty water in the humidifier and remove internal moisture thoroughly. Be sure the inner chamber is dry and cool before closing the door .
5. Moving equipment
Before moving equipment, empty inner chamber to prevent objects falling off.

Preparation before hand

When equipment running in the first time ,please operate as follows

1. open the outer door;
2. take out of the shelves
3. then take out of the other accessories, and dry the shelves and inner wall with gauze.
4. put the shelves according to yourself or experiment, then fix the shelves.
5. connect the vacuum pump to the right of vacuum oven
6. samples should not be crowded ,then close the door properly
7. air inlet valve is closed and vacuum valve is open

Specifications

Name	**200 series Vacuum Oven**	
Model	BOVA-201	BOVA-202
External Dimension (H*W*D)mm	685×545×490	775×635×550
Internal Dimension (H*W*D)mm	285×258×315	375×348×385
Volume	23L	50L
Input power	850W	1250W
Shell	Cold-roll steel sheets with powder coat treatment	
Inner chamber	SUS304 stainless steel	
Door	With heating preservation design	
Tray	SUS 304 stainless steel, adjustment space	
Heating preservation system	Heat preservation cotton, isolation filling.	
Temperature control system	PID auto-setting system	
Heating system	SUS304 stainless steel electric heating element	
Air valve	Imported air valve	
Temp. sensor	Samsung Temp. sensor PT100	
Displayer	LCD(Liquid Crystal Display), English Display	

protection	Front window is made of organic glass	
Warning system	Temperature upper limit warning; Temp. sensor failure warning or vacuum warning with acousto-optic alarm	
Weight	60Kg	90Kg
Tray quantity	2	2
Optional Accessories	Switch port ,Portable printer, Vacuum pump, Monitoring software	

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