

## Operation Manual



BODR-200

## Drying Oven

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

# Index

1. Instruction.....	07
2. Product Structure.....	08
3. Installation.....	10
4. Operation Method.....	12
5. Troubleshooting.....	17
6. Specification.....	18

## 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



**Warning**

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

### “Attention” symbol



**Attention**

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

### Warning

	Do not touch any electric components or switch with wet hand, or it may cause electric shock
	Make sure you wear mask when maintaining the equipment's 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 bend 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 equipment. 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 to avoid any injury.

## Safety operation and Preventive measure

### Attention

	Please clean the dust on the power plug and then insert it into power socket properly, or it may cause over-heating or strike sparks
	Check temperature, humidity, segment and timing and other setting value when reboot the equipment after been short circuited or cut off by power supply. Otherwise it may cause damage of the products stored inside.
	Please place equipment in ventilated and dry place if not used for long period after purchase, or it may lead to equipment malfunctioning when use.
	Should arrange proper carrying-tools or qualified person when moving equipment. Prevent tumbling when moving equipment, it may cause damage of the equipment or human injury.
	Ensure enough space when moving equipment. If you need to carry it to the second or higher floors, make sure the elevator has enough space for the equipment and working personal.
	Do not put acidic, alkaline or corrosive substance in the inner chamber if the container is not sealed. Otherwise it will cause corrosion or damage to the components of equipment.

# 01 Instruction

## Application

200 series Constant temp. Drying Ovens are temperature control equipment with heating control, highly precise and advanced. Widely used in bio-chemistry, pharmacy, medical institution, industrial and mining enterprises, university, colleges and other scientific research field etc. Can be used for drying, baking, disinfection, sterilization, etc.

## Working Principle

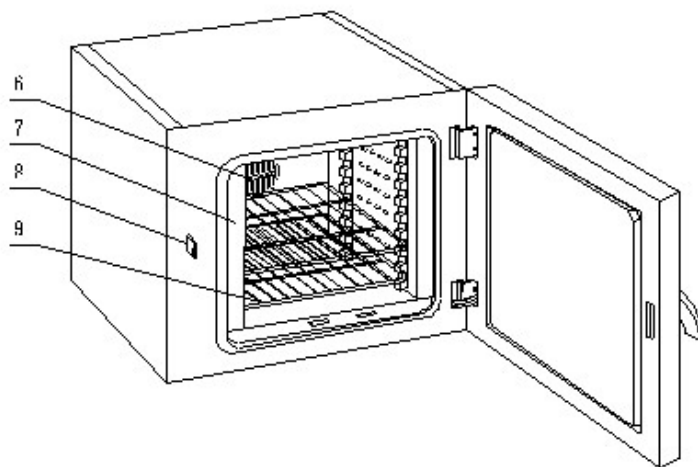
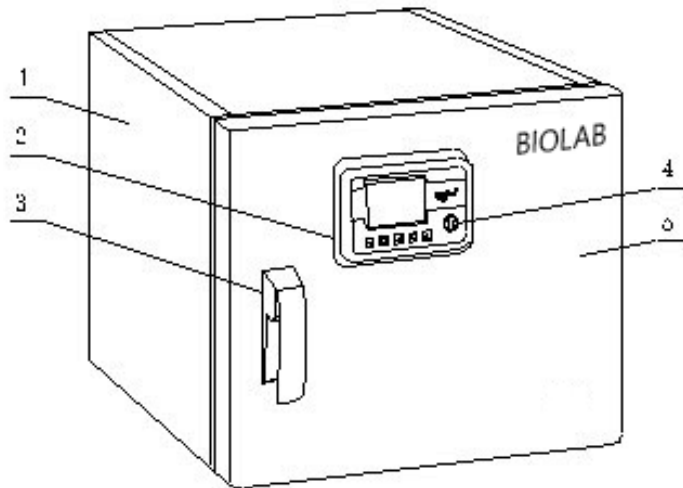
Constant temp. Drying Ovens transfer actual temperature detected from temperature sensor into signal, through the microcomputer control to the heater towards required temperature.

## Technical Parameters

1. Temp control range : +5~250°C;
2. Temp. resolution: 0.1°C
3. Temp fluctuation range :  $\pm 1.0^{\circ}\text{C}$ (50°C~240°C );
4. Temp uniform range : 2% (50°C~240°C );
5. Power voltage : AC 220V/60Hz;
6. Timing range: 0~99hour, 0~9999min
7. Equipment class : class I
8. Working ambient : ambient temp 10~40°C relative humidity 70% below ;

# 02 Product Structure

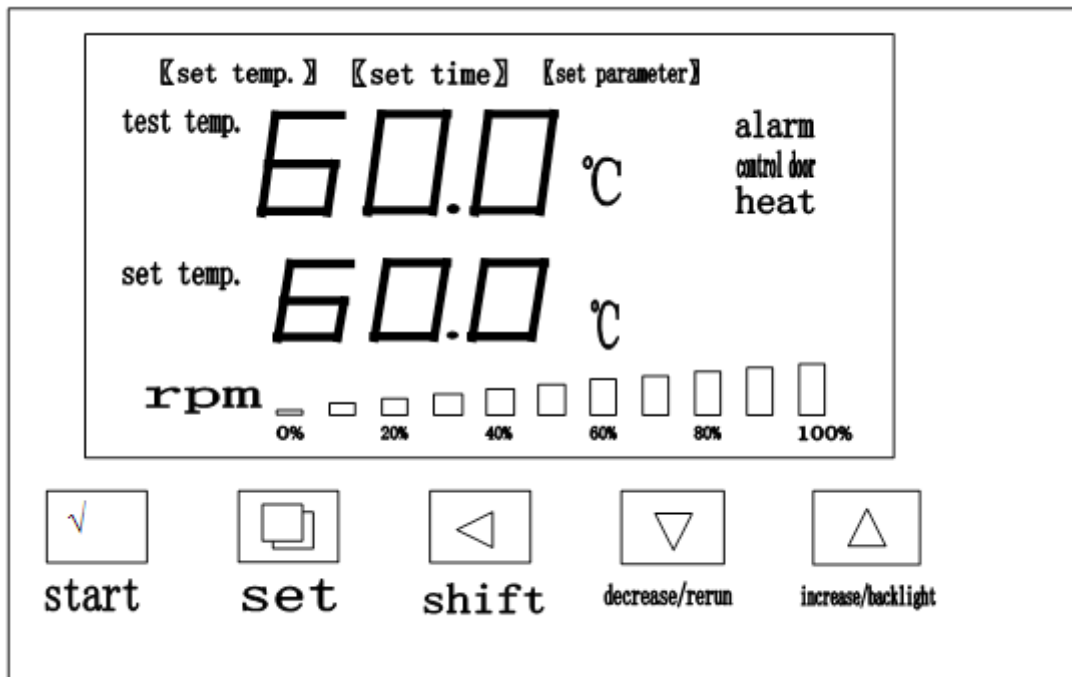
## Components



1. incubator body   2. controller   3. door handle   4. power supply   5. outer door  
6. fan cover   7. inner chamber   8. door button   9. mesh board



## Control Panel



### Button definition:

1. "start" button: start or stop
2. "set" button: set or view temperature, time and other settings.
3. "shift/self regulating" button: in non-setting mode, long press this button for 6 sec. to enter or exit system auto-setting; in setting mode, press this button to modify set value.
4. "decrease/rerun" button: in non-setting mode, when run finishes, long press this button for 3 sec. to rerun; in setting mode, press this button to decrease set value, long press this button to decrease continuously.
5. "increase/backlight" button: in non-setting mode, press this button to turn on or off the screen backlight; in setting mode, press this button to increase set value, long press this button to increase continuously.

## 03 Installation

### Installation Place

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



**Attention:** ambient temperature 10~30°C ;relative humidity less than 70%

- Avoid exposure to the sunlight.

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

- An efficient ventilated 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

- 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

- 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

- 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

- Avoid place with flammable or corrosive gas.

Do not place equipment near flammable materials and volatile substance. 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.

## 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 is running the first time, please operate according to following:

1. Take out the shelf boards and other accessories inside.
2. Clean the inner chamber with gauze
3. Insert the shelf boards into inner chamber according to your experiment and requirement
4. If you place samples on the same shelf, should keep space between samples for air circulation.

#### **Attention**

Do not use NaCl or other Halide solution to clean this equipment, or it will cause rust

## 04 Operation Methods

1. Start the equipment, screen display will light up. Wait for 2 seconds to enter the starter mode.
2. Set temp, time and fan rpm.

Press "Set" button, enter "temperature setting" mode, upper screen flashing, you can press "shift", "increase", "decrease" to reach set values needed; press "set" button again, enter "time setting" mode, two characters on the left hand side of lower screen flash, press "shift", "increase", "decrease" buttons to set "hour" value you need; then press "set" button, two characters on the right hand side of lower screen flash, press "shift", "increase", "decrease" to reach set "minute" value; press "set" button one more time, fan speed flashes, press "shift", "increase", "decrease" to reach set value you need (skip this step if fan is not installed); press "set" button again, exit set mode and auto-save values.

When set value for time is "0", means no timing function, controller will run continuously. Lower screen displays set value of temperature; when set value for time is not "0", lower screen displays time and the "second" symbol flashes when test temperature reaches set temperature. When time is up, it will stop running and shut down all output parameters. Lower screen shows "End", beeper rings 3 times. Once it stops, long press "decrease/rerun" button for 3 sec. to restart.

3. "ALM" alarm indicator is on when is over heating. Beeper beeps continuously. Press any button to mute.
4. In setting mode, if no button press within 60 seconds, controller returns back to starter mode automatically.
5. If upper screen shows "----", it could be failure of temperature sensor or the controller. Please check temp. sensor and wiring connection.

### Auto-setting

When temperature control is not ideal, You can use auto-setting. During Auto-setting, temperature can fluctuate, please consider it as a factor towards end result.

In non-setting mode, press "shift/Auto-setting" for 6 sec. to enter auto-setting mode. "AT" indicator light flashes, the indicator light stops flashing when it finishes. The control system will obtain new set value of PID parameter, then auto-save the data. During auto-setting, long press "shift/auto-setting" button for 6 seconds to stop.

During auto-setting, if there's over-heating, "ALM" indicator light is on, heating alarm relay will automatically detach, but beeper will not beep. During auto-setting, "set" button is unavailable. No matter whether there is setting for temperature control timing. Lower screen of the control panel will always display set temperature during auto-setting.

## View and set intrinsic parameters

Long press "set" button for 3 seconds, lower screen shows code "Lc", upper screen shows enter password, you can modify value through "increase", "decrease" and "shift" buttons. Then press the "set" button, if the password is incorrect, controller panel will automatically return to normal display; If password is correct, proceed to intrinsic parameter setting mode. Press set button to modify parameters. Long press set button for 3 seconds to exit, and auto-save parameters.

### Intrinsic parameter-1

Parameter code	Parameter name	Parameter function	factory default (range)
<b>Lc-</b>	Password	"Lc=3",view and modify parameters	0
<b>AL-</b>	Over-temperature alarm margins	when "test temp. > set temp. +AL ", alarm light is on, alarm beeps, stop heating.	(0~100.0°C) 20.0
<b>T-</b>	Control cycle	heating control cycle	(1~60sec.) 5
<b>P-</b>	Proportion	timing proportion adjustment.	(1~mileage value) 40.0
<b>I-</b>	Integral time	integral acting in regulation	(1~1000sec.) 380
<b>d-</b>	Differential time	differential acting in regulation	(0~1000sec.) 280
<b>Pb-</b>	Zero adjustment	Modify error margins of sensor(low temp.) during test. Pb=actual temp.-test temp.	(-12.0~12.0°C) 0.0
<b>PK-</b>	Full-scale adjustment	Modify error margins of sensor(high temp.) test. PK=1000*(actual temp.-test temp.)/test temp	(-999~999) 0

## Intrinsic parameter-2

Parameter code	Parameter name	Parameter function	(range) factory default
Lc-	Password	"Lc=9",check and modify parameters	0
Co-	turn off heating output margins	When "test temp. $\geq$ test temp.+Co", stop heat output.	(0.0~50.0°C) 5.0
Ad-	address	The machine address	(1~16) 1
rH-	Mileage value	Max value of set temp.	(0~400.0°C) 300.0
TP-	Meter type	0:without fan; 1:with fan (without fan, no fan speed display, will change to display heating output capacity. )	(0~1) 0

### Attention:

if not use auto-setting, please enter following input values according to type of equipment. If it still cannot reach the ideal result, then run the auto-setting.

P(Proportion)	I(Integral)	D(Differential)	Equipment Type
40.0	380	280	Similar to (blast, vacuum) drying oven, oil bath, etc.
18.0	380	280	Similar to electric-thermal incubator, etc.

## Alarm and safety functions

- Temperature sensor failure alarm: Screen display: “- - -”, that is temp. sensor or controller failure.
- Temperature limit alarm: when test temp. is over 20 degrees, heating stops, “ALM” alarm indicator light is on. Alarm keeps beeping. Press any button to mute.

## Routine using and maintenance

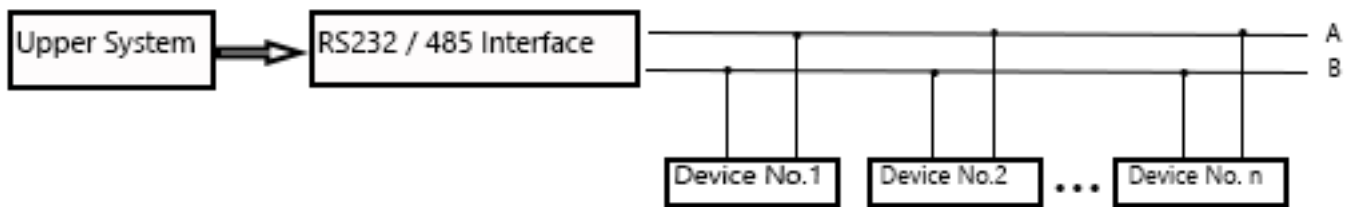
⊘	Do not capsize when moving.
⊘	Do not change the settings frequently during process, it may affect the control accuracy and the life of use.
!	The machine is equipped power switch and circuit breaker, if failure occurs during operation, please cut off the power and check the control circuit if it's intact, and then check the other parts. (See wiring diagram)
!	Make sure the door is shut. If the door is not closed properly, the device may not be able to reach maximum performance. When closing the door, do not slam the door to avoid damage of the locking system.
!	Do not use corrosive solution to wipe the exterior in order to maintain the appearance of the device. Please use dry cloth or alcohol wipe to keep the inner chamber clean.
!	When the device is not in use, keep the chamber dry, and cut off the power supply.
!	In order to keep temperature evenly inside the chamber, always check the axial fan in the chamber if it is functioning properly. During the experiment, in order to allow air circulation, objects inside the chamber should not be placed too close and blocking the vent.  Do not touch and collide the temperature probe inside, it may cause failure of temperature control.
!	Secure the shelf. Otherwise it may damage the cultures.
	Do not lean against the glass or apply pressure on the glass, it might cause injury.
⊘	Do not lean against the door of the device. To prevent tipping of the equipment or equipment damage, personal injury by the damaged door.

❗	When failure occurs, please arrange professionals or contact with the factory sales department. User should not attempt to repair or fix it.
❗	We provide one year warranty against any manufacturing defect.

## Assistant Configuration connection

### RS-232/RS-485 Instructions for use of the converter

In order to receive remote data between the different standard serial interface computer, external device or intelligent instrument. Must provide conversion of standard serial interface. The converter



is compatible with RS-232, RS-485 standard, capable of converting single-ended RS-232 signal to a balanced differential RS-485 signals. (It can connect 16 controller of this series together at the same time)



## 05 Troubleshooting

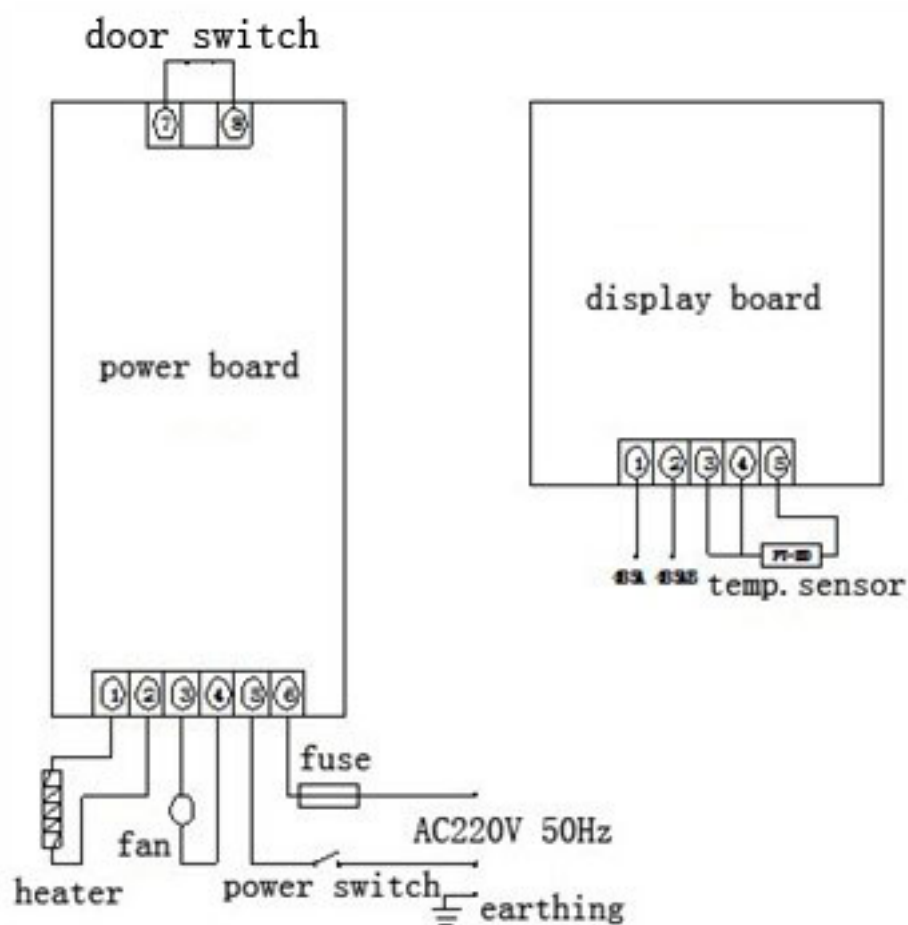
Trouble	handling
Sensor failure display (- - -)	Temperature sensor abnormal, please check temperature sensor (model:PT100)
Temp. can't reach of setting value	·Check screen if it displays heating, If it's heating, heating tube damage or control panel failure or circuit failure.
Temp. rises too slow	Check fan whether it is working properly (Open the door). If it's not running, check according to the wiring layout
Screen can not display	<ul style="list-style-type: none"> <li>·Please check if the power socket is ~220V</li> <li>·Please check if the power switch is on</li> <li>·Please check power switch, if it is tripping operation, please check wiring layout.</li> </ul>

## 06 Specification

Name	200 series temperature control Drying oven		
Model	BODR-201	BODR-202	BODR-203
External Dimension	570×580×593	670×680×593	770×780×693
Internal Dimension	350×350×350	450×450×350	550×550×450
Effective volume	40L	70L	130L
Power input	770W	970W	1270W
Case Shell	Cold-roll steel sheets with spraying treatment		
Inner hull	mirror surface SUS304 stainless steel		
Door	With original heat insulation design		
Shelf	High quality carbon steel and surface is chrome plating, adjustable space		
Heat insulation system	Polystyrene foam		
Temp. control system	PID system auto-setting program		
Heating system	Electric tube heating element		
Fan	Centrifugal fan		
Temp. sensor	Sum sung Temp. sensor PT100		
Screen	LCD(Liquid Crystal Display)		
Warning system	Temp. upper limit warning ; Temp. sensor failure warning with sound/light		
Weight	40kg	58Kg	65kg
Bracket(Standard)	2		
Optional Accessories	Port converter, portable printer		

**Note:** Biolab may change product design and specification without notice.

## Wiring layout






## Packing List

No.	Name	Quantity	Note
1	Main Unit	1	
2	User manual	1	
3	shelf	2 (130L)	
4	Handle	1	



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