Laboratory Equipment Manufacturer
www.mrclab.com

Rotary Evaporators, up to 2liter

Operation Manual

ROVA-N2L

PLEASE READ THIS MANUAL CAREFULLY BEFORE OPERATION

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MRC.3.15

Preface

This instruction manual gives detailed descriptions on the settings, operation, failure removal, repair and maintenance ROVA-N2L Series rotary evaporator.

Please be sure to read this manual carefully and gain a full understanding before use.

Packing list

Please be sure to confirm the type and quantity of all the parts.

Rotary Evaporator ROVA-N2L		Rova-N2L	Rova-N2L-H
1.	Instruction manual for use	1 copy	1 copy
2.	Warranty card	1 piece	1 piece
3.	Host machine	1 set	1 set
4.	Power cord	1 piece	1 piece
5.	Vacuum seal ring (main + assistant)	1 set	1 set
6.	O-ring	1 piece	1 piece
7.	Flask extractor	1 set	1 set
8.	Retaining nut of condenser	1 piece	1 piece
9.	Retaining spring of condenser	1 piece	1 piece
10.	Condenser pipe	1 piece	1 piece
11.	Rotary flask 1000ml	1 piece	1 piece
12.	Auxiliary condenser	1 piece	1 piece
13.	Recycling flask 1000ml	1 piece	1 piece
14.	Glass rotary shaft	1 piece	1 piece
15.	Feed pipe + Charging valve	1 set	1 set
16.	Recycling flask clip	1 piece	1 piece
17.	Condenser brace + rubber clamp	1 set	—
18.	Knob	1 piece	—
19.	Mouthpiece	3 sets	3 sets
20.	Cross screwdriver	1 piece	1 piece

Content

Safety instructions

As this device is not provided with explosion-proof structure, please pay full attention not to spill out the solution when using flammable specimen or organic solvents.

From the perspective of product function or performance, part of the host machine shall be rotated for application in the high-temperature water bath; at the same time, the product has glass components, which, if misused, would be cracked, thereby leading to unexpected injuries or accidents. However, most of accidents can be avoided if the pre-knowledge of these is obtained. Therefore, for the safety-related matters needing special attention, based on the significance and danger level, this manual gives the following definition attached with warning signs and terms. Please use it safely according to the requirements.

Warning signs and terms	Definition
⚠ Warning	If misused by operator, death or severe wound would happen to the user.
⚠ Attention	If misused by operator, wound or property damage would happen to the user.

✶ **Note:** Our Company has conducted thorough research and analysis on every danger that may occur during the operation; even so, it's extremely difficult to predict all the risks. Therefore, matters needing attention described in this manual do not contain all the dangers.

Whereas, if you conduct the operation in accordance with the methods and requirements as described in this manual, the maximum security of use will be ensured. In the use of this product, please be sure to pay full attention to avoid accident or product failure.

I Overview of product

1.1 Application

Warning

- Do not modify the product. Do not use it for unspecified purposes.
- Modifying the product or using it for unspecified purposes may cause electric shock or equipment failure.

Attention

- Pay attention to the state of glass components. Use with caution.
- Any breakage or damage of glass components would lead to unexpected accidents. Please carefully check whether the glass components are broken or damaged. Use with caution.

✶ The product is rotary evaporator, used for the concentration, rectification and fractionation of solution under the state of decompression.

✶ The product is not explosion-proof. Do not heat solvents at normal pressure or use it in reaction experiment.

1.2 Specification

Product name		Rotary evaporator	
Model		ROVA-N2L	
Performance	Rotating speed (rpm)	10～180	
	Evaporability（ml/min）	20	
	Maximum vacuum degree (Pa)	399.9 (below 3mmHg)	
Functions	Rotating speed setting	Knob-style stepless variable speed, digitalized rotating speed display	
	Safety function	Overload protection function (fuse)	
	Lifting function	Manual weight balancing mode	
Structure	Motor	Output power 25W	
	Condenser pipe	Dual coil pipe	
	Rotary flask (L)	0.5～2	
	Recycling flask (L)	1	
	Glass rotary shaft (mm)	Inner diameter Φ15 × overall length 190	
	Vacuum seal ring	Teflon + teflon-viton dual seal ring	
Specifications	Port caliber	Outer diameter of mouthpiece: Φ10	
	Engine base (mm)	T-type engine base 460×320	
	Lifting stroke (mm)	100＋150 (sliding lifting + manual lifting)	
Service ambient environment (℃)		5～35	
Heating power (W)		1500	
Rated power source (V/Hz)		AC220/50	
Dimension (mm)		560×320×660（910）	750×320×540（790）
Weight (Kg)		9.5	

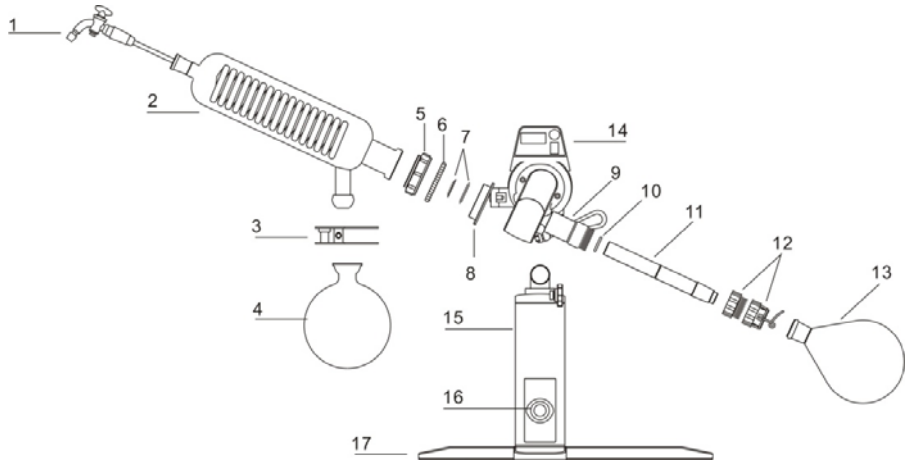
✶ The measurement for performance values is conducted at room temperature of 20□ with rated supply voltage.

✶ The evaporability differs depending upon the conditions including vacuum degree, water bath temperature, cooling water temperature, etc.

✶ Among the ROVA-N2L series, the model followed by “N” refers to digital display: for instance, “ROVA-N2L” is the digital-display type. Partial figures and contents in this manual are digital-displayed.

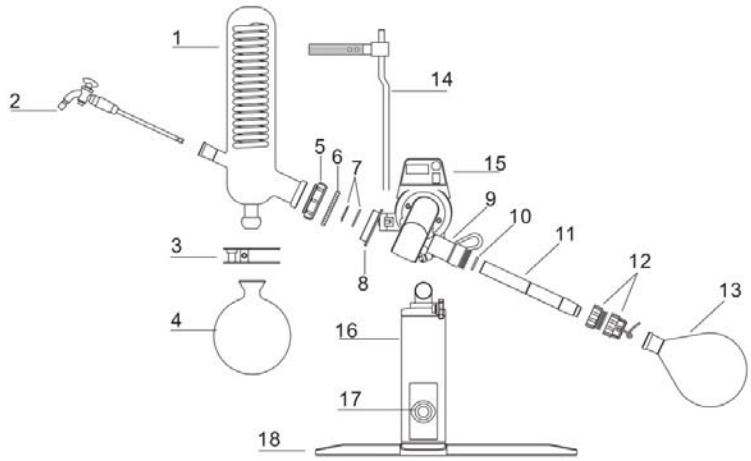
1.3 Name of parts

ROVA-N2L-H



1. Glass charging valve
2. Glass condenser
3. Ball-milled clip of receiving flask
4. Recycling flask
5. Retaining nut of condenser
6. Spring collar
7. Combined oil seal
8. Bearing end cover
9. Stainless steel rotary shaft
10. O-ring
11. Glass rotary shaft
12. Flask extractor
13. Rotary flask
14. Motor shield
15. Lifting column
16. Lifting handle
17. Base

ROVA-N2L



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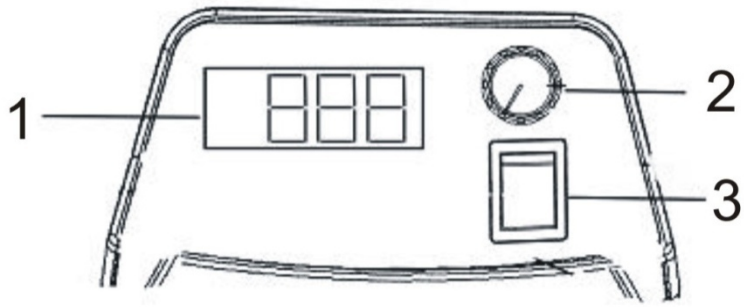
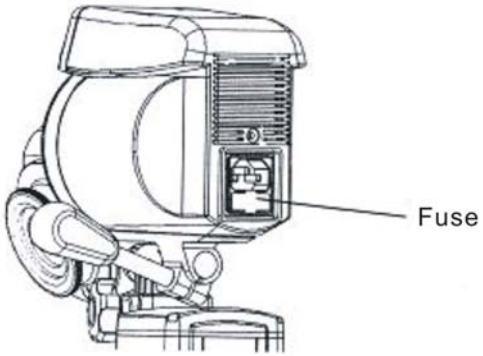
II Name and function of operation parts

2.1 Control panel



No.	Name	Function
1.	Digital display window	Displaying rotating speed
2.	Speed-regulation knob	Adjusting rotating speed
3.	Power switch	Switch indicator lighting up once power on

2.2 Safety function



Safety device	Phenomenon	Cause
Fuse	The fuse blows out and the power is cut off.	Overcurrent

III Settings

3.1 Environment for settings

Warning

- Do not set it in hazardous areas.
- The product is not explosion-proof; fire or other accidents would occur if it is used in hazardous areas.

The following places are selectable during the product setting:

- Places with the ambient temperature within the range of 5～35□.
- Places without direct sunlight, with good ventilation and little dust.
- Places at low temperature, without condensation and spattered water-drop.
- Places without inflammable solid, liquid and gas around.
- Smooth and steady places.

3.2 Power connection

Warning

- Implement the correct connection after the confirmation of power voltage, phase and power. Fire or electric shock would occur if misconnected.
- Connect ground wire correctly. In order to avoid electric shock; please absolutely do not connect the ground wire onto gas pipe or water pipe.
- Do not use the branching socket or wiring board which would cause fire or other accidents due to excessive current burning cables out.

(1) Please confirm the product model and the desired power voltage, voltage, phase and power. The power source connected to the product is illustrated by the following table:

Product model	Desired power source	
	Voltage	Current
ROVA-N2L	AC220V	10A

(2) Please confirm the power socket at the setting place. (Do not insert the plug at this moment)

Do not use the branching socket or wiring board during the power connection.

IV Operation

4.1 Preparations for operation

Attention

- Please pay attention to the rebounding of the lifter which has an upward elastic force from beginning to end. To release the lifter, please use your hands to hold the top for slow operation until the complete unlocking and then slowly lift it up.
- Before the installation of glass components, lift the lifter up first and then install the glass components; otherwise, rebounding would occur during the installation process, which may result in injuries.
- Use the glass components with caution. As glass components are easily damaged, please use them with care so as not to cause injuries.

1. Lifter lifting

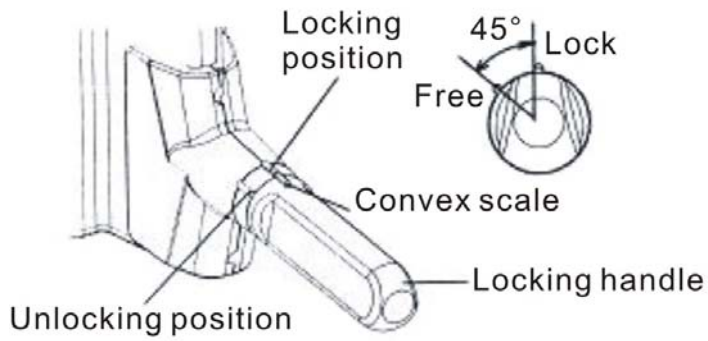
The lifter is functioning by the spring. The spring strength is regulated by the weight of glass components. After the installation of glass components, the acting force in upward and downward directions is in a balanced state.

To release the lifter under the condition without the installation of glass components, as the acting force in upward direction of instrument is strong, therefore, please use your hands to hold the top to control the rebounding strength of lifter.

(1) Use one hand to gently hold the control part and the other hand to hold the locking handle, doing a 45 ° rotation in counterclockwise direction (until to the free position). The brake will be released.

(2) To lift the lifter upward, rotate the locking handle in clockwise direction,

turning the convex standard-line on locking handle to the Lock position in the positive direction for locking. Please adjust the strength of your hand holding the control part to control the lifter lifting.



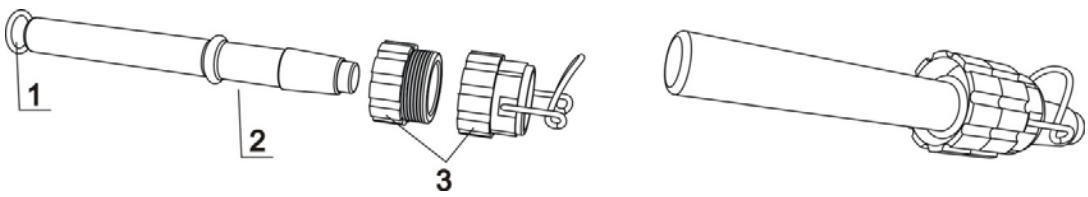
2. Installation of glass rotary shaft

(1) Please set the O-ring and flask extractor on the glass rotary shaft in proper order as shown in the following figure, in which, the-O ring shall be embedded on the left of glass rotary shaft.

(2) Insert the glass rotary shaft in the spindle nose of driving head.

(3) Screw the flask extractor onto the main rotary shaft.

(4) To remove the glass rotary shaft, please rotate the flask extractor in clockwise direction, hold it with hands and pull out the glass shaft and the O-ring simultaneously (during the installation and disassembly, insert the cross screwdriver into the hole of the main rotary shaft which will be secured then).



1. O-ring 2. Glass rotary shaft 3. Flask extractor

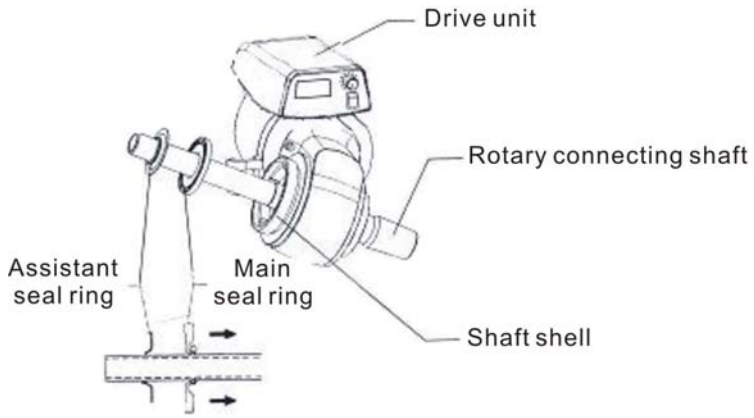
3. Installation of seal ring

Note: If the main and assistant seal rings are installed in wrong order and direction, the vacuum will be poor, which would speed up loss of seal rings.

(1) Please set the main seal ring onto the glass rotary shaft with the face of visible spring towards the host machine, pushing it into the shaft shell, rotating it and then closely pressing it to be flat.

(2) Please set the assistant seal ring onto the glass rotary shaft, pushing it into the shaft shell and pressing it against the main seal ring.

- During the installation of seal rings, please be sure to insert the glass rotary shaft first and then proceed with other work.
- Pay attention to the direction of seal rings. (as shown in the following figure)
- In the initial use, you would hear a squeaking sound at the contact part of seal rings and rotary shaft; at this moment, please apply a coat of vacuum grease or water onto the contact part.
- The vacuum seal rings are consumables.



4. Installation of condenser and vessel

Attention

- Pay attention to the state of glass components. Any breakage or damage of glass components would lead to unexpected accidents. Please carefully check whether the glass components are broken or damaged. Use with caution.
- Before the installation of glass components, lift the lifter up first and then install the glass components; otherwise, rebounding would occur during the installation process, which may result in injuries.

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(1) Align the condenser port with the vacuum seal rings in shaft shell and stick them closely, screw up with connecting nut to a certain extent, and then simultaneously rotate and further tighten the nut and condenser, ensuring the connecting mouth of recycling flask face-down during the positioning.

(2) Fix the recycling flask onto the condenser.

(3) Fix the rotary flask onto the glass rotary shaft.

(4) Slowly insert the feed pipe into the condenser.

ROVA-N2L

(1) Please install the support rod of condenser onto the host machine; the rod shall not be steadily secured for now but slightly fixed with rubber clamp instead. (Please adjust its position after installing the glass components).

(2) Please Align the condenser port with the vacuum seal rings in shaft shell and stick them closely, screw up with connecting nut to a certain extent, and then simultaneously rotate and further tighten the nut and condenser, ensuring the connecting mouth of recycling flask face-down during the positioning.

(3) Please fit the rubber clamp of condenser on, adjusting the position of support rod and condenser and fastening the rubber clamp.

(4) Fix the recycling flask onto the condenser.

(5) Fix the rotary flask onto the rotary connecting shaft.

(6) Gently insert the feed pipe into the condenser.

(7) Please conduct the disassembly in reverse order.

5. Angular adjustment of the main part of drive unit

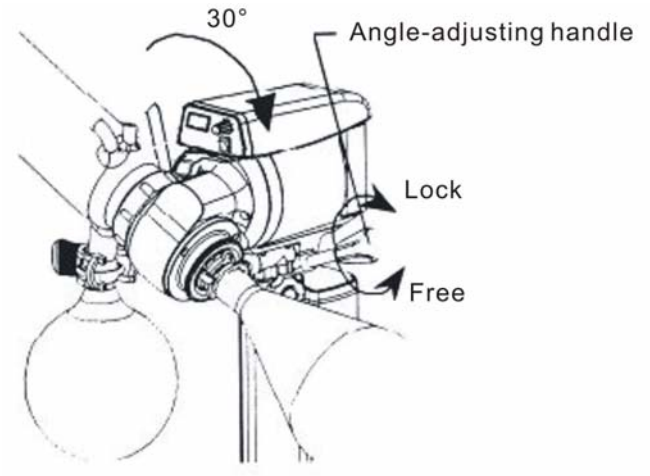
Attention

- Be sure to hold the condenser with hands when adjusting the angle of the main part of drive unit.
- When loosening the angle-adjusting handle, the condenser will suddenly tilt and tip over due to the weight of specimen and itself, which would lead to glass cracks and cause injuries.

(1) Please slowly lift the lifter up.

(2) Hold the condenser with hands, loosening the angle-adjusting handle and adjusting the angle.

(3) Please confirm the up-down movement of lifter and the position of water bath, fastening the angle-adjusting handle.



6. Connection of vacuum hose and cooling water hose

(1) Please use the vacuum hose to connect the vacuum nozzle of condenser with the extraction opening of self-owned decompressor.

- No vacuum pipe connected with the decompressor is provided along with the equipment. Please confirm the port caliber and prepare the proper hose.
- As the port is made of glass and may be damaged under excessive applied force, please care not to force too much.
- When connecting the vacuum hose, please do not mistake the decompressor's extraction opening for exhaust port. If connected incorrectly, failure would occur when the device is pressurized.

(2) Please use the hose to connect the cooling-water inlet and outlet nozzles of condenser with the related ports of self-owned cooling water circulating device.

- No connecting hose is provided along with the equipment.
- Please confirm the capacity and port caliber of the adopted circulating device and prepare the proper hose.

7. Power connection

(1) Please insert the plug of power cord into the socket with fuse on the back of host machine of drive unit.

(2) Confirm the power switch of host machine is surely in a closed state and then insert the power plug into the socket.

8. Isochronous position adjustment with surge flask (manual lifting adjustment)

Attention

- In the manual lifting process, please slowly conduct the operation with hands; if not, after unscrewing the manual-lifting retaining bolt, the instrument would easily tip over and the glass would be broken, which would cause injuries.
- In manual lifting operation, do not put the fingers between the main part of drive unit and the top of lifter. If the manual-lifting retaining bolt is loosened too fast, the device will decline sharply due to the weight of specimen and condenser itself, resulting in fingers easily caught between the drive unit and lifter.

During the application, the position of surge and rotary flasks can be adjusted by manual lifting to match the flasks with different specifications. Before the installation of condenser, please use the surge flask in the following order.

(1) Please slowly lower the lifter and lock it up.

(2) Please unscrew the manual-lifting retaining bolt, hold the main part of drive unit with both hands, slowly lift up and then tighten the retaining bolt.

- Please conduct the operation under the condition without installation of condenser.
- If the manual-lifting retaining bolt is loosened too much, the inside nut may fall off. At this time, please elevate the manual-lifting to the upper limit, using the hands to align the retaining bolt with the inside nut and screw in.

(3)Please use the standard mouth clamp to fix the surge flask and use the flask extractor to fix the specimen flask.

(4) Place the water bath and the use one hand to hold the bottom of the obverse side of driving head, slowly unscrewing the manual-lifting retaining bolt to adjust the height.

- Do not unscrew the retaining bolt all at once; otherwise, the drive unit will decline sharply due to its own weight, resulting in broken glass or injuries.

- Do not put the fingers between the main part of drive unit and the top of lifter. If the drive unit declines sharply, it will hurt fingers.

4.2 Operating method

Attention

- Please stop using if an exception occurs; at this moment, please turn off the power switch and protector at once, referring to the item of “common failure cause and removal”.
- Pay attention to the state of glass components. Any breakage or damage of glass components would lead to unexpected accidents. Please carefully check whether the glass components are broken or damaged. Use with caution.

Warning

- During the concentration, do not touch the rotary flask and water bath which would cause burns due to the high temperature state at the moment.
- Do not splash the specimen on the instrument. If the specimen is spilled on the lifter, locking handle or water bath, please immediately wipe it clean. Some specimen may cause fire due to the heating of host machine or water bath.

1. Operation

(1) Please set the water bath temperature according to the requirements.

(2) After the confirmation of the speed-regulation knob in minimum limit, turn on the power switch.

(3) Please close the feed pipe cock.

- Please apply the vacuum grease during the application.

(4) Please add the specimen in accordance with methods (A) or (B) as follows.

(A) Continuous charging:

 First connect the continuous charging mouth with specimen vessel by Teflon feed pipe.

□ Slowly lower the lifter and transfer the rotary flask into the water bath.

□ Set the speed-regulation knob at the desired rotational frequency.

□ Start the decompressor for vacuumizing to reduce the pressure inside the evaporator.

□ Rotate the feed cock, aim it at the continuous charging mouth and add specimen.

(B) Discontinuous charging

□ Remove the specimen bottle and directly fill it with specimen.

□ After starting the decompressor, adjust the speed-regulation knob and set the rotating speed based on requirements.

□ Slowly lower the lifter and place the rotary flask into the water bath.

- If the volume of rotary flask is over 1L, please conduct the operation in accordance with the order of □, □ and □specified in A.

2. Halt

(1) Stop the rotary flask from rotating, slowly elevate the lifter and take the rotary flask out of water bath.

(2) Open the feed pipe cock and relieve the inside pressure.

(3) Turn the decompressor off.

(4) If no specimen is added, please turn off the cooling water circulating device along with the water bath.

- As the water bath or rotary flask would not immediately cool down after the concentration, please be careful with the high temperature

(5) For the disassembly of rotary flask, please dismantle the flask extractor first and then remove the rotary flask.

(6) When disassembling the recycling flask, please hold the flask with hand and then remove the ball-milled clip.

- If the glass rotary shaft and rotary flask stick together and can't be separated, please simultaneously pull the rotary flask and glass rotary shaft out and then dismantle the rotary flask after a little heating.

3. Treatment after halt

For long periods without using it, please shut off the power switch and disconnect the power.

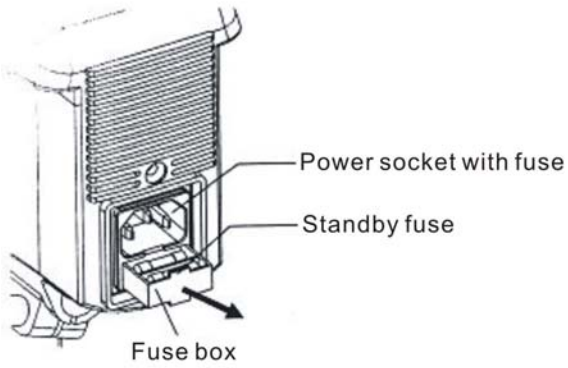
4. Replacement of fuse

(1) Please unplug the power cord from the power socket with fuse.

(2) Use the flathead screwdriver to pull the fuse box out. On the inside it's the active fuse and on the outside it's the standby fuse.

(3) Remove the outside standby fuse and replace it with the inside one.

- If unspecified fuse is used, fire or other accidents may occur as it can't blow out in case of overloading sometimes.
- If the replaced fuse blows out once again, please stop using immediately and contact us.



V Common failure cause and removal

Phenomenon	Cause	Removal
Power supply switched on but power indicator lamp not lit	Unplugging or unsteady plugging. (When connected to the water bath, please confirm the power connection of water bath at the same time.)	Place the power switch in “OFF” position and then insert the power plug into the socket.
	Plug of power cord detached from the power socket with fuse or not securely inserted	Place the power switch in “OFF” position and then insert the power cord into the power socket with fuse.
	Without power supply	Place the switch of switchboard protector in “OFF” position.
	Failure of power switch	Stop using immediately and contact us
	Failure of circuit board	
	Fuse blowout due to overload (short circuited)	
Power switch indicator lamp on but not in rotation	Bearing rusting	
	Failure of motor	
	Failure of circuit board	
Nixie tube without display but still in rotation	Failure of nixie tube	
Rotary oscillation	Abrasion of internal gear	
	Failure of motor board	
	Failure of circuit unit	
Abnormal noise	Abrasion of seal ring	Replace the seal ring
	Abrasion of internal gear	Stop using immediately and contact us
	Lack of oil in drive unit	
	Failure of motor	
High-pitched noise from the seal ring	Poor fitting of the contact part of seal ring and rotary connecting shaft	Apply a thin coat of vacuum grease or sprinkle some water on the seal ring
Leakage of pressure and poor vacuum degree	Abrasion of glass rotary shaft	Replace the glass rotary shaft
	Abrasion of seal ring	Replace the seal ring
	Improper installation of seal ring (Opposite direction)	Remount the seal ring according to the method for installation of seal rings.
	Aging of the seal ring of pressure-relief air tap	Replace the air tap seal washer
	Aging of vacuum hose	Replace the vacuum hose
Extremely heavy weight of lifter	Aging of spring	Stop using immediately and contact us
	Abrasion or rusting of sliding bearing	
Lifter unable to be locked	Idling of screw due to looseness	
	Abrasion of locking components	

VI Repair and maintenance

Warning

- Do not dismantle the device in decomposition approach.
- As there are parts with voltage or high temperature within the device, people would be injured if it is dismantled in decomposition approach.

Attention

- Please apply correct methods and supplies in the cleaning and maintenance of the product.
- Do not directly splash water over the product or use abrasive powder, diluent, oil, kerosene, acidic material and similar substance, or else the shock or other accidents would occur.

1. Please shut off the power switch before the maintenance, pulling the plug out of socket.
2. Please use wrung-out wet soft cloth to wipe clean. Stubborn stains shall be cleaned by neutral detergents which shall be then wiped off with a rag.

VII After-sale service

1. Please refer to the “common failure cause and removal” when the instrument is in abnormal state; first check whether any failure occurs.
2. Please contact us for commissioned repair if the product is still in abnormal state after treatment.
3. The repair under warranty proceeds in accordance with the regulations for warranty.
4. The necessary repair beyond the warranty period proceeds at a reasonable cost.

Appendix: Regulations for warranty

1. During the warranty period, our company will be responsible for the free maintenance of any failure that occurs under circumstance of normal usage by customers in accordance with the instruction manual and attached labels.
2. Free maintenance won't be given under the following circumstances：
   (1) Fail to present this warranty card and proof of purchase;
   (2) Actual information is inconsistent with the total or part of the contents in this warranty card; there is missing or altered data in the warranty card;
   (3) The failure and damage is caused by the misuse or the installation and operation not proceeding in accordance with the requirements of instruction manual and attached labels;
   (4) The failure and damage is caused by improper storage, like the falling or colliding during the transportation, movement or application;
   (5) The failure and damage is caused by the unauthorized maintenance, adjustment and modification not specified or approved by our company;
   (6) The failure and damage is caused by Force Majeure, such as: fire, earthquake, flood, typhoon, salinity, thunder and lightning, public hazard and other natural disasters as well as the equipment-unrelated power abnormity and other accidents;
   (7) Consumption, wearing, aging and replacement of consumables.
3. The content of regulations for warranty differs from product to product, which will be indicated in the section of regulations for warranty in the instruction manual; please confirm the specified content.