ROTARY EVAPORATOR

RE200
RE400
RE500

(AC100V)

First Edition

- Thank you for your Yamato Scientific RE Series Rotary Evaporator purchase.
- For best test date, we recommend you purchase our BM series Water Bath.
  Please call Yamato Scientific for more details.

Read and apprehend the important warnings in this instruction manual prior to use.

Table of Contents

1. Specifications

Type	RE200	RE400	RE500
Rotation Speed *1	20-180rpm		
Accuracy of display rotation speed *1	-		±3rpm(at 20-180rpm)
Drive system	Worm gear system		
Rotation speed display system	-		Digital
Resolution of rotation speed display	-		1rpm
Other Supplemental System	Movable Steam Duct Mechanism, Flask Remover		
	-	Power Socket (for Vacuum Controller)	
Glass Joint	ℐ29/38 Steam Duct, S35/20 Receiving Flask		
Lift Mechanism	Arm jack	Manual	
Motor	Induction motor 25W		
Glass set	Type A, Type B, Type C		
Safety device	Overcurrent protection (fuse 2A)		
Exterior dimensions W×D×H (mm) *2	420×290×835	420×340×580	
Weight	11kg	13kg	14kg
Power source (RE only)	AC100V±10% 50/60Hz 1A		
Option	●Evaporation Flask (opaque & frosted ℐ 29/42) 2000ml/500ml/300ml/200ml/100ml ●Receiving Flask (opaque & frosted S35/20) 2000ml/500ml/300ml ●Joint (opaque & frosted) ℐ29/42-29/38, ℐ29/42-24/40, ℐ29/42-19/38, ℐ29/42-15/25, ℐ24/40-24/40 ●Trap Ball (opaque & frosted) ℐ29/42-29/38, ℐ29/42-15/25, ℐ24/40-24/40		
Combination apparatus	●Water Bath BM100/200/400 ●Oil Bath BO600 ●Arm Jack JK200(for RE200)		

*1 The rotation speed indicates performance of the unit equipped with (A, B or C type) glass set in case of unloaded operation under rated power.

*2 Glass set is not included.

2. Safety Information

Safety Symbols

Graphic Indications

This instruction manual and our products apply various indications for safety. Ignoring these indications can cause such situations as listed below. Read and understand the following warning and caution signs in this manual prior to use.

WARNING Indicates the possibility of serious or fatal injury (Note 1).

CAUTION Indicates the possibility of injury (Note 2) or damage (Note 3) to the equipment.

(Note 1) Serious injury : Bodily harm by electric shock, bone fracture or poisoning which may require hospitalization.

(Note 2) Injury : Bodily harm by electric shock, bone fracture or poisoning which may not require hospitalization.

(Note 3) Damage : Any damage on equipment, facility, structure, etc.

Meaning of Graphic Indications

	Shows warning or caution. Specific contents are described aside each sign.
	Shows users important information not to do. Specific contents are described aside each sign.
	Shows users important information sure to do. Specific contents are described aside each sign.

If the motor overloads - Stop operation immediately.

If you continue operation under abnormal overload conditions, the motor may stop by the safety device . If the motor stops, turn the volume knob to the minimum and cut the switch off.

＊Overload means the situation when the motor surface heats up more than 90℃ due to rust on ball bearing etc.,

Never fail to ground the unit.

This unit uses a 3-core power cord (including ground wire). Be sure to ground the unit for safety.

Be cautious using flammable chemicals.

This unit is not explosion proof. Do not use in flammable or explosive gas environments and do not evaporate explosive substances.

The flask clamp is very springy. Be careful not to break the glass apparatus.

The enclosed flask clamp is very springy to hold the glass apparatus firmly. Be careful not to break the glass.

Use a trap.

Use a trap when you decompress by hydraulic rotary vacuum pump. When you use our Handy Aspirator, fill to overflow.

Maintain the vacuum seal.

- The vacuum seal is expendable. Exchange the seal in case of vacuum-down.
- You can use the vacuum seal without grease. But if you desire more longer life of the seal, put silicon grease onto the ripped side of vacuum seal. If you are afraid of sample contamination, use liquid sample.

Cleaning the exterior of the RE series evaporator

Do not use any volatile chemicals to clean the exterior of this unit. This could damage the color and shape. Wipe clean with a soft dry towel, etc.- Do not use a brush.

If the unit is not in use for a long period of time, cut the power supply.

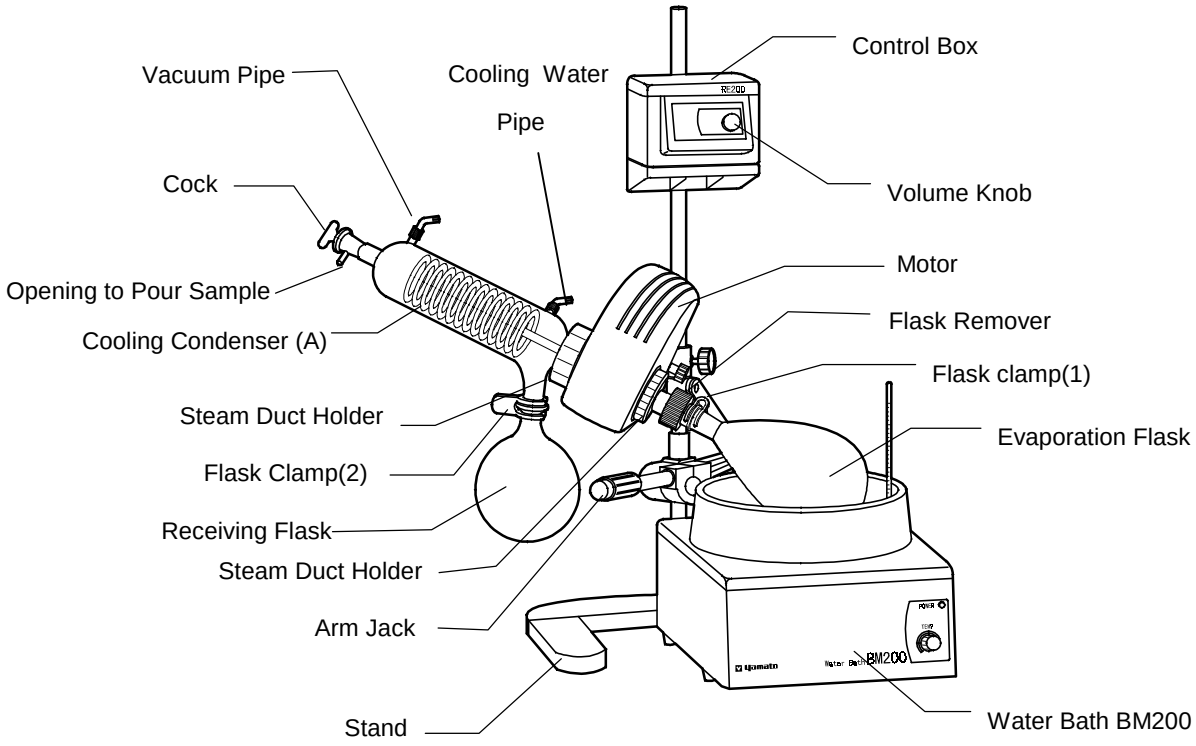
If the unit is not in use for a long period of time, turn the power off and pull out the power cord for safety.

Do not use the Unit in flammable or explosive gas environments of substances listed below. Do not evaporate explosive substances.

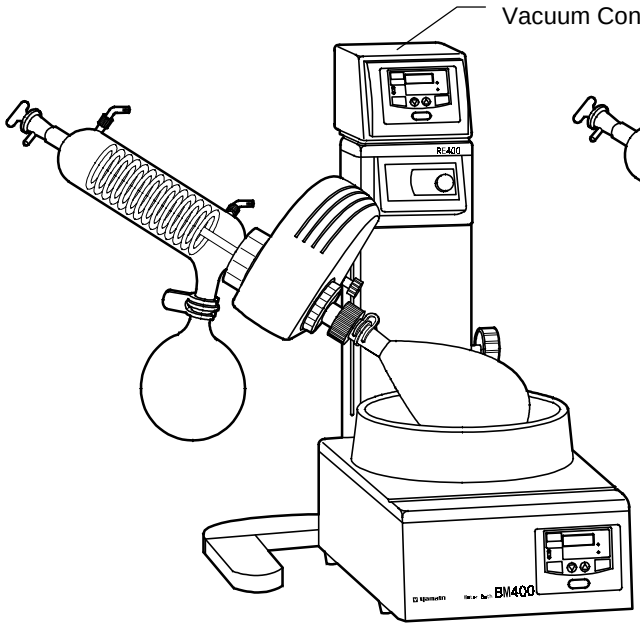
Explosive	Explosive Substance	Nitroglycol, Nitroglycerin, Nitrocellulose, and other explosive nitric esters.
		Trinitrobenzene, Trinitrotoluene, Picric acid, and other explosive nitro compounds.
		Peracetic acid, Methyl ethyl ketone peroxide, Benzoyl peroxide, and other organic peroxides.
		Sodium azide, and other metallic azides
Flammable	Combustible Substance	Metallic lithium, Metallic potassium, Metallic sodium, Yellow phosphorus, Phosphorus sulfide, Red phosphorus, Celluloid, Calcium carbide, Lime phosphate, Magnesium powder, Aluminum powder, and other combustible metal powders and sodium dithionite (hydrosulfite).
	Oxidant	Potassium chlorate, Sodium chlorate, Ammonium chlorate, and other chlorates.
		Potassium perchlorate, Sodium perchlorate, Ammonia perchlorate, and other perchlorates.
		Potassium peroxide, Sodium peroxide, Barium peroxide, and other inorganic peroxides.
		Potassium nitrate, Sodium nitrate, Ammonia nitrate, and other nitrates.
		Sodium chlorite and other chlorites.
		Calcium hypochlorite and other hypochlorites.
	Ignitable Substance	Ethyl ether, Gasoline, Acetaldehyde, Propylene Oxide, Carbon disulfide, and other flammable substances with a flash point below minus 30ºC.
		Normal hexane, Ethylene oxide, Acetone, Benzene, Methyl ethyl ketone, and other flammable substances with a flash point between minus 30ºC and 0^{o}C.
		Methanol, Ethanol, Xylene, Pentyl acetate (amyl acetate), and other flammable substance with a flash point between 0ºC and 30ºC.
		Kerosene, Light oil, Turpentine oil, Isoamyl alcohol, Acetic acid, and other flammable substances with a flash point between 30ºC and 65ºC
	Combustible Gas	Hydrogen, Acetylene, Ethylene, Methane, Ethane, Propane, Butane and other flammable gas at 15℃ degree and under 1 atmosphere.

3. Identification of Parts
with Condenser A

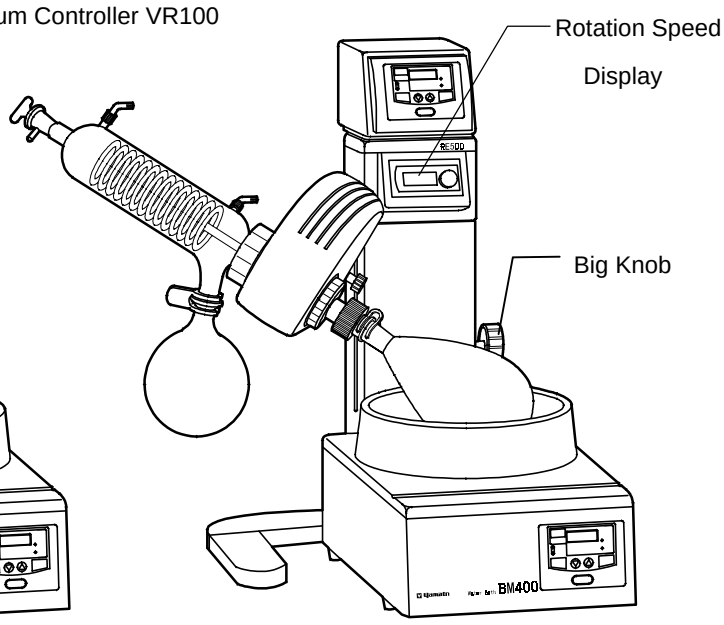
RE200(type A)



RE400(type A)

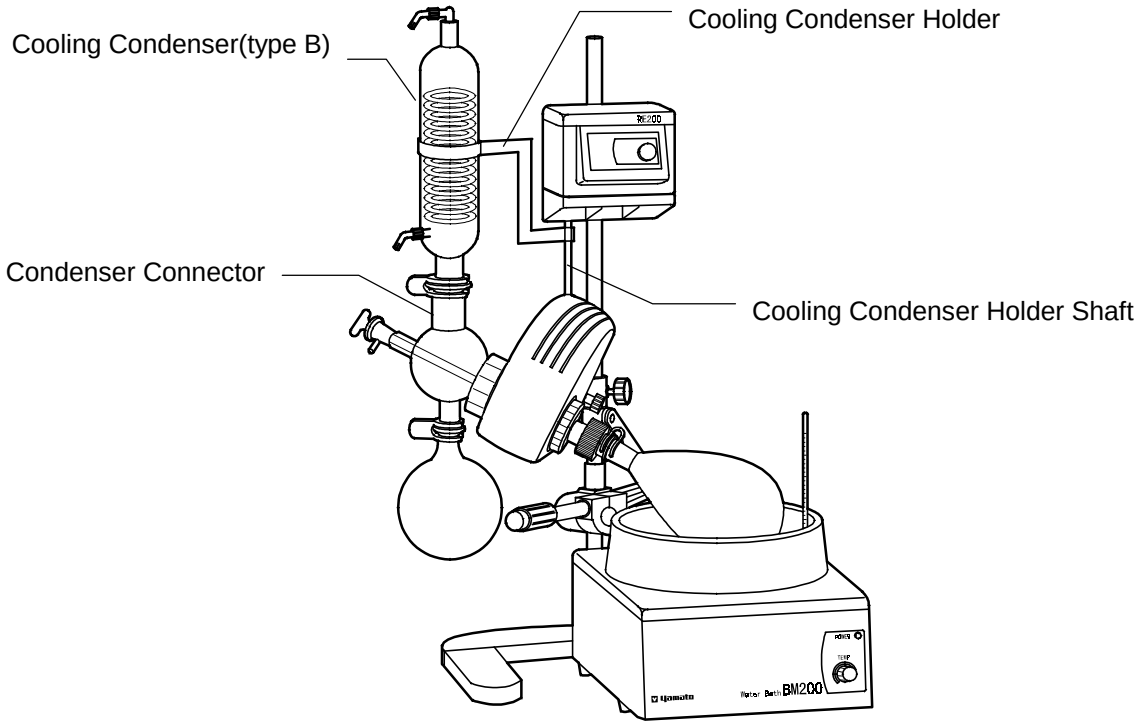


RE500(type A)

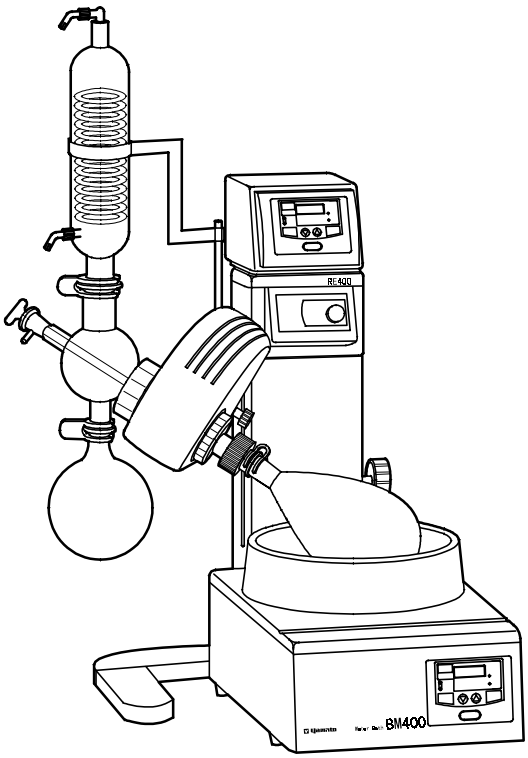


Identification of Parts
with Condenser B

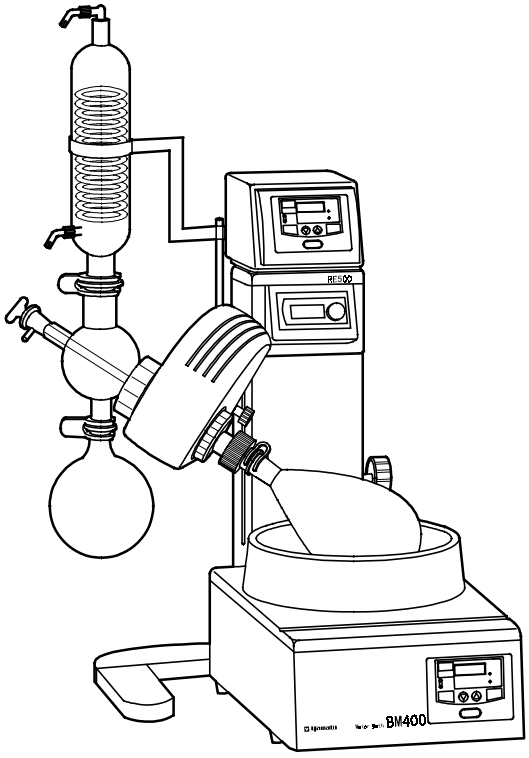
RE200(type B)



RE400(type B)

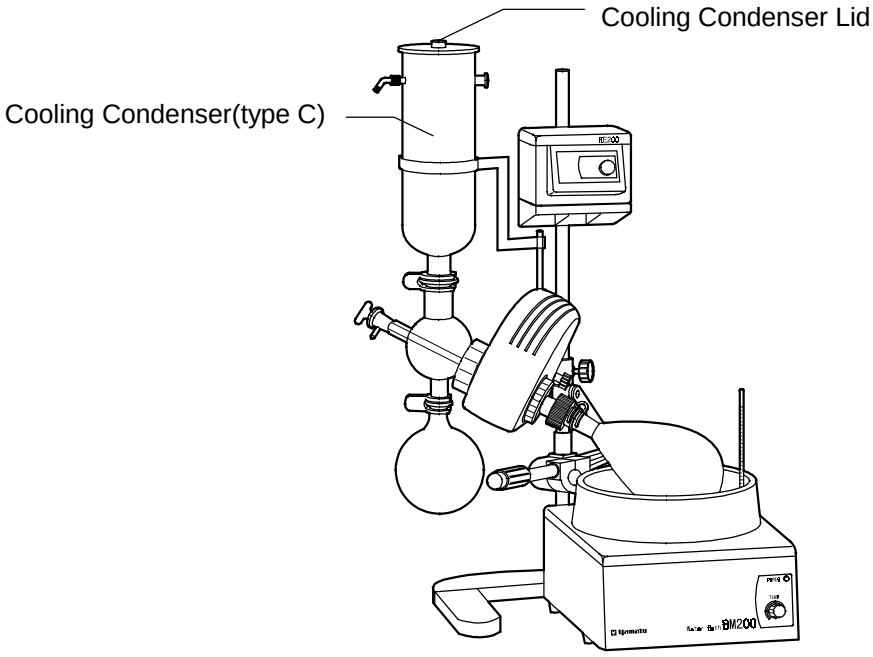


RE500(type B)

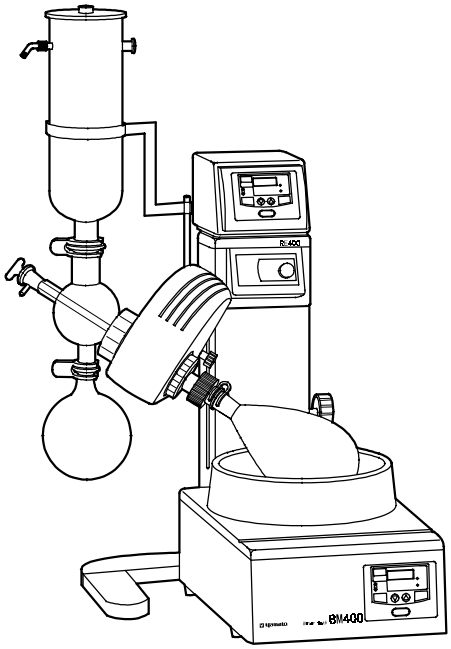


Identification of Parts
with Condenser C

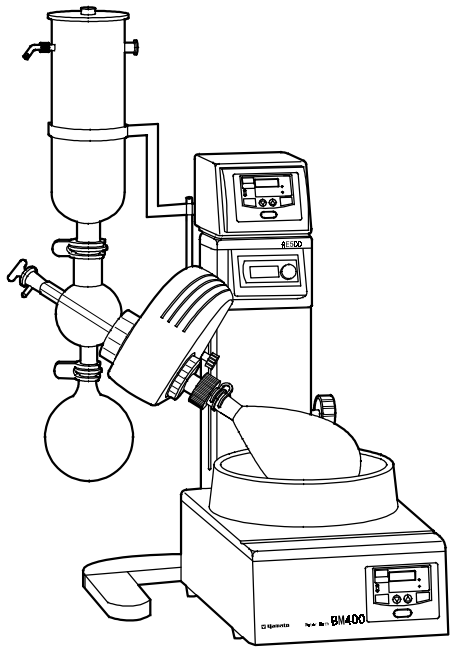
RE200(type C)



RE400(type C)



RE500(type C)



＊Please understand that our products are subject to some specification changes without notice.

＊The exterior designs above are just examples of the interchangeable parts.

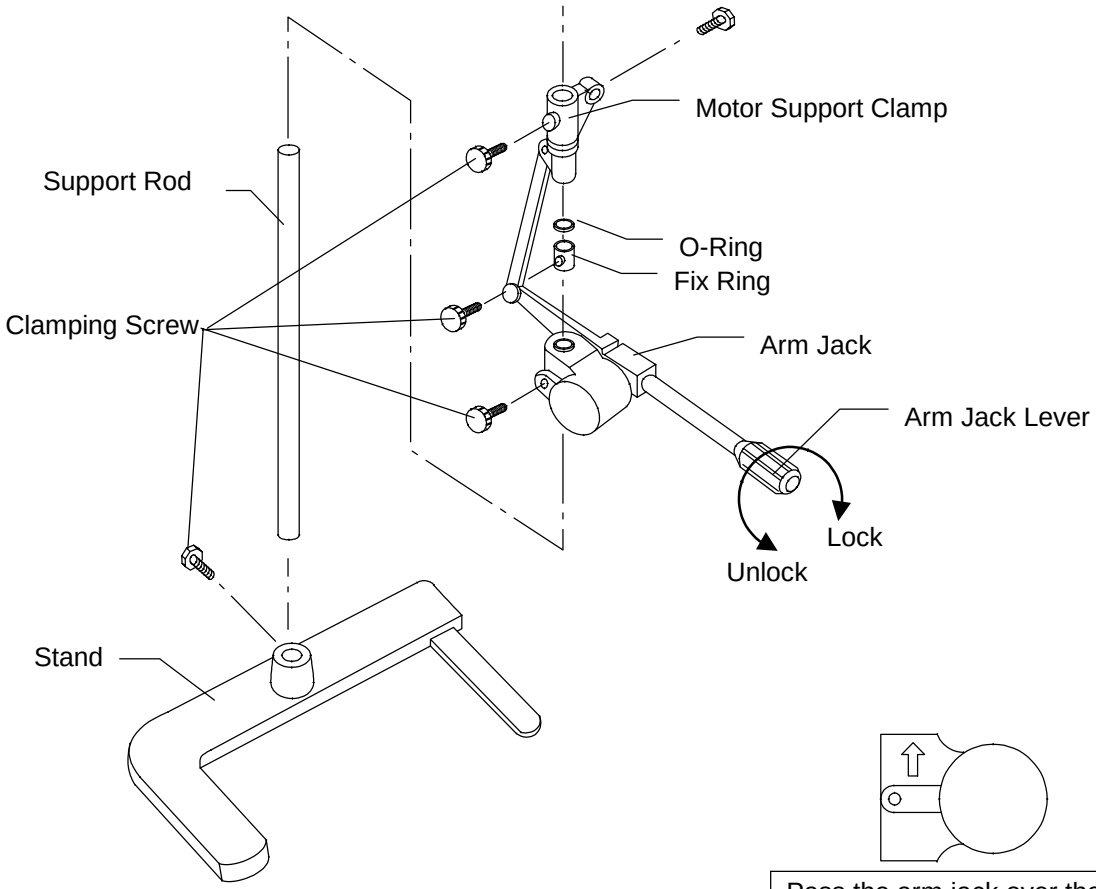
1.Set the stand at a stable place.

Unpack the package and set the stand of the body on a stable place. If you do not set the unit on a stable place, the unit may vibrate or cause strange noises or the unit can fall and get damaged.

2. Insert the rod into support of the stand.

Insert the support rod into support of the stand, and fix by clamping screw.

3. Pass the arm jack if applicable, and support clamp over the support rod.



Pass the arm jack over the rod turning the arrow up.

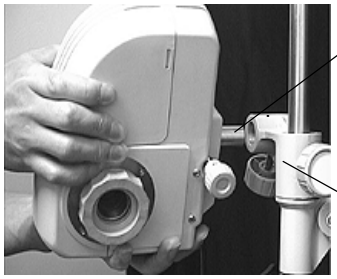
1.Turn the Arm Jack Lever counterclockwise to loosen the lever.

2. When you pass the arm jack over the rod, set the fix ring and O-ring in the middle of the arm jack (Insert the O-ring into the hollow on the fix ring).

3. Fit the motor support clamp over the support rod.

4. Fix the motor to the motor support clamp.

1. Fit the motor bearing bar to the motor support clamp, and fasten the clamping screw tightly.
   Put D-cut surface (flat surface) of the bar perpendicularly to the screw.

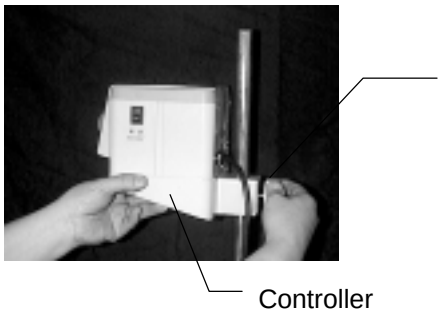


2. Slant the motor to the right (about 45 °) and fix the finger screw of the motor tightly.

⚠ **If you do not fasten the screws tightly, vibration may occur preventing accurate measurements or the motor may fall causing the glass apparatus to break.**

5. Fix the controller to the support rod.

Fix the controller to the support rod by attached clamping screw.



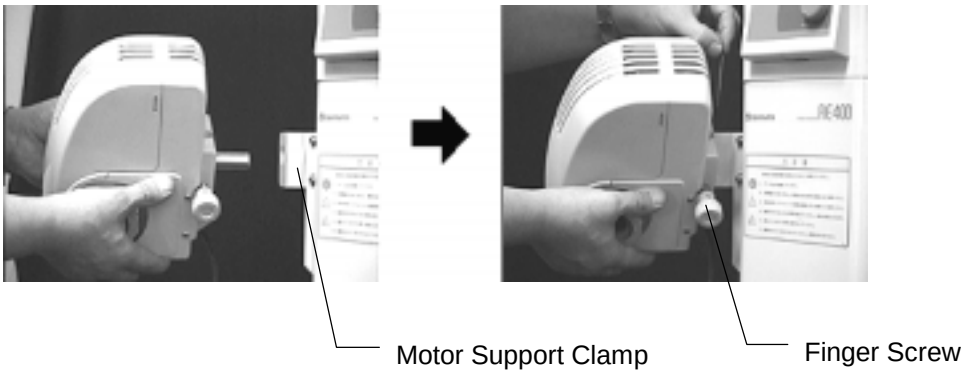
6. Set the Body at a stable place

Be sure to set the body at a stable place.

7. Fix the motor to the body.

1. Insert the motor bearing bar into the motor support clamp of the body, put D cut surface (flat surface) of the bar perpendicularly to either 2 upper or side screws, and fasten 4 fix screws tightly by using the attached hexagonal wrench (for M5).
   Then, slant the motor to the right (about 45 °), and fix the finger screw of the motor tightly.

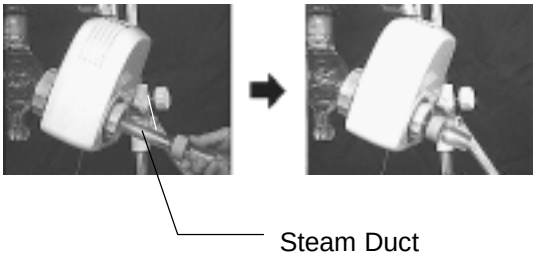
If you do not fasten the screws tightly, vibration may occur preventing accurate measurements or the motor may fall causing the glass apparatus to break.

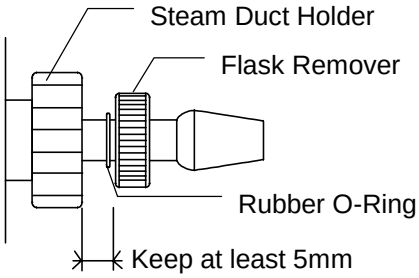


2. Remove the cooling condenser nut (the bigger nut with the coil ring) and coil ring when you fix the motor.

8. Inserting the steam duct into the motor

1. Before you insert the steam duct, make sure that the O-rings in the center hole of motor are not out of place. If so, reset them in the right place.
2. Insert the steam duct from the right side into the center hole of the motor .
3. Set the steam duct to the desired position with a minimum of 5mm between the blue flask remover and the steam duct holder.
4. Tighten the steam duct holder by turning clockwise. Be sure to tighten the steam duct holder firmly so that the steam duct does not slip.

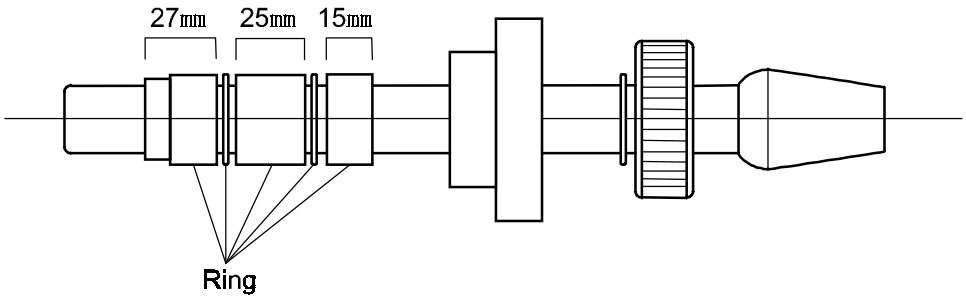




＊When removing the steam duct, first loosen the steam duct holder. Do not remove the steam duct holder or the rings may slip out.

●If the rings come off in setting/removing the steam duct, and you do not know how to assemble….

See the following picture to re-assemble.



9. Set the cooling condenser nut, coil ring and vacuum seal to the condenser or condenser connector.

1.Remove the cooling condenser nut on the left side of the motor.

2.Connect the cooling condenser nut and then coil ring to the condenser or condenser connector (which ever applies).

3.Insert the vacuum seal to the condenser or condenser connector (which ever applies).

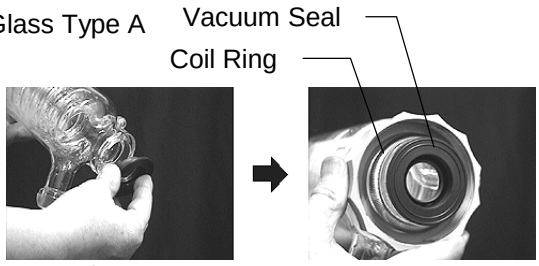
*It is optional to put grease on the vacuum seal.

10. Connect cooling condenser or condenser connector to the motor.

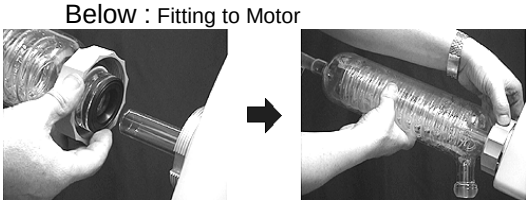
Insert the steam duct into vacuum seal, put glass flange to the motor and fasten firmly the cooling condenser nut.

＊Be careful not to damage the vacuum seal when you insert steam duct into the vacuum seal in case the damage could cause leak.

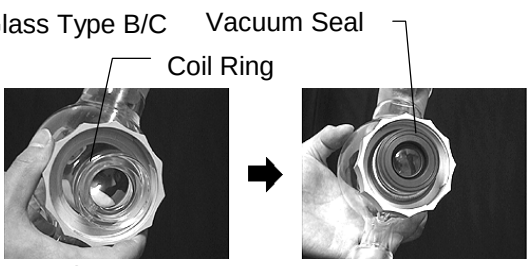
Glass Type A



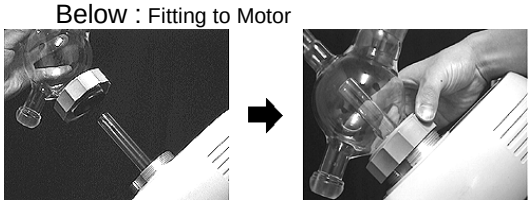
Above : Fitting of Coil Ring and Vacuum Seal
Below : Fitting to Motor



Glass Type B/C



Above : Fitting of Coil Ring and Vacuum Seal
Below : Fitting to Motor



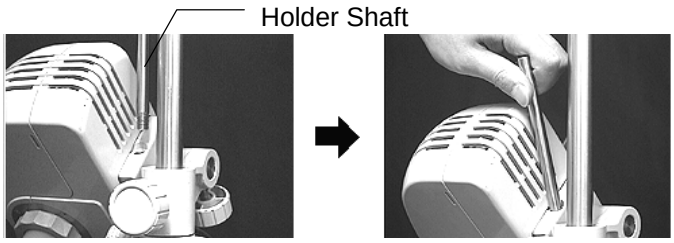
●When you remove the coil ring from cooling condenser or condenser connector

Hook the coil ring by the attached hexagon wrench as shown in the left picture in order to remove the ring easily from the cooling condenser or condenser connector. However, be careful not to force too hard in case the glass apparatus or coil ring might be damaged.

11. Connecting the cooling condenser holder shaft (glass set B and C only).

Fit the cooling condenser holder shaft firmly into the screw hole on the back of motor. Put the attached hexagon wrench through the hole on the end of shaft, and fasten tightly.

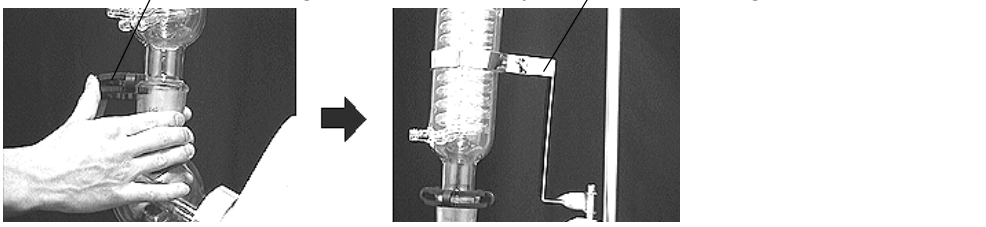
RE200



RE400/500

12. Connecting the cooling condenser and condenser holder (B & C condenser only).

1. Connect the cooling condenser to the condenser connector and hold by the cooling condenser clamp.
2. Insert the cooling condenser holder from the top of condenser, while fitting the other side through the holder shaft. (For type C, be sure to insert the cooing condenser holder from the bottom of condenser rather than top and then connect the condenser to the condenser connector)



3. Fit the suction cock to type B or the cooling condenser lid to type C.

13. Connecting the Evaporation and Receiving Flasks.

●Evaporation Flask

1.Turn the blue flask remover upward.

2.Connect the flask to the steam duct, and hold by the evaporation flask clamp.

●Receiving Flask

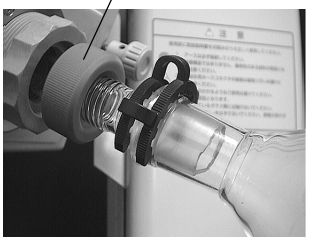
1.Connect the flask to the cooling condenser or the condenser connector, and hold by the flask clamp.

●For easy evaporation flask removal….

Use the blue flask remover.

1. Remove the clamp while holding the evaporation flask.
2. Turn the remover counter clockwise which will gently push off your evaporation flask.

Flask Remover



14. Insert the feed tube into the cooling condenser or cooling condenser connector (which ever applies). Assembly is now complete.

Feed Tube

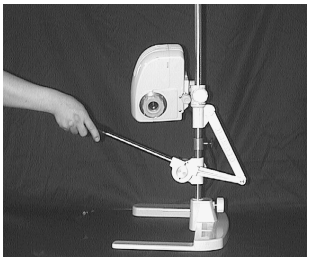
15. Arm jack JK 200(sold separately and exclusively used for RE200)

●To set at a certain height

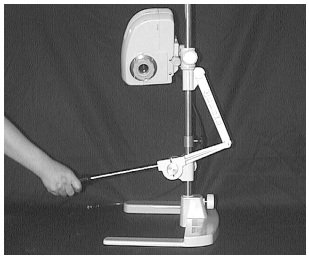
1. Turn the lever counter-clockwise to loosen and move up or down to desired height. →Picture 1,2
2. When you determine the position, turn the lever clockwise and fasten firmly. →Picture 3
3. After you turn the lever to fix, set the fix ring in-between at a certain height.

When you fix , fasten firmly by lever and fix ring. If you do not fasten tightly, arm jack will not be able to sustain the motor and it could fall.

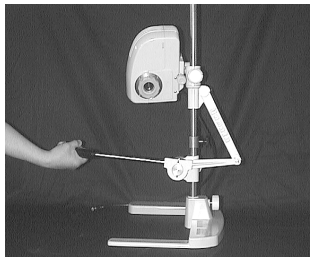
Do not move it up or down with force when the glass apparatus is connected. The glass apparatus may come off which can cause damage.



(Picture 1)



(Picture 2)



(Picture 3)

●To change the height

1. Turn the lever counter-clockwise to loosen.
   (Support the arm jack securely at this time or the motor will immediately drop downward.)
2. Then refer to the above description “To set at a certain height”.

16. Manual lift (Supplemental function of RE400/500)

Adjust the lift by using the 2 knobs (big and small) located on the right side of the unit.

1. Loosen the small knob.→Picture 1

2. Turn and keep the big knob to “Release”, and you can freely move the lift up and down.

3. After you determine the position, return the big knob to the original position “Lock” and you can fix the height.→Picture 2,3

4. After you determine the lowest position, fasten the small knob.→Picture 4,5
   The lift will not go lower than the fixed position. However, this function effectively works only when the small knob is positioned within 5.3 inches (135 mm) from the bottom.

(Picture 1)

(Picture 2)

(Picture 3)

(Picture 4)

(Picture 5)

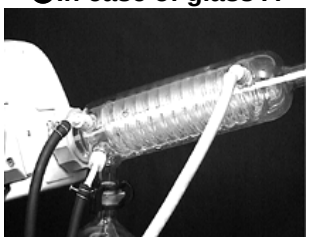
Connecting the Vacuum Hose and Water Supply

17. Fit the hose joints to the water supply, drain and vacuum hoses at first, and connect to the cooling water and vacuum pipes.

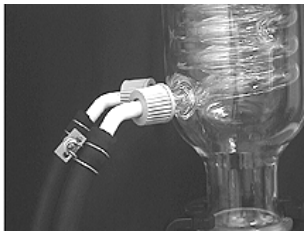
1. In case the joints are connected to the condenser, remove them.
2. Insert the hose joints into the water supply and drain hoses (inside diameter, 9mm) , hold by the attached hose clamps and fix to the cooling pipes of cooling condenser.
   In the same way, insert the hose joint into the vacuum hose (inside diameter of 6mm),fix to the vacuum suction pipe (hose clamp is not necessary).

Do not fit the hoses to the hose joints connected to the condenser.

●In case of glass A



●In case of glass B



Connect the drain hose with the inside diameter of 18mm to drain of cooling condenser.

●In case of glass C

18. Connect the power plug into an outlet.

1. Connect the power cord of the body to AC100V power source.
   Never fail to connect the earth for safety.
   ＊**Be sure to switch off whenever you insert or pull out the power cord.**
2. Then, joint the motor connecting cable to the socket on the back of controller.

19. Connect the vacuum controller, in case it is attached.

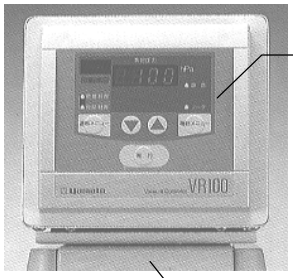
＊**Prepare additionally an aspirator with displacement of 10 ﾘｯﾄﾙ/min. as a vacuum device.**

●Combination with the vacuum controller VR100.

You can fix the vacuum controller, as shown in the right picture, by metal fastener onto the controller box of RE400/500 Rotary Evaporator.

In addition, you can connect the power cord of VR100 to the power socket on the back of Rotary Evaporator controller.

＊In case of RE200, you can not fix the vacuum controller on RE200 and connect the power cord of VR100 to RE200, so set and handle on a stable place near by.



Look at the back panel of vacuum controller where hoses to connect are indicated. Follow the indications and connect the hoses.

＊**Be sure to read the attached instruction manual to handle the vacuum controller.**

20. Prepare bath (separately sold)

Set the bath in front of the body, and pour water into it.

＊**Be sure to read the attached operation manual to handle the bath.**

BM400/BO600　　BM200　　BM100

5. How To Operate

1. Pour cooling water / alcohol into the cooling condenser

●In case of Glass A or B

Circulate the cooling water in the cooling condenser.

●In case of Glass C

Put dry ice and pour alcohol carefully so that it does not overflow.

2. Put the sample into the evaporation flask.

Put the sample into the evaporation flask.

＊Pour sample to the half of the evaporation flask capacity. Liquid collected in the receiving flask shall be also kept within approximately the half capacity.

3. Heat the bath.

Set the bath temperature at the required degree and heat up to the set point.

4. Take the flask down and start rotation.

1. When the bath temperature reaches the set point, take the evaporation flask down into the bath.
2. Turn on the switch on the right side of control box, and turn the volume knob to rotate at a required speed.
3. Operate the vacuum device for evaporation.

●When you supply sample during the unit operating

Connect the teflon tube (inside diameter, 6mm) to the opening for sample and handle the cock to let a certain amount sucked in.

5. Move the lift up or down after you stop the rotation of evaporation flask.

If the lift is moved up from or down into the bath while the evaporation flask is rotating, scalding may occur due to dispersing of hot water.

6. When the operation ends

When the operation ends and you want to remove the evaporation or receiving flask , open the cock and bring back pressure inside the container to normal.

7. Operation after restarting from power failure.

The unit restarts the same operation as before after recovering from power failure.

6. Troubleshooting Guide

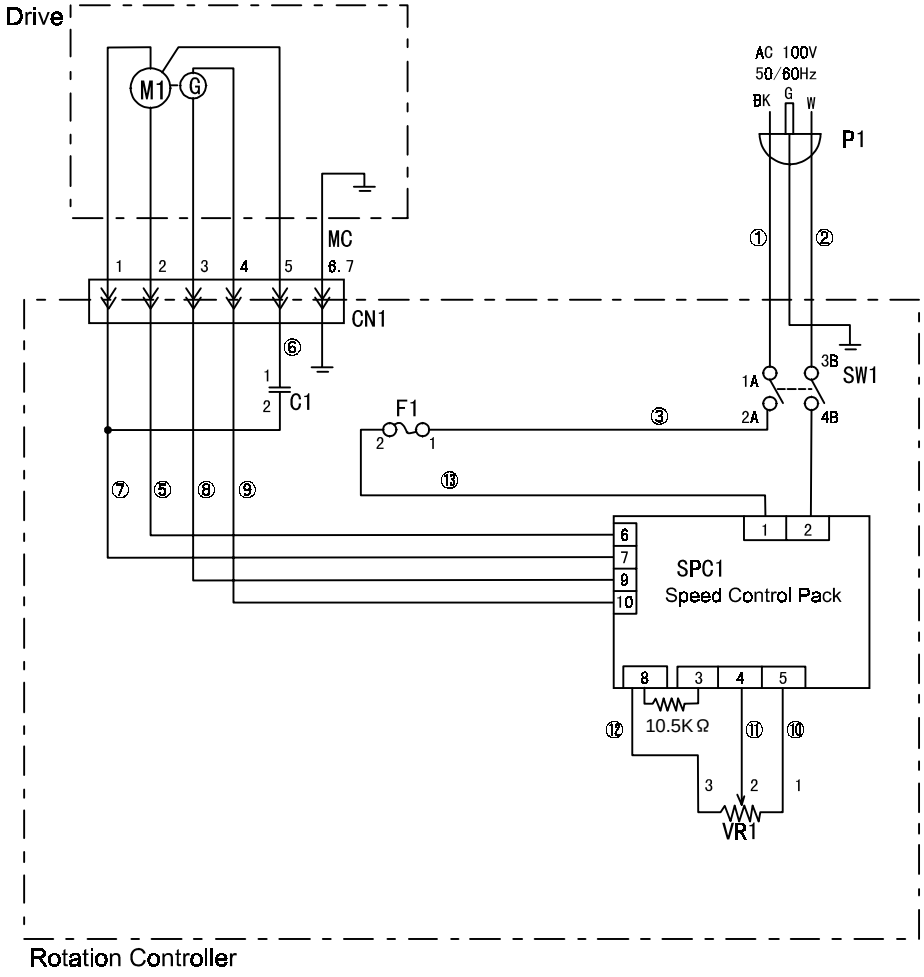
Problem Solving Chart

Trouble & Countermeasure

Check the following points if there should or seem to be some machine trouble. Contact Yamato's Technical Service Department in case trouble is not solved in spite of countermeasures below.

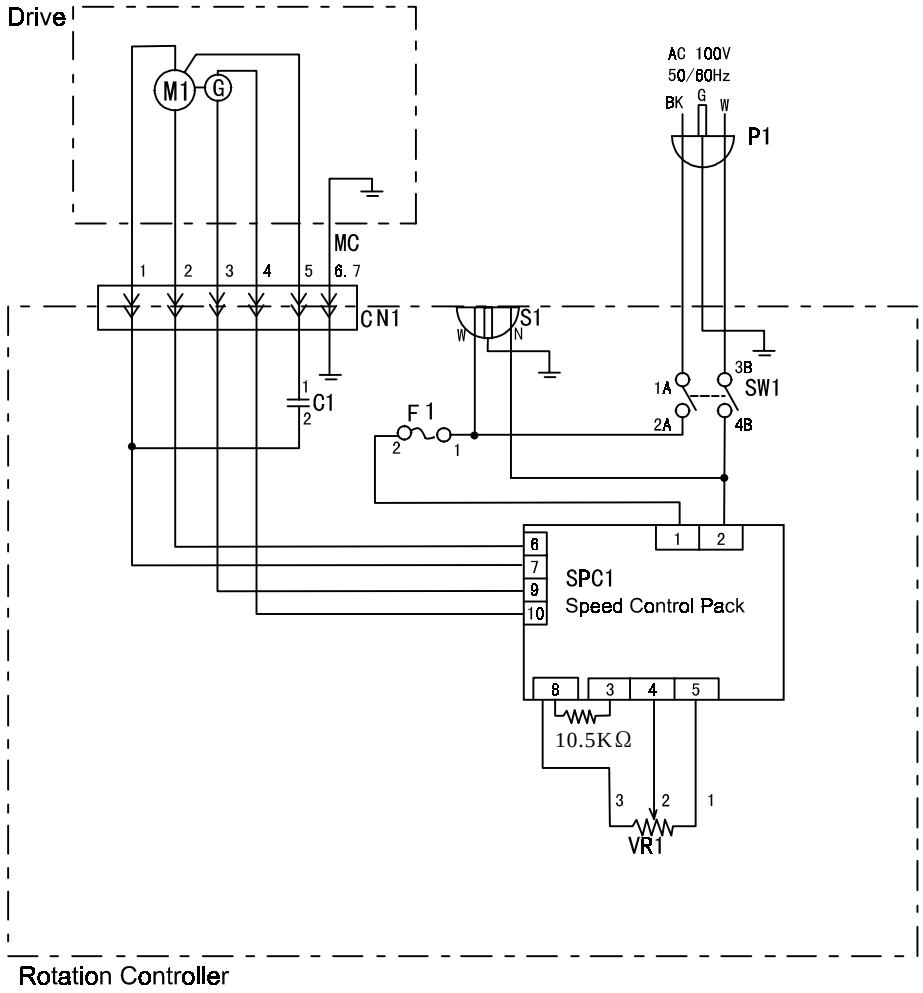
Trouble	Cause	Countermeasure
Digital display does not light up on the controller.	●Power is off ●Disconnection of power cord ●Fuse blows	●Check power source ●Connect the cord of motor and body ●Exchange of fuse(2A)
The flask will not rotate	●Switch of controller is off ●Volume knob is at the "min" ●Disconnection of motor cable ●Incomplete set-up or fastening of steam duct cause racing ●Something touches the flask	●Turn on the switch ●Turn the knob up ●Insert into the socket on the controller ●Fasten the steam duct holder ●remove something that contacts
Incomplete vacuumization	●Wear and deterioration of vacuum seal ●Direction of vacuum seal is wrong ●Cooling condenser nut is incompletely fastened ●Glass apparatus break ●Incomplete connection of glass apparatus ●Leak from hose joints	●Exchange of vacuum seal ●Re-set the vacuum seal ●Re-fasten ●Exchange ●Re-set ●Put vacuum grease on ●Check, re-fasten and put vacuum grease on joints

RE200



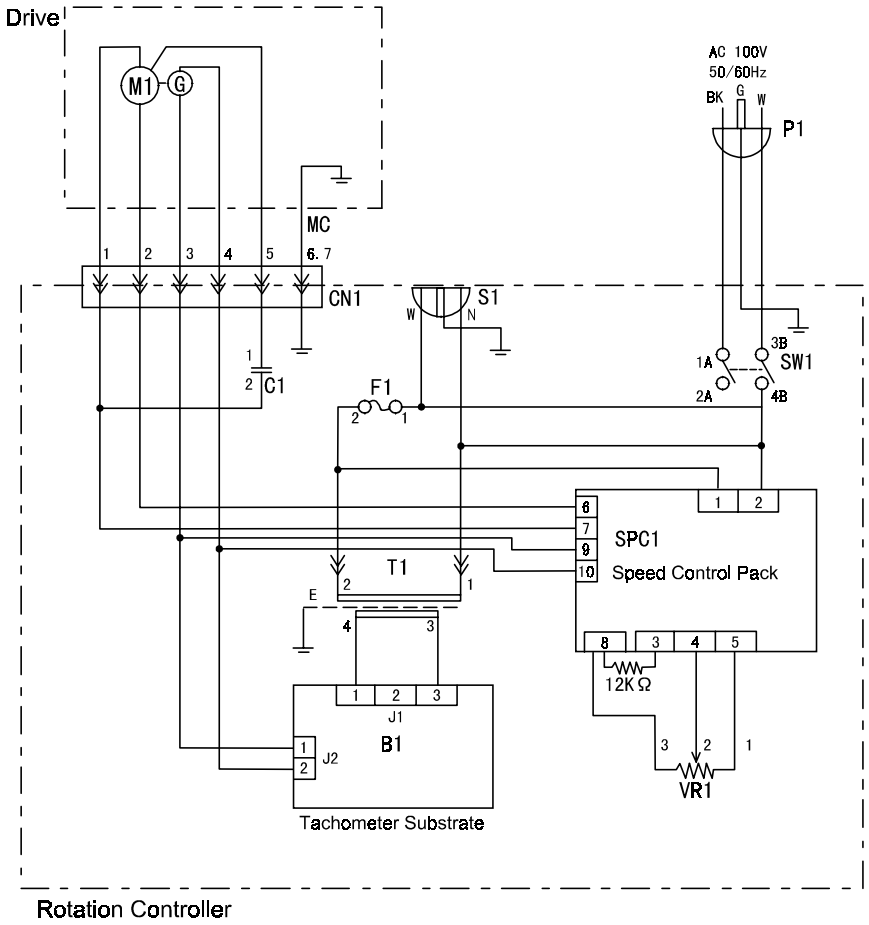
Symbol	Name of Parts
P1	Power Plug
SW1	Power Switch
SPC1	Speed Control Pack
M1	Motor
G	Tachogenerator
C1	Motor Condenser
VR1	Resister to Set Rotation Speed
CN1	Drive Socket
MC	Drive Cable
F1	Fuse

RE400



Symbol	Name of Parts
P1	Power Plug
S1	Power Socket (Power Source for Vacuum Controller)
SW1	Power Switch
SPC1	Speed Control Pack
M1	Motor
G	Tachogenerator
C1	Motor Condenser
VR1	Resister to Set Rotation Speed
CN1	Drive Socket
MC	Drive Cable
F1	Fuse

RE500



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M1	Motor
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C1	Motor Condenser
VR1	Resister to Set Rotation Speed
CN1	Drive Socket
MC	Drive Cable
F1	Fuse
T1	Transformer
B1	Tachometer Substrate

8. Lists of Exchange Parts

Name of Parts	Parts No.	Application
Cooling Condenser (A)	RG00A-30021	For A type
Cooling Condenser (B)	RG00B-30020	For B type
Cooling Condenser (C)	RG00C-30021	For C type
Condenser Connector(B)	RG00B-30030	Common use for B&C type
Evaporation Flask	RG00A-30040	Common use for all types
Receiving Flask	RG00A-30050	Common use for all types
Steam Duct	RG00A-30011	Common use for all types
Cock	255191-415	Common use for all types
Suction Cock	RG00B-40030	For B type
Cooling Condenser Clamp	7060026002	Common use for B & C type (the life is limited)
Receiving Flask Clamp	7060026004	Common use for all types (the life is limited)
Evaporation Flask Clamp	7060026001	Common use for all types (the life is limited)
Teflon Tube (A)	255191-416	For A type L=540mm
Teflon Tube (B)	255192-417	For B&C type L=350mm
Hose Joint	RG00A-30030	Common use for all types
Hose Clamp	4320016004	Common use for all types
Ring (Large)	RE500-40093	Common use for all types (the life is limited)
Ring (Middle)	RE500-40061	Common use for all types (the life is limited)
Ring (Small)	RE500-40073	Common use for all types (the life is limited)
O Ring	4210020011	Used to fix Steam duct (the life is limited)
O Ring	4210020012	Used to fix Flask Remover (the life is limited)
Vacuum Seal	RE500-40090	Common use for all types (the life is limited)
Fuse (for Body)	2100010011	Φ5.2×20 AC125V 2A

9. After Sale Service and Warranty

Request for Repair

When you request repair

If any troubles should occur, stop the operation immediately, turn the power off, pull the power cord out and contact Yamato Sciectific's Technical Service Department.

Necessary information

- Model Number
- Serial Number
- Date of Purchase
- Distributor Name
- Information on difficulties

Be sure to show the warranty when service man visits you.

Warranty (Accessory)

- Keep your warranty card for future references. Check the name of the distributor, date of purchase and any other contents of warranty.

- The terms of warranty is one year limited commencing the date of purchase. Repair is made without charge according to the contents of warranty.

- As for repair after expiration of the warranty period, consult the seller or our service office. As long as the function of the unit is maintained by repair, upon your request, we'll repair it with charge.

Minimum period to keep repair parts in stock

Minimum period to keep repair -parts in stock is 7 years after the production stop. The repair parts means any necessary parts to maintain the performance of the unit.