

EYELARotary
Vacuum**Evaporator****N-1200 Series****Instruction Manual****IMPORTANT**

This instruction manual is designed to use the product safely with keeping its best performance.

Be sure to read "Safety precautions" before use.

Please keep this manual in a place easily accessible to every users.

Important Safety Notice

1. Warning Signal Word

This unit is not explosion-proof. If you use flammable substance/sample or organic solvents, take extreme care not to spill them.

This unit is operated with some parts rotating in the hot bath because of its function and characteristics. Glass parts are used in the product and if improperly handled, glass may break and cause personal injury or other accidents. Most of such accidents can be prevented if such danger can be assumed beforehand.

To ensure the safety, this manual defines the information on such matters as requiring particular care in the safety for each danger and attaches the alert mark and signal word.

It is recommended to follow the instruction to ensure the safe use of the product.

Alert mark Signal word	Definition
 Warning	Wrong handling can cause the possibility of the death or heavy injury of the user.
 Caution	Wrong handling can cause the risk of injury of the operator or physical damages.

We have undertaken thorough verification concerning the possible occurrence of risk when using the product, but prediction of all and every kind of risk is extremely difficult. Namely, cautions contained in this manual are not necessarily all of possible risks.

However, if the product is operated according to the procedure described in this manual, the safe operation and work is ensured. Be sure to pay utmost care during handling of the product to prevent accident or failure of the product.

Thank you very much for purchasing

EYELA product.

Foreword

This instruction manual explains procedures for installation, operation, troubleshooting, maintenance and inspection, and disposal of the following Rotary Vacuum Evaporators:

N-1200A (manual jack type)

N-1200B (motorized jack type)

Be sure to carefully read this manual and understand its description before using this product.

When using this product, also refer to the instruction manual of a water bath used with it.

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Package Contents

Be sure to check the types and quantity of parts before installing them.

Main unit

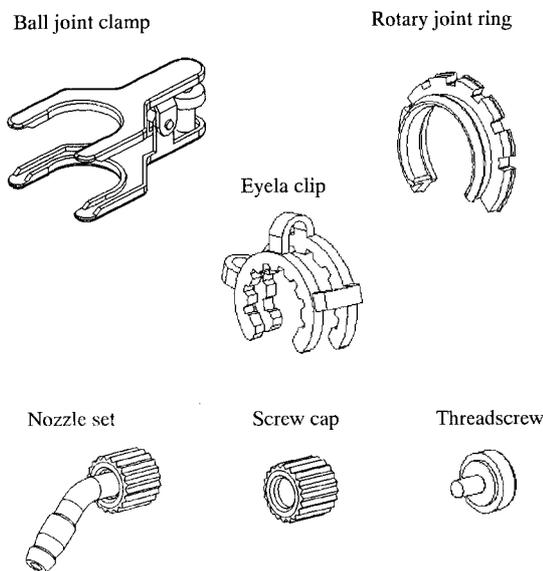
Package 1		N-1200A/B
1	Main unit	1
2	Vacuum seal	1
3	Hose holder	1

Cord set

Package 2		N-1200
1	Power cord	1
2	Instruction manual	1
3	Fuse	1
4	Warranty card	1

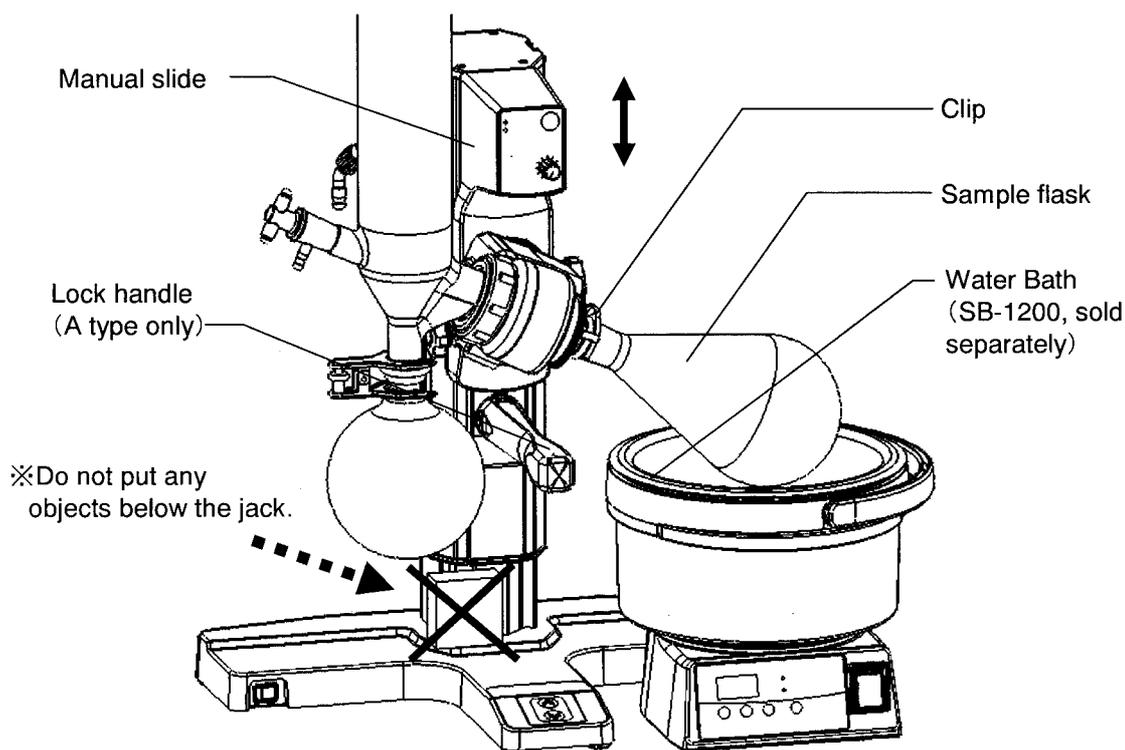
Glass parts

Package 3		S	V	T
1	Condenser	1	1	1
2	Sample flask	1	1	1
3	Receiver flask	1	1	1
4	Rotary joint	1	1	1
5	Capillary feed tube	1	1	1
6	Ball joint clamp	1	1	1
7	Eyela clip	1	1	1
8	Rotary joint ring	1	1	1
9	Adapter	-	-	1
10	Vacuum nozzle set (white)	1 set	1 set	1 set
11	Cooling nozzle set (gray)	2 sets	2 sets	-
12	Screw cap (sealed)	-	1	-
13	Condenser clamp	-	1	1
14	Condenser support bar	-	1	1
15	Thread screw	-	2	2



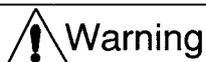
1 For safe operation

 Caution	Do not touch the rotation parts while the flask is rotating
 Caution	Do not touch the clip or the specimen flask while the flask is rotating. Your finger might be caught between protruding parts and grooves of the clip and get injured.
 Caution	Be cautions, high liquid temperatures bring the rise of burns
 Caution	Do not touch the sample flask or the bath when you use the product at high liquid temperature. Also take care of the rotation speed of the flask because of possible splashing and burning depending on the rotation speed.
 Caution	Check the up/down movement range of the jack
 Caution	If you touch the bath while performing up/down operation of the jack using the lock handle, you might be burn yourself. Carefully select the installation site of the jack. While lowering the jack, the flask may strike against the bath and glass may break or the unit may fall down depending on the inclination angle of the specimen or the size of the flask used. Use the manual slide mechanism to adjust the up/down movement range appropriately on based on the lower limit of the jack. ※Lock handle is equipped with N-1200A type only.
 Caution	Do not put any objects below the jack
 Caution	If any objects is caught or placed between the bottom of the jack and the top surface of the stand base, a malfunction of the unit may occur or the unit may fall down and cause a personal injury.



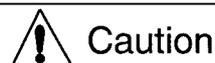
2 Product Outline

2-1 Application



**Never attempt to modify the product.
Operate the unit for the specified purpose only.**

An electric shock or a malfunction may result if the product is modified or used for any purposes other than that specified.



Take care for conditions and handling of glass parts

Broken or flawed glass parts may result in accidents. Inspect for damages or flows on glass parts and take care when handling them.

This product is a rotary evaporator that is used for condensation, purification, and fractional distillation of solutions under reduced pressure.

※ This product is not explosion-proof. Never use the product for heating solvents under normal pressure or for chemical reaction.

2-2 Specifications

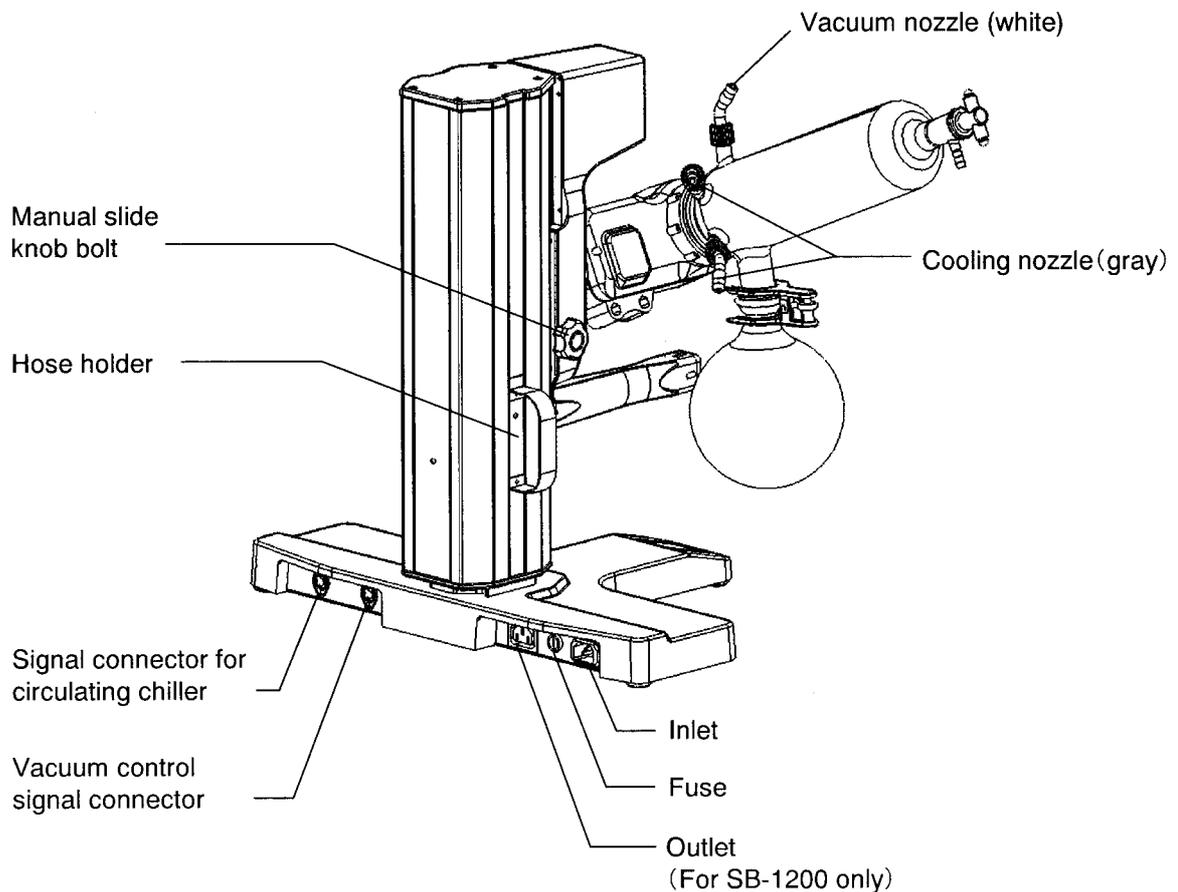
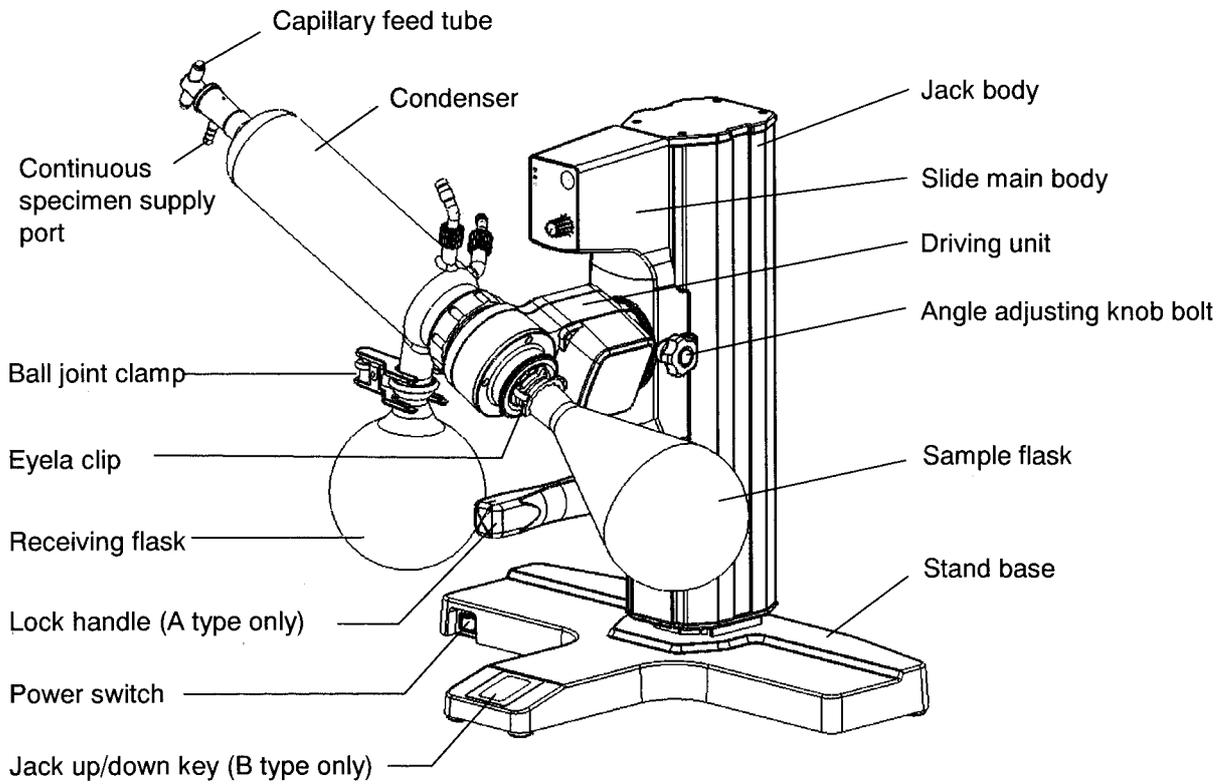
Product name		Rotary evaporator		
Type (A/B-glass set)		N-1200A/B -S	N-1200A/B -V	N-1200A/B -T
Performance	Rev. speed range	5~280rpm		
	Evaporating capacity	Max.23mL/min (water)		
	Attainable vacuum level	399.9Pa (3mmHg) or less		
Functions	Rev. setting and display	Volume setting · digital display (B type only)		
	Safety function	Fuse (2A) , motor overload protection circuit Jack upper/lower limit switch (B type only), auto lift-up on power failure (B type only)		
	Jack function	Manual weight balance (A)/ motorized lift (B) + manual extension slide		
Configuration	Rotation motor	Stepping motor		
	Jack motor	DC motor (B type only)		
	Condenser	Horizontal dual spiral condenser Cooling area:0.14m ²	Vertical dual spiral condenser Cooling area:0.14m ²	Dewar vessel O.D.110×340H (mm) (Internal size:91×230mm)
	Specimen flask	Pear shaped flask: 1L TS29/38		
	Receiver flask	Round flask:1L ball joint S35/20		
	Vacuum seal	Teflon seal		
Standard	Connection port dia.	Nozzle O.D.: 10mm		
	Stand base	T-shape base: 490×335mm		
	Jack stroke	100mm (manual balance ride/motorized lift) + 130mm (manual extension slide)		
Operational envtl temp.		5~35°C		
External side (mm)		665W×355D×520(750)H	520W×355D×700(930)H	510W×355D×740(970)H
Weight (A/B)		Approx.12kg /approx.13kg	Approx.12.5kg /approx.13.5kg	Approx.13kg/approx.14kg
Power input		A type : 1A,100VA / B type : 2A,200VA		
Rated power supply		AC100V~240V、50/60Hz		

※ Performance results have been measured at room temperature of 20°C, rated power source voltage.

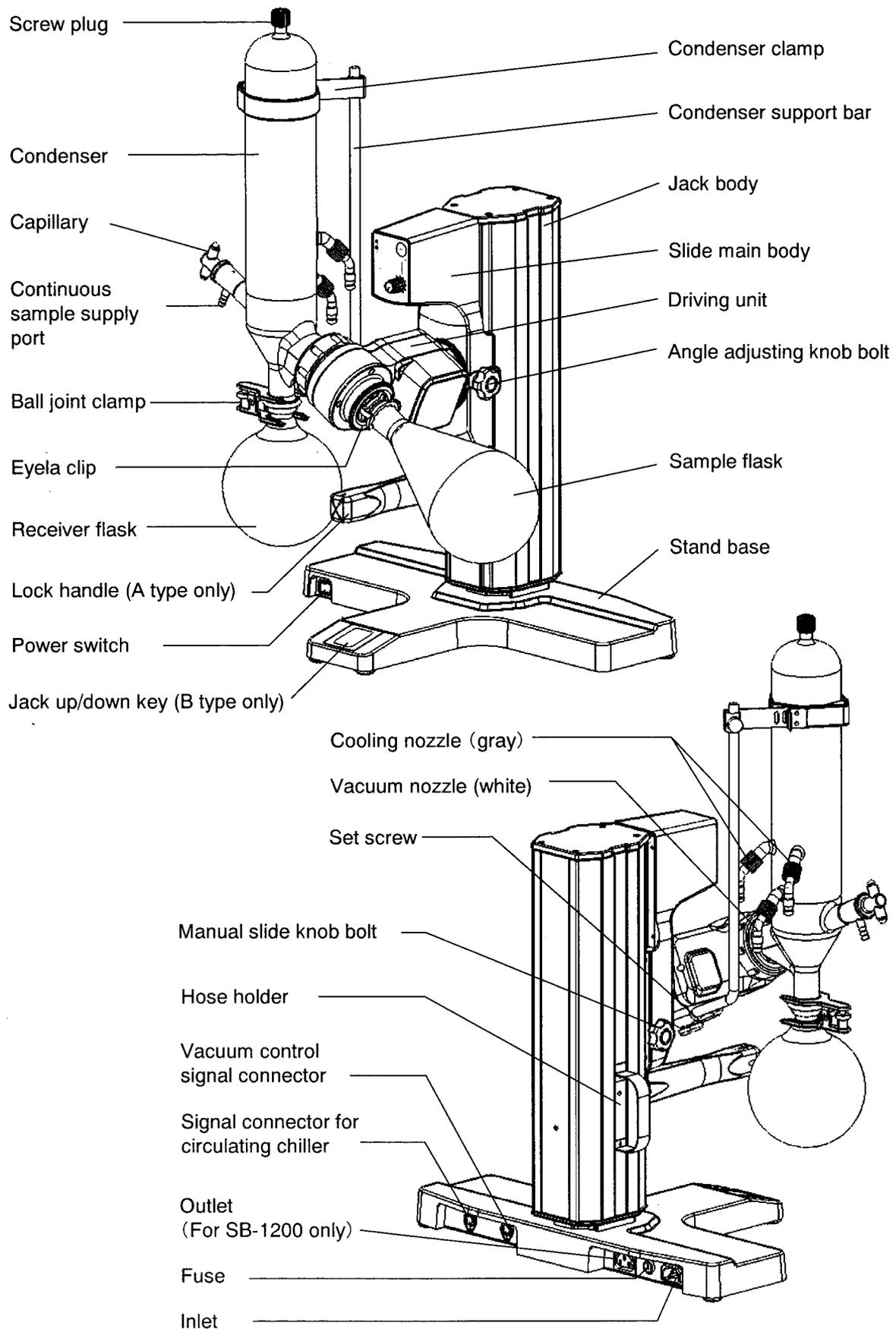
※ Evaporating capacity differs depending on the vacuum, water bath temperature, coolant temperature or other conditions.

2-3 Names of parts

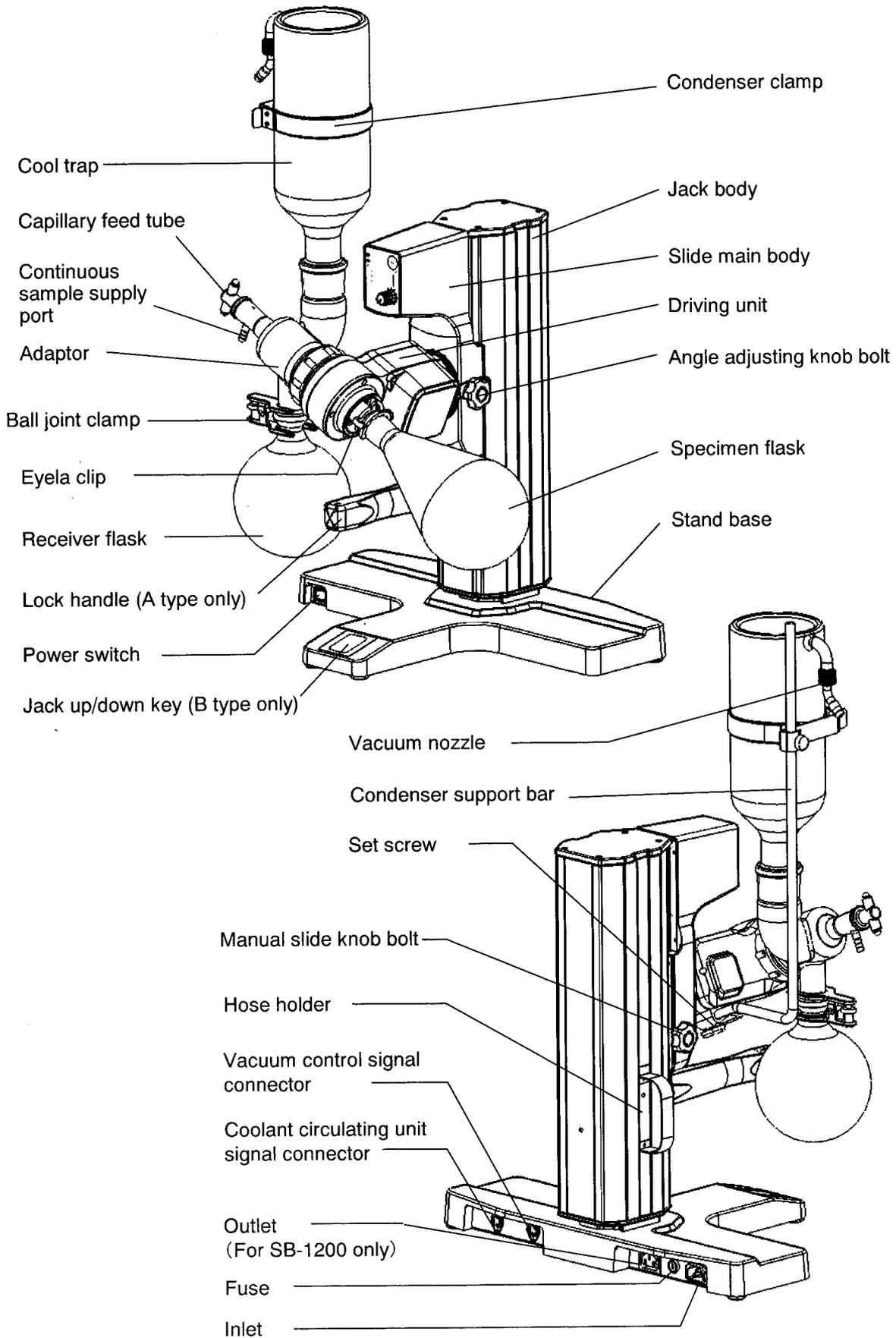
N-1200A/B -S type



N-1200A/B -V type

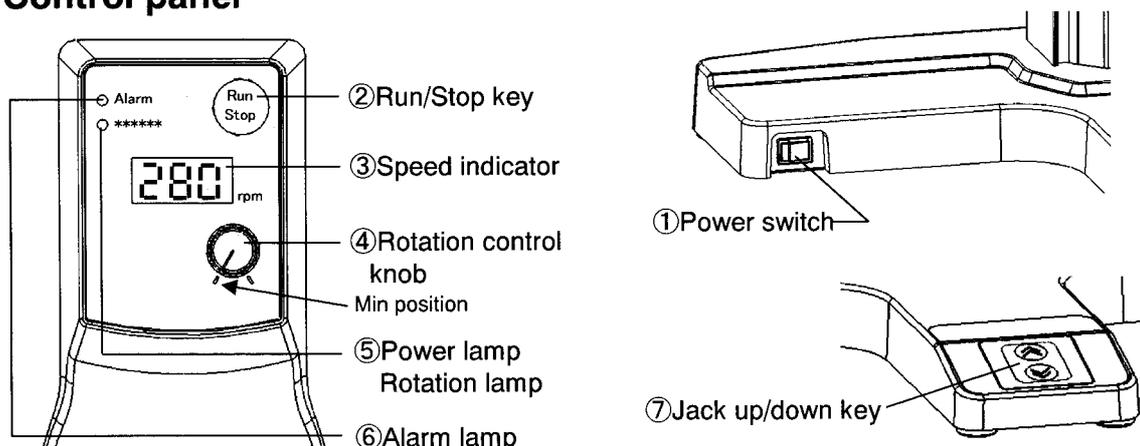


N-1200A/B -T type



3 Names and functions of control assembly

3-1 Control panel

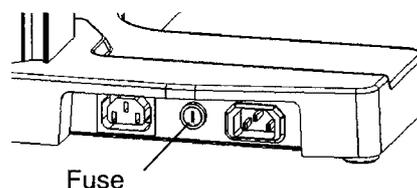


No.	Name	Function
①	Power switch	Turning this ON to power on and the switch lamp comes on.
②	Run/Stop key ※1	Press this button to start rotation and press again to stop. For B type, the jack will automatically go up to the upper limit when rotation is stopped.
③	Speed indicator (B type only)	Indicates the rotation speed.
④	Rotation control knob	This knob is used to adjust the rotation speed of the sample flask. Rotation starts at 5rpm at minimum position.
⑤	Power lamp (A type only)	Cómes on when the power switch is turned ON.
	Rotation lamp (B type only)	The lamp comes on when Run key is pressed and rotation is started and goes off when rotation is stopped.
⑥	Alarm lamp	Turns on when an abnormality occurs for rotation control function..
⑦	Jack up/down key (B type only)	The jack goes up with up arrow key and lowers with down key. The jack keeps moving while the key is pressed.

※1. Please do not run empty, because rotating without placing the glass set can result into defective rotation.

3-2 Safety functions

The product has the following safety functions.
If you encounter any abnormality, take appropriate measures referring to P.18 "Possible causes of troubles and solutions".



Safety function	Description of operation	Causes
Fuse	The fuse is blown and power is shut off.	Short-circuit occurred or over current flowed in the power supply circuit.
Motor overload protection circuit	Stops rotation and illuminates the Alarm lamp. Type B displays [ALr] and lifts the jack.	The sample flask rotation axis locked or was subjected to overload beyond the specification.
Jack upper/lower limit switch (B type only)	Stops at the jack upper/lower position.	Jack upper/lower limit is reached.
Auto lift-up on power failure (B type only) ※2	Rotations stops during operation with the jack lowered and the jack lifts up automatically.	Power failure occurred or the power switch was turned OFF.

※2. The jack may not lift completely if it is under load beyond its specification.

4 Installation

4-1 Installation environment



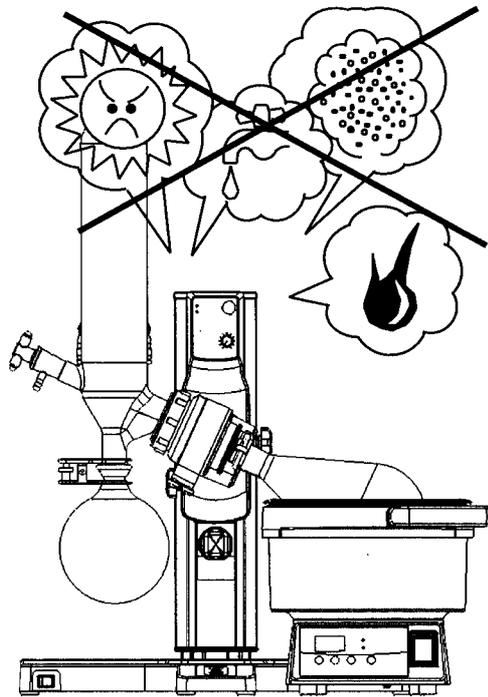
Warning

Never install the product in a potentially hazardous atmosphere.

The product is not explosion-proof. Use in a potentially hazardous atmosphere may cause a fire or other accidents.

Select a place that meets the conditions below for installing this product:

- A place free of flammable gas, liquid, or solid materials in the vicinity of the product.
- A place where the ambient temperature can be kept within a range of 5~35°C.
- A place free from condensation
- A place with less humidity and free from splashing water
- A place with minimum dust.
- A place out of/away from direct sunshine
- An airy or well-ventilated place
- A level, stable, and firm place



4-2 Connecting utilities



Warning

Confirm the voltage, phase, capacity, and the type of receptacle of power supply.

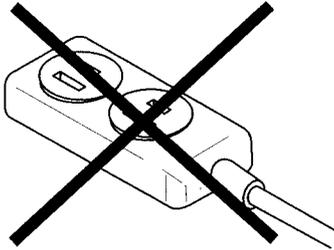
Wrong connection of power supply may cause fire or electric shock



Warning

Do not use the branching socket or table tap.

Over-current may cause cable burn, fire.



- (1) Check the product type as well as the voltage, phase, and capacity of power supply to be connected.

Power supply to be connected to the product is as shown in the right.

- (2) Check the receptacle of installation place.

(Do not connect the power plug yet.)

You can connect the power plug to an outlet with an earth terminal as it is.

※ Temporary set up

When you use an outlet without an earth terminal, set an earth adaptor to the power plug and be sure to connect the earth wire of the adaptor to the earth terminal.

※The earth adaptor is not included.

When no earth terminal is available, consult your electrical technician and make earth work of Class D earth work.

※We recommend replacing with an outlet with an earth terminal.

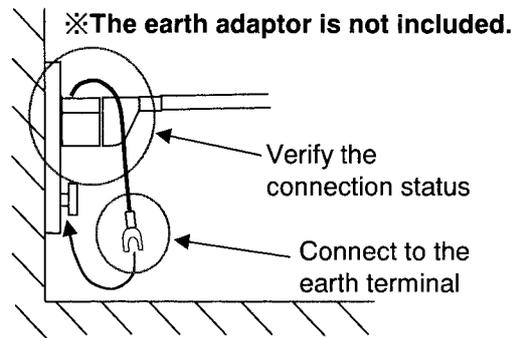


Warning

Be sure to connect the product to an outlet with an earth terminal.

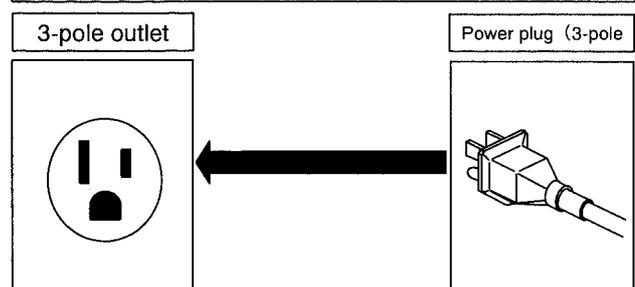
If you have to connect the product to an “outlet without an earth terminal”, be sure to connect the earth wire of the adaptor to the earth. Otherwise, electrical leakage will not be correctly detected and electrical leakage or an electrical shock may result.

Verify for connection status of the earth adaptor and the power plug. If they are inclined or not completely inserted, overheating or a fire may result.

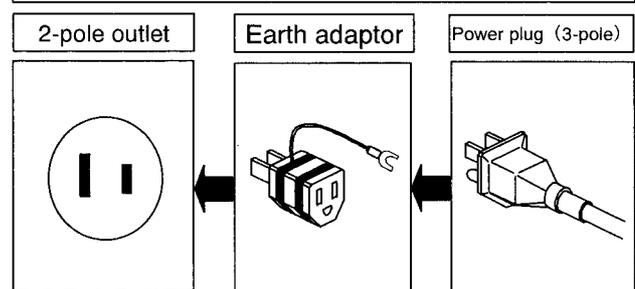


Program type	Power supply to connect	
	Voltage	Capacity
N-1200	AC100V	15A

When an outlet with an earth terminal is used



When an outlet without an earth terminal is used



※The earth adaptor is not included.

5 Operation

5-1 Preparation for operation

Caution

Be careful for jumping of the jack.

This jack is always under a lifting force.
When you release the lock, be sure to put your hand on the jack.

Caution

Be careful when handling the glass parts

Glass parts are easily damaged.
Handle them with care.

Caution

Be sure to raise the jack before setting glass parts.

First raise the jack before setting glass parts. If the jack is raised during setting work, a personal injury may result.

1. Raise the jack

The product has been packaged with its jack lowered for transportation. After unpacking, follow the procedures below to raise the jack on installation.

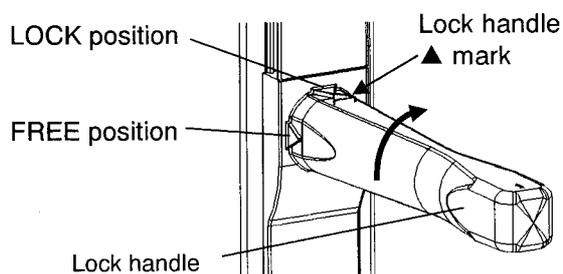
【A type (manual jack type)】

(1) Lock the lock handle.

Turn the lock handle so that its ▲ mark is aligned with the upper LOCK and lock the jack body.

(2) Remove the "PP band" that ties around the stand base and the drive together.

※ Note that the lifting force is strong and be sure to hold the top surface of the jack body with your hand and adjust the lifting speed by adjusting the holding force while the unit is in the lock free mode.

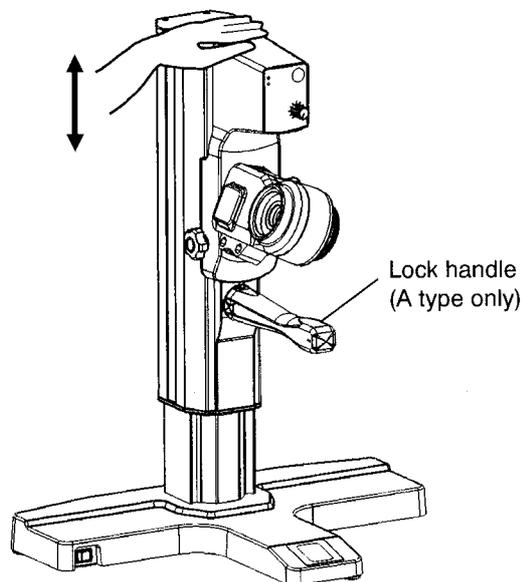
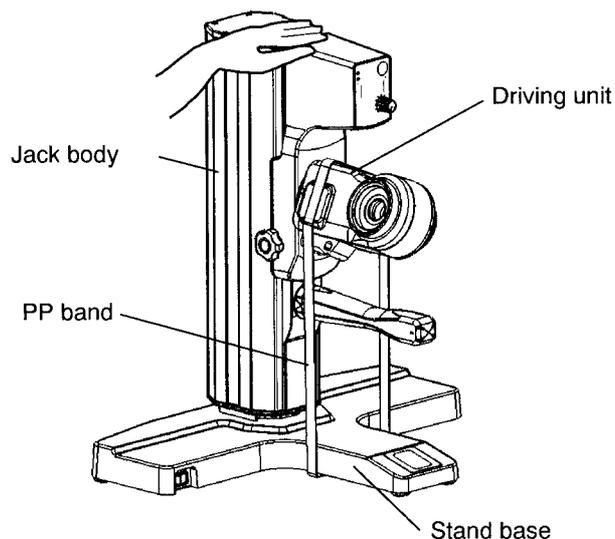


【B type (motorized jack type)】

(1) While holding the top surface of the "jack body", (2) Remove the "PP band" that ties around the stand base and the driver together.

The jack body will go up to the upper end with the spring force.

※ Note that the lifting force is stronger.

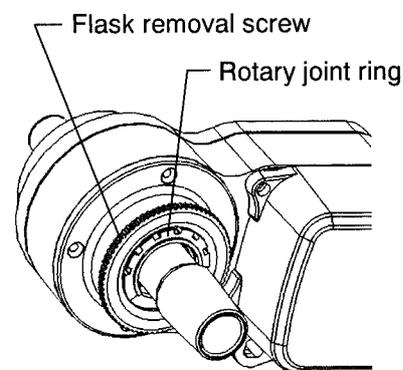
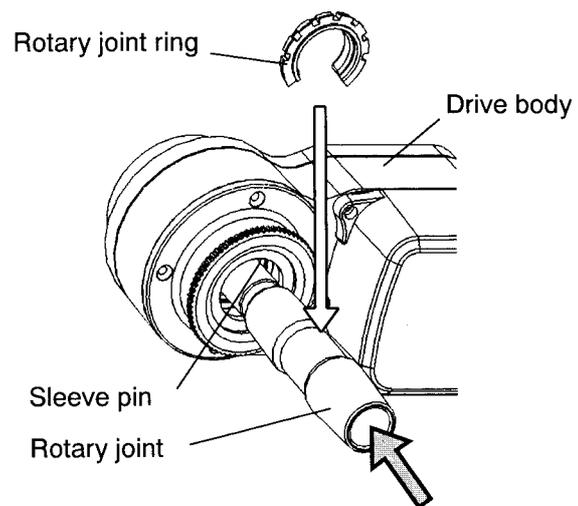


2. Installing the rotary joint

- (1) Fit the rotary joint ring over the rotary joint.
- (2) With the flask removal screw installed on the drive body, insert the rotary joint and the rotary joint ring altogether into the drive body.
- (3) Securely insert the rotary joint until it is hooked on the sleeve pin inside the drive assembly. Set the rotary joint ring so that it will hook on the inside of the flask removal screw.

※ **If the rotary joint is not inserted completely, imperfect rotation, dropping of the sample flask, or vacuum leakage may result.**

- (4) When you want to remove the rotary joint, turn the flask removal screw anticlockwise, and then pull out the rotary joint while allowing the rotary joint ring to touch the joint.



3. Installation of the vacuum seal

The vacuum seal is an important part for the performance of the evaporator. Take sufficient care handling it.

- (1) Holding the rotary joint so that the side on the vacuum seal spring and the O ring are visible toward the driver body and insert into the rotary joint at the right angle into the housing.

※ **Be sure to install the rotary joint before installing the vacuum seal.**

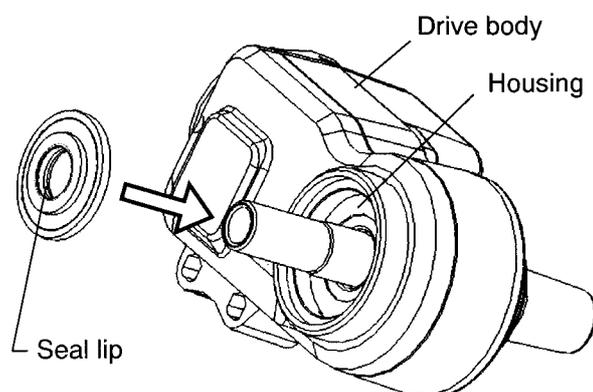
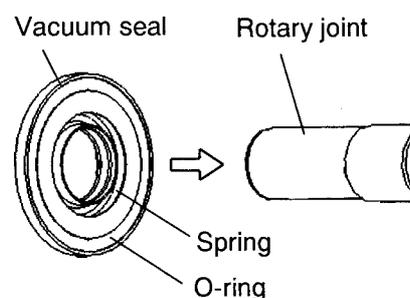
※ **Verify the direction of the seal faces.**

※ **Take care not to damage the seal lip during washing and thoroughly dry it after washing.**

※ **When storing, put the product in a plastic bag to protect from external pressures.**

※ **When you use the vacuum seal for the first time, the unit may present an insufficient rotation and cannot obtain sudden high rotation because of initial tightening of the seal lip. In this case, start with a low rotation speed and gradually increase it.**

※ **The vacuum seal is a consumable part.**



4. Installing the cooler and a flask

If you want to use a glass trap ball, perform steps in P.15 "8. Adjusting position for a glass trap ball" before performing the following procedures.

For S type



Caution

Take care for condition and handling of glass parts

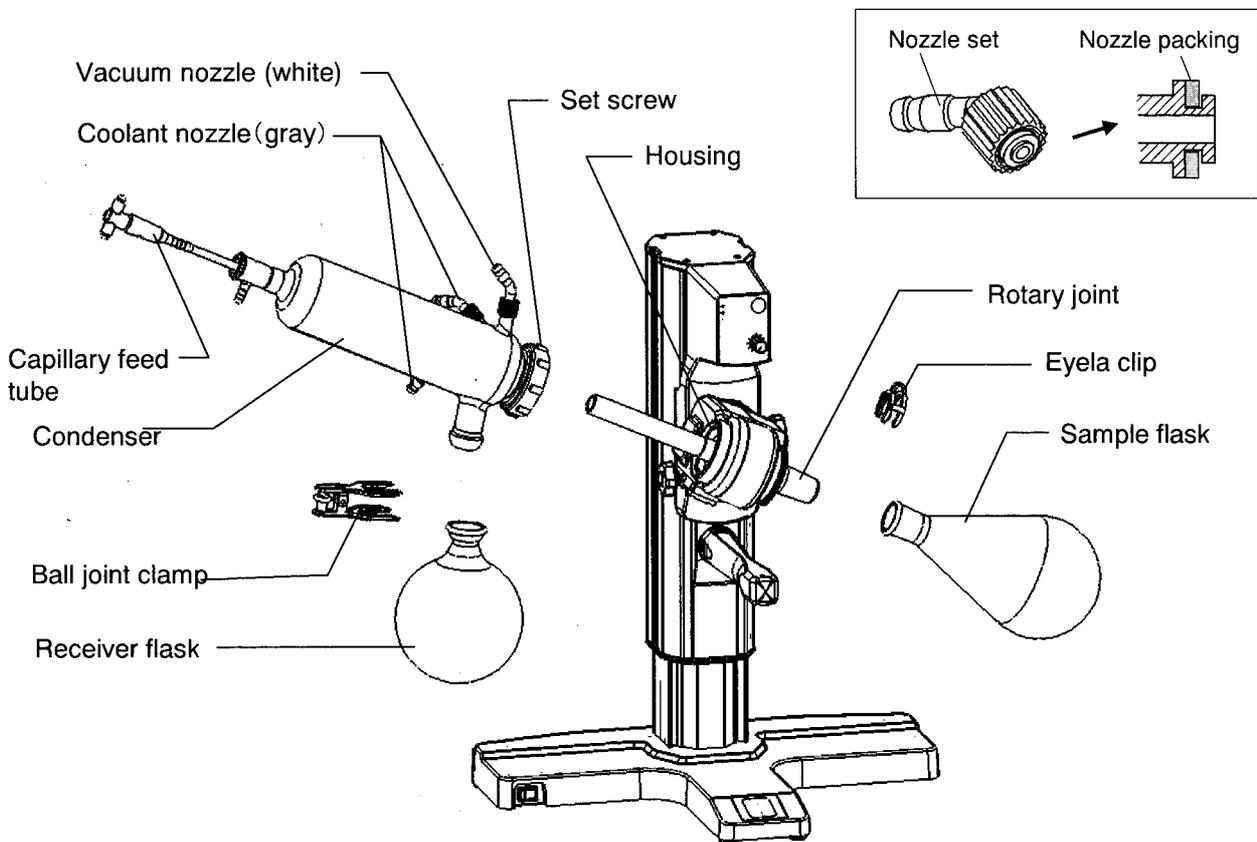
Broken or flawed glass parts may lead to accidents. Inspect for damage or flows on the glass parts and take care when handling them.



Caution

Be sure to raise the jack before setting glass parts.

First raise the jack before setting glass parts. If the jack is raised during setting work, a personal injury may result.



(1) Allow the condenser to tightly touch the vacuum seal in the housing and then tighten with the set screw.

When you have tightened to some extent, re-tighten both the set screw and the condenser at the same time and position the receiver flask so that its fixing opening faces down.

(2) Fix the receiver flask to the condenser with the ball joint clamp.

(3) Fix the sample flask to the rotary joint with the Eyela clip.

(4) Gently insert the capillary into the condensers.

(5) Install two cooling nozzles (gray) and a vacuum nozzle (white) to the condenser. Make sure that the nozzle packing sits in the groove before installation.

(6) Follow the procedures above in reverse order to remove.

For V Type



Caution

Take care for condition and handling of glass parts

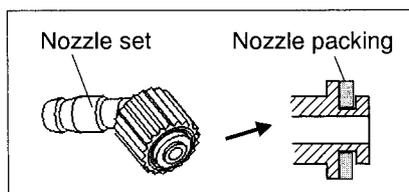
Broken or flawed glass parts may result in accidents. Inspect for damage or flows on the glass parts and take care when handling them.



Caution

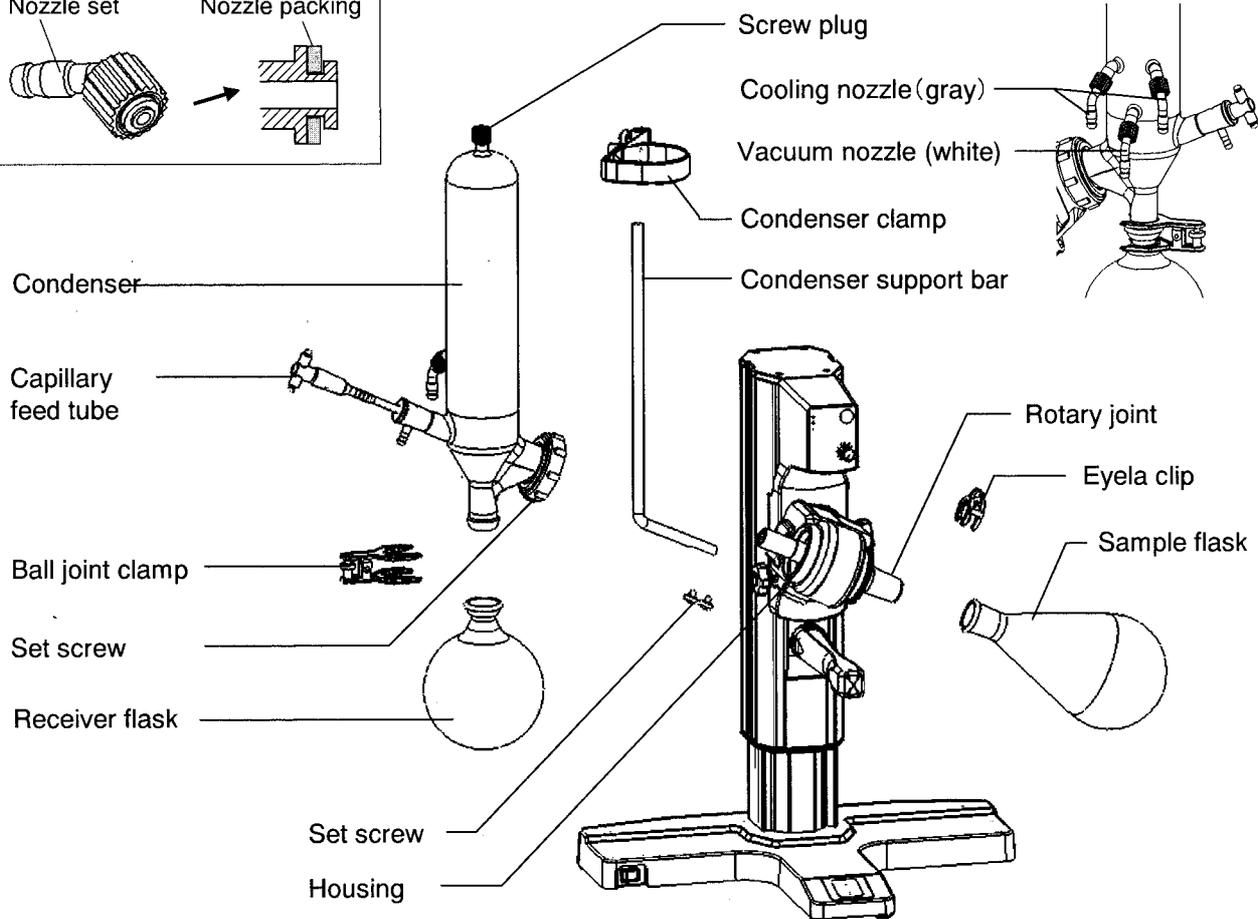
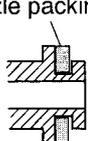
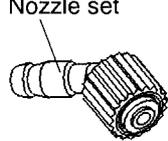
Be sure to raise the jack before setting glass parts.

First raise the jack before setting glass parts. If the jack is raised during setting work, a personal injury may result.



Nozzle set

Nozzle packing



- (1) Fix the condenser support bar into the hole at the back of the unit using the set screw. (Adjust its position after setting glass parts.)
- (2) Allow the condenser to tightly contact against the vacuum seal in the housing and then tighten with the set screw.
When you have tightened to some extent, re-tighten both the set screw and the condenser at the same time and position the receiver flask so that its fixing opening faces down.
- (3) Install the condenser clamp.
Adjust the condenser support bar and the condenser positions and fix with the set screw.
- (4) Fix the receiver flask to the condenser with the ball joint clamp.
- (5) Fix the sample flask to the rotary joint with the Eyela clip.
- (6) Gently insert the capillary into the condenser.
- (7) Install two cooling nozzles (gray) and a vacuum nozzle (white) to the condenser.
Make sure that the nozzle packing sits in the groove before installation.
- (8) Follow the procedures above in reverse order to remove.

For T Type



Caution

Take care for conditions and handling of glass parts

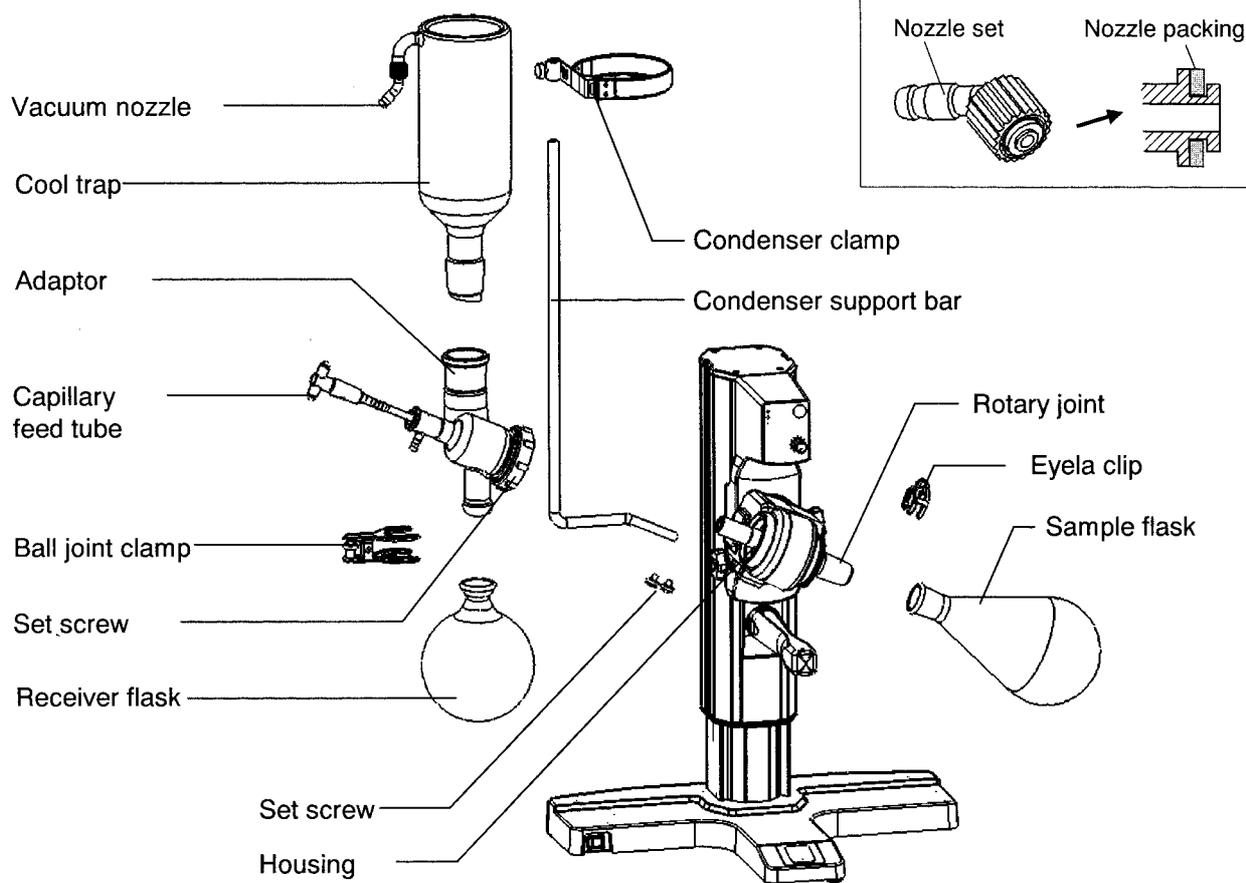
Broken or flawed glass parts may result in accidents. Inspect for damages or flaws on glass parts and take care when handling them.



Caution

Be sure to raise the jack before setting glass parts.

First raise the jack before setting glass parts. If the jack is raised during setting work, a personal injury may result.



- (1) Fix the condenser support bar into the hole at the back of the unit using the set screw. (Adjust its position after setting glass parts.)
- (2) Allow the adaptor to tightly contact against the vacuum seal in the housing and then tighten with the set screw.
When you have tightened to some extent, re-tighten both the set screw and the adaptor at the same time and position the receiver flask so that its fixing opening faces down.
- (3) Install the condenser to the adaptor.
- (4) Install the condenser clamp.
Adjust the condenser support bar and the condenser positions and fix with the set screw.
- (5) Fix the receiver flask to the condenser with the ball joint clamp.
- (6) Fix the sample flask to the rotary joint with the Eyela clip.
- (7) Gently insert the capillary into the condenser.
- (8) Install the vacuum nozzle to the cooler.
Make sure that the nozzle packing sits in the groove before installation.
- (9) Follow the procedures above in reverse order to remove.

5. Adjusting the angle of the drive body



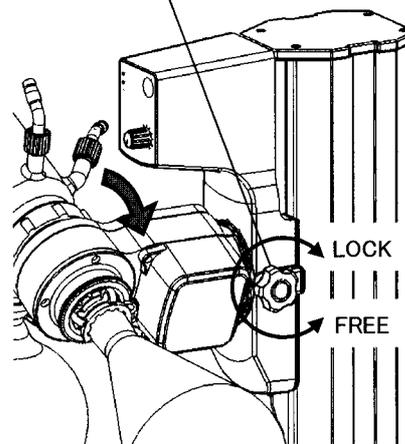
Caution

Adjust the angle of the drive body while holding the condenser with a hand.

When you loosen the angle adjusting knob bolt, the drive may suddenly incline from the weight of the cooler or sample flask and fall down and you might get injured by the broken glass.

- (1) Lift the jack body.
- (2) Loosen the angle adjusting knob bolt to adjust the angle while supporting the condenser with a hand.
- (3) Check the vertical position of the jack and its position relative to the bath and then securely tighten the angle adjusting knob bolt.

Angle adjusting knob bolt



6. Connecting the vacuum hose and the coolant hose

- (1) Insert the hose holder into the groove on the right side of the jack body.

- (2) Connect the condenser vacuum nozzle and the suction port of your vacuum unit using a vacuum hose through the hose holder.

※ **The vacuum hose for connecting to the vacuum unit is not included. Check the size of the connection nozzle and prepare a correct hose.**

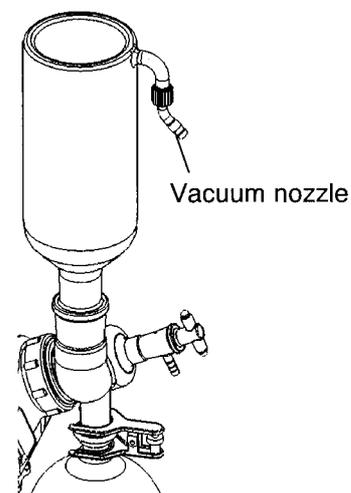
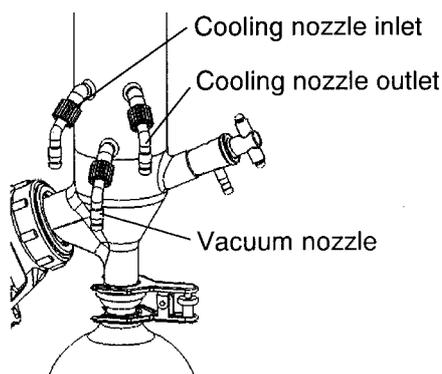
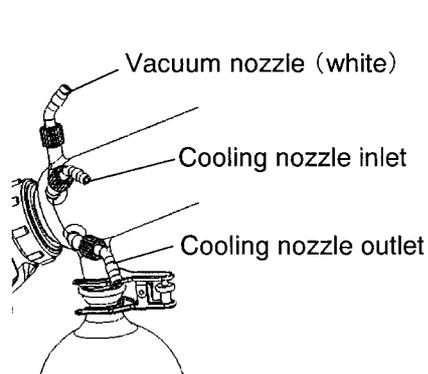
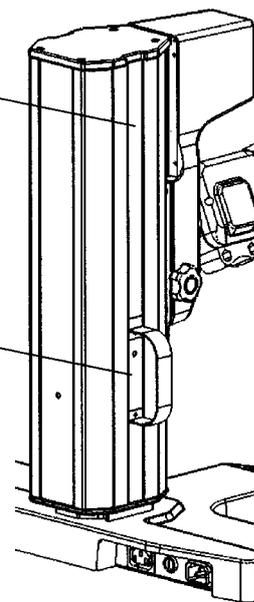
※ **Take care not to apply excessive force when connecting the vacuum hose. The nozzle is made of resin and may be damaged if it is subject to an excessive force.**

- (3) Connect the cooler coolant nozzle and the circulation port of your circulating chiller using a connecting hose through the hose holder.

※ **The connecting hose is not included. Check the capacity of your circulation unit and the size of the connection nozzle and prepare a correct hose.**

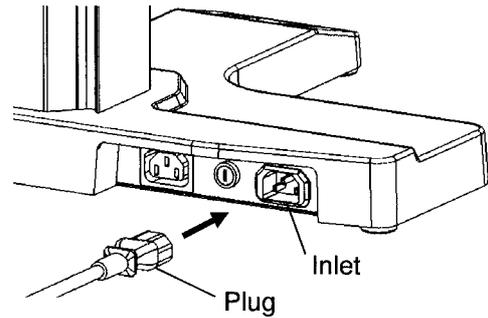
Right side of the jack body

Hose holder



7. Connecting the power cord

- (1) Insert the power cord plug into the inlet on the back of the stand base.
- (2) Make sure that the power switch is turned OFF and then insert the power plug into an outlet.



8. Adjusting the position of the glass trap ball (Adjusting the manual slide)



Caution

Use both hands to lift the manual slide slowly.

After loosening the manual slide knob bolt, the drive body may fall down, glass may break and result in a personal injury if you try to lift the body suddenly.

You can adjust the manual slide assembly to a position appropriate for the trap ball or specimen flask sizes.

Follow the procedures below to install a trap ball before installing the cooler.

- (1) Loosen the manual slide knob bolt, hold the drive body with both hands and slowly lift it and then tighten the manual slide knob bolt.

※ Remove the cooler before attempting these procedures.

※ The internal tightening plate may come if you loosen the manual slide knob excessively. If it occurs, lower the slide body, align the knob bolt with the internal plate and then tighten the knob.

- (2) Install the trap ball and the specimen flask using the Eyela clamps.

- (3) Set the bath, support the lower part of the front of the drive with one hand, gently loosen the manual slide knob bolt to adjust the height.

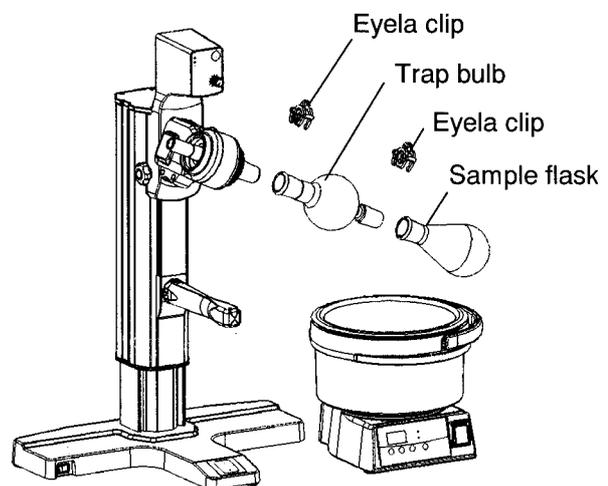
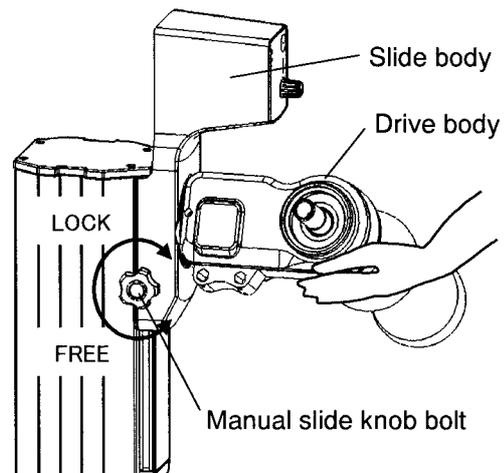
※ When you loosen the manual slide knob bolt suddenly, the drive may suddenly lower from the weight of itself causing the glass from shocks and you might be injured with broken glass.



Caution

Be sure to lower the manual slide slowly while supporting the driving assembly with a hand.

When you loosen the manual slide knob bolt suddenly, the drive may suddenly lower from the weight of the cooler or sample flask causing the glass to break from the shock and you might get injured by the broken glass.



5-2 Operating procedures



Caution

Stop operating the unit if you notice any abnormal conditions.

If you notice any abnormal condition, immediately turn the power switch OFF and refer to the section "Causes of troubles and countermeasures".



Caution

Never touch the sample flask or the bath during condensation.

The bath and the specimen flask will be hot during condensation and there is a danger of burning.



Caution

Take care for conditions and handling of glass parts

Broken or flawed glass parts may result in accidents. Inspect for damages or flows on glass parts and take care when handling them.

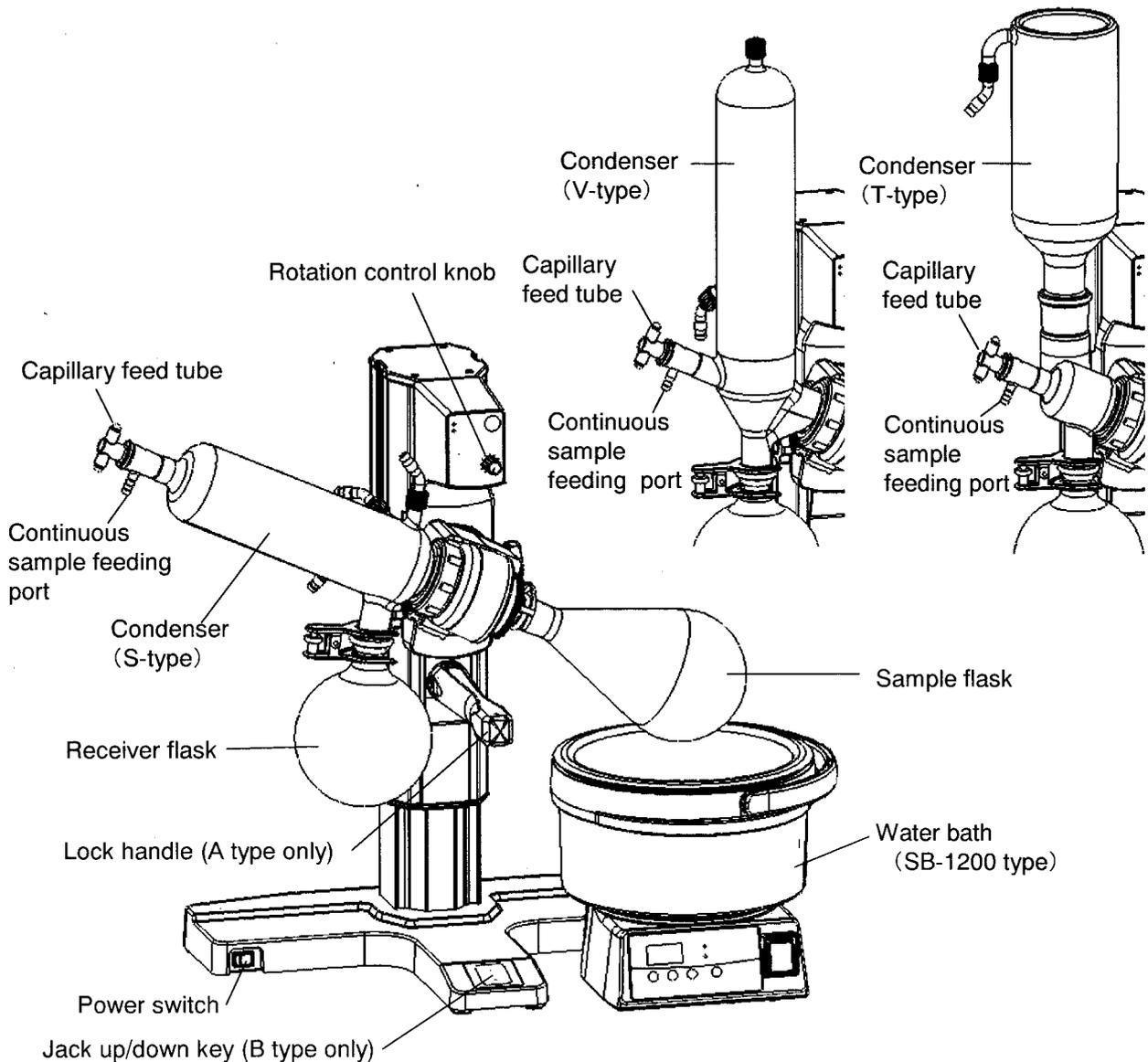


Warning

Never spill sample on the unit.

If any sample is spilt on the body or on the water bath, immediately wipe it out.

Some types of sample may be ignited with heat of the body or the water bath.

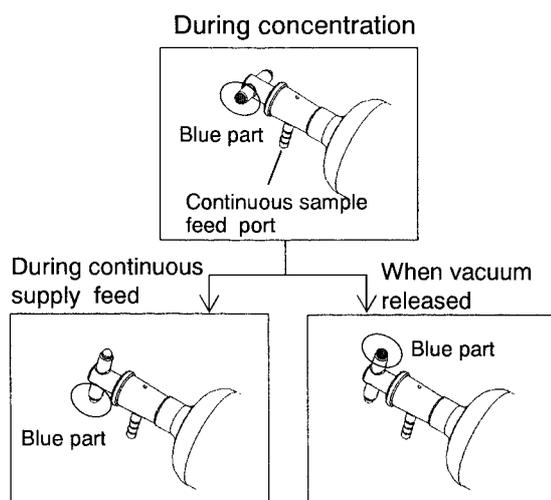


Operation

- (1) Set the temperature for the water bath and coolant.
(Refer to the operation manuals of the water bath and the cooling circulator unit for operating procedures of them.)
- (2) Turn the power switch ON.
- (3) Close the capillary cock. Turn it so that the blue mark will face you.
※ Apply some vacuum grease before operating the unit.
- (4) Supply or set samples with the procedures (I) or (II) below.

(I) To supply samples continuously

- ① Connect the continuous sample feed port and the sample container with a tube.
- ② Gently lower the jack so that the sample flask will be lowered into the heating bath.
- ③ Press Run/Stop key and turn the rotation control knob to set the number of rotations you want.
- ④ Start the vacuum unit to depressurized inside the evaporator.
- ⑤ Align the capillary cock with the continuous sample feed port (blue mark points downward) and supply sample.

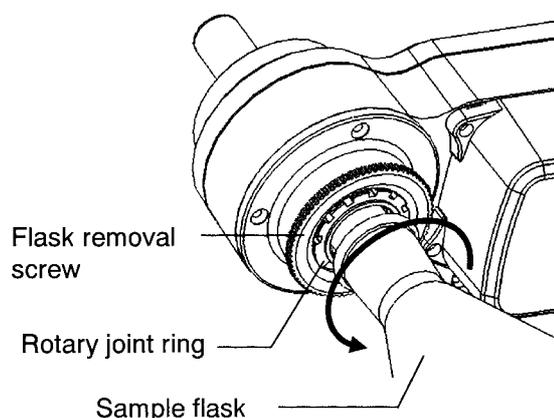


(II) Not to supply sample continuously

- ① Remove the sample flask and directly put sample in it.
- ② Press Run/Stop key, turn the rotation control knob to set to the number of rotations you want.
- ③ Gently lower the jack and put the sample flask in the heating bath.
- ④ Activate the vacuum unit to depressurized inside the evaporator.

Stopping operation

- (1) Press Run/Stop key to stop rotation, gently raise the jack and then take out the sample flask.
※ Type B will automatically go up and stop.
- (2) Open the capillary cock (blue mark points upward) and return the internal pressure to the normal pressure.
- (3) Stop the vacuum unit.
- (4) If you are not going to set samples, stop operation of all of the cooling circulator and the water bath.
※ Note that the heating bath and the sample flask are hot for some time after completion of concentration and may cause burning.
- (5) To remove the sample flask, remove the Eyela clip, turn the flask removal screw as shown in the right diagram, apply the rotary joint to the mouth of the sample flask and turn it.



- ※ If the rotary joint and the sample flask stick together and cannot be separated, remove them altogether first and then warm the flask and remove.
- (6) Remove the ball joint clip while supporting the receiver flask from bottom.

Procedures after operations

If you are not going to use the product for a long time, turn the power switch OFF, and remove the power plug out of the AC outlet.

6

Causes of troubles and solutions

Contact your dealer or the nearest service center for troubles not listed here.

Symptom	Causes	Solutions
The Power lamp (A type only) or the speed indicator (B type only) will not come on even if the power switch is turned ON.	The power plug is come off the AC outlet. Or it is not inserted securely.	Turn the power switch OFF and insert the power plug into the outlet securely.
	The power cord plug is come off the outlet. Or it is not inserted securely.	Turn the power switch OFF and insert the power cord plug into the outlet.
	The display board or the control board is malfunctioning.	Immediately stop operation and contact your dealer or the nearest service center.
	The power source board is malfunctioning.	
The power switch comes on but rotation will not start.	The fuse is blown.	Replace the fuse with new one. If the fuse is blown soon again, immediately stop operation and contact your dealer or the nearest service center.
	There is a malfunction in the control board.	Immediately stop operation and contact your dealer or the nearest service center.
	The motor is malfunctioning.	
Rotation shows hunting.	The bearing is rusted.	Immediately stop operation and contact your dealer or the nearest service center.
	The control board is malfunctioning	
	The motor is malfunctioning.	
Strange noise is heard.	The internal gear or the timing belt is worn out.	Immediately stop operation and contact your dealer or the nearest service center.
	The vacuum seal is worn out.	
	The drive assembly needs lubrication.	
	The motor is malfunctioning.	
Vacuum level is low. Decompression leak is noticed.	The internal gear or the timing belt is worn out.	Replace the vacuum seal.
	The rotary joint is worn out.	
	The nozzle packing of the vacuum nozzle set is deteriorated.	
	The vacuum hose is deteriorated.	
The jack cannot be raised or lowered.	The jack lock part is damaged.	Immediately stop operation and contact your dealer or the nearest service center.
	The screw at the handle rotation axis is loosened and the handle is rotating freely. (A type only)	
	The up/down switch is malfunctioning. (B type)	
	The jack motor is malfunctioning. (B type)	
	The limit switch is malfunctioning. (B type)	
Lifting operation of the jack drags excessively or is slow. It does not lift completely.	The spring is deteriorated.	Immediately stop operation and contact your dealer or the nearest service center.
	The jack slide bearing is worn out or rusty.	
The Alarm lamp came on. "ALr" indication appeared. (B type)	Load beyond the rating is applied to the motor.	Eliminate the cause of load and press Run/Stop key to release the alarm status.

7 Maintenance and check up

7-1 Cleaning and care of the product



Caution

Never attempt to disassembly the product.

The unit contains parts with high voltage applied or may become hot, and disassembly may cause an electrical shock or an injury.

- (1) Turn the power switch OFF and remove the power plug off the AC outlet before maintenance work.
- (2) Use a moistened and well wriggled soft cloth for cleaning. Use milt detergent for stubborn dirt and completely wipe remaining detergent after cleaning.

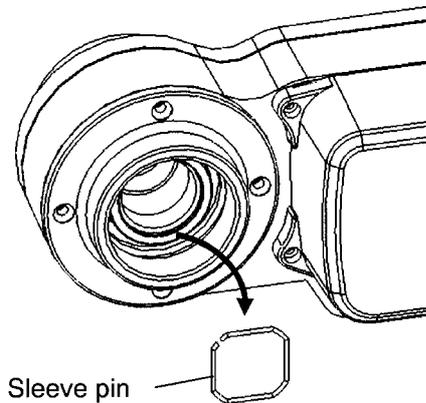
7-2 Replacing consumable parts

When parts shown in the table are consumed or deteriorated, the vacuum level will be low. Regularly inspect and replace them as and when necessary.

The sleeve pin tightens the rotary joint and hold it locked. It will wear through repeated removals and inserts of the rotary joint. If it is heavily worn, free rotation of the flask may occur, or when removing the flask, the rotary joint may be removed together with it.

Perform the following procedures to replace the worn sleeve pin.

- (1) Use a small flat-blade screw driver to remove it out of the groove.
- (2) Push a new sleeve pin with a finger into the groove.
- (3) Make sure that all of the four corners of the sleeve pin are snugly fit in the groove.

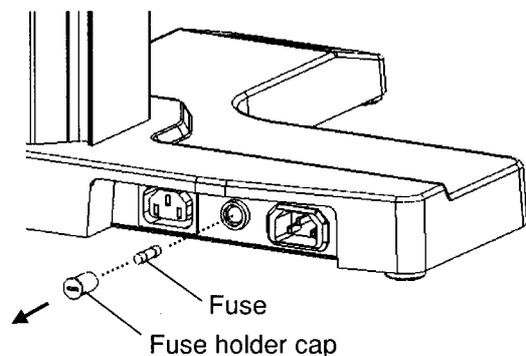


7-3 Replacing the fuse

- (1) Use a flat-blade screw driver, turn the fuse anticlockwise to remove while pushing the fuse holder.
- (2) Insert the included fuse or a fuse of specified type into the fuse holder cap and attach it to the main unit by turning it clockwise.

※ A fuse other than specified may not melt when over current flows and a fire or other accidents may result.

※ If the fuse blows soon after replacement, immediately stop operating the unit and contact your dealer or the nearest service center.



Part name	Standard	Code No
Fuse (x 2)	2A	126850



Caution

Use a correct method and items for cleaning or caring the product.

When cleaning or maintaining the product, never splash water to the exterior or the inside directly, do not put any foreign materials and never use the cleanser, thinner, oil, kerosene, acid, and equivalent. Otherwise, the user may suffer electric shock or damage to the product.

Part name	Standard	Code No
Rotary joint	272mm TS29/38	142500
Rotary joint	178mm TS29/38	142520
Vacuum seal	For N-1200	244980
Nozzle packing(x12)	For N•NE	142691
Sleeve pin (x2)	For N•NE	142650

8 Disposal of Products

Disposal of product or part must be done according to the specified disposal method.

Principal components parts and disposal method

Components	Model	Weight	External dimensions (mm)	How to discard
Main body	N-1200A-S	Approx. 12kg	665(W)×355(D)×750(H)	Request the disposal operator for disposal.
	N-1200A-V	Approx. 12.5kg	520(W)×355(D)×930(H)	
	N-1200A-T	Approx. 13kg	510(W)×355(D)×970(H)	
	N-1200B-S	Approx. 13kg	665(W)×355(D)×750(H)	
	N-1200B-V	Approx. 13.5kg	520(W)×355(D)×930(H)	
	N-1200B-T	Approx. 14kg	510(W)×355(D)×970(H)	

* We ask you to discard packing materials after classifying them by material types.

9 After-sales Services

1. In case the product does not function satisfactorily, check first by referring to the page on troubleshooting to see if this is actually a trouble.
2. If the product remains unsatisfactory even after checking, contact the dealer from which you have purchased the product or the service center described in the manual and request repair.
3. Repair during the guarantee period will be made according to the guarantee stipulations.
4. After expiration of the guarantee period, the charged repair will be made at the customer's request.

10 Reference material

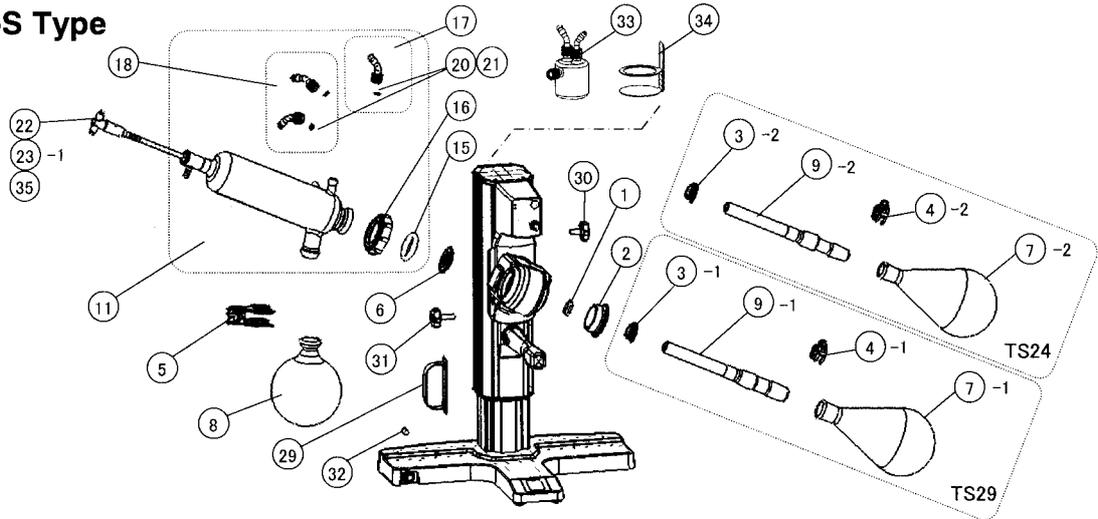
Class	Name of typical substances	Formula (Molecular formula)	MW (molar weight)	Boil (b. p)(°C) (1013hPa)	Density (g / cm ³) (20°C)	Evap. latent heat (cal / g) (1013hPa)	Vacuum level (×hPa)		
							b. p=25°C	b. p=30°C	b. p=40°C
Low-boiling point substance	Diethyl ether	C ₄ H ₁₀ O	74.1	34.6	0.736	89.8	770	Atomo p	Atomo p
	n-pentane	C ₅ H ₁₂	72.2	36.1	0.626	92.6	678	931	Atomo p
	Ethyl bromide	C ₂ H ₅ Br	109.0	38.4	1.451	549.7	598	705	Atomo p
	Dichloromethane	CH ₂ Cl ₂	84.9	39.8	1.326	78.7	571	678	Atomo p
	1,2-dichloroethylene (trans)	C ₂ H ₂ Cl ₂	97.0	48.0	1.284	75.0	532	452	798
	Cyclopentane	C ₅ H ₁₀	70.1	49.0	0.745	97.2	412	519	705
	Acetone	C ₃ H ₆ O	58.1	56.3	0.788	125.0	332	399	545
	1,1-dichloroethane	C ₂ H ₄ Cl ₂	99.0	57.4	1.175	69.0	306	359	539
	Methyl acetate	C ₃ H ₆ O ₂	74.1	57.8	0.934	98.1	279	346	532
	Chloroform	CHCl ₃	119.4	61.3	1.486	58.8	266	332	466
	Methanol	CH ₄ O	32.0	64.7	0.794	264.0	159	199	332
	n-hexane	C ₆ H ₁₄	86.2	68.7	0.659	91.8	199	239	372
	Carbon tetrachloride	CCl ₄	153.8	76.8	1.595	46.6	159	173	279
	Ethyl acetate	C ₄ H ₈ O ₂	88.1	77.1	0.901	88.2	129	159	239
	Ethanol	C ₂ H ₆ O	46.0	78.4	0.785	204.0	80	102	173
	Benzene	C ₆ H ₆	78.1	80.1	0.874	94.2	126	159	239
	2-propanol	C ₃ H ₈ O	74.1	82.0	0.786	159.2	57	77	136
	1,2-dichloroethane	C ₂ H ₄ Cl ₂	99.0	83.5	1.257	77.3	111	146	199
1-propanol	C ₃ H ₈ O	60.1	97.8	0.804	162.6	27	36	67	
2-butanol	C ₄ H ₁₀ O	74.1	99.5	0.807	134.4	21	29	57	
Water		H ₂ O	18.0	100.0	0.9970≠1	540.0	32	43	73
High-boiling point substance	Formic acid	CH ₂ O ₂	46.0	100.6	1.214	120.4	53	70	113
	Propyl acetate	C ₅ H ₁₀ O	102.1	101.8	0.889	80.3	41	55	93
	Toluene	C ₇ H ₈	92.2	110.6	0.866	98.6	45	59	94
	1,1,2-trichloroethane	C ₂ H ₃ Cl ₃	133.4	113.5	1.442	68.7	33	40	68
	1-butanol	C ₄ H ₁₀ O	74.1	117.7	0.810	141.3	9	13	24
	Acetic acid	C ₂ H ₄ O ₂	60.0	118.0	1.050	96.8	19	27	43
	2-pentanol	C ₅ H ₁₂ O	88.2	119.3	0.810	97.8	8	12	21
	Tetrachloroethylene	C ₂ Cl ₄	165.8	121.0	1.623	50.0	24	31	53
	Isoamyl alcohol	C ₅ H ₁₂ O	88.1	130.8	0.809	116.0	4	7	12
	Chlorobenzene	C ₆ H ₅ Cl	112.6	131.7	1.106	77.6	16	19	33
	1-pentanol	C ₅ H ₁₂ O	88.2	138.0	0.814	120.6	4	5	9
	m-xylene	C ₈ H ₁₀	106.2	139.1	0.860	81.9	12	15	27
	o-xylene	C ₈ H ₁₀	106.2	144.4	0.876	82.9	9	12	21
Styrene	C ₈ H ₈	104.2	145.2	0.901	100.8	10	13	21	
							Vacuum level (×hPa)		
							b. p=70°C	b. p=90°C	b. p=120°C
High-boiling point substance	Styrene	C ₈ H ₈	104.2	145.2	0.901	100.8	81	173	492
	1-hexanol	C ₆ H ₁₄ O	102.2	157.1	0.819	107.2	27	70	266
	Butyric acid	C ₄ H ₈ O ₂	88.1	163.5	0.958	113.9	20	57	199
	1-heptanol	C ₇ H ₁₆ O	116.2	176.3	0.822	438.9	9	33	133
	1-octanol	C ₈ H ₁₈ O	130.2	195.2	0.824	98.2	4	13	67
	Ethylene glycol	C ₂ H ₆ O ₂	62.1	197.4	1.116	219.8	4	12	53
	Caproic acid	C ₆ H ₁₂ O	116.2	205.8	0.927	133.0	3	8	40
	1-nonol	C ₉ H ₂₀ O	144.3	213.5	0.827	134.0	3	8	37
Glycerin	C ₃ H ₈ O ₃	92.1	290.0	1.262	158.4	5hPa /150°C			

Examples

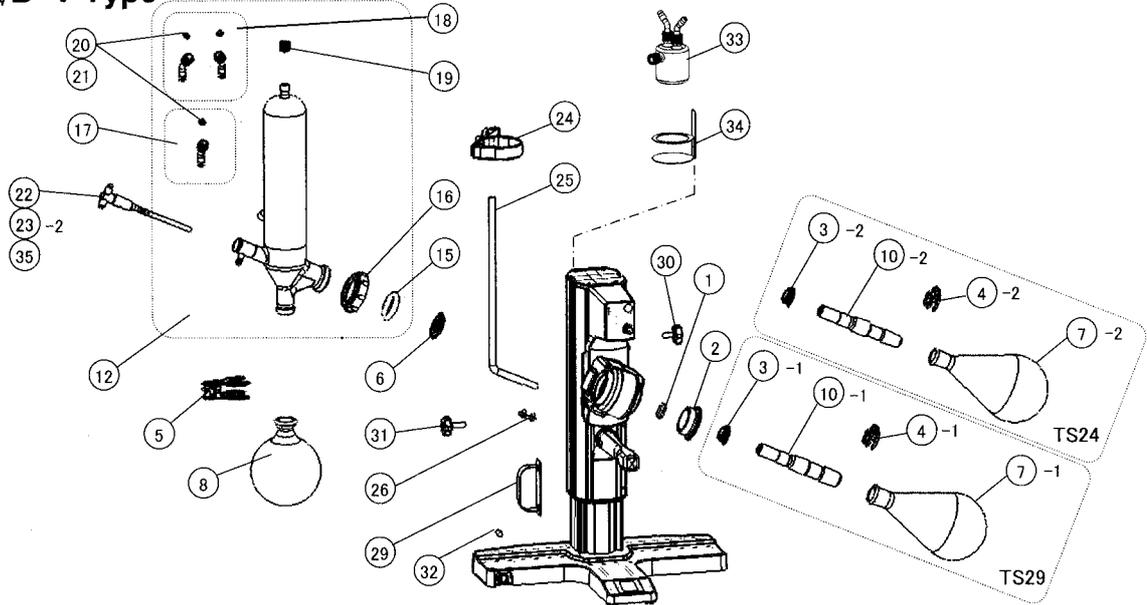
- Coolant temp.=10°C, bath temp.=40°C • • Appropriate boiling point=20°C (recommended range:15~25°C)
- Coolant temp.=10°C, bath temp.=50°C • • • Appropriate boiling point=25°C (recommended range:20~30°C)
- Coolant temp.=20°C, bath temp.=60°C • • • Appropriate boiling point=35°C (recommended range:30~40°C)

11 List of Consumable and Replacement parts/ Optional parts

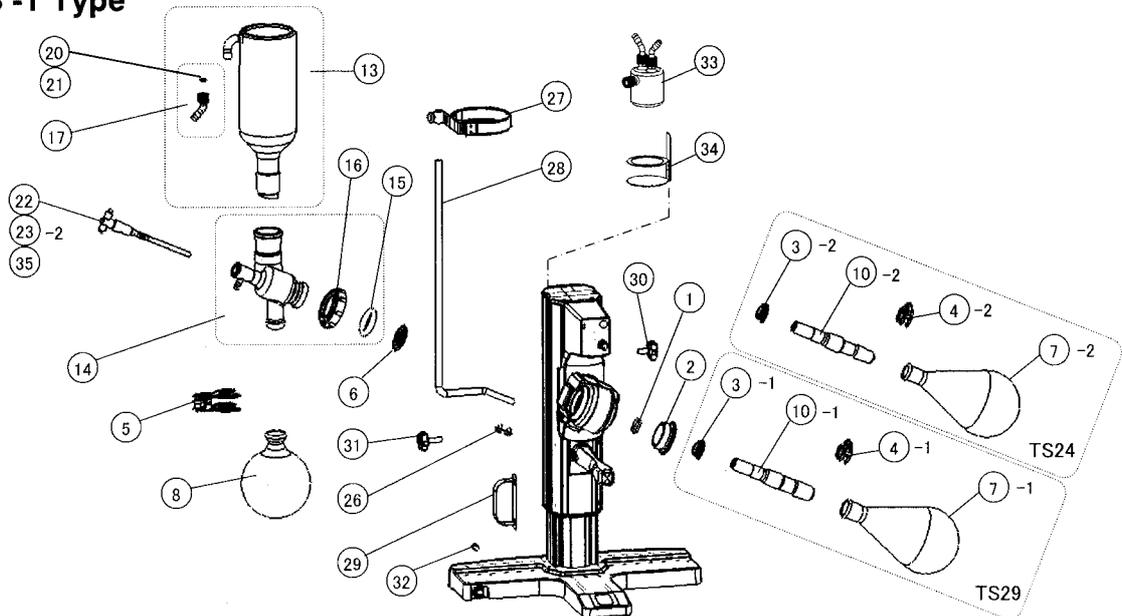
N-1200A/B -S Type

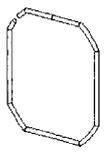
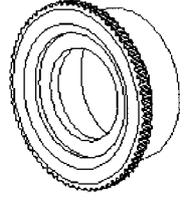
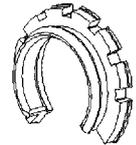
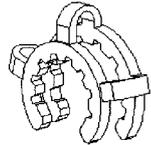


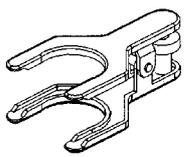
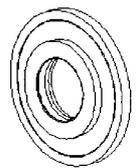
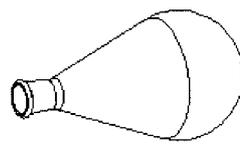
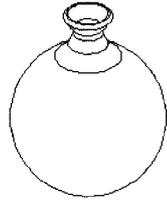
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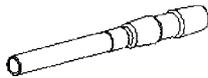


N-1200A/B -T Type

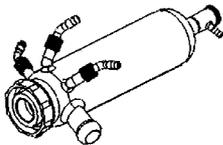
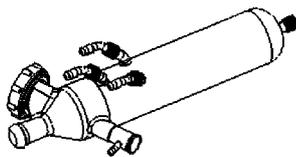
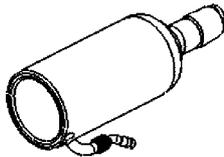


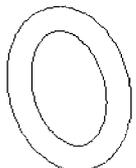
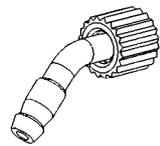
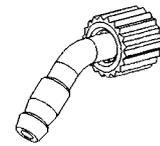
① Sleeve pin 				② Flask remover 				③ Rotary joint ring 				④ Eyela clip 			
No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty
1	142650	For N·NE	2	2	245540	For N-1200	1	3-1	192600	For TS29	2	4-1	142540	For TS29	2
								3-2	217020	For TS24	2	4-2	142550	For TS24	2

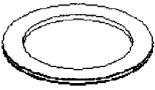
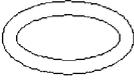
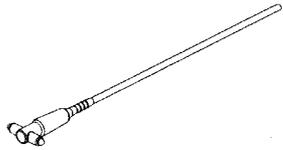
⑤ B all joint clamp 				⑥ Vacuum seal 				⑦ Sample flask 1000mL 				⑧ Receiver flask 1000mL 			
No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty
5	202790	S35	1	6	244980	For N-1200	1	7-1	116190	TS29/38	1	8	116340	S35/20	1
								7-2	116270	TS24/40	1				

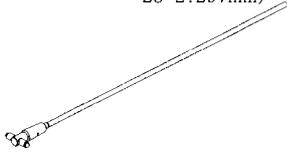
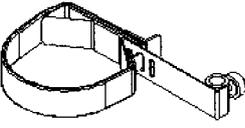
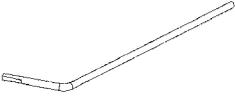
⑨ Rotary joint for S type 	No.	Standard		Thick type		Transparent edging type	
		Code No.	Std. ·total length	Coe No.	Std. ·total length	Code No.	Std. ·total length
		9-1	142500	TS29/38 · 272mm	116560	TS29/38 · 272mm	116600
9-2	142510	TS24/40 · 272mm	116570	TS24/40 · 272mm	116610	TS24/40 · 272mm	

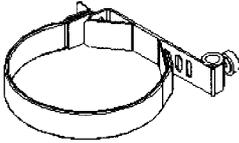
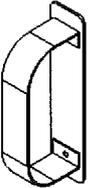
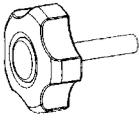
⑩ Rotary joint for V·T types 	No.	Standard		Thick type		Transparent edging type	
		Code No.	Std. ·total length	Code No.	Std. ·total length	Code No.	Std. ·total length
		10-1	142520	TS29/38 · 178mm	116580	TS29/38 · 178mm	116620
10-2	142530	TS24/40 · 178mm	116590	TS24/40 · 178mm	116630	TS24/40 · 178mm	

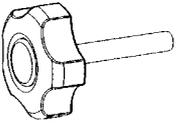
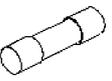
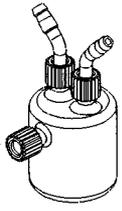
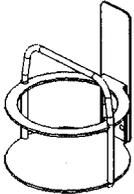
⑪ Condenser 			⑫ Condenser 			⑬ Condenser 			⑭ Adaptor 		
No.	Coe No.	Std.	No.	Coe No.	Std.	No.	Coe No.	Std.	No.	Coe No.	Std.
11-1	187780	Standard	12-1	244960	Standard	13-1	187920	Standard	14-1	911160	Standard
11-2	228460	Chemical coating	12-2	244970	Chemical coating	13-2	228480	Chemical coating	14-2	228490	Chemical coating

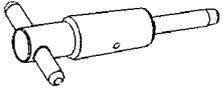
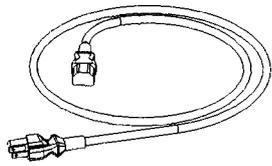
⑮ Ring spring 				⑯ Cap screw 				⑰ Nozzle set (white) 				⑱ Cooling nozzle set (gray) 			
No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty
15	142710	For N·NE	1	16	142700	For N·NE	1	17	142690	For N·NE	3 sets	18	178900	For N·NE	2sets

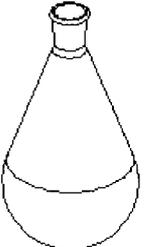
19 Screw plug (seal plug) 				20 Nozzle packing 				21 Viton O ring for nozzle set 				22 Capillary feed tube (Teflon tube:500mm) 			
No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty
19	232840	For N•NE	1	20	142691	For N•NE	12	21	202770	For N•NE	4	22	116540	TS19/40	1

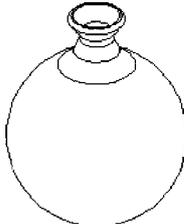
23 Capillary feed tube (Glass 23-1:510mm 23-2:297mm) 				24 Condenser holder For N-1200V 				25 Condenser support bar For N-1200V 				26 Set screw 			
No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty
23-1	142590	For S	1	24	245550	For N-1200	1	25	245560	For N-1200	1	26	187910	For N•NE	2
23-2	142600	For V•T	1												

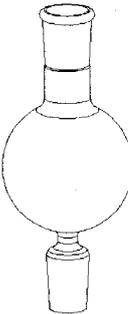
27 Condenser holder For N-1200T 				28 Condenser support bar For N-1200T 				29 Hose holder 				30 Angle adjusting knob bolt (M6×25L) 			
No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty
27	185240	For N•NE	1	28	185210	For NE•T.R	1	29	245570	For N-1200	1	30	245580	For N-1200	1

31 Manual slide knob bolt (M6×35L) 				32 Fuse 				33 Effluent trap set (Woulff bottle holder) 				34 Woulff bottle holder 			
No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty
31	245590	For N-1200	1	32	126850	2A	2	33	235460	For ECC	1	34	246300	For N-1200	1

35 Teflon capillary (Teflon tube:500mm) 				36 Power cord 100V 			
No.	Code No.	Std.	Qty	No.	Code No.	Std.	Qty
35	245000	TS19/38	1	36	245200	N-1200	1

Specimen (Pear shaped) flask 	Std. Code No.	TS29/38	TS29/38 Chemical coating	TS24/40	TS24/40 Chemical coating
	50mL	116140	228240	116220	228310
	100mL	116150	228250	116230	228320
	200mL	116160	228260	116240	228330
	300mL	116170	228270	116250	228340
	500mL	116180	228280	116260	228350
	1L	116190	228290	116270	228360
	2L	116200	228300	116280	228370

Receiver flask 	Std. code No.		S35/20 (JIS std.)	S35/20 (JIS std.) Chemical coating
	With drain cock	500mL	116370	228440
		1L	116380	228450
	100mL		116300	228380
	200mL		116310	228390
	300mL		116320	228400
	500mL		116330	228410
	1L		116340	228420
	2L		116350	228430
	Jacket type 1L		116390	-

Trap bulb 	Std. Code No.	TS29/38→				TS24/40→			
		→29/38	→24/40	→19/33	→15/30	→24/40	→19/33	→15/30	
		100mL	116700	116710	156700	116720	116730	156710	116740
		200mL	116750	116760	156680	116770	116780	156690	116790
		300mL	116800	116810	156650	116820	116830	156660	116840
	500mL	116850	116860	156610	—	156630	156640	—	
	Coating	100mL	228680	228690	228700	228710	228720	228730	228740
		200mL	228750	228760	228770	228780	228790	228800	228810
		300mL	228820	228830	228840	228850	228860	228870	228880
500mL		228890	228900	228910	—	228920	228930	—	