Rotary Evaporator

RE201

Instruction Manual

First Edition

- **Thank you for choosing RE series rotary evaporators from Yamato Scientific Co., Ltd.**
- **For proper equipment operation, please read this instruction manual thoroughly before use. Always keep equipment documentation safe and close at hand for convenient future reference.**

⚠ Warning:
Read instruction manual warnings and cautions carefully and completely before proceeding.

Yamato Scientific America Inc.
Santa Clara, CA

Printed on recycled paper

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1. SAFETY PRECAUTIONS

Explanation of Safety Symbols

A Word Regarding Symbols

Various symbols are provided throughout this text and on equipment to ensure safe operation. Failure to comprehend the operational hazards and risks associated with these symbols may lead to adverse results as explained below. Become thoroughly familiar with all symbols and their meanings by carefully reading the following text regarding symbols before proceeding

Warning Signifies a situation which may result in serious injury or death (Note 1.)

Caution Signifies a situation which may result in minor injury (Note 2) and/or property damage (Note 3.)

(Note 1) Serious injury is defined as bodily wounds, electrocution, bone breaks/fractures or poisoning, which may cause debilitation requiring extended hospitalization and/or outpatient treatment.

(Note 2) Minor injury is defined as bodily wounds or electrocution, which will not require extended hospitalization or outpatient treatment.

(Note 3) Property damage is defined as damage to facilities, equipment, buildings or other property.

Symbol Meanings

Signifies warning or caution.
Specific explanation will follow symbol.

Signifiies restriction.
Specific restrictions will follow symbol.

Signifies an action or actions which operator must undertake.
Specific instructions will follow symbol.

1. SAFETY PRECAUTIONS

Symbol Glossary

Warning


General Warning


Danger!: High Voltage


Danger!: Extremely Hot


Danger!: Moving Parts


Danger!: Blast Hazard

Caution


General Caution


Caution: Electrical Shock Hazard!


Caution: Burn Hazard!


Caution: Do Not Heat Without Water!


Caution: May Leak Water!

Caution: Water Only


Caution: Toxic Chemicals

Restriction


General Restriction


No Open Flame


Do Not Disassemble


Do Not Touch

Action


General Action Required


Connect Ground Wire

Level Installation Required


Disconnect Power


Inspect Regularly

1. SAFETY PRECAUTIONS

Warnings & Cautions

⚠ Warning

Never operate equipment near combustible gases/fumes.

Do not install or operate RE series unit near flammable or explosive gases/fumes. Unit is NOT fire or blast resistant. Negligent use could cause a fire/explosion.
See “List of Hazardous Substances (P.25).

Always ground equipment.

Always ground this unit properly to avoid electric shock.

In the event of motor overload, terminate operation immediately.

Motor may shut off if it overheats and temperature exceeds 90°C. When this happens, turn down speed dial and power off immediately. The source of overheating must be eliminated before attempting to restart.

***Lack of bearing lubrication, etc. may cause them to seize, tripping a safety device which shuts off the motor when excessively overloaded and heated to beyond 90°C.**

Exercise caution when installing/removing flask clamps.

Flask holding clamps use spring action to hold them in place. Careless installation or removal of these can break glass when snapping into place. Install and remove with care.

Use a cold trap for decompression (vacuum).

When using a hydraulic rotary vacuum pump or Yamato Scientific’s Handy Aspirator to decompress the evaporation system, additional use of a cold trap (Yamato model CA301 or CA800) is strongly recommended to protect vacuum pump from harmful substances and extend pump life.

Keep the vacuum seal in good repair.

- Vacuum seal is a wear item and should be replaced at regular intervals to avoid vacuum leaks.
- Greasing seal is not necessary, but recommend to extend seal life. Use silicon vacuum grease and apply to rippled side of seal.

Cleaning.

Clean exterior with a soft, damp cloth. Never use benzene, paint thinner, scouring powder, scrubbing brushes or other abrasives and solvents to clean unit. Superficial damage and/or discoloration, as well as deformity to some components may result.

⚠ Caution

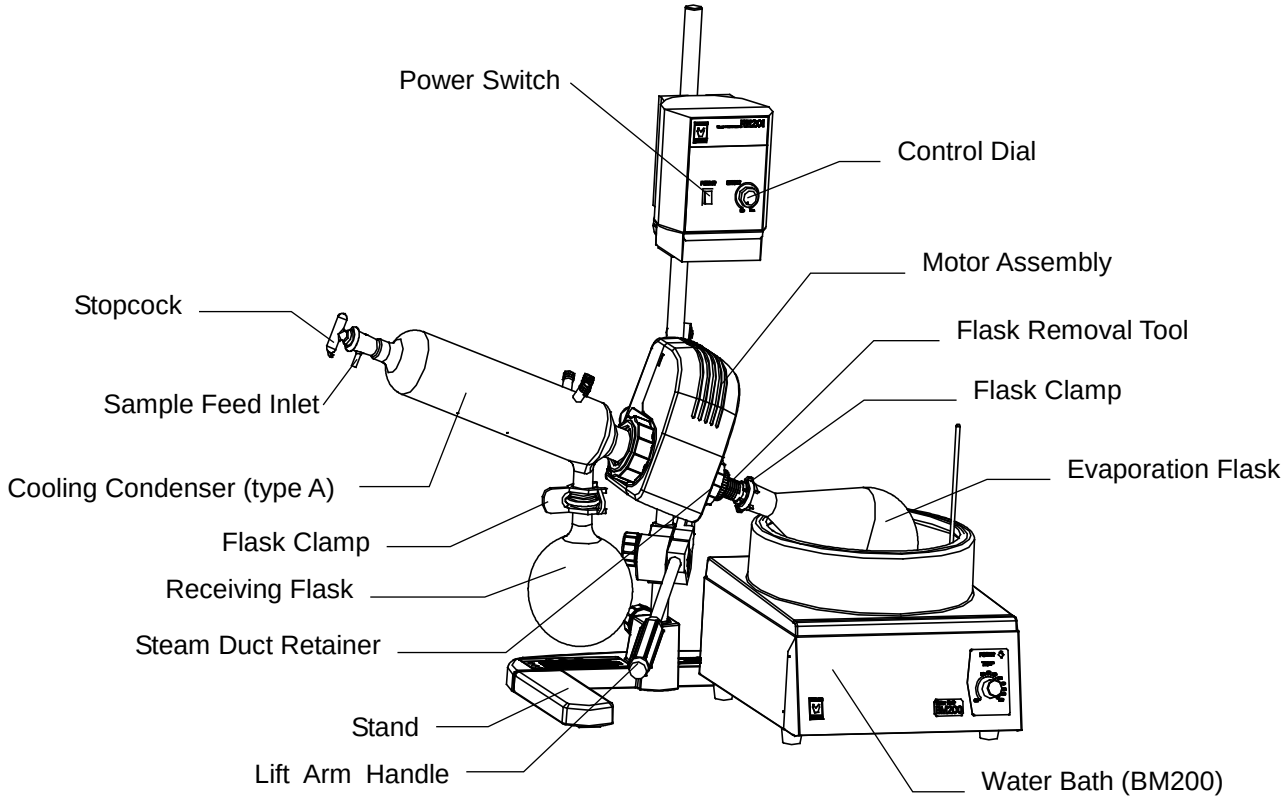
Extended nonuse and storage.

Turn off power and disconnect power cable during periods of nonuse or extended storage.

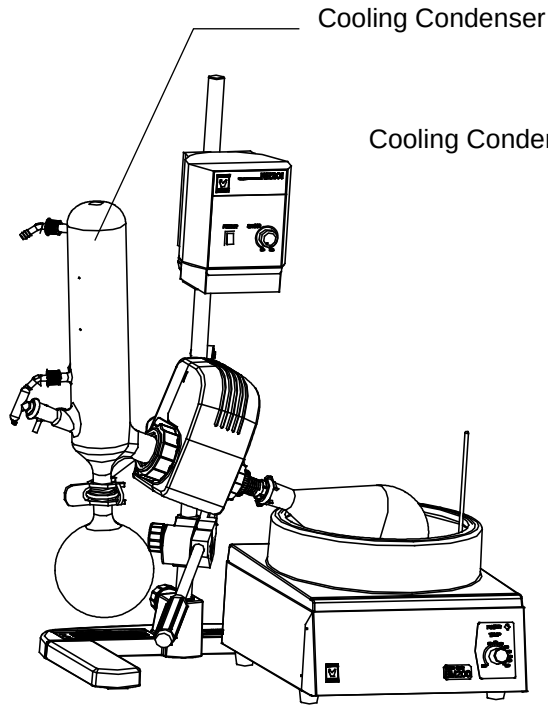
2. COMPONENT NAMES & FUNCTIONS

Main Unit Overview

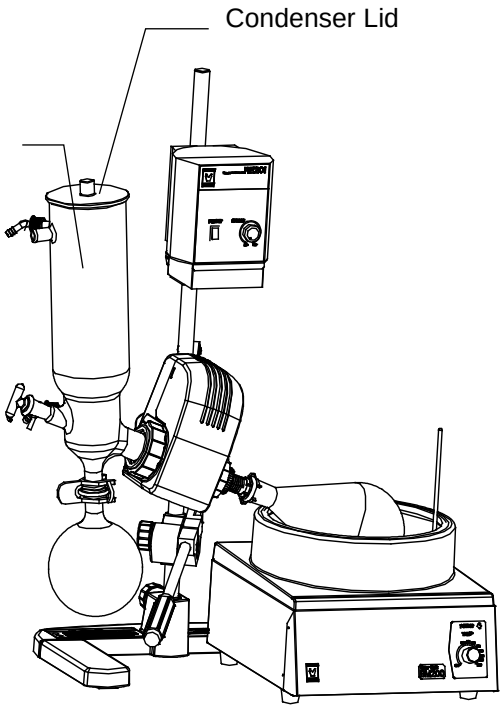
RE201 (type A)



RE201 (type B)



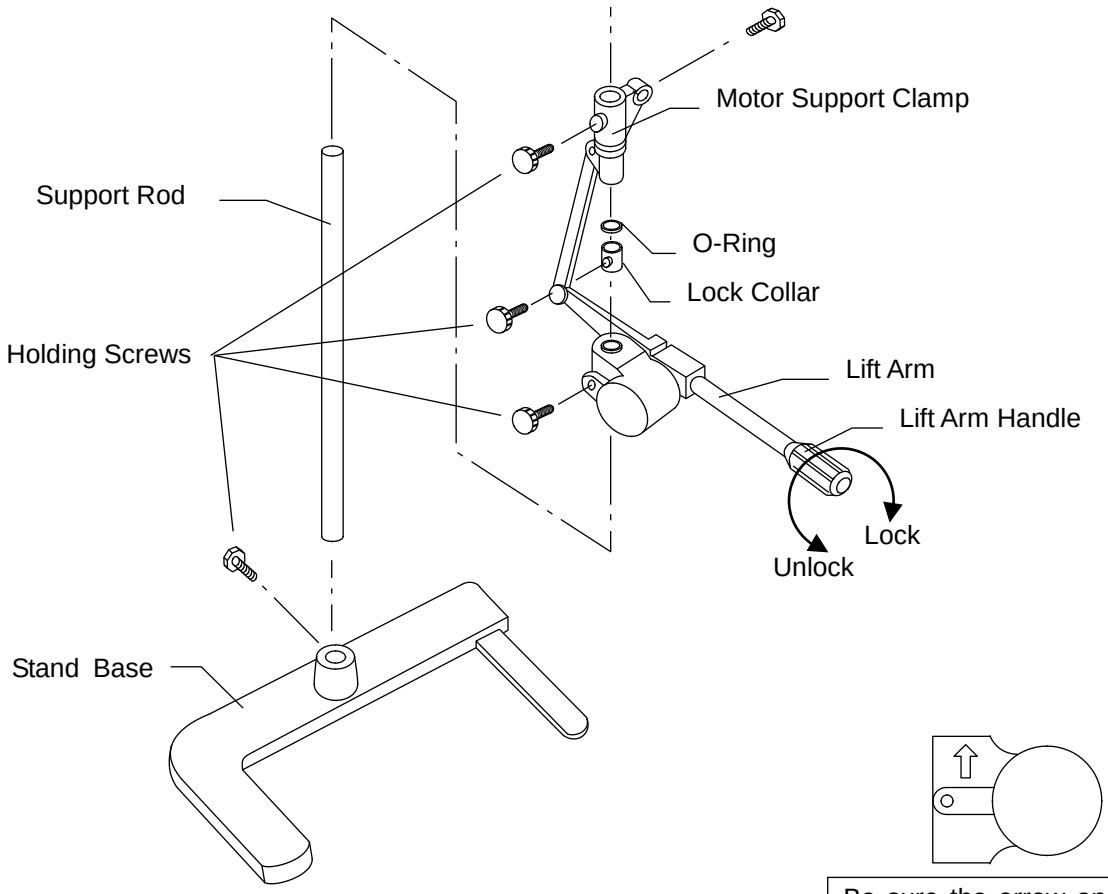
RE201 (type C)



* Some product specifications are subject to change without notice.
* Above designs are intended to illustrate component interchangeability only.

Stand

I. Assemble stand.（Arm jack is combination option）



Be sure the arrow on the lift arm assembly is pointing up.

1. Choose a stable location, such as a lab table or countertop. Unpack stand and position base on chosen surface.
2. Insert support rod into stand base and tighten holding screw.
3. Install lift arm, if applicable, and motor support clamp onto the support rod.
   a. Turn the lift arm handle counterclockwise to loosen.
   b. Install the lift arm, lock collar and o-ring (Insert o-ring into the collar) onto the support rod.
   c. Fit the motor support clamp onto support rod.

II. Install motor assembly (RE201)

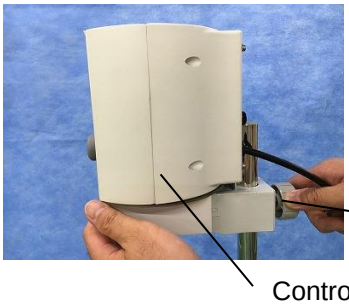
1. Install motor by inserting the protruding bearing rod into the motor support clamp, making sure that the flat surface of the rod faces the holding screw. Tighten holding screw securely.

2. Tilt the motor clock-wise about 45°. Tighten the tilt adjustment screw to “finger tight”.

If holding screws are not secure, vibration may shake them loose, preventing accurate measurements or causing motor to fall from stand, possibly damaging equipment and/or breaking glass components.

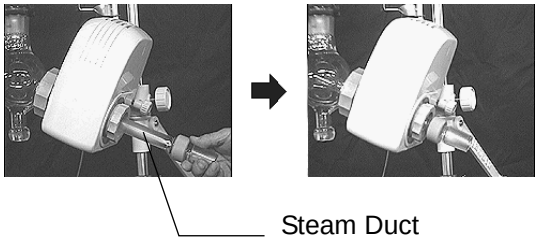
III. Install control unit.

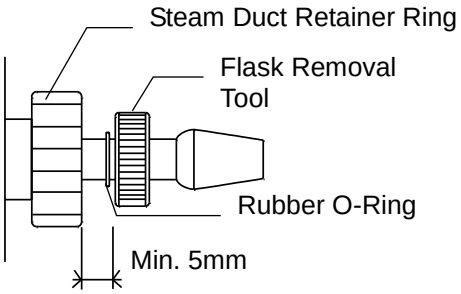
1. Fit contol unit onto support rod, above motor, and tighten holding screw securely.



IV. Install steam duct.

1. Before installing the steam duct, make sure that the required O-rings are in place, inside the duct opening. If not, set them in their correct place on the glass steam duct as in figure 1 below.
2. Insert the steam duct from the right side (side tilted down) into the duct opening in the motor assembly.
3. Set the steam duct into the desired position with a minimum of 5mm between the blue flask removal device and the steam duct retainer ring.
4. Tighten the steam duct retainer by turning clockwise. Be sure to tighten the retainer ring securely so the steam duct does not slip.





∗ To remove the steam duct, first loosen the steam duct retainer ring. Do not remove the duct retainer ring completely or inner o-rings and collars may fall out.

● If inner o-rings and collars come out when installing or removing the steam duct, refer to figure 1 below to replace them.

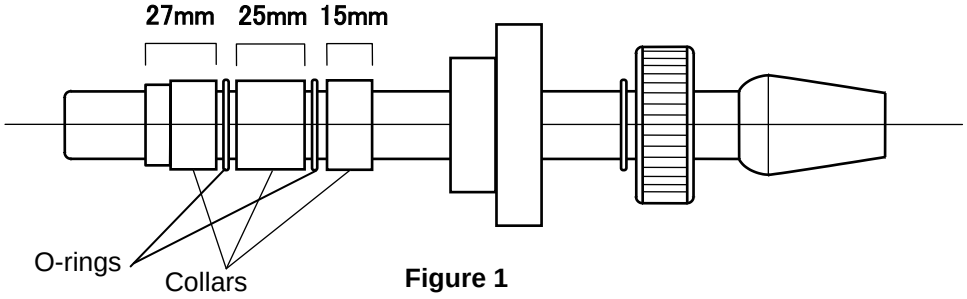


Figure 1

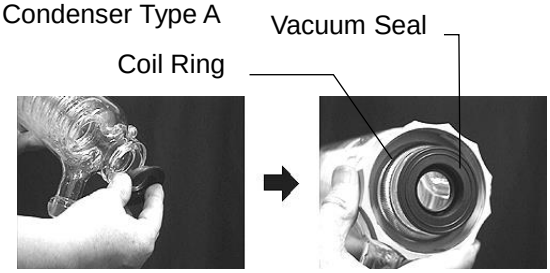
V. Condenser retainer ring, coil ring and vacuum seal placement.

1. Remove the condenser retainer ring, coil ring and vacuum seal, if they have not already been removed from the left side (side tilted upward) of the motor.

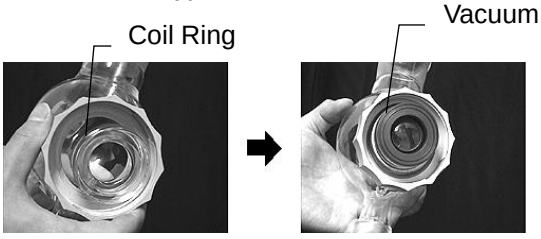
2. Place the condenser retainer ring, then the coil ring over the condenser mouth flange and place the vacuum seal over the mouth with the seal protruding inward, in whichever arrangement is applicable (see images below).

* Apply silicon vacuum grease to rippled side of vacuum seal, if desired.

Condenser Type A



Condenser Type B/C

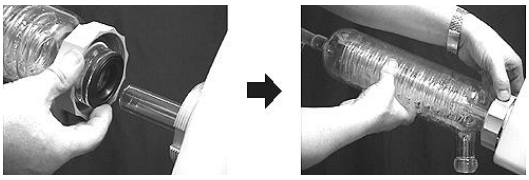


VI. Install condenser.

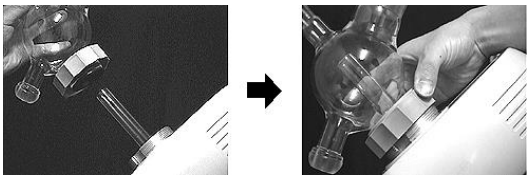
While inserting the steam duct into the cooling condenser, place seal against the metal flange on motor assembly and tighten the condenser retainer ring securely.

Be careful not to damage the vacuum seal when inserting the steam duct.

Condenser Type A



Condenser Type B/C



●Removing coil ring from condenser flange

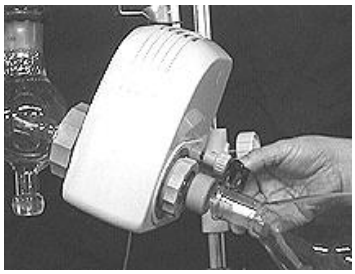
Grab the coil ring with the supplied Allen wrench, as shown in image below, in order to remove the ring more easily.

Apply moderate pressure when removing ring. Using excessive force may damage coil ring and/or glass components.

IX. Install evaporation and receiving flasks.

●Evaporation Flask

1. Rotate blue flask removal tool upward toward the motor assembly.
2. Place steam duct all the way into flask, and carefully apply clamp.



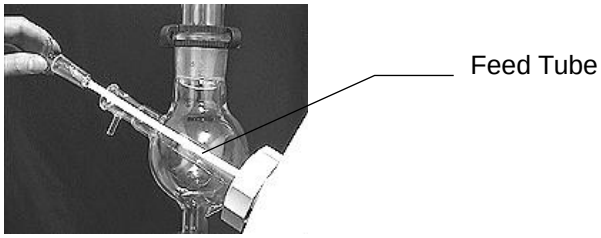
●Receiving Flask

1. Place receiving end of cooling condenser or applicable glass component all the way into flask and carefully apply clamp.

●Easy evaporation flask removal.
Use the blue flask removal tool

1. Carefully remove clamp while supporting flask.
2. Turn removal tool counter-clockwise until evaporation flask is gently pushed from steam duct.

X. Install feed tube w/stopcock.



Assembly Complete!

XI. Adjust height (RE201).

1. Loosen lock collar holding screw.
2. Turn lift arm handle counter-clockwise to loosen; move up or down to desired height (See images 1 & 2 below).
3. When desired position is determined, turn the lever clockwise and tighten securely (See image 3 below).
4. Re-position lock collar and tighten holding screw securely.

Re-tighten lock collar and arm handle securely. Neglecting to tighten one or both of these items securely may result in motor assembly coming loose and bottoming out on stand base, possibly causing damage to equipment and/or attached glass components.

Be cautious while adjusting lift arm with glassware attached. These components are fragile and easily broken even by small impacts.

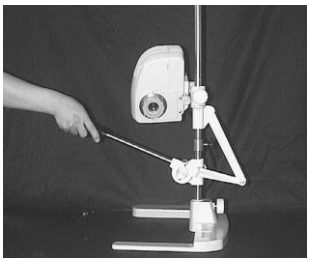


Image 1

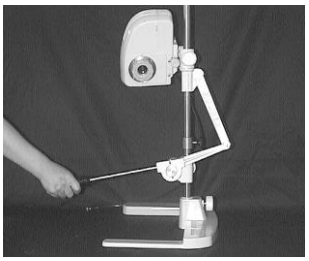


Image 2

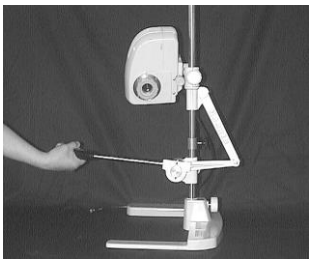


Image 3

Hose Connections

XII. Connect hoses.

Coolant Hoses

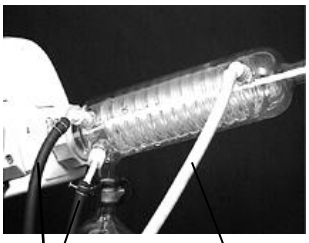
1. Remove plastic hose joints from threaded glass hose receptacles.
2. Moisten hose openings with water for easy attachment.
   Do not use any type of lubricating oil.
3. Push hose ends over plastic joint ends (id=9mm).
4. Apply hose clamps to joints.
5. Thread the joints, with hoses attached, onto the proper receptacles on cooling condenser.

Vacuum Hoses

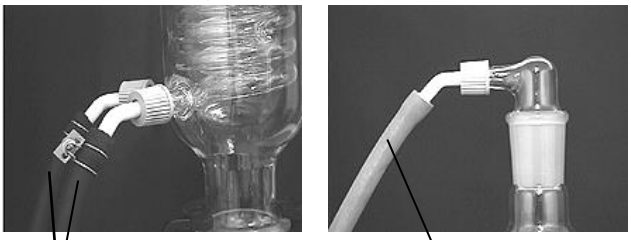
6. Connect vacuum hose to plastic joint.
   (id=6mm) (no hose clamp necessary)
7. Thread joint onto cooling condenser vacuum receptacle.

＊Always connect the hoses to the plastic hose joints BEFORE threading the joints onto the glass receptacles. Attempting to connect hoses with the joints installed on the condenser may damage or break the glass receptacles. NEVER attempt to connect hoses directly to threaded glass receptacles, except where otherwise noted.

●Glass A hose connections

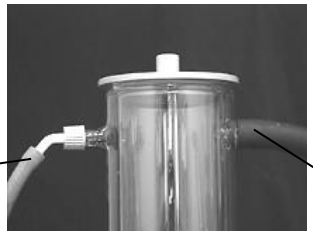


●Glass B hose connections



Connect the coolant supply/drain hose. (id= 18mm)

●Glass C hose connections



XIII. Connect power cable.

1. Connect motor power cable to the receptacle on back of main unit.
2. Connect the power cable to 115V AC power source. Always use a grounded outlet.

XIV. Setup water bath.

Position water bath in front of main unit or stand.

＊Refer to instruction manual supplied with water bath for assembly and setup details.

BM100 BM200 BM401

4. OPERATION PROCEDURES

1. Cooling Condenser

●Condenser type A and B:

Circulate water or alcohol through the cooling condenser, using Yamato Scientific CF model cooling circulators or other applicable device.

●Condenser type C

Fill with dry ice or alcohol.

2. Evaporation Flask

Fill flask with process sample fluid.

＊Do NOT fill evaporation flask to more than half capacity. Fluid collected in the receiving flask should also be kept within half capacity.

3. Water Bath

Set temperature as required. Allow bath to reach temperature setting and stabilize.

4. Position flask and start operation.

1. When the bath stabilizes at temperature setting, adjust height (see P.14 & 15) to maneuver evaporation flask down and into the bath.
2. Turn main power switch on the right side of control box to ON, and rotate the control dial until desired speed is reached.
3. Turn on vacuum device (if required) to accelerate evaporation process.

●Process Sample Feed

Sample fluid may be fed during operation without having to remove evaporation flask.

1. Connect an appropriate teflon tube to the sample feed inlet (id=6mm).
2. Slowly rotate the feed stopcock handle. Sample fluid is drawn into the flask.

Stop flask rotation before lifting flask out of bath. Rotating flask out of bath may spin off hot water, possibly causing scalding injuries.

5. Operation end

When process has finished as desired, repressurize (stop vacuum) by opening the feed stopcock before turning off the vacuum pump and removing the evaporation or receiving flasks.

Power Failures

Unit will restart when power is restored. If unit is to be unattended while power failure is in progress, turn off all power switches related to RE unit operation.

5. TROUBLESHOOTING

Troubleshooting Guide

Symptom	Possible Causes	Solutions
Digital display on control unit remains blank.	●Power is off ●Power cable is disconnected ●Fuse is blown	●Confirm that power switch is ON ●Connect power cable to motor receptacle ●Connect power cable to proper outlet ●Replace fuse (2A)
Evaporation flask does not rotate	●Control unit power switch is OFF ●Control dial is to “min” ●Motor power cable is disconnected ●Improper steam duct installation causing slippage ●Flask is obstructed	●Turn main switch ON ●Rotate dial to appropriate speed ●Insert power cable securely into motor receptacle ●Tighten steam duct retainer ring securely ●Eliminate obstruction
Weak or no decompression (vacuum)	●Vacuum seal is worn ●Vacuum seal installed backwards ●Cooling condenser retainer is not tightened securely ●Glass component is cracked or broken ●Glass components not securely connected ●Vacuum hose or joint is leaking	●Replace vacuum seal ●Reinstall vacuum seal ●Tighten condenser retainer ring ●Replace broken glass component ●Reconnect components securely ●Apply vacuum grease to joints ●Check, reconnect hoses and/or joints

If problem(s) persist, contact a local Yamato dealer or sales office for assistance.

6. SERVICE & REPAIR

Requests for Repair

When a problem occurs, terminate operation immediately, turn off power switch and disconnect power cable.
Contact a local dealer or Yamato sales office for assistance.

The following information is required for all repairs.
- Model name
- Serial Number
- Date (year/month/day) of purchase
- Description of problem in as much detail as possible

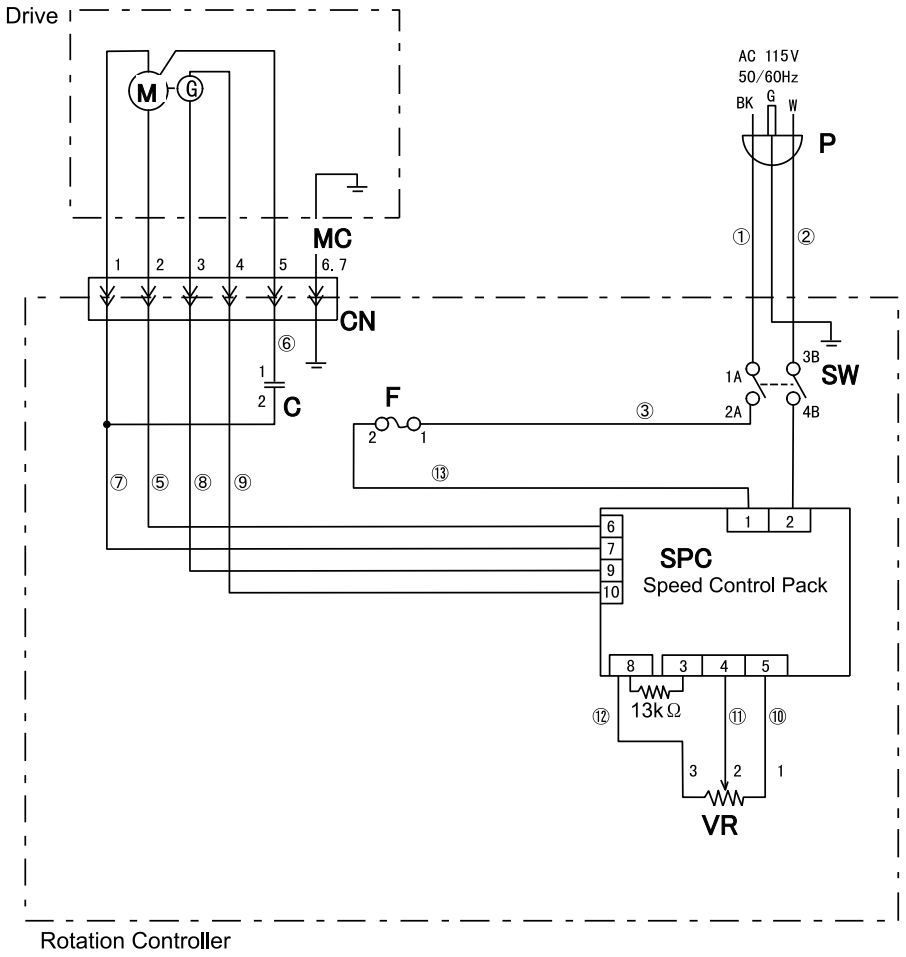
Guaranteed Supply Period for Repair Parts

Guaranteed maximum supply period for repair parts is 7 (seven) years from date of discontinuation for RE200/500 rotary evaporators. “Repair parts” is defined as components which, when installed, allow for continued unit operation.

7. SPECIFICATIONS

Type	RE200
Rotation Speed *1	20−180rpm
Drive system	Worm gear
Glass joints	℻24/40 Steam Duct, S35/20 Receiving Flask
Height adjustment mechanism	Lift arm
Motor	25W High Torque Sparkless Induction
Glass sets	Type A, Type B, Type C
Safety device	Overcurrent protection (fuse)
Exterior dimensions (W×D×H)*2	16.54×11.42×33.03 (inches) 42×29×83.9 (cm)
Weight	24.3 lb (11kg)
Power rating (RE only)	AC115V±10% 50/60Hz 0.6A
Options	●Evaporation Flask (opaque & frosted ℻ 24/40) 2000ml/500ml/300ml/200ml/100ml ●Receiving Flask (opaque & frosted S35/20) 2000ml/500ml/300ml ●Joint (opaque & frosted) ℻24/40-24/40, ℻24/40-19/22, ℻24/40-14/20 ●Trap Ball (opaque & frosted) ℻24/40-24/40, ℻24/40-19/22, ℻24/40-14/20
Combination Options	●Water Bath BM100/200/401 ●Lift Arm Jack JK200 ●Vacuum Regulator VR100

*1 Rotation speed is based on performance with (A, B or C type) glass set installed and operating under rated power, with no load.
*2 Glass sets not included.



Symbol	Component
P	Power Plug
SW	Power Switch
SPC	Speed Control Pack
M	Motor
G	Tachogenerator
C	Motor Condenser
VR	Set Rotation Speed Resistor
CN	Drive Socket
MC	Drive Cable
F	Fuse (2A)

9. REPLACEMENT PARTS TABLE

Name of Parts	Parts No.	Application
Cooling Condenser (A)	LT00016190	A
Cooling Condenser (B)	LT00016197	B
Cooling Condenser (C)	LT00016198	C
Evaporation Flask	LT00016200	All types
Receiving Flask	LT00016201	All types
Steam Duct	LT00016211	All types
Stopcock	LT00016215	All types
Receiving Flask Clamp	LT00021837	All types (wear item)
Evaporation Flask Clamp	LT00021836	All types (wear item)
Flask Removal Tool	LT00016212	All types
Teflon Tube (A)	LT00016213	A type L=540mm
Teflon Tube (B)	LT00016214	B & C type L=350mm
Hose Joint	LT00016193	All types
Hose Clamp	LT00016196	All types
Ring (Large)	RE500-40093	All types (wear item)
Ring (Middle)	RE500-40061	All types (wear item)
Ring (Small)	RE500-40073	All types (wear item)
O Ring	4210020010	Steam duct (wear item)
O Ring	4210020012	Flask Removal Tool (wear item)
Vacuum Seal	RE500-40091	All types (wear item)
Fuse	2100010012	Φ5.2×20 AC125V 2A RE201
Power Switch	2010010016	RE201
Speed Control Pack	1090000004	RE201
Motor	2140000022	RE201
Motor Condenser		RE201
Motor Speed Resistor	2120020007	RE201

10. LIST OF HAZARDOUS SUBSTANCES

Never attempt to process explosives, flammables or any items which contain explosives or flammables.

Explosive Substances	①Nitroglycol, Glycerine trinitrate, Cellulose Nitrate and other explosive nitrate esters
	②Trinitrobenzen, Trinitrotoluene, Picric Acid and other explosive nitro compounds
	③Acetyl Hydroperoxide, Methyl Ethyl Ketone Peroxide, Benzoyl Peroxide and other organic peroxides
	④Metallic Azide, including Sodium Azide, etc.
Explosive Substances	①Metal “Lithium” ②Metal “Potassium” ③Metal “Natrium” ④Yellow Phosphorus ⑤Phosphorus Sulfide ⑥Red Phosphorus⑦Phosphorus Sulfide ⑧Celluloids, Calcium Carbide (a.k.a, Carbide)⑨Lime Phosphide⑩Magnesium Powder ⑪Aluminum Powder ⑫Metal Powder other than Magnesium and Aluminum Powder ⑬Sodium Dithionous Acid (a.k.a., Hydrosulphite)
Oxidizing Substances	①Potassium Chlorate, Sodium Chlorate, Ammonium Chlorate, and other chlorates
	②Potassium Perchlorate, Sodium Perchlorate, Ammonium Perchlorate, and other perchlorates
	③Potassium Peroxide, Sodium Peroxide, Barium Peroxide, and other inorganic peroxides
	④Potassium Nitrate, Sodium Nitrate, Ammonium Nitrate, and other nitrates
	⑤Sodium Chlorite and other chlorites
	⑥Calcium Hypochlorite and other hypochlorites
Flammable Substances	① Ethyl Ether, Gasoline, Acetaldehyde, Propylene Chloride, Carbon Disulfide, and other substances having ignition point of 30 or more degrees below zero.
	②n-hexane, Ethylene Oxide, Acetone, Benzene, Methyl Ethyl Ketone and other substances with ignition point between 30 degrees below zero and less than zero.
	③Methanol, Ethanol, Xylene, Pentyl n-acetate, (a.k.a.amyl n-acetate) and other substances with ignition point between zero and less than 30 degrees.
	④Kerosene, Light Oil, Terebinth Oil, Isopenthyl Alcohol(a.k.a. Isoamyl Alcohol), Acetic Acid and other substances with ignition point between 30 degrees and less than 65 degrees.
Combustible Gases	Hydrogen, Acetylene, Ethylene, Methane, Ethane, Propane, Butane and other gases combustible at 15°C under air pressure.

Excerpt from Table 1, Hazardous Substances, in Cabinet Order from Occupational Safety and Health Law (substances related to Articles 1, 6, and 9)

Limited Liability

Always operate equipment in strict compliance to the handling and operation procedures set forth by this instruction manual.
Yamato Scientific Co., Ltd. assumes no responsibility for malfunction, damage, injury or death resulting from negligent equipment use.
Never attempt to disassemble, repair or perform any procedure on RE200/500 units which are not expressly mandated by this manual. Doing so may result in equipment malfunction, serious personal injury or death.

Notice

- **Instruction manual descriptions and specifications are subject to change without notice.**
- **Yamato Scientific Co., Ltd. will replace flawed instruction manuals (pages missing, pages out of order, etc.) upon request.**

Instruction Manual
Rotary Evaporator
RE201
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Yamato Scientific America, Inc.
925 Walsh Avenue, Santa Clara,
CA 95050, U.S.A
http://www.yamato-usa.com
Toll Free: 1-800-2-YAMATO(1-800-292-6286)