Operation

Rotary Evaporator Manual

Models: R1005 – R1050

Automatic 5L – Automatic 50L

Designed for solvent recovery & processing.

C ETL CM US LISTED

Intertek

Safety Precautions and Explanations

At USA Lab, safety is our number one priority. The following information provides guidelines for safety when using USA Lab equipment. Any piece of machinery can become dangerous to personnel when improperly operated or poorly maintained. ALL employees operating and maintaining USA Lab equipment should be familiar with its operation, thoroughly trained, and Instructed on the best safety practices. Most industry accidents are preventable through safety awareness.

Training

It is the responsibility of the customer to ensure that all personnel who will be expected to operate or maintain the equipment. Participate in training and instruction sessions to become trained operators. All personnel operating, inspecting, servicing, or cleaning this equipment must be properly trained in the operation and machine safety. **BEFORE** operating this equipment, read the operating instructions in this equipment manual. Become thoroughly familiar with the machinery and its controls.

Safety

- Never leave the equipment running unattended. Ensure that all power sources are turned off when the machine is not in use. This encompasses electrical and pneumatic power.
- Use this equipment only for its intended purpose.
- Read the manual for any special operational instructions for each piece of equipment. All USA Lab authored manuals are typically included with each device as well as posted online.
- Know how the equipment functions and understand the operating and halting processes.
- Wear the appropriate personal protective equipment for the task.
- When working on or around all equipment, avoid wearing loose clothing, jewelry, unrestrained long hair, loose ties, belts, scarves, or articles that may be caught in moving parts. Keep all extremities away from moving parts. Entanglement can cause death or severe injury.
- For new equipment, check input voltage and compare with the equipment voltage rating. DO NOT supply the incorrect power to any equipment for any reason whatsoever. Electrical specifications for your machine are printed on the machine tag. A properly grounded receptacle is required for safe operation regardless of voltage requirements.
- Keep the equipment operating zone free of obstacles that could cause a person to trip or fall toward an operating machine. Keep fingers, hands, or any part of the body out of the machine and away from moving parts when the machine is operating.
- Any machine with moving parts and/or electrical components can be potentially dangerous no matter how many safety features it contains. Stay alert and think clearly while operating or servicing the equipment. Be aware of operations and personnel in your surroundings. Be attentive to indicator lights, warning lights, and/or operator interface screens displayed on the machine and know how to respond.
- Do not operate machinery if you are fatigued, emotionally distressed, or under the influence of drugs or alcohol.
- Know where the FIRST AID SAFETY STATION is located.
- Know where the FIRE EXTINGUISHING EQUIPMENT is located.
- Never sit or stand on the machine or on anything that might cause you to fall against the machine.
- Rotating and moving parts are dangerous. Keep clear of the operating area. Never put any foreign object into the operating area.
- Use proper lifting and transporting devices for heavy equipment. Some types of equipment can be extremely heavy. An appropriate lifting device should be used.
- Use caution when moving portable equipment. In some cases, the machinery can be heavy and/or may be top heavy. Portable equipment can gain momentum during transporting and must always be controlled.

ILLUSTRATED SYMBOLS

Symbol	Explanation
	Important note, please pay attention.
	Hot surface, take caution.
	High voltage, take caution.
	Rotating objects, take caution.
	Dangerous situation that may result in serious injury or death.
	Protective earth connection.
	Wear personal protective equipment and gear.

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Section 1 | Important Information

1.1 Safety notes and warnings

ONLY USE DISTILLED WATER IN THE WATER BATH.
Any elements, sensors or switches damaged due to not using distilled water, WILL NOT BE COVERED UNDER WARRANTY.

- ⚠ ⚠ Surfaces can be extremely hot or cold to the touch. Use caution when touching any surface.
- ⚠ All gaskets must be greased and cleaned regularly. Failure to do so will result in leaks and loss of performance.
- ⚠ The use of Personal Protection Equipment (PPE) is REQUIRED.
- ⚠ Follow all state, local and municipal laws, codes, and ordinances. This is not an explosion proof evaporator. **This evaporator is not suitable for use in Class I, II or III locations**, as defined by the national electrical code NFPA 70.
- ⚠ ⚠ **NEVER LEAVE YOUR EVAPORATOR UNATTENDED WHILE OPERATING.**
- ⚠ ⚠ Please make sure the power connection is correct and well-grounded. (see **Section 1.3** for details.)
- ⚠ Cooling water line and vacuum line should be unobstructed without any hard bends.
- ⚠ Rotate and push forward onto barb to install water and vacuum lines.
- ⚠ ⚠ If flammable or organic solvent is used. Please make sure to clean any solvent immediately and take all fire safety precautions.
- ⚠ Apply a rag to wipe the glass parts clean after washing away stains; do not use hard objects against the glass.
- ⚠ ⚠ DO NOT try to heat any explosive or combustible materials inside your evaporator.
- ⚠ Inspect all glassware prior to use. Please do not use any glassware that is cracked, chipped, or damaged.
- ⚠ All glassware should be cleaned prior to use. Never clean your glassware or evaporator with flammable cleaners.
- ⚠ Keep your evaporator away from any flammable materials, fire, or corrosive gases.
- ⚠ ⚠ Do not unplug your evaporator while in use. This can be very dangerous to the operator and the equipment itself.
- ⚠ Make sure unit is properly grounded and in the correct power source (110V or 220V). Please never modify the cord your evaporator comes with, unless directed by USA Lab.
- ⚠ We recommend a separate circuit for the evaporator to prevent any overloading from other items on the same circuit.

1.2 Purpose and features

Our RE-series large rotary evaporators are mainly used in the small-scale test and production of biological, pharmaceutical, chemical, food, and other extractions. This process is most often used to separate solvents at lower boiling points, such as ethanol, n-hexane or even water. These compounds are typically solids or liquids at room temperature and then are heated up to allow separation from other solids, liquids, or products by evaporation if the products don't have similar evaporating points. When it is placed in a water bath, it allows the solution to spread. This action causes the solution to evaporate rapidly and evenly. PTFE and Viton rubber dual spin seals are included to ensure the highest vacuum pressure.

Features:
Timed shut down
High quality corrosion resistant paint
Continuous running
Over-temperature safety dial
Dry-run protection
ETL Certification (UL and CSA standards)

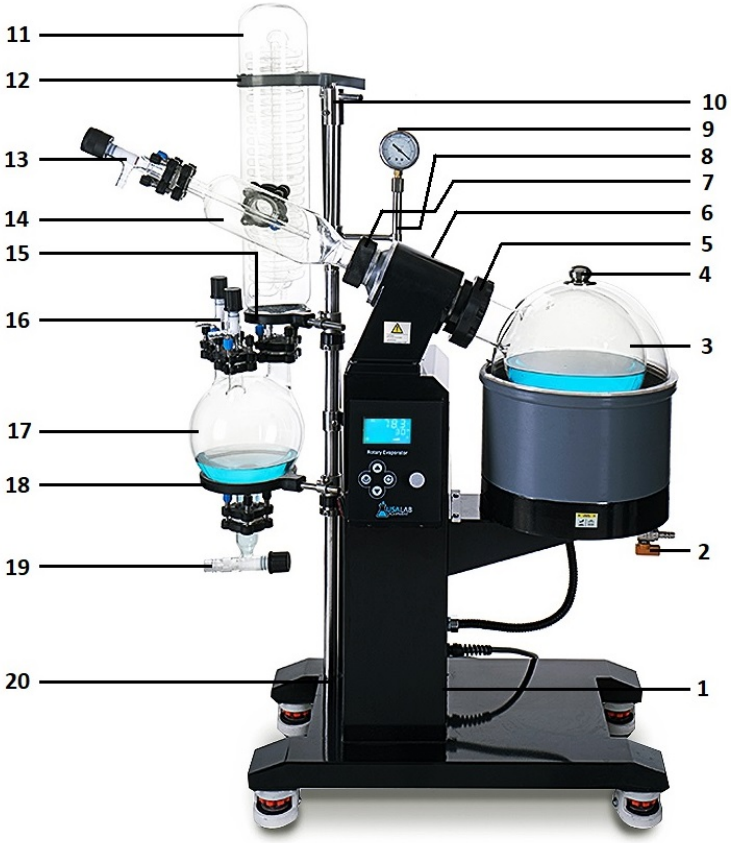
1.3 Technical parameters

Model	RE-1005	RE-1020	RE-1050
Power Requirements	110V | 60Hz Single Phase	220V | 50/60Hz | Single Phase	
Heating Power	2200 W	5000 W	6500 W
Environmental Conditions	• Indoor use and altitude up to 2000m. • Temperature range of 0° to 50°C. • Max relative humidity of 50% at 50°C. • Transient over voltages up to the levels of over voltage category II. These levels of transient overvoltage are typical for equipment supplied from the building wiring. • Temporary overvoltage occurring on the mains supply. • Applicable pollution degree of the intended environment (Degree II). Manufactures may specify more restricted environmental conditions for operations.		
Boiling Flask Capacity	5L	20L	50L
Evaporation Rate Approx.	H^2O 2L/hr Ethanol 4L/hr	H^2O 5L/hr Ethanol 12L/hr	H^2O 7L/hr Ethanol 15L/hr
Rotation Speed	20-120 RPM		
Maximum Loaded Volume	≤ 60% of total liquid volume of evaporation flask		
Glass Composition	GG-17 - 3.3 - High Grade Borosilicate Glass		
Receiving Flask Capacity	3L	10L	20L
Condenser Surface Area	0.27m²	Main: 0.8m² Aux: 0.39m²	Main: 0.91m² Aux: 0.52m²
Barb Connections	Vacuum: 1/2" | Condenser: 5/8" Solvent Drain: 5/8" | Bath Drain: 1/2"		
Temperature Range	Ambient + 5°C to 100°C (180°C with silicone oil)		
Bath Material	SS304 - Stainless Steel		
Bath Fluids	Distilled water or silicone oil		
Max Bath Level	Do not exceed 1" from the top of the bath		
Glass Vacuum Rating	399.9Pa | 5 Torr | 5,000 Millitorr		
Rotary Vacuum Seal	PTFE + Viton		
Casters	Durable leveling swivel casters (4pcs.)		
Unit Dimensions	35" x 18" x 53"	43" x 30" x 80"	52" x 30" x 84"
Shipping Dimensions and Weight	48" x 40" x 50" 198lbs	48" x 40" x 54" 337lbs	48" x 40" x 62" 423lbs
Compliance	ETL (UL and CSA)		

Section 2 | Diagrams

2.1 Power Switch

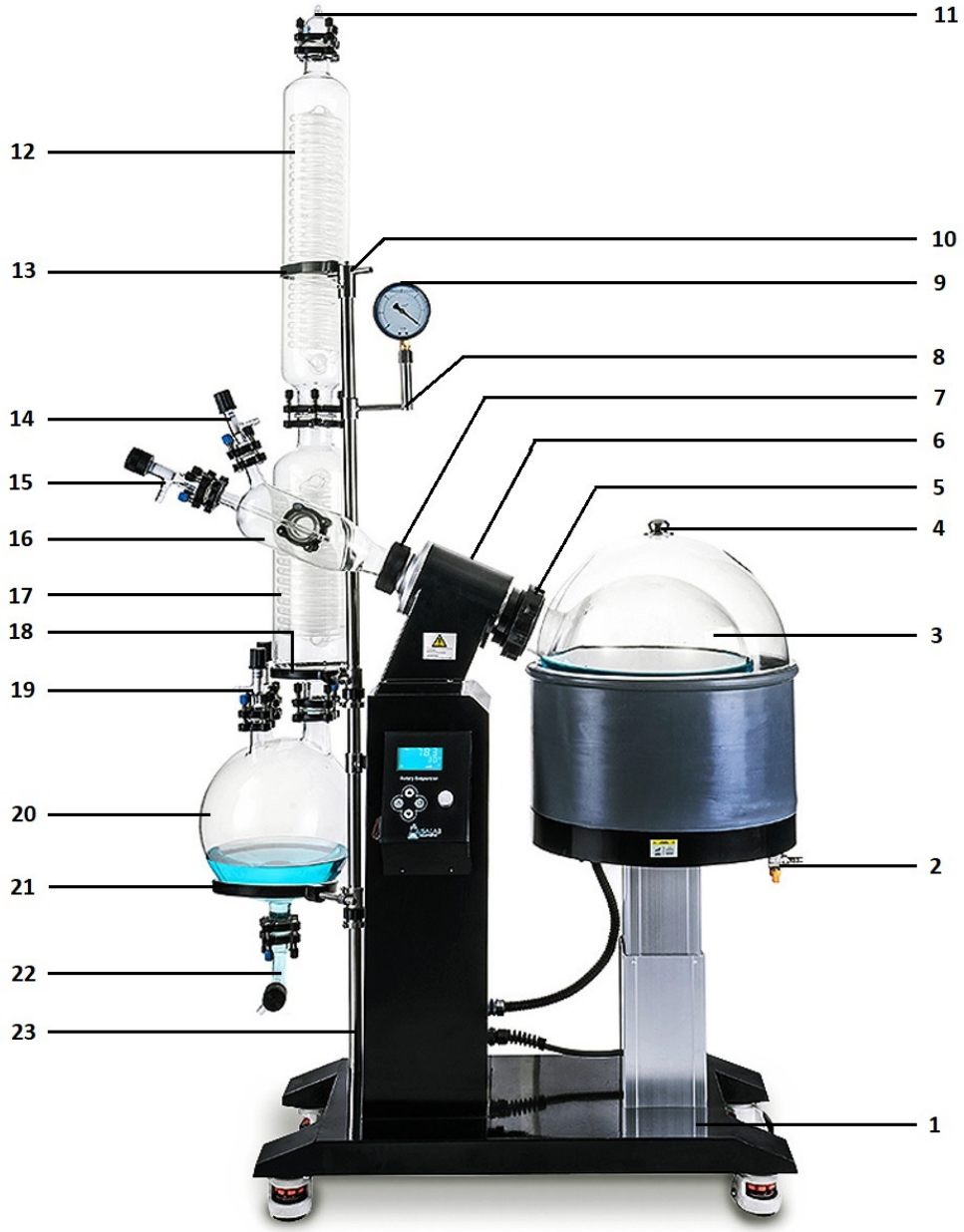
2.2 RE-1005 Diagram



11 Main Condenser
12 Condenser Retaining Strap
13 Feed Tube
14 Bump Trap
15 Condenser Pallet Mount
16 Vacuum and Air Releif Valves
17 Receiving Flask
18 Receiving Flask Pallet Mount
19 Solvent Drain Valve
20 Receiving Flask Stand and Hardware

1 Rotary Evaporator Main Assembly
2 Bath Drain Valve
3 Boiling Flask
4 Dome Cover
5 Boiling Screw
6 Rotating Motor
7 Condenser Screw
8 Vacuum Gauge Bracket
9 Vacuum Gauge and Manifold
10 Condenser Stand with Hardware

2.2 RE-1020 & RE-1050



12 Main Condenser
13 Condenser Retaining Strap
14 Vacuum Releif Valve
15 Feed Tube
16 Bump Trap
17 Auxiliary Condenser
18 Condenser Pallet Mount
19 Vacuum and Air Releif Valves
20 Receiving Flask
21 Receiving Flask Pallet Mount
22 Solvent Drain Valve
23 Reciving Flask Stand and Hardware

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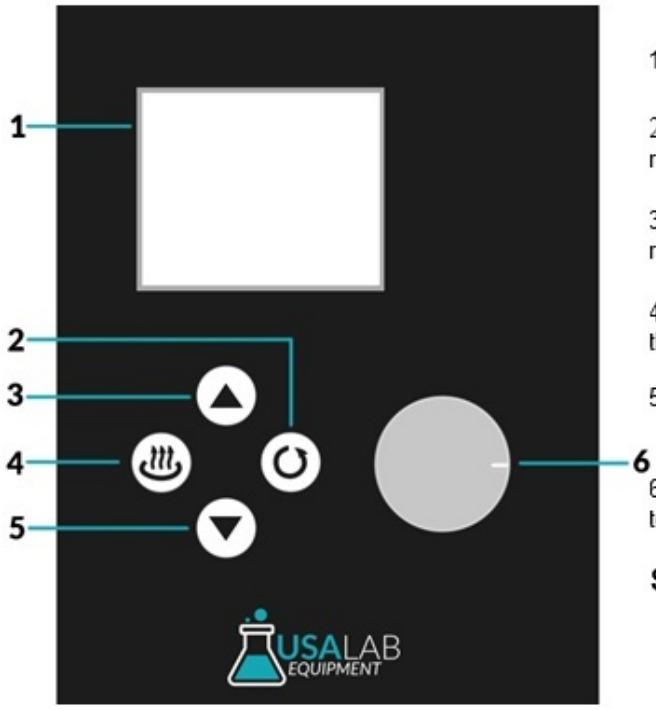
7 Condenser Screw
8 Vacuum Gauge Bracket
9 Vacuum Gauge and Manifold
10 Condenser Stand with Hardware
11 Vacuum Port

Section 3 | Control panel operation

3.1 Control panel operation



1. LCD display

2. "↻" Press this key to start or shut down the rotation function

3. "▲" Press this key to raise the bath, long press to raise continuously

4. "♨" Press this key to start or shut down the heating function

5. "▼" Press this key to lower the bath, long press this key to lower continuously

6. "Settings Dial" Press to enter the menu for temperature, speed, and timer settings.

SP - Temp | **SU** - Speed | **ST** - Timer

Power on the unit:
Flip the power switch on the left side of the display. The switch will glow if it is receiving power. The unit will beep twice and show a code before displaying the main menu.

Setting your desired temperature, speed, and time:
Press the silver knob (6) once to enter the settings menu. Adjust the value for SP, SU, and ST (see above) by rotating the dial and pressing to confirm. (Timing function is not required to be set. 0 = infinite time)

Starting and stopping the rotary evaporator:
(Ensure liquid solution, chiller, and vacuum source are fully installed and ready before operating the "rotovap".)
Raise the bath (3) to the same level as the solution in the flask. (It is very important to keep the liquid levels the same during the entire run.)
Place the dome cover onto the bath.
Press the heating button (4) and then the rotation button (2).
(Recovery instructions in **section 7**)
[Reverse these steps to shut down, lowering the bath (5) last.]

Heating above 100°C:
Only set and heat above 100°C with silicone oil. Any oil spills on the grey bath cover will cause it to melt.

Disclaimer – Parameters are not allowed to be modified by end users. This is to protect the equipment from accidental damage. Modifying parameters for any reason, without our knowledge and permission will constitute a void of the warranty.

Section 4 | Preparing for assembly

⚠ 1. When removing the evaporator from your crate, please be careful and use two people. You can lift from any point on the base to remove the evaporator from the crate. Be mindful of lopsided weight. If necessary, use a third person to stabilize the unit as it is lifted and lowered.

⚠ 2. The unit must be installed at least 3 feet away from any walls or items for easy access to the main power switch.

⚠ 3. Please use the evaporator in a well-ventilated area.

⚠ 4. Remove any residue on the glass parts before assembly and keep the glass flange surfaces clean; apply vacuum grease to both sides of the seal washer gasket, ground glass joints, and PTFE gaskets before the installation.

⚠ 5. To clean the condensers, you must empty the packaging material out and then use compressed air as well as water to fully clean them.

6. Please refer to the packing list to verify receipt of all components and parts. If there are any missing parts, please contact us as soon as possible.

7. Tools that might be needed in the installation include: Metric Allen wrenches, vacuum grease, and a screwdriver. An assistant to help with assembly.

8a. A professionally installed 110V 20A (NEMA 5-20) receptacle.
(Plug Type: RE-1005 – 110V 20A NEMA 5-20p)

8b. A professionally installed 220V 30A (NEMA L6-30) receptacle or an AC disconnect panel.
(Plug Type: RE-1020 or RE-1050 – 220V 30A NEMA L6-30p)

Section 5 | Assembly instructions

Please open all packages completely before attempting assembly.

Certain parts such as the top vacuum port (RE-1020 & RE-1050 only) are within the receiving flask packaging. This part can be particularly difficult to locate.
(Contact us if you have any missing parts, need help locating parts, or identifying parts.)

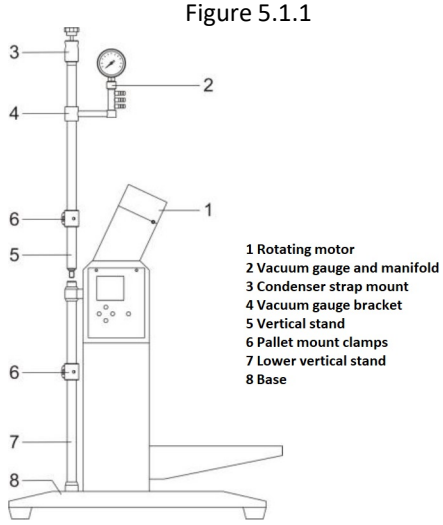
All parts must be clean and dry before assembly. Vacuum grease must be applied to all mating surfaces.
(Excluding clamps)

Some units come with similar extra glass valve parts; this is normal. These are used in case of part failure.

5.1 Vertical stand assembly

**** This part is located on the bottom of the crate ****

Figure 5.1.1



- Unwrap and prepare the top half of the vertical stand (5).
- Position the male thread onto the female thread.
- Rotating in a clockwise direction, secure the two halves together.
- Loosen the set screw holding the “L” shaped bar (3).
- Attach the grey silicone condenser strap to the short end of the bar. [fig. 5.1.2]
- Tighten the bar set screw.
- Add the vacuum gauge and manifold (2) to the vacuum gauge bracket (4). [fig. 5.1.3]
- Place the small pallet ring in the top pallet mount, and the large ring in the lower mount (6). [fig. 5.1.4]

Figure 5.1.2

Figure 5.1.3

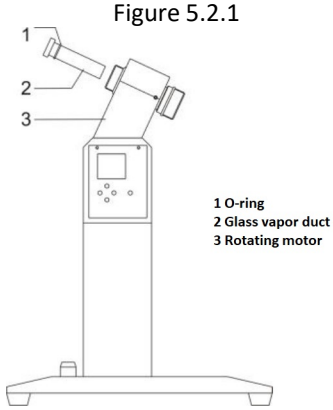
Figure 5.1.4

5.2 Vapor duct assembly

**** Refer to section 8 for instructions on greasing the vapor duct ****

**** Remove condenser screw and retainer before inserting vapor duct ****

Figure 5.2.1

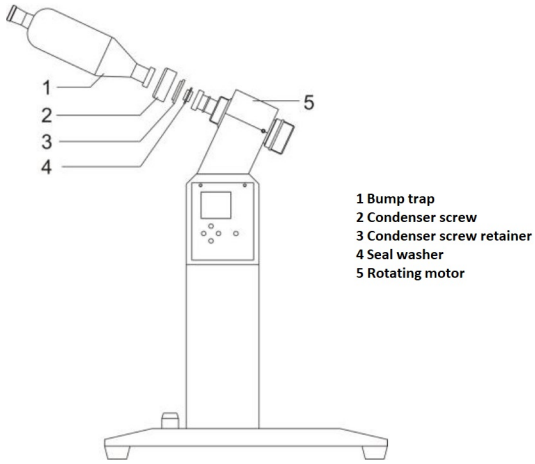


- Ensure the green O-ring (1) is on the flanged end of the vapor duct (2).
- Insert the vapor duct (2) into the center of the rotating motor (3).

5.3 Bump trap assembly

**** Condenser screw and retainer removed in the last section is used here ****

Figure 5.3.1



- Place metal condenser screw (2) over the narrow end of the bump trap (1).
- Next find the split in the condenser screw retainer (3).
- Slide one end of the retainer between the bump trap flange and the condenser screw (2).
- Push the remainder of the condenser screw retainer (3) down into the condenser screw (2).
- The condenser screw (2) should now be attached to the bump trap (1).
- Grease the seal washer (4) on both sides and insert onto the end of the vapor duct inside the rotating motor (5).
- Place the assembled end of the bump trap (1) onto the seal washer (4) and tighten the condenser screw (2) keeping it slightly loose for the following step.
- Rotate the bump trap (1) so that the side port flange points away from the operator.

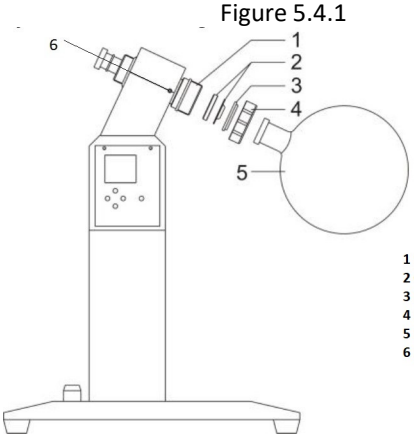
5.4 Boiling flask assembly

**** Refer to section 8 for instructions on greasing the oil seal set ****

**** The thick gasket is directional. Ensure it is set correctly. Vacuum loss will occur if incorrect. ****

**** Remove boiling screw and retainer before inserting oil seal set. ****

Figure 5.4.1



1 Motor coupler
2 Oil seal set
3 Boiling screw retainer
4 Boiling screw
5 Boiling flask
6 Motor lock port

- Place the greased thick oil seal gasket (2) into the motor coupler (1) with the smooth face pointing to the outside. [fig. 5.4.2]
- Ensure the gasket slides around the greased end of the vapor duct as displayed in section 8.
- Press the greased thin oil seal gasket (2) in the same manner placing the concave side toward the thick gasket.
- Using an assistant or a flask carrier to hold the boiling flask (5) upright and place the boiling screw (4) onto the flange.
- Slide one end of the boiling flask retainer (3) between the boiling flask (5) flange and the boiling screw (2).
- Push the remainder of the boiling screw retainer (3) down into the boiling screw (4).
- The boiling screw (4) should now be attached to the boiling flask (5).
- Place an Allen wrench into the motor lock port (6) press as you turn the motor coupler (1) the Allen wrench should slide into the corresponding shaft port, locking the motor coupler (1) into place.
- Using an assistant, place the assembled end of the boiling flask (5) onto the motor coupler (1) and tighten the boiling screw (4) keeping it balanced and aligned.

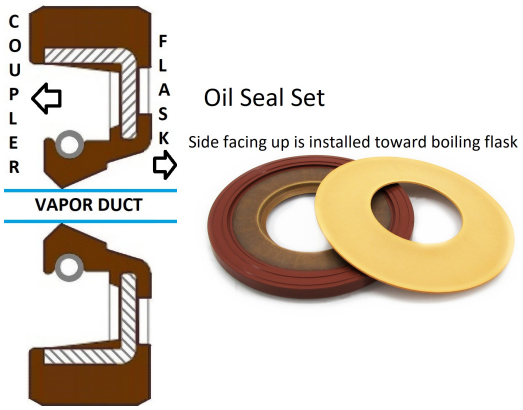
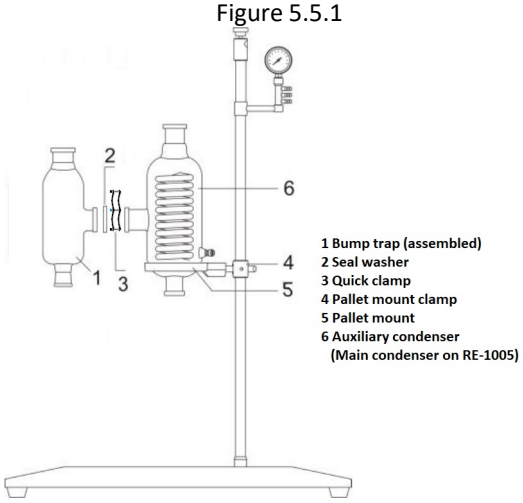


Figure 5.4.2

5.5 Auxiliary condenser assembly (Main for RE-1005)

**** Ensure bump trap and condenser pallet ring mount are installed prior to condenser assembly ****

Figure 5.5.1



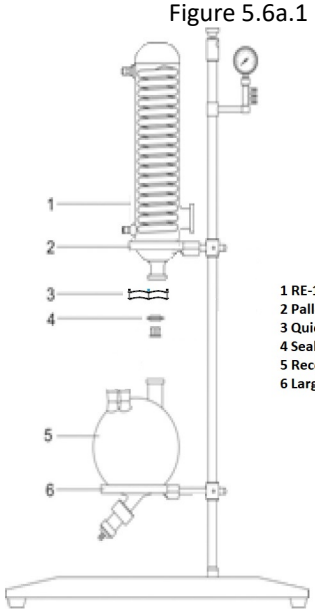
- Place the condenser (6) onto the pallet mount (5) installed in section 5.1.
- Align the side port located on the bump trap (1) and the matching flange on the condenser (6).
- Place the greased seal washer (2) between the two flanges.
- Adjust the condenser (6) until the flanges line up evenly.
- Open and loosen the quick clamp (3).
- Close the quick clamp (3) around the flanges and seal then tighten the clamp.

5.6a Receiving flask assembly (RE-1005)

**** The seal washer used between the condenser and the receiving flask has a valve in the middle. This center valve must hang down inside of the receiving flask. ****

**** Large pallet mount ring must be installed prior to receiving flask installation ****

Figure 5.6a.1



1 RE-1005 condenser
2 Pallet mount
3 Quick clamp
4 Sealing flange (insert down)
5 Receiving flask
6 Large pallet mount

- Place the receiving flask (5) onto the pallet mount (2) and keep the parts low to the base for now.
- Grease and add the sealing flange gasket (4) onto the top of the large receiving flask (5) flange.
- Ensure the center of the sealing flange gasket (4) hangs down inside of the receiving flask (5).

** The sealing flange serves a very important role in allowing the rotovap to run continuously. If you do not install this part correctly. You will not be able to empty the receiving flask without shutting down the system. The valve closes when vacuum is lost in the receiving flask allowing the system to continue recovery while the flask is emptied. When vacuum is reintroduced, the flask equalizes with the system. The valve falls back down and allows the recovered solvent to be collected. **

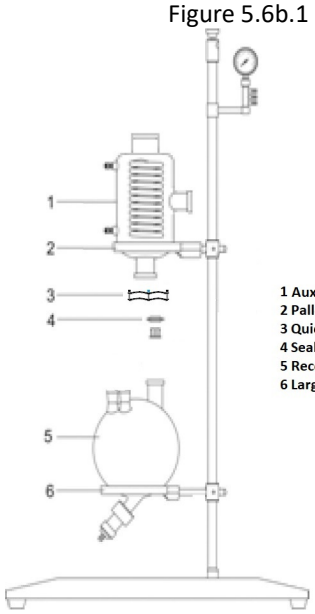
- Raise the pallet mount (6) clamp until it meets with the bottom of the condenser (1).
- Adjust the receiving flask (5) until the flanges line up evenly.
- Open and loosen the quick clamp (3).
- Close the quick clamp (3) around the flanges and seal then tighten the clamp.

5.6b Receiving flask assembly (RE-1020 & RE-1050)

**** The seal washer used between the condenser and the receiving flask has a valve in the middle. This center valve must hang down inside of the receiving flask. ****

**** Large pallet mount ring must be installed prior to receiving flask installation ****

Figure 5.6b.1



1 Auxiliary condenser
2 Pallet mount
3 Quick clamp
4 Sealing flange (insert down)
5 Receiving flask
6 Large pallet mount

- Place the receiving flask (5) onto the pallet mount (2) and keep the parts low to the base for now.
- Grease and add the sealing flange gasket (4) onto the top of the large receiving flask (5) flange.
- Ensure the center of the sealing flange gasket (4) hangs down inside of the receiving flask (5).

** The sealing flange serves a very important role in allowing the rotovap to run continuously. If you do not install this part correctly. You will not be able to empty the receiving flask without shutting down the system. The valve closes when vacuum is lost in the receiving flask allowing the system to continue recovery while the flask is emptied. When vacuum is reintroduced, the flask equalizes with the system. The valve falls back down and allows the recovered solvent to be collected. **

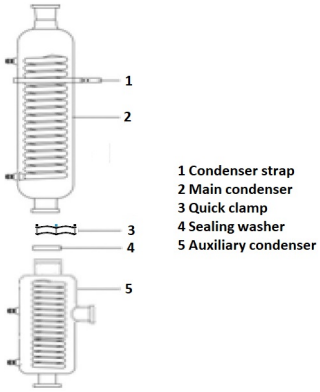
- Raise the pallet mount (6) clamp until it meets with the bottom of the condenser (1).
- Adjust the receiving flask (5) until the flanges line up evenly.
- Open and loosen the quick clamp (3).
- Close the quick clamp (3) around the flanges and seal (4), then tighten the clamp.

5.7 Main condenser assembly (RE-1020 & RE-1050)

**** Auxiliary condenser and vertical stand with condenser strap must be assembled ****

**** Use an assistant for help to stabilize the main condenser ****

Figure 5.7.1



- Grease the seal washer (4) and place on top of the auxiliary condenser (5).
- Place the main condenser (2) onto the seal washer (4) and attach the strap (1).
- Adjust the main condenser (2) until the flanges line up evenly.
- Open and loosen the quick clamp (3).
- Close the quick clamp (3) around the flanges and seal (4), then tighten the clamp.

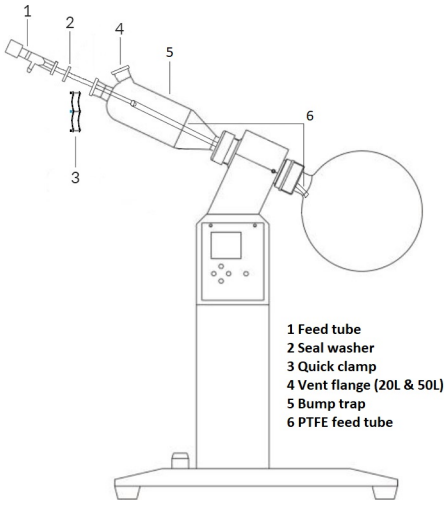
5.8a Feed tube

**** RE-1005 does not include a vent flange, it has a different style bump trap ****

**** PTFE feed tube must be installed on the feed tube before assembly ****

****Feed tube assembly must be fed through the seal washer to be placed between both flanges ****

Figure 5.8a.1

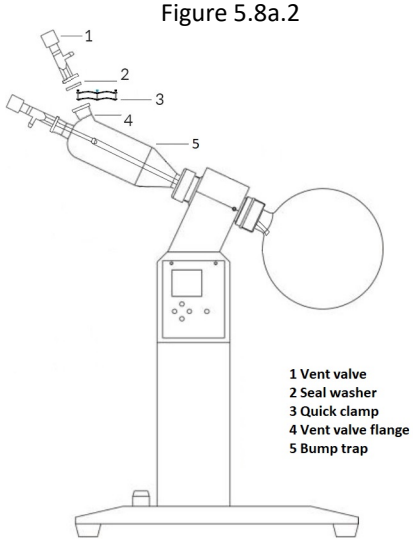


- Grease the seal washer (2) and slide it down the glass tube of the feed tube (1).
- Push the PTFE feed tube (6) onto the end of the feed tube (1). (heat if necessary)
- Slide the assembled feed tube (1)(2)(6) through the bump trap (5).
- Adjust the feed tube (1) until the flanges line up evenly.
- Open and loosen the quick clamp (3).
- Close the quick clamp (3) around the flanges and seal (2), then tighten the clamp.

- Vent valve assembly -

**** Not included on the RE-1005 model ****

Figure 5.8a.2

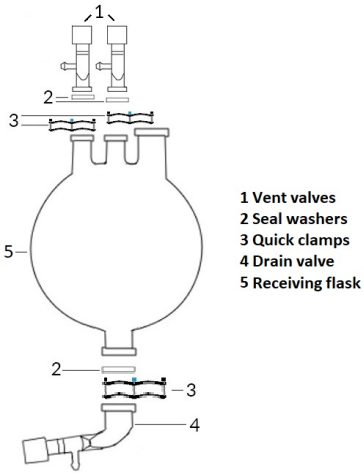


- Grease the seal washer (2) and place it onto the vent valve flange (4).
- Adjust the vent valve (1) until the flanges line up evenly.
- Open and loosen the quick clamp (3).
- Close the quick clamp (3) around the flanges and seal (2), then tighten the clamp.

5.8b Receiving flask valves assembly

**** One vent valve is connected to the vacuum manifold. One is left open to allow air into the flask. ****

Figure 5.8b.1



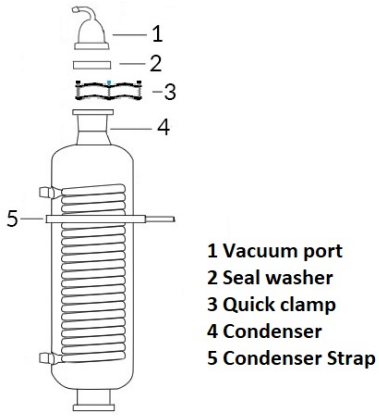
- Grease the seal washers (2) and place them onto the receiving flask flanges (4).
- Adjust the vent valve (1) until the flanges line up evenly.
- Open and loosen the quick clamp (3).
- Close the quick clamp (3) around the flanges and seal (2), then tighten the clamp.

  Repeat above for the bottom drain valve.

5.9 Vacuum port assembly (RE-1020 & RE-1050)

**** Not included on the RE-1005 model ****

Figure 5.9

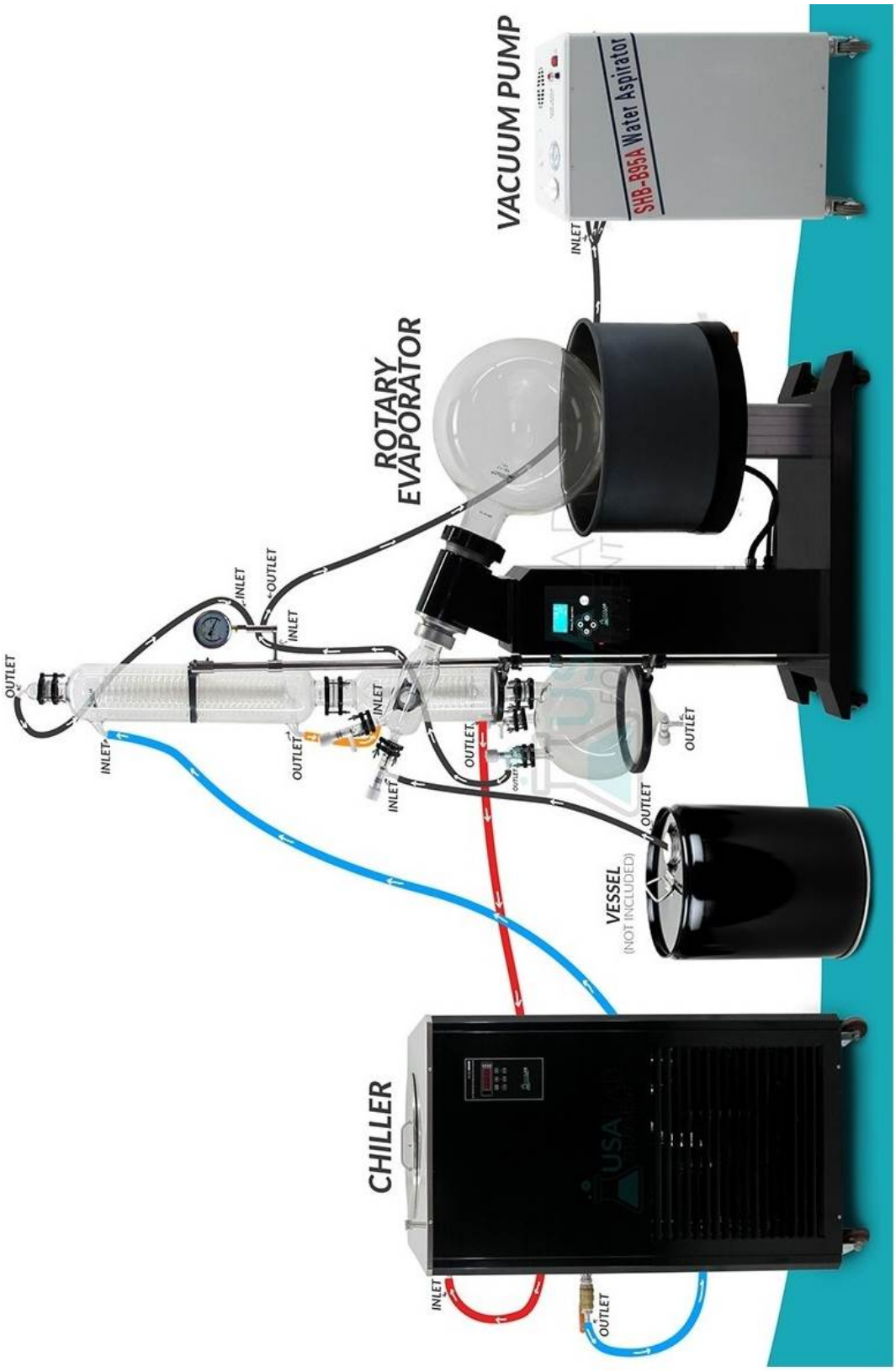


- Grease the seal washer (2) and place it onto the condenser flange (4).
- Adjust the vacuum port (1) until the flanges line up evenly.
- Open and loosen the quick clamp (3).
- Close the quick clamp (3) around the flanges and seal (2), then tighten the clamp.

Section 6 | Tubing connections

RE-1005

RE-1020 & RE-1050



Section 7 | Operation

7.1 Operating method

A good general guideline to follow is the "Rule of 20." This rule states that your bath temperature should be 20°C hotter than the boiling point or vapor temperature you are trying to achieve, and the coolant temperature should be at least 20°C cooler than the vapor temperature.

For instance: if you were trying to boil off a substance that has a boiling point of 70°C, you would want to set the bath temperature to 90°C and have the coolant in the condenser be 50°C or less.

If you'll be applying a vacuum, don't forget to check how the reduced pressure will effect your solvent's boiling point!

- Run your vacuum pump and chiller before operating the rotary evaporator.
- Please level and lock the wheels on the evaporator prior to filling your bath with water.
- Fill your bath with 50-60% distilled water. Once filled, the unit should not move as to prevent any water from spilling from the bath itself.
- Raise the bath to the level that your solution will be.
- Using a hose to the feed tube valve, the solution to be evaporated can be injected into the boiling flask (using the negative pressure of the evaporator to draw the liquid into the boiling flask).
- Once the solution is filled (no more than half-way ex. 50L boiling flask = 25L of solution). The temperature, rotation speed and timer can be set and enabled.
- Once your receiving flask reaches 90%, you can break vacuum on your receiving flask using one of the glass valves.
- The sealing washer valve on the receiving flask should close allowing you to drain the flask.
- Once drained, the second glass valve should be connected to your vacuum manifold.
- Open that valve to apply vacuum to the receiving flask, then the sealing washer valve should open allowing the recovered solvent to fill the flask again.

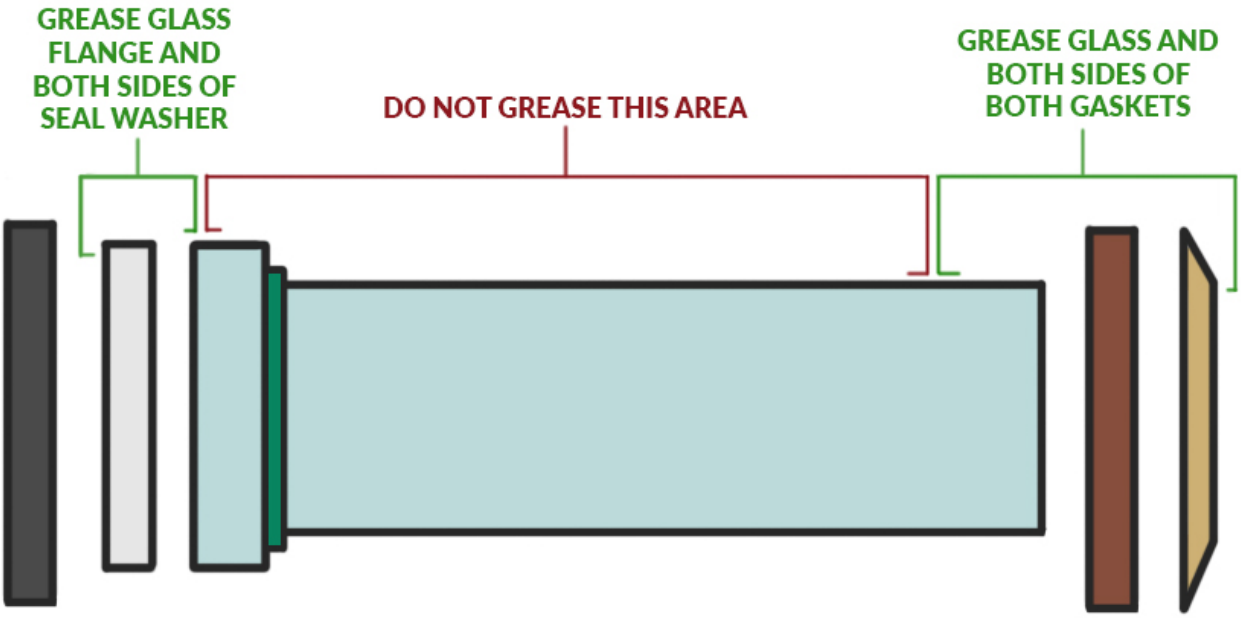
Section 8 | Maintenance

8.1 Part maintenance

WARNING: You must disconnect the plug before cleaning or maintenance.

- Please use a damp soft cloth to wipe clean. Stubborn stains should be cleaned by neutral detergents.
- The maintenance of internal electrical and heating parts must be performed by professionals or trained electricians.
- Do not directly splash water over the product or use abrasive powder, diluent, oil, kerosene, acidic material, and similar substance during cleaning, or else shock or other accidents will occur.

Periodic maintenance of the vapor duct is required. See image below for vacuum grease locations. If the vapor duct is not maintained, vacuum leaks and loud grinding noises in the motor area may occur.



8.2 Long Term Storage

- Drain and dry out the unit.
- Inspect the unit for damages or concerns.
- Clean the outside of the unit.
- Coil the cord into a circle and zip tie it to the back vent.
- Place the unit in a level, low humidity environment.

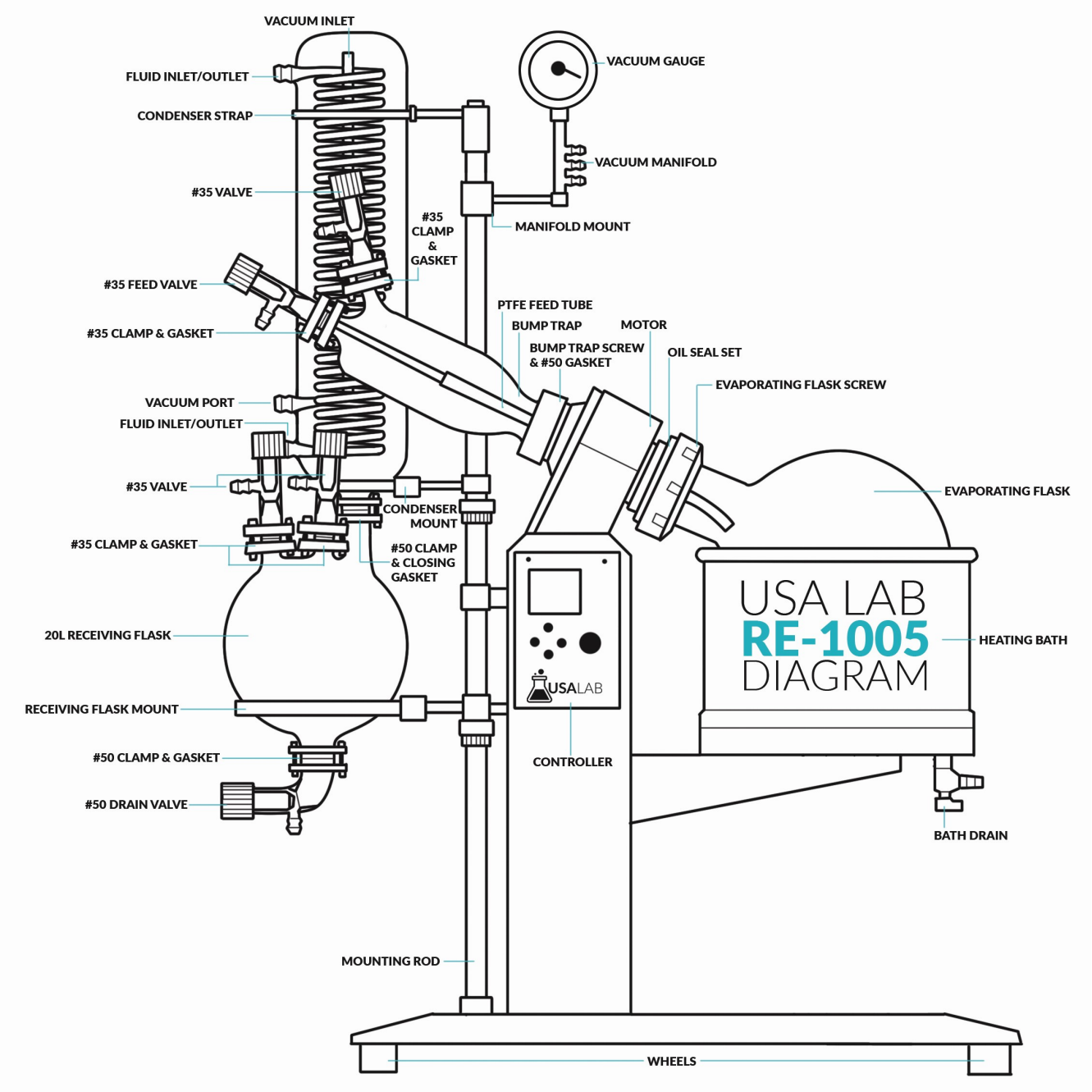
Section 9 | Troubleshooting

9.1 Troubleshooting table

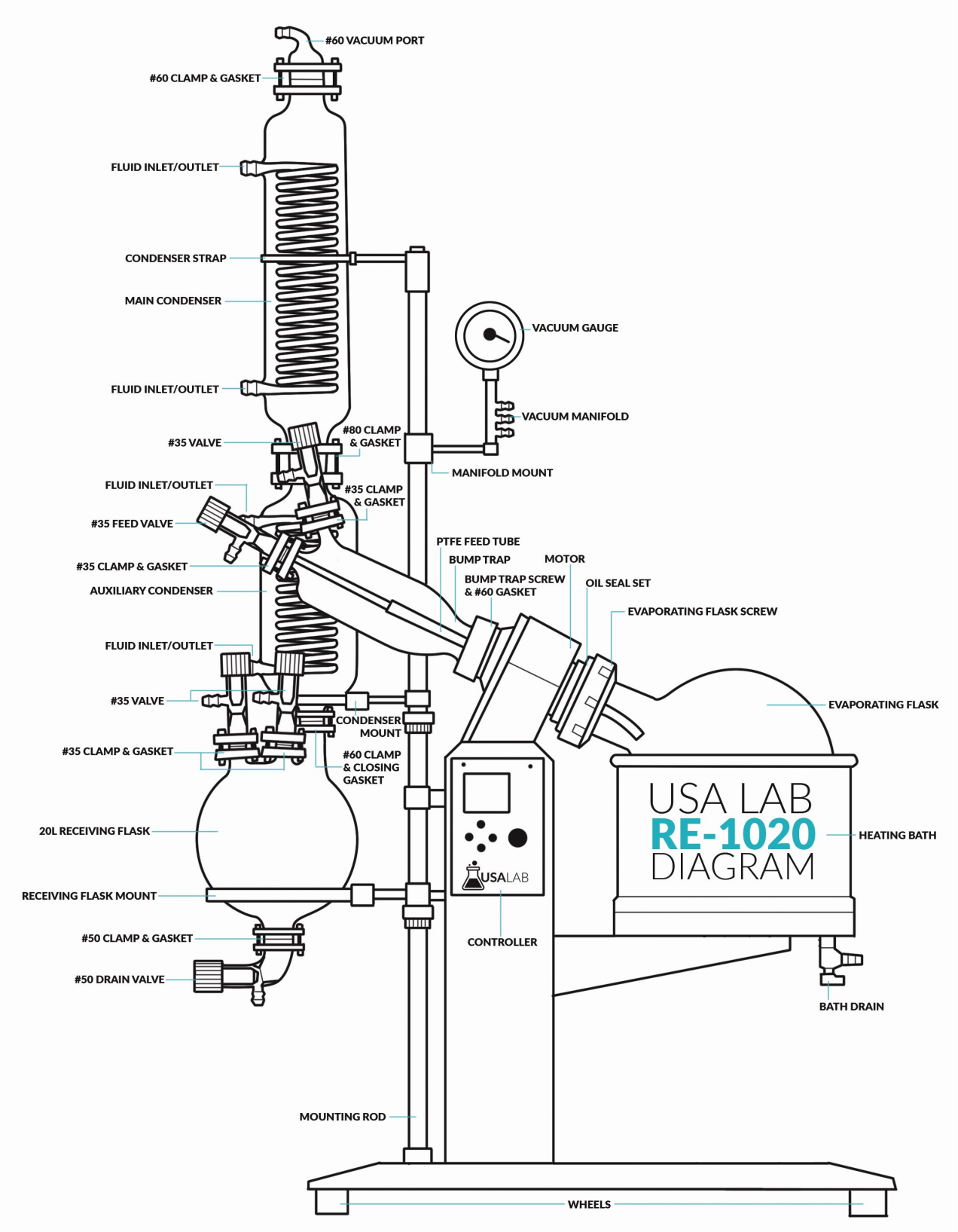
Failure	Cause	Troubleshooting
The unit is plugged in but the power indicator light or LCD panel won't turn on.	Check the power cord to see if its loose or disconnected	Re-connect the power cord.
	Power switch failure.	Replace the power switch.
	Circuit board failure.	Stop using the machine and contact us immediately.
The rotation indicator turns on but the motor does not rotate.	Motor failure.	
	Circuit board failure.	
The heating indicator turns on but the bath does not heat.	Faulty relay or level switch.	Replace the relay or switch.
	Faulty heater element.	Replace the heater element.
The temperate display shows □□□	The bath temperature sensor has a short circuit or an open circuit.	Check sensor and wiring.
The temperature display shows “Er-1”, ALM1 identifier is on.	The bath temperature sensor has a short circuit or an open circuit.	Check the sensor and wiring.
The temperature display shows “Er-2”, ALM1 identifier is on.	The bath protection sensor has a short circuit or an open circuit.	
The temperature display shows “Er-3”, ALM1 identifier is on.	The bath protection sensor exceeds the set value.	Restart the unit.
The temperature display shows “Er-1”, ALM2 identifier is on.	Faulty power module.	Remove the boiling flask. Run the unit under no load. If the fault continues, stop using the machine and contact us immediately.
The temperature display shows “Er-2”, ALM2 identifier is on.	The motor has stalled.	
The temperature display shows “Er-3”, ALM2 identifier is on.	Holzer logic error	
The temperature display shows “Er-4”, ALM2 identifier is on.	Board under voltage.	Check the power cord voltage value.
The temperature display shows “Er-5”, ALM2 identifier is on.	Board over voltage.	
The temperature display shows “Er-6”, ALM2 identifier is on.	Serial communication fault.	Stop using the machine and contact us immediately.
An abnormal noise occurs.	Abrasions on the seal ring.	Replace the seal ring.
	Abrasions on the internal gears.	Stop using the machine and contact us immediately.
	A lack of grease in the motor shell.	
	Failure of the motor bearings.	
Low vacuum pressure.	Abrasions of the glass rotary shaft.	Replace the glass rotary shaft.
	Abrasions on the seal ring.	Replace the seal ring.
	Incorrect installation of the Teflon vacuum break seal washer.	Remount the seal ring.
	Leaking from any of the seal washers or glass port valves	Replace the seal washer or glass port valve o-ring.
	Aging of the vacuum hose.	Replace the vacuum hose.
Uneven bath lifting.	Circuit board or motor failure.	Stop using the machine and contact us immediately.
	Abrasion or rusting of the sliding bearing.	

9.2 Complete system diagrams

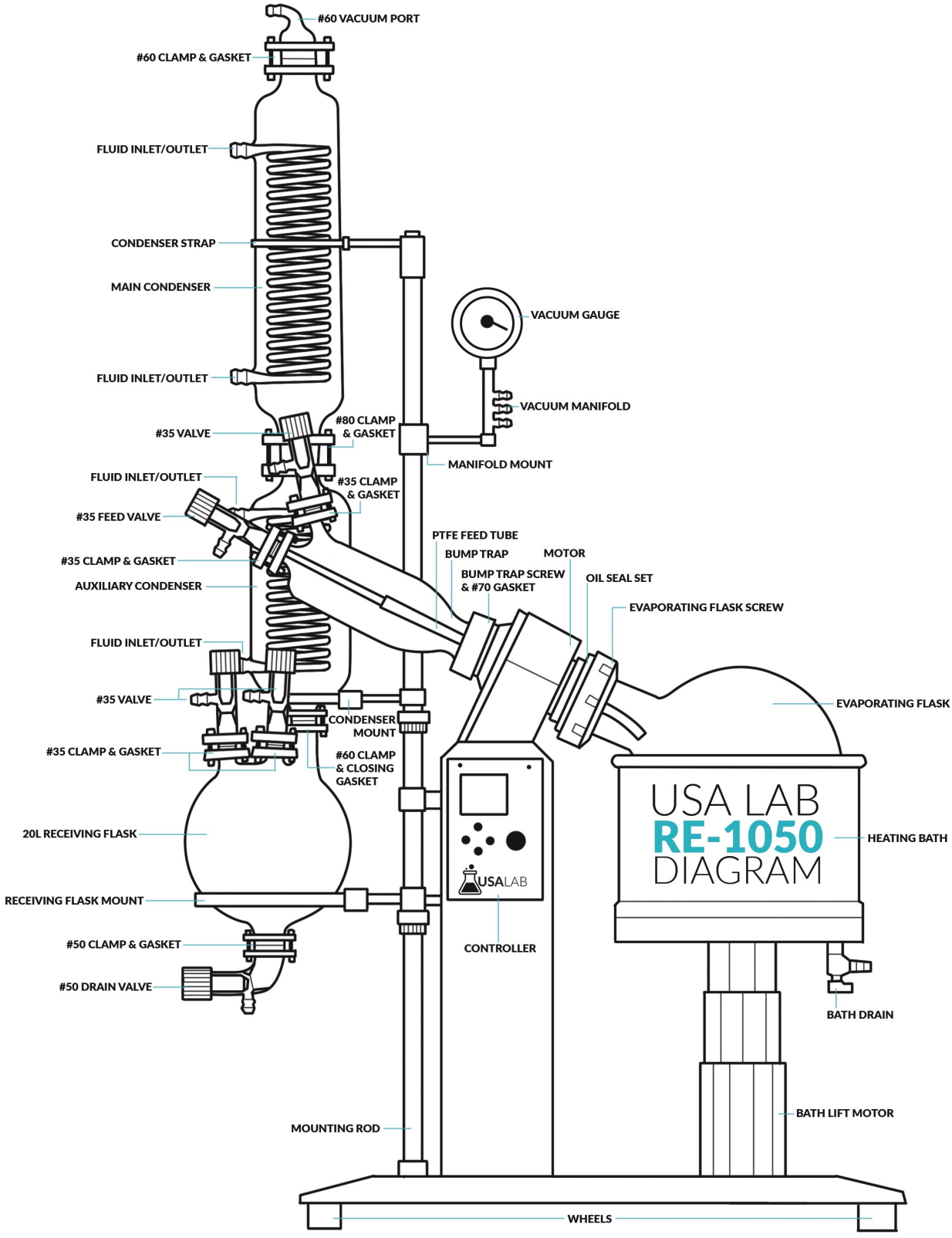
RE-1005



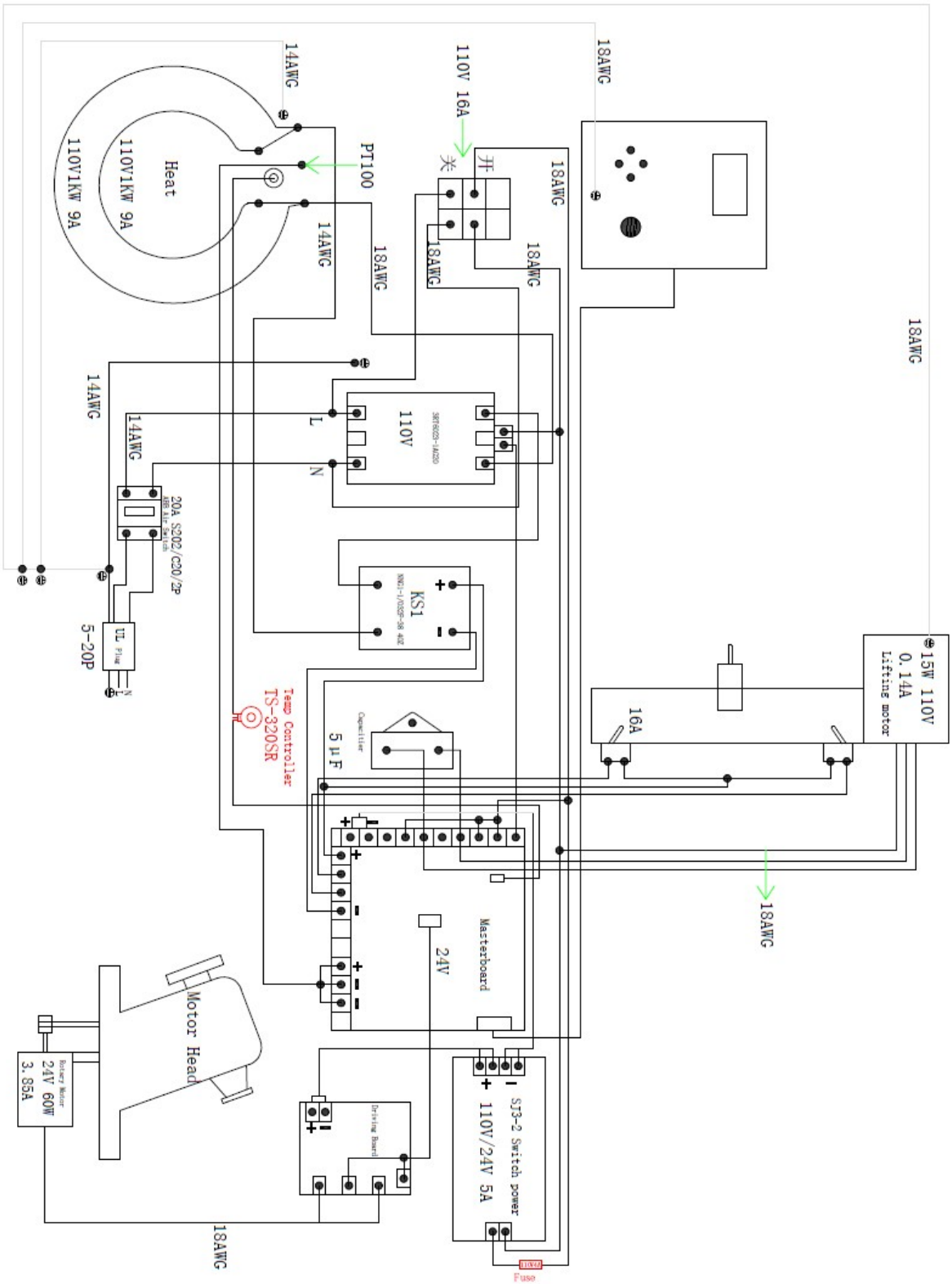
RE-1020


#60 VACUUM PORT
#60 CLAMP & GASKET
FLUID INLET/OUTLET
CONDENSER STRAP
MAIN CONDENSER
FLUID INLET/OUTLET
#35 VALVE
#80 CLAMP & GASKET
FLUID INLET/OUTLET
#35 CLAMP & GASKET
#35 FEED VALVE
#35 CLAMP & GASKET
AUXILIARY CONDENSER
FLUID INLET/OUTLET
#35 VALVE
CONDENSER MOUNT
#35 CLAMP & GASKET
#60 CLAMP & CLOSING GASKET
20L RECEIVING FLASK
RECEIVING FLASK MOUNT
#50 CLAMP & GASKET
#50 DRAIN VALVE
VACUUM GAUGE
VACUUM MANIFOLD
MANIFOLD MOUNT
PTFE FEED TUBE
BUMP TRAP
MOTOR
BUMP TRAP SCREW & #60 GASKET
OIL SEAL SET
EVAPORATING FLASK SCREW
EVAPORATING FLASK
USA LAB
RE-1020
DIAGRAM
HEATING BATH
USALAB
CONTROLLER
BATH DRAIN
MOUNTING ROD
WHEELS

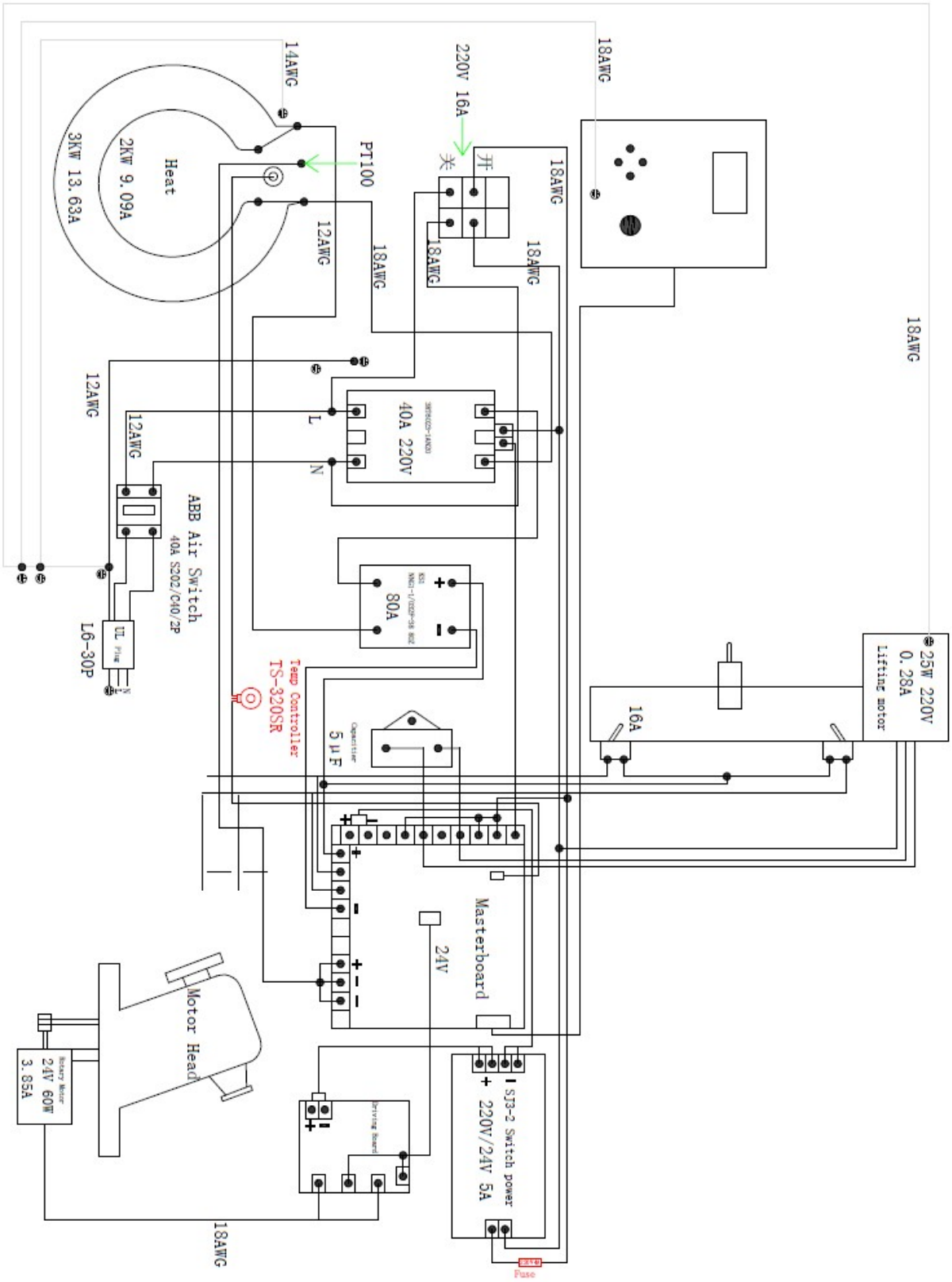
RE-1050


#60 VACUUM PORT
#60 CLAMP & GASKET
FLUID INLET/OUTLET
CONDENSER STRAP
MAIN CONDENSER
FLUID INLET/OUTLET
#35 VALVE
#80 CLAMP & GASKET
FLUID INLET/OUTLET
#35 CLAMP & GASKET
#35 FEED VALVE
#35 CLAMP & GASKET
AUXILIARY CONDENSER
FLUID INLET/OUTLET
#35 VALVE
CONDENSER MOUNT
#35 CLAMP & GASKET
#60 CLAMP & CLOSING GASKET
20L RECEIVING FLASK
RECEIVING FLASK MOUNT
#50 CLAMP & GASKET
#50 DRAIN VALVE
VACUUM GAUGE
VACUUM MANIFOLD
MANIFOLD MOUNT
PTFE FEED TUBE
BUMP TRAP
MOTOR
BUMP TRAP SCREW & #70 GASKET
OIL SEAL SET
EVAPORATING FLASK SCREW
EVAPORATING FLASK
USA LAB
RE-1050
DIAGRAM
HEATING BATH
USALAB
CONTROLLER
BATH DRAIN
BATH LIFT MOTOR
MOUNTING ROD
WHEELS

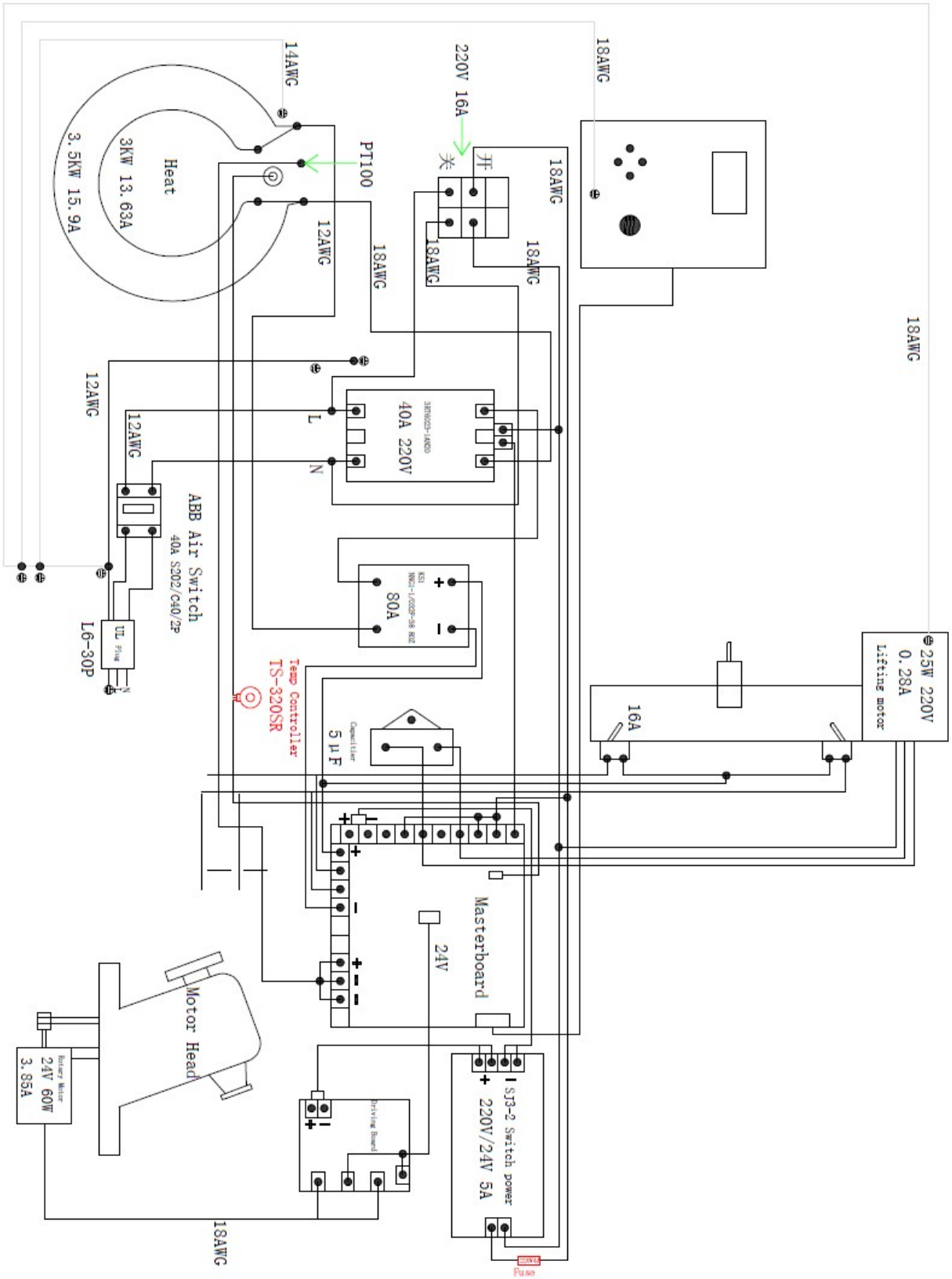
Wiring diagram for RE-1005



Wiring Diagram for RE-1020



Wiring Diagram for RE-1050



Section 10 | Warranty Information and Coverages

10.1 Warranty

-SHIPPED AND USED IN THE LOWER 48 STATES OF AMERICA POLICY-

USA Lab products are warrantied to be free of workmanship, mechanical, and material defects for ***0 days to three years*** from date of purchase depending on the product. Within this warranty period USA Lab will replace or repair components that fail due to manufacturer defect. For such repairs or parts, shipping charges will be covered in full or in part by USA Lab.

This warranty ***does not cover any failures*** due to alteration, repairs, misuse, accident, or abuse. This warranty also ***does not cover wear items*** such as glassware, heating elements, thermocouples, oil seal sets, gaskets, switches, and sensors. The warranty does also not cover wrongful input voltage. The customer needs to be responsible in monitoring power rating and routine checking. If using water in a heater or chiller, the customer must only use ***distilled water.*** Other forms of water will ***void the warranty.***

ANY product that is used in ***HIGH DUST***, ***HIGH HEAT***, and/or ***HIGH HUMIDITY*** locations. Will ***NOT*** be covered under warranty. The units ***ARE NOT*** designed to be used in an environment other than a ***CLEAN LABORATORY***. Any unit that has failed due to neglect and abuse will not be allowed to be returned.

Fittings and steel do ***NOT*** carry any warranty. Fittings and steel items with a defect or other issue must be identified ***within 30 days of arrival*** and USA Lab ***MUST*** be contacted. After 30 days, there will be ***no replacements*** sent for fittings or steel items with a defect or issue. ***Cross threading, misuse, improper storage, or improper care of fittings/steel are considered user error and are not covered under warranty.***

Glassware does ***NOT*** carry any warranty. Glassware items with a defect or other issue must be identified ***within 3 days of arrival*** and USA Lab ***MUST*** be contacted. After 3 days, there will be ***no replacements*** sent for glassware items with a defect or issue.

-SHIPPED AND USED OUTSIDE OF THE LOWER 48 STATES OF AMERICA POLICY-

USA Lab products are warrantied to be free of workmanship, mechanical, and material defects for ***0 days to three years*** from date of purchase depending on the product. Within this warranty period USA Lab will replace or repair components that fail during normal daily use. Such repairs or parts will be covered in full by USA Lab and ***the customer will be responsible for shipping, labor, and custom duties.***

This warranty ***does not cover any failures*** due to alteration, repairs, misuse, accident, or abuse. This warranty also ***does not cover wear items*** such as glassware, heating elements, thermocouples, oil seal sets, gaskets, switches, and sensors. The warranty does also not cover wrongful input voltage. The customer needs to be responsible in monitoring power rating and routine checking. If using water in a heater or chiller, the customer must only use ***distilled water.*** Other forms of water will ***void the warranty.***

ANY product that is used in ***HIGH DUST***, ***HIGH HEAT***, and/or ***HIGH HUMIDITY*** locations. Will ***NOT*** be covered under warranty. The units ***ARE NOT*** designed to be used in an environment other than a ***CLEAN LABORATORY***. Any unit that has failed due to neglect and abuse will not be allowed to be returned.

Fittings and steel do ***NOT*** carry any warranty. Fittings and steel items with a defect or other issue must be identified ***within 30 days of arrival*** and USA Lab ***MUST*** be contacted. After 30 days, there will be ***no replacements*** sent for fittings or steel items with a defect or issue. ***Cross threading, misuse, improper storage, or improper care of fittings/steel are considered user error and are not covered under warranty.***

Glassware does ***NOT*** carry any warranty. Glassware items with a defect or other issue must be identified ***within 3 days of arrival*** and USA Lab ***MUST*** be contacted. After 3 days, there will be ***no replacements*** sent for glassware items with a defect or issue.

*******This policy can change at any point in time based upon what USA Lab deems fit. Please keep this in mind when purchasing and viewing our policy.*******

10.2 Returns

Cancelling a Pre-Order will result in a 10% cancellation fee. Refunds, minus the cancellation fee, are issued to the original payment method.

-RETURN POLICY-

PLEASE EMAIL SALES*@USALAB.COM* FOR RETURNS

We offer a 30-day return policy from when your package is delivered to your shipping address. By placing an order with USA Lab, you express that you have read and agreed to the following return policies.

• **CUSTOMIZED ITEMS** - We do not accept returns for customized items. When purchasing a customized item, you agree that there are no returns due to the nature of the item(s) being specific to your needs. We do not accept returns on any solvents or consumables.

• **PRE-ORDERS** - You will be charged at time of placing a Pre-Order. If we're unable to commence shipping one-year from order placement, we'll provide a full-refund at your request. No discounts, refunds, or credits will otherwise be offered due to any such delays. The expected shipping date for Pre-Order Products will be noted on each product page, subject to reasonable delays in manufacturing and/or delivery. Such date is only an estimate, is subject to change, and USA Lab does not represent or warrant that it will be able to ship the Product by the estimated date. As a result, in the event that a delay arises and the estimated shipment and/or release of the product is not met, USA Lab is not responsible for any damages that may occur due to the delay, nor shall it be obligated to provide any discounts, refunds, or credits due to any such delays. The products will be shipped in the order in which your Pre-Order is received by the Company. Shipments will be made Monday – Friday, excluding holidays, unless otherwise noted. Once ordered items have been delivered to you, our standard refund and exchange policy will apply. Please refer to our refund policy. We reserve the right, at our discretion, to change these Terms at any time.

• **GLASSWARE** - We ship all glassware products with additional care, but sometimes they arrive broken. If glassware arrives broken, please contact us within 3 days of receiving your product and we will either send you a brand-new piece or send you a refund! Any glassware broken after delivery voids all warranties. Thank you for understanding.

• **NON RETURNABLES** - Consumables, solvents, hazardous materials, and some other products are not permitted for return.

• **INTERNATIONAL ORDERS** - International orders are **NOT** subject to return. If a part arrives damaged, please notify us within 3 business days of delivery for a replacement. Customers are subject to customers fees depending on the country.

• **RESTOCKING FEES** - By default, a 15% restocking fee is applied on all items that are in original packaging and unused with no damage. This applies to all items returned within 30 days. No exceptions. You will be responsible for the return shipment unless deemed defective by USA Lab. In that case, we will pay for return shipment and replacement shipment costs.

• **RETURN CONDITIONS** - The item(s) must be returned in original packaging and in undamaged condition. The item(s) must have no signs of usage or wear including stickers, scratches, dents, resins, non-standard fluids, plant matter, or any other wear not representing a new, unused item. Unused and undamaged products not in original packaging will be subject to a restocking fee equal to 25% of the purchase price. Products deemed defective with any signs of usage or wear whatsoever of damage or usage (including but not limited to the presence of botanical material, resins, cleaning agents, stickers or decals, or any damage, wear or tear) will not be accepted for return. Once the returned item is received, tested, inspected, and processed, a refund will be issued. If your item(s) are in original packaging and unused, you will be refunded the initial purchase price with the 15% restocking fee deducted. If your item(s) are deemed damaged or used, you will be not be refunded.

USA Lab is under no obligation to accept return of any product not sold under the USA Lab label or brand. Products that are not USA Lab branded products are governed by and subject to the specific third-party manufacturers return policy.

10.3 Notes

Keep all original packaging in the event you need to return the unit or to send it in for to us for repair.
We are not responsible for providing packaging material.

This manual and its contents are subject to change without notice.

USA Lab reserves the right of ultimate interpretation of the instruction manual. Additionally, USA Lab is not responsible for damages or injuries caused by improper use; knowingly or unknowingly.

Revision 2023.01.03

If you have any questions or concerns, please don't hesitate to contact us at:

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