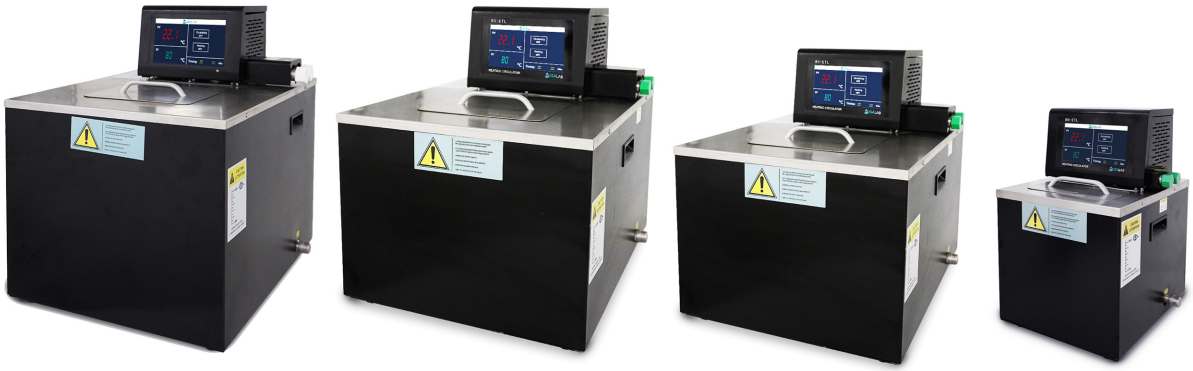
RH Series - ETL

User Manual

Models: RH5L, RH20L, RH30L, RH50L - ETL



Original instructions

Read this manual before using the equipment

Retain this manual for future use

Document number: 1005

Published date: 28 May 2025

Document version: 1

Published on: 28 May 2025

Document ID: 1005

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1 Safety information

This section provides an overview of all safety aspects for the protection of people as well as safe and uninterrupted operation. Other task-related safety instructions are included in the specific sections.

1.1 Safety notices

This manual uses the following safety notice formats. Safety notices are used at the start of sections or embedded in operating instructions.

Make sure you fully understand and comply with the notices in this manual.

DANGER

Risk of death!

Indicates a hazardous situation which, if not avoided, will almost certainly result in death or serious injury.

WARNING

Risk of serious injury or death!

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

Caution

Risk of injury!

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Notice

Indicates an important situation which, if not avoided, may seriously impair operations.

Additional information relating to the current section.

1.2 Special safety instructions

To draw attention to special hazards, this manual uses the following symbols.

Symbol	Meaning
	Electrical hazards and electrical shock hazards
	General warning
	Fire hazard
	Explosive materials
	Hot surface
	Heavy objects or equipment
	Corrosive substance
	Automatic starting equipment
	Trip hazard
	Non user serviceable parts

1.3 Intended use

The RH Series is intended to be used as a heater and circulator for the JR / JRE series of reactors. It can heat a reactor up to 200°C. Open bath functionality provides greater ease of use. PID temperature control increases heating accuracy. The controller display is bright and easy to see from any angle. The heavy duty pump ensures a steady and strong flow of fluid.

1.4 General safety warnings

WARNING

Risk of serious injury or death!

Only use this equipment for its intended purpose.

Do not leave the equipment running unattended.

Do not wear loose clothing, jewelry, hair, or any other articles that can be trapped by moving parts.

Do not operate equipment if you are fatigued, emotionally stressed, or under the influence of drugs or alcohol.

WARNING

Risk of electrical shock!

All power sources must be turned off when the equipment is not being used.

Ensure you use the correct power source for the equipment. Refer to the electrical specifications for the equipment being used.

WARNING

Risk of injury from trips or falls!

There is a risk of tripping on cables or pipe connections.

Ensure that cables or pipework are routed safely and that they are not trapped or pinched during use.

WARNING

Risk of injury from lifting heavy objects!

Use proper lifting and transportation devices when moving equipment.

WARNING

Automatically moving mechanical parts

Take care when in the vicinity of equipment with moving mechanical parts that may start automatically and unexpectedly.

Read the manual!

You must read this manual before starting work and operating this equipment.

Where required, you must use appropriate PPE when using this equipment.

Wear ear protection!

You must wear ear protection.

Wear eye protection!

You must wear eye protection.

Wear safe footwear!

You must wear safe and sturdy footwear.

Wear gloves!

You must wear appropriate gloves or hand protection.

Wear safe and protective clothing!

You must wear appropriate safe clothing.

Before using the equipment, locate the nearest of these facilities and resources:

Fire extinguisher!

Before using this equipment, locate your nearest fire extinguisher and fire prevention resources.

First Aid!

Before operating this equipment, locate your nearest first aid station.

1.5 Safe operating area

A safe operating area around the equipment and work area should be maintained at all times. Non-operators and other persons should not approach the equipment or work area.

Always leave 12-16 inches around the unit.

Caution

Risk of damage to the equipment!

Do not obstruct the ventilation on any side of the equipment. This can cause poor performance or part failure. Always keep the operating area clean and organized to prevent injury or damage.

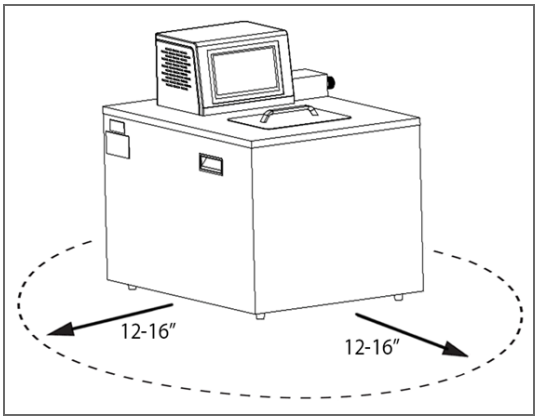

Figure 1 - Safe operating area around the heater unit

1.6 Safety warnings

The following warnings and notices are safety information specific to the RH Series - ETL.

WARNING

Risk of serious injury or damage!

Only use approved thermal transfer fluids stated in this manual.

WARNING

Risk of serious injury or damage!

Follow all federal, state, municipal laws, codes, and ordinances when installing and operating the heater.

WARNING

Risk of electrical shock!

Make sure the input voltage matches the specifications of the equipment.

Use the correct voltage, connection, and ensure proper grounding.

Do not unplug the heater while it is in operation.

Do not use a generator to power the heater.

Do not alter or change the length of the power cable.

WARNING

Risk of serious injury or damage!

Do not operate the fluid pump with the valve in the off position. The equipment will overheat the pump and lead to failure.

Do not run the liquid pump dry and allow plenty of time to prime the pump.

Fluid lines must not have any hard bends which can prevent clear flow of fluids.

WARNING

Risk of serious injury or damage!

Do not use flammable, corrosive, or explosive substances on or near the equipment.

Only install the heater in a climate-controlled environment.

Not to be serviced by users!

All repairs must be done following advice and information from USA Lab or one of their representatives.

Any repairs must only be done by qualified electricians.

Contact USA Lab for details if your equipment needs repair.

1.7 Responsibility of the owner

The owner is the person who operates the equipment for commercial or business purposes or allows a third party to use the equipment and bears legal responsibility for the product during operation for the protection of the user, personnel or third party.

1.7.1 Owner responsibilities

The equipment is used for commercial purposes. The owner of the equipment is therefore subject to the legal responsibilities for occupational safety.

In addition to the safety instructions in this manual, the applicable safety regulations as well as occupational safety and environmental regulations must be implemented for the area of application of the equipment.

This applies to the following:

- The owner must be informed of the applicable occupational safety regulations and conduct a risk assessment to identify any additional risks that may arise due to the special working conditions at the equipment location.
- This information must be implemented in the form of operating instructions for the operation of the equipment.
- During the entire period of equipment use, the owner must ensure that the operating instructions created reflect the current state of policy and adjust them if necessary.
- The owner must clearly regulate and define the responsibilities for operation, troubleshooting, maintenance and cleaning.
- The owner must ensure that all persons who work with the equipment have read and understood this manual.
- The owner must also train and inform personnel of hazards at regular intervals.
- The owner must provide personnel with the required protective equipment and must ensure that personnel wear the required protective equipment.
- The owner must ensure adequate ventilation of the installation site around the equipment and work area.
- The owner is also responsible for ensuring that the equipment is always in good working order. The following therefore applies:
    - The owner must ensure that the maintenance intervals described in this manual are observed.
    - The owner must ensure that the required fire protection measures are always compliant and functional.

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2 Hardware description

Before operating the equipment, you should be familiar with the location and names of all parts of the equipment. This will help you understand the operating procedures and assist with troubleshooting, if required.

2.1 Overview

The RH Series is intended to be used as a heater and circulator for the JR / JRE series of reactors. It can heat a reactor up to 200°C.

Acceptable Transfer Fluids:

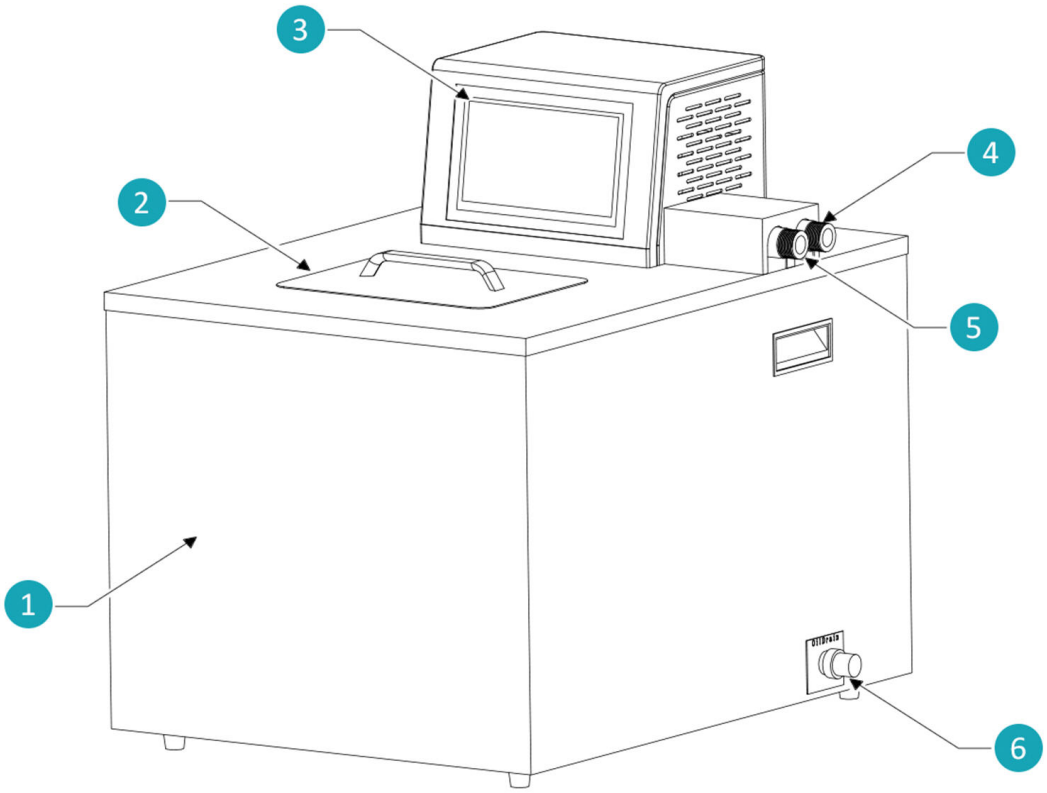
-50°C – 200°C: Caldera 7 Silicone Oil.

Notice

Heating silicone oil to 200°C in an open bath (RH Series) can cause polymerization of the oil and damage to the heater.

2.2 Diagrams

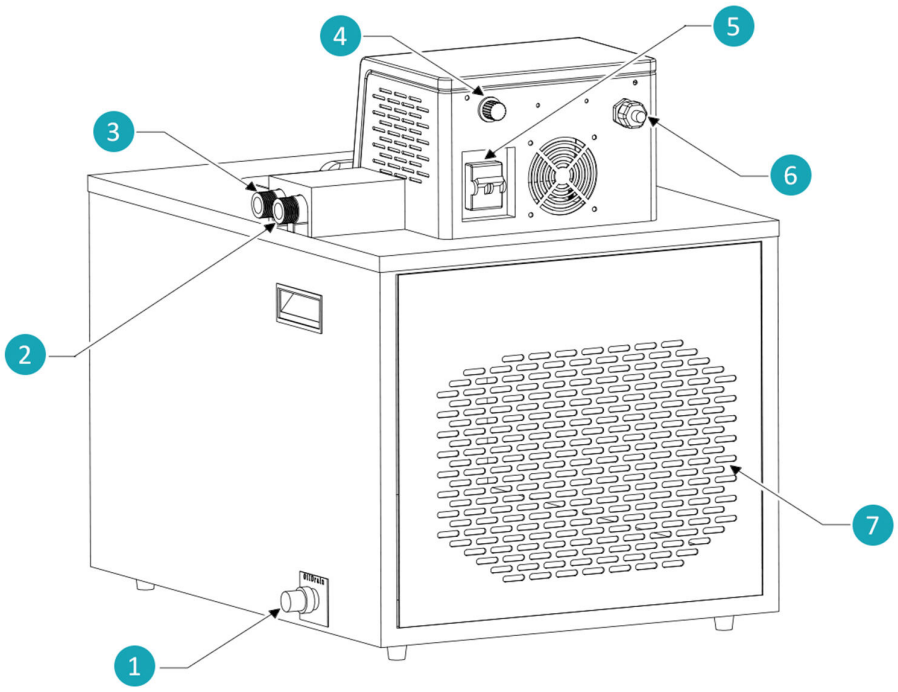
2.2.1 Front panel diagram



1	Fluid Reservoir
2	Reservoir Lid
3	Touch Screen Controller
4	Fluid Outlet
5	Fluid Inlet
6	Fluid Drain Port

Figure 2 - Front panel diagram

2.2.2 Back panel diagram



1	Fluid Drain Port
2	Fluid Outlet
3	Fluid Inlet
4	Pump Speed Knob
5	Breaker
6	Power Cord
7	Electronics access panel

Figure 3 - Back panel diagram

2.2.3 Hosing connections

Insulated hosing is provided with your heater. Hosing should be unobstructed without any hard bends in the run. The hosing is connected to the inlet and outlet ports of the heater. See below for proper connection.

Notice

Contact USA Lab for additional lengths of hosing.

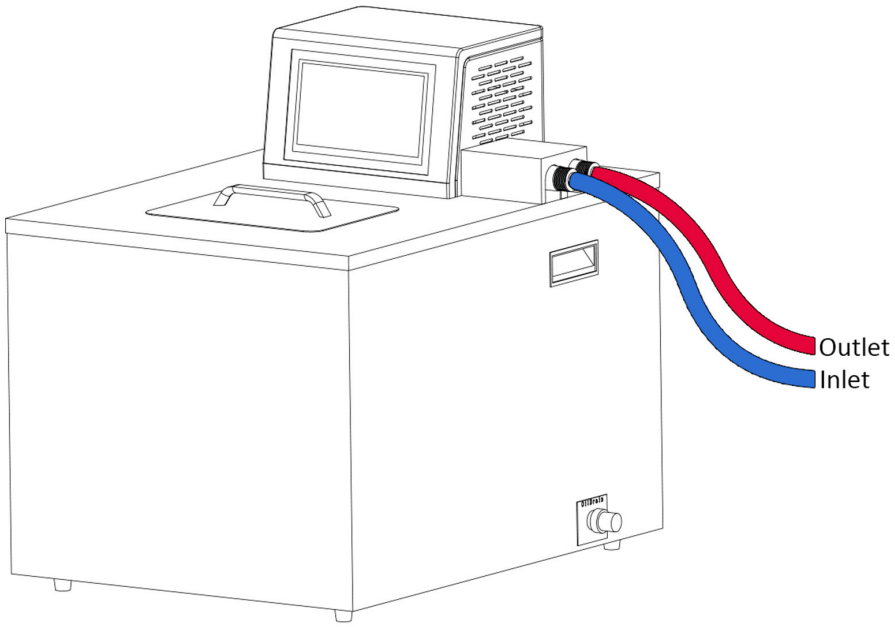


Figure 4 - Hosing connection

Before filling or priming your heater circulator, be sure to add the gaskets to the ends of the hosing. The gaskets are included in the manual pouch. Leaking will occur if this is not followed.

WARNING

DO NOT USE NPT TAPE. The gaskets will provide a seal.

Figure 5 - Adding gaskets to the hosing

2.2.4 Electrical connection

Each heater has its own power requirements. Make sure you are aware of the requirements for your heater variant.

► For more information, see *Technical specifications* on page 35.

The heater must operate on its own circuit Installed by a qualified electrician.

Depending on the heater variant, different plug types maybe fitted to your heater.

The following is a list of the plug types used with each variant:

- RH5L-ETL : NEMA 6-20P
- RH20L-ETL : NEMA 6-20P
- RH30L-ETL : NEMA L6-30P
- RH50L-ETL : Hardwire

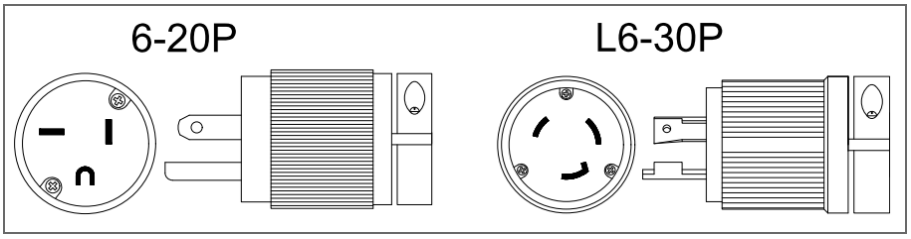
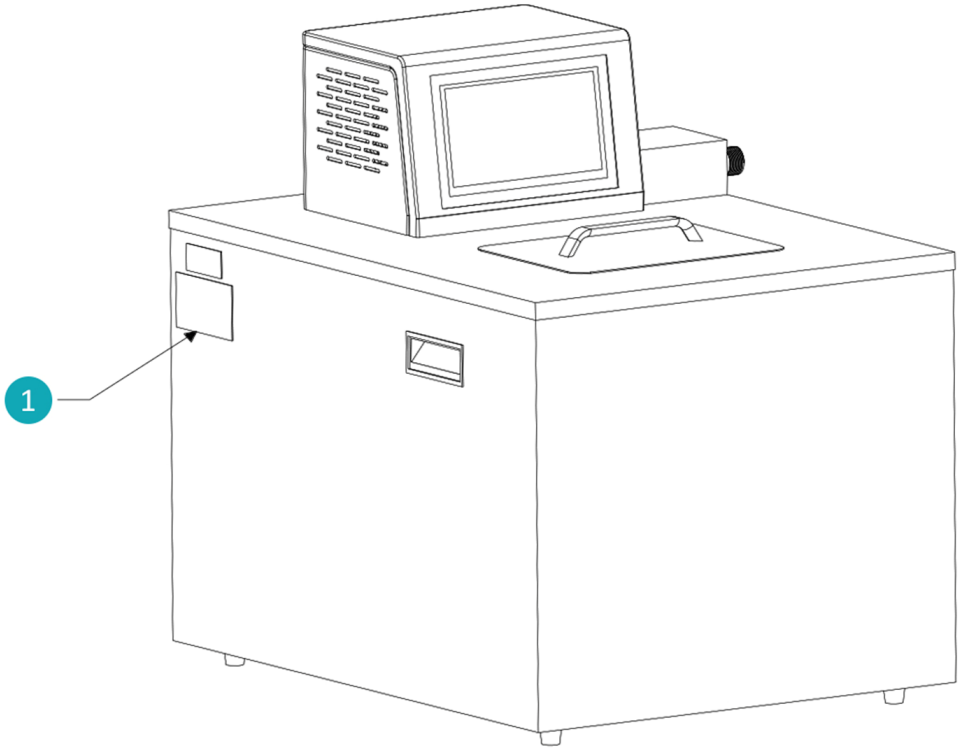


Figure 6 - Electrical connection

2.3 Heater identification

The heater identification label is located on the left side of the unit.



1	Identification label

Figure 7 - Heater nameplate location

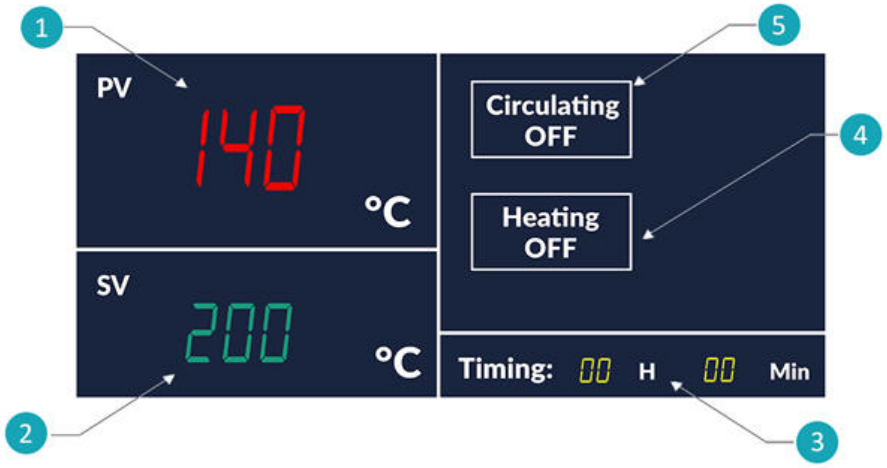
The heater identification label provides the following information:

- Unit name
- Unit model
- Voltage / Frequency (V/Hz)
- Current (A)
- Power (W)
- Temperature range
- Serial number
- Manufacturing date

The location of the identification label varies between the heater models.

2.4 Control panel - touchscreen display

The touchscreen control panel is located on the front of the unit and the pump speed control is located on the rear of the unit.



1	Current Temperature Display
2	Target Temperature Display
3	Timing Display
4	Heater Power Button
5	Pump / Circulator Power Button

Figure 8 - Control panel operation - touchscreen display

The controller sets higher than 200°C, do not use the heater above this temperature. It will break the thermocouple (probe).

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3 Installation and set up

Before you start using your heater, make sure all parts are in place and the system is ready.

- Please open all packages completely before attempting assembly.
- All parts must be clean and dry before assembly.

3.1 What's in the box

The following parts are included in the package:

Table 1 - Packaging list

Part	Quantity
USA Lab RH Series Unit	1 pcs
3/4" FNPT Insulated Bellow Hose - 6Ft. (only for 50L)	2 pcs
1/2" FNPT Insulated Bellow Hose - 6Ft. (only for 5L, 20L, 30L)	2 pcs
3/4" FNPT Brass Valve (only for 50L)	1 pcs
1/2" FNPT Brass Valve (only for 5L, 20L, 30L)	1 pcs
3/4" MNPT x 3/4" MNPT Hex Union (only for 50L)	1 pcs
1/2" MNPT x 1/2" MNPT Hex Union (only for 5L, 20L, 30L)	1 pcs
Roll of PTFE thread tape	1 pcs

3.2 Unpacking and assembly of the heater

3.2.1 Unpacking and positioning

- Unpack the heater unit and confirm you have all necessary items before setting up the unit.
- Position the heater within 6 feet of the system you intend to connect (reactor, vessel, etc.).
- Ensure adequate ventilation around the unit.
- Place the heater on a stable, level surface away from flammable materials or liquid spills.

Notice

If you believe any parts are missing, contact USA Lab. Keep the original packaging in case you need to return or send the unit back for repairs. USA Lab is not responsible for providing the return packaging material.

3.2.2 Hose connection and setup

Important Notice

- DO NOT use PTFE/NPT tape on hose fittings. The supplied gaskets create the seal.
- DO NOT overtighten hose connections, this can crush or damage the gasket and lead to leaks.
- Use an appropriate wrench to secure fittings snugly, with moderate force.

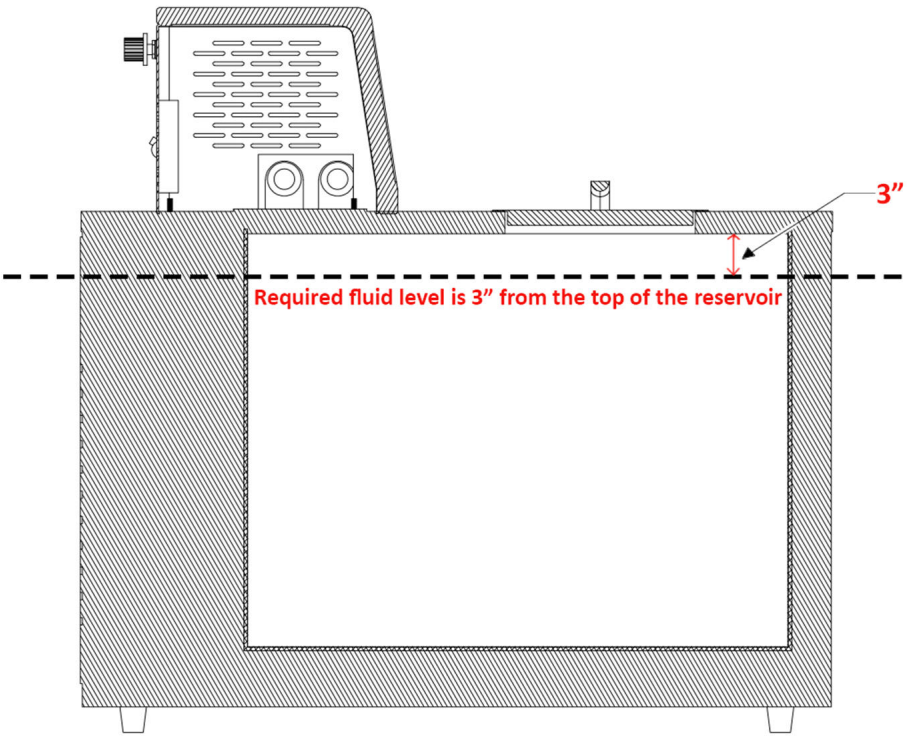
3.2.2.1 Connection steps

1. Ensure gaskets are seated properly inside both ends of the supplied hoses.
2. Attach hoses to the outlet (bottom) and inlet (top) ports of the jacketed system.
3. Use a wrench to secure both hose ends, stopping when firm resistance is met.
4. Confirm all connections are tight and correctly oriented - inlet to top port, outlet to bottom port.

3.2.3 Filling the jacket using the heater circulator

3.2.3.1 Filling the heater reservoir

When filling the reservoir, ensure the fluid level reaches **3 inch (3") below the top edge** of the tank, as shown in the diagram below. **Do not overfill**, this 3" gap allows for thermal expansion and helps prevent overflow during operation.



Important Notice

Overfilling can lead to spillage, equipment damage, or impaired performance.

WARNING

Operating the unit **below the recommended fluid level** can cause damage to the **internal pump and coil** due to insufficient fluid circulation. Always ensure the fluid level is properly maintained during use.

Use only the appropriate fluid recommended for your system, and fill slowly to avoid splashing or introducing air bubbles into the circulation lines.

3.2.3.2 Standard method (Recommended)

1. Ensure hoses are properly attached as described above.
2. Confirm that the outlet valve is CLOSED.
3. Fill the reservoir of the RH heater with compatible thermal fluid.
4. Open the outlet valve.
5. Turn on the circulator to begin pumping fluid into the jacket from bottom to top.
6. As fluid is drawn into the system, monitor the reservoir level.

7. When the reservoir drops halfway, shut off the circulator and close the outlet valve.

> **WARNING**
>
> DO NOT LET THE PUMP RUN DRY. THIS WILL RUIN THE PUMP.

8. Refill the reservoir with fluid.
9. Repeat steps 2–8 until:

- The fluid begins to return via the top hose back to the reservoir, indicating the jacket is full and circulation is complete.

10. Top off the reservoir one final time and check for leaks or air bubbles in the line.

3.2.3.3 Alternative filling method (if space allows)

This method can be used if filling the jacket manually is easier or necessary.

1. Do not attach the return line to the heater yet.
2. Close the outlet valve.
3. Hold the return hose above the jacket.
4. Using a funnel, pour fluid directly into the jacket through the return hose.
5. Fill until the jacket is mostly full, but do not overfill.
6. Attach the return line back to the RH heater.
7. Open the outlet valve.
8. Turn on the circulator.
9. Top off the reservoir as needed.

3.2.4 Final startup checklist

Before running your system:

- Heater is positioned within 6 ft of the target system.
- Gaskets are installed correctly; no Teflon tape used.
- Hoses are attached and tightened securely.
- Jacket is fully filled (fluid returning to reservoir observed).
- Reservoir is filled and capped.
- No leaks at hose connections.
- Outlet valve is open.

WARNING

If the circulator runs without fluid, this will ruin the pump.

If the heater is on without fluid, this will ruin the heating coils.

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4 Operations

This section describes common tasks required for the operation of the RH Series - ETL.

4.1 Operating method

- Only operate the unit in a climate-controlled facility. Operating temperature is 70°F or 20°C.
- Units returned that have signs of outside use will automatically be determined to be improperly used and cared for.
- When using the heater circulator with silicone oil. Raise the temperature slowly, in 10°C increments maximum.
- When not using the circulator, close the outlet valve.
- Do not use the heater without running the circulator.

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5 Service and maintenance

5.1 Periodic maintenance

WARNING

You must turn off the power switch AND disconnect the power cord before performing any maintenance.

- 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.

Fluid:

- If using Silicone Oil, degradation is not much of a concern. Keep an eye on the tank level.

Unit:

- Check the unit over monthly for leaks, broken parts, melting, burning, or any other damages.
- Please bring any concerns to USA Lab's attention immediately.

5.2 Long term storage

To store the heater for long term, ensure the following:

- Empty the reservoir.
- Clean the heater bath with 99.9% alcohol and dry the unit out completely.
- Cap the inlet and outlet.
- Clean the body of the unit.
- When storing the unit, cover it to protect it from dust/water damages.
- Store in a secure level location. Also make sure that it is in a temperature controlled environment with low humidity.

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6 Decommissioning, disassembly and disposal

After the service life of the equipment is reached, the equipment must be disposed of in an environmentally appropriate manner.

WARNING

Risk of serious injury or death!

All electronics and batteries, if fitted, must be recycled according to local regulations.

All metal components can be recycled according to local regulations.

All fluids must be fully drained and disposed of according to local regulations.

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7 Technical specifications

Technical specifications of each recirculating heater are mentioned below.

Table 2 - Technical specifications

RH Series Model	RH5L-ETL	RH20L-ETL	RH30L-ETL	RH50L-ETL
Operating Ambient Temperature	5~35°C / 41~95°F			
Inner Tank Material	304 Stainless Steel			
Controller	Touch Screen			
Oil Pump Power	DC Brushless	DC Brushless	DC Brushless	DC Brushless
	60W	100W	150W	180W
Power (V/Hz)	220V 60Hz Single Phase			
Current	220V / 10.0A	220V / 14.2A	220V / 23.9A	220V / 34.6A
Flow Setting	Knob setting			
Temp Range	RT-200°C			
Temp Precision	±1°C			
Temperature Control	PID Controller			
Heating Power	2KW	3KW	5KW	8KW
Flow	20L/min	30L/min	50L/min	68L/min
Lift	8-12M			
Inlet and Outlet	1/2 Inch NPT			3/4 Inch NPT
Tank Capacity	10L/2.64gallon	20L / 5.28 gallon	34L / 8.98 gallon	48L / 12.68 gallon
Tank Size	8.6" x 7.1" x 10.7"	11" x 10.7" x 10.7"	15" x 13" x 10.7"	17" x 13" x 13.5"
Exterior size	15.2" x 12.5" x 19.5"	17.5" x 15.8" x 20.7"	21.25" x 18" x 20.5"	23" x 19" x 23.5"
Weight	18kgs / 40lbs	25kgs / 55lbs	29kgs / 64lbs	36kgs / 80lbs

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8 Spare parts

For a list of spare or replacement parts, contact USA Lab for details.

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9 Warranty

USA Lab products are warranted to be free of workmanship, mechanical, and material defects for one to three years from the date of purchase depending on product. Within this warranty period, USA Lab will replace or repair components that fail due to manufacturer defect.

Within continental United States repairs or parts, shipping charges will be covered in full or in part by USA Lab.

For all other locations, 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, switches, and sensors.

The warranty does not cover wrongful input voltage. The customer needs to be responsible for 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.

9.1 Return policy

USA Lab offers a 30-day returns 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 returns policies:

- USA Lab does 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. USA Lab does not accept returns on any solvents or consumables.
- For pre-orders, there is a 10 % non-refundable fee associated with canceled pre-orders. This covers the banking fees and the hold fee.
- By default, a minimum of 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, without exceptions. You are responsible for the return shipment unless deemed defective by USA Lab. In that case, USA Lab will pay for return shipment and replacement shipment costs.

- 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, wear, or damage, 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.

- After 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 not be refunded.

- Contact support@usalab.com at USA Lab

  ► For more information, see *Contact information* on page 2.

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