# Single Jacket Reactor - JR Series (ETL)

## User Manual

Models: JR5-ETL, JR10-ETL, JR20-ETL, JR50-ETL, JR100-ETL, JR150-ETL

**Original instructions**

**Read this manual before using the equipment**

**Retain this manual for future use**

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## Purpose of manual

This manual enables safe and efficient use of the Single Jacket Reactor - JR Series (ETL). This manual is part of the equipment and must be stored where it is accessible to operating personnel at all times.

The operating personnel must carefully read and understand this manual prior to beginning any work. The basic prerequisite for safe work is compliance with all safety instructions and operating instructions in this manual.

The local occupational safety regulations and general safety regulations for the operation of the equipment also apply.

## Copyright



## Contact information

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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 JR reactor is intended to be used with a heater chiller for the fluid jacket and chiller for the condenser.

**WARNING**

**Danger due to misuse!**

Misuse of the device can result in hazardous situations.

- Only operate the device if it is in an undamaged and working condition.
- Never deviate from the prescribed maintenance intervals.
- Only use parts that are specified in the technical data and approved for this device.
- Never modify the device without consulting the manufacturer.
- Never allow untrained personnel to operate the device.
- Never operate the device in potentially explosive atmospheres.

## 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 36 inches around the unit.

**Caution**

**Risk of damage to the equipment!**

Do not obstruct 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.

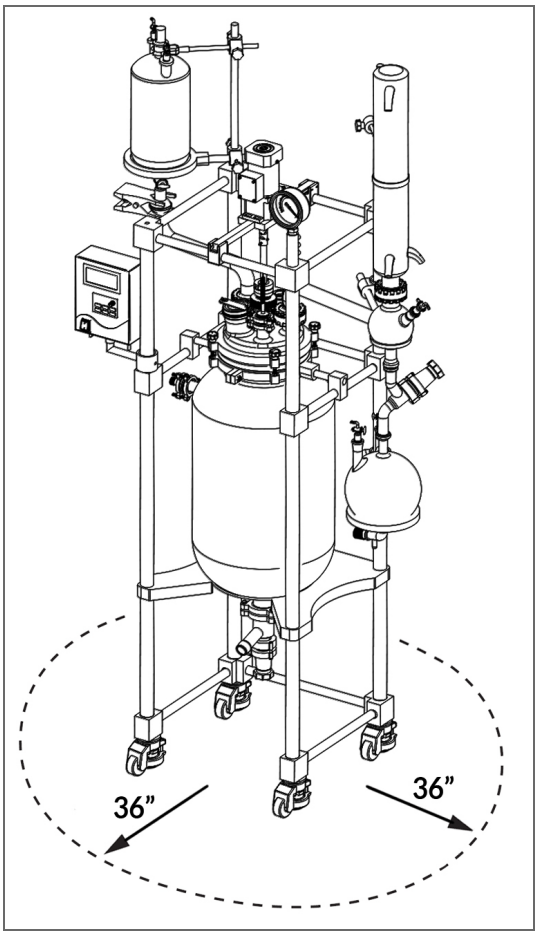



Figure 1 - Safe operating area around the reactor unit

## 1.6 Safety warnings

The following warnings and notices are safety information specific to the Single Jacket Reactor - JR Series (ETL).

**WARNING**

**Risk of serious injury or damage!**

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

**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 reactor while it is in operation.

Do not use a generator to power the reactor.

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

**WARNING**

**Risk of serious injury or damage!**

This warning is pertaining to the chiller in the system.

- Do not operate the fluid pump with your 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.
- Do not allow the compressor to cycle more than 5 times per day.
- The compressor has a 10 minute cool-down period before it can be run again.
- 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 reactor 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.

# 2 Hardware description

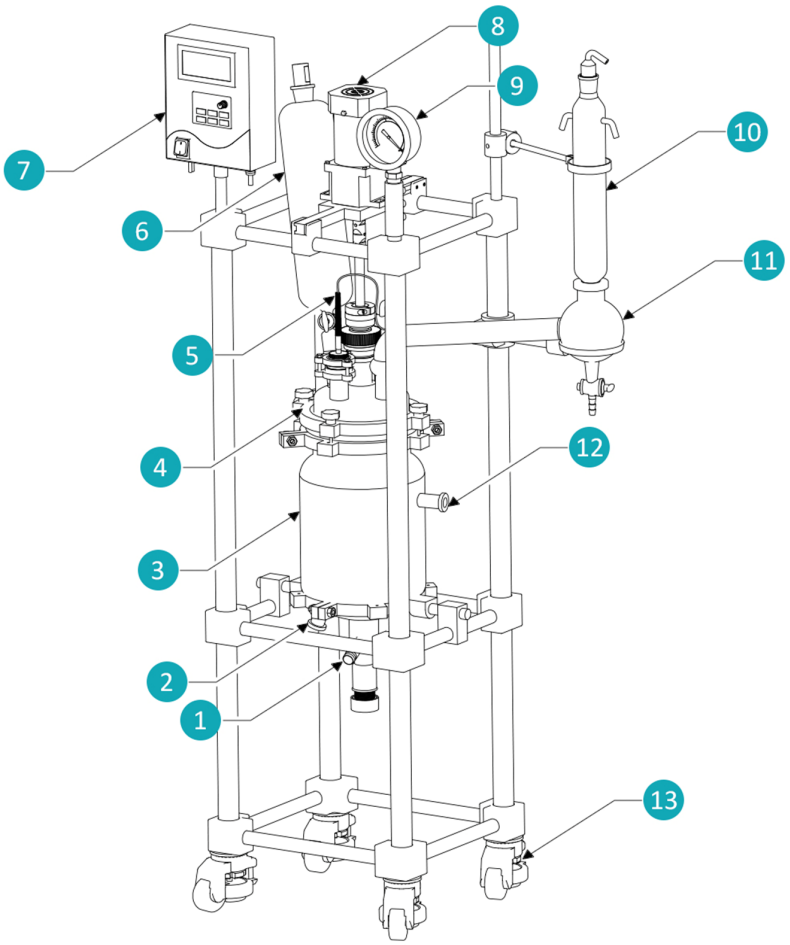
Before operating the equipment, you should be familiar with the location and names of all parts of the equipment. This will help you understand the operating procedures and assist with troubleshooting, if required.

## 2.1 Overview

The JR Series Jacketed Reactor is an advanced jacketed reaction vessel. Each reactor has a jacket allowing circulation of liquid. This creates higher chilling or heating efficiency as well as less temperature loss. The jacket can be drained and released of pressure with ease, due to the convenient drain ports near the bottom portion of the reactor. The stirring paddles are made of PTFE, mounted to a PTFE coated stainless steel rod. Allowing for better chemical compatibility and cleaning.

## 2.2 Reactor parts

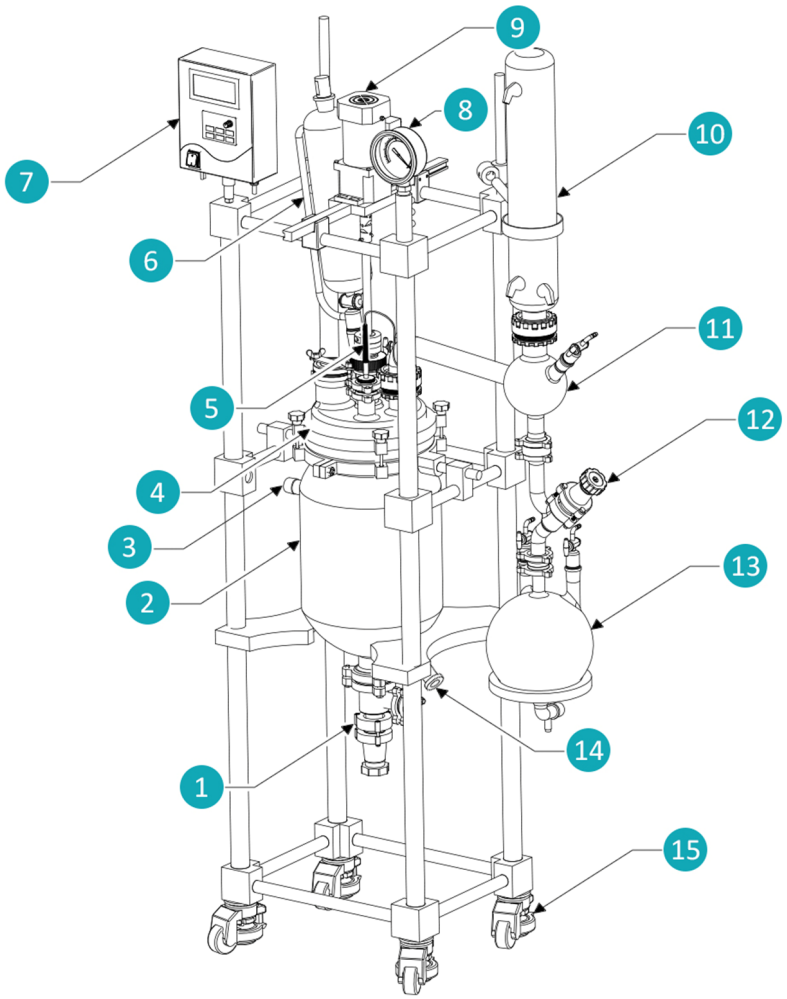
### 2.2.1 JR5-ETL: Parts diagram




| | | | |
|---|---|---|---|
| 1 | Drain Port | 8 | Motor with Stirring Shaft and Paddle |
| 2 | Jacket Fluid Inlet Port | 9 | Vacuum Gauge |
| 3 | Reactor Vessel Main Body | 10 | Condenser |
| 4 | Reactor Lid | 11 | Reflux Flask |
| 5 | Thermocouple | 12 | Jacket Fluid Outlet Port |
| 6 | Material Flask | 13 | Locking Casters |
| 7 | Controller | | |

Figure 2 - JR5-ETL reactor parts

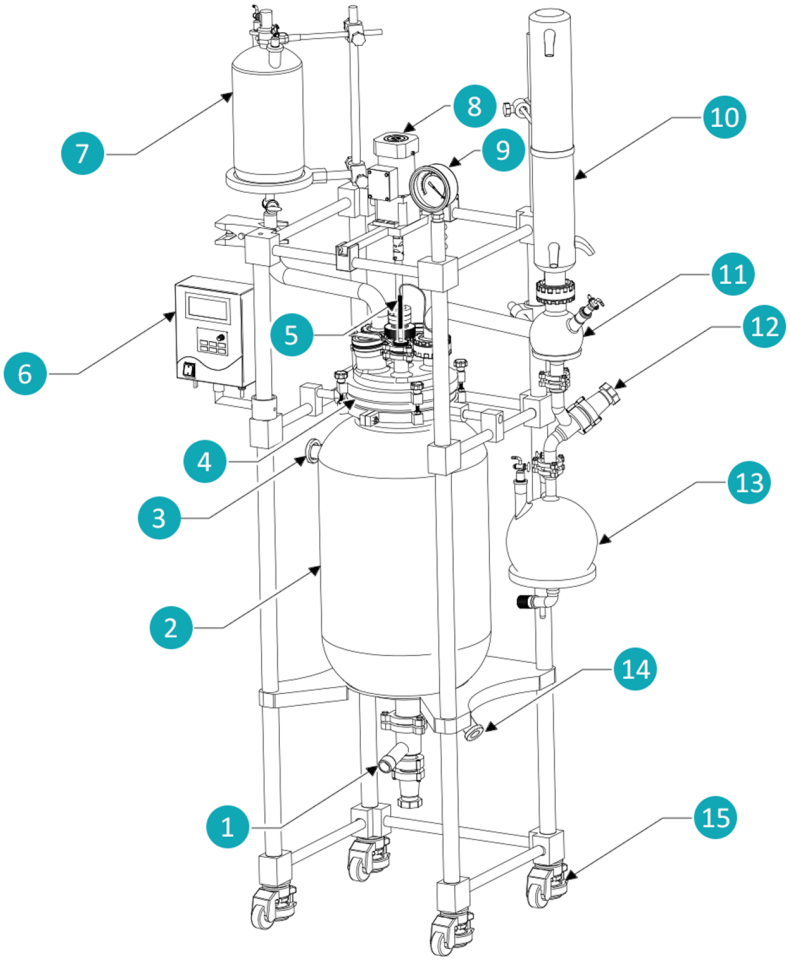
### 2.2.2 JR10-ETL: Parts diagram




| | | | |
|---|---|---|---|
| 1 | Drain Port | 9 | Motor with Stirring Shaft and Paddle |
| 2 | Reactor Vessel Main Body | 10 | Condenser |
| 3 | Jacket Fluid Outlet Port | 11 | Reflux Flask |
| 4 | Reactor Lid | 12 | Collection Valve |
| 5 | Thermocouple | 13 | Collection Flask |
| 6 | Material Flask | 14 | Jacket Fluid Inlet Port |
| 7 | Controller | 15 | Locking Casters |
| 8 | Vacuum Gauge | | |

Figure 3 - JR10-ETL reactor parts

### 2.2.3 JR20-ETL, JR50-ETL, JR100-ETL, JR150-ETL: Parts diagram



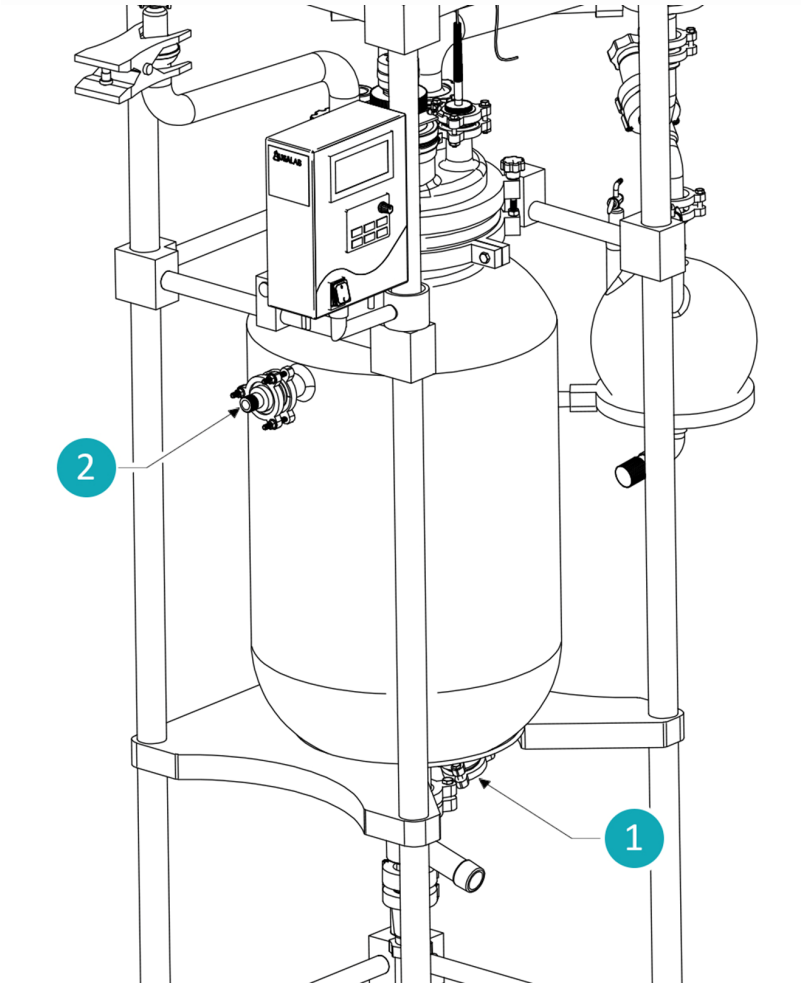

| | | | |
|---|---|---|---|
| 1 | Drain Port | 9 | Vacuum Gauge |
| 2 | Reactor Vessel Main Body | 10 | Condenser |
| 3 | Jacket Fluid Outlet Port | 11 | Reflux Flask |
| 4 | Reactor Lid | 12 | Collection Valve |
| 5 | Thermocouple | 13 | Collection Flask |
| 6 | Controller | 14 | Jacket Fluid Inlet Port |
| 7 | Material Flask | 15 | Locking Casters |
| 8 | Motor with Stirring Shaft and Paddle | | |

Figure 4 - JR20,50,100,150-ETL reactor parts

## 2.3 Tubing and vacuum connections

### 2.3.1 Vessel tubing connections

The reactor vessel jacket **must** be filled through the bottom jacket fluid inlet (1), which should be connected to the outlet of the heater/chiller. The top jacket fluid outlet (2) should be connected to the heater/chiller inlet to ensure proper flow and optimal performance.

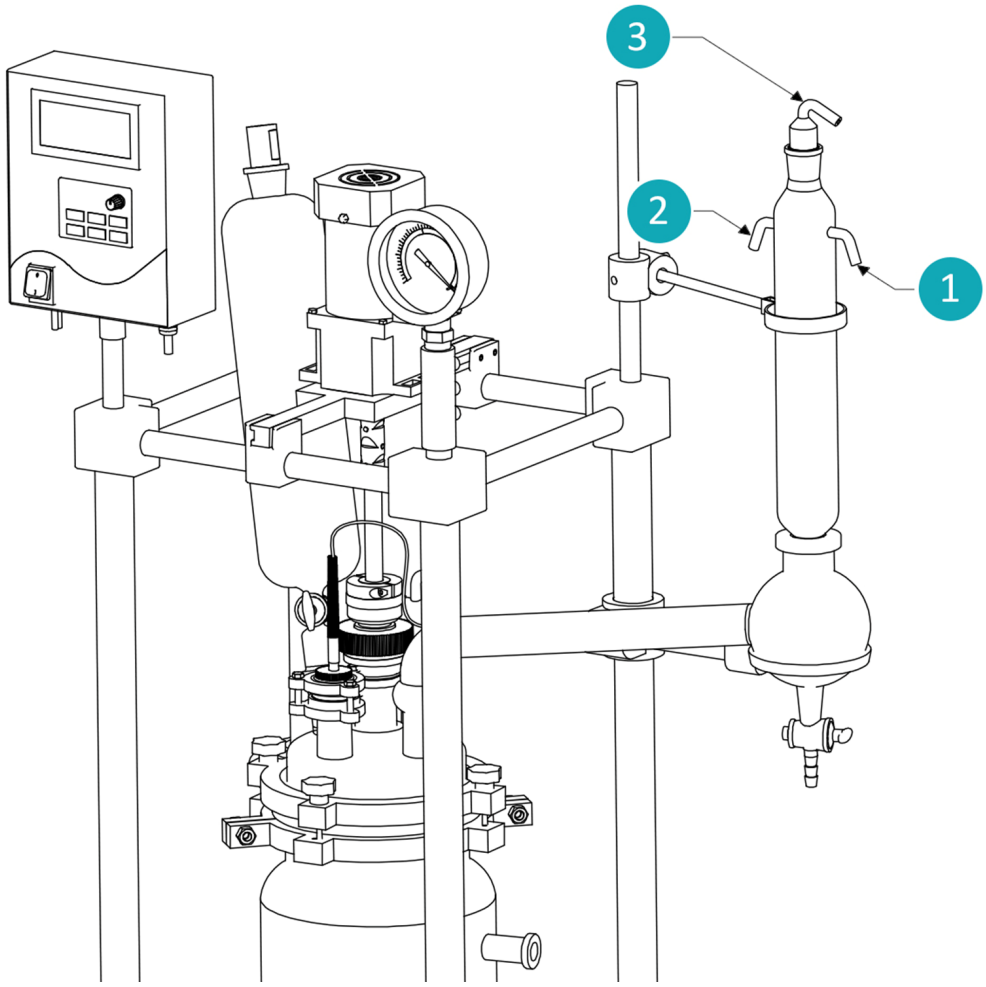



| | |
|---|---|
| 1 | Jacket Fluid Inlet |
| 2 | Jacket Fluid Outlet |

Figure 5 - Vessel tubing connection

### 2.3.2 JR5 Condenser tubing and vacuum connections

The condenser **must** be filled through the fluid inlet (1), which should be connected to the outlet of the chiller. The fluid outlet (2) should be connected to the heater/chiller inlet to ensure proper flow and optimal performance. The vacuum pump should be connected to the vacuum port (3) to pull vapors into the condenser.

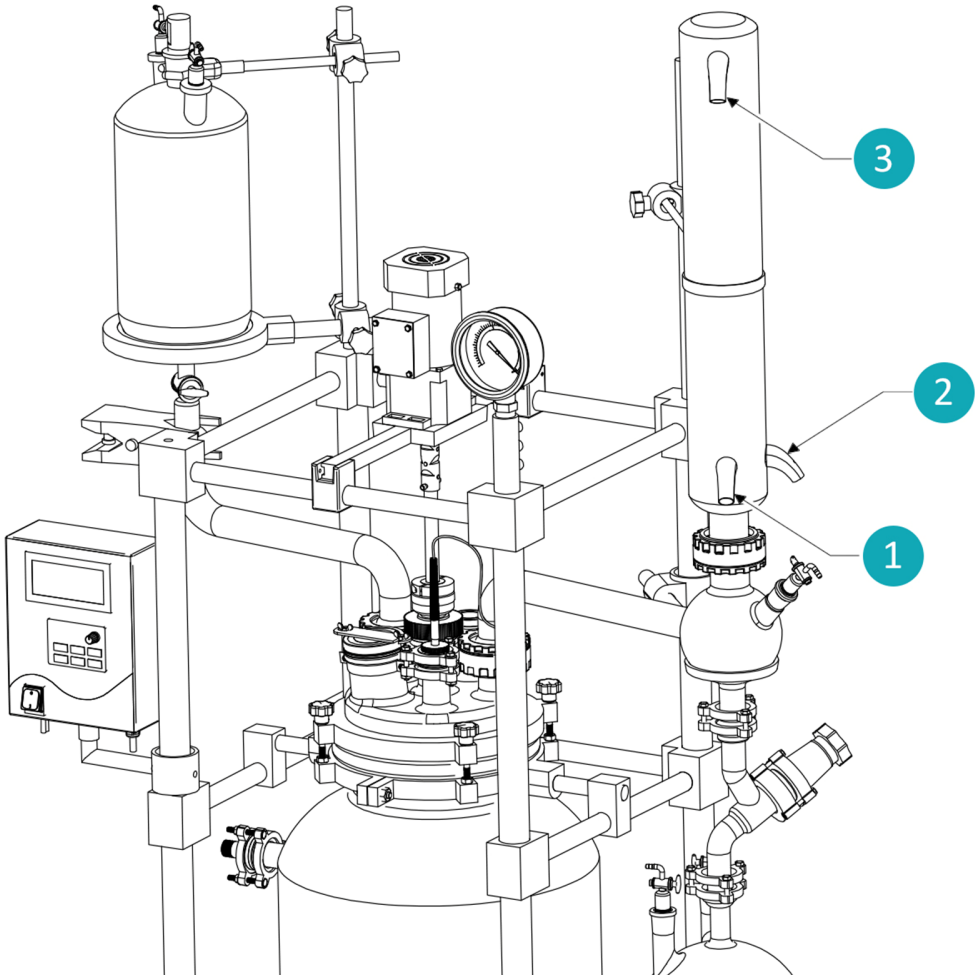



| | |
|---|---|
| 1 | Condenser Fluid Inlet |
| 2 | Condenser Fluid Outlet |
| 3 | Vacuum Port |

Figure 6 - JR5- Condenser tubing and vacuum connections

### 2.3.3 JR10, JR20, JR50, JR100, JR150 Condenser tubing and vacuum connections

The condenser **must** be filled through the bottom fluid inlet (1), which should be connected to the outlet of the chiller. The top fluid outlet (3) should be connected to the heater/chiller inlet to ensure proper flow and optimal performance. The vacuum pump should be connected to the vacuum port (2) to pull vapors into the condenser.




| | |
|---|---|
| 1 | Condenser Fluid Inlet |
| 2 | Vacuum Port |
| 3 | Condenser Fluid Outlet |

Figure 7 - JR10, JR20, JR50, JR100, JR150 Condenser tubing and vacuum connections

## 2.4 Electrical connections

All reactor models use a NEMA 6-15P plug. The reactor must operate on its own circuit Installed by a qualified electrician. DO NOT USE ON 208V. 230V+ required.

**WARNING**

Failure to use the proper plug or power will result in failure of the equipment and void warranty.

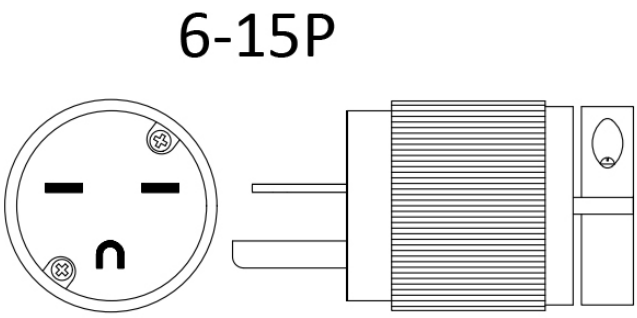
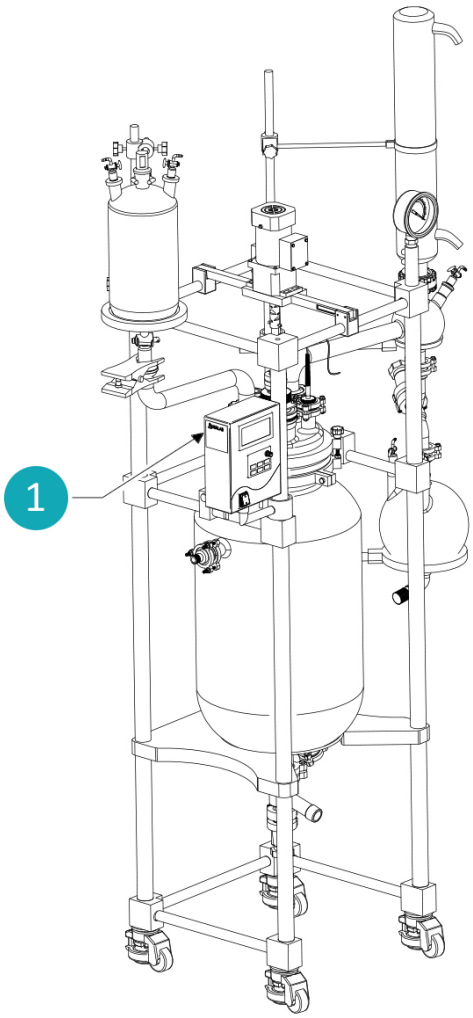



Figure 8 - Electrical connection

## 2.5 Reactor identification

The reactor data plate is located on the side of the controller box.



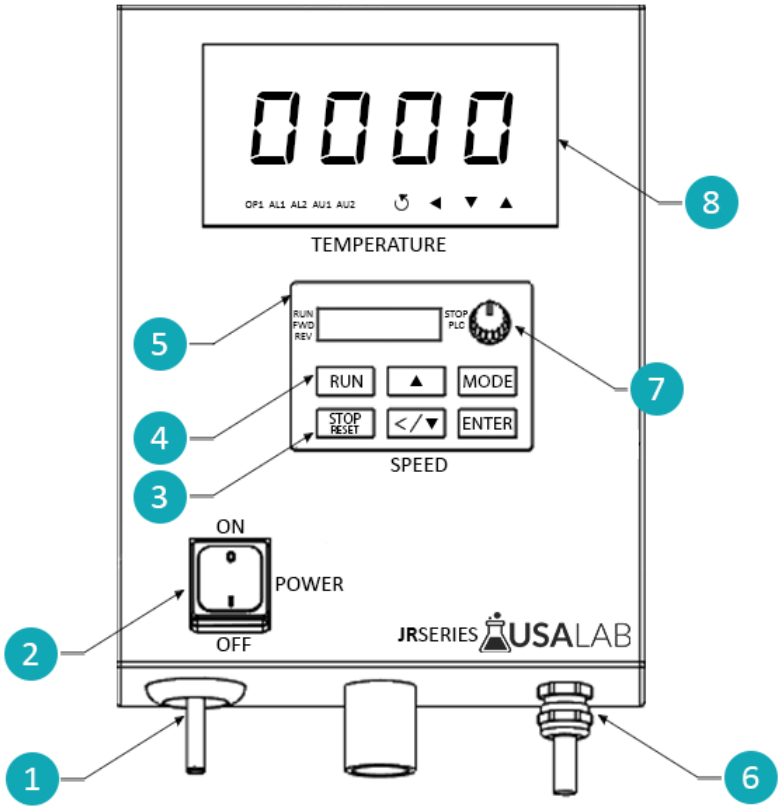

1 reactor identification label

The reactor identification label provides the following information:

- Unit name / Unit Model
- Speed Range ((rpm)
- Voltage / Frequency (V/Hz)
- Power (W)
- Batch Number
- Manufacturing Date
- Certification Standards

## 2.6 Control panel - LCD display

The LCD control panel is located on the front of the reactor.




| | |
|---|---|
| 1 | Power cord |
| 2 | Power switch |
| 3 | Stop rotation |
| 4 | Start rotation |
| 5 | Motor controller |
| 6 | Motor and probe connectors |
| 7 | Speed adjustment |
| 8 | Temperature display |

Figure 9 - Control panel operation - LCD display

# 3 Installation and set up

Before you start using your reactor, 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 Purpose

The JR reactor is intended to be used with a heater/chiller for the fluid jacket and a chiller for the condenser.

## 3.2 What's in the box

The following parts are included in the package:

**Table 1 - JR5: Packaging list**

| Part | Quantity |
|---|---|
| USA Lab 5L Jacketed Reactor JR5 | 1 set |
| Main Condenser | 1 pc |
| 1L Material Flask | 1 pc |
| Reflux Flask with Valve | 1 pc |
| Feed Ports | 1 set |
| Lid Glass PTFE Stopper w/ Barb | 1 pc |
| Strap for Condenser | 1 set |
| Control Box | 1 pc |
| Vacuum Gauge | 1 pc |
| Support Rings | 1 pc |
| Stirring Motor w/ Paddle | 1 pc |
| Temperature Probe | 1 pc |
| S35 Metal Clamp | 1 pc |
| 3oz. Vacuum Grease | 1 pc |
| Vacuum Hose | 10 ft |

**Table 2 - JR10: Packaging list**

| Part | Quantity |
|---|---|
| USA Lab 10L Jacketed Reactor JR10 | 1 set |
| Main Condenser | 1 pc |
| 2L Material Flask | 1 pc |
| 5L Receiving Flask | 1 pc |
| Reflux Flask with Valve | 1 pc |
| Feed Ports | 3 sets |
| Lid Glass PTFE Stopper w/ Barb | 1 pc |
| Strap for Condenser and Material Flask | 2 sets |
| Sealing Screw / Flange | 2 sets |
| Fluid Line Sealing Clamp / Flange | 2 sets |
| Control Box | 1 pc |
| Vacuum Gauge | 1 pc |
| Support Rings | 2 pcs |
| Stirring Motor w/ Paddle | 1 pc |
| Temperature Probe | 1 pc |
| Liquid 5/8" Connections | 2 pcs |
| S35 Metal Clamp | 1 pc |
| 3oz. Vacuum Grease | 1 pc |
| Vacuum Hose | 10 ft |

**Table 3 - JR20: Packaging list**

| Part | Quantity |
|---|---|
| USA Lab 20L Jacketed Reactor JR20 | 1 set |
| Main Condenser | 1 pc |
| 2L Material Flask | 1 pc |
| Reflux Flask with Valve | 1 pc |
| Glass - Material Flask to Lid | 1 pc |

| Part | Quantity |
|---|---|
| 29/32 Stopper | 1 pc |
| Lid Glass PTFE Stopper w/ Barb | 1 pc |
| Strap for Condenser and Material Flask | 2 sets |
| Condenser Sealing Flange | 1 set |
| Lid Sealing Flange (Pre-Installed) | 1 set |
| Fluid Line Sealing Flange (Pre-Installed) | 2 sets |
| Control Box (Pre-Installed) | 1 pc |
| Vacuum Gauge | 1 pc |
| Support Rings (Pre-Installed) | 1 pc |
| Stirring Motor w/ Paddle (Pre-Installed) | 1 pc |
| Temperature Probe (Pre-Installed) | 1 pc |
| Liquid 1/2" Connections (Pre-Installed) | 2 pcs |
| 3/8" Drain Valve (Pre-Installed) | 1 pc |
| Lift Remote Control | 1 pc |
| PTFE Sealing Tape | 1 pc |
| Allen Keys and hex Screws | 1 set |
| 3oz. Vacuum Grease | 1 pc |
| Vacuum Hose | 10 ft |

**Table 4 - JR50: Packaging list**

| Part | Quantity |
|---|---|
| USA Lab 50L Jacketed Reactor JR50 | 1 set |
| Main Condenser | 1 pc |
| 5L Material Flask | 1 pc |
| 10L Receiving Flask | 1 pc |
| Reflux Flask with Valve | 1 pc |
| Feed Ports | 6 sets |
| Stopper | 1 pc |

| Part | Quantity |
|---|---|
| Clamp for Material Flask | 1 pc |
| Strap for Condenser | 1 set |
| Sealing Screw / Flange | 3 sets |
| Fluid Line Sealing Clamp / Flange | 2 sets |
| Control Box | 1 pc |
| Vacuum Gauge | 1 pc |
| Support Rings | 2 pcs |
| Stirring Motor w/ Paddle | 1 pc |
| Temperature Probe | 1 pc |
| Liquid 5/8" Connections | 2 pcs |
| Metal Clamp | 2 pcs |
| 3oz. Vacuum Grease | 1 pc |
| Vacuum Hose | 10 ft |

**Table 5 - JR100: Packaging list**

| Part | Quantity |
|---|---|
| USA Lab 100L Jacketed Reactor JR100 | 1 set |
| Main Condenser | 1 pc |
| 5L Material Flask | 1 pc |
| 10L Receiving Flask | 1 pc |
| Reflux Flask with Valve | 1 pc |
| Feed Ports | 6 sets |
| Stopper | 1 pc |
| Clamp for Material Flask | 1 pc |
| Strap for Condenser | 1 set |
| Sealing Screw / Flange | 3 sets |
| Fluid Line Sealing Clamp / Flange | 2 sets |
| Control Box | 1 pc |

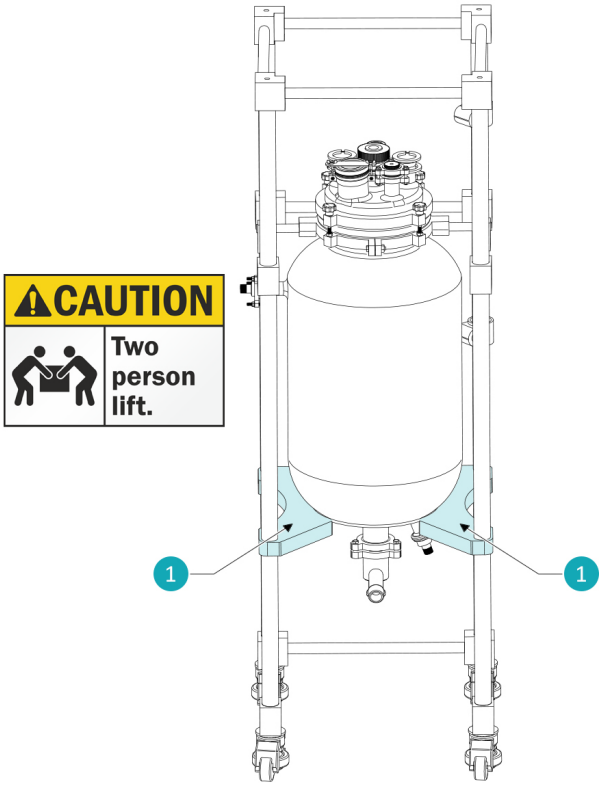
| Part | Quantity |
|---|---|
| Vacuum Gauge | 1 pc |
| Support Rings | 2 pcs |
| Stirring Motor w/ Paddle | 1 pc |
| Temperature Probe | 1 pc |
| Liquid 5/8" Connections | 2 pcs |
| Metal Clamp | 2 pcs |
| 3oz. Vacuum Grease | 1 pc |
| Vacuum Hose | 10 ft |

## 3.3 Unpacking and assembly of the reactor

- You will need to place the crate in an area with enough space to remove all the components.
- The edges and tabs of the crate are very sharp, use the proper PPE to prevent injury.
- Remove all boxes and foam from the crate before lifting the frame out.
- The frame, vessel, and the preassembled components are heavy.
- Please have a few personnel on hand to help you lift the frame out of the crate.
- Remove all protective foam and wrap from the frame after placing it on the ground upright.
- Open all included boxes and verify that you are not missing any components.
- Apply a light amount of vacuum grease on all ground glass joints before installation.
- Preinstall clamps to make assembly easier. (if not already installed)

**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.




1 Lift Point

**Caution**

Before you start assembling your reactor, make sure of the following:

- When removing the reactor from your crate, please be careful and use two people. You can lift from any point on the frame to remove the reactor from the crate. Be mindful of lopsided weight. If necessary, use a third person to stabilize the unit as it is lifted and lowered.
- The unit must be installed at least 3 feet away from any walls or items for easy access to the main controller.
- Please use the reactor in a well-ventilated area.
- Remove any residue on the glass parts before assembly and keep the glass flange surfaces clean; apply vacuum grease to both sides of the gaskets, and ground glass joints before the installation.
- To clean the condensers, you must empty the packaging material out and then use compressed air as well as water to fully clean them.

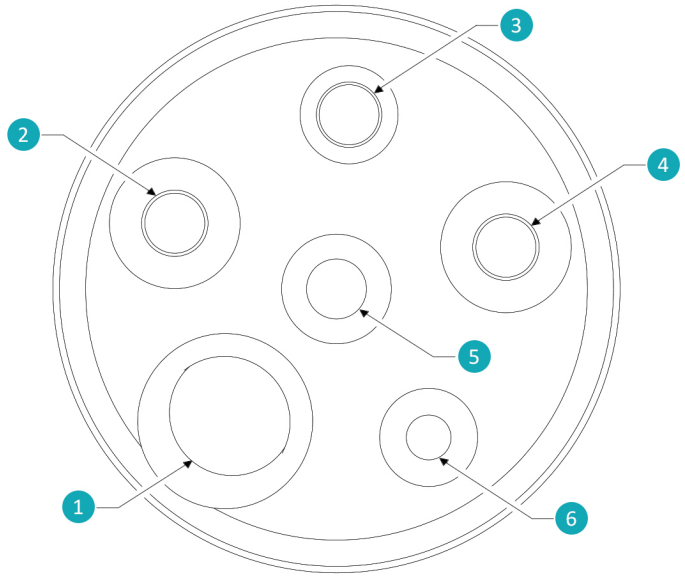
Please refer to the packing list to verify receipt of all components and parts. If there are any missing parts, please contact us as soon as possible.

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

A professionally installed 220V 15A (NEMA 6-15) receptacle or an AC disconnect panel.

**Table 6 - JR Reactor lid specifications**

| Model | JR-5L | JR-10L | JR-20L | JR-50L | JR-100L | JR-150L |
|---|---|---|---|---|---|---|
| Front Port 1 (1) | N/A | 80mm with PTFE Lid | 80mm with PTFE Lid | 80mm with PTFE Lid | 80mm with PTFE Lid | 80mm with PTFE Lid |
| Left Port (2) | 29mm Joint | 40mm Joint | 50mm Ball Joint | 50mm Ball Joint | 50mm Ball Joint | 50mm Ball Joint |
| Rear Port (3) | 24mm Joint | 34mm Joint | 34mm Joint | 34mm Joint | 34mm Joint | 34mm Joint |
| Right Port (4) | 35mm Ball Joint | 50mm Ball Joint | 50mm Ball Joint | 50mm Ball Joint | 50mm Ball Joint | 50mm Ball Joint |
| Stirring Port (5) | 50mm Flange Port | 50mm Flange Port | 50mm Flange Port | 50mm Flange Port | 50mm Flange Port | 60mm Flange Port |
| Front Port 2 (6) | 24mm Joint | 50mm Flange Port | 50mm Flange Port | 50mm Flange Port | 50mm Flange Port | 50mm Flange Port |

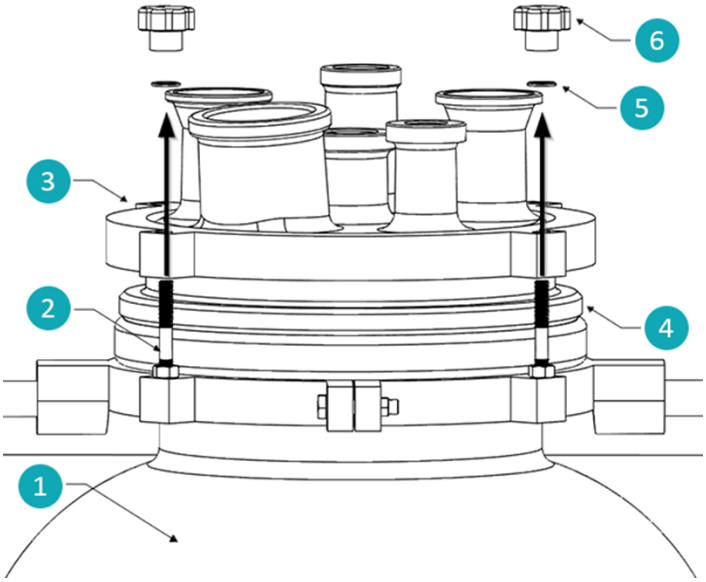



| | | | |
|---|---|---|---|
| 1 | Front Port 1 | 4 | Right Port |
| 2 | Left Port | 5 | Stirring Port |
| 3 | Rear Port | 6 | Front Port 2 |

Figure 10 - JR Reactor lid diagram

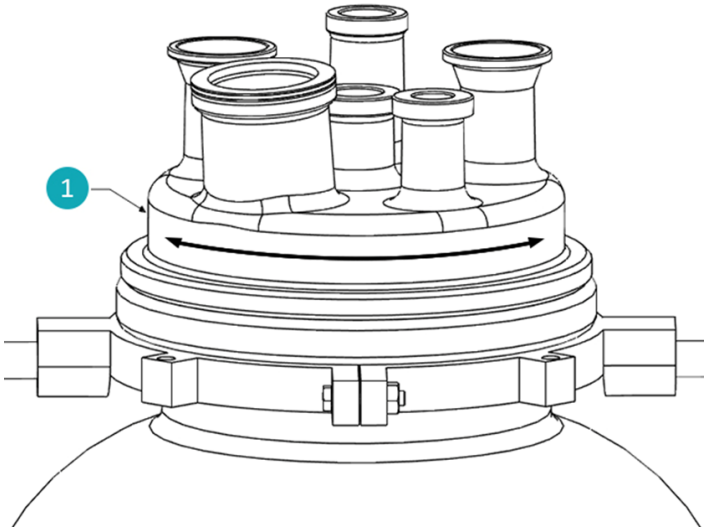
## 3.4 Stirrer assembly

1. Remove the clamp (3) securing the lid (4) to the vessel (1) by unscrewing the knobs (6) and removing the washers (5) from the bolts (2).



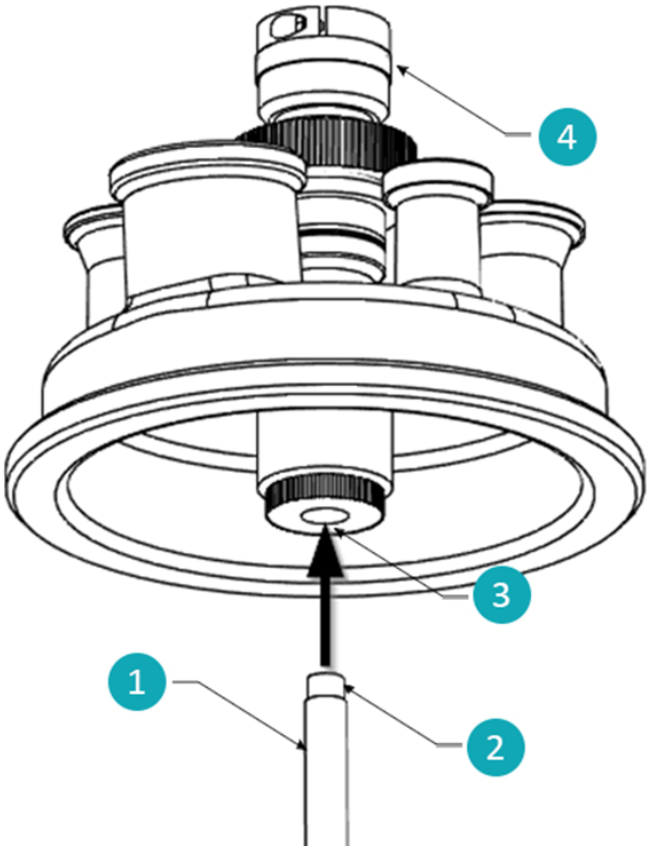

| | |
|---|---|
| 1 | Reactor Vessel |
| 2 | Clamp Bolt |
| 3 | Lid Clamp |
| 4 | Reactor Lid |
| 5 | Clamp Washer |
| 6 | Clamp Knob |

2. Remove the lid (1). (Heating and twisting will aid in the removal, do not try to lift the lid off vertically.)



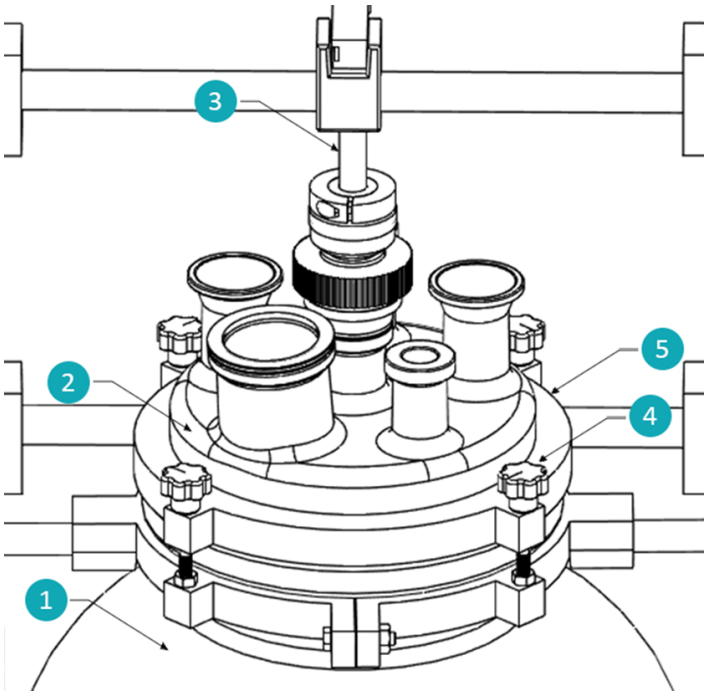

| | |
|---|---|
| 1 | Reactor Lid |

3. Unwrap the stirrer shaft (1) and slide the bare metal end (2) up through the bottom of the center port (3) . Be very careful not to push too hard as damage to the ceramic bearings may occur. Push the stirrer shaft (1) fully through the coupler (4) until the stirrer shaft (1) is 5-6” extruding from the coupler (4).
(On 150L reactor model, install the drain valve first. For more information, see *Drain valve assembly (does not apply to JR-5)* on page 53.)




| | |
|---|---|
| 1 | Stirrer Shaft |
| 2 | Stirrer Shaft End |
| 3 | Bottom of Shaft Coupler |
| 4 | Shaft Coupler |

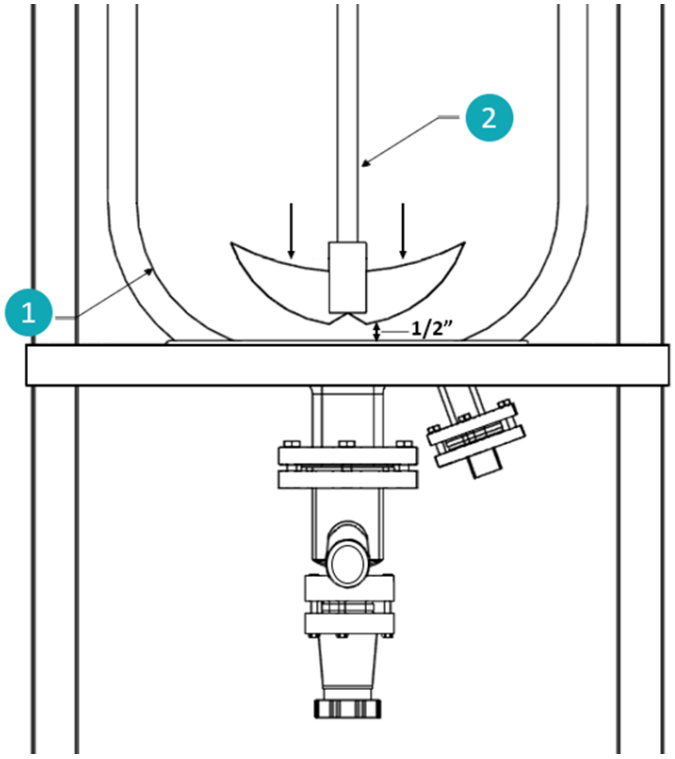
4. Place the lid (2) and stirrer (3) back into the vessel (1). Align the lid (2) as shown below. Re-secure the lid clamp (5) with the lid knobs and washers (4).




| | |
|---|---|
| 1 | Reactor Vessel |
| 2 | Reactor Lid |
| 3 | Stirrer Shaft |
| 4 | Clamp Washer and Knob |
| 5 | Lid Clamp |

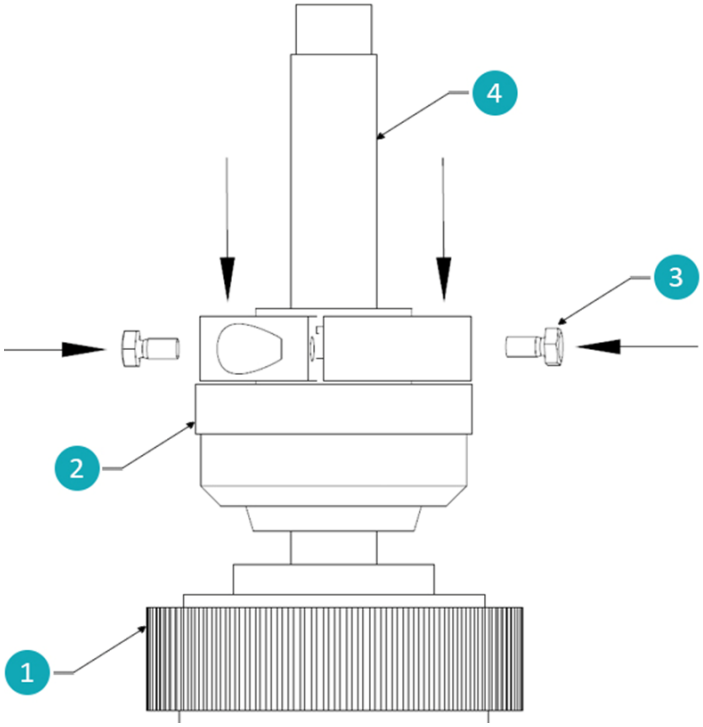
5. Push the stirrer (2) down until it touches the bottom of the vessel (1) and then pull it back up by a ½ inch.

> **Notice**
>
> JR-150L model drain valve features a retainer for the bottom of the stirrer shaft.




| | |
|---|---|
| 1 | Reactor Vessel |
| 2 | Stirrer Shaft |

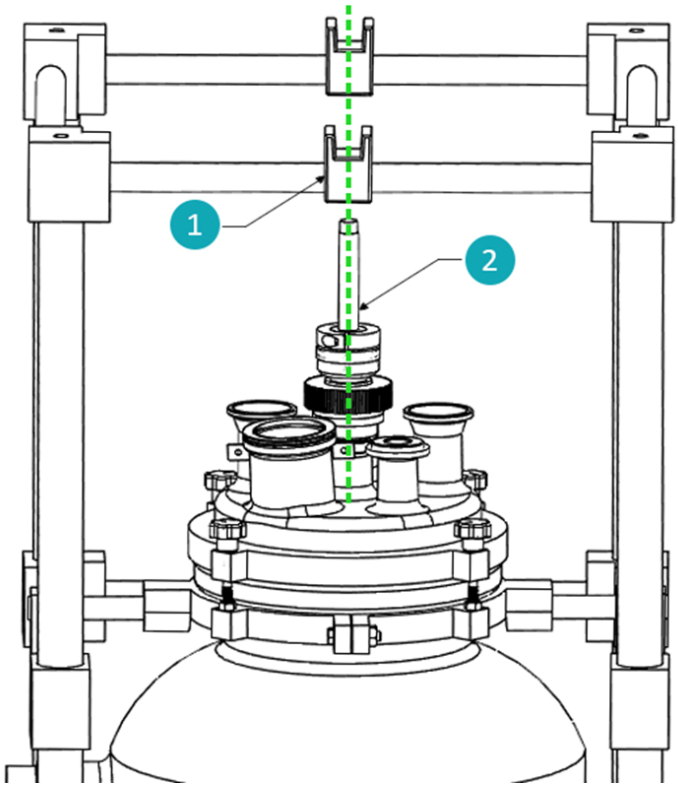
6. Place the mechanical seal (2) onto the stirrer shaft (4). Slide it down to the coupler (1). While compressing the seal (2), tighten the screws (3) that secure the seal (2) to the shaft (4).




| | |
|---|---|
| 1 | Stirring Shaft Coupler |
| 2 | Mechanical Seal |
| 3 | Mechanical Seal Screws |
| 4 | Stirrer Shaft |

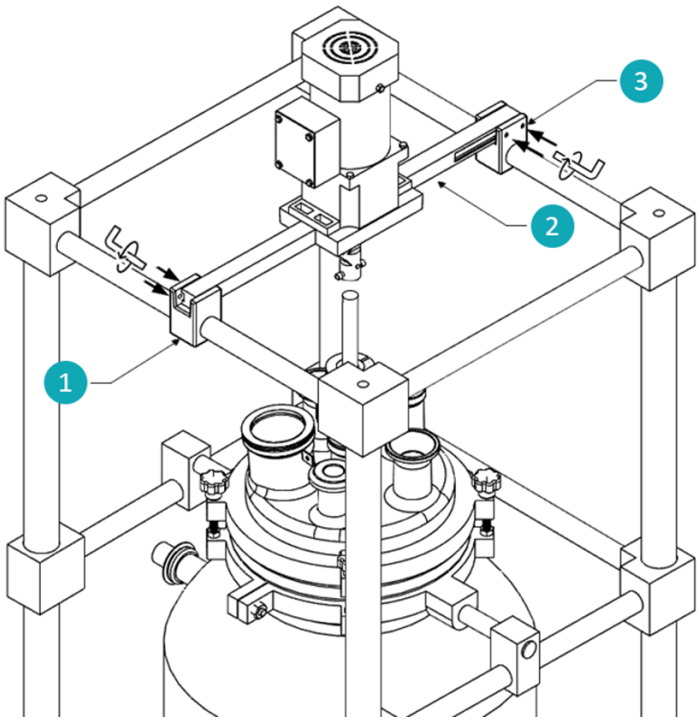
## 3.5 Motor assembly

1. Align the motor mounts with the stirrer shaft (located on the front and rear top horizontal bars).



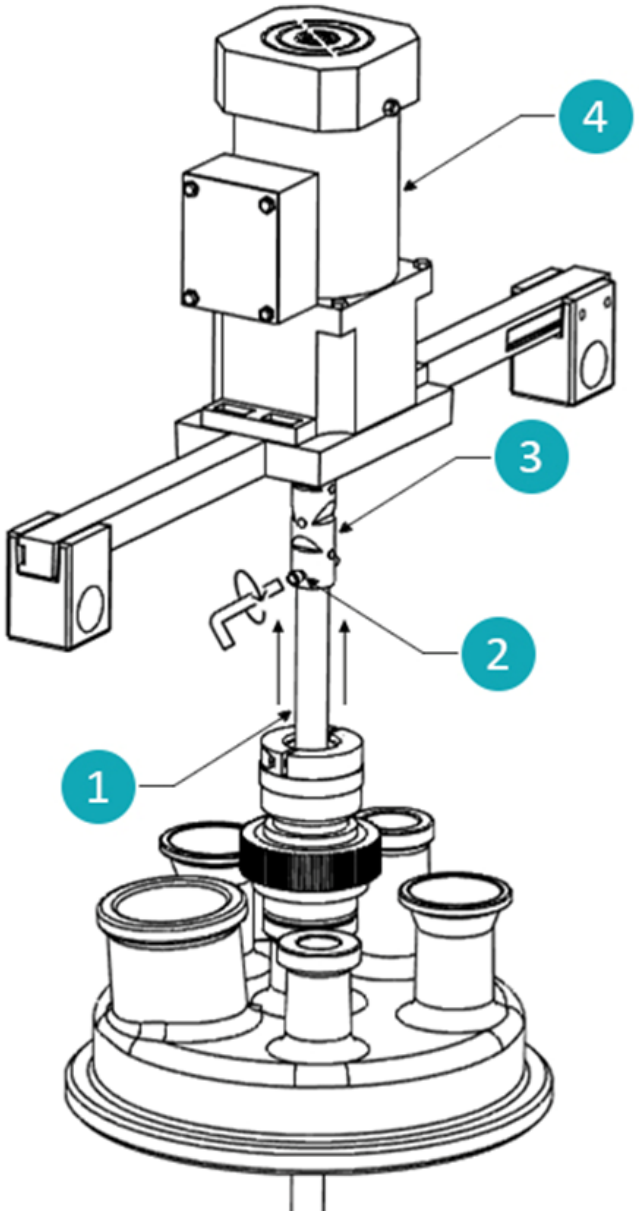

| | |
|---|---|
| 1 | Motor Mounts |
| 2 | Stirrer Shaft |

2. Place the motor assembly (2) on top of the motor mounts (1) and secure the motor mounts (1) to the motor brace assembly (2) with set screws (3). (Do not secure the mounts to the frame at this time).



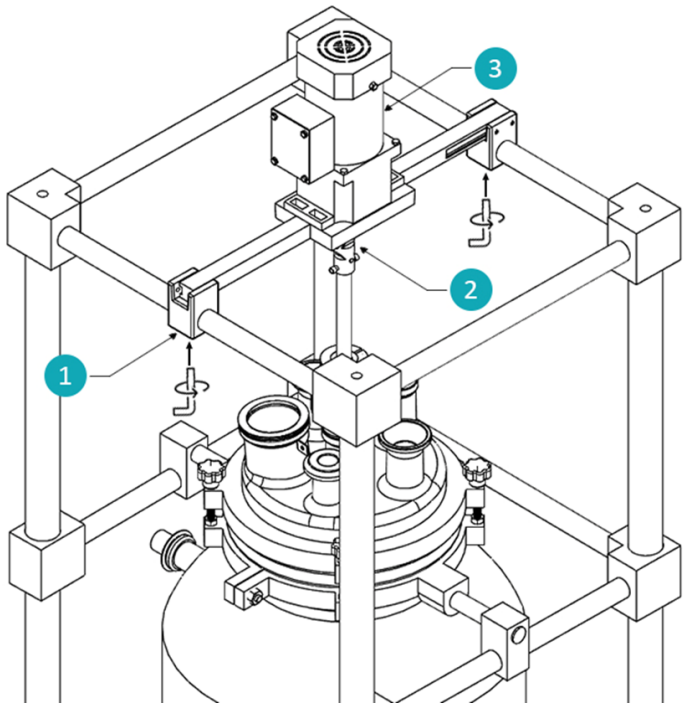

| | |
|---|---|
| 1 | Motor Mounts |
| 2 | Motor Brace Assembly |
| 3 | Motor Mount Set Screw |

3. Place the open end of the motor coupler (3) onto the top of the shaft (1) and tighten the screws (2).




| | |
|---|---|
| 1 | Stirrer Shaft |
| 2 | Motor Coupler Set Screw |
| 3 | Motor Coupler |
| 4 | Motor Assembly |

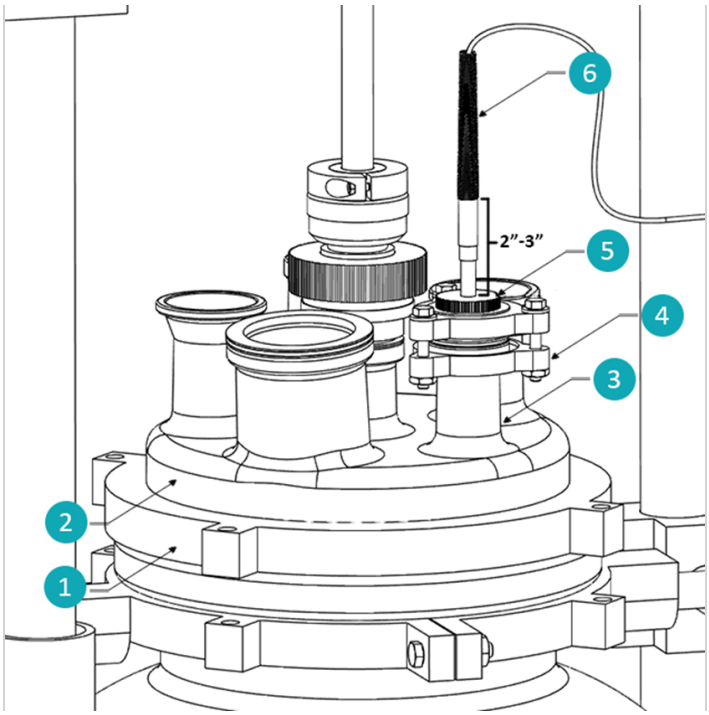
4. Align the motor (3) directly above the coupler (2) and then secure the mounts (1) into position with the set screws from underneath.




| | |
|---|---|
| 1 | Motor Mounts |
| 2 | Motor Coupler |
| 3 | Motor |

## 3.6 Temperature probe assembly

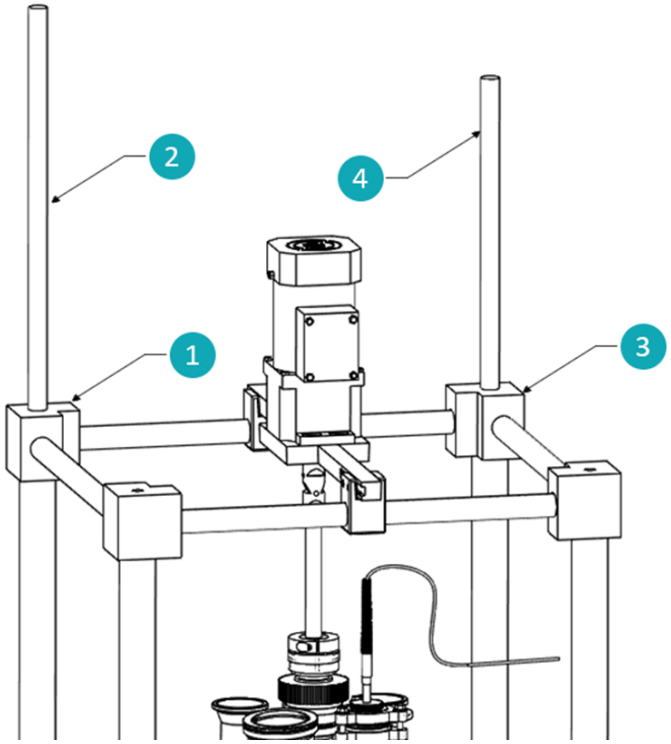
1. Unwrap the temperature probe (6). Locate and install the temperature probe adapter (5) and clamp (4) to the front port 2 (3) (front right) of the lid (JR-5 does not use a clamp). Loosen the cap of the adapter (5) and then slide the probe (6) (down into the reactor). Leave 2”-3” of the probe outside of the lid (2).




| | |
|---|---|
| 1 | Lid Clamp |
| 2 | Reactor Lid |
| 3 | Front Port 2 |
| 4 | Thermometer Probe Clamp |
| 5 | Thermometer Probe Adapter |
| 6 | Thermometer Probe |

## 3.7 Glass stand assembly

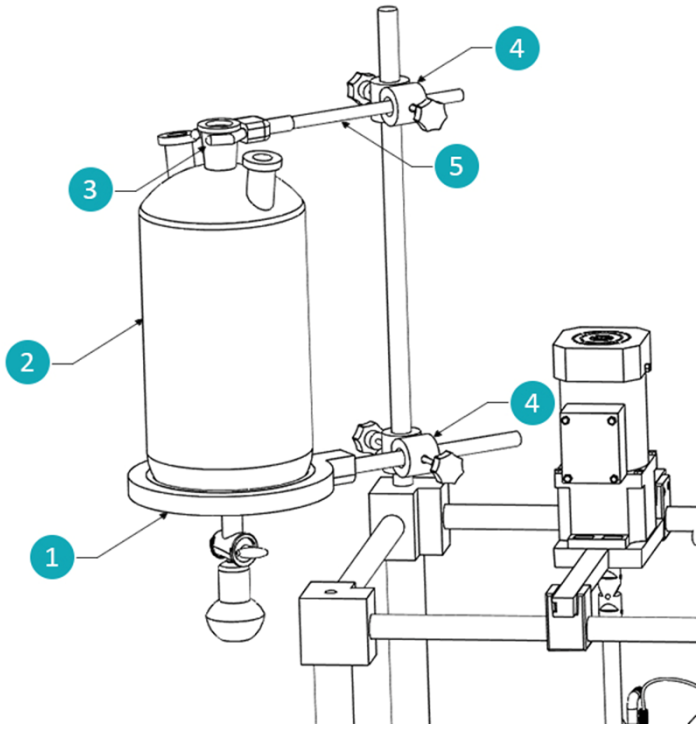
In the packaging, there are two threaded rods (1 & 2). The longer rod (2) is to be installed on the rear left top corner (1). The shorter rod (4) is to be installed on the rear right top corner (3).




| | |
|---|---|
| 1 | Rear Left Top Corner |
| 2 | Long Threaded Rod |
| 3 | Rear Right Top Corner |
| 4 | Short Threaded Rod |

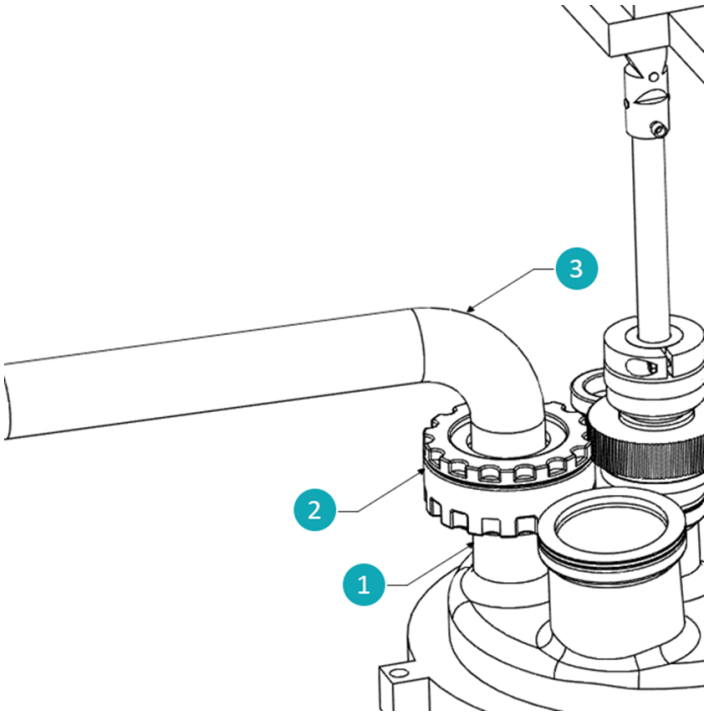
## 3.8 Material flask assembly

1. Attach the ring clamp (1) and 3 prong clamp (5) with the provided boss head clamps (4) to the left rear stand. Place the material flask (2) onto the ring clamp (1) and secure it with the 3-prong clamp (5) on the center port (3) of the top.



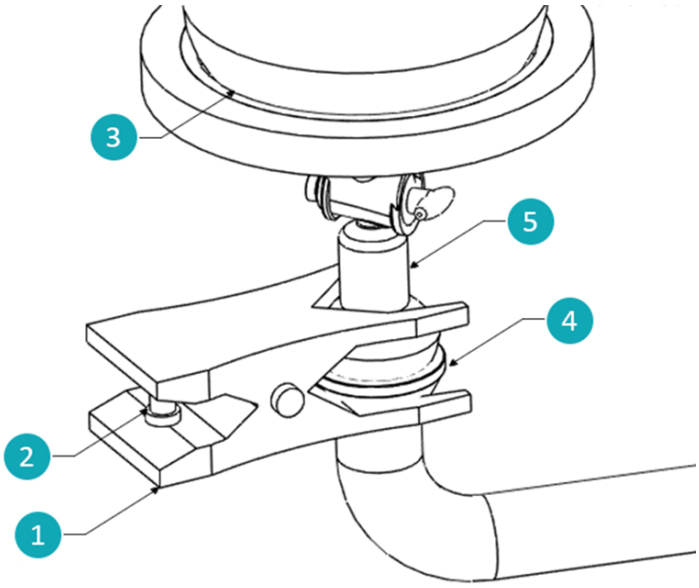

| | |
|---|---|
| 1 | Ring Clamp |
| 2 | Material Flask |
| 3 | Material Flask Center Port |
| 4 | Boss Head Clamp |
| 5 | 3-Prong Clamp |

2. Place the male end of the S-shaped glass tube (3) into the left spherical joint (1) of the lid. Then tighten the plastic clamp (2).



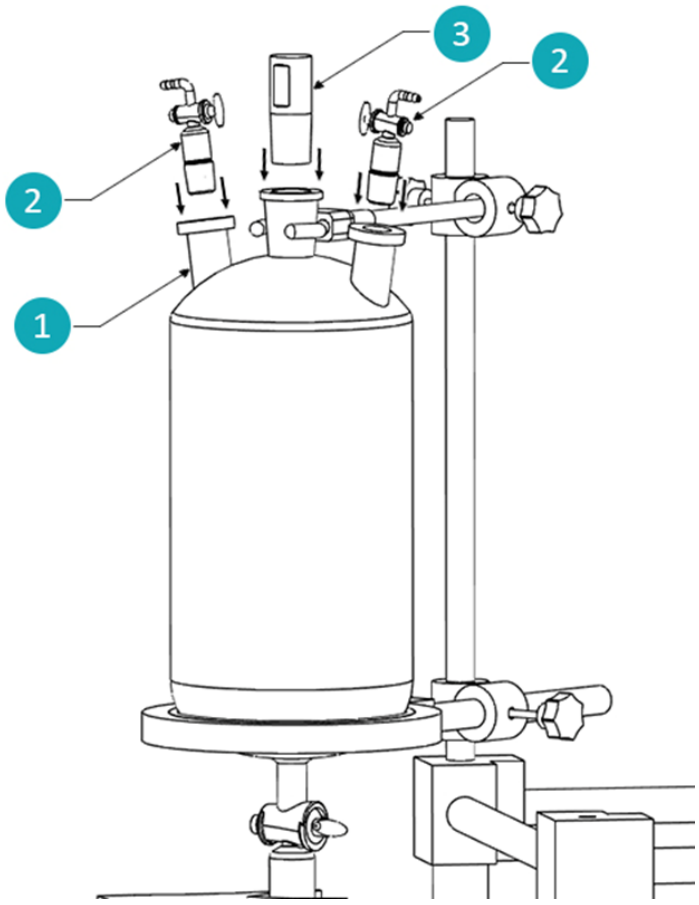

| | |
|---|---|
| 1 | Left Spherical Joint |
| 2 | Plastic Clamp |
| 3 | Male End S-shaped Glass Tube |

3. Place the female end of the S-shaped glass tube (4) onto the male bottom drain of the material flask (5). Apply the metal U-shaped clamp (1) to the joint and tighten the stop nut (2).




| | |
|---|---|
| 1 | U-shaped Clamp |
| 2 | Clamp Stop Nut |
| 3 | Material Flask |
| 4 | Female End S-shaped Glass Tube |
| 5 | Male Bottom Drain of Material Flask |

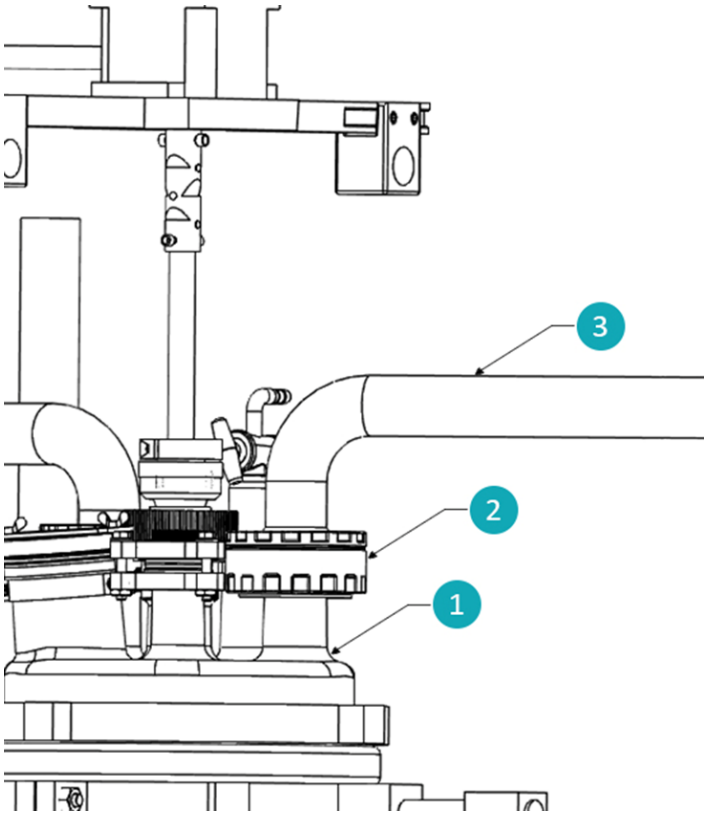
4. Add the stopper (3) and stopcocks (2) to the top of the material flask ports (1).




| | |
|---|---|
| 1 | Material Flask Ports |
| 2 | Stopcocks |
| 3 | Stopper |

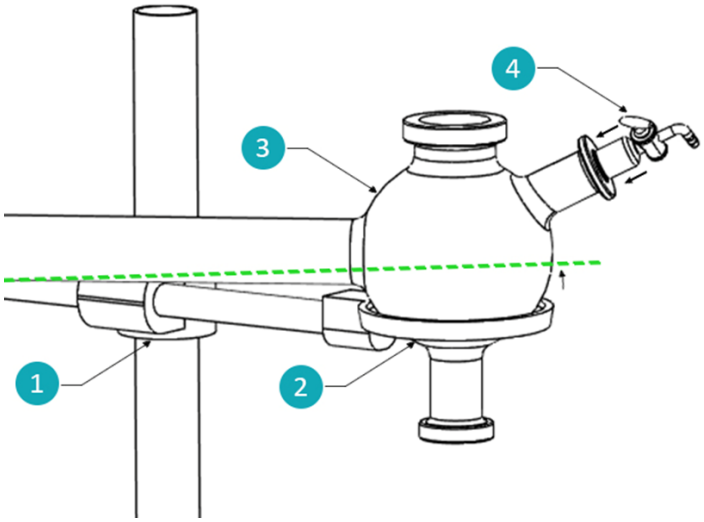
## 3.9 Reflux and condenser assembly

1. Place the male end of the reflux flask (3) into the right spherical joint of the lid (1). Then tighten the plastic clamp (2).



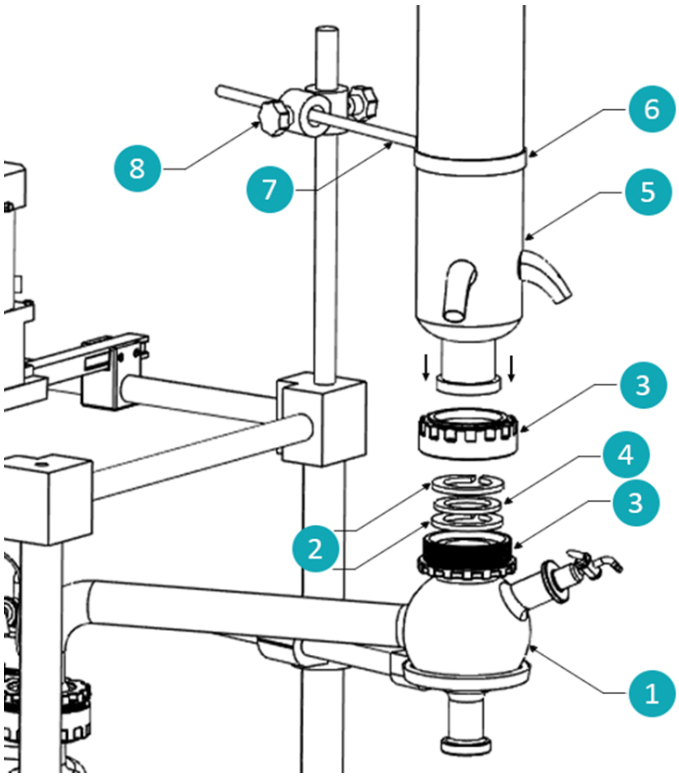

| | |
|---|---|
| 1 | Right Spherical Joint |
| 2 | Plastic Clamp |
| 3 | Reflux Flask |

2. Attach the ring clamp (2) with the provided boss head clamp (1) to the rear right stand. Move the ring clamp (2) into position to hold the flask end of the reflux (3) up. Ensure the straight part of the tube has a slight slope towards the lid. This ensures refluxed liquid will re-enter the vessel. Add the stopcock (4) to the end of the flask port.




| | |
|---|---|
| 1 | Boss Head Clamp |
| 2 | Support Ring |
| 3 | Reflux Flask |
| 4 | Stopcock |

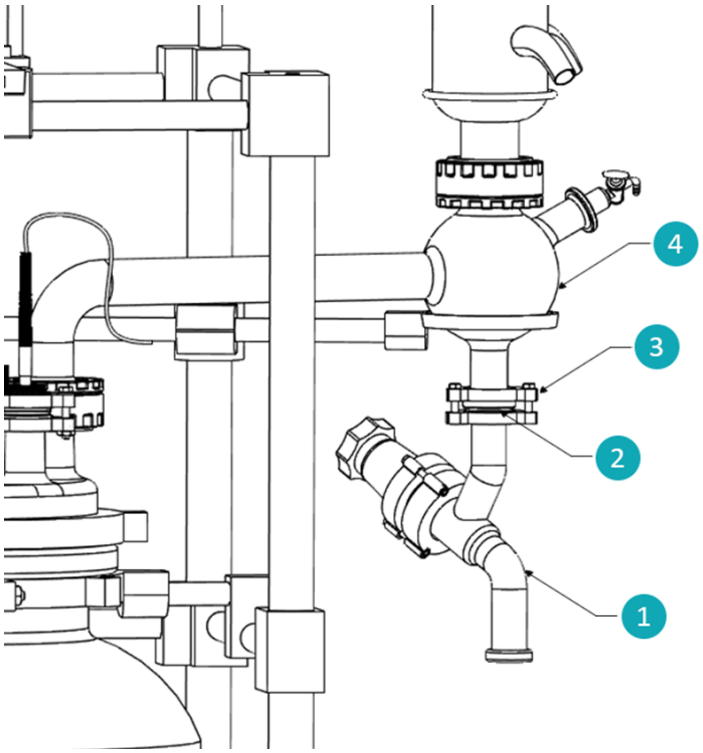
3. Install the condenser strap rod (7) and condenser strap (6) with the provided boss head clamp (8). Ensure the condenser strap (6) is in position and the seal washer (4) is close by. Pre-install the plastic clamp (3) with the provided retainer rings (2). The clamp (3) goes on the reflux flask (1) and condenser (5) first, and then the retainer ring (2) is applied to hold the clamp (3) in place. Using an assistant. Place the seal washer (4) on the top of the reflux flask flange (1). Have the assistant place the condenser (5) on top of the seal washer (4) and hold it steady. Secure the condenser (5) with the strap (6) and then connect and tighten the plastic clamp (3).




| | |
|---|---|
| 1 | Reflux Flask |
| 2 | Retainer Rings |
| 3 | Plastic Clamp |
| 4 | Seal Washer |
| 5 | Condenser |
| 6 | Condenser Strap |
| 7 | Condenser Strap Rod |
| 8 | Boss Head Clamp |

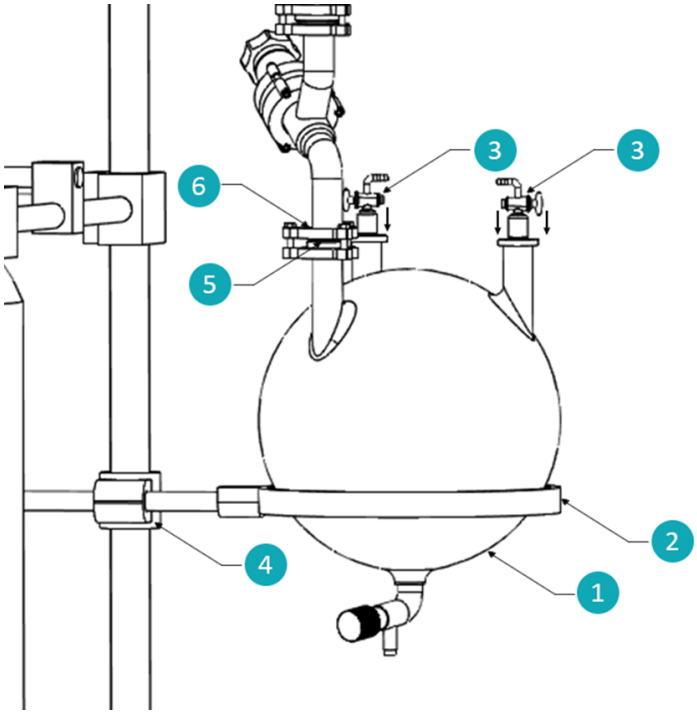
## 3.10 Receiving flask assembly

1. Attach one side of the valve clamp (3) on the bottom of the reflux flask (4) and on the valve (1). Align the valve (1) with the handle pointing upwards. Place the White PTFE gasket (2) between the two male spherical joints and then tighten the clamp bolts hand tight. (Final step will be to tighten the clamps).




| | |
|---|---|
| 1 | Valve |
| 2 | White PTFE Gasket |
| 3 | Valve Clamp |
| 4 | Reflux Flask |

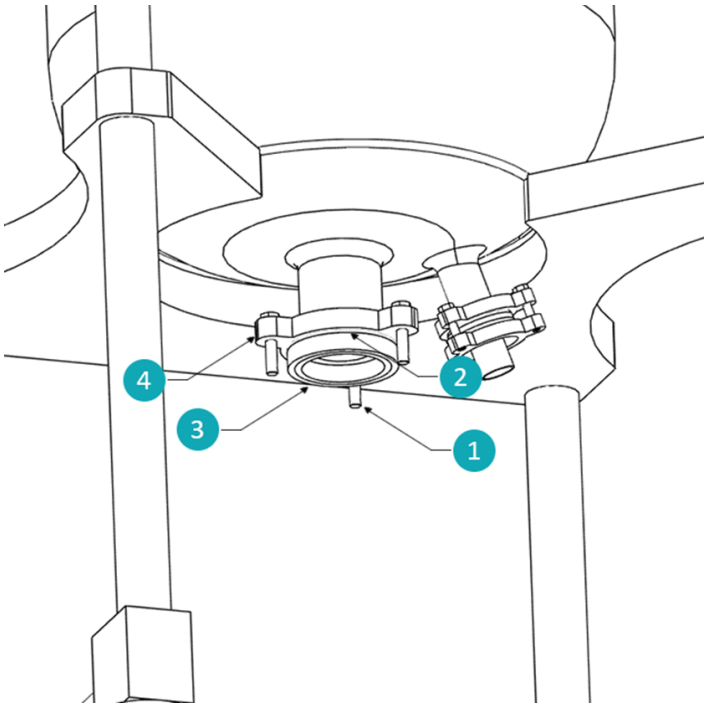
2. Attach the lower ring clamp (2) with the provided boss head clamp (4). Place the receiving flask (1) onto the lower ring clamp (2) and adjust its height to meet the bottom of the valve. Ensure the seal washer (5) is placed between the two male spherical joints before tightening the valve clamp (6). Then tighten the bolts evenly. (Do not tighten more than 20 in/lb).
3. Add the stopcocks (3) to the top of the receiving flask (1) ports.




| | |
|---|---|
| 1 | Receiving Flask |
| 2 | Lower Ring Clamp |
| 3 | Stopcocks |
| 4 | Boss Head Clamp |
| 5 | Seal Washer |
| 6 | Valve Clamp |

## 3.11 Drain valve assembly (does not apply to JR-5)

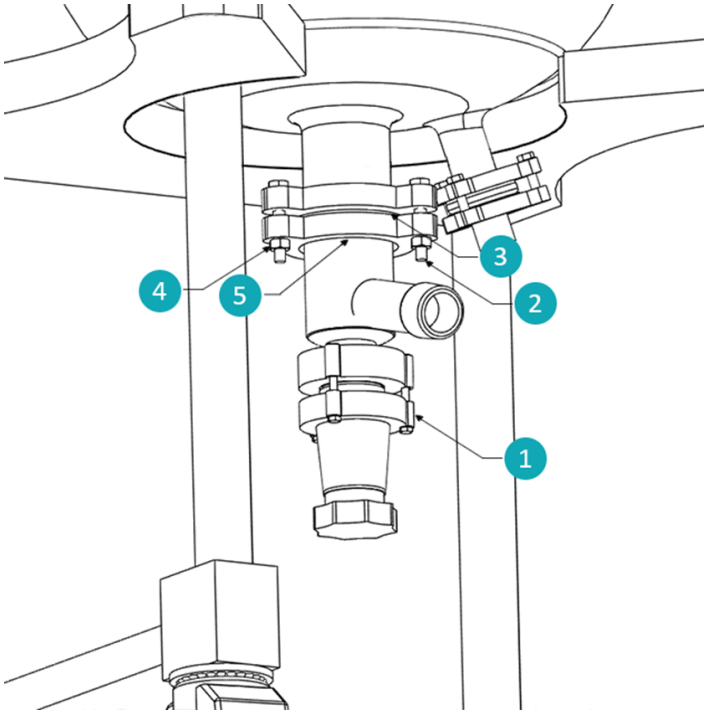
1. Disassemble the clamp (4). Keep the bolts (1) inside of one half. Place that half up around the flange (3) and then install the plastic retaining ring (2) between the flange (3) and the metal ring of the clamp (4). Ensure the bolts (1) are hanging down.




| | |
|---|---|
| 1 | Clamp Bolts |
| 2 | Clamp Retaining Ring |
| 3 | Flange |
| 4 | Drain Clamp |

2. Place the other half of the clamp (5) and retainer ring onto the drain valve (1). Grease and apply the gasket (3) to the flange on the drain valve (1). Slide the drain valve (1) up into the bottom. Making sure the bolts (2) go through the same holes on the bottom half of the clamp (5). Add the washers and nuts (4) to the bolts (2) of the top half of the clamp (5). Tighten the nuts (4) of the clamp (5) evenly. (Do not tighten more than 30in/lb).

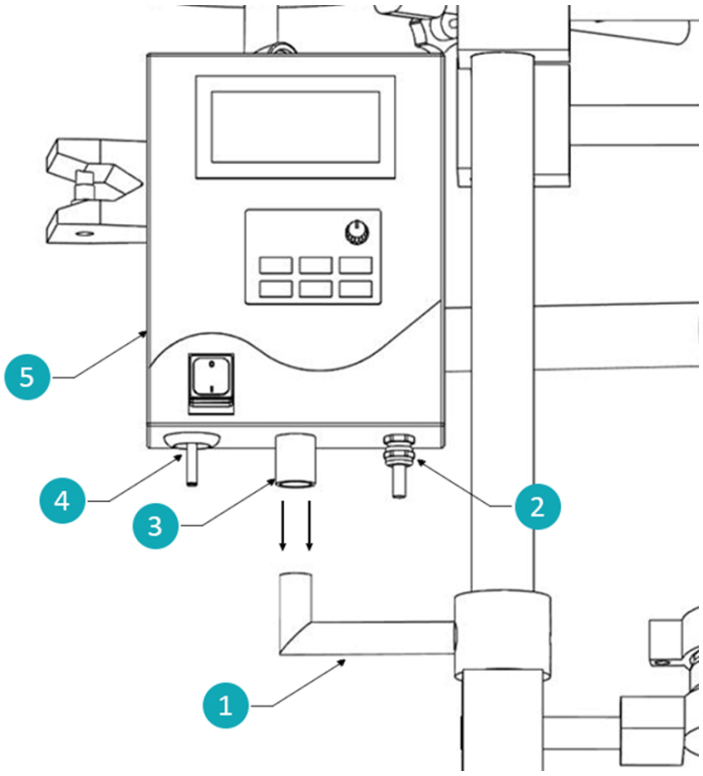
> **Notice**
>
> JR-150L model drain valve should be installed prior to placing the stirrer shaft into its final position.




| | |
|---|---|
| 1 | Drain Valve |
| 2 | Clamp Bolt |
| 3 | Clamp Gasket |
| 4 | Clamp Washer and Nut |
| 5 | Drain Clamp |

## 3.12 Controller assembly

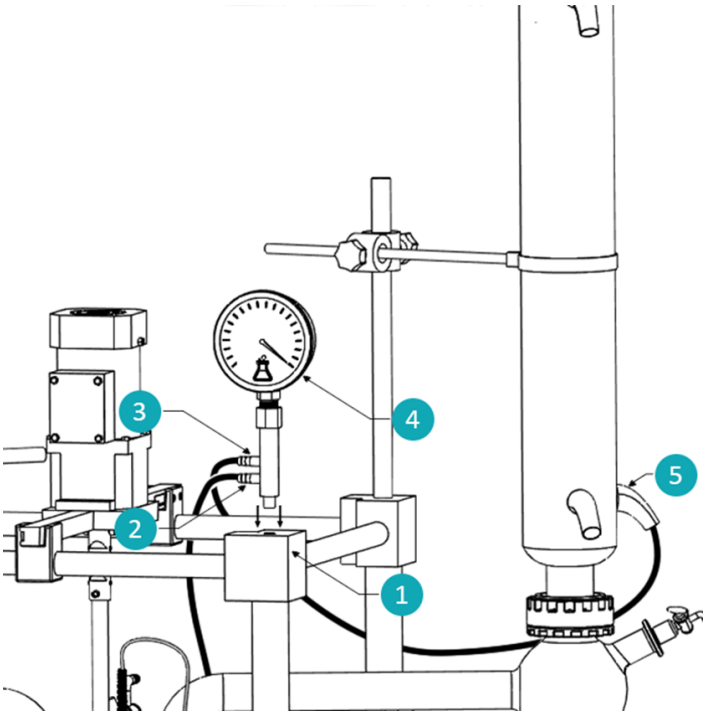
1. On the front left side of the frame is the mount (1) for the controller (5). Position the mount (1) for the controller (5) at the desired height. Place the controller (5) onto the mount (1) and secure it using the bolt (3) on the rear. Connect the motor (2) and the temperature probe (2) to the ports on the bottom. The plug should smoothly clip into the port (2). If you need to remove the connection at any point. Pull the dimpled sheath down to release the mechanism and disconnect the plug (2).




| | |
|---|---|
| 1 | Controller Mount |
| 2 | Motor and Probe Connectors |
| 3 | Controller Mount Bolt |
| 4 | Power Cord |
| 5 | Controller |

## 3.13 Vacuum gauge assembly

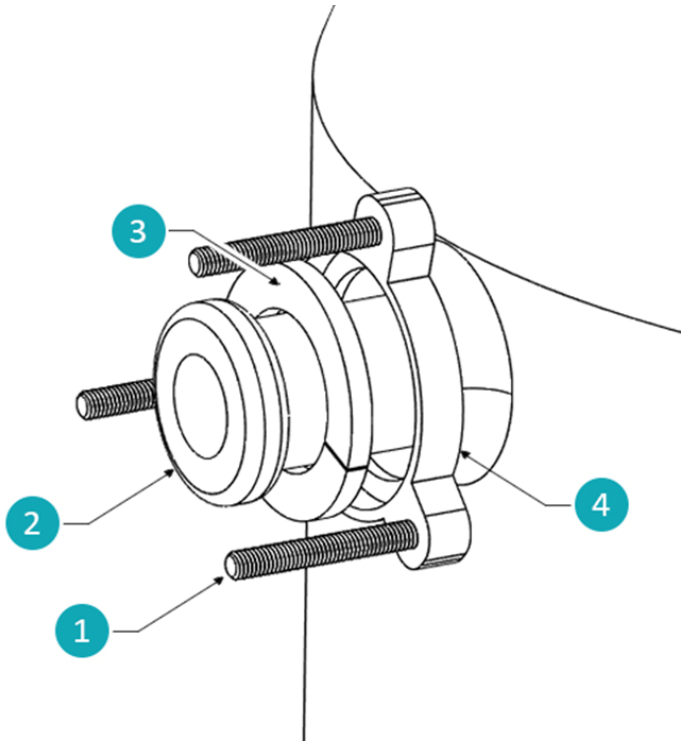
1. The vacuum gauge (4) connects to the frame the same way that the rear glass stands are connected. The location for the gauge (4) is on the top of the front right post (1). Use the nut on the thread to secure the gauge (4). Use one port of the gauge for the vacuum source (2) and the other should be connected to the vacuum port of the condenser (5). You can additionally connect the reactor lid and receiving flask by splitting off the previously stated connections.




| | |
|---|---|
| 1 | Top Front Right Post |
| 2 | Vacuum Pump Connection |
| 3 | Condenser Vacuum Connection |
| 4 | Vacuum Gauge |
| 5 | Condenser Vacuum Port |

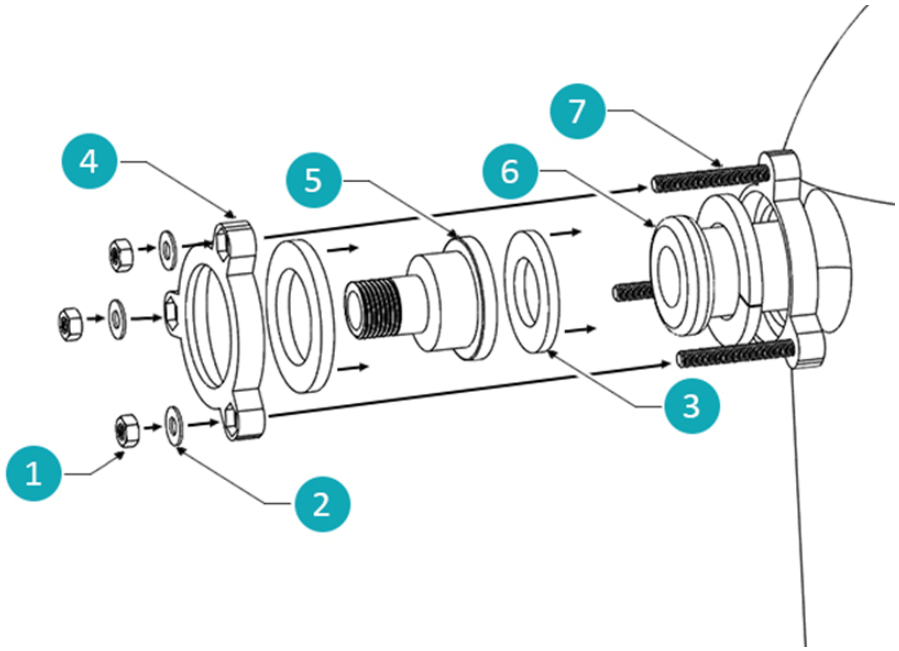
## 3.14 Jacket clamps assembly

1. Disassemble the clamp(4). Keep the bolts(1) inside of one half. Place that half up around the flange(2) and then install the plastic retaining ring(3) between the flange(2) and the metal ring of the clamp(4). Ensure the bolts(1) are hanging down/out.



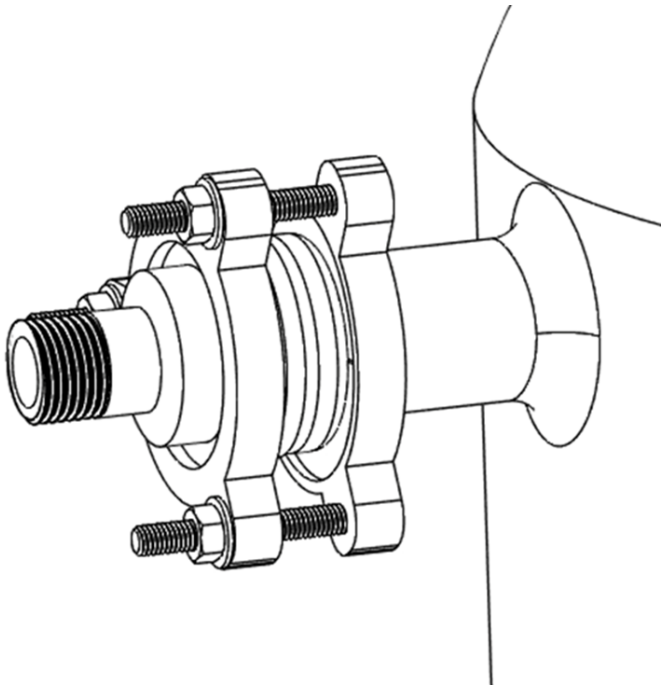

| | |
|---|---|
| 1 | Clamp Bolts |
| 2 | Vessel Flange |
| 3 | Plastic Retaining Ring |
| 4 | Metal Ring of the Clamp |

2. Center the gasket(3) onto the vessel flange(6). Then center the jacket outlet port(5) on top of the gasket(3). Slide the bolts(7) from the installed half of the clamp into the other half of the clamp(4). Add the washers(2) and nuts(1) to the bolts((7) of the clamp. Tighten the nuts(1) of the clamp(2) evenly. (Do not tighten more than 30in/lb).




| | |
|---|---|
| 1 | Clamp Nut |
| 2 | Clamp Washer |
| 3 | Gasket |
| 4 | Metal Ring of the Clamp |
| 5 | Jacket Outlet Port |
| 6 | Vessel Flange |
| 7 | Clamp Bolts |

3. Below is the completed installation of the jacket clamp onto the vessel flange.



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# 4 Service and maintenance

## 4.1 Periodic maintenance

**WARNING**
You must turn off the power switch AND disconnect the power cord before any 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.

## 4.2 Long term storage

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

- Disconnect the power.
- Empty and clean the reaction vessel.
- Empty and clean the stirrer.
- Empty and clean the jacket.
- Empty and clean the condenser.
- Empty and clean the material flask.

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# 5 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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# 6 Technical specifications

Technical specifications of each reactor are mentioned below.

| Model | JR5 | JR10 | JR20 | JR50 | JR100 | JR150 |
|---|---|---|---|---|---|---|
| Vessel Capacity | 5L / 1.32Gal | 10L / 2.6Gal | 20L / 5.28Gal | 50L / 13.20Gal | 100L / 26.41Gal | 150L / 39.62Gal |
| Material Flask Capacity | 500ml / 0.26Gal | 1L / 0.26Gal | 5L / 1.32Gal | 5L / 1.32Gal | 5L / 1.32Gal | 5L / 1.32Gal |
| Receiving Flask Capacity | Not included | 5L / 1.32Gal | 5L / 1.32Gal | 10L / 2.6Gal | 10L / 2.6Gal | 10L / 2.6Gal |
| Fluid Jacket Capacity | 0.8L / 0.21Gal | 8L / 2.11Gal | 9L / 2.37Gal | 16L / 4.22Gal | 25L / 6.60Gal | 35L / 9.25Gal |
| Glass Material | GG-17 Borosilicate Glass 3.3 \| Thickness: 6.5mm ±0.5mm | | | | | |
| Rotary Speed | 0-450RPM | | | | | |
| Glass Temperature Range | -80°C to 210°C / -112°F to 410°F | | | | | |
| Power Requirements | 230V 60Hz 15A 1p (“OL” error = below 230V) | | | | | |
| Stirrer Wattage | 120W | 120W | 120W | 120W | 200W | 250W |
| Lowest Vacuum Level | 0.0033 Mpa \| 25 Torr \| 25,000 Micron | | | | | |
| Speed Regulation | Digital Step-Less | | | | | |
| Condenser and Feed Valve Barbs | 10MM - 3/8" | | | | | |
| Bottom Drain Port | 35MM - 1 3/8" | | | | | |
| Receiving Flask Barb | 16MM - 5/8" | | | | | |
| Jacket Pressure | Maximum 0.05Mpa / 7.25psi | | | | | |
| Fluid Connection | 16MM - 5/8" barb or 1/2" MNPT (JR-100: 5/8 Barb or 3/4" MNPT) | | | | | |
| Certification | ETL to UL and CSA Standards | | | | | |
| External Dimensions LxWxH | 16 x 18 x 68" | 20.4 x 20.4 x 70" | 39 x 20.4 x 79" | 41 x 23 x 90" | 48 x 34 x 102" | 50 x 34 x 108" |
| Weight | 75 lbs | 149 lbs. | 176 lbs | 205lbs | 275 lbs | 598 lbs |

This chart is a recommendation, not a requirement.

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# 7 Spare parts

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

Visit www.usalab.com/jr-reactor-parts for a full list of reactor parts.

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# 8 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.

## 8.1 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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