



Benchtop Heater Chiller - UHC-7/20

User Manual



S

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 Benchtop Heater Chiller UHC-7/20. 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.

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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 USA Lab UHC-7/20 is intended to provide a quick and simple way of keeping a precise temperature fluid for your process. The cooling and heating systems work together to keep your process regulated to the precise temperature that you demand. The pump can push your fluid up to 20L/min and as high as 5.6 m or 18 ft.

**WARNING****Danger due to misuse!**

Misuse of the device can result in hazardous situations.

- The unit gets hot at the lid of the bath and the sides. Do not touch these areas during or after the unit has been running. Personal injury may occur.
- Do not exceed temperature rating. Damage to persons, or property may occur.
- Do not attempt to remove or replace internal parts.
- Do not use this device unattended or unobserved.
- Do not touch rotating parts. Personal injury will occur.
- If the unit has a malfunction, stop use immediately. Contact us for instructions to return the unit for inspection and repair.
- 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. This product is intended for use as a fluid temperature regulator for liquids. Consult your supplier for alternatives.

Do not leave the equipment running unattended.

Do not cover the side grille or block air entry by placing object up against the grille.

Ensure adequate ventilation.

Do not cut any openings into the cabinet.

Do not touch any internal electrical parts or hot surfaces.

Do not wear loose clothing, jewellery, 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.

Do not overload the power supply circuit.

Never use extension cords, power strips, or plug adapters other than what is supplied. If the power supply cord is damaged, it must be replaced by the manufacturer, USA Lab, or a similarly qualified and skilled persons to avoid hazard or injury.

Disconnect the mains power supply before attempting any cleaning, removal of any covers, or maintenance work.

All electrical work must be executed by suitably qualified persons. When using any electrical appliance, safety precautions must always be observed.

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 6 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.

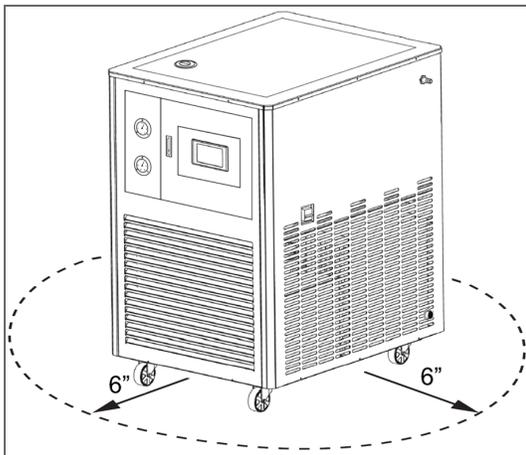


Figure 1 - Safe operating area around the chiller unit

1.6 Safety warnings

The following warnings and notices are safety information specific to the Benchtop Heater Chiller - UHC-7/20.

**WARNING****Risk of serious injury or damage!**

Only use approved thermal transfer fluids stated in this manual.

► For more information, see *Thermal transfer fluids* on page 22.

**WARNING****Risk of serious injury or damage!**

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

**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 chiller while it is in operation.

Do not use a generator to power the chiller.

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 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 chiller 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 USA Lab UHC-7/20 is a bench-top Recirculating Heater Chiller used as a fluid temperature regulator for liquids in a wide range of applications. The compact chiller unit is equipped with a powerful refrigeration system and high-performance heating element, allowing it to rapidly cool or heat up to the set temperature. It is also equipped with precise temperature control, ensuring that the temperature stays within a tight tolerance range.

The pump can push your fluid up to 20L/min and as high as 5.6 m or 18 ft. This chiller comes standard with a digital display for ease of use and accurate control.

2.2 Diagrams

2.2.1 Cooling curve

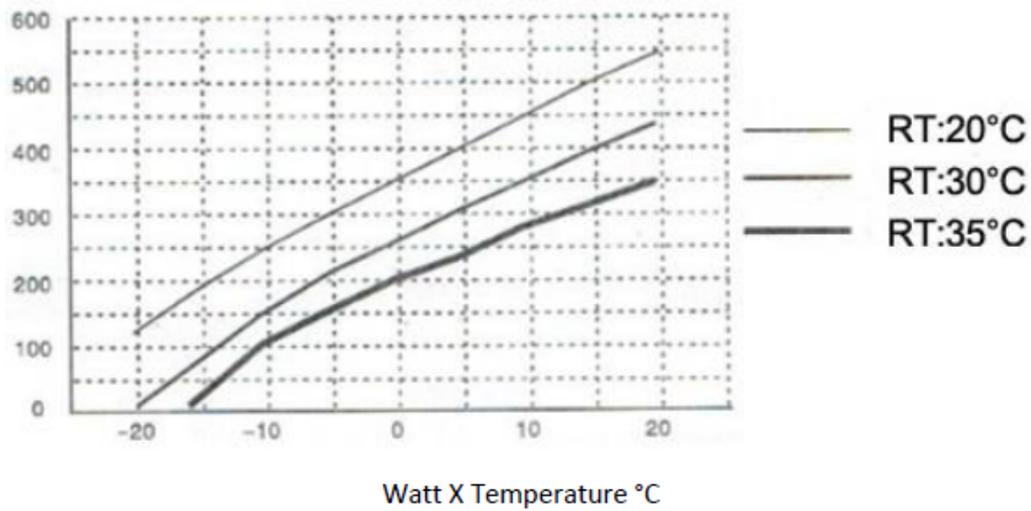


Figure 2 - Cooling curve

2.2.2 Pump curve

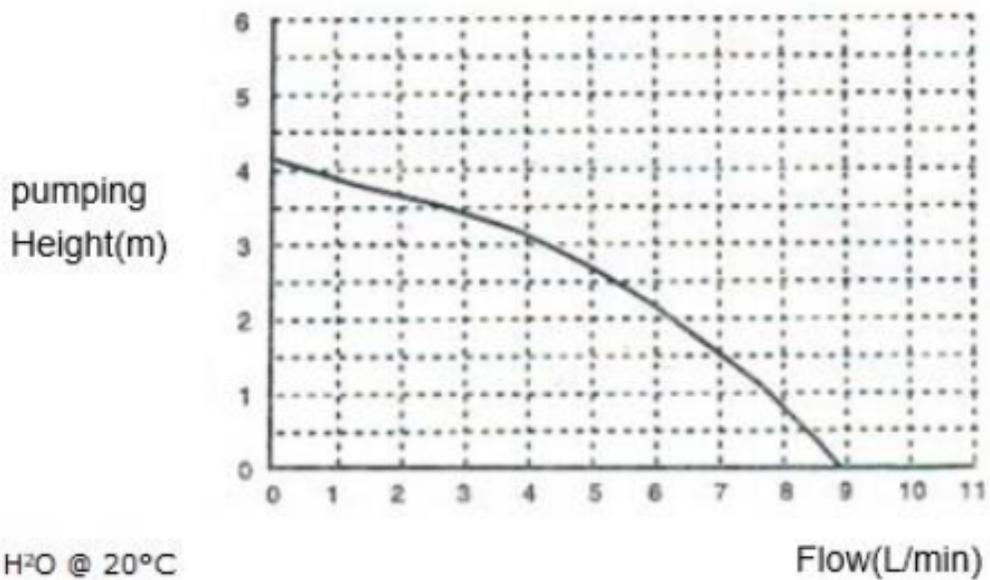


Figure 3 - Pump curve

2.2.3 Bath level

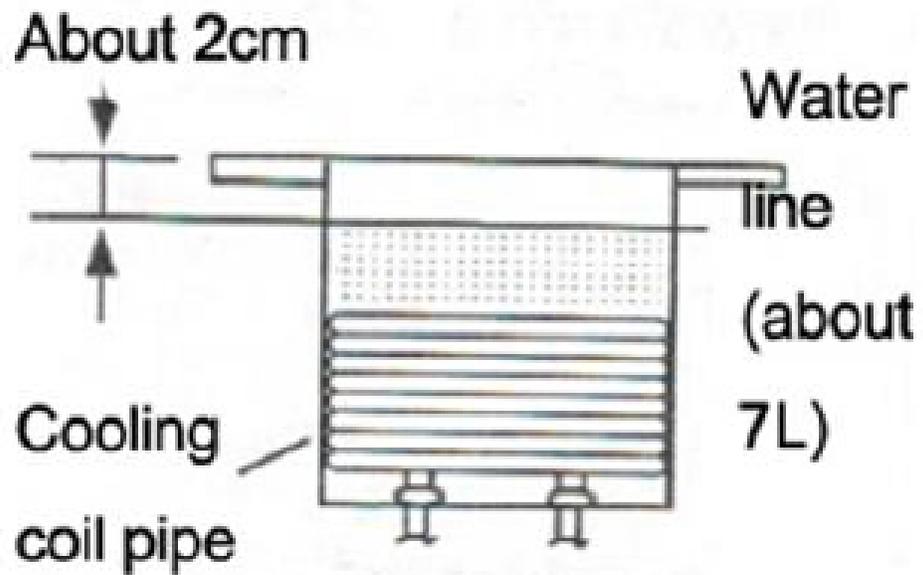


Figure 4 - Bath level

2.2.4 Front panel diagram

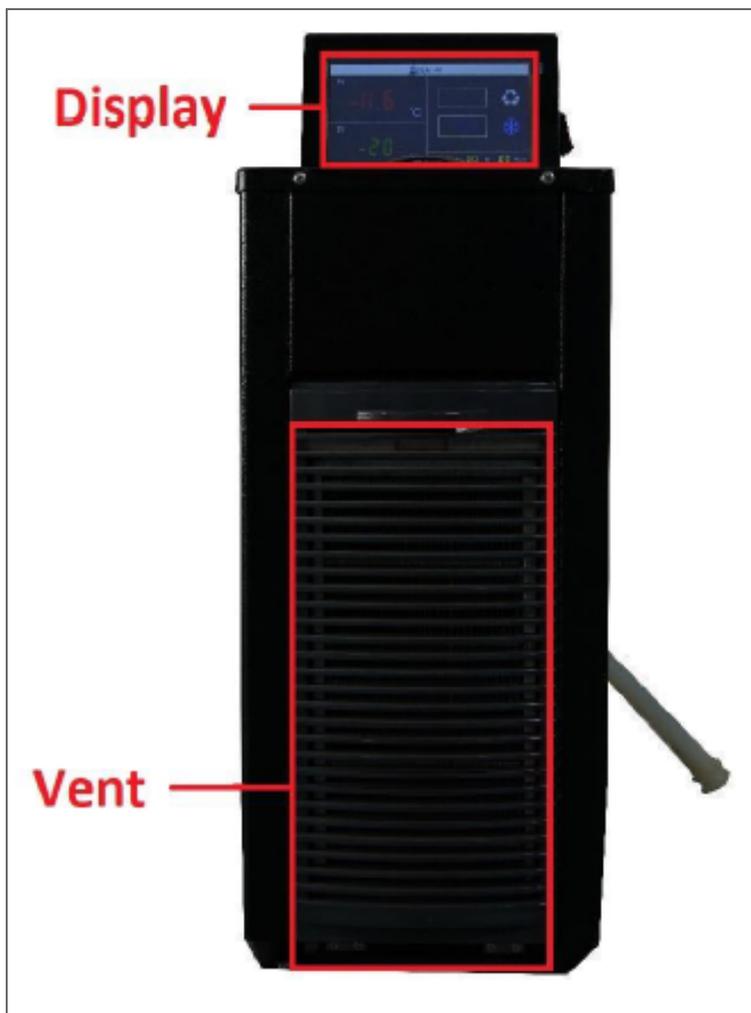


Figure 5 - Front panel diagram

2.2.5 Back panel diagram

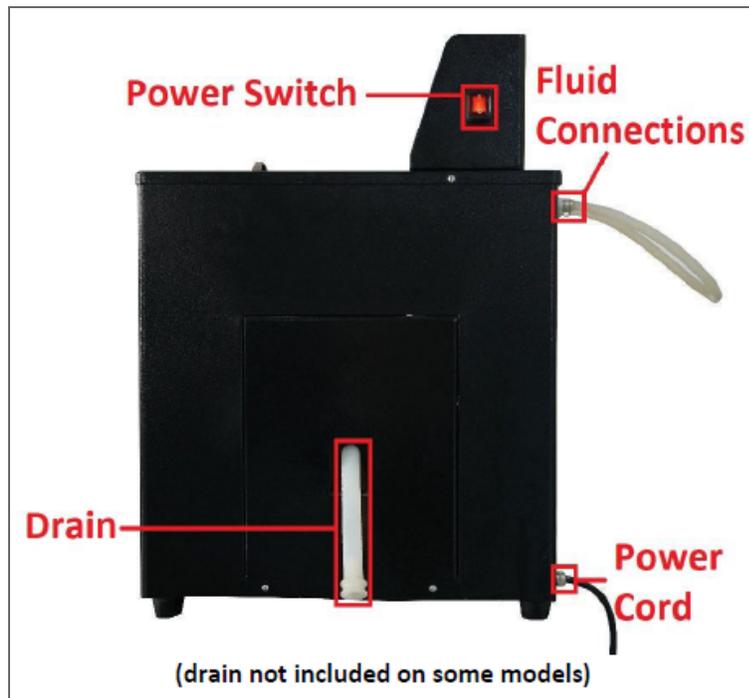


Figure 6 - Back panel diagram

2.3 Environmental conditions

- Temperature range: +10°C to +30°C (+50°F to +86°F)
- Low dust, low humidity, low/no sunlight, level surface, and free of clutter.
- 6" of clearance around the entire unit.

Certain thermal transfer fluids are not compatible with tubing, fittings, or other materials. Check chemical compatibility before changing fluids or extending fluid lines. Also, clean thoroughly before swapping.

2.4 Thermal transfer fluids



WARNING

Risk of serious injury or damaged!

Do not use automotive anti-freeze, it contains additives that have been known to corrode heat exchangers.

Do not use tap water, as it can cause corrosion of internal parts.

USA Lab recommends using the following:

- **-20°C to +100°C:** Propylene glycol blended with distilled water. Ratio = 40:60 (PG : Distilled Water)
- **-20°C to +180°C:** Silicone Oil

2.5 Electrical connection

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

► For more information, see *Technical specifications* on page 37.

Ensure that the outlet is well grounded and installed by a licensed electrician. The unit must be used on a **NFPA 70 NEC** compliant circuit without other devices attached.

- Receptacle: NEMA 6-20R
- Plug: NEMA 6-20P
- Voltage: 220-240VAC
- Frequency: 50/60Hz
- Maximum Nominal Amperage: 16A

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3 Control panel operation

The LCD touchscreen control panel is located on the front of the chiller.

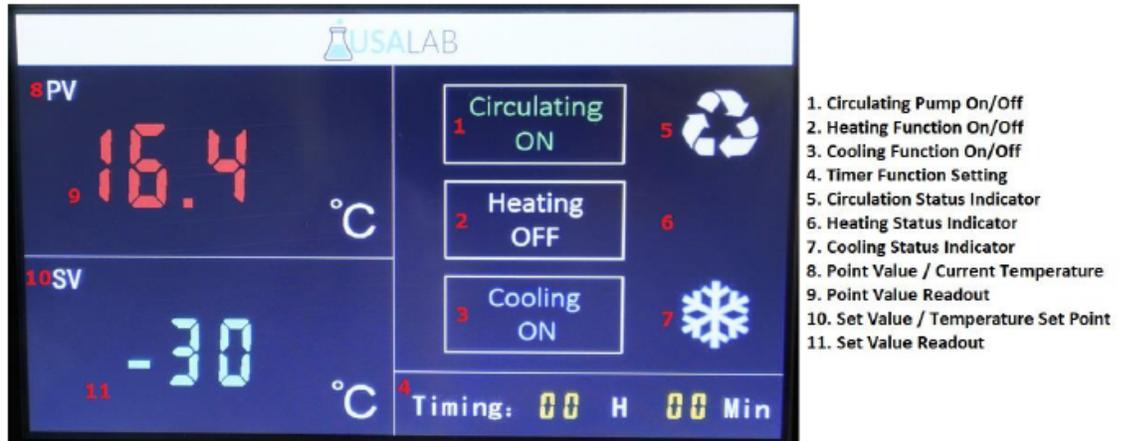


Figure 7 - Control panel operation - LCD display



Prior to running the chiller, your fluid loop should be primed and the tank filled.

To set your desired temperature and time:

1. Press on the digits (11) to enter the temperature set menu.
2. Adjust the value using the popup digital keyboard.
3. The timing function (4) is set in the same manner. (Timing function is not required to be set. 0 = infinite time)

To run the desired temperature:

1. After setting the temperature as described above. Press the circulation button (1),
2. Press the heating button (2),
3. Press the cooling button (3).

Using cooling only:

1. Set the SV to no higher than 40°C.
2. Press the circulation button (1),
3. Press the cooling button (3).

** Cooling only will cause temperature inaccuracy. Also, temperature overshoot will occur without an adequate load. **

Using heating only:

1. Set the SV to no lower than 40°C.
2. Press the circulation button (1),
3. Press the heating button (2).

** Heating only will cause temperature inaccuracy. Also, temperature overshoot will occur without an adequate means of cooling. **

Heating above 100°C:

Only set and heat above 100°C with silicone oil. Do not use cooling at these temperatures.



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.

4 Installation and set up

Before you start using your Chiller, 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.

4.1 What's in the box

The following parts are included in the package:

Table 1 - Packaging list

Part	Quantity
USA Lab UHC-720 unit	1 pcs
1/2" FNPT Insulated Heater Hose - 6 Ft.	2 pcs
1/2" FNPT Union Fitting	2 pcs
User Manual	1 pcs

4.2 Unpacking and assembly of the chiller

Unpack the chiller unit and confirm you have all necessary items before setting up the unit.



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. Position the unit within 6 ft of the system to which you want to connect.

Place the chiller in a way that guarantees proper ventilation.

- ▶ For more information, see *Safe operating area* on page 12.



Notice

Use the PTFE tape and wrap at least 4 times around the thread of the outlet port and the 1/2" MNPT fitting.

2. Remove any items that may be inside the bath area.
3. Connect the included tubing to the condenser or jacket of your load.

**Notice**

“load” is any device that is using the heating or cooling power of the unit.

4. Prime the system.
 - ▶ For more information, see *Priming the chiller* on page 28.

4.3 Priming the chiller

Priming the pump of your chiller is an important step to make sure there is no air in the pump that could prevent the unit from functioning properly.

Prime the pump in the following scenarios:

- On first use.
- After the reservoir is emptied, and then filled.
- If you notice any bubbling.
- If the liquid flow is visibly impeded.

To prime the pump, follow these steps:

- Power on the unit.
- Fill the bath.
- Run the pump until 2” of liquid remain.
- Refill.
- Run the pump again.
- Repeat the process until the bath is full.
- Then shut off the pump.

The chiller is now primed.

5 Operations

This section describes common tasks required for the operation of the Benchtop Heater Chiller.

5.1 Operating method

Only operate the unit in a climate-controlled facility. Operating temperature is +10°C to +30°C (+50°F to +86°F). If the temperature exceeds, the performance will be degraded.

Units returned that have signs of outside use will automatically be determined to be improperly used and cared for.

Wait 12-hours after receiving shipment before operating the equipment. This gives the compressor oil a chance to settle back inside the compressor.

When filling the unit and/or a reactor:

- Power on the unit.
- Fill the tank $\frac{3}{4}$ full.
- Open the ball valve and turn on the fluid pump.
- Continue to fill the tank watching the level. Do not allow level to drop below $\frac{1}{4}$.
- When the jacket is full and the tank reaches the $\frac{1}{2}$ way point stop filling.
- Close the lid and follow the priming instructions.

5.2 Running the chiller

With the system and chiller pump primed, you can start the chiller to control the temperature in your system.



Notice

When using the unit always enable the pump first. Then enable the cooling AND heating functions. Both must be used to keep temperature accuracy. Otherwise, the temperature may overshoot the set point.

When not operating the unit, shut off the power.

To run the chiller, follow these steps:

1. Power on the unit.
2. Set the target temperature.

3. Enable the pump, cooling and heating. Ensure there are no leaks present and that the system seems to operate as desired.
4. Run until the process is complete.
5. When complete, turn off the heating and cooling functions.
6. Run the pump until the temperature has returned to room temperature. This is required when running temperatures is above 100°C.
7. Turn the pump off and then switch off the unit.

6 Service and maintenance

6.1 Periodic maintenance

**WARNING**

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

- Do not use abrasive cleaning agents or tools to clean the delicate coating of your unit.
- Always wipe dry after cleaning.
- 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.
- USA Lab or a qualified technician must carry out any repair if required.

Fluid:

- If using Silicone Oil, degradation is not much of a concern. Keep an eye on the tank level.
- Propylene Glycol will degrade over time, it is recommended to purchase glycol test strips.

Condenser:

- Check and clean the condenser regularly. Every quarter for low dust facilities or every month for high dust facilities.

Unit:

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

6.2 Long term storage

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

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

7 Troubleshooting

If you encounter issues with your unit, refer to the following table.

Table 2 - Troubleshooting for the Benchtop Heater Chiller.

Problem	Possible cause	Solution
No power	<ol style="list-style-type: none"> 1. The chiller is not plugged in. 2. There is no power from the outlet. 3. There is power in the outlet, but not in the chiller. 	<ol style="list-style-type: none"> 1. Plug in the chiller. 2. Reset the breaker / GFCI or call an electrician. 3. Verify the 220V - 240V supply.
Incorrect temperature display	<ol style="list-style-type: none"> 1. The probe wire is loose. 2. The temperature probe has a short circuit. 3. The main board has failed. 	<ol style="list-style-type: none"> 1. Tighten the loose wire. 2. Replace the temperature probe. 3. Replace the faulty control board.
Temperature display not working correctly or flashing	<ol style="list-style-type: none"> 1. Incorrect power supply. 2. Display cable loose or broken. 3. The display board has failed. 	<ol style="list-style-type: none"> 1. Verify the 220V - 240V supply. 2. Re-seat or replace the display cable. 3. Replace the display board.
Shock from the unit shell	<ol style="list-style-type: none"> 1. Faulty system grounding. 2. An electrical component has failed. 	<ol style="list-style-type: none"> 1. Repair the fault in system grounding. 2. Contact us for further troubleshooting.

Problem	Possible cause	Solution
No cooling	<ol style="list-style-type: none"> 1. Cooling is not enabled. 2. The condenser fan is not spinning. 3. The compressor does not start. 4. The compressor is louder than normal, bad. 5. The refrigerant has leaked. 	<ol style="list-style-type: none"> 1. Enable cooling. 2. Clean the condenser and replace the fan. 3. Check the capacitors, relay, and power board. 4. Check the windings for a short to ground. 5. Contact us for further troubleshooting.
Cooling slowly or warming unexpectedly	<ol style="list-style-type: none"> 1. The compressor has stopped. 2. The condenser fan is running slowly. 3. The glycol ratio is incorrect. 4. The capillary or refrigerant are blocked. 5. The liquid pump is not primed. 6. The load is greater than the chiller can handle. 7. Tubing is not insulated. 	<ol style="list-style-type: none"> 1. Wait for the compressor delay to end. 2. Replace the condenser fan. 3. Change the fluid to the correct ratio. 4. Contact us for the further troubleshooting. 5. Re-prime the liquid pump . 6. Reduce the load on the chiller. 7. Use tubing insulation.
Not heating	<ol style="list-style-type: none"> 1. Heating is not enabled. 2. Pump not enabled. 3. Elements do not turn on. 4. Elements are good, no output from board. 	<ol style="list-style-type: none"> 1. Enable heating by pressing the Heating button on the display. 2. Enable pump. 3. Check elements for damage and replace. 4. Replace the control board

8 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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9 Technical specifications

Technical specifications of each reactor are mentioned below.

Model	UHC-7/20
Operation Range	-20°C to 100°C (up to 180°C with silicone oil)
Power Requirements	220V -240V 60hz 15.5A - 14.5A 6-20p
Cooling Capacity	+10°C - 450W 0°C - 350W -10°C 250W
Controller Accuracy	±2°C
Circulation Type	Open loop with bath cover
Circulation Capacity	Lift: 5.6m/18.3ft. Flow: 20L/min PSI: 8
Circulation Wattage	100W
Display Type	LCD Touchscreen with Timer
Temperature Probe Type	PT100
Compressor	Piston style rated for 735W
Refrigerant	R-134a
Heating Element Rating	2500W
Condenser Fans	2X 38W (76W Total)
Tank Capacity	7L SS304
Tank Size WxDxH	11.8" X 8.7" X 5.1"
Cooling Exchanger	Chromium Coated Copper
Barb size	1/2"
Overall Size WxDxH	12.6" X 21.7" X 27.2"
Overall Weight	35kg 77lbs.

This chart is a recommendation, not a requirement.

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10 Spare parts

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

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11 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.

11.1 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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