



Recirculating Chiller - CLC Series

User Manual

Variants covered: 10/40, 20/40, 30/40, 50/40



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 Recirculating Chiller - CLC Series. 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 area of application of the equipment also apply.

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Certification

A representative sample of the listed devices have been tested, investigated and found to comply with the requirements of the Standard(s) for Safety Requirements For Electrical Equipment For Measurement, Control, And Laboratory Use, Part 2-011: Particular Requirements For Refrigerating Equipment (UL 61010-2-011), and are identified with the ETL Listed Mark.

Installation record

Model:	_____	Serial number:	_____
Batch number:	_____	Manufacturing date:	_____
Installation date:	_____	Thermal transfer fluid in use:	_____

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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 Recirculating Chiller - CLC Series are devices that are used to provide an external cooling system for laboratory and other related systems that require cooling during operation.

A Recirculating Chiller - CLC Series is used to keep temperature-sensitive system components at a constant temperature. This is done by removing excess heat using convection through a closed-loop flow system.

**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.

USA Lab recommends a safe area of at least 12-16" (300-400 mm) around the equipment.

**Caution****Risk of damage to the equipment!**

Do not obstruct the ventilation on the 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.

The chiller rejects heat into the room while it is running. Install the unit in a room with enough air volume and ventilation to absorb this heat. Do not install the chiller in a closet, cabinet, or small enclosed room. A room that cannot carry the heat away will raise the air temperature at the condenser, which reduces cooling capacity and increases the risk of the unit failing to reach its setpoint.

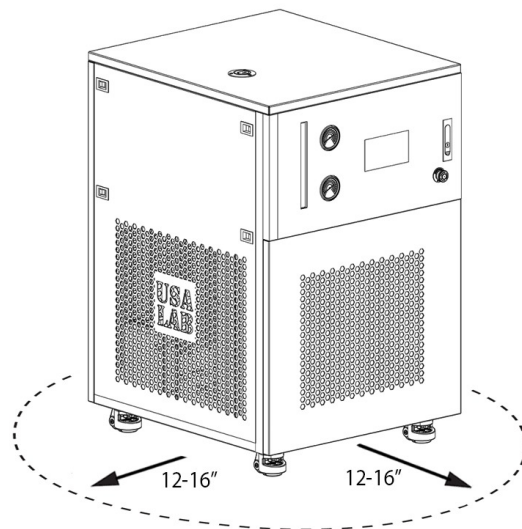


Figure 1 - Safe operating area around the chiller unit

1.6 Safety warnings

The following warnings and notices are safety information specific to the Recirculating Chiller - CLC Series.



WARNING

Risk of serious injury or damage!

Only use approved thermal transfer fluids stated in this manual.

► 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.

Frequent compressor cycling shortens the life of the unit. If the compressor is cycling more than 5 times per day, the heat load on the chiller is too small for the model you are using. See *Running the chiller* on page 36.

The compressor has a 10 minute cool-down period. Wait 10 minutes before restarting the unit.

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!**

The refrigeration circuit is sealed and contains refrigerant under pressure. Only a qualified refrigeration technician may open, service, or recharge it.

Refrigerant must be recovered and disposed of according to local regulations.

Do not release refrigerant to the atmosphere.

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 Recirculating Chiller - CLC Series are high-performance closed-loop recirculating chillers that use phase-change compressors and a pump to circulate cooling fluid quickly around your system.

In this type of system, the flow rate is very important. Weak coolant flow will prevent the chiller from operating correctly.

All ETL CLC units feature a manually adjusted coolant bypass valve that keeps the chiller operating correctly by recirculating a portion of the fluid back into the exchanger.

► See *Bypass valve* on page 19.

The chillers are connected to your system using insulated, flexible supply and return hoses to maintain temperature and reduce fluctuations.

The chillers are controlled and configured using a touch-screen interface. This interface provides access to fluid pumping controls and temperature settings.

The variants covered in this manual are:

10/40, 20/40, 30/40, 50/40

The CLC Series numbering is as follows:

CLC-XX/YY = Maximum system capacity / Lowest rated set point

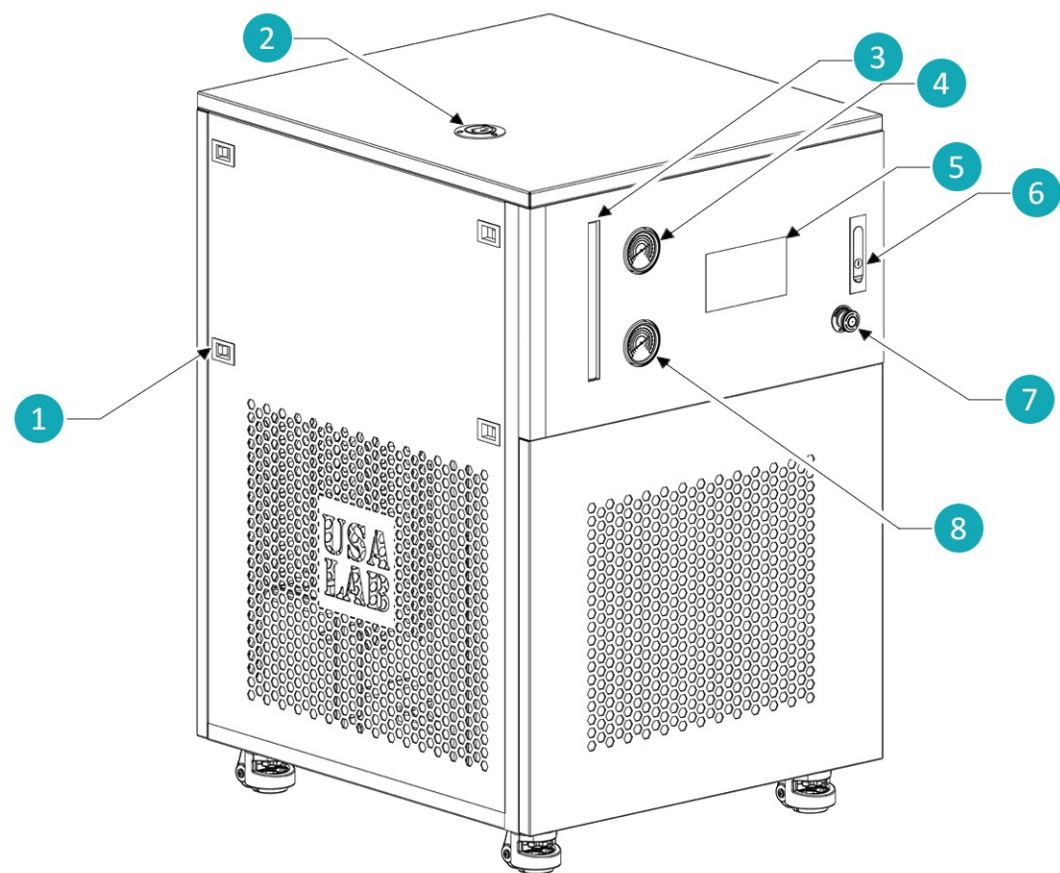
Maximum system capacity, meaning the total volume of the heat exchanger or jacket connected to the chiller.

Thermal fluid is poured into the expansion tank and then, after priming the chiller and your system, the fluid is chilled and pumped around your system. For example, the unit will pump through the condenser of a rotary evaporator.

All chiller variants are fitted with casters to allow for easy positioning relative to your system.

2.2 Chiller parts

2.2.1 Front panel diagram



1	Side Panel Latches	5	Touchscreen Display
2	Transfer Fluid Fill Cap	6	Front Panel Latch
3	Fluid Reservoir Sight Glass	7	Emergency Stop
4	Bypass Pressure Gauge	8	Low Side Refrigeration Gauge

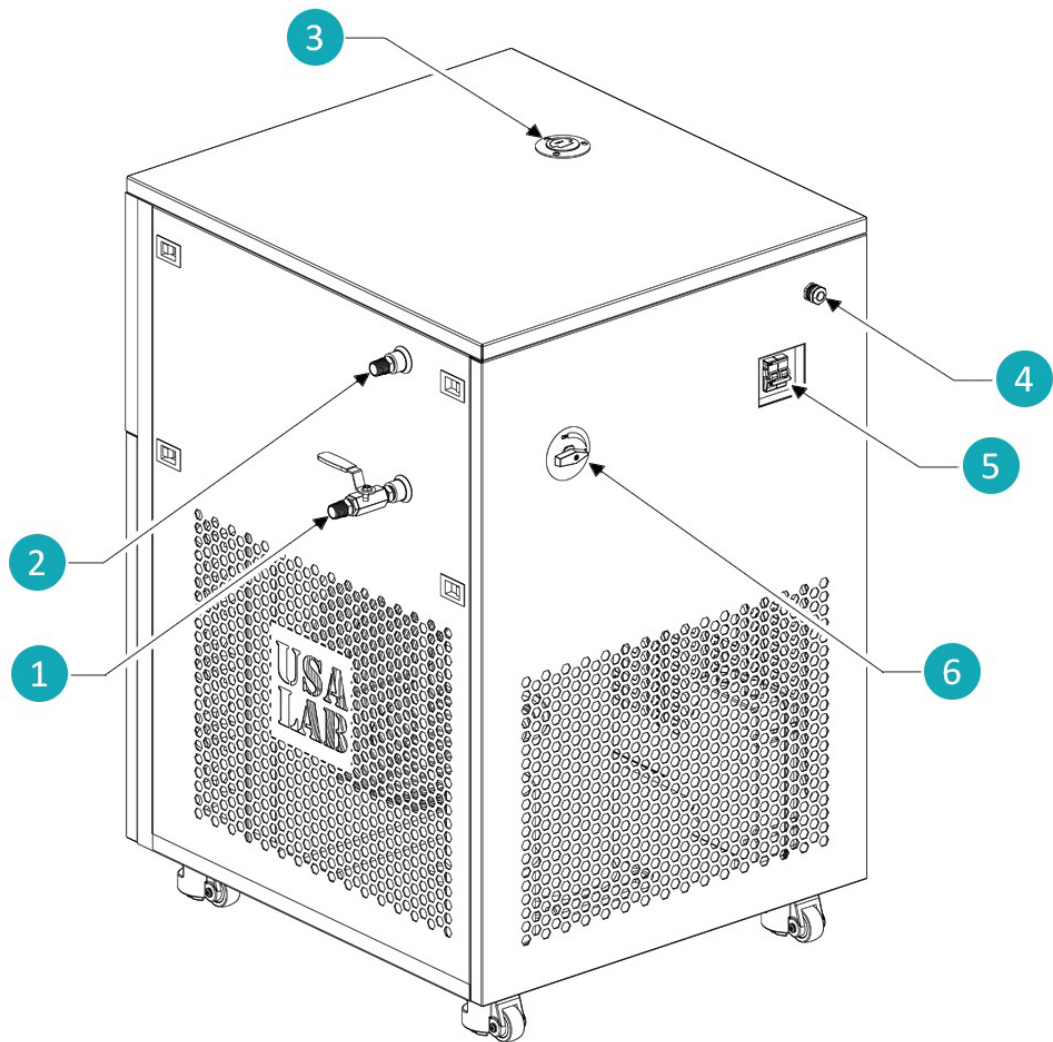
Figure 2 - Front view of the chiller

Bypass Pressure Gauge (item 4) reads the fluid pressure in the bypass circuit. Use this gauge when adjusting the bypass valve.

► See *Bypass valve* on page 19.

Low Side Refrigeration Gauge (item 8) reads the suction pressure of the refrigeration circuit. This gauge is provided for reference and for use by a qualified refrigeration technician during service. It is not adjusted by the operator.

2.2.2 Back panel diagram



1	Fluid supply	4	Power Cord
2	Fluid return	5	Breaker
3	Fluid Fill Cap	6	Bypass Valve

Figure 3 - Rear view of the chiller

2.2.3 Tubing connections

Insulated flexible hosing is provided with your chiller. Contact USA Lab if you require different lengths of hosing.

Hosing should be unobstructed without any hard bends in the run.

The hosing is connected to the supply and return ports of the chiller in a complete sealed loop.

The supply port carries chilled fluid from the chiller to your system. The return port carries fluid from your system back to the chiller.

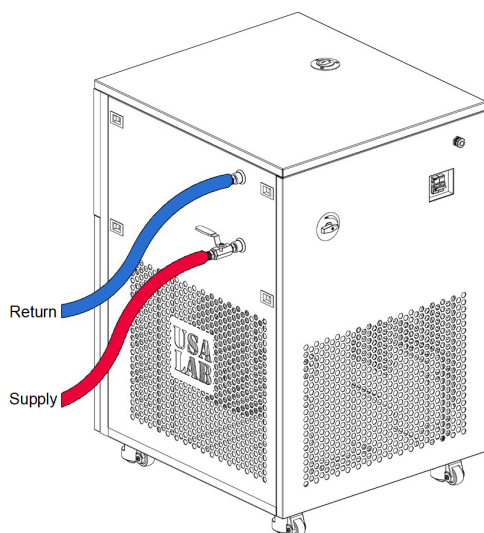


Figure 4 - Tubing connections

2.2.4 Electrical connections

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

► See *Specifications* on page 49.

The chiller must operate on its own circuit installed by a qualified electrician.

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

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

- CLC 10/40: NEMA 6-20P
- CLC 20/40: NEMA 6-20P
- CLC 30/40: NEMA L6-30P
- CLC 50/40: NEMA L6-30P



Figure 5 - Plug types used on chillers

2.2.5 Bypass valve

The bypass valve is a manually adjusted ball valve on the rear of the unit. It controls how much of the pumped fluid leaves the supply port and travels to your system, and how much is diverted back into the chiller's heat exchanger without leaving the unit.

Opening the bypass valve sends more fluid back through the chiller and less fluid to your system. Closing the bypass valve sends more fluid to your system.

The bypass valve exists to protect the pump. If your system is restrictive, or if a valve in your loop is partially closed, the bypass gives the pump somewhere to send fluid. This prevents the pump from running against a closed circuit, which will overheat it and lead to failure.

The bypass pressure gauge on the front of the unit (Figure 2, item 4) reads the pressure in this circuit. Use it to see the effect of a bypass adjustment. Pressure rises as the valve is closed and falls as it is opened.

To adjust the bypass valve:

1. Start with the bypass valve open.
2. Turn on the pump using the "Circulating" button.
3. Close the bypass valve slowly while watching flow at your system and the reading on the bypass pressure gauge.
4. Stop closing the valve once you have adequate flow through your system.
5. Do not close the bypass valve completely.



Notice

Weak coolant flow will prevent the chiller from operating correctly. If your system is not receiving enough flow, close the bypass valve further. If the pump is loud or the bypass pressure is climbing sharply, open the valve.

2.3 Emergency stop button

The emergency stop button on the chiller is located on the front of the unit. This switch is used to quickly cease all functions of the unit in an emergency.



Figure 6 - Emergency stop button

2.4 Chiller identification

The chiller identification label is located on the rear of the unit.

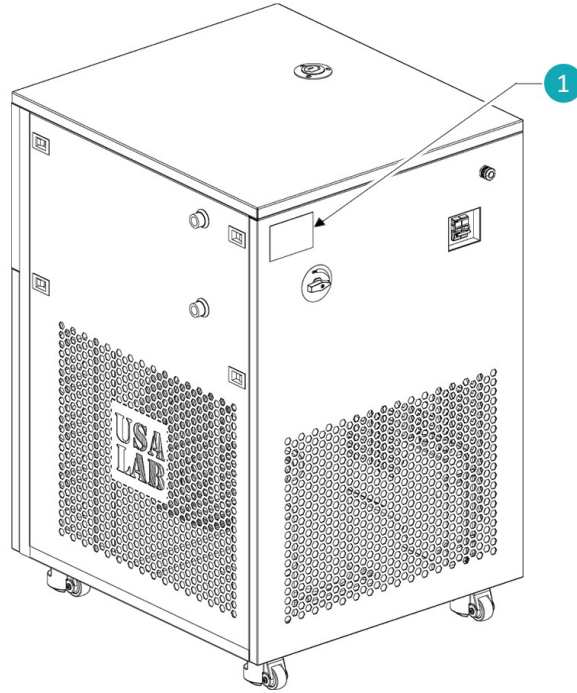


Figure 7 - Chiller data plate

The chiller identification label provides the following information:

- Unit name
- Unit model
- Refrigeration power (W)
- Voltage / Frequency (V/Hz)
- Current (A)
- Power (W)
- Weight
- Batch number
- Manufacturing date



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

2.5 Thermal transfer fluids



WARNING

Risk of fire, serious injury, or death!

Only use the thermal transfer fluids listed in this section.

Never use flammable fluids, including alcohols, in this equipment.

Use of any fluid not listed in this section voids the warranty and may cause fire, equipment damage, or serious injury.

Table 1 - Propylene glycol blends by volume %

Lowest Degree C	-10°C	-20°C	-30°C	-40°C
PG : DW	30 : 70	40 : 60	50 : 50	60 : 40

Table 2 - Ethylene glycol blends by volume %

Lowest Degree C	-10°C	-20°C	-30°C	-40°C
EG : DW	30 : 70	40 : 60	50 : 50	60 : 40



Notice

Glycol becomes more viscous as temperature drops and as concentration rises. A thicker fluid moves more slowly, increases load on the pump, and carries less heat away from your system. Use the lowest concentration that covers your intended setpoint. Do not use a stronger blend than your application requires.

The following cooling fluids are permissible for use with the CLC Series chillers

- Propylene Glycol (blended with distilled water only)
- Ethylene Glycol (blended with distilled water only)
- Low viscosity and low temperature silicone oil (Relatherm S-2, or similar rated <60Cst @ -40°C)

Wetted materials

The thermal transfer fluid contacts stainless steel and PTFE. Confirm that your chosen fluid is compatible with both materials before filling the unit.

Prohibited fluids

Use of any of the following voids the warranty:

- Tap water or deionized water
- Water alone at any setpoint below 0 °C
- Automotive antifreeze or any glycol containing an additive package
- Any flammable fluid, including alcohols
- Any oil other than the approved silicone oil
- Two different fluid types mixed together

Changing fluid types

Do not add one approved fluid on top of another. When switching from one approved fluid to another, fully drain and flush the chiller and your system first. See *Draining and changing the fluid* on page 41.



Notice

When using silicone oil, fill the reservoir to around 80%. Silicone oil contracts as it cools, which requires more fluid in the system.

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3 Installation and set up

Before you start using your ETL CLC Chiller, make sure all parts have been received. The next section will cover the included parts and how to prepare the unit for use.

3.1 What's in the box

The following parts are included in the package:

Table 3 - Packaging list

Part	Amount
ETL CLC Chiller	1 unit
Insulated bellow hosing - 6 ft	2 pieces
Fiber gaskets	6 pieces
Brass female NPT ball valve	1 piece
Male NPT union	1 piece
Manual pouch	1 piece
PTFE sealing tape	1 piece
Manual	1 piece

3.2 Positioning and preparing the chiller

Unpack the chiller 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 packaging material.

3.2.1 Moving the chiller

**WARNING****Risk of injury from lifting heavy objects!**

The chiller weighs 256 lbs (330 lbs for the CLC 50/40). Use a pallet jack, forklift, or two or more people to move the unit. Do not attempt to lift it alone.

- Keep the unit upright at all times.
- Do not roll the casters over thresholds, cords, hoses, or uneven surfaces.
- Lock the casters once the unit is in position.

Before you install the chiller, confirm the following:

- A dedicated circuit has been installed by a qualified electrician, at the correct voltage and amperage for your model. See *Specifications* on page 49.
- The installation area is indoors, between 41 °F and 77 °F (5 °C and 25 °C), below 2000 m altitude, and within the humidity range given in the specifications.
- The floor is level and rated to carry the weight of the unit. See *Specifications* on page 49.
- There is at least 12-16" (300-400 mm) of clearance on all sides. See *Safe operating area* on page 11.
- The room is ventilated well enough to absorb the heat the chiller rejects.
- You have enough approved thermal transfer fluid on hand to fill the chiller, your system, and the hose run.

Estimating how much fluid you need

The chiller reservoir holds 9 L (19 L on the CLC 50/40), but most of the fluid in a running system sits in the hoses and in your jacket or vessel, not in the reservoir. Size your fluid purchase as:

Reservoir capacity + the volume of your jacket or vessel + the volume of the hose run

Have more fluid on hand than you calculate. The priming procedure requires repeated topping up as fluid moves out into the system.

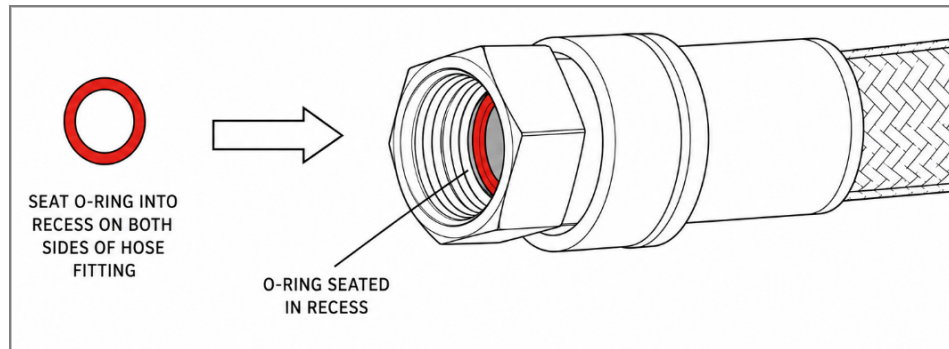
Preparing the chiller

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.

► See *Safe operating area* on page 11.

2. Apply PTFE sealing tape to the male threads of the brass ball valve. Wrap the tape in the direction of the thread, three to four turns.
3. Thread the ball valve into the return port. Tighten by hand, then snug with a wrench. These are tapered NPT threads. Do not over tighten.
4. Apply PTFE sealing tape to the male NPT union in the same way, then thread it into the brass ball valve. Tighten by hand, then snug with a wrench
5. Add a fiber gasket to each end of both hoses, four gaskets in total. Six gaskets are supplied, so two are spares. Fiber gaskets are single use. Replace the gasket any time you break a connection and reassemble it.



6. Connect one hose to the male NPT union you assembled on the chiller return port.
7. Connect the other end of that hose to the lowest port on your system.
8. Connect the second hose to the supply port on the chiller
9. Connect the other end of the second hose to the highest port on your system.

Connecting the return to the low point and the supply to the high point allows air to clear out of your system as it fills.

**Notice**

After delivery, allow the chiller to stand upright for 24 hours before connecting it to power for the first time. Powering the unit before the compressor oil has settled can damage the compressor.

10. Connect the unit to the power supply that matches the specifications of your model.

3.2.1.1 Routing the hoses

- Keep hose runs as short as possible.
- Do not put any hard bends or kinks in the hose. Hard bends restrict flow and will prevent the chiller from operating correctly.
- Do not allow anything to crush or pinch the hose.

- Insulate the full length of both hoses. Uninsulated line loses cooling capacity to the room and will collect condensation or ice at low setpoints.
- Route the hoses so they cannot be tripped over or driven into.
- The supplied hoses are 6 ft. Contact USA Lab if your installation requires a different length. Longer runs increase thermal loss and reduce the flow reaching your system.

3.3 Priming the chiller and system

Before priming, connect hosing and pre-fill jacket if possible.

Prime the pump in the following scenarios:

- On first use
- After the reservoir is emptied, and then filled
- If you notice any bubbling (glass jackets)
- If the liquid flow is impeded

Before you start:

- Have a funnel, a rag, and a drip tray ready.
- Have your approved thermal transfer fluid on hand, more than you calculated for the system volume.
- Open the bypass valve on the rear of the unit. See *Bypass valve* on page 19.

Filling the chiller is a repeating cycle. Fluid poured into the expansion tank moves out into your hoses and system as soon as the pump runs, which drops the level in the reservoir. You refill, run the pump again, and repeat until the level stops dropping. That is how you know the system is full and the air is out.

To fill and prime the chiller, follow these steps:

1. Make sure the brass return valve is closed.

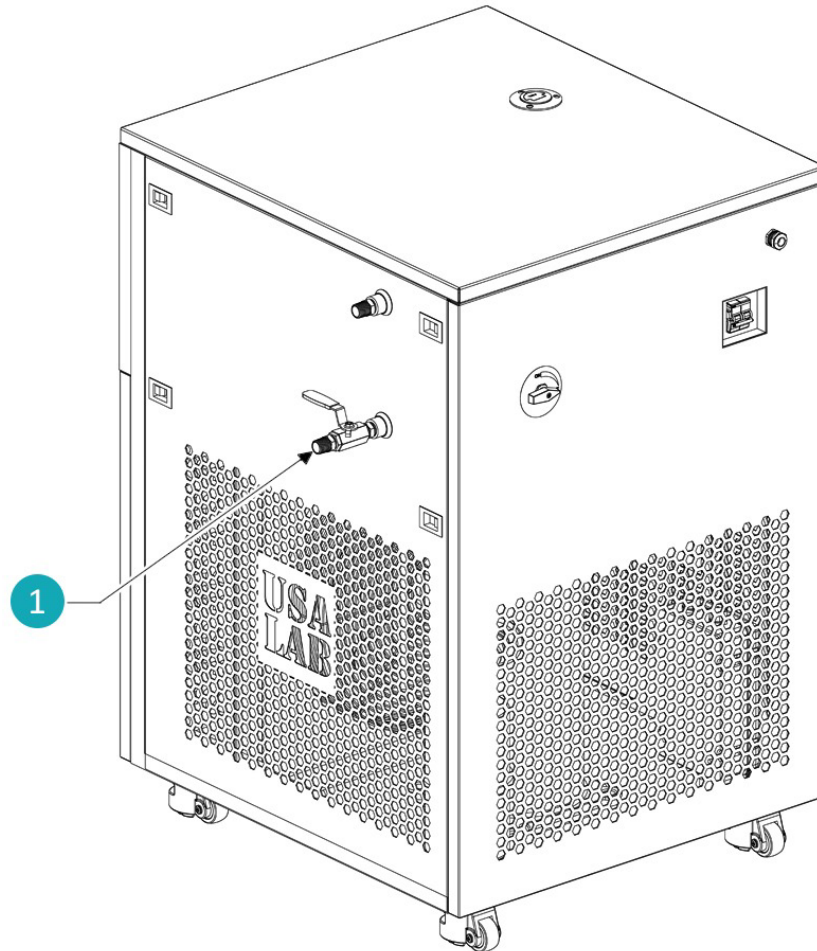


Figure 8 - Return Valve Closed

2. Open the filling port on top.

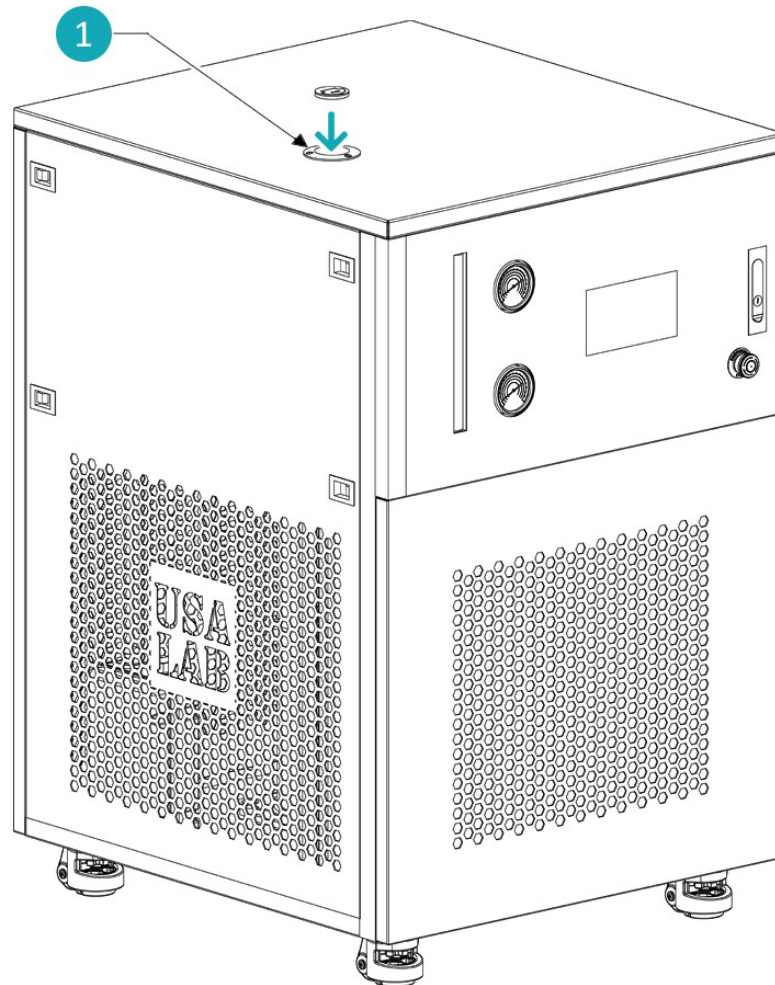


Figure 9 - Transfer Fluid Fill Cap

3. Use a funnel to fill the expansion tank with the coolant. Watch the sight glass carefully.

4. When filled to 90%. Stop filling.

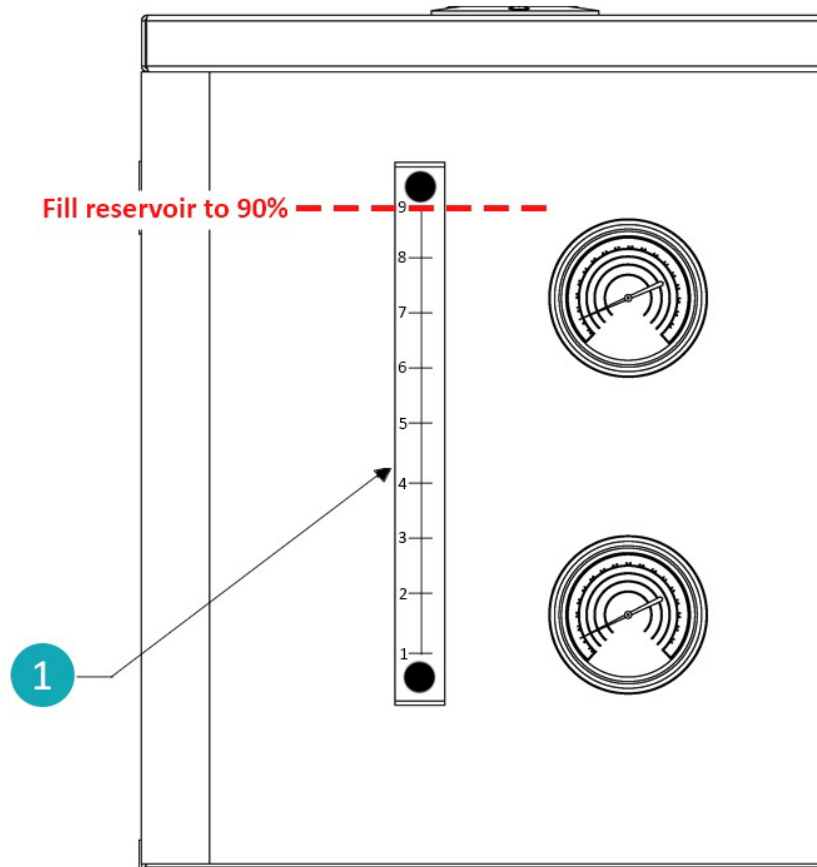


Figure 10 - Fluid Sight Glass

5. Turn on breaker at the rear, then release the emergency stop button.

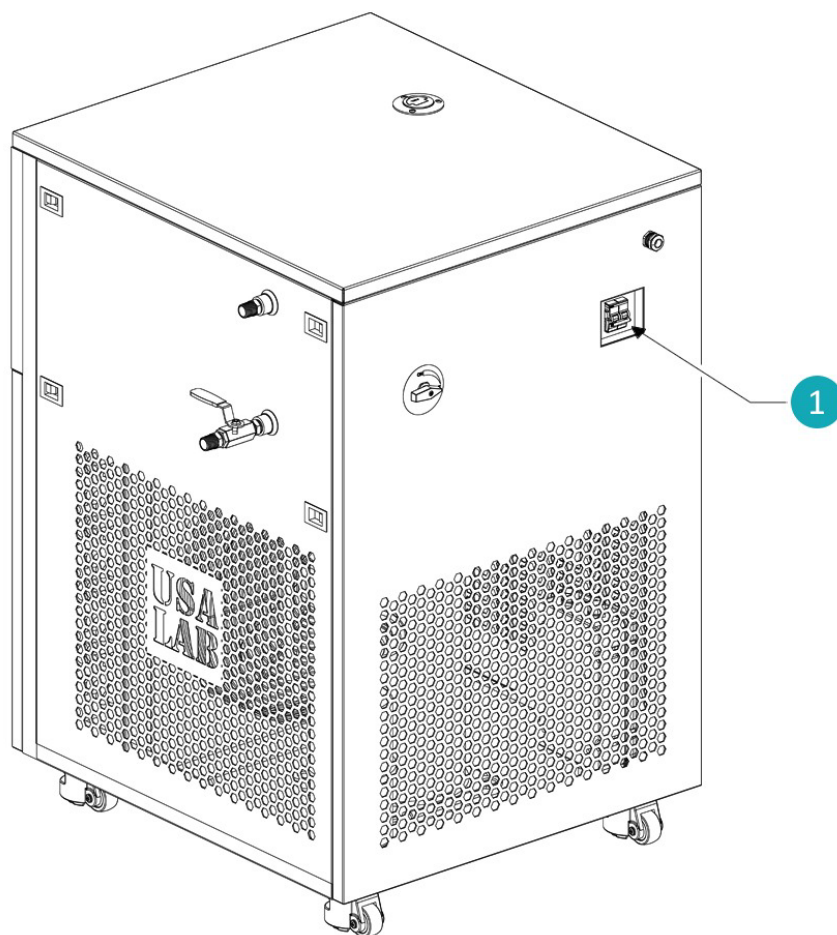


Figure 11 - Breaker

6. Open the brass return valve.
7. Turn on the pump by using the “Circulating” button and watch the level carefully.
8. Adjust the bypass valve to establish flow through your system. See *Bypass valve* on page 19.
9. When the level has dropped to 10%. Turn the pump off.
10. Repeat steps 3, 4, 7, 8 and 9 until the liquid level does not drop any longer.



Notice

A pump that is fully primed runs at a steady, even hum. A pump still moving air gurgles, rattles, or surges. If the sound does not settle after several fill cycles, there is still air in the system.

11. Fill the unit to your desired level. Between 20% to 80% is acceptable.

**Notice**

The fluid is primarily stored in the tubing throughout the system. The expansion tank fills in the gaps of the system or stores excess fluid.

**Notice**

The expansion tank does not need to be filled completely with most coolants. When using silicone oil fill the level to around 80%. Silicone oil will contract, requiring more fluid in the system.

3.3.1 Clearing trapped air from your system

Air collects at the high points of a loop. If the pump is primed but flow is still weak, or if you see bubbles moving through a glass jacket:

1. Turn off the pump.
2. Loosen the highest connection in your system slightly to release trapped air, then retighten it.
3. Top up the reservoir.
4. Run the pump again and check for bubbles.
5. Repeat until no air is visible.

If the pump will not prime

Possible cause	Solution
The brass return valve is still closed	Open the return valve
Air is trapped in the loop	Clear trapped air as described above
A hose is kinked or has a hard bend	Reroute the hose
There is not enough fluid in the system	Top up the reservoir and run the pump again
The bypass valve is closed	Open the bypass valve and restart the pump
The fluid is too viscous at the current room temperature	Allow the fluid to warm, or use a lower glycol concentration

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4 Operations

This section describes common tasks required for the operation of the ETL CLC Chiller.

4.1 Using the touchscreen

The touchscreen on the front of the chiller displays the current fluid temperatures and gives you control over the pump, the cooling, and the temperature setpoint.

PV (Process Value) is the temperature the chiller is currently reading. This is the live measurement.

SV (Set Value) is the temperature you want the chiller to reach and hold. This is the value you set.

Outlet temperature is the temperature of the fluid leaving the chiller and heading to your system.

Inlet temperature is the temperature of the fluid returning to the chiller from your system.

The difference between the inlet and outlet readings reflects how much heat your system is putting into the fluid. This difference will change with your load, your flow rate, and your setpoint.

Circulating turns the fluid pump on and off.

Cooling turns the cooling on and off. Always run the pump before enabling cooling.

Control inlet temperature

This button selects which of the two temperatures the chiller controls to.

Inlet is the temperature of the process fluid returning to the chiller from your system.

Outlet is the temperature of the process fluid leaving the chiller and going out to your system.

With the button set to control inlet temperature, the chiller works to hold the fluid coming back from your system at the setpoint. With it set to control outlet temperature, the chiller works to hold the fluid it is delivering at the setpoint.

Setting the temperature

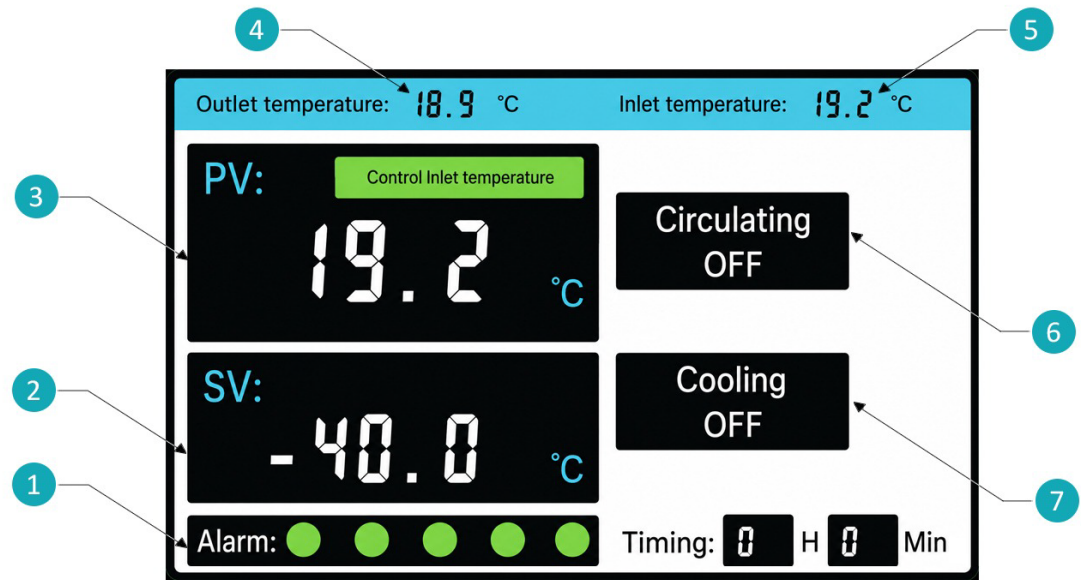
Tap the SV field and enter the temperature you want the chiller to hold.

The controller will not accept a setpoint below the lowest temperature the unit is rated for. If you enter a value below that limit, the controller holds at its lowest allowed setting. See *Specifications* on page 49 for the range of your model.

Alarm indicators

The alarm indicators along the bottom of the display show the status of the unit.

If an alarm appears, shut the chiller down using the procedure in *Shutting down the chiller* on page 37, then restart it. If the alarm does not clear after a restart, stop using the unit and contact USA Lab at tech@usalab.com or (734) 855-4890.



1	Alarm Setting	5	Return Temperature
2	Temperature Set Value	6	Pump On/Off
3	Process Temperature Value	7	Cooling On/Off
4	Supply Temperature		

Figure 12 - Touchscreen display

4.2 Running the chiller

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

Before starting the chiller, check the following:

- Fluid level is visible in the sight glass, between 20% and 80%
- The brass return valve is closed
- Both hoses are connected and insulated
- There is clearance around the unit and the ventilation is not obstructed

To run the chiller, follow these steps:

1. Turn on the breaker at the rear of the unit. See Figure 3.
2. Release the emergency stop button. See Figure 6.
3. Open the brass return valve.
4. Turn on the pump using the "Circulating" button.
5. Adjust the bypass valve to establish flow through your system. See *Bypass valve* on page 19.
6. Walk the length of both hoses and check every connection for leaks.
7. Set the temperature using the SV field.
8. Enable cooling using the "Cooling" button.

The time it takes to reach setpoint depends on your model, your heat load, and the fluid you are using. See *Cooling curves* on page 57

**Notice**

At low setpoints, condensation or frost on uninsulated lines and fittings is normal. Insulate the full hose run to reduce it.

4.3 Shutting down the chiller

After you finish your work, the chiller must be shut down properly.

To shut down the chiller, follow these steps:

1. Turn off the cooling by pressing the "Cooling" button.
2. Allow the system to warm before continuing. This is important when your system uses glassware, where a sudden temperature change can crack the vessel.
3. Turn off the pump by pressing the "Circulating" button.
4. Close the return valve to prevent liquid from draining out of the unit.
5. Turn off the breaker at the rear to cut all power to the unit.

**Notice**

Wait 10 minutes before restarting the chiller. Starting the compressor before the cool-down period has passed will shorten its life.

**Notice**

The emergency stop button is for emergencies only. Use the shutdown procedure above for normal operation. See *Emergency stop button* on page 20.

**Notice**

If the unit will not be used for a long period, see *Long-term storage* on page 42 for long-term storage instructions.

4.4 Unattended operation

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

Do not leave the chiller running unattended. A leak, a loss of flow, or a fault that develops while the unit is unsupervised can damage your system, damage the chiller, and create a slip or electrical hazard in your work area.

5 Service and maintenance

When using an ETL CLC Chiller, make sure to service your unit correctly and perform the necessary checks at the required intervals.



WARNING

Risk of serious injury or death!

Shut off the power switch and disconnect the power cord from the unit before performing any maintenance tasks.

Maintenance of internal electrical and heating parts must be performed by professionals or trained electricians.

Cleaning tips:

- Use a damp and soft cloth for wiping.
- Use neutral detergents to deal with stubborn stains.
- Do not splash water directly over the equipment.
- Do not use abrasive powder, diluent, oil, kerosene, acidic material, or similar substances when cleaning.



Notice

When using the recommended propylene glycol in thermal transfer fluids, remember that glycol degrades over time. Purchase glycol test strips and test the substance monthly.

5.1 Regular checks

USA Lab recommends the following checks to make sure your equipment runs smoothly:

Table 4 - Regular checks for the ETL CLC Chiller.

Check	Every day	Every month	Every 3 months
Check the fluid levels.	Yes		
Check for cracks and potential leaks.	Yes		
Check for any damaged electrical lines.	Yes		
Check the coils for damage and wear.			Yes
Change the cooling fluids and check fluids for debris.			Yes
If required, change the taping on the piping joints.			Yes
Blow out the condenser section with compressed air and clean the condenser. In high-dust environments, perform this check every month instead.			Yes
Test the glycol concentration with test strips		Yes	

Cleaning the condenser



WARNING

Risk of electrical shock!

Turn off the breaker and disconnect the power cord before cleaning the condenser.

Wear eye protection when using compressed air.

1. Shut down the chiller, turn off the breaker, and disconnect the power cord.
2. Release the side panel latches (Figure 2, item 1) and remove the side panel.
3. Blow out the condenser fins with compressed air, working in the direction opposite to normal airflow.
4. Clear the loosened dust away from the unit so it is not drawn straight back in.
5. Refit the side panel and secure the latches.

Clean the condenser every 3 months, or every month in a high dust environment.

5.2 Draining and changing the fluid

The return valve is the lowest point in the fluid circuit. Drain the unit from there.



WARNING

Risk of electrical shock!

Turn off the breaker and disconnect the power cord before draining the unit.

To drain the chiller:

1. Shut down the chiller. See *Shutting down the chiller* on page 37.
2. Turn off the breaker at the rear and disconnect the power cord.
3. Place a container under the return valve. The container must be large enough to hold the fluid in the chiller, the hoses, and your system.
4. Disconnect the return hose from the brass ball valve.
5. Open the ball valve and allow the chiller to drain completely.
6. Drain the hoses and your system into the same container.
7. Close the ball valve once the flow has stopped.

Dispose of used thermal transfer fluid according to local regulations. Do not pour it into a drain.

Changing to a different fluid

Do not add one approved fluid on top of another. Drain the chiller and your system completely, then flush the full circuit with a small volume of the new fluid and drain again before filling. See *Thermal transfer fluids* on page 22.

5.3 Long-term storage

If you plan to not use your chiller for a longer period of time, take the following actions to prepare the unit for storage:

- Empty the unit of any fluids.
- Cap the supply and return ports.
- Clean the condenser.
- Clean the body of the unit.
- Wrap the unit with plastic.
- Store the unit in a secure and level location.
- Store in a dry climate.
- Do not store outside.

6 Troubleshooting

If you encounter issues with your unit, refer to the following table or contact tech@usalab.com at USA Lab.

► See *Contact information* on page 2.

Table 5 - Troubleshooting for the ETL CLC Chiller

Problem	Possible cause	Solution
No power	1. The chiller is not plugged in. 2. There is no power from the return port. 3. There is power in the return port, but not in the chiller.	1. Plug in the chiller. 2. Reset the breaker or GFCI. Call an electrician. 3. Open the front panel, and check for damage.
Incorrect temperature display	1. The probe wire is loose. 2. The temperature probe has a short circuit. 3. The display board has failed.	1. Repair the loose wire. 2. Replace the temperature probe. 3. Replace the display board.
Temperature display not working correctly or flashing	1. Incorrect supply voltage. 2. The power board has failed.	1. Verify the power supply matches the requirements. 2. Replace the power board.
Shock from the unit shell	1. Faulty system grounding.	1. Repair the fault in system grounding.
No cooling	1. Cooling is not enabled. 2. The condenser fan is not spinning. 3. The compressor does not start. 4. The refrigerant has leaked.	1. On the display, press the cooling button. 2. Replace the condenser fan. 3. Check the capacitors, relay, and power board. 4. Call an HVAC technician to repair and recharge the system.

Problem	Possible cause	Solution
Cooling slowly or warming	1. The compressor has stopped. 2. The condenser fan is not spinning. 3. The glycol ratio is incorrect. 4. The capillary or refrigerant are blocked. 5. The liquid pump is running slowly. 6. The load is greater than the chiller can handle. 7. The tubing lines are not insulated.	1. Wait 10 minutes for the compressor delay to end. 2. Replace the condenser fan. 3. Do not use more than 60 % glycol in your blend. 4. Call an HVAC technician to repair and recharge the system. 5. Re-prime the liquid circulation pump or remove the restriction. 6. Reduce the heat load on the chiller. 7. Use the supplied line insulation to prevent thermal loss.
Pump runs but there is no flow or low flow	1. The bypass valve is too far open. 2. The brass return valve is closed. 3. A hose is kinked or has a hard bend. 4. The pump has lost its prime. 5. The fluid is too viscous.	1. Close the bypass valve further. 2. Open the return valve. 3. Reroute the hose. 4. Re-prime the pump. 5. Warm the fluid or use a lower glycol concentration.
Pump is noisy, gurgling, or surging	1. Air is trapped in the system. 2. The reservoir level is too low. 3. The bypass valve is closed too far.	1. Clear trapped air and re-prime. 2. Top up the reservoir. 3. Open the bypass valve.

Problem	Possible cause	Solution
Fluid level drops over time	1. Air is still working its way out of the system. 2. There is a leak at a connection. 3. Silicone oil has contracted as the system cooled.	1. Top up the reservoir and continue running. 2. Check every connection and replace the fiber gasket. 3. Top up the reservoir.
Heavy ice or condensation on lines and fittings	1. Hoses are not insulated. 2. Room humidity is high.	1. Insulate the full hose run. 2. Reduce humidity in the installation area.
Unit reaches setpoint but cannot hold it under load	1. The heat load is greater than the chiller can handle. 2. Flow to the system is too low. 3. The condenser is dirty or ventilation is obstructed.	1. Reduce the heat load or select a larger unit. 2. Close the bypass valve further to increase flow. 3. Clean the condenser and clear the ventilation area.

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7 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.



Not to be serviced by users!

The refrigeration circuit is sealed and contains refrigerant under pressure. Only a qualified refrigeration technician may open, service, or recharge it.

Refrigerant must be recovered and disposed of according to local regulations.

Do not release refrigerant to the atmosphere.

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.

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8 Specifications

This chapter details the specifications of all ETL CLC Chillers.

8.1 CLC 10/40 specifications

Table 6 - CLC 10/40 specifications

Reservoir capacity	9 L
Reservoir dimensions	300X100X300mm 12x4x12 (in)
Temperature range	Ambient to -40°C*
Environmental operation conditions	a) indoor use b) altitude up to 2 000 m c) temperature 5 °C to 25 °C d) maximum relative humidity 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C
Power requirements	220V 60 Hz / 15 A (20A Single Phase)
Plug type	NEMA 6-20P
Compressor type	2HP Invotech
Compressor capacity (BTU)	15,051 BTU @ 20 °C / 253 BTU @ (Minimum Temp)
Compressor capacity (Watt)	4,411W - 74W
Pump model	GPD20-6S
Pump wattage	100 W
Pump flow rate (water)	30 L/min
Pump lift (water)	4 m / 12 ft
Pump pressure	2.2 bar
Tube High Pressure (Mpa)	2.80(Stable)

* The minimum temperature reached in practice depends on your heat load, the thermal transfer fluid in use, the ambient conditions, and your system configuration. See *Cooling curves* on page 57 for tested performance.

Tube Low Pressure (Mpa)	0.10(Stable)
Port connection size	1/2" FNPT
Refrigerant	R-507 (1300g)
Overall dimensions	26.8x23.6x37.8 (in)
Weight	256 lbs

8.2 CLC 20/40 specifications

Table 7 - CLC 20/40 specifications

Reservoir capacity	9 L
Reservoir dimensions	300X100X300mm 12x4x12 (in)
Temperature range	Ambient to -40°C*
Environmental operation conditions	a) indoor use b) altitude up to 2 000 m c) temperature 5 °C to 25 °C d) maximum relative humidity 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C
Power requirements	220V 60 Hz / 15 A (20A Single Phase)
Plug type	NEMA 6-20P
Compressor type	3HP Invotech
Compressor capacity (BTU)	22,576 BTU @ 20 °C / 376 BTU @ Min Temp
Compressor capacity (Watt)	6615W-110W
Pump model	GPD20-6S
Pump wattage	100 W
Pump flow rate (water)	30 L/min
Pump lift (water)	4 m / 12 ft
Pump pressure	2.2 bar
Tube High Pressure (Mpa)	2.80(Stable)
Tube Low Pressure (Mpa)	0.10(Stable)
Port connection size	1/2" FNPT
Refrigerant	R-507 (1400g)
Overall dimensions	26.8x23.6x37.8 (in)
Weight	256 lbs

* The minimum temperature reached in practice depends on your heat load, the thermal transfer fluid in use, the ambient conditions, and your system configuration. See *Cooling curves* on page 57 for tested performance.

8.3 CLC 30/40 specifications

Table 8 - CLC 30/40 specifications

Reservoir capacity	9 L
Reservoir dimensions	300X100X300mm 12x4x12 (in)
Temperature range	Ambient to -40°C*
Environmental operation conditions	a) indoor use b) altitude up to 2 000 m c) temperature 5 °C to 25 °C d) maximum relative humidity 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C
Power requirements	220V 60 Hz / 20A
Plug type	L6-30P
Compressor type	4HP Invotech
Compressor capacity (BTU)	30,102 BTU @ 20 °C / 502 BTU @ Min Temp
Compressor capacity (Watt)	8820W-147W
Pump model	GPD25-8S
Pump wattage	245 W
Pump flow rate (water)	53 L/min
Pump lift (water)	6 m / 20 ft
Pump pressure	2.2 bar
Tube High Pressure (Mpa)	2.80(Stable)
Tube Low Pressure (Mpa)	0.10(Stable)
Port connection size	1/2" FNPT
Refrigerant	R-507 (1900g)
Overall dimensions	26.8x23.6x37.8 (in)
Weight	256 lbs

* The minimum temperature reached in practice depends on your heat load, the thermal transfer fluid in use, the ambient conditions, and your system configuration. See *Cooling curves* on page 57 for tested performance.

8.4 CLC 50/40 specifications

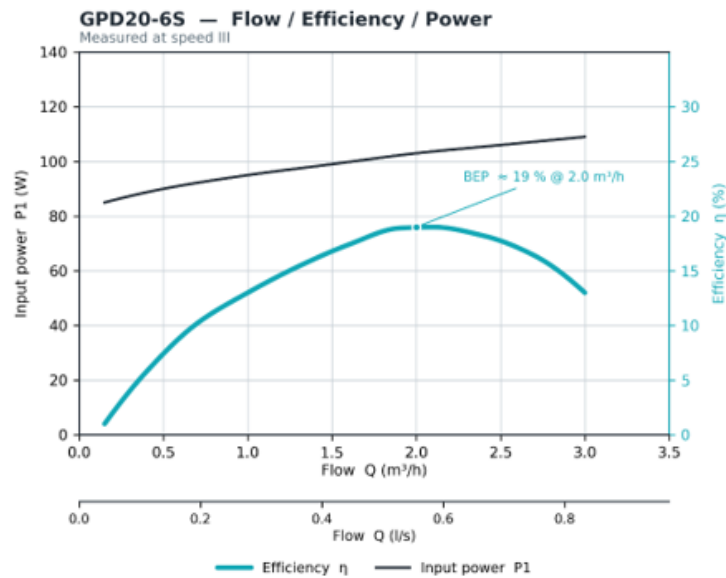
Table 9 - CLC 50/40 specifications

Reservoir capacity	19 L
Reservoir dimensions	400X140X340mm 16x5.5x13.4 (in)
Temperature range	Ambient to -40°C*
Environmental operation conditions	a) indoor use b) altitude up to 2 000 m c) temperature 5 °C to 25 °C d) maximum relative humidity 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C
Power requirements	220V 60 Hz / 22.5 A(30A Single Phase)
Plug type	L6-30P
Compressor type	5HP Invotech
Compressor capacity (BTU)	37,617 BTU @ 20 °C / 627 BTU @ Min Temp
Compressor capacity (Watt)	11025W-184W
Pump model	Aulank WM-05E
Pump wattage	370 W
Pump flow rate, maximum (at zero head)	42 L/min
Pump head, maximum (at zero flow)	28 m / 92 ft
Pump rated duty	22 m at 14 L/min
Tube High Pressure(Mpa)	2.56(Stable)
Tube Low Pressure(Mpa)	0.12(Stable)
Port connection size	1/2" FNPT
Refrigerant	R-507 (2700g)
Overall dimensions	31x26.8x42 (in)
Weight	330 lbs

* The minimum temperature reached in practice depends on your heat load, the thermal transfer fluid in use, the ambient conditions, and your system configuration. See *Cooling curves* on page 57 for tested performance.

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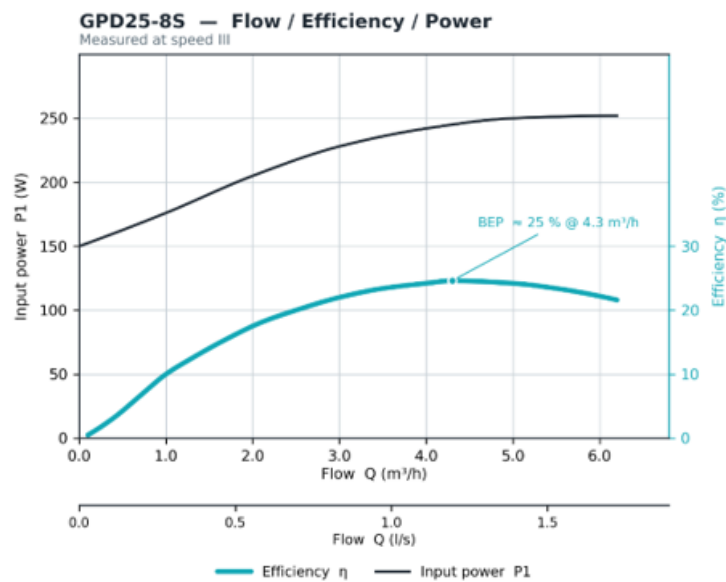
9 Pump curves



Speed settings

Speed	P1 (W)	I _n (A)
III	100	0.45
II	70	0.35
I	55	0.25

230 V · 50 Hz · Class H
Max. working pressure 10 bar



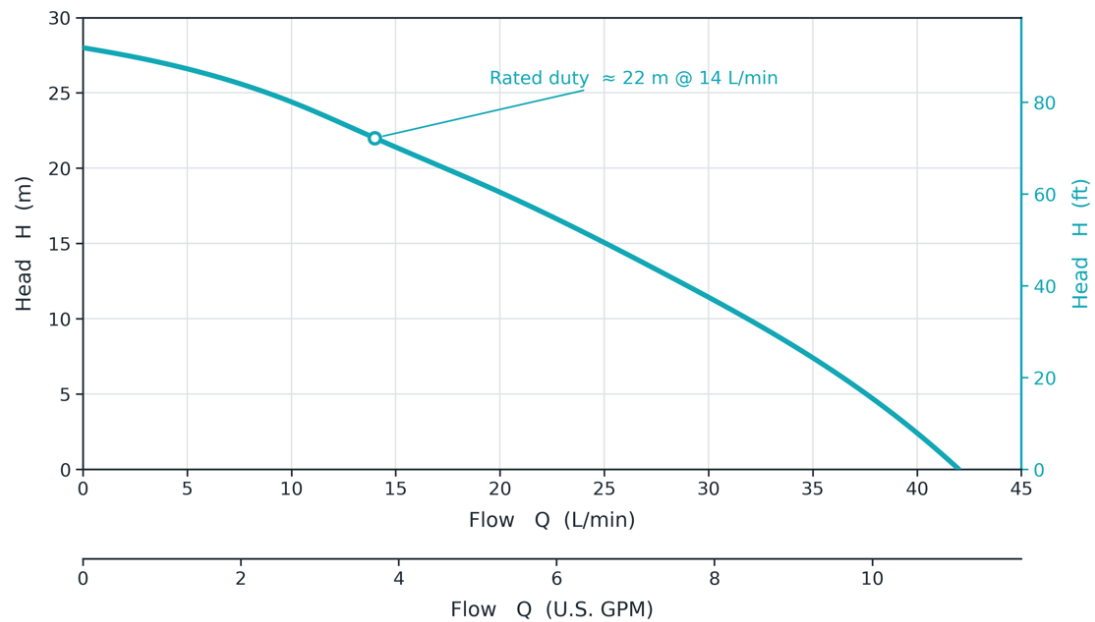
Speed settings

Speed	P1 (W)	I _n (A)
III	245	1.10
II	190	0.85
I	135	0.60

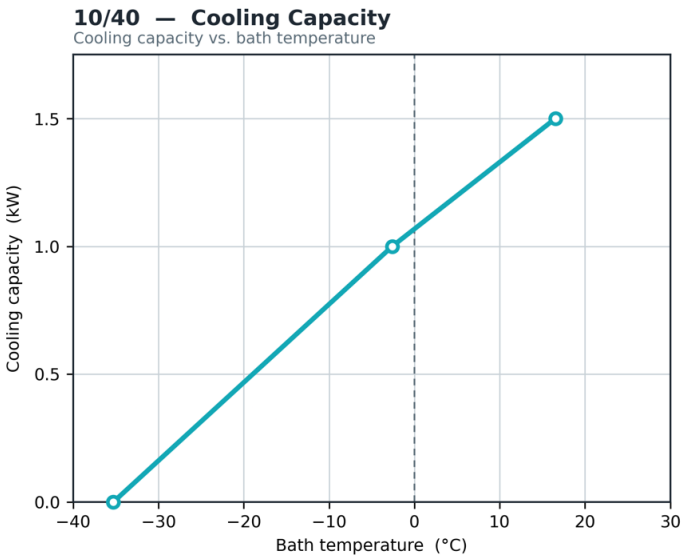
230 V · 50 Hz

Aulank WM-05E — Head / Flow

Measured on water at 20 °C · 60 Hz · 3400 r/min



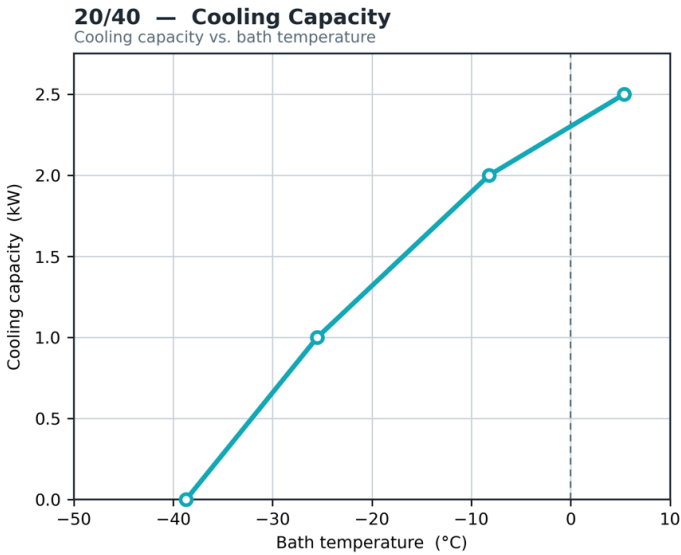
10 Cooling curves



Test data

Temp (°C)	Capacity (kW)
-35.3	0
-2.6	1
16.5	1.5

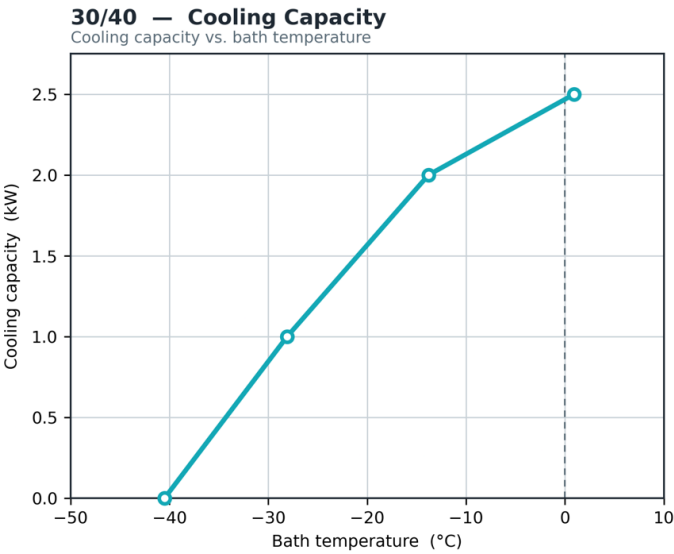
Minimum temperature: -35.3 °C
Max capacity tested: 1.5 kW



Test data

Temp (°C)	Capacity (kW)
-38.7	0
-25.5	1
-8.2	2
5.4	2.5

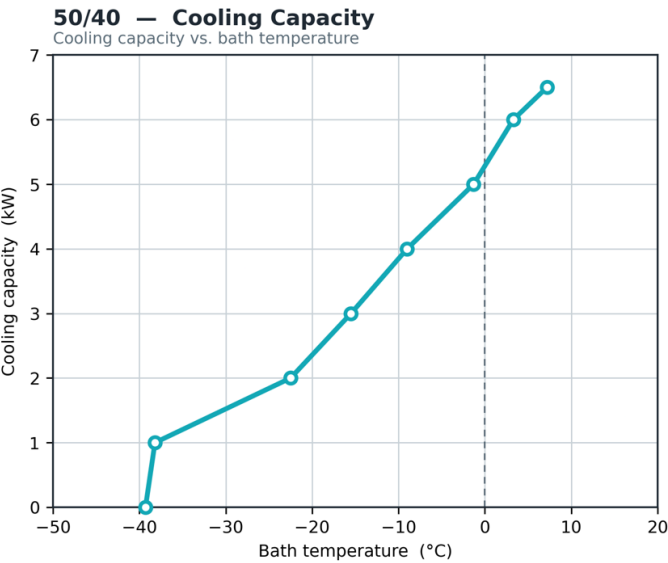
Minimum temperature: -38.7 °C
Max capacity tested: 2.5 kW



Test data

Temp (°C)	Capacity (kW)
-40.5	0
-28.1	1
-13.8	2
0.9	2.5

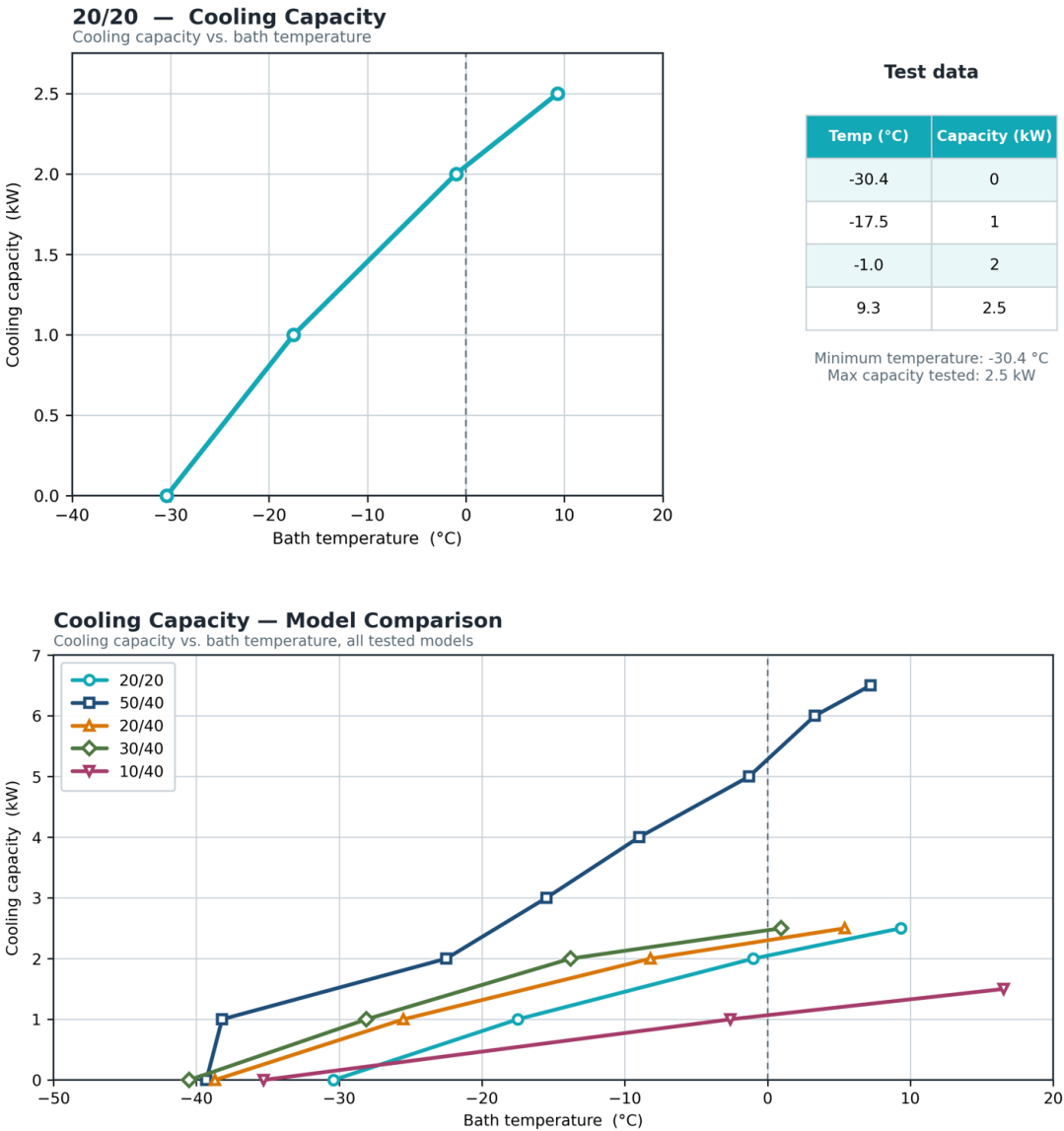
Minimum temperature: -40.5 °C
Max capacity tested: 2.5 kW



Test data

Temp (°C)	Capacity (kW)
-39.3	0
-38.2	1
-22.5	2
-15.5	3
-9.0	4
-1.3	5
3.3	6
7.2	6.5

Minimum temperature: -39.3 °C
Max capacity tested: 6.5 kW



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11 Spare parts

For spare or replacement parts, contact USA Lab.

Have the following information from the chiller identification label ready when you call. See *Chiller identification* on page 21.

- Unit name and model
- Batch number
- Manufacturing date

The refrigeration circuit and the internal electrical components are not user serviceable. See *Safety warnings* on page 12.

support@usalab.com

tech@usalab.com

(734) 855-4890

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12 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.

12.1 Returns 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

► See *Contact information* on page 2.

Bypass valve

A manually adjusted valve on the rear of the unit that controls how much fluid is sent to your system and how much is diverted back through the chiller

Delta T

The difference between two temperatures. On this chiller, usually the difference between the inlet and outlet fluid temperatures

Head

The vertical height a pump can lift fluid, and a measure of the resistance a pump works against

Pull-down

The period during which the chiller brings the fluid from its starting temperature down to the setpoint.

PV, Process Value

The temperature the chiller is currently measuring.

Setpoint

The temperature you want the chiller to reach and hold.

Short cycling

When the chiller reaches setpoint quickly, the cooling shuts off, and then restarts a short time later, repeating. Caused by a heat load that is too small for the unit. Short cycling causes early component failure and is not covered under warranty.

SV, Set Value

The setpoint as entered on the touchscreen.

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14 Quick start

This page is a summary. Read the full manual before operating the equipment.

Starting up

1. Check the fluid level in the sight glass, 20% to 80%
2. Turn on the breaker at the rear
3. Release the emergency stop
4. Open the brass return valve
5. Press "Circulating" to start the pump
6. Adjust the bypass valve for flow to your system
7. Set the temperature (SV)
8. Press "Cooling"

Shutting down

1. Press "Cooling" to turn cooling off
2. Let the system warm
3. Press "Circulating" to turn the pump off
4. Close the return valve
5. Turn off the breaker

Every day

- Check the fluid level
- Check for leaks and cracks
- Check for damaged electrical lines

Every month

- Test the glycol concentration

Wait 10 minutes before restarting the compressor.

Do not leave the chiller running unattended.

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