-35°C Scientific Freeze Dryer Manual

Model:

USA-SFD-4, USA-SFD-6

Safety Precautions and Explanations

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

Training

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

Safety

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

Symbols and Warnings

Below are examples of commonly used symbols and what they mean.

Understand them and their potential consequences.

High Voltage or Electrical Hazard

Explosive Hazard

Not User Serviceable

Flammable Hazard

Hot Surface or Steam Hazard

Operating Principals

Freeze drying is the process of removing water and/or solvents from frozen samples. During the process the sample is in a liquid state below freezing. Generally lower than -10°C. Over time, the sample will be heated very slowly while still frozen. The solid water will convert directly to a gas. This is the process of sublimation. The gasses will then recondense in the cold trap.

This low temperature process is best used for samples that are “high temperature” sensitive. Biological products such as tissues, tissue extracts, bacteria, and vaccines are made with the use of this process. Vacuum freeze drying is the most gentle presevation process, even benefiting nano scale paticles.

How a recipe runs

Stage 1 – The most time intensive step. This initial step sees the freezer start at room temperature. The cooling will begin, pulling the heat out of the chamber. ***During this stage the vacuum will not turn on***. When the chamber is close to its target temperature, add your pre-frozen samples to the freeze dryer. When the target temp. is reached, the next step will begin automatically.

Stage 2 – ***The vacuum will start*** pulling down during this step. Once the correct vacuum pressure is reached. The remaining stages will run in order.

Stage 3+ - These stages will incrimentally increase the temperature, generally 1-3 hours per stage @+5°C. This is where the “recipe” will begin to dry your samples based on your settings.

Notes / Warnings

It is recommended to set your unit to “automatic running” to enable the recipe function.

Samples thicker than ¾” / 2cm will extend the time requred for stage 1.

Use the vacuum pump receptacle on the back of the unit to power the vacuum pump, otherwise the vacuum pump will not be controlled by the system. * Maximum of 8 amps *

Remember to clean the unit between runs and empty the chamber and vent lines of any liquid.

If you would like to save the data recorded during the process. Simply plug a FAT32 formatted, 1 - 8 GB USB memory card into the USB port on the top right side of the unit.
To export the data: Press the record tab > then press USB Export.

WARNING: Anything containing azide, must not be used in this device. Azides are explosophores and toxins. The molecules bond to non-ferrous metals and cause explosions.

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Section 1 | Important Information

1.1 Safety Notices

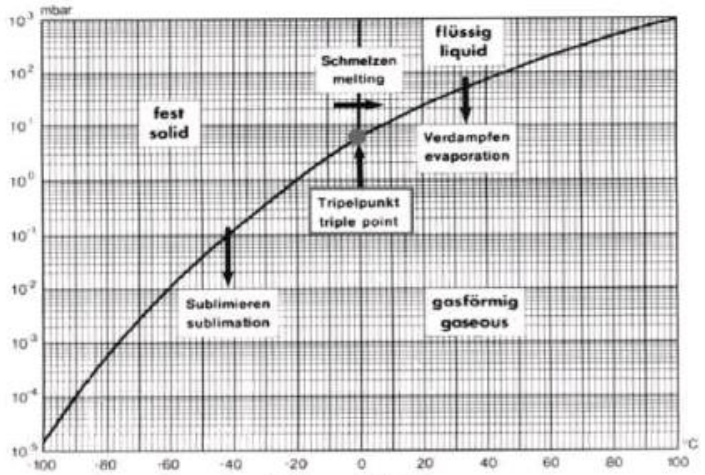
- All electrical work must be executed by suitably qualified persons. When using any electrical appliance, safety precautions must always be observed.
- Do not use this appliance for other than its intended use. This product is intended for use as a Low Temperature Freeze Dryer for laboratory samples. Consult your supplier for alternatives.
- Do not cover the front grille or block the rear air entry by placing object up against the cabinet.
- Pay close attention, when used by or near children
- Ensure adequate ventilation.
- Do not cut any openings into the cabinet.
- Do not touch any internal electrical parts or hot surfaces.
- Do not overload the power supply.
- If have any problems, please contact us immediately.
- Caution: Never use extension cords, power strips, or plug adapters other than what is supplied.
- If the mains 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.
- Do not use to store explosive substances, such as aerosol cans with flammable propellant.
- Warning: Do not use mechanical devices or other means to accelerate the defrosting process. Defrosting is performed automatically.
- Warning: Do not damage the refrigeration circuit.

1.2 Technical Parameters

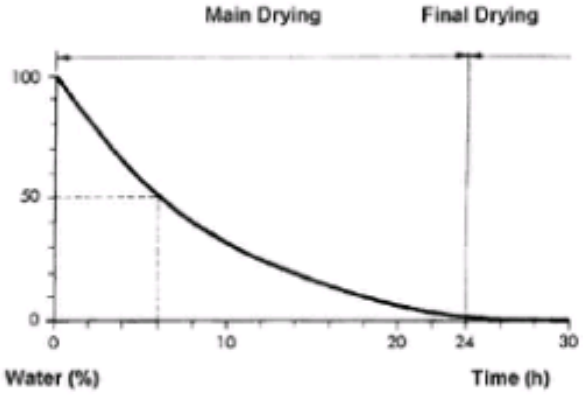
Model	USA-SFD-4	USA-SFD-6
Power Requirements (Phase / V / A)	Single / 110V / 14.09A	Single / 110V / 16.5A
Wattage	1,550W (1.55kW)	1,900 (1.9kW)
Cold Trap Temp.	-35°C	-35°C
Drying Temperature	-30°C to +60°C	-30°C to +60°C
Ice Capacity	4 Liters	6 Liters
Batch Size	1 - 2 gal.	2 - 3 gal.
Vacuum Port Type	KF25 (NW25)	KF25 (NW25)
Shelving Dimensions	7.8" x 17.7" (4 qty)	12" x 17" (6 qty)
External Dimensions	35" x 25" x 29"	46" x 25" x 29"
Weight	248 lbs.	350 lbs.

Section 2 | Diagrams

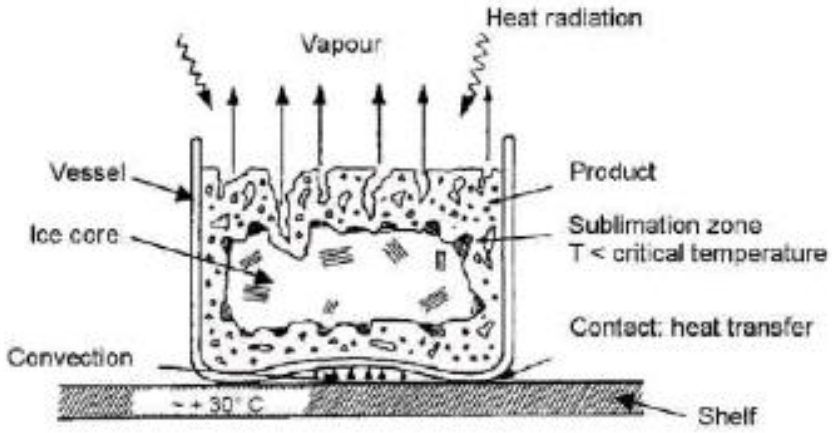
Vapour pressure curve for ice and water



1mbar = 10^2Pa

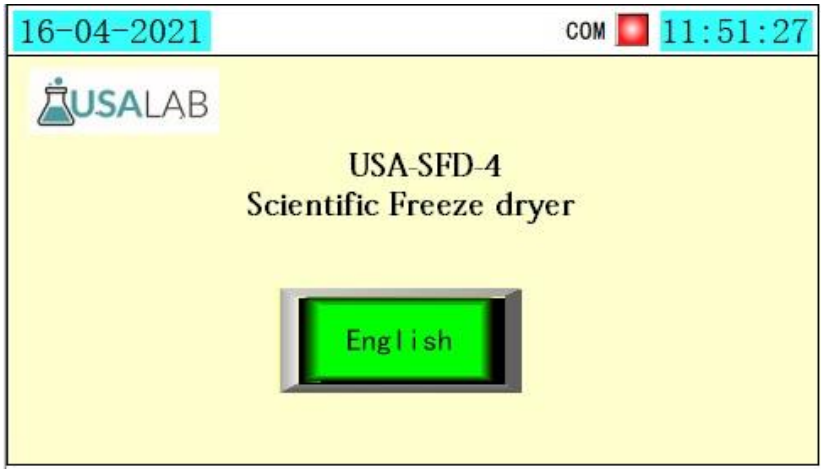


Effects of freeze drying of a product in a dish



Section 3 | Control Panel Operation

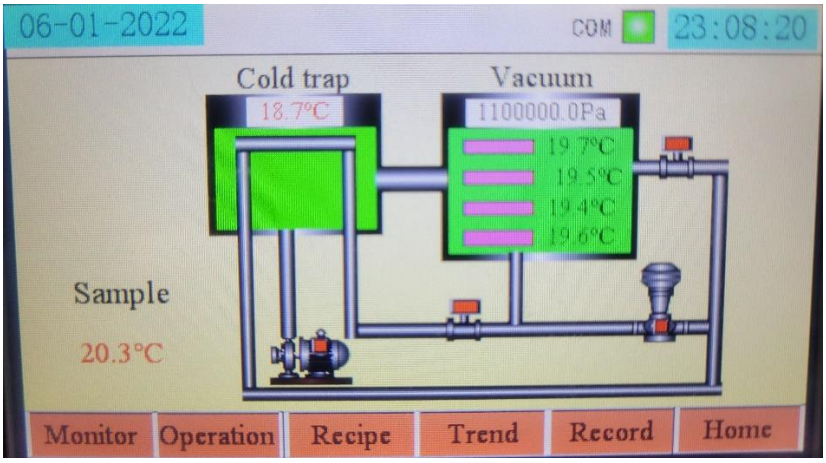
3.1 LCD Touchscreen Display Operation



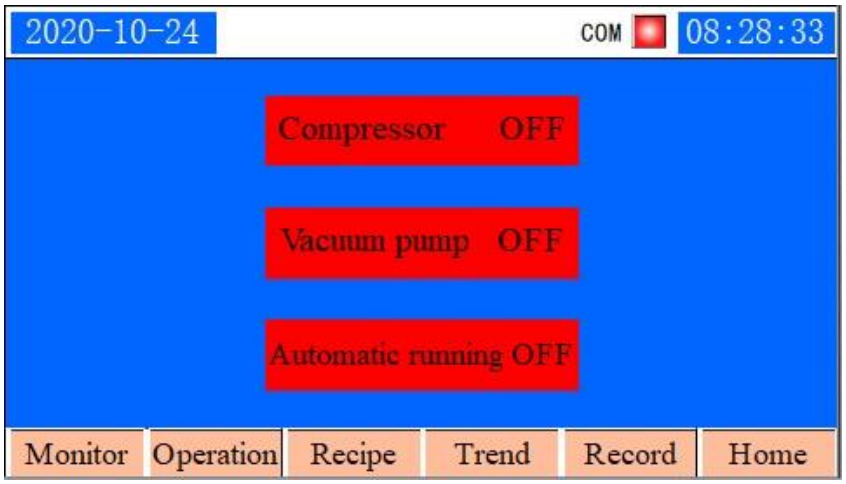
After powering on, press English to begin.

At the bottom of the screen, you have 6 different tabs.

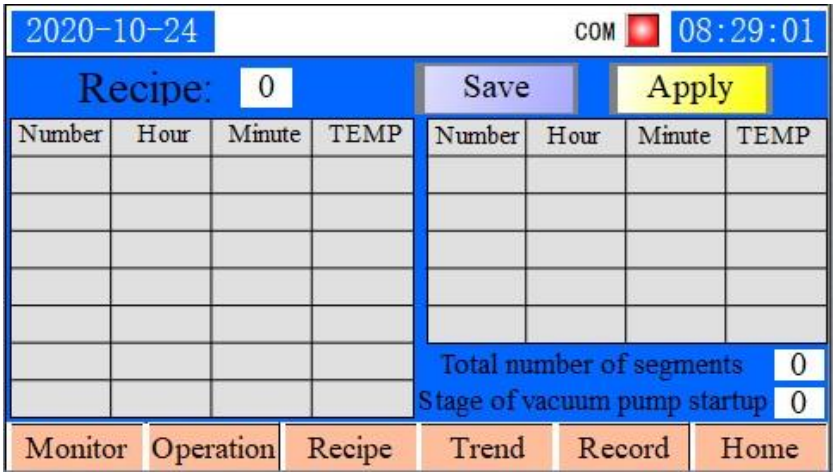
Monitor – A line graphic view of different temperature values on devices in the system.



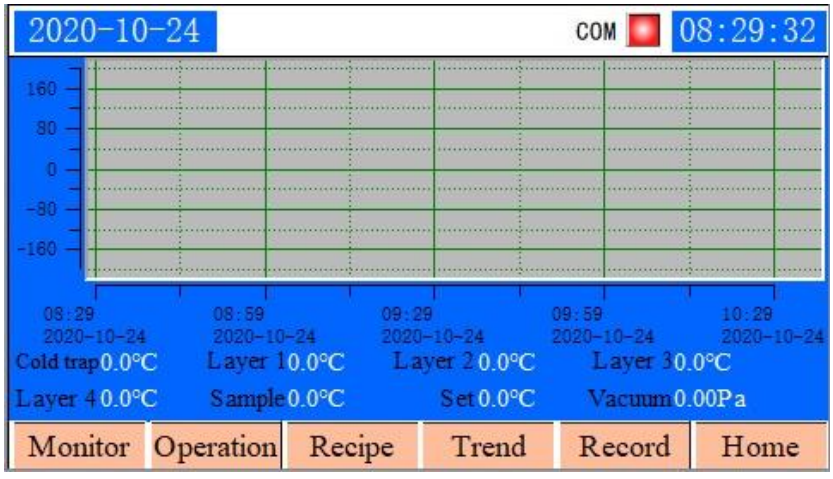
Operation – A tab dedicated to switching on and off the compressor, vacuum pump, and enabling auto run / recipe.



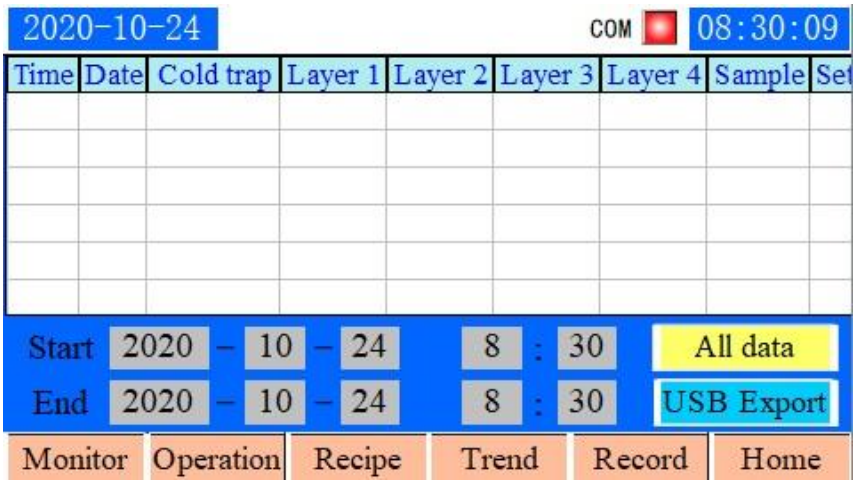
Recipe – This tab is how you set your temperature curve using time and temperature values.



Trend – A line graph view of sensor data.



Record – Historical sensor data of the current run.



If you have any questions or need any help with using the control panel, please contact us.

Section 4 | Installation

4.1 Included Items

PACKING LIST	
Model	**Quantity**
USA Lab USA-SFD-4 Freeze Dryer	1
7.8" x 17.7" Shelf	4
24" KF25 Vacuum Line	1
KF25 Clamp	2
KF25 O-ring	2
KF25 to 1/4" JIC Female	1
Male 1/4" JIC Union	1
Manual	1

4.2 Electrical Connection

Ensure that the outlet is well grounded and installed by a licensed electrician.

Receptacle: NEMA 5-15R

Plug: NEMA 5-15P

Voltage: 110-120VAC

Frequency: 50/60Hz

Maximum Nominal Amperage: 15A (USA-SFD-4) | 20A (USA-SFD-6)

4.3 Operating Area and Warnings

- The power supply cord exits the product at the top left-hand side (as viewed from the front). For ease of access, the cord should be retrieved prior to positioning the product in its final location.
- The maximum recommended ambient temperature for this product is 30°C
- Avoid positioning the appliance in direct sunlight or damp areas.
- Ensure that this product is positioned on a level surface. Also, as to allow proper drainage from the cold trap, to prevent any overflow.
- All models must have clear and unobstructed ventilation from the entire surface area of the front grille.

WARNING: Failure to provide the minimum ventilation space will harm the performance of your freeze dryer, could cause a fire, and will invalidate the warranty.

WARNING: Keep clear of obstruction, all ventilation openings in the appliance enclosure, or in the structure / building.

WARNING: You must not store volatile, flammable, and/or explosive materials inside this freeze dryer.

WARNING: Do not attempt to freeze dry corrosive substances.

WARNING: Do not touch the internal surfaces without the use of proper personal protection.

WARNING: Infectious, toxic, pathogenic, and radioactive samples should be handled with proper care, precautions, and protocols.

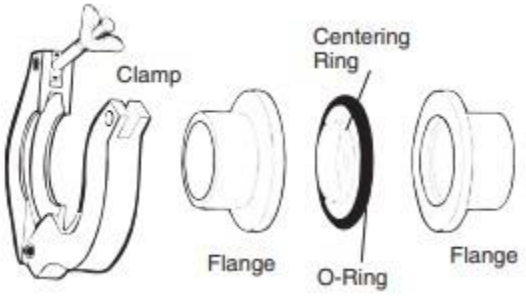
WARNING: Do not attempt drying of samples known to react with this process.

4.4 Initial Assembly and Connecting the Vacuum Pump

After the unit has been unpacked and placed into a suitable location.
Open the front door and empty the contents except for the metal cage.
Cut and peel off any plastic wrap.
Clean the trays.
Unwrap the vacuum hoses.

Connecting the vacuum pump:

Connect the large hose to the KF25 flange.



Add the KF25 to ¼" MJIC Adapter.

Then connect the JIC Stainless Steel hose to the adapter then the vacuum pump.

Fill the vacuum pump with the included oil, half-way up the sight glass.
[Remove the exhaust filter and pour into the hole]

Plug the vacuum pump power cord into the receptacle on the rear of the dryer.

4.5 Operating Instructions and Notes

* Pre-freeze the samples to speed up drying times. *
Enter the recipe tab and program the stages accordingly.

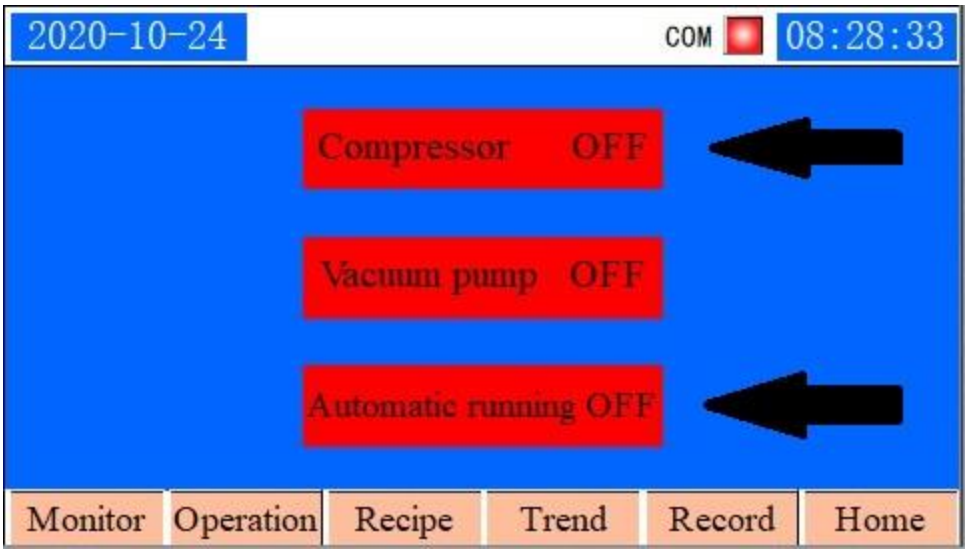
Stage 1 - Always set this step to -35°C or lower, give the machine at least 5 hours on this step.

Stage 2 – Keep the same -35°C temperature setting with at least a 30-minute run time. This step should be used for enabling the vacuum pump and allowing it to pull down to the required level.
[Ensure the recipe has "stage of vacuum pump startup" set to 2]

Stage 3 – Start increasing the temperature here. For normal batches increase the temperature by 5°C for 1 hour. Then program the remaining steps as desired or follow the default values below.

Stage	Temp	Hours	Stage	Temp	Hours	Stage	Temp	Hours
4	-15°C	1	7	20°C	1	10	40°C	5
5	0.0°C	1	8	30°C	2	11	45°C	5
6	10°C	1	9	35°C	3	12	50°C	5

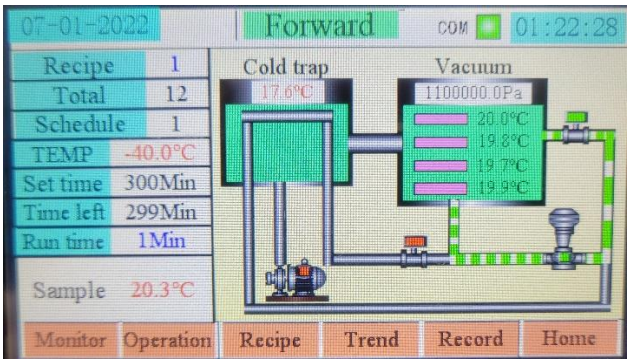
After save and apply the recipe.



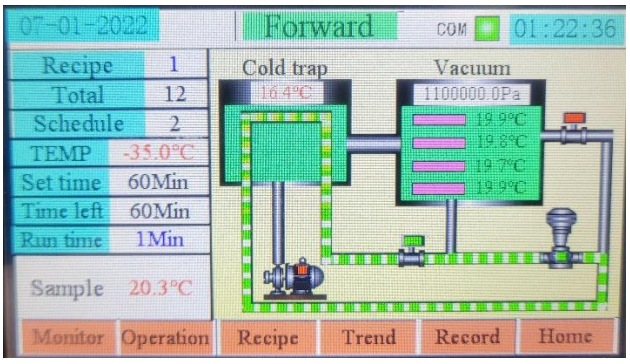
To begin using the applied recipe. Load the samples to be dried. Then, open the operations tab and enable the compressor. This will start running the first stage. Next, turn on automatic running.

Enter the monitor tab.

You should see the following:



Then after stage 1 has completed, and stage 2 starts the animation will change:



Open the vent valve before you turn off the system

Section 5 | Maintenance

5.1 Periodic Maintenance

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

Do not use abrasive cleaning agents or tools to clean the delicate coating of your cabinet.

Always wipe dry after cleaning.

USA Lab or a qualified technician must carry out any repair if required.

Using an air compressor, blow out the condenser and lower cabinet. Monthly if required.

5.2 Long Term Storage

Inspect the unit for damages or concerns.

Clean the condenser.

Clean the Inside of the unit.

Clean the outside of the unit.

Prop open the door slightly or open the vent port on the side of the cabinet.

Coil the cord into a circle and zip tie it to the back vent.

Place the unit in a level, low humidity environment.

DISPOSAL

Contact your township or local authority to determine the best way to dispose of the unit. You may also contact us to help with disposal. It is not legal or recommended to cut any of the cooling system lines to remove the refrigerant. Please have a trained HVAC technician remove the refrigerant before attempting to dispose the unit.

Section 6 | Troubleshooting Table

Problem	Cause	Solution
The unit is not powering ON	A. The unit is not plugged in B. Plug is damaged C. Power supply D. Internal wiring fault	A. Plug the unit in B. Repair the damaged plug C. Verify power at receptacle D. Contact us for help
The unit turns on, but the temperature is too high or too low	A. Condenser blocked or dirty B. Doors are not secured C. Heat source near unit or low air flow D. Ambient temperature is too high E. low or no rotation from fan F. Overloaded cabinet G. Parameters are incorrect	A. Clean the condenser B. Check the seals for damage or close doors C. Move the unit to a more suitable location D. Increase air flow or move unit to a cooler location E. Remove blockage or replace fan motor F. Reduce the amount of stored items G. Contact us or restore default parameters
The LCD display is not working properly	A. Display board is damaged	A. Contact us for replacement
The unit is excessively loud	A. The unit is touching a nearby object B. Verify the unit is on a level surface	A. Move the unit away from the object B. Move to a level location

Section 7 | Warranty Information and Coverages

7.1 Warranty

Continental United States

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

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

Non-continental United States

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

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

7.2 Return Policy

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

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

• ***Pre-orders***: There will be a ***10% non-refundable fee*** associated with pre-orders that are canceled. This covers the banking fees and the hold fee.

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

• The item(s) must be returned in original packaging and in undamaged condition. The item(s) must have no signs of usage or wear including stickers, scratches, dents, resins, non-standard fluids, plant matter, or any other wear not representing a new, unused item.

Unused and undamaged products not in original packaging will be subject to a restocking fee equal to 25% of the purchase price.

Products deemed defective with any signs of usage or wear whatsoever of damage or usage (including but not limited to the presence of botanical material, resins, cleaning agents, stickers or decals, or any damage, wear, or tear) will not be accepted for return.

• Once the returned item is received, tested, inspected, and processed, a refund will be issued. If your item(s) are in original packaging and unused, ***you will be refunded the initial purchase price with the 15% restocking fee deducted***.

If your item(s) are deemed damaged or used, ***you will not be refunded.***

7.3 Notes

Keep all original packaging in the event you need to return the unit or to send it in for to us for repair.

We are not responsible for providing packaging material.

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

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

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