

Pinnacle

SCIENTIFIC AND MEDICAL EQUIPMENT

OPERATIONS MANUAL

FOR

PF-UP-86-100VT

PF-UP-86-430T

PF-UP-86-730T

PF-UP-86-730VT

PF-UP-86-990T



Thank you for choosing equipment from the Pinnacle Scientific range. We appreciate your confidence in our products and are committed to supporting you throughout the life of your unit.

Please read this manual carefully before installing or operating the unit to ensure safe use and reliable performance.

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OPERATIONS MANUAL

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Precautions for Safe Operation

Read this manual carefully to ensure the safe operation and correct use of this product.

■ Safety labels and precautions



Hazard point



Electric
shock



Risk of
crushing



Highly
flammable
substances



Warning
Low temperature



Grounding

■ Precautions for safe operation

Warning

Failure to follow a WARNING notice may result in serious injury or death.

Caution

Failure to follow a CAUTION notice may result in injury, equipment damage, or damage to surrounding property.



Prohibited actions or operations



Required actions or operations

If the CO₂/LN₂ backup system is activated, the area must be well ventilated. Elevated CO₂ or N₂ levels can be hazardous and may be fatal. If ventilation is inadequate, take appropriate additional precautions to maintain a safe working environment.

If petroleum gas or any other flammable gas leaks, close the gas supply valve immediately and open doors and windows to ventilate the area. Do not plug in or unplug the freezer, as this may create a spark and cause fire or explosion.

Install the freezer on a firm, level surface. Installation on an uneven floor may cause the unit to tip, resulting in injury or equipment damage.

Use only the dedicated power supply specified on the product label to reduce the risk of fire or electric shock.

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If the supply voltage is more than 10% above the rated voltage, install a voltage regulator with a capacity of at least 4000 W.

If an extension lead is required, use a cable with a cross-section of at least 14 AWG and a maximum length of 9 ft for 220V/50Hz operation.

Never install the unit in an unprotected outdoor area. Exposure to moisture greatly increases the risk of electric shock.

Do not install the unit in a damp location or where it may be exposed to water spray. Moisture can reduce insulation performance and cause leakage current or electric shock.

Never pour water directly onto or into the unit, as this may cause electric shock or a short circuit.



Do not place heavy objects on top of the unit, as a falling object may cause injury.

Never use gas pipes, water pipes, telephone lines, or lightning rods as a grounding point for the unit. Incorrect grounding may cause electric shock or other hazards.



Do not touch any electrical components, switches, or power cords with wet hands. Such actions may lead to electric shock.

If the unit malfunctions, switch it off and unplug the power cord. Continued operation under abnormal conditions may result in electric shock or fire.

Do not dismantle, repair, or modify the equipment yourself. Doing so may cause fire, electric shock, or personal injury.

Before repairing or maintaining the freezer, disconnect the power supply to avoid electric shock or injury.

During repair and maintenance, avoid inhaling any chemicals or aerosols inside or around the unit, as they may be harmful to your health.

If the unit will not be used for an extended period, unplug the power cord.

Damaged or deteriorated cord insulation may cause electric shock or fire.

The freezer must be disposed of by qualified personnel.

Do not use unapproved electrical components with this freezer.

Do not store flammable, explosive, or volatile materials in the unit, and do not use flammable sprays near it. Doing so may cause fire or explosion.

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Do not store corrosive chemicals with acidic or alkaline properties in the unit, as they may damage internal components.

Do not use glass containers if they may crack or shatter at ultra-low temperatures, as broken glass may cause injury.

Do not climb on the unit or place objects on top of it. Falling objects may cause injury or damage.

Do not insert hard objects such as nails or wires into openings or ventilation gaps. Contact with live or moving parts may cause electric shock or injury.

After restarting the unit following a shutdown or power outage, confirm that all settings are correct. Unintended changes may affect the integrity of stored products.

After power is restored, wait at least 5 minutes before restarting the unit to protect the compressors and refrigeration system.

Clean the condenser air filter regularly. A dirty filter may cause poor performance or a rise in cabinet temperature.

Wear protective gloves during repairs to reduce the risk of injury from sharp edges or corners.

Do not handle stored products or internal surfaces with bare hands. Ultra-low temperatures may cause frostbite.

Do not tilt the unit more than 45° while moving it.

Do not place your hands under the freezer door or inner compartment door when lifting or moving the unit. Doing so may cause injury or damage.

Do not lift or move the unit by the handle.

We recommend that installation, servicing, and replacement of parts, including batteries, be carried out by manufacturer-authorised technicians.

Keep all ventilation openings in the enclosure or built-in structure clear and unobstructed.

Do not use mechanical devices or other methods to speed up defrosting unless they are recommended by the manufacturer.



Do not damage the refrigerant circuit.

Usage Precautions

- During normal operation, the area around the front door frame may feel slightly warm. This is normal, as warm tubing is built into the frame to prevent condensation.

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- Before loading samples, make sure the unit has reached the set temperature. Load samples in batches, with each batch not exceeding one-third of the unit's total capacity, to minimise temperature rise during loading.
- The displayed temperature reflects the reading at the sensor location inside the chamber. It may differ from the temperature at the centre of the chamber, but the temperature will stabilise over time.
- Access ports are provided on the left side wall and rear of the unit for thermocouple wires used in testing or verification. After routing the wires, seal any remaining gaps with insulating material. Poor sealing may reduce performance and cause condensation on the outer surface.
- Clean the unit with a mild or neutral detergent only. Do not use wire brushes, acids, petrol, abrasive powders, polishing compounds, or hot water, as these may damage painted or plastic surfaces. Do not use petrol or other volatile chemicals on plastic or rubber parts.
- Frost may accumulate on the inner liner and doors during prolonged use. Excessive frost reduces cooling efficiency and increases energy consumption. When the frost thickness reaches approximately 5 mm, remove it using the supplied scraper.
- Before defrosting, transfer stored samples to another suitable freezer to prevent temperature rise and possible sample loss.
- The interior walls contain refrigeration tubing. Do not use knives, ice picks, screwdrivers, or other sharp tools to remove ice or frost, as they may damage the liner or refrigeration circuit.
- If the freezer will be out of service for an extended period, switch off the power and backup battery, then unplug the power cord.
- EMC statement: The freezer's refrigeration system operates normally and provides the intended cooling performance within the chamber.

Product Installation

■ Installation environment

- Ambient temperature: 10°C to 32°C. The recommended operating range is 18°C to 25°C. Use air conditioning if needed to maintain suitable room conditions.
- Relative humidity: below 80% RH.
- Install the unit in an area free from excessive dust.
- Avoid locations subject to heavy vibration or mechanical shock.
- Mains supply: rated voltage $\pm 10\%$.
- Power supply frequency: 50 Hz.

Caution

- ULT freezers are highly sensitive to their operating environment. If the installation conditions above are not met, performance and reliability may be affected.
- This unit is exclusively designed for indoor use.

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■ Installation site

- Do not install the unit in a confined space. Ensure the doorway is wide enough to allow the unit to be moved in and out of the room if service is required.
- Install the unit on a flat, stable surface.
- Provide good ventilation and avoid direct sunlight.
- Do not share the power outlet with other equipment. Make sure the plug is fully inserted into the socket.
- Do not twist, crush, or pinch the power cord.
- The freezer must be properly grounded.
- If the wall socket does not provide protective grounding, arrange for a qualified electrician to install an appropriate outlet before use.



Warning

- Do not ground the freezer through gas lines, water pipes, telephone lines, or lightning rods. Incorrect grounding may cause electric shock.
- After installation, make sure the power plug remains easily accessible for emergency disconnection, and keep all ventilation openings unobstructed.

■ Preparation before use

1. Remove all packaging materials and transport straps.
2. Check the supplied accessories.
 - Compare the contents of the package with the enclosed packing list. If anything is missing or damaged, contact the manufacturer or supplier.
3. Check placement conditions.
 - Leave at least 30 cm of clearance around the freezer to ensure adequate airflow.
4. Adjust the levelling feet.
 - Turn the levelling feet clockwise to extend them until the unit is level and stable.
5. Allow the unit to stand before switching on.
 - After positioning and cleaning the unit, do not connect the power immediately. Leave the freezer standing in its final location for at least 24 hours before switching it on.
6. Confirm that the unit will be used indoors only and not operated in wet conditions.
 - Before unpacking, move the freezer using a forklift or pallet truck. If using a forklift, insert the forks beneath the blocking panel from the front or rear. If using a pallet truck, lift only from the bottom of the blocking panel and from one side of the freezer.
 - After unpacking, raise the levelling feet off the floor before moving the freezer on its castors.
 - Do not tilt the freezer more than 45° during handling.
 - Take care to avoid slips, trips, and impact damage while moving the freezer.

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■ Power on the first time

Before switching on the unit for the first time, complete the following steps:

1. While keeping the unit empty, please plug in the power cord to a dedicated power socket that meets all electrical requirements.

Figure 1

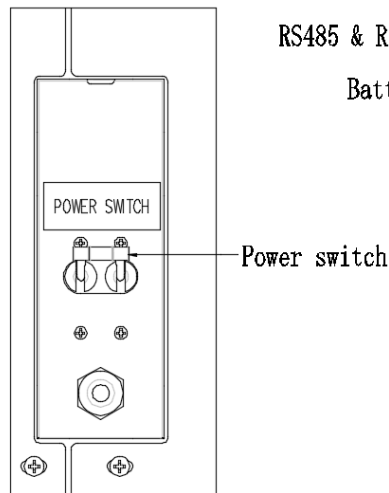
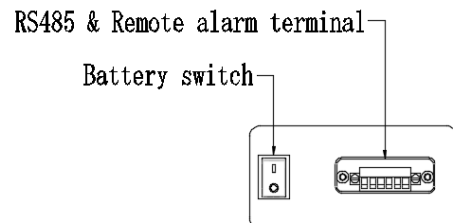


Figure 2



2. To connect the freezer to the power supply, first plug it into a dedicated power outlet. Then, locate the power switch on the back of the freezer (as shown in Figure 1) and turn it on. After that, find the battery switch on the right side of the freezer (as shown in Figure 2) and turn it on.

3. If the unit is equipped with an optional backup cooling system, please ensure that the backup system is turned off.

4. Set the unit to the desired temperature. After freezer reaching set temperature, monitor its performance for 24 hours to ensure it is functioning properly and undergoing normal cycling.

5. Once the unit is confirmed to be operating properly, it is ready to be loaded with samples. Load the samples into the unit in batches, ensuring each batch comprises less than one-third of the unit's total capacity. Ensure that the unit is capable of maintaining the set temperature for at least 8 hours without cycling excessively.

6. If the unit is equipped with an optional backup cooling system, activate it.

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- The ULT freezer should be operated and monitored by trained personnel. We recommend checking and recording the unit's operating status every 2 to 4 hours. If a fault occurs and the freezer temperature rises, take corrective action immediately. If the problem cannot be resolved quickly, transfer the stored samples to another freezer that can maintain the required temperature.
- Before storing samples, confirm that the freezer has reached the required set temperature to minimise the risk of sample loss or damage.
- Ultra-low temperature freezers are intended for storage only. Do not load large quantities of samples at one time, as overloading may affect performance and overheat the compressors. Load samples in batches and lower the temperature gradually until the final setpoint is reached.
- Do not use unauthorised tools or methods to speed up defrosting.
- Do not damage the refrigeration circuit.
- Do not use any unapproved electrical components in the freezer.

■ Operation after a power outage

Warning

- The freezer stores its control settings in memory and will resume operation with the previous settings after power is restored.
- Before restarting the unit after a power outage, wait at least 5 minutes to avoid damaging the compressors.
- If the unit will be out of service for an extended period, unplug the power cord to reduce the risk of electric shock or fire caused by deteriorating insulation.

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Product Description

■ Control panel



Description of icons

1- Interior temperature; 2- Set temperature; 3- Ambient temperature;
4- Voltage; 5- Alarm/Mute; 6- Temperature curve; 7- User menu; 8- Alarm notification.

Usage

■ Interior Temperature

The centre of the home screen displays the current temperature inside the freezer.

■ Mute the alarm sound

When an alarm occurs, the alarm indicators on the main screen turn red. Tap the Alarm/Mute icon to silence the buzzer.

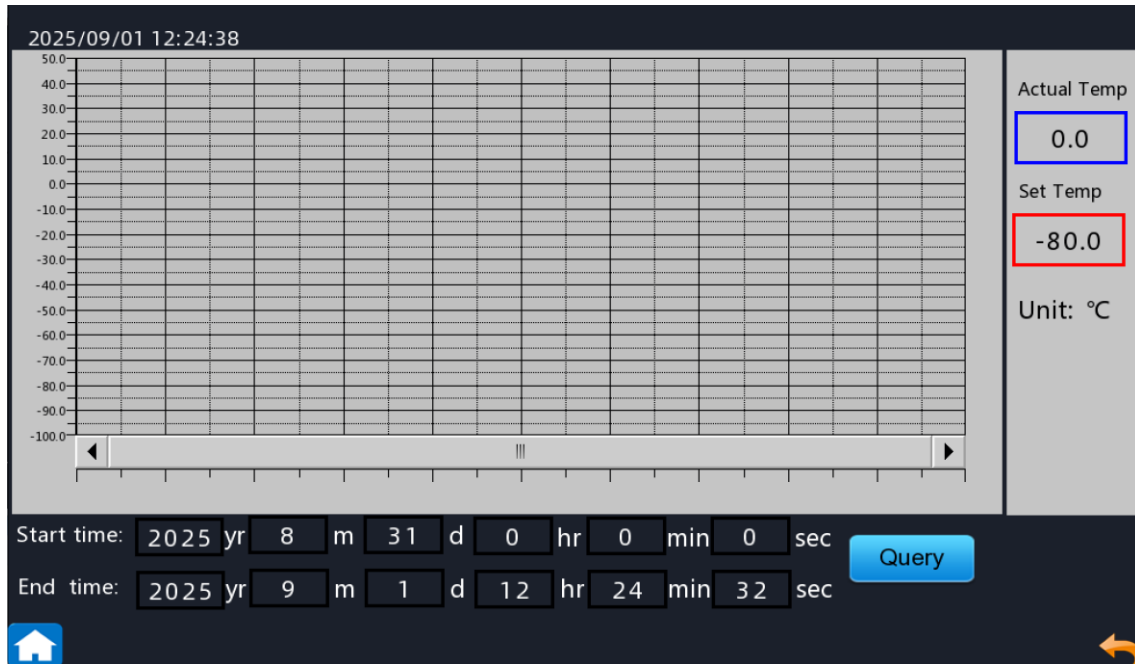
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■ Temperature Curve

Tap this icon to open the temperature curve screen, where you can review recorded temperature data for a selected time period.

1. Specify the desired time range.
2. Tap  to view the temperature curve for the selected time period.



■ User Menu

Tap to open the User Menu. Enter the password (default: 0008) to access the settings.

1. Temp settings

Use this menu to set the chamber temperature and the high- and low-temperature alarm thresholds.

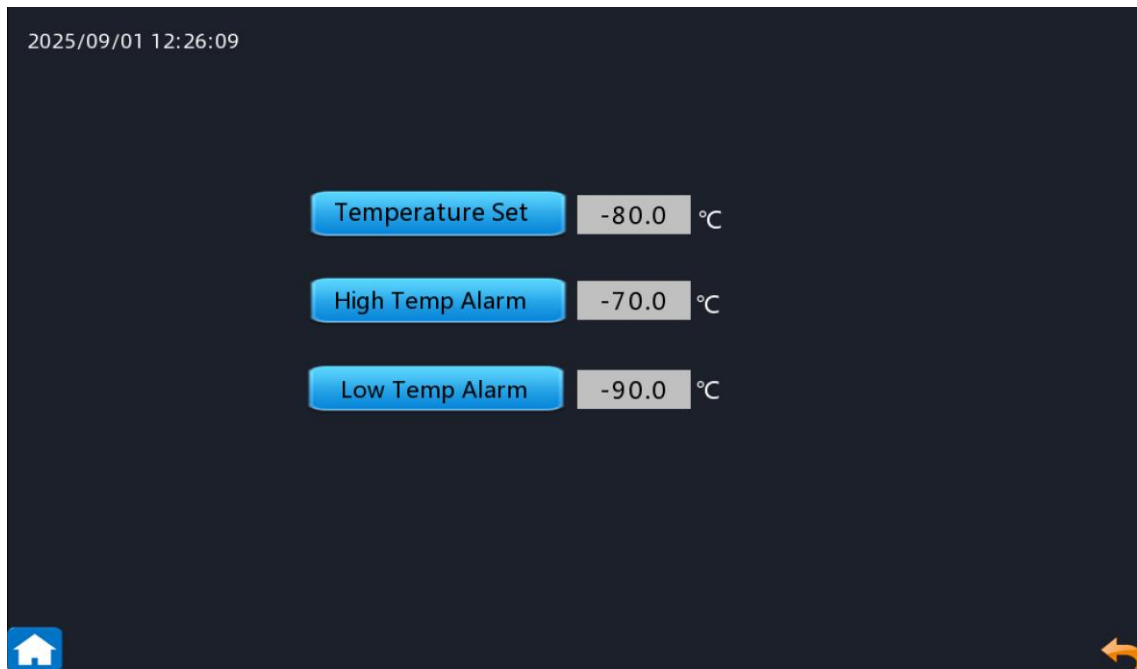
Temperature Set: Set the chamber temperature within the range of -40°C to -86°C.

High Temp Alarm: Set the alarm threshold above the set temperature. An alarm will sound if the chamber temperature rises above this value.

Low Temp Alarm: Set the alarm threshold below the set temperature. An alarm will sound if the chamber temperature falls below this value.

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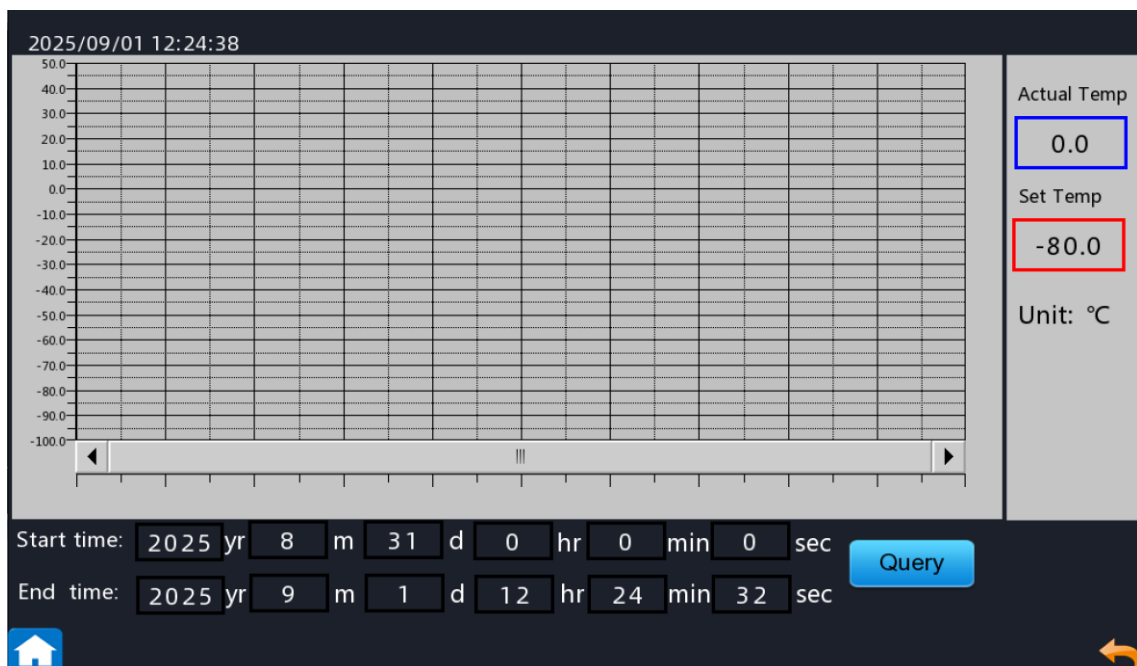
FOR ULT SERIES



2. Chart

Users can view the temperature curve inside the freezer and select data for a specific time range.

1. Specify the desired time range.
2. Tap to view the temperature curve for the selected time period.



3. Alarm

Users can view, search, and filter historical alarm records, including door alarms, power failure alarms, low-battery alarms, sensor faults, over-temperature alarms, over-voltage alarms, and other system events. Records can be filtered by date range.

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1. Specify the desired time range.
2. Tap **Start Query** to retrieve records within the selected timeframe.
3. Tap **Data Export** to export the alarm logs.

2025/09/01 12:49:28

Trigger date	Trigger time	Recovery date	Recovery time	Event content

Start time: 2025 yr 8 m 31 d 0 hr 0 min 0 sec
End time: 2025 yr 9 m 1 d 12 hr 49 min 24 sec

Start Query **Data Export** Progress 0 %

4. User Password

Users can change their login password in this menu. The factory default password is "0008".

2025/09/01 12:50:52

Current password:

New Password:

Confirm password:

Apply **Cancel**

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5. Open Times

Users can review door opening records and search for events within a selected time period.

1. Specify the desired time range.
2. Tap **Door Query** to retrieve records within the selected timeframe.
3. Tap **Data Export** to export the door operation logs.

2025/09/01 12:51:24

Date	Time	Inner temp	Voltage	Open1/Close0	NO.o/c door

Start date: 2025 yr 8 m 31 d 0 hr 0 min 0 sec
End date: 2025 yr 9 m 1 d 12 hr 51 min 20 sec

Door Query **Data Export** progress 0 %

Home icon and back arrow are visible at the bottom.

6. Data Export

Users can select a time period to review detailed device information and export the data to a USB drive.

1. Specify the desired time range.
2. Tap to retrieve records within the selected timeframe.
3. Tap to export the selected data.

2025/09/01 12:52:04

Date	Time	Inner temp	Ambient temp	Power voltage	Battery voltage	Num

Start Time: 2025 yr 8 m 31 d 0 hr 0 min 0 sec
End Time: 2025 yr 9 m 1 d 12 hr 51 min 54 sec

Start Query **Data Export** Progress 0 %

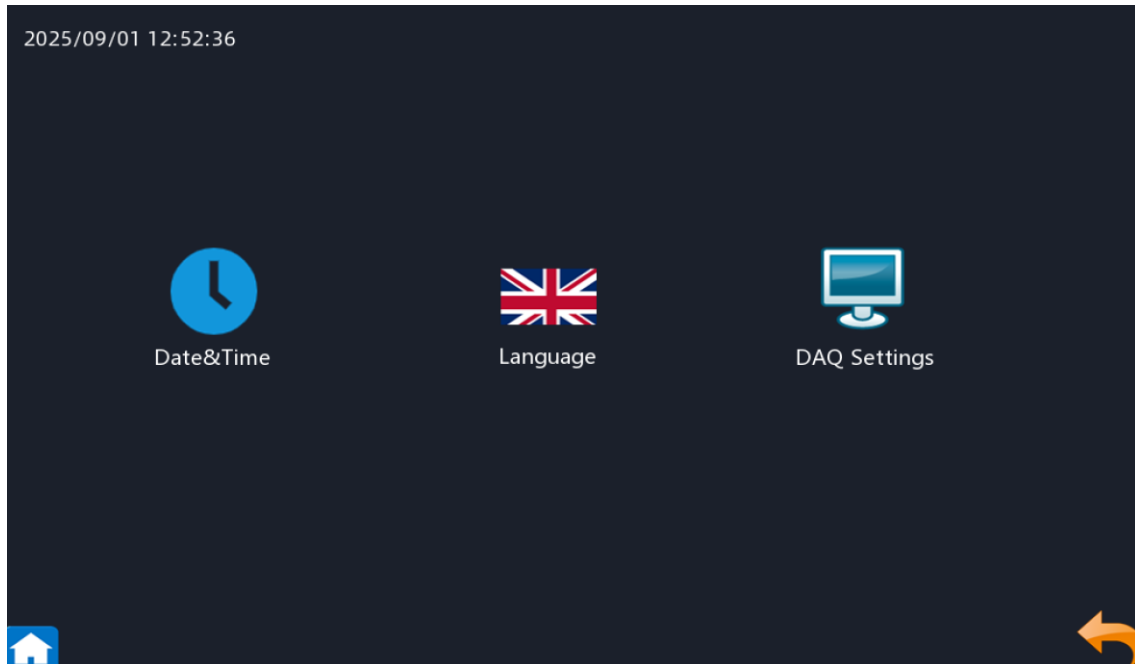
Home icon and back arrow are visible at the bottom.

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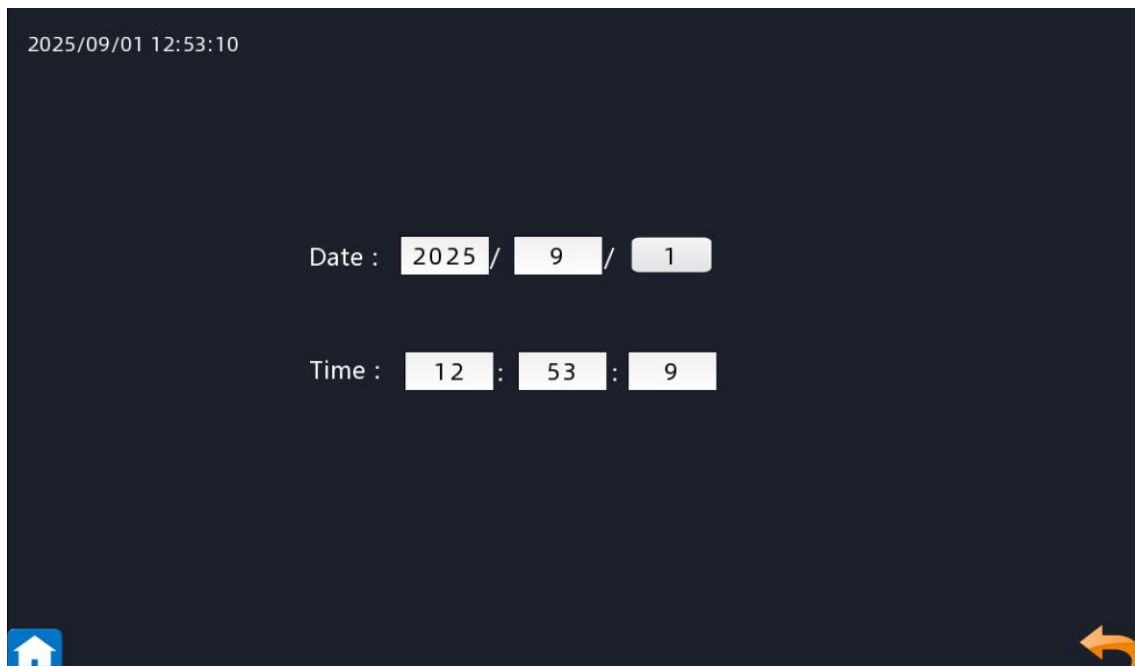
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7. System Settings

Use this menu to configure the date, time, language, and DAQ parameters.



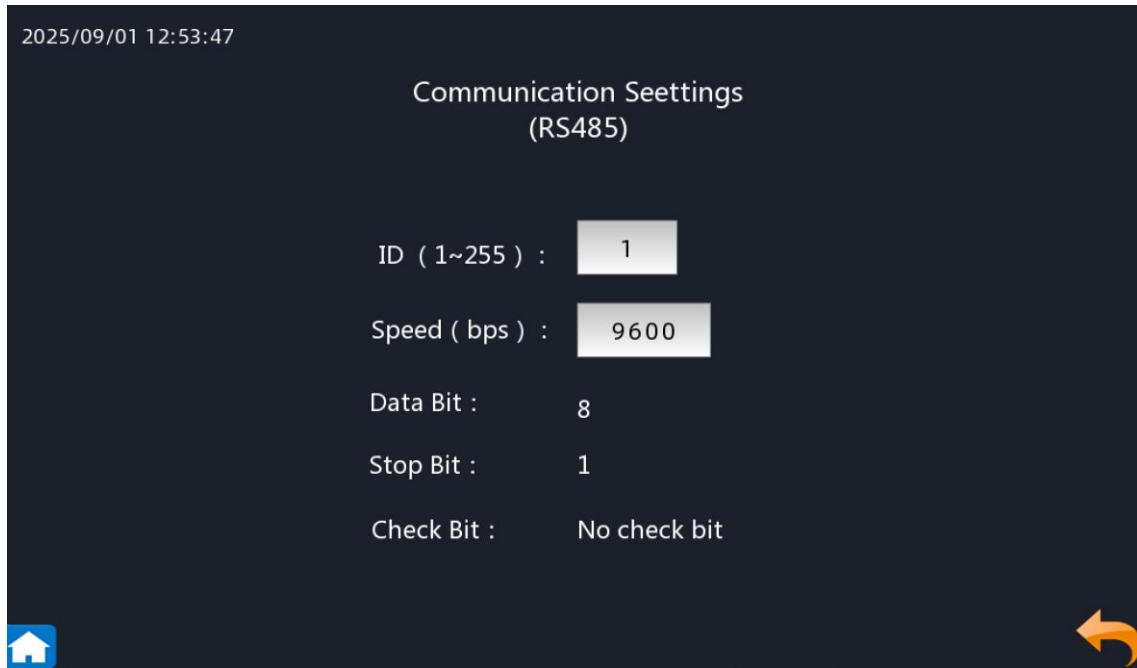
Tap  to access the settings interface and configure the date and time.



Tap  to switch languages.

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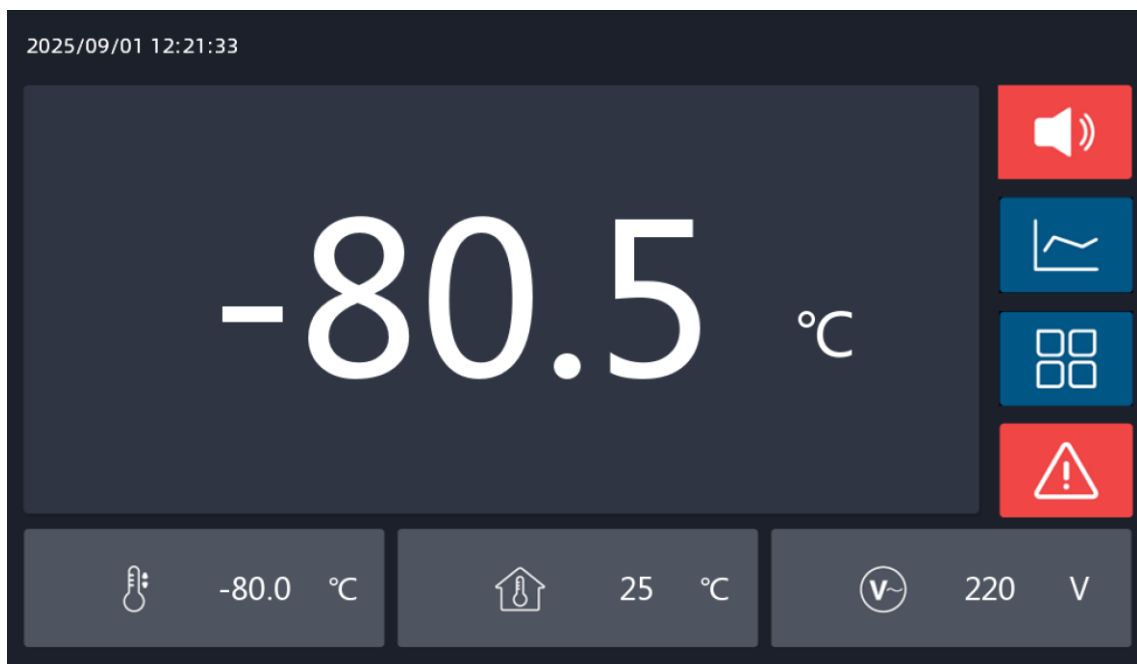
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Tap  to configure the RS485 communication parameters.

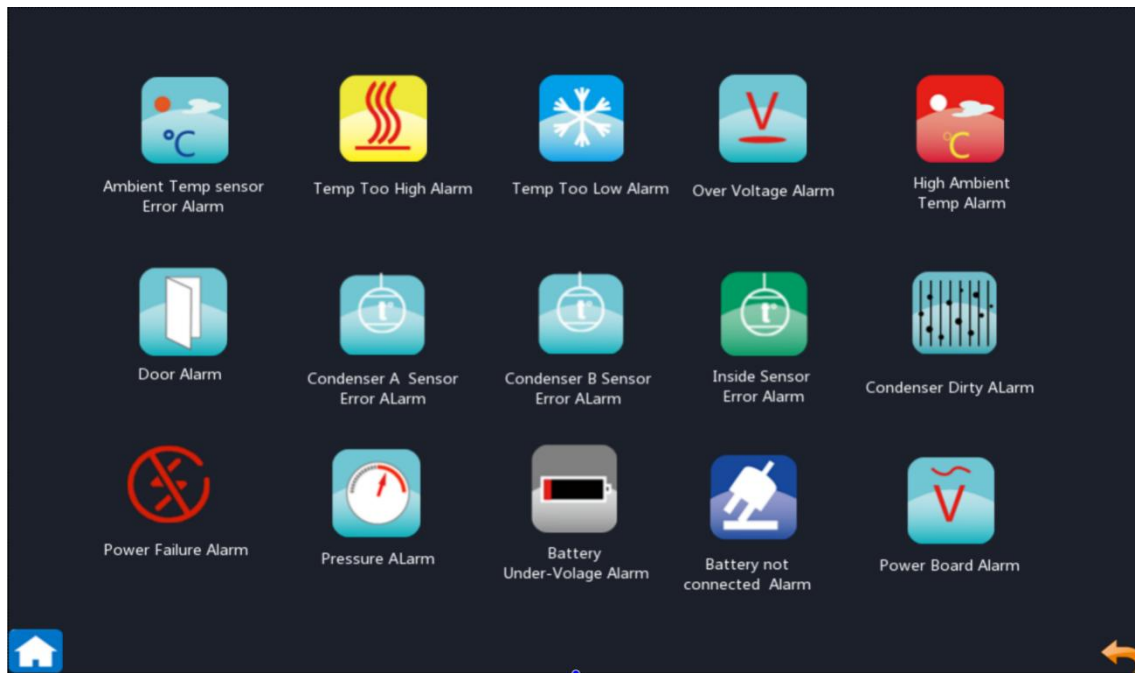
8. Display and Operational Anomaly Warnings

If the unit detects an abnormal operating condition, it sounds an audible alarm and the alarm indicators on the main screen turn red. Tap the mute control to silence the buzzer, then open the alarm screen to view the details.



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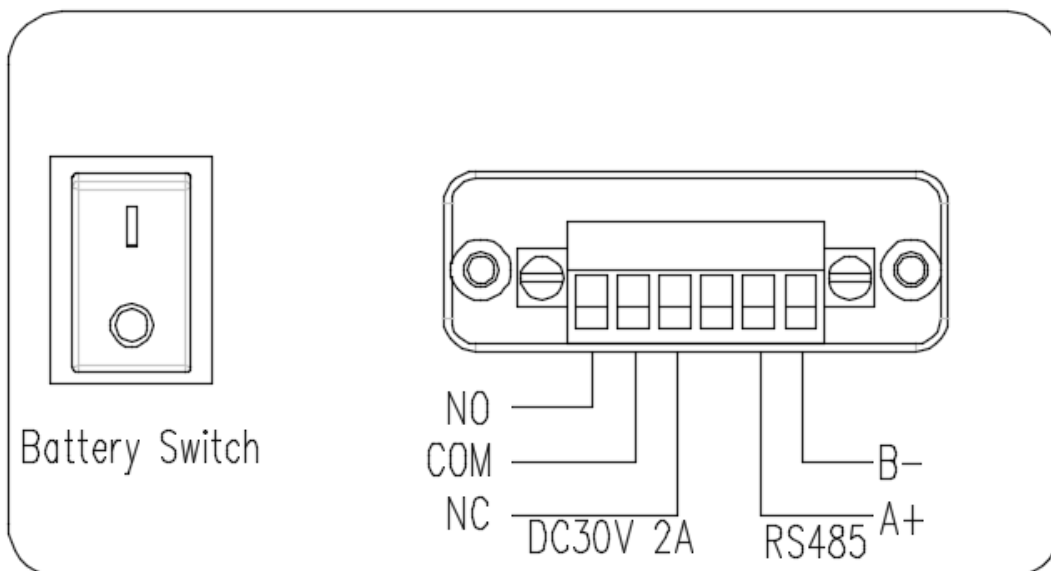


■ Remote alarm terminal

The remote alarm terminal is located on the right side of the freezer cabinet and outputs alarm signals. The terminal load capacity is DC 30V, 2A.

The terminal provides normally open, normally closed, and common contacts. Select the connection type that matches your monitoring system.

The RS485 port can be used to transmit freezer temperature data to external monitoring software.



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Cleaning and Maintenance

■ Cleaning of components

- Before carrying out repair or maintenance work, switch off the power supply to prevent electric shock or injury.
- During maintenance, avoid inhaling chemicals or airborne particles from inside or around the freezer, as they may be harmful to your health.

■ Cleaning the freezer

- Clean the freezer regularly.
- Use a dry cloth to remove light dust from the exterior, chamber interior, and accessories. If the storage compartment is heavily soiled, wipe it with a clean cloth dampened with a neutral detergent, then remove any residue with a damp cloth and dry thoroughly.
- Do not pour water on the exterior or inside the freezer, as this may damage electrical insulation and cause malfunction.
- The compressors and other mechanical parts are sealed and do not require lubrication.
- Remove frost or ice from the inner walls and clean the condenser filter monthly.

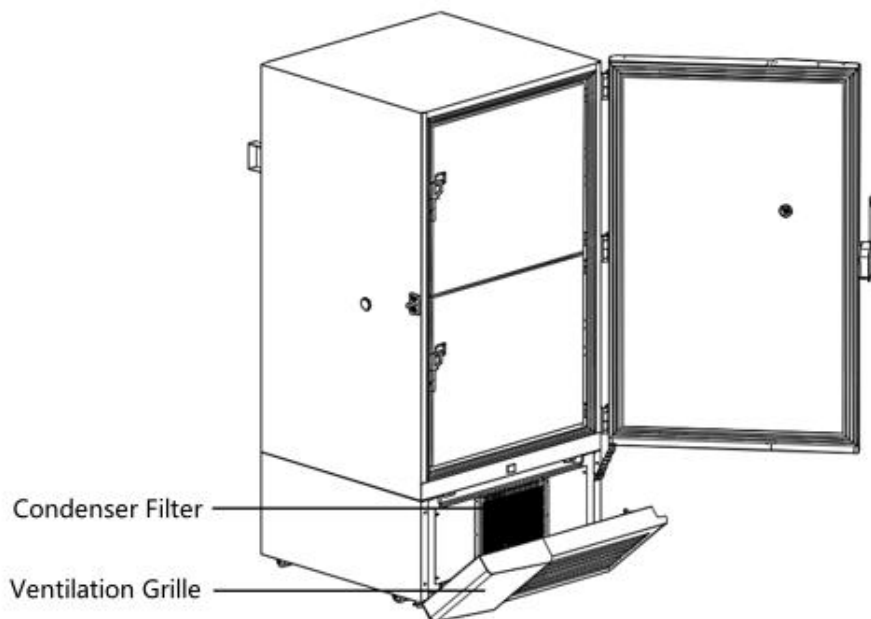
■ Clean the condenser filter

Clean the condenser filter once a month. A blocked filter reduces cooling performance and may shorten the service life of the product. Follow the steps below:

1. Open the ventilation grille;
2. Pull the condenser filter upwards from the grille;
3. Clean the filter with water and air dry it;
4. Reinstall the original filter and close the ventilation grille.

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■ Defrosting on the inner wall

Frost may create gaps between the cabinet and the door seal, reducing insulation performance. Use the supplied scraper to remove frost from the inner door. Follow the steps below for natural defrosting:

1. If an auxiliary cooling device is fitted, switch it off.
2. Remove all stored items and transfer them to a suitable storage environment.
3. Turn off the power switch.
4. Open the outer and inner doors and allow the freezer to defrost naturally.
5. Wipe away any water collected at the bottom of the chamber with a dry cloth.
6. After cleaning the chamber and inner doors, restart the freezer.
7. Return the items only after the freezer has cooled back to the required temperature.
8. If an auxiliary cooling device is fitted, switch it back on.

Do not use sharp tools such as knives or screwdrivers to remove frost.

■ Battery maintenance

- While the freezer remains connected to power, check the battery level every 15 days. If the level is low, make sure the battery switch is in the “ON” position so the battery can charge. After one week of charging, check the battery again. If it is still low, replace the rechargeable battery.
- Batteries are consumable items and typically last 2 to 3 years. If the battery has been in service for more than 3 years, the alarm may not operate during a power failure. Contact after-sales service to arrange replacement.

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■ Disposal of the freezer

- If the freezer will be left unused in an unsupervised area for an extended period, ensure that children cannot access it and do not leave the door fully closed.
- The freezer must be disposed of by authorised personnel. To prevent entrapment or suffocation, remove the door before disposal.

Rechargeable Battery Recycling

The freezer contains a rechargeable battery that can be recycled. At the end of its service life, arrange inspection by a local battery recycling service or dispose of the battery in accordance with local regulations.

■ Location of the battery

The built-in battery powers the alarm during a power failure and is located inside the electrical box. Open the right-hand side panel of the compressor compartment to access the electrical box, then remove the cover plate to expose the battery. To avoid electric shock, this work must be carried out by a qualified technician.

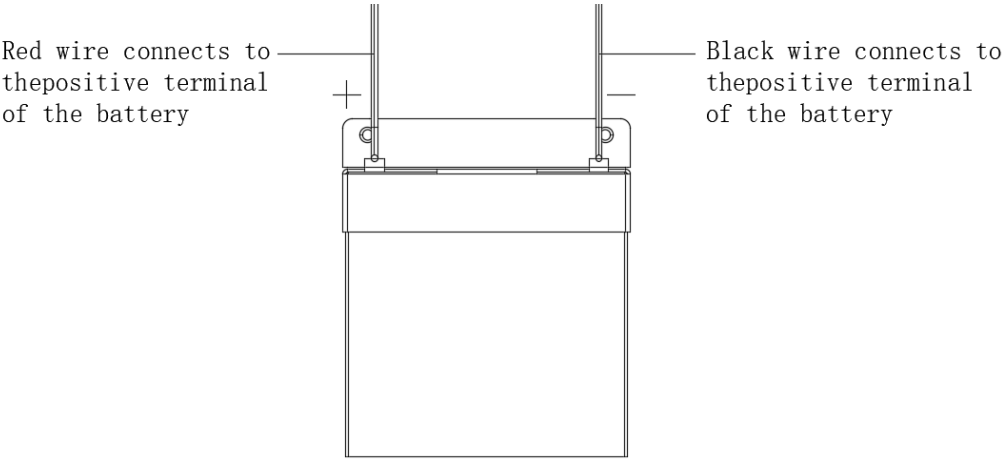
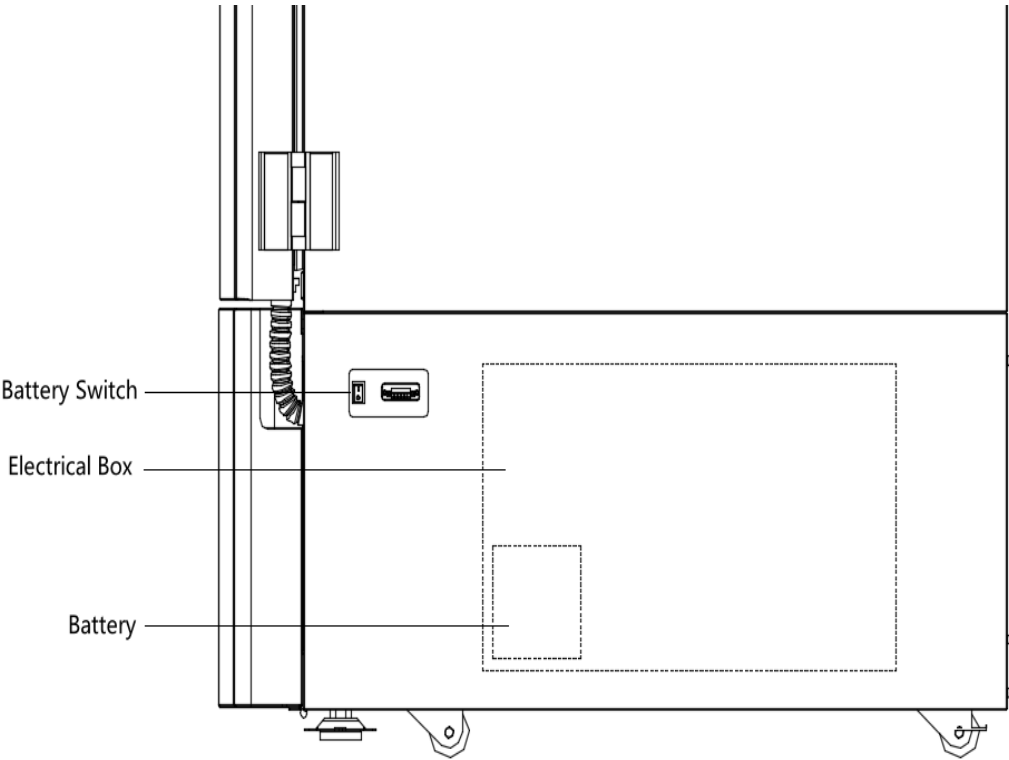
■ Removal of the battery

1. Turn off the power switch and unplug the power cord from the socket.
2. Turn off the battery switch, remove the right-hand side panel of the compressor compartment, and remove the cover plate from the electrical box. The battery is located in the lower-left corner of the electrical box.
3. Remove the battery, disconnect the battery connector, and dispose of or recycle the battery in accordance with local regulations.

Note: When replacing the battery, connect the red wire to the positive terminal and the black wire to the negative terminal. Reversed polarity may damage the charging circuit on the control board and prevent the battery from charging.

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Troubleshooting

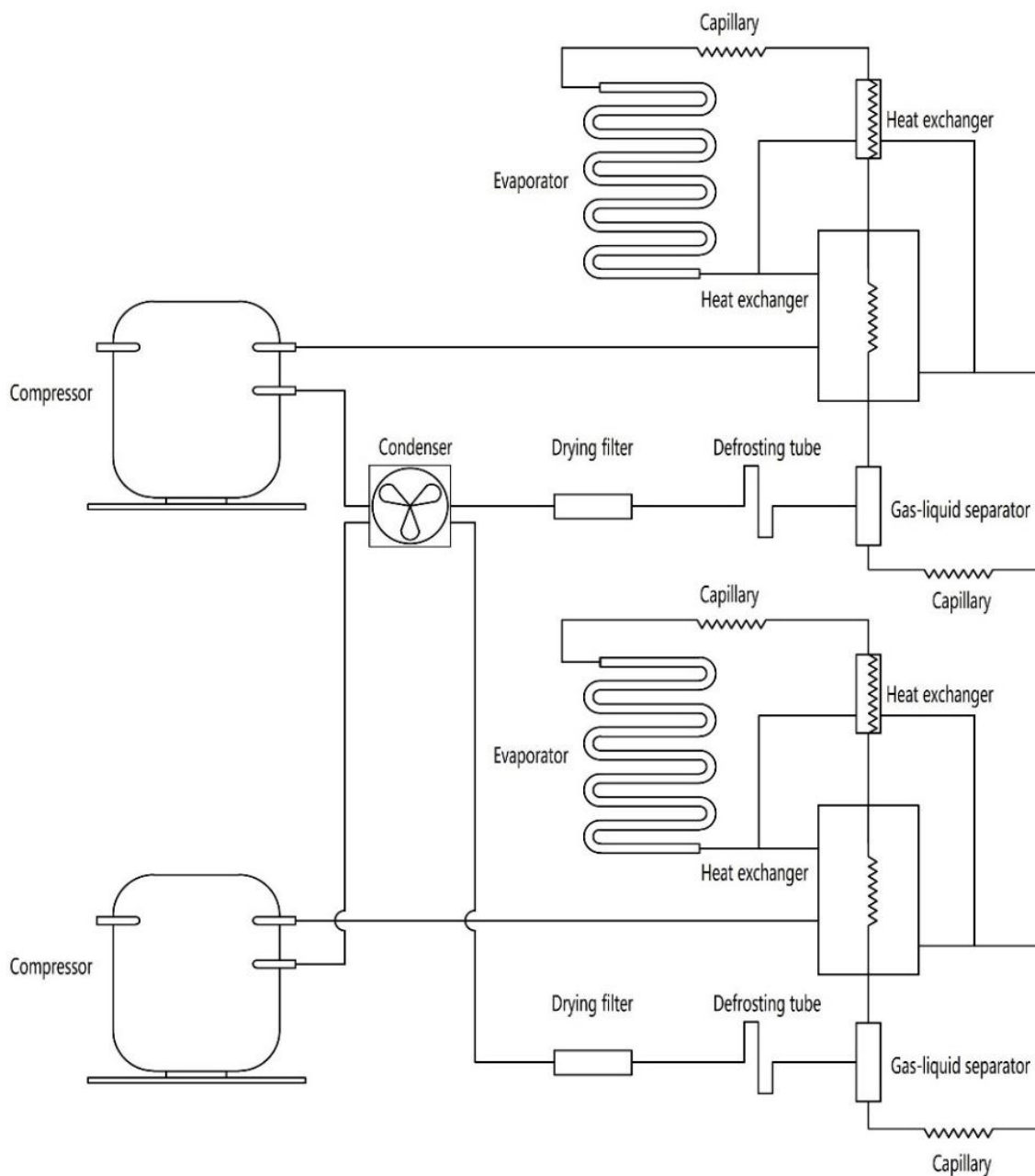
Problem	Checks / corrective actions
Freezer does not start	Check that the unit is connected to power and that the power switch is in the "ON" position.
	Check whether the supply voltage is too low.
	Check that input power is available at the outlet.
Insufficient cooling	Check whether the ambient temperature is too high.
	Check that both the inner and outer doors are fully closed. Frost on the cabinet or door seal may prevent proper sealing.
	Check whether the condenser filter is dirty or blocked.
	Check that the set temperature is correct.
	Check whether the unit is exposed to direct sunlight.
	Check whether the unit is installed near a heat source.
	Check that the access-port plugs are fitted correctly.
Noise	Check whether a large quantity of warm items was loaded into the cabinet in a short period.
	Check that the freezer is installed on a firm, level surface.
	Check whether the cabinet is touching nearby objects.
	Check that the feet are adjusted correctly.

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Refrigeration Principle and Circuit Diagrams

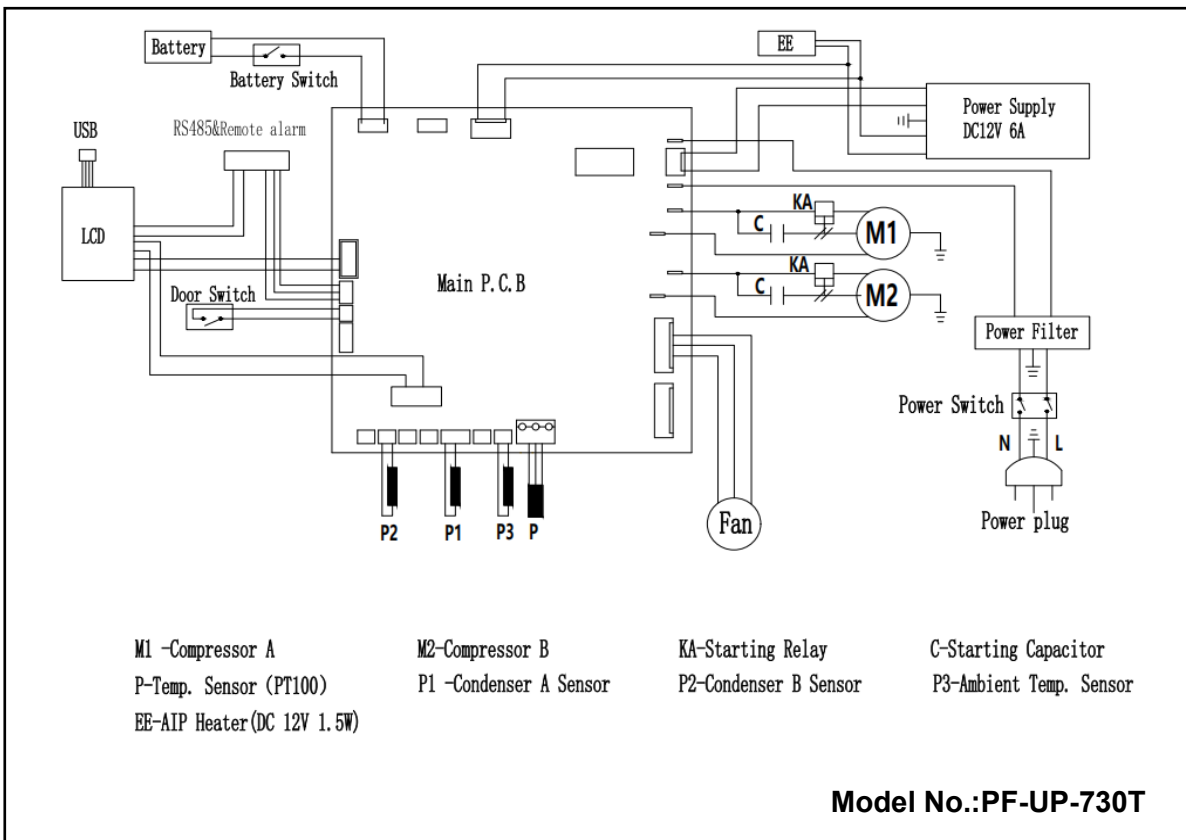
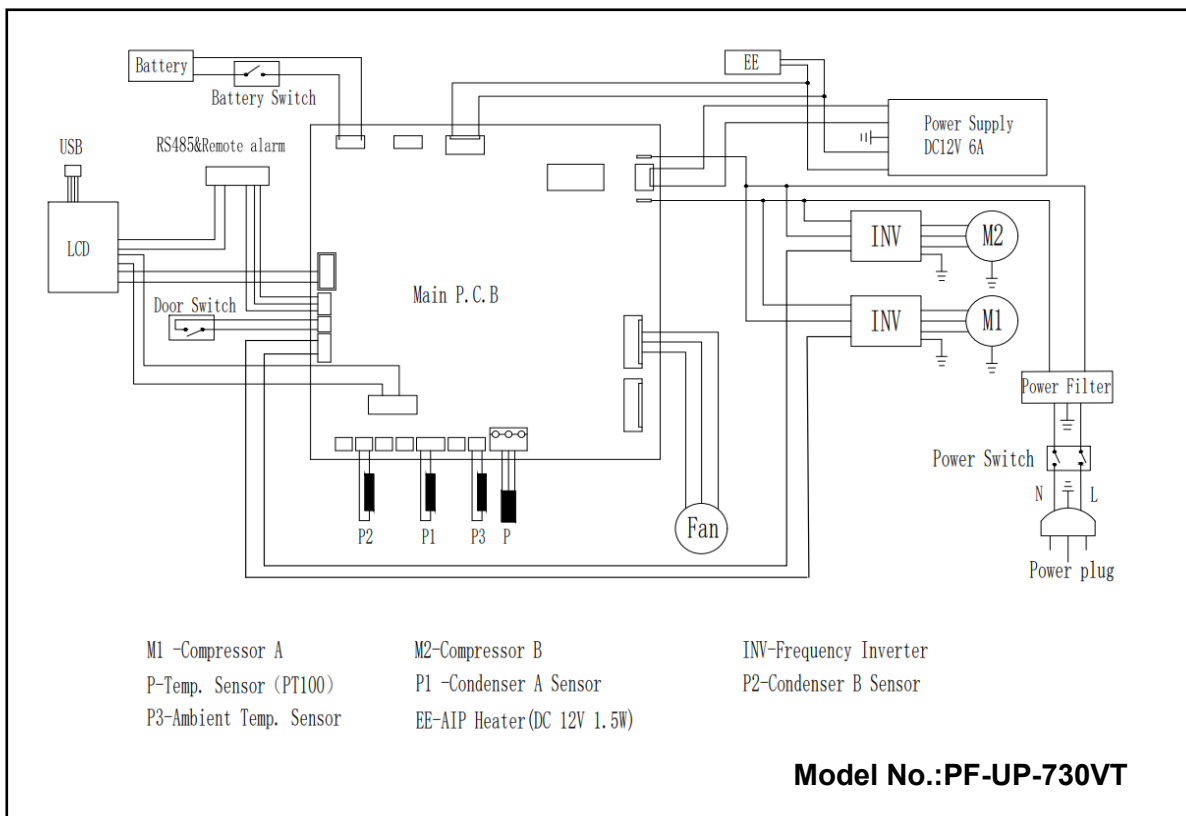
■ Freezer schematic diagram (Dual system)



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■ Circuit diagram (Dual system)



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■ Packing List

Item	Quantity
User manual	1
Ice scraper	1
Key	2
Shelf	3
Position limiter	2