Ultra Low Temperature Freezer NULF-207

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1. Safety Measures

Warning:

- The sign of "  " means the place is dangerous to human bodies, or the use pattern is harmful to products, or alarm users should pay special attention to this.
- It is strictly prohibited to unpack the outer packing case for transportation. The ultra-low temperature freezer should be used under the environmental temperature of 10℃~30℃.
- It is suggested to use it in an environment with air conditioning.
- The slant angle of the body of the ultra-low temperature freezer should not be larger than 45° in transportation to avoid faults of the compressor or the system.
- After unpacking, the freezer should be placed on flat and firm ground near the power socket.
- Do not put it near the heat source and avoid the sunshine.
- The ultra-low temperature freezer should be stored in a dry and draft-free room, away from corrosive gases.
- If the ultra-low temperature freezer must be stopped for a long period, it should be cleaned inside and outside and then covered properly with a plastic housing.
- The power supply is 198V to 242V/50Hz. If the voltage is unstable, kindly equip a power regulator that is above 3000VA, and kindly use it alone.
- It is necessary to provide an individual one-phase, three-hole socket and the proper fuse for the ultra-low-temperature freezer.
- The ultra-low temperature freezer must be provided with a reliable independent ground wire. The ground wire cannot be related to the gas pipe, stem heating pipe, and water pipe, and the zero line of the single-phase source should not be taken over as well.
- If the power connection wire must be lengthened, the sectional area of the conductor is larger than or equal to 1.5mm. The conductor can be single-stranded or multi-stranded. It is strictly prohibited to use the multipurpose socket for connection. The ultra low temperature freezer cannot lean against the wall. A space of at least 30cm should be left in the machine room for normal running of the system.
- No water is allowed to be splashed on the outside body of the ultra-low temperature freezer. When scouring the ground, it is strictly prohibited to splash water into the control panel and the compressor room. It is also prohibited to use the product in the rain or in an environment with a relative humidity of more than 85%. Otherwise, faults such as electric leakage, etc., may be caused.
- With a continuous operation system, the ultra low temperature freezer should be restarted after five minutes in case of power failure or machine halt to prevent the compressor or the system from being damaged.
- The key of the ultra-low temperature freezer should be kept out of the reach of children to avoid accidents.

- Inflammable, explosive, and volatile dangerous articles, and acid and alkali etc., with strong corrosiveness, are never allowed to be put in the ultra-low temperature freezer. The ultra low temperature freezer cannot be used in an inflammable and explosive gas environment. Be sure not to spray combustibles such as paint, coating, etc. to avoid fires.
- The door should be closed tightly. Otherwise, the normal operation and usage of the system may be affected.

2. Introduction

Ultra Low Temperature Freezer NULF-207 is an upright cold storage unit designed to maintain temperatures ranging from -45°C to -80°C. With a storage capacity of 20 liters, this freezer is ideal for preserving biological specimens, serum, blood samples, and germ cells over extended periods. Utilizing advanced microprocessor control, it ensures precise temperature regulation for optimal storage conditions. Built-in digital display facilitates easy monitoring of temperature variations, while visual and audible alarms provide added safety measures against power or thermostat failure.

3. Features

- Superior grade handle design
- High efficiency and low energy consumption
- Internal Stainless-Steel body
- External color Sprayed steel body
- High-Definition Digital temperature display
- Dual door gaskets and thick foam insulation, good thermal insulation and energy saving
- Chemically stable, CFC-free, hence environmentally safe refrigerant
- Easy maintenance of memory functions of standard working cycle in spite of any sensor failure

4. Specifications

Model	NULF-207
Temperature range	-45 to -80 °C
Capacity	20 L
Defrost	Manual
Refrigerant	Mixed gas
Voltage	DC 12V
Power	270 W
Interior dimension (W×D×H)	327 × 200 × 305 mm
Exterior dimension (W×D×H)	780 × 410 × 55 mm
Weight	40 kg

5. Applications

It has wide range of applications in scientific research institutes, Cell culture laboratories, blood banks, and in areas like clinical research, biomedical and biotechnology-based industries

6. Installation

Preparation for use

After unpacking, remove all outer packing material.

Kindly place the ultra-low temperature freezer at the proper location.

It would be best to clean the freezer before use.

7. Operations

7.1 Start and Test Machine

- Plug in the socket and switch on the power switch (located at the right side of the temperature controller on the front part of the body). Then the power supply indicator light is on. To ensure the normal running of the cryogenic freezer, be sure to use the three-hole socket, which is above 16A.
- The system will automatically start the compressor, and the refrigeration indicator light is on. The system goes into the refrigerating cycle state.
- After the power has been supplied for a period, the temperature inside the freezer decreases significantly, which indicates the refrigerating system is working normally.
- Before storing articles, kindly keep the freezer running in an empty state. When the freezer is running stably (it is best to keep it running in an empty state for 5 hours above) and the inside is cooled completely, the cold store articles can be put in.

7.2 Functions and basic operation of the controller

1) Control Panel

The computer control system is adopted by the ultra low temperature freeze.

Figure-1

2) Description

The NULF-207 is designed for heating and cooling applications. The probe temperature is displayed on the bright 3-digit display. The user can program different parameters, including set point, hysteresis, alarms, and probe adjustment, using the silicone front keypad. The unit features an error or alarm warning, internal buzzer (optional), a configurable digital input, and password protection. The Key input allows an easy programming of the parameters. Select between temperature display in º Cor ºF, display color, and 230V ac, 115V ac, 24V ac/dc or 12V ac/dc power supplies.

	Description	Units	Range	Factory
SP	Set Point	Degrees	r1 to r2	- 86
r0	Differential or hysteresis	Degrees	0. 1 to 99. 9	2. 0
r1	Lower value for SP	Degrees	- 200 to r2	60
r2	Higher value for SP	Degrees	r1 to 600	- 25
r4	Set Point variation	Degrees	0. 1 to 200	3. 0
d0	Cooling or heating control	Degrees	Co/ Ht	Co
c0	Minimum stopping time	Seconds	0 to 999	0
c2	Output status with probe error	Option	On/ OFF	ON
P1	Ambient probe adjustment	Degrees	- 99 . 9 to 99 . 9	0. 0
P4	Decimal point	Option	no/ yes	yes
P5	3 wires Pt 100	Option	no/ yes	yes
E 0	Digital input configuration	Option	OFF/ Al/ ES/ HC	OFF
H5	Access code to parameters	Numeric	0 to 255	0
A0	Alarm 1 hysteresis	Degrees	0. 1 to 99 . 9	1. 0
A1	Alarm 1 threshold	Degrees	0. 0 to 999	0. 0
A2	Alarm 1 exclusion time	Seconds	0 to 999	0
A3	Alarm 1 type	Option	OFF/ HI/ LO	OFF
A4	Alarm 2 hysteresis	Degrees	0. 1 to 99 . 9	1. 0
A5	Alarm 2 threshold	Degrees	0. 0 to 999	0. 0
A6	Alarm 2 exclusion time	Seconds	0 to 999	0
A7	Alarm 2 type	Option	OFF/ HI/ LO	OFF
A8	Alarm verification time	Seconds	0 to 999	0

7.3 Parameter descriptions

SP = Set point. The temperature we wish to regulate the machine (variable from r1 to r2).
r0 = Differential or hysteresis
R1 = Lower value for SP
r2 = Higher value for SP
r4 = Set point variation for energy saving. If digital input configuration E 0 ES this value modifies the set point as follows:

If d0 =Ht new SP= SP- r4
If d0 = Co new SP= SP+ r4

do = Cooling or heating control
If d0 = Ht and TS is the temperature of the ambient probe:
If TS >= SP load is disconnected
If TS <= SP- r0 the load is connected

If d0 = Co then:
If TS <= SPthe load is disconnected
If TS >= SP+ r0 the load is connected

c0 = Minimum stopping time of the load
c2 = Output status with probe error
P 1 = Ambient probe adjustment
P 4 = Decimal point
P 5 = 3 wires Pt 100. no = 2 wires, yes = 3 wires
E0 = Digital input configuration
OFF = Digital input disabled
Al = External alarm (if input is short-circuited)
ES = Energy Saving. The Set Point value is modified in r4.
HC = if input is short-circuited, it changes to Heat or Cold depending on d0 value.
if d0 = Heat, it changes to Cold mode.
if d0 = Cold, it changes to Heat mode.

H5 = Access code to parameters (it is set to 00 from factory)
A0, A1, A2, A3 = Alarm 1 parameters
If A3 =OFF, alarm 1 is disabled
If A3 =HI, then a high-temperature alarm is set:
If TS >= SP+A 1, alarm 1 is activated
If TS <= SP+A 1 - A 0, the alarm 1 is deactivated
If A3 =LO, then a low-low-temperature alarm is set:
If TS <= SP- A 1 the alarm 1 is activated
If TS >= SP- A 1 +A 0 the alarm 1 is de- activated
The alarm 1 is not activated until the time the instrument is turned on is higher than A2

A4, A5, A6, A7 = Alarm 2 parameters (like alarm 1)
A8 = Alarm verification time. Time since the alarm situation occurs until its signals. (It affects Alarm 1, Alarm 2, and the External alarm).

7.4 Parameter Programming

Set Point (SP) is the only parameter the user can access without code protection.

- Press **SET.SP** text will appear on the display.
- Press **SET** again. The real value is shown on the display.
- The value can be modified with the **UP** and **DOWN** arrows.
- Press **SET** to enter any new values.
- Press **SET** and **DOWN** at the same time to quit programming or wait one minute, and the display will automatically exit programming mode.

7.5 Access to all code-protected parameters

- Press **SET** for 8 seconds. The access code value 00 is shown on the display (unit comes with code set at 00 from factory).
- With the UP and DOWN arrows, code can be set to the user's needs.
- Press **SET** to enter the code. If the code is correct, the first parameter label is shown on the display (SP).
- Move to the desired parameter with the UP and DOWN Keys.
- Press **SET** to view the value on the display.
- The value can be modified with the UP and DOWN arrows.
- Press **SET** to enter the value and exit.
- Repeat until all necessary parameters are modified.
- Press **SET** and **DOWN** at the same time to quit programming or wait one minute, and the display will automatically exit programming mode.
  The keyboard code can be reset to ZERO by turning off the controller and turning it on again while keeping the SET key depressed.

7.6 Led indication, buzzer, and display messages

The led OUT indicates if the load is connected or not.
In normal operation, the probe temperature will be shown on the display.
In case of alarm or error, the following messages can be shown (the alarm led is ON and buzzer sounds).

- Err = Memory Error.
- ooo = Open Probe Error.
- --- = Short-circuit Probe Error.
- A1 H = High temperature alarm 1.
- A1 L = Low temperature alarm 1.
- A2 H = High temperature alarm 2.
- A2 L = Low temperature alarm 2.
- ALE = External alarm.

7.7 Alarm Validation

In case of alarm, the internal buzzer and alarm led is activated. The display showed the corresponding message. The buzzer and display message can be silenced by pressing the **SET** and **DOWN** arrows at the same time. If the alarm continues after A8, it is signaling again.

8. Maintenance

8.1 Storage Essentials

- Before storing articles, kindly keep the freezer running in an empty state. When the freezer is running stably (it is best to keep it running in an empty state for 9 hours above) and the inside is cooled completely, the cold store articles can be put in.
- Articles or other products put in the freezer at one time shouldn't be too many. Proper clearance should be left to help the circulation of the inside cold air.
- The refrigerating system of the ultra-low temperature freezer is a device used for maintaining a low temperature rather than a quick freezing device. If you want to store high-capacity (high water-bearing material), precool them in another quick-freezing plant and then store them in the freezer to avoid long-term running without stopping the refrigerating system.
- When the initial storage capacity is large, a method of gradually lowering the temperature set should be adopted. The temperature is lowered by 10°C in every step and then maintained for 1-2 hours until the storage temperature is reached.
- When storing plastic bag products, kindly note that the user should not get them close to metal edges to avoid scratching of plastic bag.

8.2 Maintenance

- **Body cleaning:** Kindly use a non-corrosive neutral cleaning agent to clean the inside and outside surfaces of the ultra-low temperature freezer and then use a dry cloth to wipe it up.

Notes: It is strictly prohibited to use water to directly wash the inside and outside surfaces of the freezer so as not to affect the insulating property of electrical equipment. Boiling water, cleaner, acid, alkali, gasoline, alcohol, benzene, corrosive cleaning agent, and scrub-bush are forbidden in cleaning.

- Clean dust on the condenser frequently with a banister brush or vacuum cleaner to maintain a good condensing effect.
- Regularly wipe a little talcum powder on the door seal to extend the service life of the sealing strip.
- If the ultra-low temperature freezer has been running for a long time, frost may easily accumulate on the door seal, the opening part of the freezer, and the side wall inside the freezer. If the frost layer is too thick, the sealing property and the refrigerating property may be affected. Therefore, kindly defrost regularly and wipe it clean with a dry cloth.
- Kindly use a non-corrosive neutral cleaning agent to clean the inside and outside surfaces of the freezer, and then use a dry cloth to wipe it up.
- **Machine halt:** when stopping using the freezer, unplug the power plug, clean it according to the above method, cover it with a plastic bag after natural drying, and put it in a ventilated and clean place.

9. Troubleshooting

9.1 Non-Fault phenomenon

- **The sound of running water can be heard in the ultra-low temperature freezer:**
  This is the sound of refrigerating fluid running in the pipeline.
- **Compressor is hot:** When the compressor is running, the surface temperature can reach 70℃～90℃.
- The user may feel a little hot on the two sides of the body (close to the door) when the freezer is running. That is because the leak-proof tube is equipped in the freezer.
- **There is condensation on the door seal:** In rainy and moist seasons or under the environment with higher relative humidity, there may be condensation on the outer surface of the freezer and the door seal. Then rub dry.

9.2 General Fault Analysis and Removal

1) The ultra-low temperature freezer does not work and there is no display on the controller.

- If the power plug wire is properly connected and the main power supply is plugged in.
- If the power switch is turned on.
- If the power socket is in good condition.
- If the fuse has been burned out.
- If the controller is broken or the line is damaged.

2) The compressor is running without stopping, but the temperature inside the freezer does not decrease.

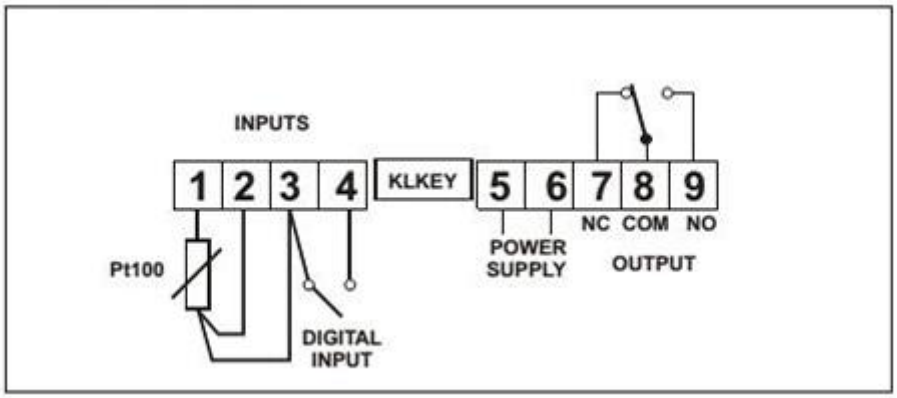
- **The door is opened too often for too long:**Try to reduce the door-opening time.
- **The storage capacity is too much:** Take some out or distribute evenly to keep the air inside the freezer flowing.
- **The condenser is dirty, and the heat dissipation is not good**: clean the condenser (operate according to Maintenance).
- The refrigerant leaks or the pipeline is blocked.
- The condensate fan in the machine room is broken.

3) Noise

- If the outer packing has been completely removed.
- If the freezer is placed smoothly.
- If the back part of the freezer body contacts the wall: Kindly operate according to safety measures.

- **The compressor is in abnormal operation only with drone:** If the power voltage is within the defined limits, kindly operate according to safety measures.
- **The fan in the machine room makes a lot of noise:** The fan is broken or in contacts with something.

10. Circuit Diagram



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