

ULT FREEZER

TRUST

-45°C / -86°C



User manual

Ref: UM_TRUST/EN_rev1.3

 **Froilabo**
Precision for life

Please read carefully this manual before first use!

This document has been prepared with the utmost care possible. However, Froilabo declines all responsibility in the event of errors or omissions. The same applies to any damage arising from the use of information contained in this manual.

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WARNING: GENERAL INFORMATION AND SAFETY INSTRUCTIONS

It is necessary to strictly follow the instructions of use of this manual to ensure the proper functioning of the device or to exercise a possible resort to warranty.

To use this manual :

- Read these instructions carefully before using the device for the first time.
- Follow the instructions in the operating instructions.
- This manual is part of the product. Please conserve it.
- If you need to transfer this device, do not forget to attach the user manual.
- In case of loss, upon request, we will provide you with a new user manual.

Concerning these devices, some risks are to be taken into consideration (indicated by symbols):



This pictogram is intended to draw your attention to informations, observations of great importance, potential danger or a risk of personal injury.



Information: this symbol informs the user of advice and additional information allowing him / her to make optimal use of the product.



Warning! This symbol indicates the safety measures to be followed by the user or the technician, in order to guarantee the physical integrity of people in the vicinity of the device. These measures must be followed with the utmost care.



The pictogram is intended to remind you to pay attention to **hot surfaces**.



The pictogram is intended to remind you to pay attention to **electric risk**.



The pictogram is intended to remind you to pay attention to **risk of asphyxiation**.



Danger extreme cold temperature! Potential hazard due to ultra-low temperature of the freezer and contents.

ENVIRONNEMENT:

This device may contain fluorinated greenhouse gases under the KYOTO protocol.

Waste treatment methods: Do not allow the product to disperse into the environment.

Destruction / Disposal: Consult the manufacturer or supplier for information on recovery or recycling.

Companies installing, servicing, maintaining, repairing or commissioning equipment containing refrigerants must have a certificate referred to in Article R543-76 of the French Environment Code or an equivalent certificate issued in one of the member states of the European Union.

1. Certificate of conformity

FROILABO SAS hereby certifies that the equipment listed below:

Low temperature freezers -45°C and Ultra Low Temperature freezers -86°C TRUST (TRU)

Comply with the applicable standards and technical directives:

- EN 61010-1 – Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: general requirements,
- 2014/35/EU – Low Voltage Directive,
- 2014/30/EU – EMC Directive, Class A equipment.

Nota: this equipment is not designed for operation in explosive atmospheres (ATEX). Furthermore, they may not be used to store flammable, corrosive or explosive substances.

2. Warranty

Optimal performance will be achieved following correct installation and operating instructions provided in that manual. Froilabo SAS guarantees that the equipment will operate optimally in accordance with the conditions of installation and use set out of this manual.

The warranty period is: 24 months.

This warranty is extended to:

- 5 years on the following parts: fan, compressors, condenser and regulator*
- 10 years on the VIP insulation

* For parts, the warranty is limited to spare parts, other costs (transport, travel, labor) remain the responsibility of the customer.

During this period, in case of malfunction of your device, the warranty is limited to:

- free repair or exchange of equipment
- functioning improvement

It must be clear that the trouble or failure must be related to a defect in the material or manufacture. **Any other claim for compensation is excluded.**

Lifespan of the product is around 10 years minimum.

The right use includes following the instructions in the user manual and performing the inspection and maintenance work.

The photos used in this document are not contractual.



3. General informations



Ensure that all persons installing, using and repairing the equipment are aware of the potential hazards related to their work, of the safety measures to respect and have read and understood the instructions included in this user manual.

If hazardous or potentially hazardous products are used, only persons fully familiar with the equipment should handle these products. These persons must be capable to conduct an overall assessment of the potential risks. Please contact us if you have any questions regarding the use of the equipment or the instructions. **Under no circumstances Froilabo may be held liable for the quality of material stored in the freezers.**

Nota: the equipment that you have purchased is designed for professional use. Nevertheless, impacts to the frame and vibrations should be avoided. Ensure that the equipment is inspected at regular intervals appropriate for its frequency of use. Also check (at least once every two years) that labels relating to safety and unauthorised use are properly in place. If backup systems using liquid CO₂ or N₂ vapour injection are used, please refer to the corresponding safety data sheets.

4. First contact with your freezer

4.1 Delivery and unpacking

Use a pallet truck to move the freezer on its pallet. It is imperative to keep the freezer unpacked to avoid any risk of tipping over. The device can be placed on the ground and maneuvered thanks to the wheels. After positioning the device in the desired location, remove the various protective plastics and shims.

Do not forget to remove the foam padding shelves (at the bottom thereof) to avoid damaging the gates when closing the door once the freezer is at -80 ° C.

Froilabo freezers are delivered on a pallet equipped with an unloading ramp. In fact, they do not require specific equipment to get off the pallet. Please refer to the handling and unpacking sheet attached to the device.

After the reception, please check the contents of the delivery.

340 liters	515 liters	690 liters
1 detachable power cord L=2.50m with IEC19 connector		
1 filter cassette		
1 set of 2 keys		
1 pressure relief valve + 1 x foam valves + 1 x spare foam valves		
1 user manual		
1 shelf	2 shelves	3 shelves
2 brackets	4 brackets	6 brackets



Do not use sharp objects to avoid damaging the paint. Do not tip the device. Preserve the device as much as possible from all vibrations. Two people are needed to move the device.

Protective gloves should always be worn!

4.2 Setting up and installation

The freezer is designed for use under the following environmental conditions (according to EN 61010-1):

- Indoor use only
- Maximum altitude: 2000 m
- Ambient temperature range between 18 ° C and 32 ° C
- Maximum relative humidity of 80% for temperatures up to 22 ° C
- Supply voltage ripple $< \pm 10$ % of rated voltage
- Supply network voltage surges: category II (Standard IEC 60364-4-44)
- Maximum level of room pollution: 2

TRUST freezers are Class A devices within the meaning of the EMC Directive.

In order to minimize energy consumption and reach announced performances, place the unit in a **well-ventilated room**, away from sources of heat (radiator, heating ...) and avoid direct exposure to the sun. Place it on a flat surface. It is essential for its proper functioning that the device is level. If necessary, use rigid shims.

It is important to ensure that no obstacle (wall, switchgear) interferes with the ventilation of the appliance (air inlet and outlet). Remove about 200mm from each side of the freezer.

Lower the 2 front levelling feet, by performing an additional $\frac{1}{4}$ turn after contact with the ground.

The temperature of the room **must not exceed + 35 ° C**. The moisture content in the air should ideally not exceed 50% RH. The use of air conditioning can significantly extend the life of compressors.

If you are using a liquid CO₂ or LN₂ liquid backup device, refer to the safety data sheets at the end of this manual.

4.3 Power supply

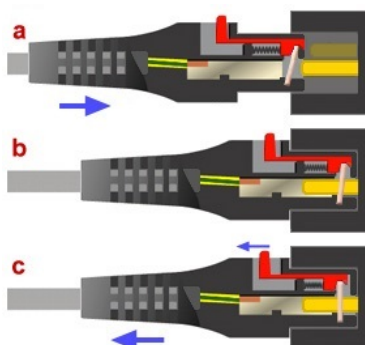
See the manufacturer's plate on the back of the device, 3 models exist:

- Voltage 230 Vac $\sim \pm 10\%$, 50 Hz, protection by fuse "aM 12 A"
- Voltage 110 Vac $\sim \pm 10\%$, 50/60Hz, protection by fuse "aM 20 A"
- Voltage 208 Vac $\sim \pm 10\%$, 60Hz, protection by fuse "aM 12 A"

For the voltage 220V $\sim \pm 10\%$ 60 Hz, refers to the characteristics of the voltage 230V $\sim \pm 10\%$ 50 Hz of the table in § 4.6.

The power supply must be single-phase, in accordance with the manufacturer's plate on the rear of the unit. It must be equipped with a safety device ensuring the automatic shutdown of the power supply in the event of an insulation fault, such as a properly sized differential circuit breaker.

In order to allow the electrical disconnection of the appliance, the circuit breaker must be immediately identifiable and within easy reach of the operator



Your freezer is equipped with a **detachable IEC connector with blocking**.

The insertion of the male connector into the female connector (step a) is carried out normally.

To remove the IEC connector (step c), slide the red pull tab back to allow the male connector to be removed from the female connector.

4.4 Temperature range

The TRUST freezer is factory preset to optimized power consumption.

On the -86°C model, the setting ranges of the device are from **-55°C to -90°C**, default setting being **-80°C**.

On the -45°C model, the setting ranges of the device are from **-20°C to -45°C**, default setting being **-45°C**.

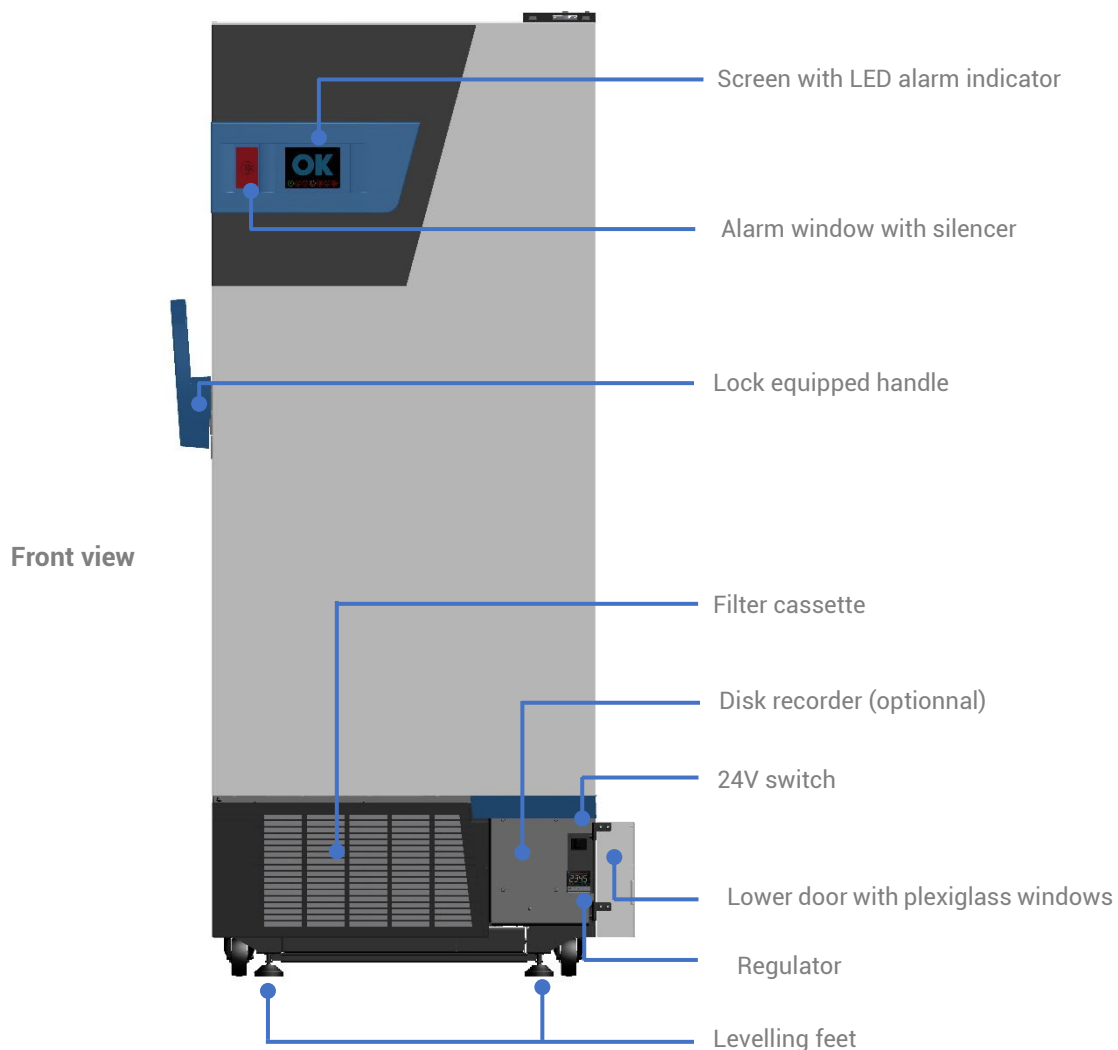
The room temperature (**recommended between +18°C and +32°C**, ideally between 20°C and 25°C) has a major influence on the power consumption of the equipment.

4.5 Construction and insulation

The one-piece **electro-galvanized steel** exterior body is protected by an epoxy paint.

The inner tub is made of stainless steel. The thermal insulation is ensured by a set of insulating panels under vacuum / polyurethane foam. The insulated swing door is mounted on a pivot.

The closing and sealing of the door are ensured by a progressive tightening handle.



Heated pressure relief valve:

The pressure relief valve allows a balance of pressures between the inside and the outside of the freezer which makes it easier to open the door.

Frequent doors opening favours the introduction of moisture in the freezer and may induce frost formation after the air intake tube where the valve is attached. A calibrated foam is placed into the air intake tube to limit this phenomenon.

Froilabo freezers are equipped with a **heated pressure relief valve** allowing a quick return to the ambient pressure inside the enclosure, either after a door opening or after the injection of CO₂ or LN₂, and without ice formation in the valve well.

In normal operation, this valve does not require any maintenance.

The heating element of the valve starts to heat when the temperature inside the freezer **reaches -15 ° C**.

However, check regularly (depending on use) that the pressure relief valve (located on the side of the device) and the calibrated foam are working properly. Reposition it properly after cleaning.

After stopping the freezer completely, remove the valve foam to dry. Before restarting the freezer, replace the dry foam.

After CO₂ or LN₂ injection, it is necessary to dismantle the decompression valve and reposition the inner circular silicone membrane properly in order to ensure the correct sealing inside of the valve.

Heating door seal:

Froilabo freezers are equipped with a **heating door seal** to prevent the formation of ice and thus maintain an optimal seal of the freezer.

Refer to the "Maintenance, cleaning and decontamination" section for cleaning the door seal.

Air filter:

In order to maintain the cooling performance of the device and to preserve the compressors lifespan, an air filter is placed in front of the condenser.

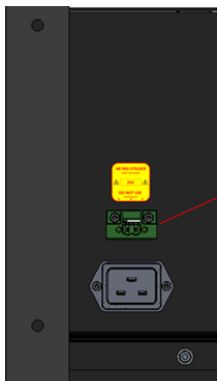
It is necessary to dust or wash this filter as frequently as necessary.

A device must never operate without a filter.

Clamping handle:

The device has a progressive tightening handle. Its double action makes it easier to open and close the door. The freezer door can be locked thanks to the key lock located on the side of the handle.

Dry contact:



This connector is under a tension of 24 Vdc, nothing must be connected without the previous agreement of Froilabo

It is not possible to connect a supervision unit directly to this connector; you must order the **BM/OPT18** option before any electrical connection.



Lateral view of the option of dry contact

4.6 Technical characteristics and refrigeration system

Technical characteristics:

Characteristics	TRUST Freezers					
	340L		515L		690L	
	-86°C	-45°C	-86°C	-45°C	-86°C	-45°C
	General					
Raw volume (liters)	340	340	515	515	690	690
Number of compartments	2	2	3	3	4	4
Freezer weight (kg)	223	178	267	222	330	285
Power consumption* at 230 V at 50 Hz (Watts)	1150	1000	1500	1000	1500	1000
Minimum cooling capacity of the room containing the continuous freezer (Watts)	850	950	1200	950	1200	950
Sound pressure measured in dB(A) (in regulation mode)	56					
Power supply	Voltage 230 Vac ~ +/-10%, 50 Hz, protection by fuse "aM 12 A" Voltage 110 Vac ~ +/-10%, 50/60Hz, protection by fuse "aM 20 A" Voltage 208 Vac ~ +/-10%, 60Hz, protection by fuse "aM 12 A"					
	External dimensions					
Height (mm)	1280	1280	1640	1640	2000	2000
Width (mm)	875	875	875	875	875	875
Depth (mm)	970	970	970	970	970	970
Required clearance at the back of the device (mm)	200	200	200	200	200	200
Maximal depth with the door open (mm)	1750					
Maximal width with the door open (mm)	1150					
Maximum opening angle of the door	110°					
	Internal dimensions without rack					
Height (mm)	716	716	1076	1076	1436	1436
Width (mm)	630	630	630	630	630	630
Depth (mm)	752	752	752	752	752	752

* Power consumption in regulation mode, all components activated and stabilized, at 23 ° C (room temperature) with the freezer being empty.
On an equivalent product, hydrocarbon-based (HC) gases can reduce both power consumption by up to 25% and cooling requirements.

Refrigeration system:

Characteristics	TRUST Freezers					
	340L		515L		690L	
	Standard gases	Green gases	Standard gases	Green gases	Standard gases	Green gases
	Double stage -86°C models					
Hermetic compressor power stage 1 (Watt)	580	380	780	580	780	580
Hermetic compressor power stage 2 (Watt)	380	380	580	580	580	580
Stage 1 R417a refrigerant– load(g)	600	/	600	/	600	/
Stage 2 R508b refrigerant– load (g)	300	/	300	/	300	/
Stage 1 R290 refrigerant– load (g)	/	140	/	200	/	200
Stage 2 R170 refrigerant– load (g)	/	190	/	80	/	90
	Simple stage -45°C models					
Hermetic compressor power	380	/	580	/	780	/
ISCEON 89 refrigerant – load (g)	600	/	600	/	600	/
Capillary relaxation	YES					
Air condenser as standart	YES					

4.7 Sample storage

Technical characteristics:

In order to avoid any risk of deterioration of the elements of construction and to guarantee the announced technical performances, the following instructions must be respected:

- Do not place strong corrosive products inside the freezer.
- Do not place explosives or highly flammable products in the freezer.
- Leave a minimum space of 3 cm along the internal walls.
- Do not remove several shelves together.
- Take care not to prevent the closing of the wickets when closing the door.

In order to avoid the risk of tipping over a heavily loaded device, it is forbidden to pull several sliding shelves and / or drawers simultaneously.

The maximum permissible load for each sliding shelf or drawer must never be exceeded (75 kg).



These devices are not explosion-proof.

The internal surfaces of the freezer and its contents can be extremely cold (-86 ° C). Protect yourself accordingly (specially adapted gloves).

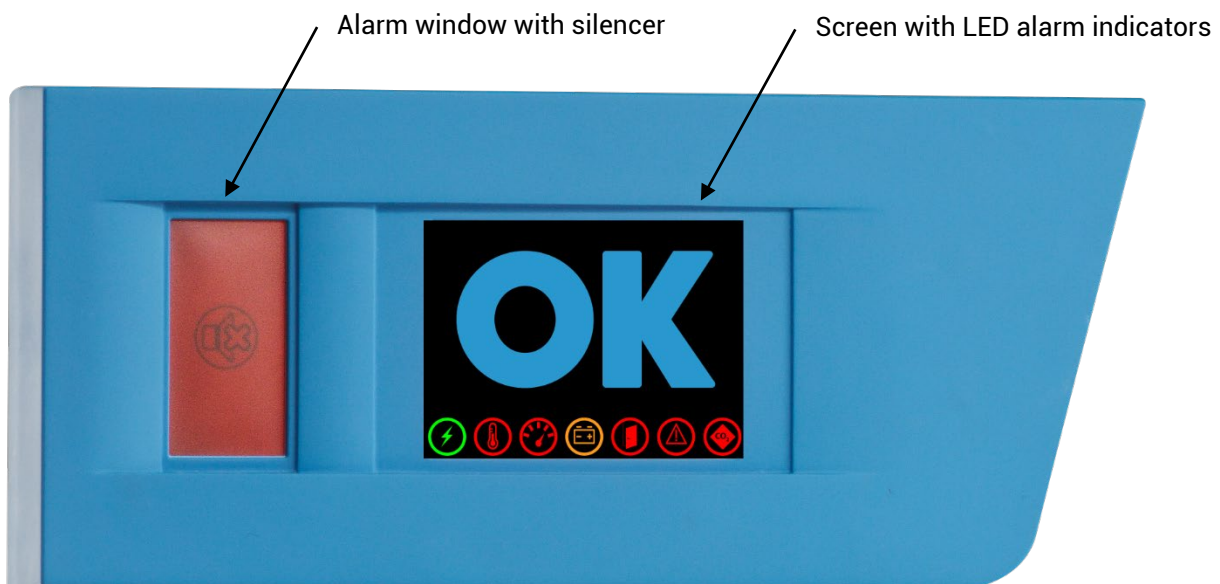


	BM340	BM515	BM690
Level 4	/	/	1 shelf
Level 3	/	1 shelf	1 shelf or 1 drawer
Level 2	1 shelf	1 shelf or 1 drawer	1 shelf or 1 drawer
Level 1	No interior featings	No interior featings	No interior featings

It is possible to replace a drawer with a shelf. A shelf can not, however, be replaced by a drawer.

4.8 Control panel

On the TRUST model, the control panel is located on the controller at the bottom of the unit. An alarm window with button is also present on the upper part of the door.



4.9 Starting up

Respect the order of the following instructions:

1. Equip the levels of drawers / shelves. Do not forget to remove any foam padding at the bottom of the shelves.
2. Connect the device to a single-phase earthed network protected by a 30 mA differential circuit breaker.
3. Press the ON / OFF button (activates 24V). A buzzer sounds, clear the alarm by pressing the button.
4. Make sure that the compressor and the fan start.
5. The display shows the first 2 pictograms (sector and set temperature not reached).
6. Set the set point (-45 ° C or -80 ° C default, depending on the model).
7. Wait for the device to reach the set temperature (3 to 4 hours depending on the model). The "temperature not reach pictogram" disappears when the temperature reaches -60 ° C (for the -80 ° C model) or -30 ° C (for the -45 ° C model).
8. Once the set temperature is reached, you can **charge the device**.



Nota 1: Charging the device with "hot" products may cause the device to warm up. The high temperature alarm could then activate.

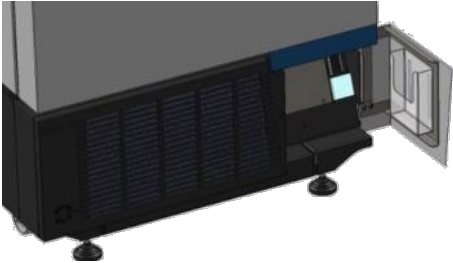


When the device is installed, the injection must only be activated once the target temperature has been reached, otherwise the cylinders will be unloaded during the first temperature decrease.

5. Using PXF4 regulator

5.1 Adjusting setpoint temperature

On the TRUST model, the setpoint temperature is adjusted thanks to the regulator at the front bottom right of your freezer, behind the glass door.



Open the lower right wicket to access the regulator



Actual temperature (PV)

Setpoint temperature (SV)

Adjust the value using the 2 arrows keys.

No validation is needed. The value is automatically saved.

If you press and hold the keys, the value changes more quickly.

5.2 Setting high and low temperature alarms


High visual alarm:

These devices are equipped with a high and low temperature alarm visible on the main screen: a maximum deviation between the temperature in the enclosure (PV) and the set temperature (SV, Set Value) is allowed in the enclosure of freezer.


If the measured temperature (PV) cross this gap, the alarm goes on and the alarm n°2 lights up.

The high alarm value is set (factory setting) at -60°C (for -86°C model) or -30°C (for -45°C model).

Setting the high temperature alarm A1-H:

1. Press **SEL** to access parameters.
2. Hold **SEL**: apparition of A1-L parameter.
3. Display A1-H parameter by pressing 1 time ↓ and select by pressing SEL (blinking).
4. Modifie A1-H parameter, by using the ↑ and ↓ keys.
5. Validate by pressing **SEL**.
6. Go to home menu by pressing 

Setting the low temperature alarm A1-L:

1. Press **SEL** to access parameters.
2. Hold **SEL**: apparition of A1-L parameter.
3. Press **SEL** (blinking of A1-L).
4. Modifie A1-H parameter, by pressing the ↑ and ↓ keys.
5. Validate by pressing **SEL**.
6. Go to home menu by pressing 

5.3 Setting CO₂ / LN₂ injection

To be used, the CO₂ / LN₂ emergency injection system must be activated and the injection threshold must be set.

Configuration de l'injection CO₂ / LN₂:

1. Press **SEL** to access parameters.
2. Press **↓** to display **CH 5**, validate by pressing **SEL**.
3. Press **↓** to display **A2tp**, validate by pressing **SEL**.
4. Enter the value 1 using the **↑** key. Validate using **SEL**. CO₂ / LN₂ threshold is activated.
5. Go back to main menu by pressing **⏮**
6. Press **SEL** 1 time.
7. Press **↓** 2 times to display **AL2**, validate by pressing **SEL**.
8. Modify the triggering CO₂ / LN₂ temperature by using **↑** and **↓** keys.
9. Validate by pressing **SEL**.
10. Go back to main menu by pressing **⏮**



When the device is installed, the injection must only be activated once the target temperature has been reached, otherwise the cylinders will be unloaded during the first temperature decrease.

6. Indicators et alarms LED

The main display allows a clear and visible display of indicators and warning lights. They have a simplified color code to help you easily understand the type of defect:

- **Green: Normal running**
- **Orange: minor defect (make the necessary arrangements as soon as possible)**
- **Red: major defect (make the necessary arrangements immediatly)**

Alarms functions maintaining:

If there is no main power, alarms (buzzer, alarms report and CO₂/LN₂ [optionnal]) stay activated thanks to the 24V batteries supplied as standard with your freezer. Temperature display is also maintained by the 24V batteries.



Warning: compressors are no longer powered, so the freezer doesn't produce cold anymore.

When a **major alarm** is triggered, the « OK » indicator on the screen disappears until the problem is resolved.

6.1 Main power connected



This icon appears when the 230 VAC power supply is connected. It disappears when the 230 VAC power supply is disconnected.

If the alarm is cut off via the front panel button, it will restart after **30 minutes**.

6.2 Temperature alarm (high or low)



This light indicates that the set temperature inside the freezer is not reached. Check the setting on the regulator or contact after sales service.

If the alarm is cut off via the front panel button, it will restart after **4 hours**.

6.3 Overpressure CP1



This indicator appears when the pressure in the compressor cooling circuit #1 (CP1) is too high. The compressor is then cuts off for 5 minutes. Please check that nothing obstructs the air filter, check also its state. After 3 alarms over 24 hours, the LED appears definitively, in this case, contact the After-Sales Service.

If the alarm is cut off via the front panel button, it will restart after **4 hours**.

6.4 Battery charge failure



This LED indicates that the state of charge of the battery is very low. Have the battery changed as soon as possible.

This alarm does not trigger any **sound signal** from the freezer.

6.5 Open door alarm



This indicator appears when the door remains open for more than 2 minutes. It disappears when closing the door.

If the alarm is cut off via the front panel button, it will restart after **10 minutes**.

6.6 Engine failure



This light indicates that the compressor has been running nonstop for more than 10 hours. Contact the service department as soon as possible.

If the alarm is cut off via the front panel button, it will restart after **4 hours**.

6.7 CO₂/LN₂ injection in progress



This LED flashes with each CO₂ / LN₂ injection. Injections take place every second, so it is normal for the LED to flash.

If the alarm is cut off via the front panel button, it will restart after **4 hours**.

7. Maintenance and customer services

7.1 Security rules



Before any maintenance, it is essential to stop the devices with the ON / OFF button, then unplug the power cord to turn OFF the power.



7.2 Maintenance, cleaning and decontamination

Froilabo strongly recommend users perform a complete defrost of equipment twice a year.

Do not use a water jet to avoid splashing the appliance.

The use of a -80°C freezer requires a minimum of maintenance to ensure optimal continuous operation of the device.

Because of the intense cold, germs brought by packaging, handling and contacts survive and retain all their virulence. It is necessary to take all precautions when using freezers:

- Periodic cleaning of external surfaces
- Use of gloves
- Short-times door openings
- Manipulation in laminar flow hood of tissues and packaging

For a careful cleaning of the device we recommend a product of commercial type without acids or halides. A diluted alcohol solution may be used **when mentioned**.

External surfaces:

For simple cleaning, simply wipe the surfaces with a damp cloth.

Inner tank:



Formally avoid bleach, even very diluted. Never rub stainless steel with metal sponges or other abrasives. Beware of the risk of burns.

Freezers are equipped with removable racks for easy maintenance.

Rack disassemble:

- Use a flat screwdriver to disassemble the racks.
- Clean the all tank with soft cloth soaked in alcohol.
- Reassemble the racks, considering their orientation (if the rack is reversed, not all screws can be reassembled).

Door seal:

The door seal is heated by conduction through a resistive wire located in the joint itself and decreasing the formation of frost. Nevertheless, frost can accumulate, especially during frequent door openings. Clean the silicone seal with dry compressed air or the plastic squeegee provided by **Froilabo**.

Inner wickets:

The inner wickets are removable without tools for easy maintenance and defrosting.

Any serious problem requires the intervention of our maintenance department, or a possible diagnosis and help by telephone. Depending on the type of contract signed, FROILABO undertakes to intervene within certain deadlines in case of breakdown.

In order to subscribe to a maintenance contract, please return the maintenance contract request at the end of this manual.

Decontamination:

Following contamination of the device by hazardous substances, the operator must ensure that proper decontamination is performed.

Do not use decontamination products that could cause a hazard due to the reaction with the components of the device or the potential materials inside. If in doubt about the cleaning product, please contact Froilabo Service.

In case of contamination of the inner chamber with hazardous biological or chemical materials, we recommend decontamination of the interior with commercial type products.

In turns, you can use the following disinfectants:

Inner tank (stainless steel):

- commercial surface disinfectants without acids or halides (without drops)
- Alcohol solutions

Door seal (silicone) :

- Alcohol solutions

Inner wickets:

- commercial surface disinfectants without acids or halides (without drops)
- Alcohol solutions max. 10%

After cleaning, rinse using a sterile cloth.

Before restarting, the device must be thoroughly dried and ventilated as explosive gases may be formed during disinfection.



During each decontamination, ensure the protection of people adapted to the risks. DO NOT USE acid or chlorine base cleaners (corrosion risks)!

In the event of any deterioration and corrosion as a result of the use of non-recommended cleaners, FROILABO declines all responsibility.

7.3 Extended stop

When the device is not used for a long time, it is best to do as described:

- Stop the freezer.
- Unplug the main.
- Defrost, clean and dry the inner tank.
- Leave the door open to prevent bad smells.
- Remove valve foam and let it dry.

7.4 Problems encountered and solutions



Any work on a device must be performed by qualified personnel. Observe the safety instructions. Any serious problem requires the intervention of our maintenance department, or at least a possible diagnosis and help by telephone.

Symptoms	Possible problems	Solutions
Regulator does not start	Main unplug	Plug the main
	24V switch on « 0 »	Switch the 24V switch to « I »
	Defective power supply	Check the electrical installation
	Defective power cord	Replace the power cord
Regulator does start but the freezer doesn't produce any cold	No temperature setpoint has been set	Set the set point
	The freezer has a lot of inertia	Normal operation, wait for the device to stabilize
	Refrigerating problems	If the LED lights up, call customer service!
	The charge prevents the passage of cold air	Check load disposition
Regulator displays U.U.U.U.	Probe rupture	Call customer service!

8. Security

8.1 Liquid CO₂ backup

Precautions for CO₂ use :

Properties of CO₂:

- Does not sustain life or combustion.
- Available in low quantities in the air (0,03 %).
- Makes the atmosphere unbreathable at concentrations exceeding 3%.
- Accelerates respiratory rate, induces faintness, vomiting, coma or **even death**.
- Heavier than air (d=1.53).
- Non-flammable, colourless gas with a slightly acidic odour at high concentrations.
- When liquid CO₂ is released at atmospheric pressure, carbon dioxide snow is generated at a temperature of – 80°C.

Ensuing risks:

- Risk of asphyxia. Loss of consciousness occurs when concentration exceeds 8 to 10%.
- CO₂ builds up in low areas.
- Risk of frostbite.
- Risk of corrosion of steels in the presence of humidity.



Critical precautions to be taken:

- Areas where CO₂ is stored or used must be well ventilated (extraction or ventilation at both high and low levels in the room).
- Areas liable to contain an unbreathable atmosphere must be indicated with a CO₂ – risk of asphyxiation hazard pictogram.
- Never enter a room that has contained CO₂ without taking predefined precautionary measures.
- Eliminate links between areas where CO₂ is stored or used and low points (pits, drainage channels, basements) where it could accumulate and render the atmosphere unbreathable.
- Use a CO₂ concentration detector (or O₂ concentration detector) to check that the CO₂ concentration is less than 0.5% (as recommended by INRS, French National Research and Safety Institute).

In case of asphyxiation:

- Check the oxygen concentration in the room and then take the victim to the open air (taking an insufflator with you).
- Begin artificial respiration and call the emergency services.

In the event of a leak:

- Do not enter the room without breathing apparatus if the carbon dioxide concentration is higher than 3%.
- Close the valve on the cylinder.
- Aerate the room at length, ensuring that low points are ventilated.

Precautions with regards to equipment:

Warning, cylinders are pressurized !

- Handle cylinders with care.
- Secure cylinders in place.
- Do not expose cylinders to excessive temperatures.
- Treat valves with care (operate gently, do not dismantle or lubricate valves).
- Ensure that hoses and pressure regulators are fit for use. Check the condition of gaskets and use original parts only.
- Before installing the pressure regulating valve, open the valve briefly to expel dust (do not stand in front of the valve outlet at this time).
- Never transfer gas from one cylinder to another.
- Never lay a cylinder on its side during use.

After use:

- Close the valve carefully.
- Drain the coolant outlet.
- Loosen the adjustment screw on the pressure regulating valve.
- Close the valve on the receiving equipment.
- Regulations apply to the transportation of cylinders.
- Frames must be handled with care in the same way as cylinders.

Users of the equipment, who are fully aware of the conditions of use and thus best placed to monitor the equipment, are solely responsible for proper use.

8.2 LN₂ backup

Precautions for liquid nitrogen use:

Strict rules must be followed when handling cryogenic fluids such as liquid nitrogen. These rules are intended to prevent two key risks: **asphyxiation and burns** from contact or splashes. Air contains 21% oxygen and 78% nitrogen, by volume. At atmospheric pressure, liquid nitrogen evaporates at temperatures greater than -196°C .

In a cryogenic room, natural evaporation from containers, filling, and handling of stored samples result in continuous evaporation of liquid nitrogen. This can increase significantly if a default occurs. If the room is not well ventilated, the nitrogen gas generated can cause the atmosphere to be depleted in oxygen.

Properties of liquid nitrogen:

- Does not sustain life or combustion.
- Present in air (78%).
- The evaporation of one litre of liquid nitrogen generates 680 litres of gas.
- Heavier than air at low temperatures.
- Non-flammable and colourless.

Ensuig risks:

- Risk of **asphyxiation and loss of consciousness**. An atmosphere with less than 16% oxygen is hazardous (nitrogen gas displaces oxygen in the air).
- Nitrogen gas builds up in low areas.
- Risk of frostbite.
- Risk of corrosion of steels in the presence of humidity.
- In closed vessels, the pressure can reach very high values (in the order of 700 bar) resulting in a risk of bursting.

Criticals precautions to be taken:

- Areas where liquid nitrogen is stored or used must be well ventilated (extraction or ventilation at both high and low levels in the room).
- Areas liable to contain an unbreathable atmosphere must be indicated with an asphyxiation hazard pictogram.
- Never enter a room that has contained liquid nitrogen without taking predefined precautionary measures.
- Eliminate links between areas where liquid nitrogen is stored or used and low points (pits, drainage channels, basements) where it could accumulate and render the atmosphere unbreathable.
- **Use an O₂ concentration detector to ensure that the oxygen concentration is greater than 18%.**
- Avoid uninsulated liquid nitrogen pipes in any areas.
- Call on the services of a specialist to determine the layout of facilities.

In case of asphyxiation:

- Check the oxygen concentration in the room and then take the victim to the open air (taking an insufflator with you).
- Start artificial respiration and call the emergency services.

In the event of a leak:

- Evacuate the room.
- Do not enter the room without breathing apparatus if the oxygen concentration is lower than 18%.

- Close the valve on the leaking outlet.
- Aerate the room at length, ensuring that low points are ventilated.

If liquid nitrogen is splashed:

- **In the eyes:** rinse the eye thoroughly for at least 20 minutes. **Call a doctor.**
- **On the skin:** do not rub. Remove clothing if necessary. Warm up the affected areas as quickly as possible under running water for 20 minutes. **Call a doctor.**

Precautions with regards to the equipment:

Warning: nitrogen is liquid at extremely low temperatures and is stored in a double-walled tank. A high vacuum between the walls ensures good thermal insulation.

This equipment, especially mobile storage tanks, must be handled with care.

- Avoid impacts. Never lay a cryogenic container on its side.
- Do not expose containers to excessive temperatures.
- Treat valves with care (operate gently, do not dismantle or lubricate valves).
- All equipment used must be in good condition and designed for use at the intended temperature and pressure.
- Mobile equipment must be sheltered from inclement weather. Open-necked containers must be fitted with stoppers to avoid the neck becoming blocked by cryopumping of ambient humidity.
- Use suitable connection hoses; never use intermediate couplings.
- Monitor the pressure of closed containers and check safety equipment (pressure relief valve).
- Regulations apply to the transportation of recipients.

Users of the equipment, who are fully aware of the conditions of use and thus best placed to monitor the equipment, are solely responsible for proper use.

9. Transportation and waste disposal

9.1 Transportation

Do not tip the device. Preserve the device as much as possible from all vibrations. At least two people are needed to move the device. Protective gloves should always be worn!

9.2 Waste disposal

Before disposing of the device, whatever the means, decontaminate the appliance. Please observe the corresponding legal provisions in case of product disposal. Information on the disposal of electrical and electronic equipment in the European Community: in the European Union, electrical appliances are governed by national regulations, based on the Directive 2002/96 / EC on Waste Electrical and Electronic Equipment (WEEE). According to this directive, it is now forbidden to discard industrial devices (of which this product is a part) delivered after 13.08.2005 with municipal or domestic waste. To facilitate their identification, these devices will be provided with the following symbol:



Since waste disposal regulations within the EU may vary from country to country, we invite you to contact your suppliers if necessary.

10. Customer services

Headquarter FRANCE

Mail: froilabo@froilabo.com

Phone: +33 (0)4 78 04 75 75

PARIS agency

Mail: froilabo.paris@froilabo.com

Phone: +33 (0)1 60 95 15 65

Export department

Mail: export@froilabo.com

Phone: +33 (0)4 78 04 75 75

After sales service

Mail: service@froilabo.com

Tél: +33 (0)1 60 95 15 70



MAINTENANCE CONTRACT

YOUR DETAILS:

Mrs ☐ Ms. ☐ Mr. ☐ Last Name _____ First name _____

Company name _____ Job title _____ Service _____

Phone __ / __ / __ / __ / __ /

Fax __ / __ / __ / __ / __ /

Address _____

ZIP Code _____ City _____

YOUR REQUEST (circle your choice):

Service contact _____ Renewal _____ actual contract number: _____

✓ Kind of devices : _____

✓ Temperature : _____

✓ Brand : _____

For the freezers:

✓ CO₂ back up YES NO

✓ LN₂ back up YES NO

✓ Number of devices: _____

✓ Number of visits desired per year: _____

Do you already have a FROILABO maintenance contract? YES NO

If yes, n° of contract: _____



To return by mail at service@froilabo.com