ULT FREEZERS

-45 °C / -86 °C

Froilabo
Precision for life

User Manual
Ref: UM_BMEVO_EN_rev0.7

Please read carefully this manual before first use!

TABLE DES MATIERES

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:

Concerning products that does not use natural cooling, these devices 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 temperatures freezers -45°C and Ultra Low temperatures freezers -86°C **EVOLUTION (EVO)**

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* CO_2 *or* N_2 *vapour injection are used, please refer to the corresponding safety data sheets.*

4. Installation of the device

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 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 < ±10 % of rated voltage
- Supply network voltage surges: category II (Standard IEC 60364-4-44)
- Maximum level of room pollution: 2

BM Evolution 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 ¼ 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 CO_2 or LN_2 liquid backup device, refer to the safety data sheets at the end of this manual.

4.3 POWER SUPPLY

See the manufacturer's plate at the rear of the unit. 3 models are available:

- Voltage 230V ~ +/-10%, 50 Hz, protected by aM 12 A fuse.
- Voltage 110V ~ +/-10%, 50/60 Hz, protected by aM 20 A fuse.
- Voltage 220V ~ +/-10%, 60Hz, protected by aM 12 A fuse.

For voltage 220V ~ +/-10%, 60 Hz, refer to the characteristics of the voltage 230V ~ +/-10% 50 Hz in the previous table.

The connectors of the device (USB, serial port) must be connected to circuits rated S.E.L.V., according to standard IEC 61010-1: 2010.

4.4 TEMPERATURE RANGE

The BM ULT Freezer is factory set to optimise its power consumption.

On the -86°C model, the set point can be adjusted from **-55°C to -90°C**. The default setting is -80°C.

On the -45°C model, the set point can be adjusted from **-20°C to -45°C**. The default setting is -45°C.

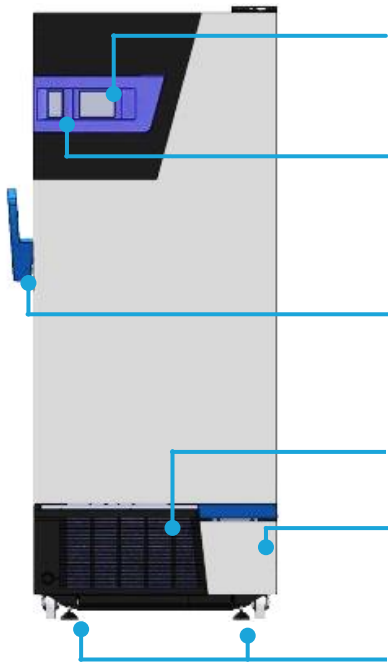
The ambient temperature (**recommended between +18°C and +35°C**, ideally between 20°C and 25°C) also has a significant impact on the power consumption of the equipment.

4.5 CONSTRUCTION AND INSULATION

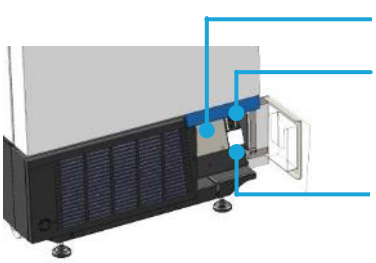
The one-piece **electro-galvanized steel** exterior body is protected by an epoxy paint.

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.



Front view



Lower door panel opened

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 introdution 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 CO_2 or LN_2, 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.

4.6 TECHNICAL CHARACTERISTICES AND REFRIGERATION SYSTEM

Technical characteristics:

FREEZER MODEL	BM340		BM515		BM690	
	-86	-45	-86	-45	-86	-45
GENERALITIES						
Gross volume (litres)	340	340	515	515	690	690
Number of compartments	2	2	3	3	4	4
Freezer mass (kg)	223	178	267	222	330	285
Maximum power consumption 230V (Watts) (BoSS System)	1500	1500	2150	1500	2150	1500
Power consumption* 230V, 50 Hz (Watts)	900	1000	1150	1000	1150	1000

Maximum power consumption 110V (Watts) (BoSS System)	1600	1700	2400	1700	2400	1700
Power consumption* 110V, 60 Hz (Watts)	1000	1100	1400	1100	1400	1100
Minimum power of cooling of the room containing the freezer in continuously (W)	850	950	1200	950	1200	950
Acoustic pressure measured in dB(A) (BoSS System)	76					
Acoustic pressure measured in dB(A) (in regulation mode)	56					
OUTSIDE 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
Clearance required at the rear of the unit (mm)	200	200	200	200	200	200
Maximum dimension with door open (mm)	1750	1750	1750	1750	1750	1750
Maximum width with door open (mm)	1150	1150	1150	1150	1150	1150
Maximum door opening angle	110°	110°	110°	110°	110°	110°
GROSS INTERNAL DIMENSIONS EXCLUDING RACKS						
Height (mm)	716	716	1076	1076	1436	1436
Width (mm)	630	630	630	630	630	630
Depth (mm)	752	752	752	752	752	752

Notes

** Power consumed in regulation mode, all parts activated and stabilized, at 23 ° C in atmosphere and with empty cabinet.*

On an equivalent product, hydrocarbon (HC) gases allow a reduction in power consumption up to 25%, as the need of cooling.

Refrigeration system:

FREEZER MODEL	BM340		BM515		BM690	
	Standard cooling	Natural cooling	Standard cooling	Natural cooling	Standard cooling	Natural cooling
TWO-STAGE -86°C MODELS						
Stage 1 hermetic compressor power (Watt)	580	380	780	580	780	580
Stage 2 hermetic compressor power (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
SINGLE-STAGE -45°C MODELS						
Hermetic compressor power	380		580		780	
Isceon 89 refrigerant – load (g)	600		600		600	
Capillary expansion	yes		yes		yes	
Air condenser as standard	yes		yes		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.

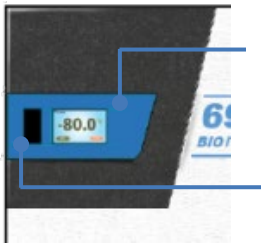
The internal surfaces of the freezer and its contents can be extremely cold (-86 ° C). Protect yourself accordingly (specially adapted gloves).

	BM340	**BM515**	**BM690**
Level 4	/	/	1 shelf
Level 3	/	1 shelf	1 shelf or 1 extractible shelf
Level 2	1 shelf	1 shelf or 1 extractible shelf	1 shelf or 1 extractible shelf
Level 1	No fixture	No fixture	No fixture

It is possible to replace an extractible shelf for a shelf. A shelf cannot, however, be replaced by an extractible shelf.

4.8 SAMPLE STORAGE

The control panel is located towards the top of the door. It includes a main screen and a touch-sensitive alarm window. The main screen is a touch-sensitive one.

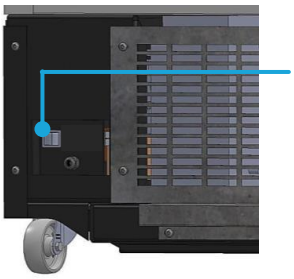


4.9 COMMISSIONING

Follow the instructions in the correct sequence:

1. Remove any foam wedge shelves.
2. Put the On/Off switch to the On position (it activates 24V). A buzzer sounds for 30 seconds.
3. Connect the freezer to a power outlet protected by a 30 mA differential circuit breaker.
4. The compressor(s) and fan will start up. The freezer will make a sound.
5. Froilabo is displayed on the screen, then the internal temperature of the freezer.
6. Adjust the set point if necessary (Set to-45°C or -80°C by default, depending on model).
7. Set the date.
8. Wait until the freezer reaches the set temperature (3 to 4 hours depending on the model).
9. Load the freezer.

Rear view



Close-up view of the switch

Note 1: the temperature in the freezer may rise if loaded with “hot” products. The high temperature alarm could trigger.

Note 2: The On/Off switch only cuts off the internal 24V power supply requested by the processor and display. The freezer remains powered as long as the power cable is connected to the mains.

Qualified staff must perform any electrical maintenance.

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. First contact with your freezer

5.1 Main screen

When the freezer is in use, the screen on the left is permanently displayed.

Main display

-86,3 °C	Temperature measured
	An envelope flashes when a new message is received. Biohazards or radioactivity symbols can be displayed at the top of this screen and can be activated in the user preference menu (section 5.6). This is only a visual indication.

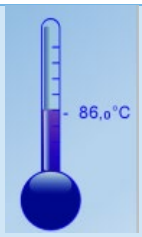
5.2 Home screen

Press anywhere on the main display to show the Home screen. The Home screen provides access to all available menus.

If the screen is not touched during 1 minute, the main display automatically resumes.

Home screen

	User preferences menu
	Sample location menu (activated if the option is valid)
	Information menu
	Statistics menu
	Setting menu (password required)
	Factory settings (unused by the customer)
	Diagnostics menu
	Eco menu
	Access to a free text area where it is possible to enter a message. The envelope will flash to indicate a new message.

		Adjust the temperature setpoint protected by password (default 11111)
		Back to main screen

6. Alarms and error codes

6.1 BATTERY BACK UP

In the event of power outage, the buzzer, remote alarm and CO_2 injection (optional) functions remain active, powered by a 24V backup battery supplied as standard. The temperature display is also maintained.

Warning: the compressors are no longer powered and thus the freezer therefore does not cool.

6.2 ALARM DISPLAY

Error messages are displayed on the touch screen.

If a fault occurs, the screen turns red.

Temperature is displayed.

Press the “i” button for error identification.

A pictogram illustrating the fault is displayed in the centre of the screen.

A brief error with description and action to be taken are displayed in English beneath the pictogram.

6.3 STOP THE ALARM

When the alarm start, visual and sound alarms are triggered.

When the alarm is triggered, it is possible to deactivate the sound by pressing on the black rectangle located on the left of the screen (encircled in red on the picture).

6.4 ALARM HIGH TEMPERATURE

The high temperaure alarm is inhibated during the first decrease of the freezer and is activated when the freezer reach storage temperature (-80°C by default).

In this case, the screen displays the following warning (picture below) :

It is possible to deactivate the sound, refers to the above section $6.3.

7. General Use

7.1 NUMERIC KEYPAD

When it is necessary to key a numeric parameter, the below keypad is displayed.

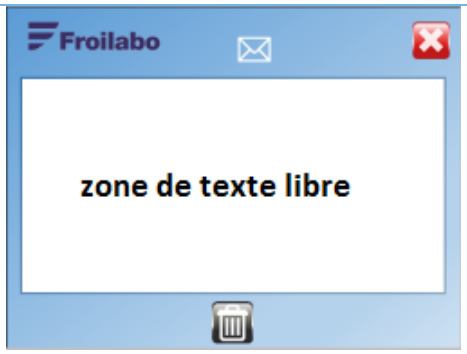
Numeric data entry

	Save the modification and return to the previous screen.
	Delete the last digit entered.
	Return to the previous menu without saving changes.

7.2 ENTERING A MESSAGE

A text message, visible to all users, can be entered.

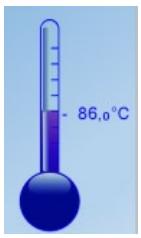
This function is accessible from the Home screen by pressing on the envelope icon.



	Touch the text field
	Delete the entire message
	Return to the main display

	Lower case characters access
	Upper case characters access
	Number and symbols access
Del	Delete the last symbol written

7.3 TEMPERATURE SETPOINT ADJUSTEMENT AND PASSWORD MODIFICATION



The temperature setpoint adjustment is accessible from the Home screen, by pressing the following pictogram.

Entrer access code, by default 11111.

Entrer access code. Validate. 

It is also possible to change the password:

- Activate the password modification
- Type the current password and validate
- Enter the new password and validate
- Confirm the new password and validate

Note: the value of the password must be less than 65500

The numeric data entry screen is used to enter a setpoint within the authorised range.

Enter the desired setpoint and confirm. 

7.4 « USER PREFERENCES » MENU

The user can configure certain settings to customise the use of the freezer. From the Home screen, access the user preferences by pressing on the following pictogram. 

User preferences menu

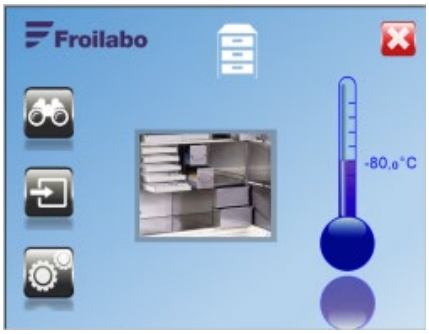
	Screen brightness setting. Enter the desired value with the numeric keyboard and validate.
	Standby timer (by default, 2 min).
	Date setting Format: Year-Month-Day
	Time setting. Format: Year-Month-Day
	Temperature unit: °C / °F Default value: °C Touch the pictogram to modify.
	Display of biological risk warning: ON/OFF. Default value: OFF. When set to ON, the logo is displayed at the top of the screen.

	Display of radiation risk warning: ON/OFF. Default value: OFF. When set to ON, the logo is displayed at the top of the screen.
	Return to previous menu

7.5 « SAMPLE LOCATION » MENU

The main menu gives access to the three functions of samples location. This menu is an option. Once the option is activated, from the “Home screen”, access the “Location sample menu” by pressing on the following pictogram.

Location sample menu



	Search for a sample (protected by a password)
	Enter a new sample
	Configure the freezer storage space
	Return to the previous menu without saving changes Pressing one of these buttons brings up a username entry screen

a) Configuring the freezer :

The freezer must be configured to specify the type of storage elements incorporated. Configuration therefore entails defining the types and locations of drawers and shelves.

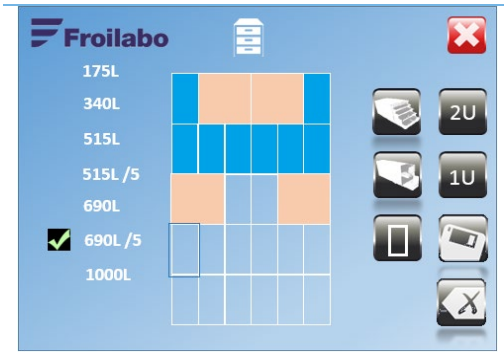
From the “Location sample” screen, access the freezer configuration menu by pressing on the following pictogram (on the right).

Enter the password and validate.

690L	Select the size of the freezer by choosing the appropriate model. The “elementary” grid corresponding to the capacity is displayed (factory-set default value). Note: several sample numbers can be stored in the same location.
	Select a drawer two units wide.
	Select a rack one unit wide.
2U	Select any other accessory two units wide.

	Select any other accessory one unit wide.
	Empty space.
	Exit the menu, recording the configuration.
	Erase the last item entered.
	The elementary location being configured is highlighted.
	Return to the previous menu without saving changes.

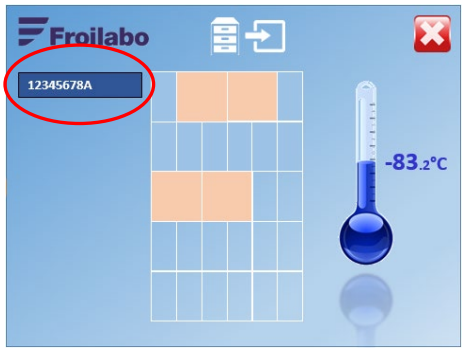
Example after configuring the top three shelves:

	 In blue: rack elements
	 In pink: drawer elements
	 The cursor is positioned on the next zone to be edited.

b) Sample entry :

From the “Location sample” screen, access the “Add sample” menu by pressing the pictogram (encircled in red on the picture).

Confirm.



Press the blue zone to enter a sample identifier. A data entry keyboard is displayed.

Enter the sample identifier.

Save and confirm the data entered.

Select where the sample will be stored.

Rack (blue) OU Drawer (pink).

Select the drawer or rack by pressing the corresponding number.

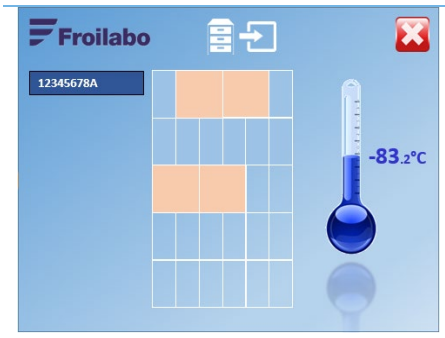
The selected drawer number is displayed in the location.

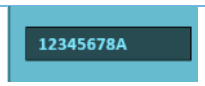
Confirm the data.

c) Searching for sample :

From the “Location sample” screen, access the “Search sample” menu by pressing the following pictogram (on the right).

Enter the password (5 digits) and confirm.



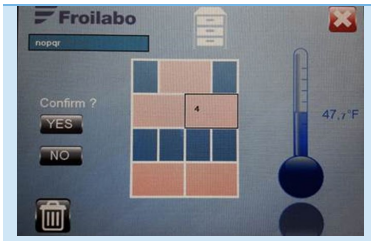


Press the blue zone to enter a sample identifier. A data entry keyboard is displayed.

Enter the sample identifier.

Confirm the data.

The corresponding storage area is highlighted.
The drawer or rack number is shown in the centre.



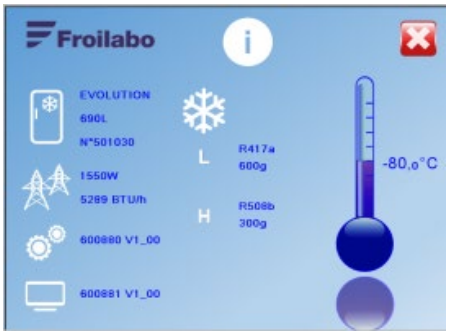
The sample record can be deleted.

A confirmation is asked (YES/NO).

7.6 « PRODUCT INFORMATION » MENU

From the "Home" screen, access to the "Product information" menu by pressing the following pictogram (on the right).

Product information Menu

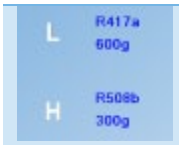


The information cannot be modified. The following information are displayed:

- Model name
- Capacity in litres
- Serial number

- Maximum electrical power rating
- Electricity consumption converted to BTU/h (1 W = 3.412141633 BTU/h)

- System software version
- Screen software version



- **CP1 or L**: 1st stage refrigerant type and load
- **CP2 or H:** 2nd stage 2 refrigerant type and load

Return to previous menu

7.7 « STATISTICS » MENU

Data is stored in the unit. It can be displayed either for the last 24 hours or for the entire operating life of the freezer.

From the "Home" screen, access to the "Statistics" menu by pressing the following pictogram (on the right).

Statistics Menu

Select the reference period:

- "24H": last 24 hours
- "4EVER": since the freezer was commissioned

Number of start-ups (e.g. 10) and number of start-ups per hour (e.g. 3/h) for each compressor*.

*

CP1: Stage 1 (bottom) compressor
CP2: Stage 2 (top) compressor

Compressor usage rate: compressor operating time relative to the total operating time of the unit (e.g. 98%).

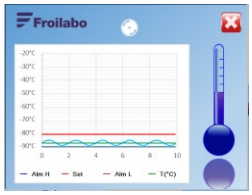
Compressor usage time, in hours (e.g. 23).

Number of door apertures, and average duration of the door aperture (e.g. 0min20sec).
NB: During the last 24 hours, the data is up-dated every hour

Electrical power consumption of the unit (e.g. Wh).

Temperature evolution for the last 10 hours.

Display the following screen:



The graph shows the actual temperature (T°C), the high (Alm H) and low alarm (Alm L) levels and the temperature setpoint (Set).

Temperature graph

Access to defaults record.

Display the following screen:

List of the 10 last alarms recorded including nature of default, date and time when default occurs.
Error codes are listed in the first column.

Fault history

Return to previous menu

7.8 « CONFIGURATION » MENU

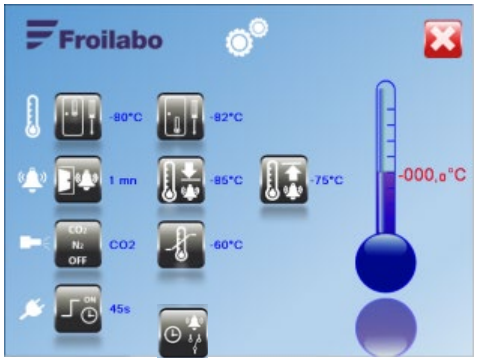
From the “Home” screen, access to the “Configuration” menu by pressing the following pictogram (on the right).

Enter the access code (5 digits).

Default code: “11111”.

Confirm.

Configuration Menu

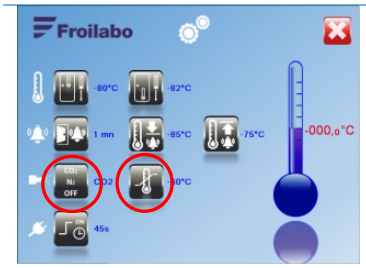


	Top sensor offset (unused on those models)
	Bottom sensor offset Permits to change the temperature displayed by another measure. Let's get the value actually measured in stabilized conditions. Do not enter a temperature difference.
	Door open alarm delay (e.g. 00h00min30s).
	Low temperature alarm threshold. Fix the chosen value of low temperature threshold.
	High temperature alarm threshold. Fix the chosen value of high temperature threshold.
CO2 N2 OFF	Back-up injection configuration: OFF / CO_2 / N_2. More informations below.
	Back-up injection trigger threshold (e.g. -60°C). More informations below.
ON	Start-up delay time (e.g. 00h00min30s). More informations below.
	Delay door open alarm to dry contact (e.g. 00h00min30s). More informations below.
	Return to the main display

Co_2 / N_2 injection threshold setting (option)

To allow back-up of the injection, CO2 or N2 injection must be selected and injection threshold must be set.

The CO_2 / N_2 injection is inactive until the freezer temperature has stabilized after installation.

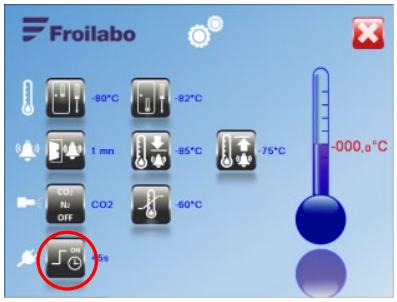


CO2 N2 OFF	Back-up injection configuration: OFF / CO_2 / N_2 Select the corresponding mode.
	Emergency injection trigger threshold Set the desired temperature.

When the freezer is installed, injection must be enabled only once the temperature set point has been reached, otherwise the gas cylinders will be discharged during the first temperature drop.

Start-up delay setting

If several freezers are installed on the same electrical network, the start-up time delay can be used to start the units in turn in order to avoid momentary overload.



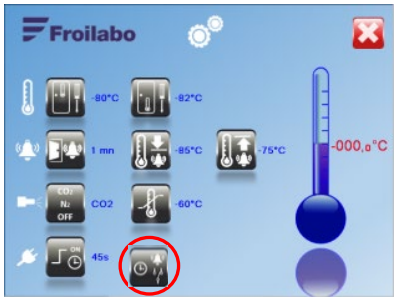
Start-up delay.

Set the delay before the unit starts up.

When the freezer is powered up, the first stage compressor will only start after this delay.

Configuring remote alarm time offset (for door alarms only)

When using remote alarm, a time delay offset can be set to prevent unnecessary alarm notification during routine freezer use.



Set the time offset for the door alarm notification to the central monitoring station (e.g. 00h02min00s).

7.9 « FACTORY » MENU

From the “Home” screen, access to the “Factory” menu by pressing the following icone. 

Restricted access, only available by production operator. The access is protected by a password.

7.10 « DIAGNOSTIC » MENU

From the “Home” screen, access to the “Diagnostic” menu by pressing the following pictogram (on the right). 

Diagnostic Menu		Temperature of the top sensor (Optional)
		Temperature of the bottom sensor (analogue gauge).
		Ambient temperature (optional)
		Instant power consumption (analogue gauge), in Watts.

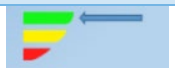
	Door status sensor: ➢ Green tick: door closed ➢ Red cross: door open
H	High level compressor control (H **or** CP2): State of power contact: ON/OFF
L	Low level compressor control (L **or** CP1): State of power contact: ON/OFF
	Condenser fan control: State of power contact: ON/OFF
	Low battery information: ➢ Green tick: battery charged ➢ Red cross: battery discharged
	Heating gasket status: ON/OFF Default value: ON. Possibility to put it on ECO mode, see $7.11 (Eco menu).
H	High level compressor (H or CP2) overpressure sensor. Pressure value in bar.
L	Low level compressor (L or CP1) overpressure sensor. Pressure value in bar.
	Heat exchanger temperature sensor. Temperature in the middle of the heat exchanger (°C)
	Condenser fan flow measurement: percentage of maximum flow measured in factory.
	Proximity sensor: Green tick: Movement is detected in front of the keyboard. Red cross: No detection of the user or user keeps still in front of the door.
	Remote alarm relay test
	CO_2 / N_2 solenoid valve test (working only when the option is activated)
	Return to previous menu

7.11 « Eco » menu

The Eco menu enables you to minimise power consumption outside of working periods (no door opening).

From the “Home” screen, access to the “Eco” menu by pressing the following pictogram (on the right).

Eco Menu	1 2 3 4 5 6 7	Select the day of the week on which the ECO mode is to be scheduled. Monday = 1 to Sunday = 7
	ON OFF	ECO mode: enabled (ON) or disabled (OFF).

	Set the start time for ECO mode. A numeric keypad is displayed. Enter the start time and confirm (e.g. 22h00min00s).
	Set the end time for ECO mode. A numeric keypad is displayed. Enter the end time and then confirm (e.g. 06h00min00s).
	Door seal heating mode: enabled (ON) or disabled (OFF) the heating. In the OFF position, frost may build up on the seal, which may then harden.
	User presence detection mode: enabled (ON) or disabled (OFF). If this mode is disabled, the screen does not turn on when movement is detected in front of the door.
	Energy saving advices are displayed.
	ECO mode set point. A numeric keypad is displayed. Enter the desired temperature when running on ECO mode and then confirm (e.g. -80.0°C).
	Indication of power consumption according to the settings. ➢ Green: economy setting. ➢ Red: settings to be reconsidered, high electrical consumption.
	Return to previous menu

7.12 FREEZER CLOSURE

The freezer has a progressive sealing handle with a double-acting mechanism to facilitate opening and closing of the door. The freezer door can be locked using a key-operated lock on the side of the handle.

7.13 AIR FILTER MAINTENANCE

At regular intervals (each month, factory preset), the sound alarm goes off and the alarm filter LED is enabled. The acquittal of the alarm using the Mute button brings it back to the selected time before the next filter alarm

This interval can be changed. It can only be performed by an authorized technician. Please contact the Froilabo Technical Department or your local distributor.

7.14 DATA RECORDING

On the freezer, the temperature, date and error message data transfer is available.
Data can be collected under CVS format on a USB stick. It takes approximately 5 minutes to collect one month of data.
Once data is transferred, the freezer memory is automatically cleaned.

Data transfer procedure:

1. Connect the USB stick to the USB plug located above the LED indicators.
2. The LED will switch off one by one during the data transfer.
3. Once transfer is achieved, all LED lights turn on again .
4. Remove the USB stick.

NB: A USB stick is supplied with the freezer. Optimal data transfer is achieved using that key.

Froilabo decline any responsibility if data transfer is not achieved on that USB key.

7.15 EXAMPLE OF TEMPERATURES DATA'S SHAPING

After collection of data from the freezer by using the USB key given by Froilabo, these data can be processed.

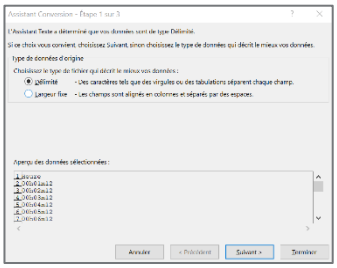
Once data is transferred, the freezer memory is automatically cleaned.

An example of shaping of these data is presented here, using Excel.

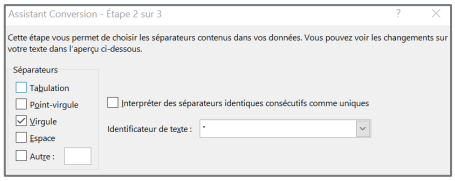
Open the Excel file and select the column A.

Go to « Data » and click on « Convert ».

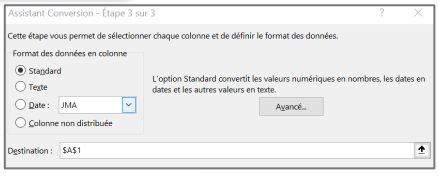
Click on « Delimited » and Next.



Check « Comma » as separators then click on "Next".



Leave the shaping of data on "Standard" and click on "Finish".

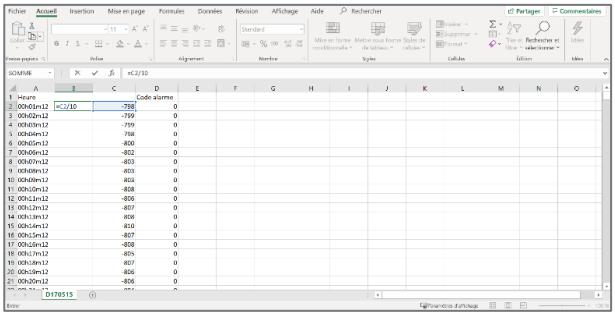


The table with 3 rows appears, now the shaping must be done.

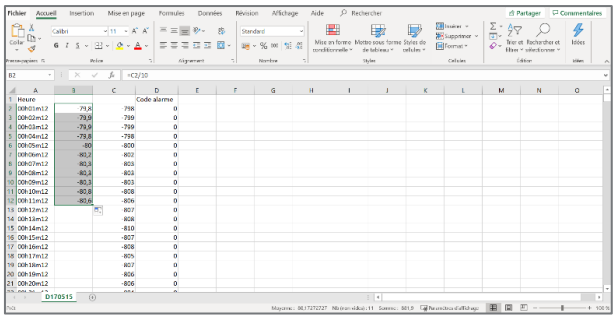
For the shaping :

Right click on the header of the column B and click on “Add” to add an empty column between time and temperature.

In the first row of column B, enter the following formula : « =C2/10 »



Copy the formula on all the column B (put the mouse at the bottom right of the cell, a “+” sign appears, click and slide until the last row of the column.



Now Column B displays the right temperature with the right decimal.

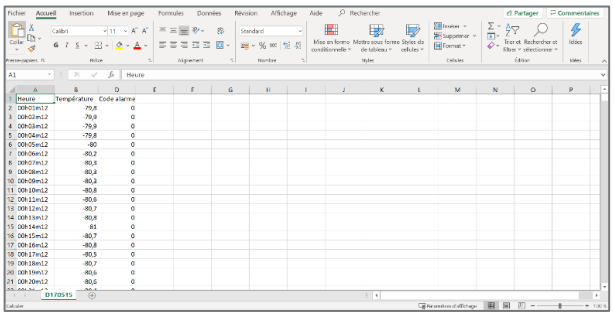
Click on the header of column C and on “Hide” so that column C with row data do not shows up anymore.

Shape the table by adding titles to the columns.

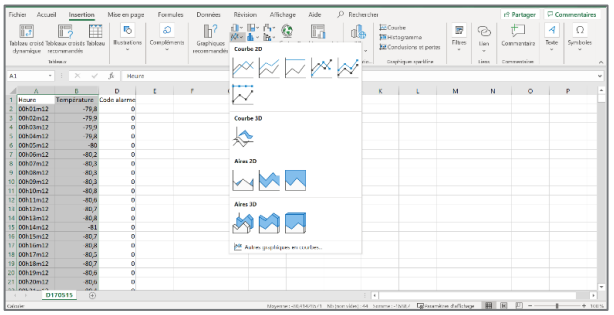
Column A displays time.

Column B displays temperature.

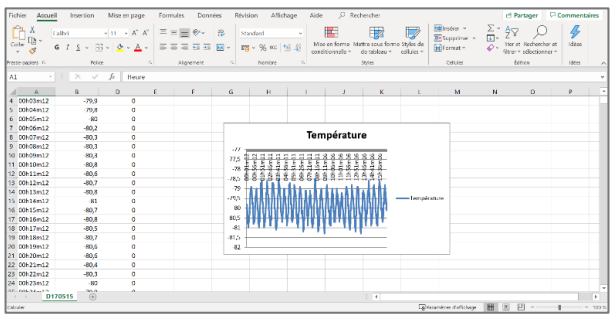
Column C displays the eventual alarm code (0 meaning there is no alarm currently).



Select columns A and B, click on “Insertion”, then in “Graph” and pick linear graph (presentation of the graph is up to the user).



The graph displays with time on the x axis and temperature on the y axis.



8. OPTIONS

8.1 REMOTE ALARM

The connection located at the rear (bottom left) of the unit can be used to connect a remote alarm.

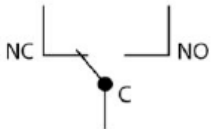
We highly recommend using the NC contact, which also enables an alarm to be transmitted if one of the wires is disconnected.

Maximum allowable current: 5 A at 30 V DC, 5 A at 250 V AC

Note: After connecting the wires, screw the connector to its base to avoid any risk of the wires being pulled loose.

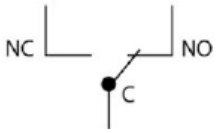
FREEZER AT -80°C, ALARM THRESHOLD SET TO -60°C

Contact position above alarm threshold



Temperature above alarm threshold (e.g. 59°C): the contact switches to NC

Contact position below alarm threshold



Temperature below alarm threshold (e.g. 80°C):

8.2 CO_2 / N_2 BACKUP

1) *Safety rules*

Whenever a CO_2 or N_2 backup system is used, it is essential to refer to the safety data sheet.

2) *Cold burns (cryogenic burns)*

The “extreme cold” pictogram must be used to warn of this hazard.

If CO2 or N2 injection has been made, don’t open the door to prevent any risk of cryogenic burns.

In case of accident: WARNING! The temperature of the injury site must be returned to body temperature as quickly as possible. The appearance of a cryogenic burn initially seems to be minor and does not cause concern. Rinse the burn with warm water for **at least 15 minutes**.

Cover with a sterile dressing and seek urgent medical attention.

3) *Risk of asphyxiation / suffocation*

The “asphyxiation risk” pictogram must be used to warn of this hazard.

Cold vapours are heavier than air and can accumulate in confined locations, particularly at or below floor level.

These gases can result in asphyxiation, even from the second breath, leading to unconsciousness (oxygen content of less than 18%).

To prevent this hazard:

- Ensure that storage and working areas are well ventilated.
- Do not discharge nitrogen into locations where it could build up to dangerous levels (sewers, basements, pits, closed rooms).

In case of accident: If asphyxiation occurs, the rescuer must use a self-contained breathing apparatus to access the victim or must be able to quickly ventilate the room to a sufficient extent without entering it.

4) CO_2 backup

General remarks

CO_2 pressure in the cylinders and hoses reaches **70 bar**. It is therefore recommended to call on qualified personnel for any servicing of this system.
Cylinders of **liquid CO_2** must be used.

Connection

Principle: when internal freezer temperature above injection temperature, liquid CO_2 is injected into the chamber. The CO_2 injection solenoid valve monitors the temperature, managing CO_2 injection.
Connect the hose to the solenoid valve located at the rear of the freezer, then to the distribution manifold or the CO_2 cylinder, after checking that Teflon tape is applied to the thread.
Warning: if the ambient temperature is higher than +37°C, all of the CO_2 in the cylinder will be transformed to a gas. The cylinder pressure may exceed 90 bars (temperature of +40°C).

CO_2 detector

When CO_2 or N_2 are injected, the oxygen content in the air gradually decreases. To avoid potential asphyxiation of people in the room, CO_2 detector must be used and an audible alarm is sounded when oxygen level too low. Froilabo can supply CO_2 detectors.
To order or install a CO_2 detector on an existing system, please contact our customer service department.

5) N_2 backup

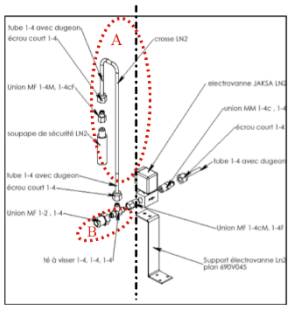
Principle: when internal freezer temperature rises above injection temperature, liquid Nitrogen is injected into the chamber. The solenoid valve monitors the temperature, managing Liquid Nitrogen injection.

Connecting the N_2 option:

1. Connect the N_2 hose supplied with the freezer (**1**).
2. Check that all couplings are properly tightened.
3. Connect the liquid nitrogen supply.

Parts to be assembled:

- ¼" copper pipe + short nut + safety valve (part A)
- pre-assembled kit (tee piece + two male-female unions) (part B).



1. Check that the pre-assembled kit is covered with Teflon tape.
2. Screw the pre-assembled kit onto the solenoid valve, ensuring that the tee points upwards.
3. Connect the copper pipe to the tee.
4. Attach the copper pipe to the freezer using Colson clamps, ensuring that the safety valve points downwards.
5. Check that all couplings are properly tightened.
6. Connect the liquid nitrogen supply.

8.3 Slowing down temperature rise (cryo-accumulator)

Principle: the cryo-accumulator plates are incorporated into the useful volume of the freezer and do not reduce the storage capacity.

It provides additional autonomy, slowing down temperature rise in case of any freezing issue.

As an example, for a 690 litres freezer, the rising temperature time from -80°C to -40°C is:

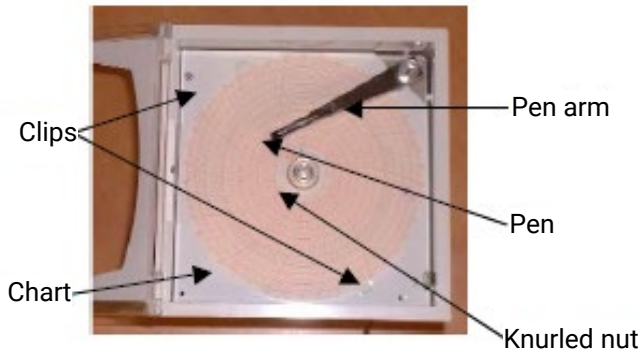
- 6½ hours without cryo-accumulator.
- 13 hours with cryo-accumulator.

Note: these tests were conducted with a freezer half full, at an ambient temperature of 25°C, without opening the door.

8.4 Chart recorder

Optional chart recorder (paper or digital) are available, allowing the temperature to be recorded over a 24-hour or 7-day period (Select on the unit).

Description



Replacing the paper disc (diagram):

1. Unlock and open the recorder door.
2. Raise the pen arm.
3. Unscrew the knurled nut.

4. Remove the chart.
5. Position the new disc, inserting it beneath the clips, and then tighten the knurled nut **without forcing.**
6. Put the pen back to the right position.

Note: the chart is perfectly aligned with the axis.

1) Time setting

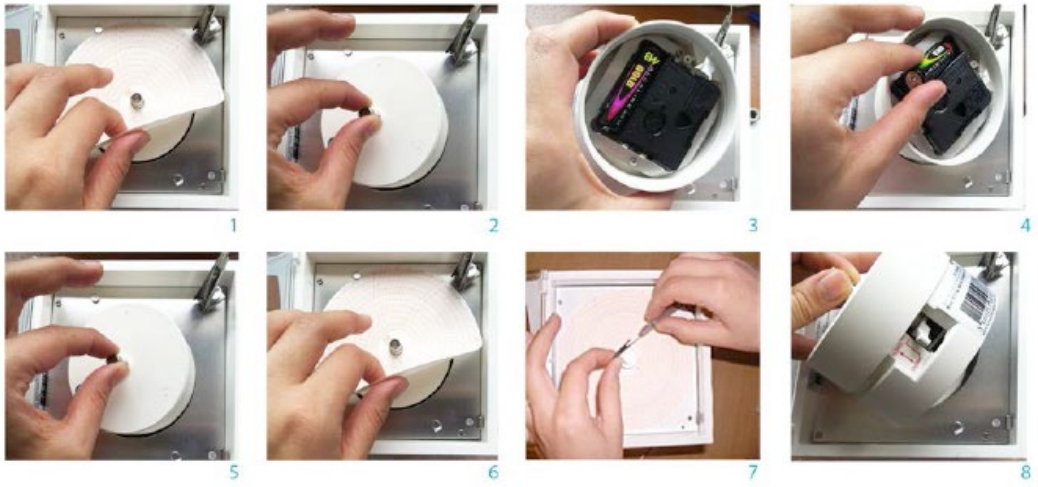
Turn the disc support clockwise manually to the desired date and time.

Use the tip of the pen as a reference point. It is essential to turn clockwise to avoid backlash in the timer mechanism.

2) Replacing the LR6 (AA) battery

1. The battery compartment is located underneath the paper disc in the recorder (1).
2. Remove the paper disc (1).
3. Remove the drive mechanism and turn it upside down (2 and 3).
4. Replace the battery, ensuring that the polarity is correct (4).
5. Replace the drive mechanism (5).
6. Position the disc beneath the clips and then tighten the knurled nut (knurling on outside) without forcing (6).
7. Set the time (7).

Note: The operating speed can be selected (1× 24 h or 7× 24 h). To change the speed, move the drive mechanism switch downwards (8).



3) Replacing the stylus in the recorder

The pen is supplied in a sealed silver-coloured bag.

1. Raise the arm.
2. Remove the pen, holding the arm between your thumb and index finger.
3. Insert the new pen.
4. Remove the protective cap.
5. Lower the arm.
6. Set the time.

8.5 SYSTEM BOSS

The BoSS system ensures that the freezer will operate in case of a board (PCB) malfunction or 24 V outage, **provided that the mains supply is present**. The compressors are then powered permanently, without any temperature monitoring. The temperature will fall to the lowest possible one.

Your samples are thus safe, with no risk of a temperature rise.

Principle:

1. If the 24 V supply to the regulator is cut off due to a fault on the circuit board, the regulator is powered by the 24 V batteries, the alarm light is not lit and the freezer operates normally, powered by the backup batteries. The BoSS led is activated.
2. When battery voltage drops to 20 Volts (±2 V) or if the controller does not activate its heartbeat signal, the BoSS system is triggered, the alarm indicator and buzzer on the freezer front panel are triggered and the regulator display is lit. The compressors are directly connected to the 230 V supply, the temperature monitoring is no longer active.
3. The temperature in the freezer falls to the lowest possible and could reach –90°C ±2°C.
4. After 40 hours (±1 hour), the regulator display stops. The compressors remain in continuous operation with no regulation, and the alarm indicator is not lit.

The freezer can operate under the BoSS system for several days or weeks without any problem. However, Froilabo's service department should be contacted to schedule a repair.

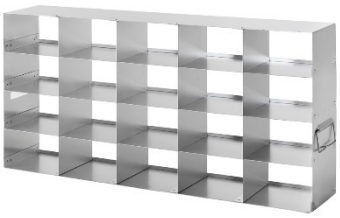
WARNING: THESE SPECIFICATIONS WERE OBTAINED USING NEW BATTERIES CHARGED FOR AT LEAST 24 HOURS.

9. STORAGE ELEMENTS

To facilitate storage in your freezer, an extensive range of storage elements is available: fixed shelves, sliding shelves, drawers, etc.

For further information, please contact our sales department.

Drawers
(ELMP690)



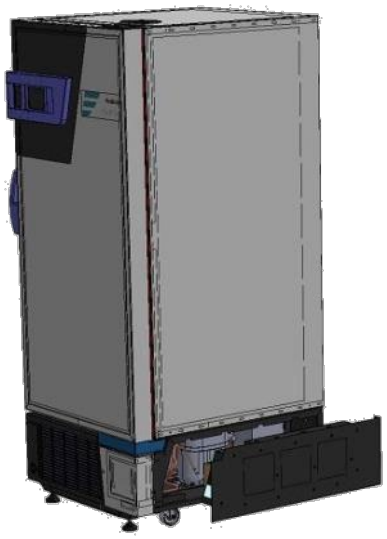
Shelves
(ELE)

Drawer unit
(ELT)

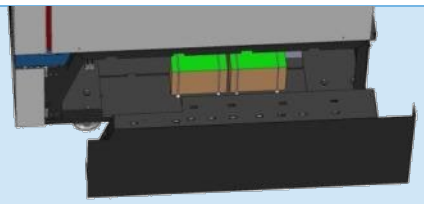
10. MAINTENANCE AND SERVICE CONTRACT

10.1 SAFETY RULES

Before performing any servicing on the freezer, turn it off using the 24 V On/Off button and disconnect it from the mains. Cut off at the main fuse holder (on the electrical cabinet, accessible by dismantling the bottom right section.



Remove the rack mounting system.



Withdraw the rack and place it carefully on the floor.

10.2 USER MAINTENANCE

1) General indications

Due to the intense cold, microorganisms from packaging, handling and contact can survive and remain fully virulent. All necessary precautions must be taken when accessing freezers:

- Outer surfaces must be cleaned regularly.
- Gloves must be worn.
- The door must be briefly opened.
- Tissue samples and packaging must be handled under a laminar flow hood.

The freezer must be switched off before cleaning. A water jet must not be used for cleaning, to avoid splashing the freezer.

2) Outer surfaces

Prior actions

Turn off the device before cleaning (remove outlet and ***put on/off button located behind the unit on 0***).

Cleaning

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

For a careful cleaning of the appliance, we recommend a commercial product without acid or halides. A diluted alcohol-based solution can be used ***when mentioned***.

- Outer surfaces:

  For a simple cleaning, wipe the surfaces with a wet cloth.

- Inner cabinet:

  Formally avoid bleach, even very diluted. Never rub the stainless steel with metal sponges or any other abrasive.

- Door seal:

  The door gasket is heated by conduction through a resistive wire located in the gasket itself and reducing ice formation. Nevertheless, frost can build up, especially during frequent door openings. Clean the silicone seal using compressed dry air or the plastic scraper provided by Froilabo.

- Compartment doors
  - Commercial cleaning products without halides or acid.
  - Maximum 10% alcohol solutions.

To protect surfaces, do not scrape with abrasive sponges and use microfiber type rags.

After cleaning, remove the cleaning of surfaces with a wet cloth.

Don't use laundry soap for cleaning because it can contain chlorides.

Do not use acetone and other organic solvents for cleaning.

Decontamination

Following a contamination of the device by dangerous substances, the operator must ensure that the right decontamination is done.

Don't use decontamination products that may cause a danger due to the reaction with the components of the unit or the potential materials inside. If doubt about the cleaning product, please contact the after-sales service Froilabo. In case of cabinet contamination with dangerous biological or chemical materials, we recommend the decontamination of the interior with commercial products.

Alternatively, you can use the following disinfectants for:

• Interior (stainless steel):

  - Surface disinfectants of commercial type without acid nor halides (without drips).
  - Alcohol solutions.

• Inside door seal (silicone):

  - Solutions of alcohol

• Compartment doors:

  - Surface disinfectants of commercial type without acid nor halides (without drips).
  - Maximum 10% alcohol solutions

After cleaning, rinse with a sterile wet cloth.

Before commissioning, well dry and ventilate the device because explosive gases may form during disinfection.

During each decontamination, ensure the protection of persons adapted to risks.

CAUTION in link with the risk of corrosion and damage of the unit

DO NOT use cleaners containing acid or chlorine.

In case of potential damages and corrosions following the use of not recommended cleansers, Froilabo accepts decline all responsibility.

3) Pressure relief valve

Froilabo freezers have a pressure relief valve enabling the chamber to return quickly to ambient pressure, either after door opening or CO_2 or N_2 injection.

Frequent door opening increase humidity in the freezer. It may result in ice forming in the air intake tube in which the pressure relief valve is located. A set of calibrated foam blocks is located in the air intake tube to minimise this issue.

If the air intake tube is blocked by ice, opening the door becomes difficult.

If this occurs, remove the safety valve and the calibrated foam blocks and then insert a screwdriver (or other long, thin object) in the air intake tube and push the ice into the freezer chamber. When possible, apply a spray of warm water also allows to remove the ice.

Clean the pressure relief valve (on the side of the unit) and the calibrated foam blocks on a regular basis (everyone to three months, as needed). Ensure that the valve and blocks are repositioned correctly. The foam set consists of 2 foams, a thin on valve side and a thicker on tank side.

After a freezer shut down, remove the foam from the pressurization valve. Allow the foam to dry completely, or use the spare set, before replacing the foam in the valve, and restarting freezer.

After injection of CO2 or N2, it is necessary to proceed to the disassembly of the decompression valve and to replace the internal circular silicon membrane in the right direction to find a seal inside the valve.

4) Air filter

In order to keep the refrigeration performance of the freezer optimum and prolong the life of the compressors, an air filter is located on the front panel, in front of the condenser.

This filter must be cleaned of dust as often as necessary. To do this, simply remove the filter and wash it (using water with no cleaning agents). After drying the filter (without wringing), put it back in place.

Freezers must not be operated without filters. If the filter is not in place, an alarm will be raised until the filter is back in place.

Froilabo strongly recommend disposing of the filter and replacing it with a clean one. It will protect users from potential contamination and reduce the risk of exposure.

10.3 LONG STOP PERIOD

If the unit is to remain unused for a long period of time, the following operations should be performed:

1. Turn off the freezer.
2. Unplug the mains lead.
3. Defrost, clean and wipe the chamber.
4. Leave the door ajar to avoid any unpleasant odours.
5. Remove valve's and allow to completely dry.

10.4 ANNUAL MAINTENANCE

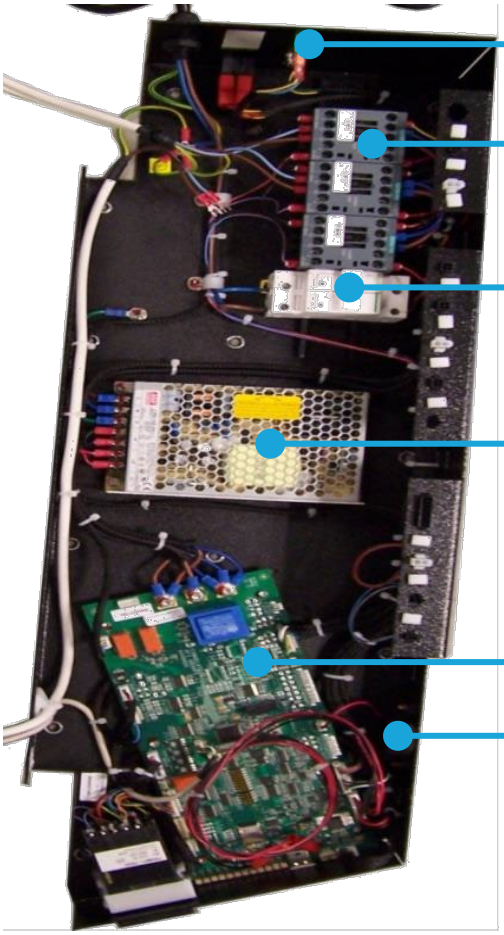
In the same way that motorists service their vehicles to keep them in the best possible working order, a freezer requires a minimum level of maintenance to keep it in good working condition.

Accordingly, an annual maintenance is recommended, to check various aspects (performance, safety, alarms), to pre-empt certain failures and to carry out preventive actions to minimise the risks of unexpected shutdowns. The customer's maintenance department could perform this service as long as a Froilabo technician or a local representative has properly trained them, and the appropriate equipment is available. Notwithstanding the above, any serious issues will require a visit from our maintenance department, or assistance and diagnosis by phone.

Inspection points:

- Fully clean the condenser and replace the filter.
- Check the refrigerant load.
- Check the compressor current level.
- Check the safety mechanisms, alarms and thermostats.
- Check all mechanical parts (latches, chamber fixtures)
- Check the internal freezer temperature.
- Check the refrigerating circuit is leak-proof.
- Check the compressor dampers (vibration reduction).
- Replace the recorder pen.
- Check the fan bearings.

Depending on the type of service contract, Froilabo undertakes to respond within set lead times in the event of a failure. Please send an email to the after sales service with the maintenance contract demand.



Remote alarm connector

Power contactors (×3)
The BoSS protection system makes use of these normally closed power contactors.

Fuse holder

24 V supply

Main control board

Buzzer

Power and control rack

10.5 DOOR BEARINGS

Your Froilabo freezer is delivered with 2 extra door bearings. In case of intensive use of the freezer, this part may have to be replaced.

When the bearing is damaged, it should be replaced with the ones supplied (x2) with the freezer, as described in the procedure below:

- Open the door
- Remove the screw with a suitable tool
- Remove the washer and the damaged bearing.
- Replace the new bearing, then the washer and put in the screw, tightening by hand
- Close the door

11. SAFETY

11.1 LIQUID CO_2 BACKUP

1) *Precautions for the use of CO_2*

Properties of CO_2:

- Does not sustain life or combustion.
- Present in low concentrations (0.03%) in air.
- 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 CO_2 is released at atmospheric pressure, carbon dioxide snow is generated at a temperature of –80°C.

Ensuing risks:

- Risk of asphyxiation. Loss of consciousness occurs when concentration exceeds 8 to 10%.
- CO_2 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 CO_2 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 **CO_2 – risk of asphyxiation** hazard pictogram.
- Never enter a room that has contained CO_2 without taking predefined precautionary measures.
- Eliminate links between areas where CO_2 is stored or used and low points (pits, drainage channels, basements) where it could accumulate and render the atmosphere unbreathable.
- Use a CO_2 concentration detector (or O_2 concentration detector) to check that the CO_2 concentration is less than 0.5% (as recommended by INRS, French National Research and Safety Institute).

In case of incident or accident:

- If asphyxiation has occurred
  - 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.

2) *Precautions regarding equipment*

Warning: cylinders are pressurised!

- 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.

11.2 LIQUID NITROGEN BACKUP

1) *Precautions for the use of nitrogen*

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 recipients, 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 nitrogen liquid:

- 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.

Ensuing 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.

Critical 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 O_2 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 an incident or accident:

- If asphyxiation has occurred:
  - 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**.

2) Precautions regarding 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.

12. TRANSPORTATION AND WASTE DISPOSAL

12.1 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!

12.2 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.

13. CONTACT

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MAINTENANCE CONTRACT

YOUR DETAILS:

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

Company name _____ Job title _____ Service _____

Phone _ _ / _ _ /_ _ /_ _ /_ _ / Fax _ _ /_ _ /_ _ /_ _ /_ _ /

Adress _____

ZIP Code _____ City _____

YOUR REQUEST (circle your choice):

Service contact Renewal actual contract number: _____

- ✓ Kind of devices : _____
- ✓ Temperature : _____
- ✓ Brand : _____

For the freezers:

- ✓ CO_2 back up *YES NO*
- ✓ LN_2 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: _____

Froilabo
Precision for life

To return by mail at service@froilabo.com

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