DEEP FREEZERS TOUCH
BMT -86°C

User manual
Ref : BMT86/E/rev2

Froilabo
Precision for life

CONTENT

ATTENTION: GENERAL INFORMATION AND SAFETY

It is necessary to strictly follow the instructions for use of this manual to ensure the proper functioning of the appliances or to exercise any warranty claims.

Using this manual:

- Read this manual carefully before starting the appliance.
- Follow the instructions of the manual.
- This manual is an integral part of the product. Keep this manual in a convenient place.
- If you need to transfer this product, do not forget to attach the manual.
- In case of loss, on request, we will provide another manual.

In this manual:

The icon is intended to draw your attention to information or an observation of great importance or potential danger

The icon is intended to remind you to pay attention to the warm surface

On these devices, there are risks to consider:

MU Health hazard: respiratory, germ cell mutagenicity, carcinogenecity, or reproductive toxicity risks GHS08

IN Flame hazard: flammable solids risks GHS02

EN Hazardous to the aquatic environment GHS09

DA Acute toxicity, skin irritation, eye irritation, specific target organ toxicity risks GHS07

ENVIRONMENT:
This device contains gas fluorinated greenhouse under the Kyoto protocol.

Methods of disposal
Do not allow the product to be released into the environment

Destruction / Disposal: Consult the manufacturer or the supplier for information on recovery or recycling. Companies performing the installation, maintenance, servicing, repair, startup of equipment containing refrigerant must have a certificate referred to in Article R543-76 code of the environment or an equivalent certificate issued in one of the member states of the European Union.

TRANSPORT :
To move the appliance, you should always wear protective gloves! Two people are required to lift or carry the cabinet.
Do not tip or place cabinet horizontally. Prevent unit from excessive vibrations.
Use a hoist in case it is necessary to lift the machine.

1. CERTIFICATE OF CONFORMITY

FROILABO SAS certifies that the appliances mentioned below:

Bio Memory Touch –86°C Deep freezer

Comply with the technical directives applying to them:
- European Directive covering pressure equipment: 97/23/CE.
- European Directive covering electromagnetic compatibility: 2004/108/CE.
- European Directive covering low voltage appliances: 2006/95/CE
- European Directive covering machines: 2006/42/CE
- European standard covering safety rules for electrical measurement, regulation and laboratory equipment EN 61010-1: 2001

Note : *These appliances are not designed to operate in explosive environments (ATEX). Moreover they cannot be used to store flammable, corrosive or explosive substances.*

2. WARRANTY

FROILABO SAS guarantees optimum operation of these devices in the installation and operating conditions as stated in this manual.

The duration of the warranty is: 24 months

And it is extended to:
- 5 years on the fan of the condenser, the compressors, the regulator and the PLC.
- 10 years on the VIP insulation.
During this period, in the event of a malfunction of your appliance, the warranty is limited to repair free of charge or the replacement of equipment if it is evident that the malfunction or breakdown is caused by faulty material or workmanship. **All other claims for compensation are excluded.**

3. GENERAL INFORMATION

Make sure that persons using these appliances are trained for the work.

Make sure that all persons installing, using or repairing these appliances are aware of the possible danger connected to their work; the safety measures to be followed and that they have understood the operating instructions.
If you use hazardous substances, or ones that could become hazardous, only persons with perfect knowledge of these appliances can operate them. These persons should be able to assess the possible risks overall. If you have any questions about the use of the appliance or method of operation don't hesitate to contact us. **FROILABO can in no circumstances be held responsible for the quality of the substances stored in the freezers.**

Note : *You have acquired equipment designed for professional use. Despite this you should take care to avoid impacts on the chassis and vibration. Make sure that the appliance is inspected regularly depending on the frequency of its use. You should also check (at least every two years) that all safety and banning signs are in place. Check that the electricity supply circuit has low impedance to avoid any influence on other appliances connected to the same circuit. If a safety device operating by injection of liquid CO_2 or nitrogen vapour is used, refer to the safety data sheets.*

4. APPLIANCE SPECIFICATIONS

4.1. Technical characteristics

	BMT 340	BMT 515	BMT 690	BMT 1000
External dimensions				
Height (mm)	1280	1640	2000	2000
Width (mm)	900	900	900	1200
Depht (mm)	995	995	995	995
Free space required behind the appliance (mm)	200	200	200	200
Max. dimensions door open (mm)	1750	1750	1750	2050
Gross dimensions excluding racks				
Height (mm)	716	1076	1436	1436
Width (mm)	630	630	630	920
Depht (mm)	752	752	752	752
Weight (kg)	223	267	330	390
Power (watts)	1100	1800	1800	2300

4.2. Performance and ambient temperature

The BM freezer can reach -87°C. It is factory pre-set to -80°C to optimise its electricity consumption.
The temperature setting range of the regulator is -70°C to -85°C. This range can be modified and extended to -55°C to - 87°C for temporary operating in a degraded mode (stability and homogeneity deteriorated or severe compressor loading). Please contact us to extend the setting range. The ambient temperature (between +18°C and +35°C; ideally between 23°C and 25°C) also influences electricity consumption greatly.

5. INSTALLATION OF APPLIANCES

5.1 Delivery Unpacking

Use a pallet truck to move the freezer on its pallet. It is essential to hold the freezer while unpacking it to prevent it tipping over. The appliance can be placed on the floor and ma- noeuvred on its casters. Once the appliance is correctly positioned remove the protec- tive plastic sheets and wedges. FROILABO freezers are delivered on pallets with unloading slopes. Consequently they do not require special equipment to remove them from their pallets. Refer to the handling instruction sheet attached to the appliance.

Note : *After unpacking check the condition of the appliance and its accessories (if possible in the presence of the carrier). If you observe any transport damage enter the damage on the delivery note and inform FROILABO as soon as possible.*

Avoid using sharp objects so as not to damage the paint.
To move the appliance, you should always wear protective gloves!
Two people are required to lift or carry the cabinet.
Do not tip or place cabinet horizontally. Prevent unit from excessive vibrations.
Use a hoist in case it is necessary to lift the machine.

After reception, please inspect the delivery:

BMT – 340 litres	BMT – 515 litres	BMT – 690 litres	BMT – 1000 litres
1 power supply cable			
2 rear buffers			
1 washable filter			
1 set of keys (x2)			
1 depressurisation valve			
1 installation and use CD			
1 shelf	2 shelves	3 shelves	
2 shelf supports	4 shelf supports	6 shelf supports	

5.2 Electricity supply

This equipment needs to be connected to an electricity supply:
Earthing of the appliance is a mandatory safety requirement.

Type of appliance	Electricity supply		
BMT 340	**230V (+/- 10%) Ph+N+E** Single phase frequency 50 Hz Current 16 A.	**220V (+/- 10%) Ph+N+E** Single phase frequency 60 Hz Current 16 A.	**110V (+/- 10%) Ph+N+E** Single phase frequency 50/60 Hz Current 16A
BMT 515			
BMT 690			
BMT 1000			

5.3 Location

To minimise energy consumption and obtain the specified performance, place the appliance in a ventilated location, remote from heat sources (radiators, heating, etc.) and avoid exposure to the sun. Place it on a flat surface. It is essential for its proper operation that the appliance be level. If necessary use hard wedges. Check that no obstacle (wall, equipment, etc.) can impede the ventilation of the ap- pliance (air inlet and outlet). **Room temperature should not exceed +35°C. The humidity level in the air should not exceed 50% RH**. Using air conditioning can significantly increase the service life of the compressors. If a safety device operating by injection of liquid CO_2 or liquid nitrogen is used, refer to the safety data sheets.in the appendix.

5.4 Compressors

Power of the hermetic compressors for – 86°C deep freezers expressed in HP.

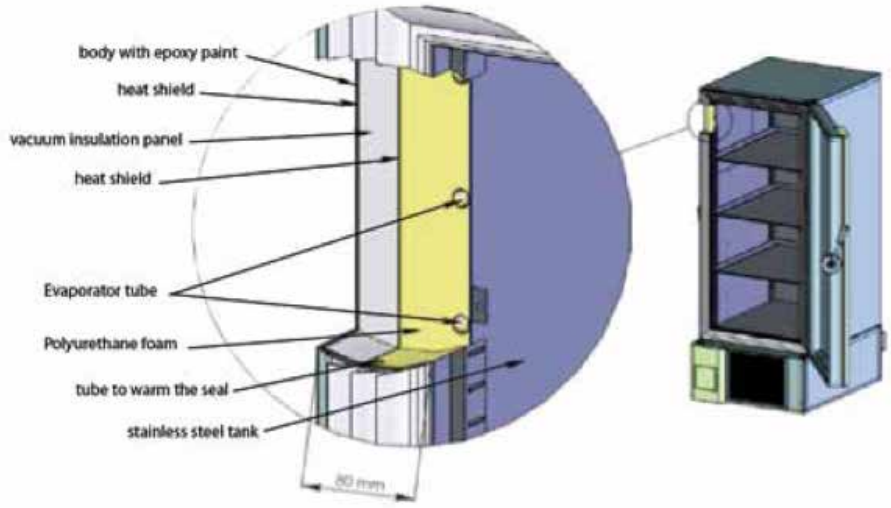
	BMT 340	BMT 515	BMT 690	BMT 1000
1st	1	1,5	1,5	1,5
2nd	3/4	1	1	2

5.5 Condensers

The freezer is fitted with an air condenser as standard.
The freezer can be fitted with a water condenser (this option can only be factory fitted and should be specified on the order). The water supply necessitates a flow of 0.3 m3 /h. Estimated consumption is 0.15m3 /h.
Water inlet / outlet connection 20/27 M. We recommend using a recycled water loop.

5.6 Construction and insulation

The monobloc exterior bodywork is made from electro galvanized steel and protected by epoxy paint.
The inside tank is made from stainless steel. Thermal insulation is by a set of insulating panels under vacuum/ polyurethane foam. The hinged door is mounted on a pivot. Closing and sealing is by a progressive tightening handle and a triple silicone profile seal.



FROILABO deep-freezers are equipped with vacuum panels .
Perforation of the walls of the appliance can greatly affect the insulation thereof significantly reduce performance.
Any perforation or unauthorized modification of the appliance will automatically invalidate the warranty.

5.7 Loading

To avoid any risk of damage of the structural parts and to guarantee the technical performance announced, it is important to respect the following instructions:

- Never place **highly corrosive materials** in the freezer,
- Never place **explosive or highly flammable materials in the freezer,**
- Leave a minimum clearance of **3 cm** along internal faces,

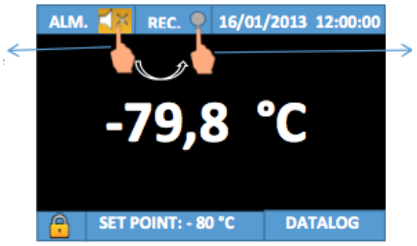
These appliances are not explosion proof

6. GENERALE USE

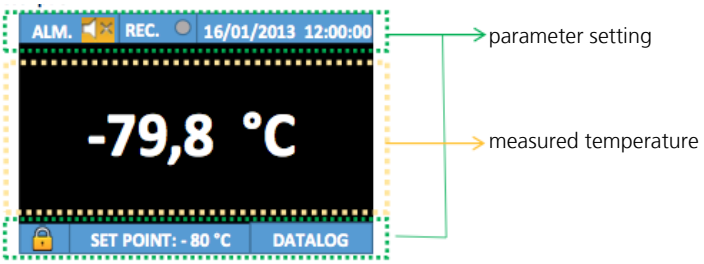
6.1 Bio Memory Touch (BMT)

Sample preservation remains our priority. To counter any possible failure of the digital display you can also manage your freezer from the standard controller according to the instructions for the freezer Bio Memory (BM), see 6.2, page 10.

6.1.1 General interface



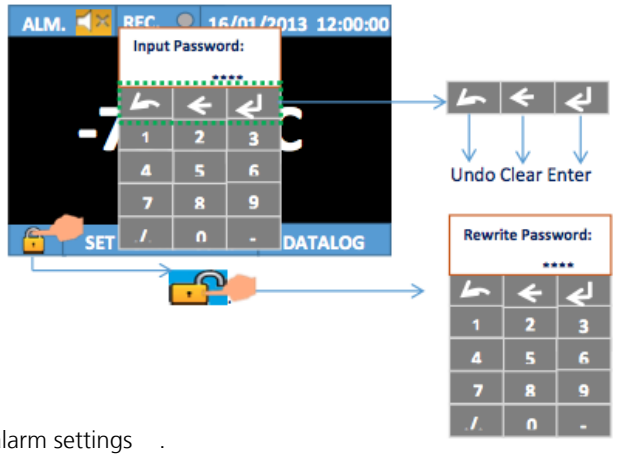
6.1.2 Description



6.1.3 setting parameters

Identification

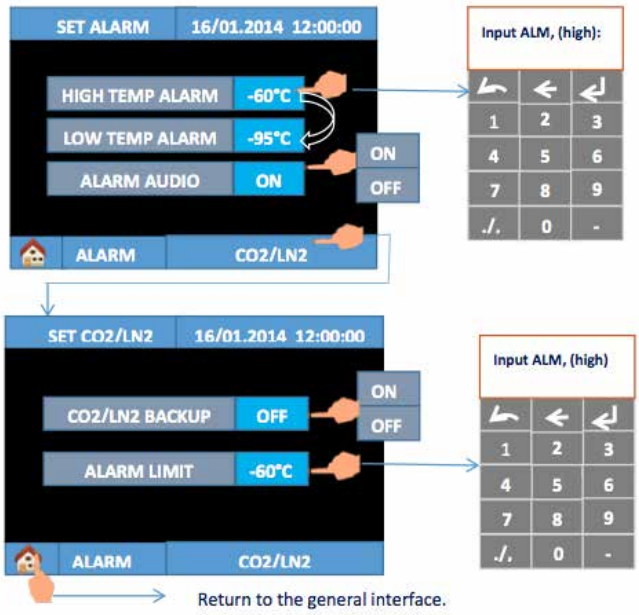
To be able to define the parameters you need to log in (password is 0000, then «Enter»).
The padlock icon must be open. Press the lock open, and re-tuck your password (eg 1111).



Alarm setting

Push ALM to access the alarm settings .

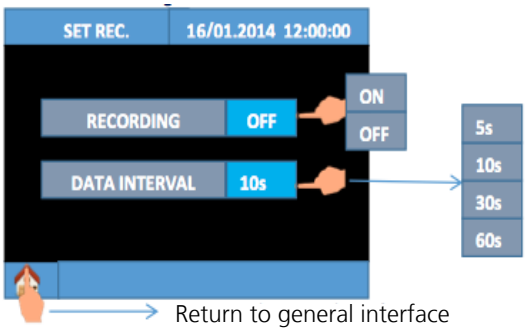
- To set the upper limit, press HIGH TEMP ALARM and enter the new value.
- To set the lower limit, press LOW TEMP ALARM and enter the new value.
- Enable or disable sound of alarms.
- To set the injection of CO_2 alarm, press ALARM LIMIT and set the new value.



Recording Settings

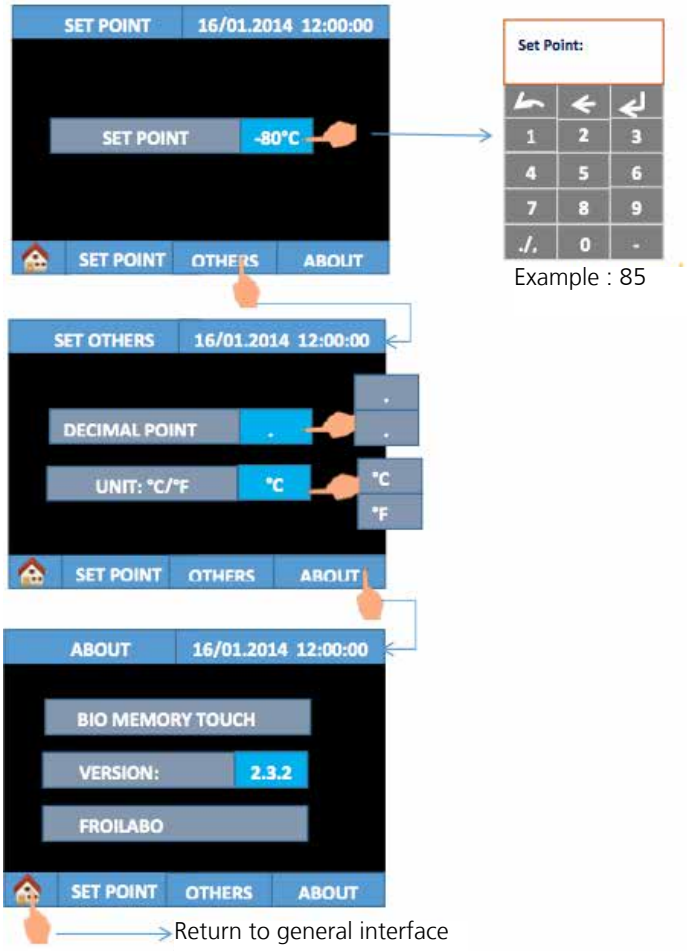
Push REC. to modify recording setting

- Enable or disable the recording
- Set the recording interval..



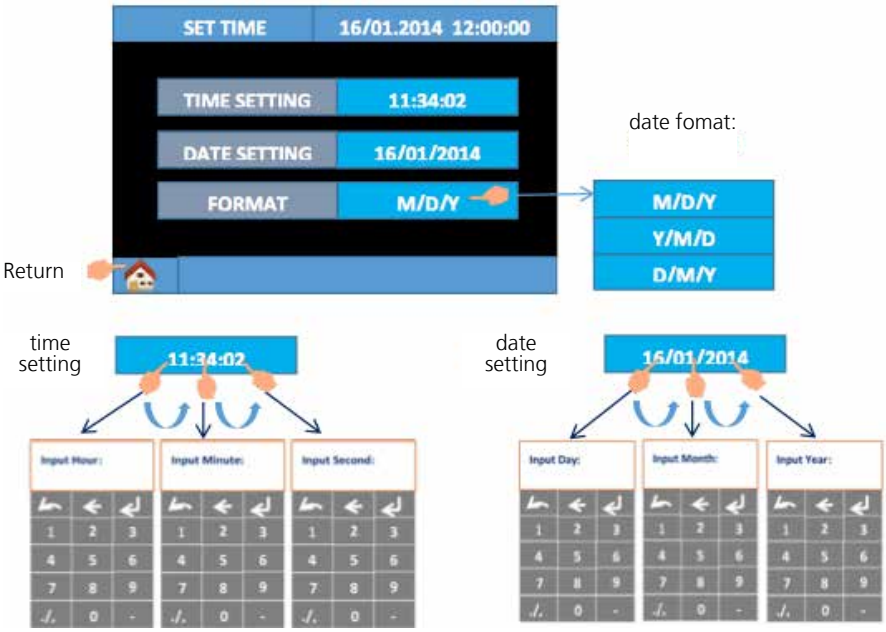
Temperature setting

Push SET POINT: - 80 °C to adjust the set temperature of the freezer.



Time setting

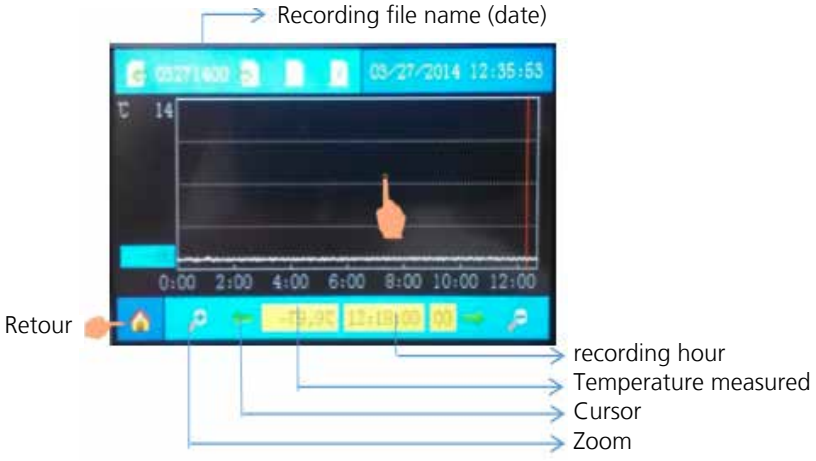
Press 16/01/2014 12:00:00 to set the date and time.



Data recording

It is possible to record the evolution of the temperature inside the freezer over time, to do:
Press DATALOG to see the graph of the temperature record.

Slide your finger across the screen to display the history.



To transfer files from the card to the PC, you must use a card reader.
the card is located to the right of the display panel of the freezer and is indicated by «SD CARD» (see picture below).
Press the card to remove it and insert it into the card reader on your PC.
The card contains a file for each day, the file name is the date and time of recording (see the sample file, page 9).
Now you can copy files from your PC.

File example: File 03241400 (day/month/year/file number)

ROM Ver. D01

Start time 03/24/2014 00:00:00

Temperature setting(C) -80

Interval(s) 5

Alarm value(up) -60

Alarm value(low) -95

-79.2

-79.2

-79.2

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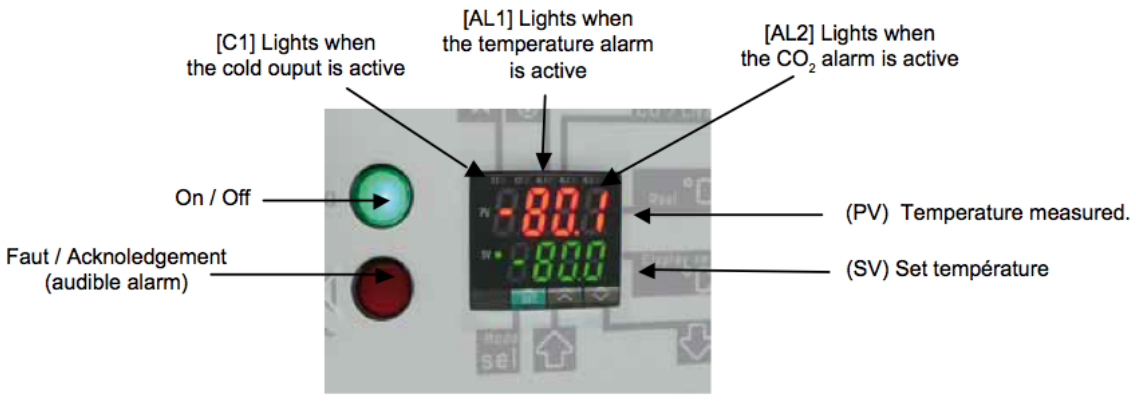
6.2 Bio Memory (BM)

6.2.1 Control panel



6.2.2 Starting up

Follow these instructions in order:
1) Connect the appliance to the electricity supply protected by a 30 mA differential circuit breaker
2) Press the Start/Stop button (green button on the front panel) to start the appliance.
3) The red light goes on during the first reduction in temperature of the appliance. It is preferable to accept the audible alarm by pressing the red button.

Remember to press the red button again when the alarm temperature (60°C) is reached to reactivate the alarm.

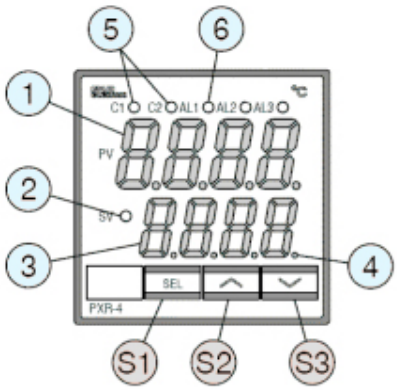
4) Adjust the set point (80°C by default).
5) Wait for the appliance to reach the set point temperature (3 to 6 hours depending on the model).
6) Load the appliance.

Note : *Loading the appliance with "hot" products may cause the appliance temperature to rise. The high temperature alarm may then trigger.*

Push button indications:
- On / Off (green) button pressed/lit = run
- On / Off (green) button released/light off = stop
- Fault/Acknowledge button pressed=buzzer deactivated
- Fault / Acknowledge button released = buzzer activated

6.2.3 PXR temperature regulator

Function description and names



Function keys

Item	Function
S1	Selection of parameter blocks 1 and 2 of the alarms and the display of the name or the value of the parameters.
S2	Increase set temperature. Prolonged pressure increases the value quickly. For switching from one parameter to another in blocks 1 and 2.
S3	Reduction set temperature. Prolonged pressure decreases the value quickly. For switching from one parameter to another in blocks 1 and 2.

Display and indications

Item	Description	Function
1	Display temperature / name of the parameters	Indicates the actual temperature. Displays the parameter symbols in the adjustment mode. Displays the error codes.
2	Set temperature indicator light (**SV**)	The light is on when the set temperature (**SV**) is displayed.
3	Display of the set point (**SV**) / of the parameter adjustments	Displays the set point temperature (**SV**). Displays the value of the parameters in the adjustment mode.
5	Regulated output indicator light	**C1:** The light goes on when the freezer is producing cold (**ON**).
6	Alarm	**AL1:** The light goes on when the temperature alarm is triggered. **AL2:** The light goes on when the emergency CO alarm is triggered.

Changing the set point temperature (SV)

Change the set point value (SV) with the ↑(S2) et ↓(S3) keys.

Note : *the modified data is automatically saved after 3 seconds*

Adjusting the parameters

By varying the time you press the **SEL** key you can select parameter blocks 1 and 2.

Parameter block selection

Holding time (sec.)	Block selection	Function
1	N°1	Programming of the alarms
3	N°2	Action of the emergency CO_2 / LN_2

Low temperature alarm adjustment A1-L

1. Hold the **SEL** key down until parameter **A1-L** appears
2. Press **SEL**, the low temperature alarm flashes

Modify the alarm temperature with the ↑(S2) et ↓(S3) keys.

3. Press **SEL** to confirm the new low alarm value
4. Hold the **SEL** key down until the main page reappears

Note : *the default value is –95°C*

High temperature alarm adjustment A1-H

1. Hold the **SEL** key down until parameter **A1-H** appears
2. Press the once to display the parameter
3. Press **SEL**, the high temperature alarm flashes

Modify the alarm temperature with the ↑(S2) et ↓(S3) keys.

4. Press **SEL** to confirm the new high alarm value
5. Hold the **SEL** key down until the main page reappears

Note : *the default value is –60°C*

6.2.4 Closing the deep freezer

As standard the appliance has a progressive closing lever. Its double action facilitates opening and closing of the door. The freezer door can be locked using the lock situated on the front panel, under the door.

6.2.5 Maintaining the alarm functions

In the event of the failure of the mains electricity supply, the alarm functions: buzzer, alarm and CO_2 (optional except BMS) remain active due to the back-up battery supplied as standard. The temperature display is also maintained.
Caution: The compressors receive no electricity supply so the appliance therefore no longer cools.

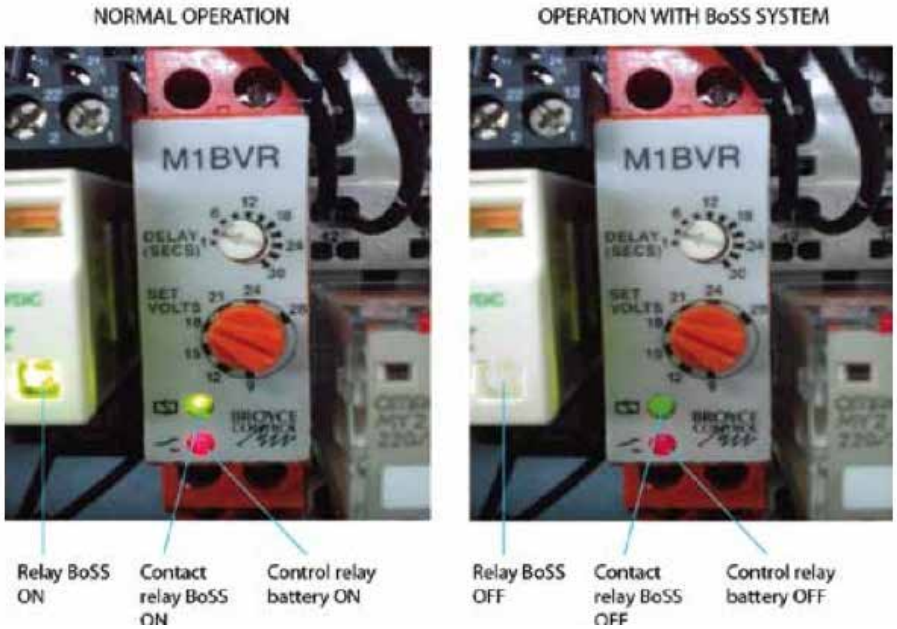
6.2.6 BoSS System

The Boss system guarantees the operation of the freezer in the event of a malfunction of the 24 volt electronic board **and assuming mains power is still supplied**. The compressors then receive power permanently but they are not controlled by the PLC.
Your samples are safe, there is no risk of a temperature increase.

Triggering principle:
1. Cut off of the 24 volt supply to the regulator linked to a fault on the electronic board; the regulator receives supply from24 volt batteries. The alarm indicator light is off. The freezer operates normally thanks to the back up batteries.
2. When the battery voltage reaches 20 volts (+/ -2V) i.e. after about 32 hours: the BoSS system triggers, alarm indicator andbuzzer active (freezer front panel), display of the regulator alarm. The compressors are connected directly to the electricity supply without the regulator. The temperature of the appliance falls to - 90°C +/ 2°C.
3. After 40 hours (+/-1 hour). The regulator, display stops, the compressors continue to operate permanently without regulation, alarm light on.

Running under the control of the BoSS system for several days does not present any problems. However, it is necessary to contact the FROILABO service Department to programme the replacement of the 24 volt supply board.

Operating status monitoring



Caution ! these specifications are obtained with new batteries charged for at least 24 h.

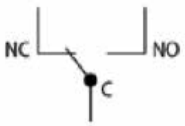
7. OPTIONS

7.1 Remote alarm

The connector situated at the back of the appliance enables a remote alarm to be connected via a connector which can be unscrewed from its base and disconnected.

DEEP FREEZER -80°C, ALARM SET THRESHOLD -60°C

Contact positon above the alarm threshold



Upper temperature alarm threshold (eg -59°C) contact switches NC

Contact positon below the alarm threshold

Lower temperature alarm threshold (eg -59°C) contact switches NC

We strongly recommend using a NO contact which also makes it possible to transmit an alarm if one of the wires is disconnected. Acceptable maximum current: 10 A at 30 Volts DC, 10 A at 250 Volts AC

Note : *after connecting the wires, screw the connector to its base to prevent it being torn off.*

7.2 Emergency CO_2/LN_2

Dangers and precautions
For use of the emergency CO_2 or LN_2 system, see the safety data sheet.

Freezer burns (frostbite)
This danger should be announced by the presence of the "extreme cold" sign
In the event of the injection of CO_2 or LN_2, do not open the door, to avoid the risk of freezer burns.

In the event of an accident: WARNING! *The wound temperature sould be returned to the body temperature as quickly as possible ; a freezer burn is apparently innocuous and not worrying at first. Rinse the burn with warm water for at least 15 minutes; close with a sterile dressing; consult a doctor.*

Danger of asphyxia
This risk should be indicated by the presence of an "Asphyxia danger" pictogram
Cold vapour is heavier than air and can accumulate in confined spaces, especially at floor level or below. As of the second inhalation, these gases cancauseasphyxiaand leadtoalossofconsciousness(oxygenratebelow18%).Topreventtheserisks:
- Ventilate storage and usage areas
- Do not release nitrogen in areas where its accumulation could be dangerous (sewers, basements, pits, closed rooms, etc.).

In the event of an accident: *In the event of asphyxia, the helper must be equipped with autonomous breathing apparatus to help the victim or be able to ventilate the room quickly and sufficiently without entering it.*

Emergency CO_2

General points
CO_2: The pressure in the cylinders and hoses reaches **70 bar**. Consequently we recommend calling in qualified personnel for any work on this system. It is essential to use liquid CO_2 cylinders.


CO_2 solenoid valve

Connection
Principle: In the event of a rise in the temperature of the appliance the freezer injects liquid CO_2 into the tank. Temperature control is by the CO_2 injection solenoid valve. Connect the hose to the solenoid valve on the back of the freezer and to the distribution pipe or the CO_2 cylinder, taking care to ensure that the thread is covered in Teflon tape.

Warning: If the ambient temperature is above +37°C, all the CO_2 present in the cylinder changes into the gaseous state; the pressure can then rise to more than 90 bar (ambient temperature of +40°C).
In the event of injection, g a s e o u s CO_2 is introduced into the tank without any cooling effect.

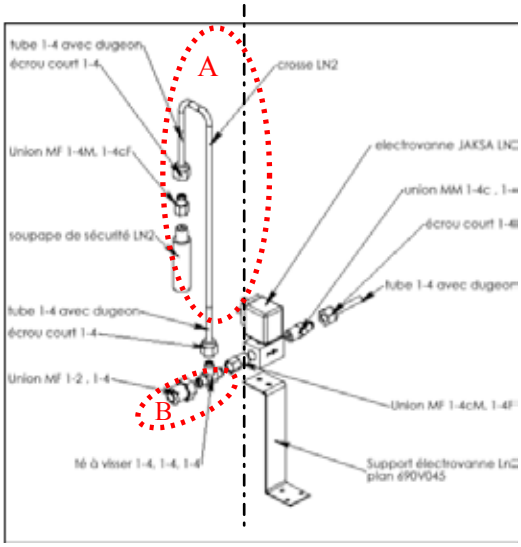
Activation and modification of the threshold
To activate the emergency CO_2 :
1. Hold **SEL** down until the **ALM1** parameter is displayed
2. Press until the **ALM2** parameter is displayed (the initial value is "0")
3. Press **SEL**; the value flashes
4. Activate the emergency CO_2 by displaying the value 1 using the ↑(S2) et ↓(S3) keys.
5. Press **SEL** to confirm the CO_2 alarm
6. Hold **SEL** down until the main page returns

To change the CO_2 injection threshold temperature
1. Hold **SEL** down until the **A1-L** parameter is displayed
2. Press until the **AL2** parameter is displayed
3. Press **SEL**; the alarm temperature flashes
4. Change the alarm temperature using the ↑(S2) et ↓(S3) keys.
5. Press **SEL** to confirm the new alarml
5. Hold **SEL** down until the main page returns
Note: *the default value is -60°C*

O_2 sensor
During injection of CO_2 or LN_2, the oxygen content in the ambient air diminishes progressively. To prevent asphyxia of the personnel in the room, FROILABO offers O_2 sensors. An alarm triggers in the event of a lack of oxygen.
To order or install an O_2 sensor on an existing system contact customer service.

7.2.5 Emergency LN_2

Principle : In the event of a rise in the temperature of the appliance the freezer injects Liquid nitrogen (vapour state) into the tank of the appliance.
Temperature control is by the solenoid valve, by creating pulses in the N2 injection.



Connecting up the LN_2 option

1. Connect the LN_2 hose supplied with the appliance (1)
2. Check that all the connections are properly tightened
3. Connect up the liquid nitrogen supply

Parts to be assembled :

- One 1/4 copper tube + short nut + safety valve (part A) unit
- One pre assembled unit (T + 2 connections "male female union") (part B)

1. Check that the pre assembled unit is covered with Teflon tape.
2. Screw the pre assembled unit onto the solenoid valve making sure that the "T" piece is positioned facing upwards.
3. Join the copper tube to the "T" piece
4. Fix the copper tube to the appliance with Colson clips, making sure that the safety valve is positioned facing downwards.
5. Check that all the connectors are tight.
6. Connect the liquid nitrogen supply.

Activation andmodification ofthe emergency LN_2 on the appliance

To activate the emergency LN_2 :

1. Hold **SEL** down until the **ALM1** parameter is displayed
2. Press ↓ until the **ALM2** parameter is displayed
3. Press **SEL**; the value flashes
4. Changethevalueoftheparameterto1 using the ↑(S2) et ↓(S3) keys.
5. Press **SEL** to confirm the N2 alarm
6. Hold **SEL** down until the main page returns

To change the LN_2 injection threshold temperature:

1. Hold **SEL** down until the **AL1** parameter is displayed
2. Press ↓ until the parameter **AL2** is displayed
3. Press **SEL**; the alarm temperature flashes
4. Change the alarm temperature using the ↑(S2) et ↓(S3) keys.
5. Press **SEL** to confirm the new alarm
6. Hold **SEL** down until the main page returns

Note: *the default value is -60°C*

7.3. Cryo-accumulator / Slowing of the temperature rise

Principle: the CRYO ACCUMULATEUR system is installed in the working volume of the freezer and does not reduce the storage capacity of the appliance.
It provides additional autonomy in the event of a temperature rise caused by a failure in the refrigeration output.

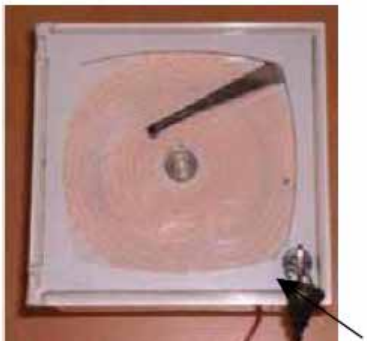
For example,
the duration of temperature rise from 80°C to 40°C for a BM690 is :

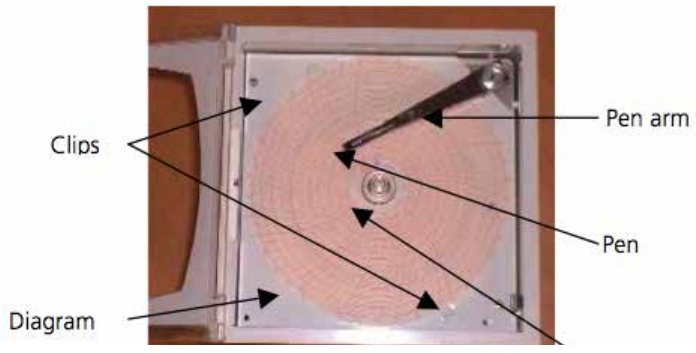
- 6h30 without the CRYO ACCUMULATEUR
- **13h with the CRYO ACCUMULATEUR**

Note : *these tests were carried out with an appliance at half load and an ambient temperature of 25°C, without opening the door.*

7.4 Disc recorder

FROILABO offers an optional disc recorder that registers the temperature over 24 hours or 7 days (selected on the appliance).





1. Open the recorder door with the key
2. Lift the pen arm
3. Unscrew the knurled nut
4. Remove the diagram
5. Position the new disc, inserting it under the clips, and tighten the knurled nut **without forcing.**

Note : *the diagram positions itself perfectly on the axis.*

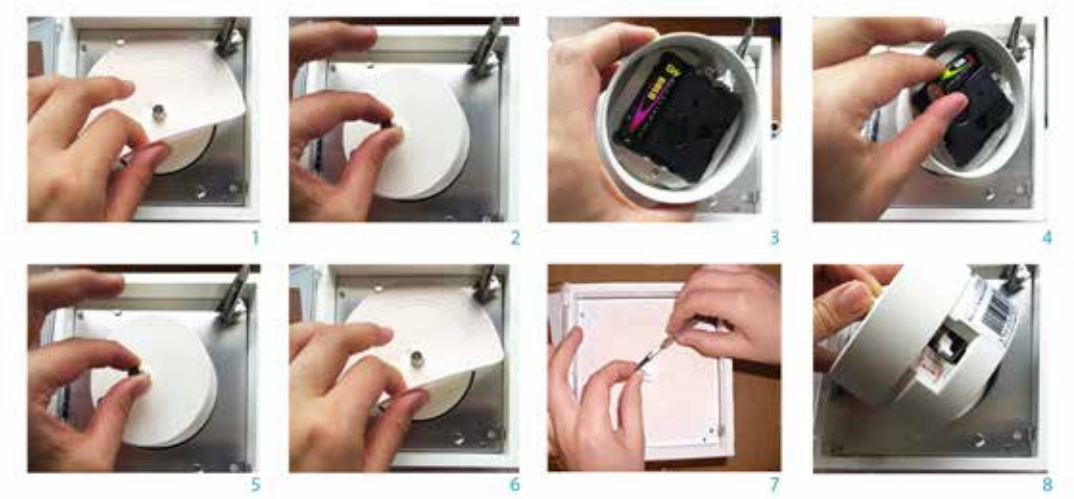
7.4.1 Setting the time

Turn the spindle clockwise by hand to the desired time.
Use the end of the pen as a reference. It is essential to respect the direction of rotation to eliminate the play in the clock movement

7.4.2 Replacing the LR6 (AA) battery

1. The battery housing is under the recorder paper disc. (1)
2. Remove the paper disc (1)
3. Remove the drive mechanism and turn it over. (2 and 3)
4. Replace the battery taking care of the polarity +/-. (4)
5. Refit the drive mechanism. (5)
6. Position the disc under the clips and tighten the knurled not (knurling towards the outside) without forcing. (6)
7. Proceed with the time adjustment. (7)

Note : *It is possible to select the operating speed (1x24h or 7x24h). To change speeds, change the position of the drive mechanism rocker switch from up to down. (8)*



7.4.3 Replacing the recorder pen

The felt pen is delivered in a silver coated hermetically sealed bag.
1. Lift the arm
2. Remove the pen while holding the arm with your thumb and index finger (photo).
3. Change the pen
4. Remove the protective cap
5. Lower the arm.
6. Proceed with the time adjustment

8. STORAGE ELEMENTS

A whole range of storage elements exists to facilitate storage in your freezer. For more information please contact our sales department.

Drawers (ELMP690) | Racks with fixed shelves (EL.E) | Racks with drawers (EL.T)

9. MAINTENANCE AND CUSTOMER SERVICE

9.1 User maintenance

Microbism
Because of the intense cold, germs imported by foodstuffs, handling and contact survive and retain all their virulence. It is important to take all the usual precautions when accessing freezers and:
- Periodical cleaning of the outside surfaces
- Use of gloves
- Short periods of opening
- Handling of fabrics and packaging under laminar flow hoods.

Before any cleaning operation. It is essential to DISCONNECT THE POWER SUPPLY to the appliance. Do not clean with a water jet, to avoid splashing onto the appliance.

9.2 Outside surfaces

Wash with warm water and soap or a neutral and non corrosive detergent. Rinse and dry thoroughly

9.3 Inside tank

Never use disinfectant bleach, even heavily diluted. Never rub stainless steel with steel wool all any other abrasive.

9.4 Door seal

The door seal is heated by conduction by means of a hot gas circuit, positioned under the seal, which reduces frost formation. Nevertheless frost may accumulate between the lips, especially during frequent door opening. Clean the triple silicone seal with dry compressed air or the plastic scraper provided by FROILABO.

9.5 Depressurisation valve

FROILABO freezers are fitted with a double diaphragm valve for correcting the ambient pressure of the volume after door opening or injection of CO_2 or N2.
Frequent door opening tends to cause the introduction of humidity into the freezer and can cause the formation of a block of ice in the air inlet pipe on which the valve is mounted. This results in clogging of the air inlet pipe and consequent difficulty to open the door. To remedy this, remove the safety valve, insert a screwdriver (or any other long thin object) into the inlet pipe and push the ice block towards the inside of the freezer.
Clean the depressurisation valve regularly (situated on the back of the appliance) (every month to 3 months as required).

9.6 Air filter

To maintain the cooling performance of the appliance, and prolong the service life of the compressors, an air filter is fitted on the front panel in front of the condenser. It is important to clear the dust from this filter as often as necessary. To do this remove the filter a n d simply wash the whole unit with clean water. Squeeze out (without wringing) and replace the filter.
The appliance must never be operated without a filter (except in a clean room).

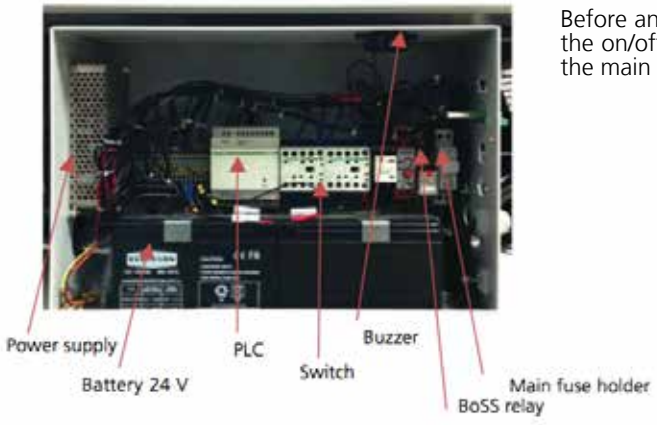
9.7 Long stoppage

If the appliance is not used for a long period, it is preferable to perform the following actions:

1. Switch off the appliance
2. Disconnect the power supply cable.
3. De ice, clean and wipe the tank carefully.
4. Leave the door slightly open to prevent foul smells.

10. MAINTENANCE CARRIED OUT BY OUR TECHNICAL DEPARTMENT

10.1 Safety rules



Before any maintenance operation it is essential to switch off the appliance with the on/off button and to disconnect the power supply cable. Open the circuit of the main fuse holder (on the electricity panel).

10.2 Maintenance / Maintenance contract

n the same way as a motorist maintains his vehicle to keep it in the best possible working order, the use of a freezer necessitates a minimum of maintenance to ensure permanent optimum operation of the appliance.

Consequently, we recommend performing an annual maintenance service, during which various points are checked (performance, safety, alarms, etc.), to prevent breakdowns, and preventive action is carried out to reduce risks of unplanned shutdowns. This maintenance work can be done by the customer's maintenance department technician if he is trained by FROILABO and possesses the equipment required by them, or by a FROILABO technician, during an annual inspection. Nevertheless, any serious problem will require repair by our maintenance department, or diagnosis and assistance by telephone.

Inspection points:
- Complete condenser cleaning and filter replacement.
- A gas charge check.
- A motor current consumption check.
- A check on the safety systems, alarms and thermostats.
- Inspection of all mechanical parts (locks, tank fittings, etc.)
- Checking of the inside temperature of the unit
- Checking on the cooling circuit leak tightness.
- Inspection of the compressor dampers (to minimise vibrations) - Replacement of the recorder pen.
- Inspection of the fan bearings

Depending on the type of contract, FROILABO undertakes to intervene within predetermined times in the event of a breakdown. To take out a maintenance contract, please send the contract request fax.

11. FAULTS

11.1 Problem/solution table

Symptoms	Possible problems	Solutions
HP1 pressure switch safety alarm	No fan operation	Call customer service
	Condenser filter and / or condenser clogged	Clean the condenser and change the filter.
	Ambient temperature +35°C	Check the operation of the air conditioning. Move the appliance
	Air inlet source of the condenser hot or hot air on the freezer (sun or hot air from another appliance)	Eliminate or move this source
Open door alarm	Door not closed	Close the door
	Door sensor faulty or maladjusted.	Call customer service
Sensor alarm. The regulator displays LLLL or UUUU	Tank sensor failed	Call customer service
Mains power cut alarm	Mains plug disconnected	Reconnect the mains plug
	Supply fuse	Replace the fuse
	24 V supply faulty, wire disconnected	Call customer service
Temperature alarm	First fall in temperature.	Acknowledge and reset once the set point temperature is reached
	Room temperature above 32 °C	Check the operation of the air conditioning. Move the appliance
	Door opening too frequent or too long.	Reduce the number and/or the duration of door openings.
	Introduction of "hot" products.	Introduce products which are already at their conservation temperature
	Alarm/set point gap too small	The minimum gap is 10°C, the usual and recommended value is 20 °C.
	Fan or compressor out of action.	Call customer service.
Display error	Problem requiring an intervention.	Call customer service.
Absence of display	Absence supply	Switch on the power.
	Electrical problem	Call customer service.

11.2 Restarting after a "HP1 pressure switch alarm stoppage

1. Press the on/off button.
2. Wait 3 seconds
3. Press the on/off button
4. The fan and the compressor start

Wait a few minutes to check that the inside temperature of the freezer falls.

MAINTENANCE CONTRACT

(form to fax to the number: +331 60 37 41 78)

YOUR DETAILS:

Ms. ☐ Miss ☐ M ☐ Name .....

Company or institution .....

Function.....

Service .....

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

Adress .....

Post code ☐☐☐☐☐ City .....

YOUR REQUEST:

Maintenance contract ☐ Renewal ☐ Number.....

Type of device .....

temperature .....

brand .....

For freezers:
Emergency LN_2 yes ☐ No ☐ $C O_2$ yes ☐ no ☐

Number of devices .....

Desired number of visits per year .....

You already have a maintenance contract FROILABO yes ☐ no ☐

If so, contract number.....

Froilabo
Precision for life

13. TECHNICAL DATA SHEET

	BMT 340	BMT 515	BMT 690	BMT 1000
External dimensions				
Height (mm)	1280	1640	2000	2000
Width (mm)	900	900	900	1200
Depht (mm)	995	995	995	995
Gross dimensions excluding racks				
Height (mm)	716	1076	1436	1436
Width (mm)	630	630	630	920
Depht (mm)	752	752	752	752
Weight (kg)	223	267	330	390
Power supply				
Voltage	230 V - 50 Hz or 220 V - 60 Hz or 110 V - 50/60 Hz			
Protection	aM 16 A			
Refrigeration system				
Hermetic compressors 1st stage	1 HP	1,5 HP	1,5 HP	2,5 HP
Hermetic compressors 2nd stage	3/4 HP	1 HP	1 HP	2 HP
Coolant 1st stage	R 417 a			
Coolant 2nd stage	R 508 a / R 508 b			
Expansion	Capillary			
Condenser	air			
Capacities				
Gross volume (liters)	340	515	690	1011
Number of compartments	2	3	4	4
Temperatures				
Ambient	+18°C to +32°C			
Working (+/-°C)	- 80°C			
Standards	97/23/CE, 2004/108/CE, 2006/42/CE, 2006/95/CE, EN 61010-1			

14. SAFETY

14.1 Liquid CO_2 emergencies

PRECAUTIONS WHEN USING CO_2

Properties of CO_2
- Supports neither life nor combustion
- Present in small quantities in the air (0.03 %)
- Makes the atmosphere unbreathable above 3 %
- Causes an acceleration of the heartbeat, malaise, vomiting, coma, **or death**
- Heavier than air d=1.53
- Non flammable, colourless with a slightly acid odour at high concentrations
- Reduced pressure liquid at atmospheric pressure produces carbon dioxide snow at a temperature of – 80°C

Resulting dangers

- **Risk of asphyxia. Above 8 to 10 % loss of consciousness**
- CO_2 accumulation at low points
- Risk of frostbite
- Risk of corrosion of steel in the presence of humidity

Essential precautions

- Zones of storage and use of CO_2 must be well ventilated (extraction or ventilation at the top and bottom of the room)
- Indicate the danger in areas likely to contain an unbreathable atmosphere with a **"CO_2, risk of asphyxia"** pictogram
- Never enter an area that has contained CO_2 without taking the above precautions
- Eliminate all communication between the areas where CO_2 is stored or used and low points (pits, gutters, basements, etc.) where it could collect and make the atmosphere unbreathable.
- Use a CO_2 concentration sensor to ensure that the CO_2 level is below 0.5 % (INRS recommendation)

Intervention on the site of an incident or accident

In the event of asphyxia
• After having checked the oxygen level in the room, carry the victim out into the fresh air (after equipping yourself with breathing apparatus)
• Start artificial respiration and call the emergency services

In the event of leakage
• Do not enter the room without breathing apparatus if the carbon dioxide level is above 3%
• Close the valve on the cylinder.
• Ventilate the room for a long time; pay particular attention to the ventilation of the low points

PRECAUTIONS in relation to EQUIPMENT

Warning, the cylinders are under pressure!
• Handle the cylinders with care
• Fix the cylinders
• Do not expose the cylinders to excessively high temperatures
• Take care of valves (operate them gently, do not dismantle and never grease a valve)
• Use appropriate equipment for the pipes and pressure valves, check the condition of the seals, only use genuine parts
• Before fitting the pressure valves, open the valve briefly to blow out any dust (do not stand opposite the valve outlet at this time)
• Never transfer gas from one cylinder to another
• Never lie a cylinder down while it is being used

After use:
• Close the valve carefully
• Drain the usage circuit
• Loosen the pressure valve adjustment screw
• Close the valve on the appliance that is being used
• The transport of cylinders is subject to regulations
• Frames should be treated with the same care as the cylinders`

As the user is the only person who knows and monitors the operating conditions of this equipment thoroughly he/she alone is responsible for its correct use.

14.2 Liquid nitrogen emergencies

The handling of cryogenic fluids, and in particular liquid nitrogen, necessitates the observation of strict rules. Their purpose is to prevent two principal dangers: **anoxia and burns** by contact or projection. The air contains, by volume, 21% of oxygen and 78% of nitrogen. At atmospheric pressure, liquid nitrogen vaporises above –196°C.
In a cryogenic chamber, the natural evaporation o f t h e containers, their filling and the handling of the samples stored causes permanent vaporisation of liquid nitrogen. This can increase significantly in the event of a malfunction of the installation. If the room is insufficiently ventilated, the production of gaseous nitrogen can result in the atmosphere lacking oxygen.

Properties of liquid nitrogen
- Supports neither life nor combustion
- Present in the air (78%)
- **One litre of liquid nitrogen produces 680 litres of gas by vaporisation**
- Heavier than air at low temperatures
- Non flammable and colourless

Resulting dangers

• Risk of asphyxia and loss of consciousness. An atmosphere containing less than 16% oxygen is dangerous (gaseous nitrogen replaces the oxygen in the air)
• Nitrogen accumulation at low points
• Risk of frostbite
• Risk of corrosion of steel in the presence of humidity
• In a closed volume, the pressure can reach very high values (in the order of 700 bars) and there is a danger of explosion

Essential precautions

• Zones of storage or use of liquid nitrogen must be well ventilated (extraction or ventilation at the top and bottom of the room)
• Indicate the danger in areas likely to contain an unbreathable atmosphere with a "danger of asphyxia" pictogram
• Never enter an area that has contained liquid nitrogen without taking the above precautions
• Eliminate all communication between the areas where liquid nitrogen is stored or used and low points (pits, gutters, basements, etc.) where it could collect and make the atmosphere unbreathable.
• **Use an O_2 concentration** sensor to ensure that the O2 level is above 18%
• Avoid using non insulated liquid nitrogen pipes in any area
• Consider the layout of the installations with a specialist

Intervention on the site of an incident or accident

In the event of asphyxia
• After having checked the oxygen level in the room, carry the victim out into the fresh air (after equipping yourself with breathing apparatus)
• Start artificial respiration and call the emergency services

In the event of leakage
• Evacuate the room
• Do not enter the room without breathing apparatus if the oxygen level is below 18 %
• Close the valve on the leaking cylinder.
• Ventilate the room for a long time; pay particular attention to the ventilation of the low points

In the event of liquid nitrogen projection
• In the eyes: Wash the eye abundantly for at least 20 minutes. **Call a doctor**
• On the skin: Do not rub. Remove clothes if necessary, raise the temperature of the parts affected as quickly as possible by spraying with running water for at least 20 minutes. **Call a doctor**

PRECAUTIONS in relation to EQUIPMENT

Warning: Liquid nitrogen, which is fluid at very low temperatures, is stored in cylinders with double walls between which there is a high vacuum producing good thermal insulation. This equipment should be handled with care, especially mobile storage systems.

- Avoid shocks. Never lay a cryogenic container down
- Do not expose the containers to excessively high temperatures
- Take care of valves (operate them gently, do not dismantle and never grease a valve)
- Only use equipment in good condition, that is designed for the working temperature and pressure
- Store mobile equipment in a place protected from the weather. Containers with open necks should be fitted with their plugs to prevent the neck being blocked by cryopumping of the ambient humidity
- Use suitable connecting hoses, never use intermediate connections
- Monitor the pressure and the safety equipment (valves) for closed containers
- The transport of containers is subject to regulations

As the user is the only person who knows and monitors the operating conditions of this equipment thoroughly he/she alone is responsible for its correct use.

15. DISPOSAL

TRANSPORT:
To move the appliance, you should always wear protective gloves! Two people are required to lift or carry the cabinet.
Do not tip or place cabinet horizontally. Prevent unit from excessive vibrations.
Use a hoist in case it is necessary to lift the machine.

DISPOSAL:
In case the product is to be disposed of, the relevant legal regulations are to be observed. Information on the disposal of electrical and electronic devices in the European Community: Within the European Community, the disposal of electrical devices is regulated by national regulations based on EU Directive 2002/96/EC pertaining to waste electrical and electronic equipment (WEEE). According to these regulations, any devices supplied after August 13, 2005, in the business-to-business sphere, to which this product is assigned, may no longer be disposed of in municipal or domestic waste.
To document this, they have been marked with the following identification:

Because disposal regulations may differ from one country to another within the EU, please contact your supplier if necessary.

16. CUSTOMER SERVICE