

ULT FREEZERS

ESSENTIAL | EVOLUTION

Froilabo is where security makes the difference

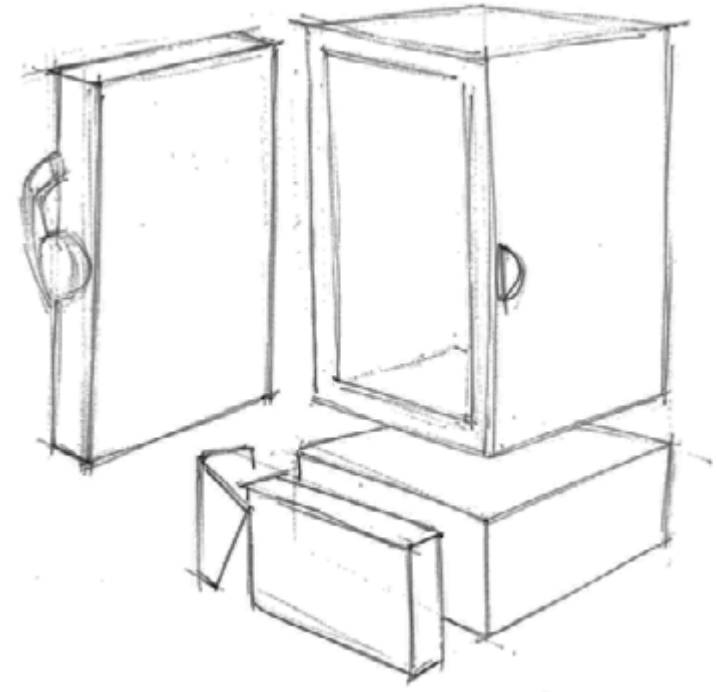




Froilabo

EVOLUTION

Essential Evolution



“ 12 months of R&D and 100 years of experience have led our team to offer you a range of ultra-performant ULT Freezers. Safety, innovation and performance have been at the heart of our strategy of development and design of our devices. ”

Bernard Léguillon

Bernard Léguillon General Manager

 **Froilabo**

A development guided by the user

Froilabo development of ULT Freezers has been based on 4 goals:



Security of samples

The preservation of the sample has been the key to any other consideration in our product development.



Innovation in the use

Customer's comments and suggestions have led the development of those freezers. Several innovations have been patented.



Performance of the ULT Freezer

Priority has been given to fast temperature recovery without compromising the power consumption.



Simplicity of maintenance & diagnosis

CMS (Compressor Management System) permits to anticipate and simplify maintenance. It allows to limit freezer's downtime when intervention is necessary.

100 years
of experience and know-how

12 months
of research and development

European manufacturing

Results of several months of research and development, Froilabo ULT Freezers are conceived and designed in France, manufactured in Europe.



CE marking



UL marking



ISO 9001 and ISO 13485
certified production site



A scalable range

Research and comments from every type user has helped Froilabo in designing the new ULT Freezers with 2 models according to your needs:

2 models

48 000 cryo-tubes

ESSENTIAL

Ideal for long term sample storage.



Storage

Functionnal « OK »
status

EVOLUTION

Optimal for daily use with frequent door opening.



Work

Optimisation interface
of the ULT Freezer

| Your samples

Protected and secure



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Secure samples

Equipped with several safety devices, Froilabo ULT Freezers guarantee the long term preservation of your samples.



BoSS system *(Board Substitution System)*

Froilabo's BoSS ensures the compressors remain operational in the case of losing the 24V regulation power supply. Up to 30 hours regulation on batteries.



CMS technology *(Compressor Management System)*

If failure of a component driving the compressors, the appliance automatically duplicates the initial operation. It is based on cycles registered during the first 10 hours of functioning.



Ergonomic intelligent handle

The ergonomically designed handle aligns the user force with the required action of unlocking or opening/closing the door. A sensor in the handle confirms door closure/locking.



Access control

Froilabo ULT Freezers protect your samples on two levels. All freezer settings such as temperature are protected by a user password and the door can be locked to restrict access.



Visual and audible alarms

A variety of alarms indicates various warnings, regarding door opening, power supply, pressure defaults, filter blockage and many other concerns. Alarms events are recorded and can be customised.



Powerful compressors

Essential for a quick return to the set temperature after opening door.



Secure its environment

The equipment of Froilabo ULT Freezers ensures optimal operation for the safety of your samples in all circumstances.



Micro-cut power protection

The electronic board will accept power micro-cuts. It will minimise the number of compressor reboots and will reduce the potential maintenance.

1

Adjustable delay

2

3

After a mains power outage, each ULT Freezer can adjust the time delay for re-start to avoid a simultaneous peak demand on the facility power supply.

CO₂ and LN₂
back up

available in option

The equipment

Innovative and ergonomic



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An equipment designed by the user

Research and comments from every type user has helped Froilabo in designing the new ULT Freezers.



Easy to replace filter cassette

Froilabo's new filter cassette allows the user to monitor blockages and easily clean or replace the filter. It improves compressor performance and energy consumption.



Easy cleaning

Round corners ease the cleaning and disinfection of the internal compartment.



Easy access to samples

Pull-out shelves are anti-tipping and ease the access to sample and specimen.
(available in option, 2 shelves maximum for the 690I model).



Instantaneous control

The proper functioning of the unit and the perfect security of your samples can be checked at a glance through an "OK" indicator (available on Essential model).



No frost build-up

With a unique design, gasket's flexibility allows a perfect seal of the freezer and minimises frost's formation.



Pressure self-regulation

A bi-directional and removable pressure relief valve balances the pressure inside the freezer in all circumstances.



Removable internal door panels

It can be disconnected without tool for a simplified cleaning outside the freezer.



5 sec

Filter replacement

0 tool

Internal door panels extraction

| The performance

Temperature and consumption



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Cooling power and temperature homogeneity

Rapid cooling and temperature homogeneity inside the freezer are critical for sample preservation.



Rapid temperature pull down

Unrivalled temperature pull down allows rapid temperature recovery after door openings and restarts.



Delayed temperature rise

60 years of experience with designing insulation for ULT Freezers and the use of cryo-reservoir plates (option) retains the low temperature during door opening and power failures.



Set temperature recovery speed

It is an essential setting for the optimal preservation of samples. Froilabo ULT Freezers always show the current temperature inside the bowl.



Temperature homogeneity

The excellent temperature homogeneity inside the bowl allows to save energy for a same high temperature limit.



< 4 hours

Pull down to -86°C
(empty 690L model - 22°C
ambient temperature)

Energy consumption

The energy consumption of an ULT Freezer is influenced by many factors, including the performance of the freezer and the way it is used.



No one uses an empty freezer

Beware of manufacture performance and economy claims measured with empty freezers in low temperature environments. Froilabo ULT Freezers operate and are measured in the real world with large numbers of samples and realistic ambient temperatures.



ULT Freezer in use

This is the only significant measure of the real power consumption of an ULT Freezer. It is greatly influenced by the set temperature, the frequency of door opening, the ambient temperature, the filter cleanliness, the power supply stability, and many more factors.

Froilabo offers the user all the information allowing to really influence the consumption of its equipment.





The consumption

Optimised and controlled

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A user help to reduce energy consumption

The user can significantly reduce energy consumption by optimising operating conditions, environment and paying attention to the equipment and settings.



"Eco" mode

Ability to minimise the power consumption of the freezer outside usual working hours (Evolution model).



Energy performance indicator

A colored indicator gives in real time the energetical comfort zone of the device. Green, yellow or red, the user is informed of the freezer's energy performance (Evolution model).



Proximity sensor

Proximity sensor will only active the screen when a user is present to conserve power. (Evolution model).
NB: screen brightness is adjustable.



Best practices tutorial

Recommendations and tips to guide users influencing power consumption: ambient T°, cleanliness of the filter, door opening frequency, etc. (Evolution model).



Optimal thermodynamics performances

Powerful and economic compressors combined with efficient insulation deliver the best performance/power consumption ratio.



Optimised insulation

Vacuum Insulation Panel (VIP, VACUPOR™ type) combined with high density polyurethane foam offers optimal insulation. In case of power outage, the temperature rise is significantly slowed down.



Homogeneity and stability of temperature

The use of rounded corners improved by 15% heat exchange. It also contributes to energy savings for the same high temperature limit.



New generation of compressors

More compact and offering improved energy performance, our new generation of compressors allow significant energy savings.

+/- 20%

Ability to optimise energy consumption by the user

The management interface

Intuitive and secure



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Active monitoring to protect samples

All events and parameters are tracked and recorded. It allows diagnostics and trouble-shooting to prevent failures or unwanted temperature increases.



Sample Location Software

Software integrated into the touch screen and bar-code reader can define the rack & shelf configuration and record the location of samples in the ULT Freezer (option on Evolution model).



Management of inputs and outputs

Entry of samples references to be stored or located on the touch screen with an alphanumeric keypad. Validation of the inputs and outputs (Evolution model).



Bar-code reader

A bar-code reader is integrated in the ULT Freezer handle. Sample identification and location are very easy. Sample collection is quick and miss identification risk is eliminated (option on Evolution model).



Transfer of data on a back-up

If necessary, immediate recovery of data storage on PC/tablet to transfer it to an equivalent back-up ULT Freezer. No re-entry of logins and locations.

Traceability of events in any circumstances

Follow-up of the evolution of the temperature and all events that may potentially affect the samples.



Collection of data with USB port

A USB port is available for data collection. Temperature evolution and alarm events are recorded and can be downloaded on Evolution and Expert models (CSV file).



History of events

Display on touch screen of the temperature evolution on the last 10 hours, but also the last events and their acquittal (up to 10) (Evolution model).



10 hours
of temperature evolution

10 events
and their acquittal



| The maintenance

Preventive and simplified

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Self-diagnosis and predictive maintenance

ULT Freezers provide a self-diagnosis that allows users to anticipate maintenance by reporting any reduction in performance.



"Diagnosis" menu

It gives a preview in real time of the operation of the device. It identifies drifts of parameters (pressure, consumption, T ° of exchange, etc.) and the status of critical components (battery, power relay contacts, etc.). (Evolution model).



CMS technology *(Compressor Management System)*

Critical parameters of the last 10 operating hours are permanently compared to those recorded during the first 10 hours of the ULT Freezer life. Any deviation is reported to the user.



"Statistics" menu

Key figures related to conditions of use: number of door openings and times, starts of compressors, power consumption, ambient T °, etc. (Evolution model).



12 LED state's indicator

LED indicators give quick alarms identification (BoSS engaged, low battery, T° alarm, ...). It eases the diagnosis.



Quick and simple service

The critical elements can be replaced very rapidly. It will minimise ULT Freezer's downtime and will significantly reduce maintenance and service cost.



"Plug & play" electronics

Electronics and display contained in the module are easily removable and can be rapidly switched without any specific tool.



Removable cooling system

The cooling unit is mounted on a removable tray. Immediate cooling system substitution is possible and can avoid return of the unit back to the workshop.

No oil separator

Simple and efficient pipe architecture avoids oil clot and eliminates potential expensive maintenance.



| Specifications & accessories

Versatility and modularity

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Technical specifications

| MODEL | Volume | Capacity (cryo-tubes) | Compartments | External dimensions (H x W x D) | Inner dimensions (H x W x D) | Net weight | Power supply |
|------------------------|--------|--------------------------|--------------|------------------------------------|---------------------------------|------------|--------------|
| ESSENTIAL EVOLUTION | 340L | 24 000 | 2 | 1280 x 875 x 970 mm | 716 x 630 x 752 mm | 223 kg | 230V/50Hz |
| | 515L | 36 000 | 3 | 1640 x 875 x 970 mm | 1076 x 630 x 752 mm | 267 kg | 110V/50Hz |
| | 690L | 48 000 | 4 | 1990 x 875 x 970 mm | 1436 x 630 x 752 mm | 330 kg | 110V/60Hz |



| FEATURES | | ESSENTIAL | EVOLUTION |
|---------------------------|--|---|---|
| DISPLAY | Functional "OK" status Display of temperature on regulator Internal current temperature Set temperature Touch screen Proximity sensor | ✓ ✓ ✓ ✓ X X | X X ✓ ✓ ✓ ✓ |
| VISUAL AND AUDIBLE ALARMS | Visual and audible alarms Filter to be cleaned/replaced High pressure default High and low temperature Closed door sensor BOSS system activated 24V battery back up LN ₂ injection CO ₂ injection | ✓ ✓ ✓ ✓ ✓ ✓ ✓ • • | ✓ ✓ ✓ ✓ ✓ ✓ ✓ • • |
| ALARM FEATURES | Backup of display temperature in case of power outage Temporary switch off of the audible alarm Dry contact NO / NC Adjustable open door alarm delay Delay in transmitting the open door alarm signal Periodic control of the alarms | ✓ ✓ ✓ ✓ X X | ✓ ✓ ✓ ✓ ✓ ✓ |
| SAMPLES PROTECTION | 24V BoSS System CMS Technology Power micro-cut protection Key locked Closed door sensor User password User / Admin / Maintenance password Handle locked in case of alarms CO ₂ back-up LN ₂ back-up Cryo accumulator Tropical standards of electronic parts | ✓ ✓ ✓ ✓ ✓ X X X X • • • • | ✓ ✓ ✓ ✓ ✓ ✓ ✓ X X • • • • |

✓ available | x not available | • option

| FEATURES | | ESSENTIAL | EVOLUTION |
|--|--|--|--|
| ECO MODE | Stand-by of the screen (decrease of contrast and luminosity) Eco-friendly environment and usage of the freezer "Eco" mode | X X X | ✓ ✓ ✓ |
| COMMUNICATION, INFORMATION, DATA RECORDING | 12 LED state's indicators Data recording with USB port Sample Location Storage "Statistics" menu "Infos" menu (freezer serial number, gas load, BTU information, ...) Help for power consumption optimisation Possibility to leave a message on screen | ✓ X X X X X X | ✓ ✓ ✓ ✓ ✓ ✓ ✓ |
| EQUIPMENT | Cable entry port Pressure valve Removable filter cassette (washable or disposable) Robust hinge Anti-icing heated gasket Internal stainless steel with round corners for easy cleaning Cooling system mounted on a removable tray/chassis 4,5 cm of ground clearance for easy handling Ergonomic intelligent handle "Plug and play" electronics | ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ |
| OPTIONS + | Automatic frequency adjustment 50Hz / 60Hz Sliding shelves Sliding drawers RS 485 connector Additionnal probe / DIN connector Additionnal probe / terminal block Additionnal probe / Lemo Pt 100 Ohms / 4/20 mA Additionnal cable entry port Disc recorder Wireless recorder Racks | • • • • • • • • • • • • | • • • • • • • • • • • • |

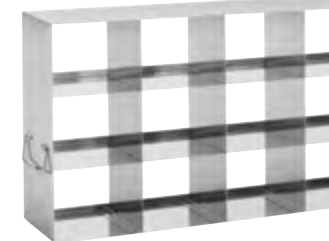
✓ available | x not available | • option

Options



| CAT | REF | DESCRIPTION |
|------------------------------|----------------------------------|---|
| EQUIPMENT | BM/ES515 BM/ES690 | Pull-out shelf for 515L and 690L (x1) Pull-out shelves for 690L (x2) |
| | BM/CRY02 BM/CRY03 BM/CRY04 | Cryo-reservoir for 340L (temperature increase delayed by additional +/- 6h) Cryo-reservoir for 515L (temperature increase delayed by additional +/- 6h) Cryo-reservoir for 690L (temperature increase delayed by additional +/- 6h) |
| | BM/CO2E | CO ₂ backup system |
| | BM/FL1 BM/FL2 BM/FL3 | Connection stainless steel flexible freezer/bottle or CO ₂ ramp, 2m length Connection stainless steel flexible freezer/bottle or CO ₂ ramp, 3m length Connection stainless steel flexible freezer/bottle or CO ₂ ramp, 4m length |
| | BM/TROP | Tropical standards for electronic parts |
| TRACEABILITY | BM/OPT2 | Independant temperature probe PT100 ohms (-100°C to +50°C), connector at back |
| | BM/OPT3 | Independant K thermocouple (-100°C to +50°C), connector at back |
| | BM/OPT4 | Independant temperature Pt 100 Ohms (-100°C to +50°C), connector at back |
| | BM/OPT5 | PT 100 temperature probe connected with 3 m long wires to allow external calibration |
| | BM/OPT6 | Certified regulation probe |
| | BM/OPT7 | Circular chart recorder with battery supply (temperature range: from 0°C to -100°C), 1 revolution = 7 days |
| | BM/OPT9 | RS 485 output |
| | BM/OPT13 | 4-20mA output for Evolution |
| | BM/OPT14 | Mapping by manual capture on screen for Evolution |
| VALIDATION/ QUALIFICATION | BM/QP BM/QIQO | Qualification of the freezer: 9 points temperature monitoring performed in Froilabo factory by independent test organization IQ OQ Documentation |

Accessories



| CAT | REF | DESCRIPTION | Nb of shelves | Usable height (mm) | Cryboxes capacity (133x133x51mm) | Freezer racks capacity (340/515/690) |
|---|---|--|------------------|-----------------------|---|--------------------------------------|
| RACKS WITH DRAWERS (288x730x343) | BM/EL2T690 BM/EL2T690A | 2 drawers stainless steel rack Stainless steel rack with 2 aluminium drawers | 2 | 164 | 60 | 4 / 6 / 8 |
| | BM/EL3T690 BM/EL3T690A | 3 drawers stainless steel rack Stainless steel rack with 3 aluminium drawers | 3 | 109 | 60 | |
| | BM/EL4T690 BM/EL4T690A | 4 drawers stainless steel rack Stainless steel rack with 4 aluminium drawers | 4 | 80 | 40 | |
| | BM/EL5T690 BM/EL5T690A | 5 drawers stainless steel rack Stainless steel rack with 5 aluminium drawers | 5 | 63 | 50 | |
| | BM/EL6T690 BM/EL6T690A | 6 drawers stainless steel rack Stainless steel rack with 6 aluminium drawers | 6 | 53 | 60 | |
| RACKS WITH FIXED SHELVES (140x730x343) | BM/EL3E690 BM/EL3E690C BM/EL3E690AC | 3 fixed shelves stainless steel rack Stainless steel rack, 15 compartments Aluminium rack, 15 compartments | 3 | 109 | 30 | 8 / 12 / 16 |
| | BM/EL4E690 BM/EL4E690C BM/EL4E690AC | 4 fixed shelves stainless steel rack Stainless steel rack, 20 compartments Aluminium rack, 20 compartments | 4 | 80 | 20 | |
| | BM/EL5E690 BM/EL5E690C BM/EL5E690AC | 5 fixed shelves stainless steel rack Stainless steel rack, 25 compartments Aluminium rack, 25 compartments | 5 | 63 | 25 | |
| | BM/EL6E690 BM/EL6E690C BM/EL6E690AC | 6 fixed shelves stainless steel rack Stainless steel rack, 30 compartments Aluminium rack, 30 compartments | 6 | 54 | 30 | |
| STORAGE ELEMENTS | BM/ELMP690 BM/ELE690 | Stainless steel rack with 2 drawers for microplates Stainless steel rack, 5 columns, until 30 compartments, adjustable shelves | 2 From 1 to 6 | 140 From 54 to 109 | 160 x 96 well plates Until 30 compartments | 8 / 12 / 16 8 / 12 / 16 |
| | BM/PERSO | Customized rack | / | / | / | / |
| BASKETS (142x740x330) | BM/TIR | Stainless steel storage drawer | 1 | 330 | / | 8 / 12 / 16 |
| ADDITIONAL SHELVES | BM/ETA2 | Stainless steel shelf for 340L/515L/690L | | | | |



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