User Guide

Nano Digitcool
Programmable freezer

Edition: 02/24/2016

Lire attentivement ce manuel avant d'utiliser Nano Digitcool

CRYO BIO SYSTEM - www.cryobiosystem-imv.com - +33 (0)2 33 34 64 64

Contents

• 1 - Warning

Please read this user guide carefully, in order to learn how to use the Nano Digitcool in complete safety and to obtain full satisfaction from it.
This user guide presents the different elements of which the NANO Digitcool programmable freezer is composed, notably including parts, together with their reference numbers, which are essential when ordering spare parts (see point 8 “Exploded views and components list”).

• 2 - Introduction

2.1 Applications

Cryo Bio System, a division of the IMV Technologies group, develops, manufactures and markets packaging and freezing solutions for the cryopreservation of biological samples. The packaging solutions are composed of different types of containers able to withstand the conditions of freezing and cryopreservation, as well as tools and equipment for their use.
Cryo Bio System has developed complete packaging solutions for human biological samples, which combine CBS™ High Security straws with a full range of tools covering every process, whether manual or entirely automated.

2.2 Protection and safety

Electrical safety standards

- Class I product requiring installation with properly protected earth connection.
- Pollution degree 2.
- LED warning light defining the status of the equipment.
  - ⇨ **green**: pause
  - ⇨ **blue**: cooling
  - ⇨ **red**: heating

2.2.1. Setup requirements and safety

Safe use of this unit requires its connection to a grounded, compliant electrical source.
The power cable must be in perfect condition. If the cable looks damaged in any way, turn off the power supply to the device immediately. Call a specialist to replace the cable or contact the Cryo Bio System After Sales Service.

Failure to comply with the specifications in these operating instructions may compromise the protection provided by the equipment

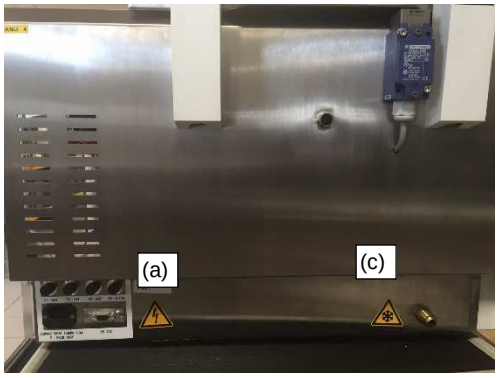
The device must not be opened.
Any change and/or electrical repairs may only be carried out by a qualified individual under the supervision of a Cryo Bio System After Sales Service technician.

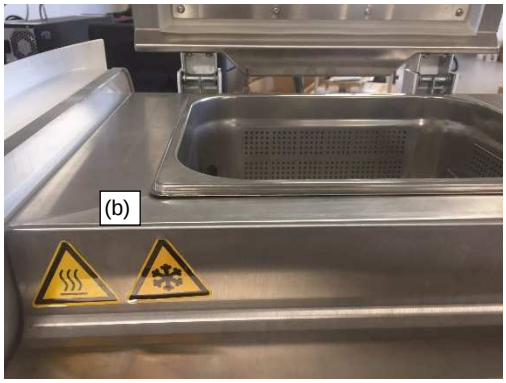
2.2.2. Protection

Wearing PPE overalls , glasses is recommended when the machine is used, as well as the gloves, notably during the unloading stages.

The danger pictograms on the machine identifying the potential dangers:

- Electric during connection (a)
- Burning (hot or cold) during operations in the tank (b)
- Burning (cold) at the level of the connection of the nitrogen circuit after the cycle (c): N.B. The disconnection to change the nitrogen source is not at the back of the machine but directly to the source.





All this information is recalled by the Cryo Bio System After Sales Service during the installation of the machine and training of the users.

2.3 Transportation and storage

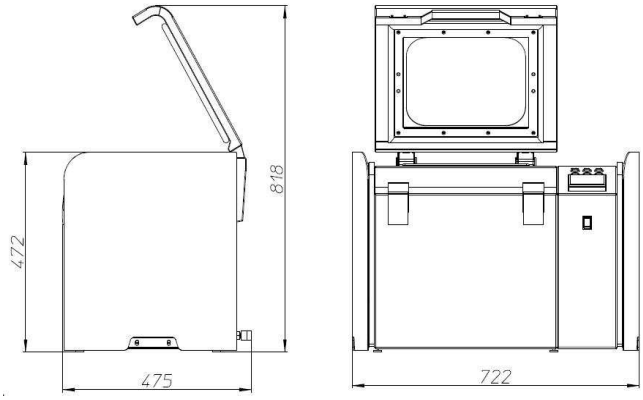
Unplug the unit from the power source.
Store and transport the unit and its accessories in the original packaging to prevent any damage.
Store the unit in a dry place.
Avoid any shocks or jolts while transporting the Nano Digitcool device.

Important, the unit must not be moved during use.

• 3 - Technical specifications

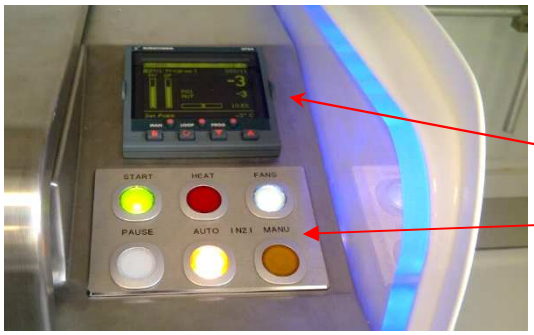
3.1 Overview

Container



Container dimensions:
Ext. L: 722 mm x w: 475 mm x h: 472 mm
Weight: 63 Kg
Container volume: 11.5 litres

Console

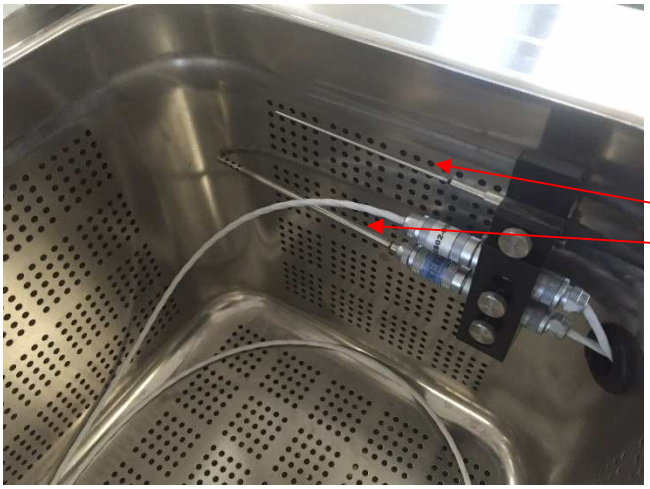


Equipped with:

- A plug-in EUROTHERM 2704 controller

- Luminous control buttons

Inside of the tank



Fitted:
- Product sensor
- Sensor

3.2 Power sources

❒ *- Electrical power:*

⇨ *Power circuit: 230 VAC 50-60Hz – 2.7 A*

⇨ *Low-voltage circuit: 12VDC – (LEDs and Bluetooth module)*

❒ *- Cooling fluid:*

⇨ *Liquid nitrogen under pressure of 0.8 to 1.2 bar*

3.3 Standardisation/regulations

Complies with standards:

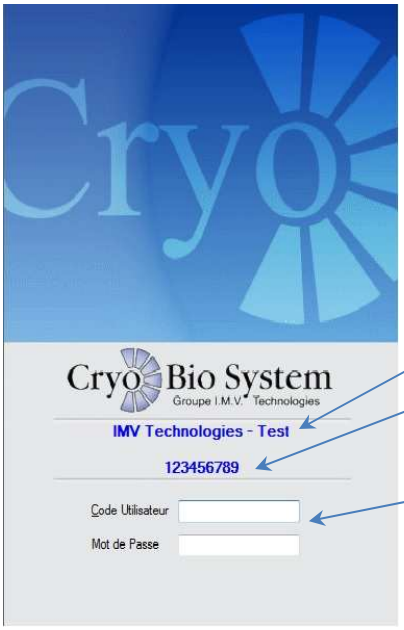
- “Low voltage” Directive 2006/95/EC
- "EMC" Directive 2004/108/EC
- Electrical safety standard EN 61010-1
- EMC standard EN 61326

• 4 - Cryobiosoft control and supervision software

CRYOBIOSOFT software program was developed for controlling CBS freezers. See the software guide (IFU-000026) for instructions on its use.

The main functions of the software are:

- To programme a freezing operation simply and very rapidly.
- To store all the programming curves = save all your freezing protocols.
- In real time, to monitor temperatures within the tank and the control product on the screen,
- To display the graphic representation of the freezing operation: three curves (Product curve, Tank curve, Theoretical curve).
- To analyse these curves by: knowing the coordinates of all the points of the graph, enlarging a section of the curves, extracting the points of a freezing operation in text format for use in Excel for example.
- To store all freezing operations in order to comply with the requirement of absolute traceability under Good Laboratory Practices and adherence to standards and practices (GPL and SOP),
- To print out all the freeziing curves on a colour printer.
- To secure user traceability (profile configurations, passwords, login request for defined tasks, etc.).



Login screen:

Customer ID

Software licence number

User identification by means of username and password associated with a profile configured in the software

• 5 - Accessories and Options

5.1 Accessories

Ref 025433: Tube rack

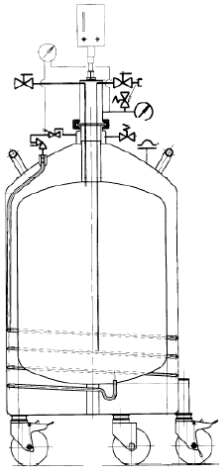
Ref 024572: Straw rack

Ref 025327: Bag rack

5.2 Options

Ref. 020086: Cryo Diffusion self-pressurising drum, 60 litres with capacity gauge, bleed head, hose and wheels.

The most commonly used is the XRP from CRYO DIFFUSION. It is connected to the container by a special reinforced hose equipped with a safety valve set to 3 Kg.



For precise adjustments and use of this pressurised drum, refer to the supplier's instructions.
The operating pressure of the Nano Digitcool is 0.800 bar to 1.2 bar.
The container must have a pressure-reducing valve enabling pressure adjustment.

Example of adjustment for pressure of 1 bar

- Open the "bleed" valve.
- Open the "vent" valve and close it again when the pressure manometer indicates 1 bar.
- Open the pressurising valve.
- Launch the freezing program.

After a few minutes of operation, check the manometer:

a) If the needle rises and exceeds 1 bar (desired pressure for freezing), loosen the lock nut and slightly unscrew the controller screw.

b) Conversely, if the needle descends below 1 bar, slightly tighten the controller screw.

Since the effect of the adjustment is not instant, continue the freezing program for a few minutes to observe and assess the newly adjusted pressure.

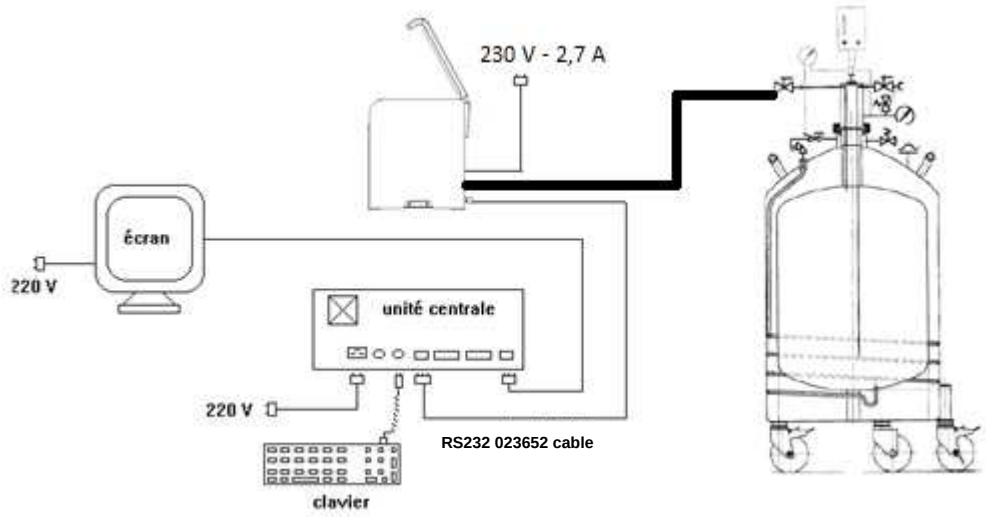
Continue adjusting the controller until the desired pressure is attained.
After adjustment, do not forget to retighten the lock nut adjustment screw.

• 6 - Commissioning

CBS teams install the equiment and train in the use of the nano digitcool.

6.1 Connections

- Plug the device into a 220 V single-phase power socket - N + P + T – 6 A protected by a 0.30 mA differential circuit.
- Attach the nitrogen supply hose to the connector located on the rear and at the bottom of the container, and connect it to the self-pressurising source (see chapter 4.2 for more details).
- Connect the Nano Digitcool to the computer control system using the RS232 (023652) cable provided for this purpose.



6.2 Start-up

- Switch on the control console by pressing the ON/OFF button on the front panel of the Nano Digitcool.
- Open the pressurising valve and check the tank pressure.

USE: at a pressure of 1 bar

As the pressure is set to 1 bar, you do not need to operate the regulator setting:

1. Open the "bleed" valve and check the tank pressure
2. Open the "vent" valve and close it again when the pressure manometer indicates 1 bar
3. Open the pressurising valve

- Close the freezer cover
- Engage the automatic switches: ventilation (FANS), nitrogen (AUTO N2), heating (HEAT)
- The container will be automatically regulated at the temperature indicated by the programmer (by default, 20 °C).
- Launch the computer supervision (refer to the CryoBioSoft software user guide (IFU 000026))

Close the bleed valve and the pressurising valve after you have used them.

6.3 Backup mode without computer supervision

Important: this mode must only be used when there is a computer fault, as part of the functions are provided by use of the software interface, particularly traceability, data recording, etc.
The program used during the last freezing operation is automatically stored in the 2704 controller. It is therefore possible to restart it using the START button (on the box and on the front panel of the Nano Digitcool).

- Launch the program by pressing the **START** button.
- The program may be interrupted at any time by pressing the **PAUSE.**
- To resume the program following an interruption, press **START** again.
- Allow the program to run normally.
- When attainment of starting temperature is complete, release the AUTO N2, HEAT and FAN buttons – wait for 30 seconds.
- Once the fan has completely stopped, open the lid and load the samples.
- Position the control sensor in the sample.
- Introduce the products to be frozen.
- Close the lid of the freezer and engage the FANS, AUTO N2 and HEAT buttons.
- The temperature will adjust to the programmed starting temperature – wait for it to stabilise.
- Restart by pressing **START.** The program will run normally. When the final temperature is attained, an audible signal indicates the pause for removal of the samples.
- Release the AUTO N2, HEAT and FANS buttons – **Wait for 30 seconds to avoid nitrogen vapours when the tank is opened.**
- Open the lid and recover the samples.
- Once this operation is complete, close the lid, re-engage FANS, AUTO N2 and HEAT, and restart the cycle by pressing **START.**
- The device automatically enters the heating cycle.
- The programmer automatically returns to the "Segment 1" starting point, bringing the temperature to +20° C and regulating it there.

At this stage, the freezer is once again ready for another freezing cycle.

• 7 - Cleaning and maintenance

7.1 Precautions

The machinery must be turned off for all maintenance operations.
In the event of an accident, Cryo Bio System cannot be held liable under any circumstances.

Wear personal protective equipment such as gloves, lab coat and safety glasses at all times when handling samples.
Comply with the manufacturer's precautions when handling cleaning and decontamination products.

7.2 Cleaning the device

The Nano Digitcool requires cleaning, but must not be submerged in water.

 Non-removable parts of the equipment must only be cleaned with the device switched off and its electrical power supply disconnected.

Never soak non-removable components by applying excessive quantities of liquid.
Do not use products containing concentrated acids or corrosive products.
Do not use solvents.
In case of doubt, contact the manufacturer.

- Clean with a non-woven wipe soaked in a product designed for cleaning laboratory instrument surfaces.
- Rinse with a cloth soaked in water.
- Dry with a cloth leaving no particles after wiping, which may be soaked in alcohol.

Important: when cleaning the inside of the tank, take care not to damage the sensors.

7.3 Cleaning the accessories

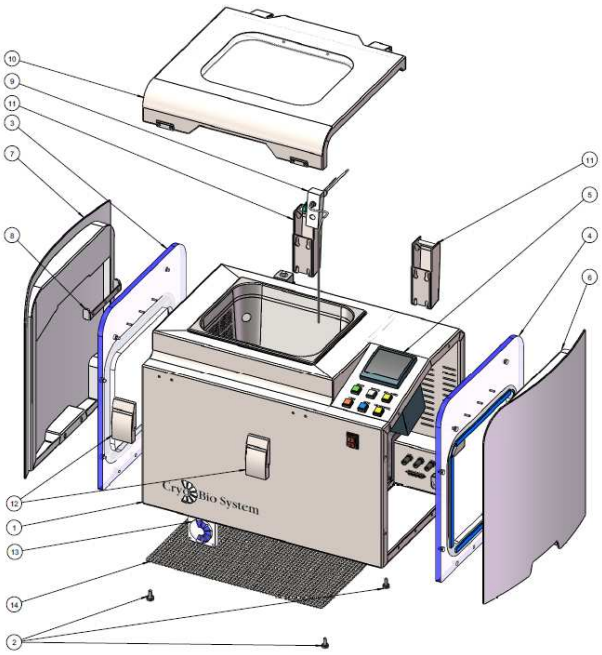
- Take the accessories out of the freezer and follow the same recommendations as above.

7.4 Maintenance

Maintenance operations must only be carried out by staff previously trained and authorised to do so by the CBS After Sales Service.
They notably include checking the connectors, fan, safety units, sensors, etc.
The solenoid valve (ref. 003126) is a sensitive device which must be replaced once a year.
Contact Cryo Bio System's After Sales Service: **+33 (0)233 346 444**

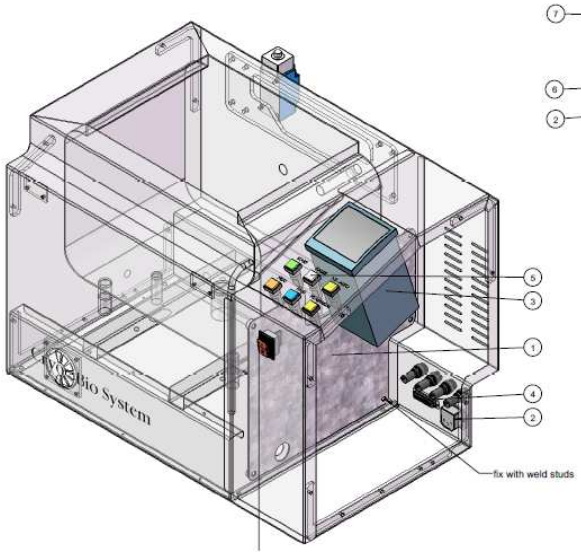
• 8 - Exploded views and components list

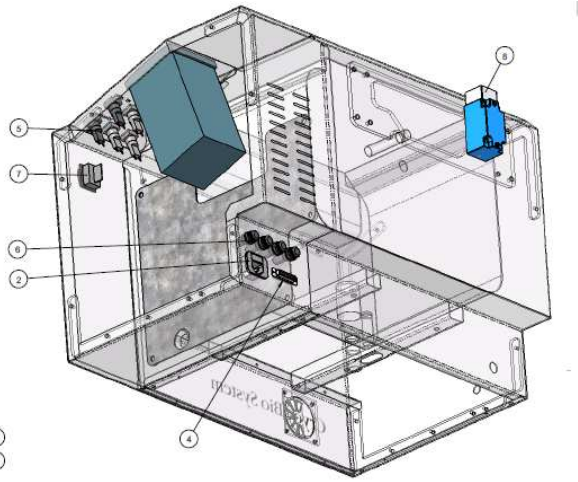
View 1: hooding



ITEM NO.	PART NUMBER	Default/QTY
1	122403281218-zone refroidissement	1
2	122403301117-pootje	4
3	122403200826-lichtplaat links	1
4	122403191526-lichtplaat rechts	1
5	122403251342-partie électrique	1
6	122403261531-protection droite	1
7	122403261656-protection gauche	1
8	122403251608-haak rechts	2
9	122403191127-detectieblokje-assy	1
10	122403091559-couvercle-assy	1
11	122403201358-charnière base	2
12	122403201553-crochet	2
13	122403201317-logoverlichting	1
14	122403251103-grille inférieure	1

View 2: electrical units





ITEM NO.	PART NUMBER	QTY.
1	122403261401-partie électrique montage	1
2	122403191041-Toestelstekker male + fuse	1
3	122403220929-eurotherm 2704 regelaar	1
4	9215F-ND DB15 Female	1
5	122403191149-drukknop	6
6	122403191310-zekeringhouder	4
7	122403201640-hoofdschakelaar	1
8	122403201355-eindeloopschakelaar	1

Components list

REPERE	FOLIO	DESIGNATION	CODE IMV
		BARRETTE DE JONCTION A RESSORT	017072
		BARRETTE DE JONCTION ORANGE 4 POLES	017073
		BORNES WEIDMULER 1.5 BLA	001356
B	05	CORPS DE BOUTON PAS A PAS IP40 FIXATION CALOT CARRE 60V	018474
B	05	VOYANT BLANC MIDGET T1 3/4 28VDC-40mA DIAM:6x16mm	001494
B	05	CABOCHON ORANGE DE BOUTON A IMPULSION TETE CARRE 18mm	018705
B	05	ELEMENT CONTACT 2O+2F	019679
F5/F6	03	FUSIBLES 5x20 10A TEMPORISE	2x017337
C	03	SURTENSEUR HAGER	008176
C2	05	CONDENSATEUR 0.3uF 230V/60V	001284
C3	06	CONDENSATEUR 0.3uF 230V/60V	001284
C6	06	CONDENSATEUR 0.3uF 230V/60V	001284
C5	06	CONDENSATEUR 0.3uF 230V/60V	001284
C8	06	GEMOVE 275L 20	014104
C1	04	CONDENSATEUR 0.3uF 230V/60V	001284
D	05	RELAIS STATIQUE 45A REF 240D45	001610
E	04	CORPS DE BOUTON PAS A PAS IP40 FIXATION CALOT CARRE 60V	018474
E	04	ELEMENT CONTACT 2O+2F	019679
E	04	VOYANT BLANC MIDGET T1 3/4 28VDC-40mA DIAM:6x16mm	001494
E	04	CABOCHON JAUNE DE BOUTON A IMPULSION TETE CARRE 18mm	018704
R2	07	SONDE PT100	
F1	03	PORTE FUSIBLE T20 00311801 + 00311811	001511
F1	03	FUSIBLE 5x20 8A TEMPORISE	001047
F2	03	PORTE FUSIBLE T20 00311801+00311811	001511
F2	03	FUSIBLE ACTION TEMPORISEE 5x20 - 2AT	001045
F3	03	PORTE FUSIBLE T20 00311801+00311811	001511
F3	03	FUSIBLE ACTION TEMPORISEE 5x20 - 2AT	001045
SC	04/06	CORPS RUPTEUR POUSSOIR OF 1ENCL ZXKJ2	001597
SC	04/06	TETE RUPTEUR EN HAUT	001298
Y1	04	VANNE B263 B209 LT 220-50/60HZ	003126
R3	07	SONDE PT100 CABLES	001657
F4	03	PORTE FUSIBLE T20 00311801+00311811	001511
F4	03	FUSIBLES ACTION RAPIDE 5x20mm - 3.15A SERIE F1	001053
H	04	CORPS DE BOUTON A IMPULSION IP40 FIXATION CALOT CARRE 60V	018475
H	04	ELEMENT DE CONTACT O+F POUR BOUTON A IMPULSION	001581
H	04	CABOCHON JAUNE DE BOUTON A IMPULSION TETE CARRE 18mm	018704
L	04	CONTACTEUR 25A 2 POLES 220V	001591
L	05/06	CONTACT AUXILLIAIRE O+F	019678
M	06	SIRENE 230V AC 2 TONS	003152
N	06	CORPS DE BOUTON PAS A PAS IP40 FIXATION CALOT CARRE 60V	018474
N	06	VOYANT BLANC MIDGET T1 3/4 28VDC-40mA DIAM:6x16mm	001494
N	06	CABOCHON CARRE BLEU DE BOUTON A IMPULSION IP40	018627
N	06	ELEMENT CONTACT 2O+2F	019679
P	06	CORPS DE BOUTON A IMPULSION IP40 FIXATION CALOT CARRE 60V	018475
P	06	ELEMENT DE CONTACT O+F POUR BOUTON A IMPULSION	001581
P	06	CABOCHON BLANC DE BOUTON A IMPULSION IP40 CARRE	018626
P1	03	EMBASE SECTEUR 2xPORTE FUSIBLES	017078
R	07	REGULATEUR EUROTHERM 2704	017442
S	06	CORPS DE BOUTON A IMPULSION IP40 FIXATION CALOT CARRE 60V	018475
S	06	ELEMENT DE CONTACT O+F POUR BOUTON A IMPULSION	001581
U1	03	ALIMENTATION 24V DC 4A 6EW 1380-1AB	
S	04	CABOCHON CARRE VERT DE BOUTON A IMPULSION IP40	018702
U2	03	ALIMENTATION 12V DC 1,3A HL 15.121	
C4	06	CONDENSATEUR 4µF POUR VENTILATEUR MINI MICRO DIGIT COOL	001283
I	03	INTERUPTEUR A BASCULE BIPOLAIRE 16A	016332
E1/E2	05	2X RESISTANCE 500W	
M	06	VENTILATEUR 115W R2E 180 AH 0520	001291

• 9 - Important information

9.1 Orders

For all spare parts orders, please refer to paragraph 8 of this guide, “Exploded views and components list”.

9.2 Terms of guarantee for new equipment

Cryo Bio System guarantees its equipment against all malfunctions caused by faulty material, manufacturing defects or design errors for one year from the date specified on the guarantee certificate.
Parts and services are free of charge during this period.
Any malfunction must occur within twelve months of the effective warranty date and while using the equipment in strict accordance with these operating instructions.

The guarantee excludes the following:

- Malfunctions caused by an unauthorised procedure on the unit.
- Malfunctions caused by a failure to comply with the technical specifications and these operating instructions.
- Malfunctions caused by a situation of force majeure.

Based on the above guarantee, Cryo Bio System shall repair or replace parts that become unusable during the guarantee period for reasons outlined above.
The implementation of this warranty, i.e., the repair and replacement of all or part of the delivered equipment, is not liable to extend the warranty period.
Any dispute arising from the interpretation and/or execution of these warranty conditions shall be subject exclusively to French law. The Courts of Alençon shall be the only courts of competent jurisdiction; this also applies to the introduction of third parties and multiple defendants.

9.3 Exclusion of liability

Cryo Bio System is not liable for damages caused by outside influences or any inappropriate handling and use that do not comply with the recommendations stipulated in these operating instructions.
Please refer to the fields of application (see 2.1 Applications) and the electrical specifications (see 2.2 Protection and safety and 2.3 Set-up requirements and safety) in this guide.

9.4 Contact

Cryo Bio System
ZI n°1 Est
61300 L'Aigle - FRANCE
Tel. +33 (0)233 346 464
Fax +33 (0)233 341 198
After-sales service Tel.: +33 (0)233 346 444
Fax +33 (0)233 849 504
contact@cryobiosystem-imv.com

CE 0459

Notes: