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1 Introduction

This user manual contains all the information required on unpacking, installing, operating, and maintaining the CRYOLYS.

The technical specifications of the product and the following information may change without prior notice.

1.1 Safety information and recommendations

User manuals for the CRYOLYS cooling system and PRECELLYS[®]24 must be read carefully by the user before operating the product.

In case of any doubt about the safety of the equipment, please contact the local distributor.

1.1.1 Risk of electric shock

Although the appliance is perfectly safe, users must be aware of the potential risks associated with handling liquids near an electric power supply.

In the event of a liquid being accidentally spilt, the appliance must be immediately switched off by unplugging the main power lead, even if the appliance is running. The appliance must then be dried and the spilt liquid wiped up.

Do not plug the appliance in until it has been checked.

1.1.2 Incorrect operation

Operating the equipment in other ways than those detailed in this user manual may alter the protection given by the appliance.

- Do not tilt the equipment : the CRYOLYS must always stand on its four feet. Failing to do so could damage its internal components, break its plastic shell or cause liquid nitrogen to be spilt.
- Do not operate the unit when the shell is partially or entirely removed or when it is damaged.
- Do not install unauthorised cards, components or accessories as this may alter the protection given by the appliance and cancel the warranty.
- **Do not** overfill the tank with nitrogen (see 5.1 Start-up procedure)
- **Do not** transport the unit before emptying the nitrogen tank completely.
- Do not transport the unit in packaging which is different from the original one.
- Do not supply the unit with air pressure which is different from the specified one.
- **Do not** use gas which is different from the specified one.
- Do not use a power adapter which is different from the one supplied with the CRYOLYS.

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Bertin Technologies is not responsible for any damage or injuries which may occur as a result of operating the unit in a way other than that specified in this document.

1.1.3 Biological risks

Individual protective equipment (IPE) must be worn when cleaning parts which have been contaminated by biological samples, for instance, the inside of the diffusing bowl.

See PRECELLYS[®]24 user manual.

1.1.4 Risks associated with liquid nitrogen



Figure 1 : Risk of asphyxiation



Figure 2 : Risk of burns



Figure 3 : Protection of eyes and face



Figure 4 : Protection of hands and skin

Liquid nitrogen is a colourless, odourless, highly refrigerated gas (around -196°C). The main risks associated with the handling of this product are asphyxiation and burns. To protect against projections and asphyxiation risks the operator must wear equipment which protects the eyes, face and skin, store and use the liquid nitrogen in an aerated location.

It is advised to have the safety instructions to hand about the risks and precautions associated with the utilization of liquid nitrogen.

1.1.5 Risks associated with compressed air

Do not disconnect the in and out airflow pipes when they are under pressure.

Do not apply a pressure of more than 8 bars (116 PSI) as this may damage the internal components of the cooling system.

1.1.6 Mechanical risks



Figure 5 : Risk of pinching

The diffusion bowl may close itself. It is advisable to hold it open by hand for any operation requiring it to be opened. Otherwise, it is advised to shut the bowl.

1.1.7 Safety sign



Ne pas ouvrir le capot lors du fonctionnement. Do not open the cover while running.

Respect the instructions associated with these signs.

Only staff authorised by the distributor or the manufacturer are authorised to repair the equipment.

1.1.8 Noise level

In normal operating mode the appliance has a noise level below 70 dBA.

1.1.9 Intensive operating mode

When the appliance is operated intensively (frequent filling of liquid nitrogen, successive cycles), frost can block the air exit holes on the cover and prevent proper cooling of the tubes. In such cases the nominal operational mode is no longer guaranteed.

1.2 Warranty

Bertin Technologies certifies that this product is free from defects at time of shipment.

This warranty is limited to a period of one [1] year.

This warranty does not cover the following circumstances:

- If the unit has not been installed, operated or maintained according to the instructions described in this user manual.
- If the unit has been repaired or modified by unauthorised personnel.
- If the unit's serial number has been damaged or removed.

1.3 Appliance reference details

Appliance code : CRYOLYS 05068.200.RD000

1.4 Manufacturer's address

BERTIN TECHNOLOGIES Parc d'activités du Pas du Lac 10 bis, avenue Ampère 78180 Montigny le Bretonneux France Tél : +33 (0)1 39 30 60 00 Fax : +33 (0)1 39 30 61 85 e-mail : precellys@bertin.fr

1.5 Technical support.

Should a problem occur, please contact the local distributor.

2 Description of the CRYOLYS

2.1 Product overview

The CRYOLYS is an appliance whose purpose is to cool biological samples during the PRECELLYS[®] lysis and homogenization in order to protect them from excessive heating. The PRECELLYS[®] tubes holder can be partially or entirely equipped with tubes.

The main advantages of CRYOLYS:

- It keeps samples at a temperature which is below 30°C during homogenization.
- It protects temperature-sensitive molecules from degrading.
- ✤ It is compatible with the lysis and homogenization product, PRECELLYS[®]24.

The CRYOLYS cooling system is as follows :



2.2 Generating cold conditions

Cold air is generated continuously and independently of the $\ensuremath{\mathsf{PRECELLYS}}\xspace^{\ensuremath{\mathbb{R}}\xspace}$ 24 working cycles.





2.3 Settings

The user can opt for one of three different air flow rates by activating the front switch.

The user will determine the optimal air flow rate to use according to the reaction to heat of samples as well as the PRECELLYS[®]24 usage settings.

- Number of cycles,
- Pause time,
- Rotation speed,
- Number of tubes.

2.4 Control Panel

The control panel consists of a knob which can be turned to 3 different positions and an ON / OFF switch.

It is important to select the right position for the outflow before switching on the CRYOLYS.



Figure 8 : Control panel in position 01 - OFF

Technical Specifications							
Voltage	230 V – 50 Hz (standard Europe)	With the adapter supplied					
Consumption	<15 VA						
Physical Specifications							
Width	278 mm						
Depth	408 mm						
Height	311 mm						
Weight	11 kg						
Temperature for use	15-30°C						
Humidity	15-85 % HR						
Altitude	< 2000 m						
Air supply tube (not provided)	Recommended : Flexible PVC tube with an internal diameter of 10 mm, supporting up to 8 bars (116 PSI) of pressure, which should be attached using a tightening collar						
Operating Requirements							
Air outflow	70 – 90 – 110 l /min at 20°C and 1 ATM						
Pressure of compressed air source	From 5 to 10 bars relative (73 PSI to 150)						
Clean and dry compressed air	Purity 99,99%, water < 5ppm						
Liquid nitrogen tank	2 liters max						
Liquid nitrogen consumption	About 1 liter / 5 min						
User Interface							
Air outflow switch	3 position knob						
Switch	ON / OFF	Led switched on when ON, Led switched off when OFF.					

2.5 Technical Specifications

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3 Transport / Storage

3.1 Transport

Avoid violent shocks that may damage the equipment.

Before transporting the equipment, the following actions should be done:

- 1. Remove the CRYOLYS cover.
- 2. Check that the tank does not contain any liquid nitrogen.
- 3. If there is, it should be left open until the liquid nitrogen has completely evaporated.
- 4. Ensure that there is no dampness, especially around the power connection.
- 5. Otherwise, dry the damp areas with a dry cloth.





3.2 Storage

The equipment must be stored in a dry area at a temperature of between +0°C and + 50°C on its four feet.

The equipment can be stored after checking the following:

- 1. The tank is empty.
- 2. The power lead is unplugged.
- 3. The equipment is dry, clean and decontaminated.

4 Installation

WARNING :

Do not connect the unit to the main supply before installation has been carried out.

Do not tilt the unit: The cooling system should always rest on its four feet. Failure to do so could damage the internal components or the plastic shell.

4.1 Unpacking

- 1. Check the contents of the box is as follows :
 - 1 user manual (French/English)
 - 1 CRYOLYS (cooling system, bowl)
 - 1 diffusion bowl with 2 screws
 - ✤ 1 mains lead and adaptator
 - 1 thermometer (probe and display)
 - 1 AC power cord
 - 1 EC certificate
 - 1 manufacturer's inspection certificate.

Should some parts be missing when delivered, please contact your local distributor immediately.

- 2. Take out the diffusion bowl, thermometer and power lead.
- 3. Take the CRYOLYS carefully out of its box and install it on a clean, horizontal, stable worktop near the PRECELLYS $^{(\!R\!)}$ 24.

WARNING :

When removing the unit from its box, do not lift it up by the copper coil or by the flange of the tank. The unit must be handled using the slots located at the bottom and on the side of the shell. Slots are also available on the protective foam.



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- 4. Check the external parts of the unit. Any defect should be reported immediately to the delivery company.
- 5. Keep the original packaging, protective foam and manual : these items will be required for transport.

* An adapter or appropriate lead (not supplied) will be needed for use with any non-standard European electrical plug.

4.2 Installation and connection

When purchasing a PRECELLYS[®]24 and CRYOLYS unit at the same time, see chapter entitled 4.2.2 Pneumatic connection. When a CRYOLYS unit is purchased to complement a PRECELLYS[®]24, follow the instructions described in chapter entitled 4.2.1 Installation of the diffusion bowl.

4.2.1 Installation of the diffusion bowl

- 1. Unpack the diffusion bowl.
- 2. Unscrew the 2 screws of the PRECELLYS[®]24 cover using a n° 6 Allen key.



- 3. Remove the original cover.
- 4. Position the diffusion bowl.

WARNING :

Use the 2 provided screws only.

- 5. Screw at a torque of 2 Nm the 2 screws on the cover using a dynamometric key.
- 6. Switch on the PRECELLYS[®]24.
- 7. Start a grinding cycle.
- 8. Open the cover slightly and check that the $\mathsf{PRECELLYS}^{\$}24$ stops to check the correct "Top Alarm" release.

WARNING :

When the unit is ON, do not stop the PRECELLYS[®]24 by opening the cover.

WARNING :

Please keep the packaging.

Also, please keep the foam protection. This protection must be re-used for transporting the equipment. Should a unit be returned to the distributor or manufacturer without this protection the warranty will be void.

4.2.2 Pneumatic connection

Dry air is required to use the CRYOLYS unit: purity 99.99%, water content < 5%. Connection of the supply pipe with air from the cooling system:

- 1. Use an air supply pipe adapted to employed pressure (pipe not provided)
- 2. Fix a clamp on to the air supply pipe (not provided).
- 3. Fix the pipe onto the grooved connection (\emptyset external 10 mm) so that the connection is completely covered.
- 4. Position the collar in the middle of the connection.
- 5. Firmly tighten the collar with a screwdriver.



Connection of the cooling systems's air outlet to the PRECELLYS $^{(R)}$ 24 diffusion bowl:

1. Position the CRYOLYS and the PRECELLYS $^{(R)}$ 24 so that the flexible tube can connect them without being too tight or slack.





- 2. Unscrew the adaptator at the other end.
- 3. Screw the adaptator on the air intake of the diffusion bowl.



4. Screw the flexible tube on the connection and tighten it with a n° 22 wrench. The user should use another wrench to secure the fixed parts.





4.2.3 Electrical connection

Connect the CRYOLYS unit to the socket using the power cable provided.

WARNING:

Do not connect the CRYOLYS unit with a different power cable to the one supplied.

4.2.4 Installation of the thermometer

- 1. Unpack the thermometer.
- 2. Insert the probe into its shell until it emerges in the bowl
- 3. Fix the probe with the thumb screw.
- 4. Place the display unit on the metal plate of the bowl.

Probe

Magnetic display

Thermometer tightening screw





Probe

Figure 9 : Temperature probe positioning, inside and outside view

5 Instructions for use

All installation procedures must be carried out before using CRYOLYS.

5.1 Start-up procedure

The start-up procedure should to be carried out where the last use of the CRYOLYS was more than 4 hours previously. In which case, it is important to cool the tank.

- 1. Wear individual protective equipment (IPE), as previously described.
- 2. Pour enough liquid nitrogen into the tank to immerse the highest spiral of the coil. The purpose of this procedure is to cool the tank.
- 3. Put the cover on the tank.
- 4. Wait for the nitrogen to evaporate (approx. 5 min).

WARNING :

Do not inhale nitrogens fumes

5.2 Preparation of the cooling system

- 1. Check that the switch is in the OFF position and that all connections are correct (electrical connection and pneumatic connection).
- 3. Set up the controls on the PRECELLYS[®]24 so that the next touch on the Valid key starts the cycle (see PRECELLYS[®]24 User Manual).
- 4. Close the PRECELLYS[®] 24 lid.
- 5. Select the outflow on CRYOLYS using the adjustment button at the front.

WARNING:

Do not apply pressure greater than 10 bars (145 PSI), otherwise the internal components of the cooling system may deteriorate.

5.3 Running a cycle

- 1. At the end of the start-up phase, re-adjust the amount of liquid nitrogen in the tank so that the highest spiral of the serpentine is immersed. The nominal consumption of nitrogen is 1 litre for 5 minutes of operation.
- 2. Put the cover on the CRYOLYS.
- 3. Put the switch in the ON position so that the led is on. The cold air is diffused over the tubes.
- 4. Press the PRECELLYS [®] 24 "Valid" button when the displayed temperature on the thermometer reaches 10°C. The cycle will start.

WARNING:

Do not to open the PRECELLYS[®]24 cover while the switch is on or the cooling system is being supplied with air.

- 5. At the end of a PRECELLYS[®]24 cycle, turn the CRYOLYS switch to the OFF position.
- 6. Open PRECELLYS[®]24's lid and take out the tubes using gloves.

5.4 Running a sampling sequence

If the last use was less than 4 hours ago, release operations from chapter "5.2 Preparation of the cooling system". Start up procedure is not necessary.

If the last test finished more than 4 hours ago, restart operations of chapters "5.1 Start-up procedure", "5.2 Preparation of the cooling system" and "5.3 Running a cycle".

5.5 End of cycle

If you don't want to realize another run:

- 1. Allow the nitrogen to evaporate or suck it up using suitable equipment.
- 2. Wipe out the white frost and water using a cloth (flexible tube, flange of tank, inside of diffusion bowl...).
- 3. Switch off the thermometer.

WARNING:

Avoid any direct skin contact with the cold parts of the PRECELLYS $^{\ensuremath{\mathbb{R}}}$ 24 and the CRYOLYS.

Do not heat the nitrogen using a hairdryer or similar object to speed up the evaporation process.

Handle equipment with suitable gloves whilst the tank contains liquid nitrogen.

6 Maintenance / Preventative maintenance

6.1 Troubleshooting

The following table provides a list of the principal problems encountered when the equipment is in operation and the action(s) to be carried out :

Problem encountered	Possible Cause	Action(s) to be carried out	
	There is no voltage.	 Check the power source. Check the lead between the unit and the main. 	
The air does not reach the diffusion bowl	The cooling system is not supplied with air.	 Check that the air source is open. Check that there is no leak along the flexible tube. 	
	The diffusion holes are obstructed.	 Wait for diffusion bowl de-icing. If malfunction persists, contact technical support. 	
The Led of the switch does not	There is no voltage.	 Check the power source. Check the lead between the unit and the mains. 	
come on.	The Led is defective.	 Turn off the power. Contact technical support. 	
Electrical power cut off	-	Switch off the air supply.	
One or several outflows do not work.	One or several electro valves are defective.	Contact technical support.	
Lower	The diffusion holes are obstructed.	 Wait for diffusion bowl de-icing. If malfunction persists, contact technical support. 	
the system.	The outflow control valves are disturbed.	Contact technical support.	
	The thermometer is defective.	Contact technical support.	

6.2 Cleaning and decontamination

6.2.1 Recommendations

The external cover of the appliance can be cleaned with a sponge or wet cloth which has been soaked in water or alcohol.

WARNING:

For safety reasons and so as not to damage the appliance, please follow the following recommendations:

- Do not allow the equipment to be splashed or sprinkled with fluids, particularly the electrical connector.
- Cleaning must always be carried out with the appliance disconnected.
- Do not use a sponge-scraper as this may damage the equipment.
- Do not use acetone or sodium.
- Do not subject the appliance to an air decontamination process.

6.2.2 Example of decontamination procedure

Should splashes occur, the parts likely to be contaminated by infectious agents must be decontaminated using a suitable disinfectant.

The user is solely responsible for choosing the decontamination procedure.

Parts of the equipment likely to be contaminated may, for example, be cleaned with a cloth soaked in diluted bleach at 6° Cl.

Should a different decontamination procedure be required, please contact the technical department beforehand in order to check that the procedure is compatible for use with the equipment.

Manufactured by:

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