C3-20 Chiller

User manual



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1. Safety information

Definitions of warning words and symbols

The safety information in this manual is very important to prevent personal injury, damage to the instrument, malfunctions or incorrect results due to failure to comply with it. Read this manual carefully in its entirety and familiarise yourself with the instrument before putting it into operation and starting to work with it. This manual must be kept near the instrument so that the operator can consult it when necessary. Safety precautions are indicated by warning terms or symbols.

Warning terms:

CAUTION Indicates a hazardous situation that could result in minor or moderate injury, serious injury or death if not avoided.

NOTICE For important information about the product.

NOTES Useful information.

Warning symbols:



DANGER
This symbol indicates an **imminent danger** situation which, if not avoided, could result in death or serious (irreversible) injury.



WARNING
This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury (irreversible).



CAUTION
This symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury (reversible).

NOTICE
This symbol draws attention to possible damage to the instrument or instrument parts.



NOTES
This symbol identifies useful information about the product.



Pictograms

This manual contains various symbols identifying hazards, prohibitions and obligations, as illustrated below.

Danger symbols

	**Risk of electric shock**
	**Explosion hazard**
	**Fire hazard**
	**Poisoning hazard**
	**Danger of overheating surfaces**
	**Danger of damage to health caused by toxic substances**
	**Risk of injury caused by falling objects**
	**Risk of injury caused by lifting heavy objects**
	**Risk of environmental damage**
	**Risk of corrosion**

Prohibition symbols

	**Do not wet with water**

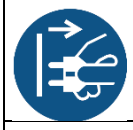
Mandatory symbols

	**Disconnect the instrument from the power supply by pulling the plug**
	**Eye protection must be worn**

2. General safety instructions

If the thermocryostat is not installed, commissioned, cleaned, adjusted or calibrated correctly, there is a risk of malfunction that could cause physical injury to persons and damage to the instrument and samples. Therefore, the thermocryostat must only be installed, commissioned, cleaned, adjusted and calibrated by qualified personnel.

<table>
<tr><th colspan="2"> DANGER</th></tr>
<tr><td>

</td><td>Risk of electric shock and risk of death
x Do not wet the instrument during installation, commissioning or maintenance.
x Do not connect the instrument to the power supply if the side panel or head of the thermocryostat is dented or damaged.

➢ Before opening the side panel or head of the thermocryostat, disconnect the plug from the power supply.
➢ If the power cable, side panel or head of the instrument are damaged, stop using it immediately, unplug it from the power supply and contact your dealer for the necessary repairs.
➢ All work on the electrical components of the instrument must be carried out exclusively by qualified personnel.</td></tr>
<tr><td></td><td>Explosion hazard
➢ Only install the instrument in areas where there is no risk of explosion.

x Do not keep air/solvent mixtures or explosive dusts in the vicinity.
x Never introduce materials into the instrument that are explosive or flammable at the selected operating temperature.
x Never introduce materials containing flammable or explosive solvents into the instrument.
x Never introduce materials into the instrument that, due to sublimation or pyrolysis, give rise to the formation of flammable materials at the selected operating temperature.</td></tr>
<tr><td>
</td><td>Risk of poisoning and risk of death
x Never introduce materials into the instrument whose disintegration could result in the formation of poisonous gases at the selected working temperatures.</td></tr>
</table>

WARNING	
	**Fire hazard** x Thermocryostats must not be used if the class 3.1 safety thermostat has failed the test. ➢ If the safety thermostat test is unsuccessful, immediately stop using the thermocryostat, unplug it from the power supply and contact your dealer for the necessary repairs. ➢ Always place the instrument on a work surface that is resistant to temperatures up to 100 °C. Do not place anything under the instrument (paper, plastic film, etc.). ➢ Always connect the instrument to a power supply with a fuse of at least 10A. Follow the recommendations of your local electricity supplier.

WARNING	
	**Risk of burns** ➢ The lid of the thermocryostat becomes hot and must not be touched while the instrument is in operation. ➢ Use the handle on the cover.
	**Risk of injury and risk of breakage** ➢ Ensure that the surface on which the instrument is placed can support the weight of the thermocryostat and the liquid that will be placed inside it.
 	**Risk of injury, risk of the instrument slipping or tipping over, and risk of damage to the instrument** ➢ The instrument must be lifted by 2 persons. ➢ The instrument must only be transported in its original packaging. ➢ The instrument must always be lifted from below using mechanical equipment (e.g. forklift truck) together with the support pallet. x The instrument must not be lifted directly from below using mechanical equipment without the support pallet (e.g. forklift truck). x The instrument must not be lifted or dragged by pulling on the cover.

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3. CE marking data

Our instruments bear the CE marking. The EU Declaration of Conformity (CE certificate) is available for download on our website. The instruments are designed and manufactured in accordance with Directive 2006/42/EC and the relevant EU Directives/Regulations applicable at the time of placing on the market; compliance with the relevant harmonised standards demonstrates compliance with the essential health and safety requirements.

4. Equipment

The instrument will be delivered complete with the following parts:

1. 2 hose connections (installed on the instrument)
2. Set of two 2-metre hoses complete with insulating material
3. 2 hose clamps
4. User manual

5. Transport

Instructions for safe and eff te transport

CAUTION	
  	**Risk of injury, risk of the tool slipping or tipping over, and risk of damage to the tool** ➢ The instrument must be lifted by 2 persons. ➢ The instrument must only be transported in its original packaging. ➢ The instrument must always be lifted from below using mechanical equipment (e.g. forklift truck) together with the support pallet. x The instrument must not be lifted directly from below using mechanical equipment (e.g. forklift truck) without the support pallet. x The instrument must not be lifted or dragged by pulling on the cover.

Transporting a cryostat that has already been used

1. Switching off the cryostat: Switch off the Argolab cryostat using the main switch.
2. Disconnecting from the power supply: Disconnect the power plug from the electrical socket.
3. Cleaning: Clean the Argolab cryostat thoroughly following the instructions in the chapter on maintenance and cleaning.
4. Removing accessories: If installed, remove the set of tubes or other connected accessories.
5. Drying: Carefully dry the inside of the cryostat and the removed components (e.g. tubes or other accessories).
6. Packaging: Pack the Argolab Cryostat, including accessories, using the original packaging.
7. Protection from contact with liquids: Ensure that the cryostat does not come into contact with liquids during transport.
8. Environmental conditions: During transport, maintain the permitted ambient temperature between -10 °C and +60 °C.

Note: Compliance with the above instructions ensures the correct transport and protection of the Argolab Cryostat.

6. **Storage**

Store the Argolab Cryostat exclusively in closed, dry environments.
The permitted storage temperature is between -10 °C and 50 °C, while the maximum permitted storage humidity is 85% RH in the absence of condensation.

7. Initial installation

Preliminary operations

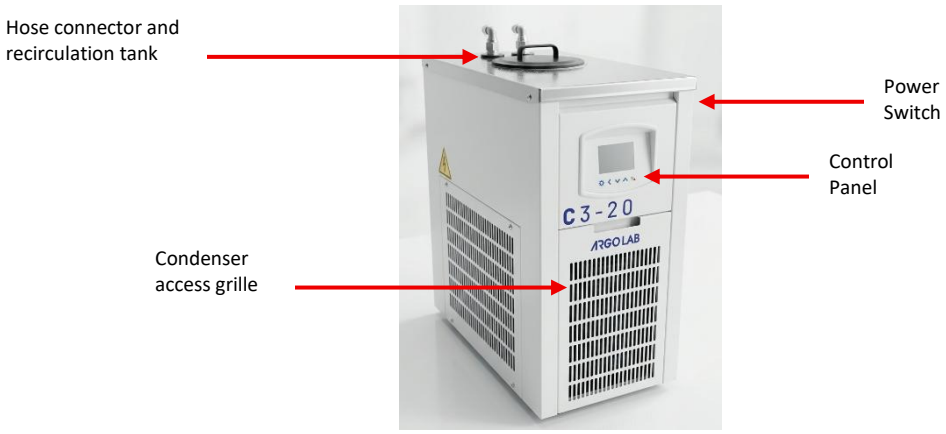
The Cryostat must be installed under the following conditions:

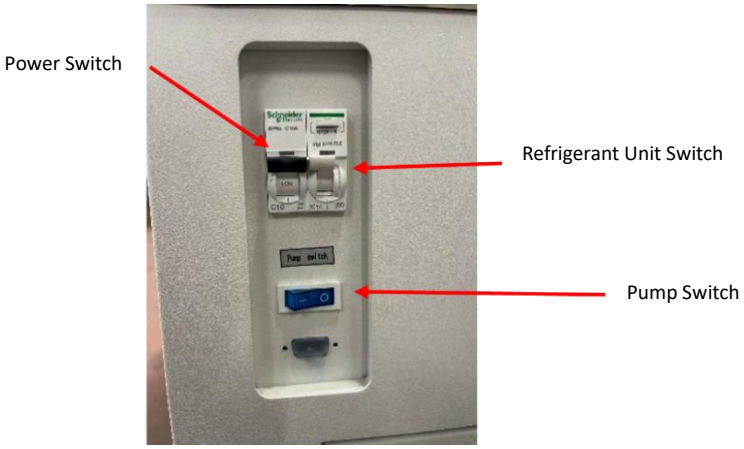
- Stable work surface with a horizontal, dry and clean surface.
- Minimum space of 30 cm on all sides around the instrument.
- Ambient temperature between 5 °C and 40 °C and relative humidity not exceeding 85%.
- Power socket with earth connection.
- Power supply 220-240 V - 50 Hz.

 **WARNING**	
	**Risk of overheating - Damage to the device** Æ DO NOT install appliances in unventilated locations. ➢ Ensure that there is sufficient ventilation to dissipate heat.

 **DANGER**	
	**Risk of explosion and danger of death.** Æ DO NOT operate the device in potentially explosive areas. Æ DO NOT use in environments containing explosive dust or airborne mixtures. Æ DO NOT use open flames near the instrument.

8. Parts of the instrument

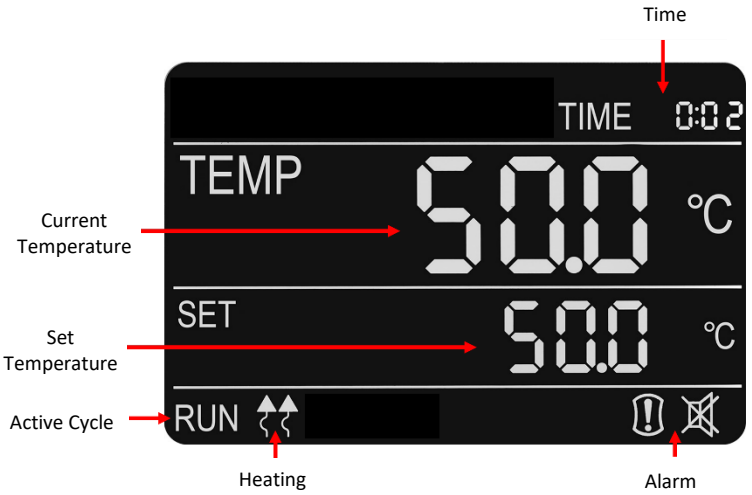


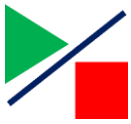






9. Display and controls



CONTROL	DESCRIPTION
	The **SET/PROG** key allows you to set the operating parameters and enter/exit programmes. In combination with the **SHIFT** key, it allows you to access password-protected menus (see paragraph 12).
	The **SHIFT** key allows you to quickly change the digit (decimal, unit, ten, etc.) of the parameter being modified.
	**The adjustment buttons** allow you to increase or decrease the value of the parameter.
	The **START/STOP** key starts or stops a cycle or programme.

10.Technical Specifications

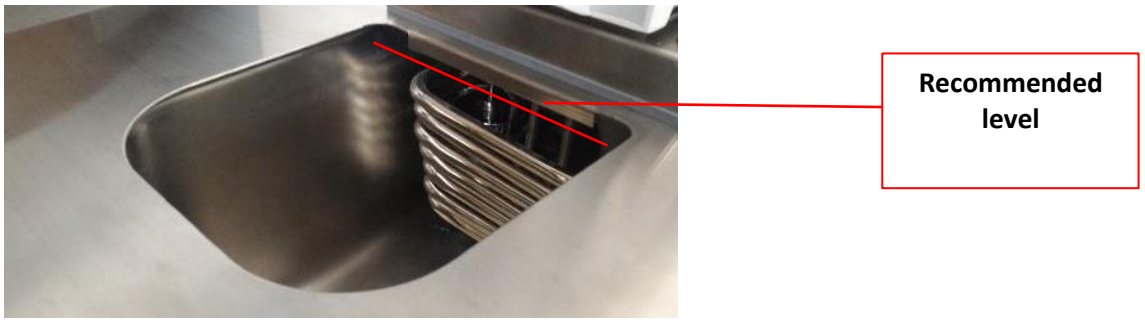
Forced circulation thermocryostat	C3-20
Useful volume	5 litres
Working temperature range / Resolution	From -20 to +20°C
Temperature stability at 20°C	± 2 °C
Recirculation pump	Yes
Timer	99:59 and ∞
Overtemperature protection	Yes
Internal tank dimensions (W x D x H)	240 x 150 x 150 mm
Power supply / Power	220-240 V / 550 W
External dimensions (W x D x H)	511 x 230 x 450 mm
Weight	32 kg

11.Filling the tank

Fill the tank with a suitable thermal fluid, such as demineralised water, mixtures of water and ethylene glycol or pure ethylene glycol. The fluid must have physical and chemical properties suitable for reaching the desired temperature without freezing or becoming excessively viscous. It is important that the liquid level is always at the maximum capacity of the tank or, in any case, sufficient to ensure that the cooling coil remains completely submerged, in order to avoid damage or malfunction.

When using water or mixtures thereof, the natural evaporation of the liquid must be taken into account. For this reason, it is essential to check the level regularly and top up the thermal fluid so that the cooling and heating elements of the instrument are always covered.

IMPORTANT: We accept no responsibility for any damage resulting from the use of a thermal fluid that is unsuitable or does not comply with the specifications indicated.



WARNING	
	**Risk of injury** Æ Never use the instrument without fluid in the tank. ➢ Check the tank periodically to ensure that the fluid level is within acceptable limits. Always fill the tank using the same fluid already present in the tank. Do not damage the coil inside the tank. ➢ If the internal coil is damaged, switch off the instrument and contact the supplier.
WARNING	
	**Risk of injury and fire** ➢ The cryostat is designed to be used exclusively with Class I non-flammable liquids (DIN 12876-1). ➢ Never use the cryostat without first filling the tank with the appropriate fluid. ➢ Pay attention to the chemical risks associated with the fluid used. ➢ Observe all warnings contained in the safety data sheet**.** ➢ Preferably use recommended thermal fluids. Æ DO NOT introduce flammable liquids/materials into the instrument.
DANGER	
	**Risk of explosion and danger of death** Æ DO NOT use explosive mixtures in the cryostat. Æ DO NOT use acidic fluids.

12. Connection of pipes for external circulation

The Argolab cryostat allows an external circuit to be cooled through the appropriate delivery and return connections connected to the tank. The instrument is supplied as standard with 2 quick connectors already installed, 2 flexible hoses, each 2 metres long, complete with insulation and 4 clamps.

To use the external circuit, connect the external system to the cryostat using the tubes supplied and the relevant connectors. Ensure that the tubes are securely fastened to the connectors using the clamps supplied, thus ensuring a stable and secure connection.

NOTE: The circulation pump in the tank is activated by pressing the appropriate switch. The pump ensures continuous recirculation of the fluid within the circuit.

13. Operation

Switching on the instrument

Before connecting the power cable to a power outlet, ensure that the tank has been filled correctly. Then switch on the instrument and the refrigeration unit using the switch located on the side of the instrument, together with the pump switch. When switched on, the display will light up and show the initialisation sequence. At the end of this sequence, the instrument will be ready for use.

Operating temperature

With the instrument switched on, press the **SET/PROG** key once: the set temperature value will start flashing on the display. Use the **adjustment keys** to set the desired value (expressed in degrees Celsius). To scroll quickly through the digits, press the **SHIFT** button, which allows you to move quickly within the value. Once the desired temperature has been set, confirm by pressing the **SET/PROG** button again.

Operating time

After confirming the temperature value, the last set time value (timer) will start flashing on the display. Use the **adjustment keys** to set the desired time in hh:mm format. To move quickly between digits, you can use the **SHIFT** key.
Once you have selected the desired value, confirm by pressing the **SET/PROG** button again.

NOTE: By setting the value to "00:00", the instrument will enter continuous operation mode. In this mode, once the cycle has been started using the **START/STOP** key, the system will maintain the set temperature until it is stopped manually by pressing the **START/STOP** key again.
If, on the other hand, a defined time value is set, for example 1:00 (1 hour), the instrument will reach the set temperature and maintain it for the specified period. At the end of the set time, the operating cycle will stop automatically.

Starting/stopping the operating cycle

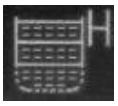
After setting the operating parameters, the cycle can be started by pressing and holding the **START/STOP** button for **4-5 seconds**. Once started, the word "END" at the top right of the display disappears and the word **"RUN"** appears at the bottom left. During operation, the display will show the timer, the set temperature and the temperature measured inside the tank simultaneously.

The cycle can be stopped manually at any time by pressing the **START/STOP** button for **4-5 seconds**. At the end of the set time or in the event of manual stop, the instrument will emit an intermittent acoustic signal, while the visual alarm icon and the word "**END**" will appear on the display. To silence the acoustic signal, simply press any button; the alarm icon will then remain visible on the display, indicating that the cycle has ended.

It is important to note that the acoustic signal will continue until it is deactivated by the operator. However, once the cycle is complete, the samples inside the instrument will remain exposed to the temperature in the tank.

Tank liquid level control

The instrument is equipped with a system for detecting the liquid level inside the tank, which indicates the amount of fluid via an icon on the display:



Sufficient liquid level



Insufficient liquid level: it is necessary to top it up

IMPORTANT: when the instrument detects an insufficient liquid level, it immediately stops heating, but the recirculation pump continues to operate.

14. Accessing submenus with a password

To access password-protected functions and parameters, press and hold the **SET/PROG** and **SHIFT** buttons simultaneously for a few seconds. To avoid accidentally entering the operating parameter settings, we recommend pressing **SHIFT** first and then, while holding it down, pressing **SET/PROG** for a few seconds.

After this operation, "**Lk**" (lock) will appear in the top right corner of the display instead of **TIME**, with the digits "**0000**" (password) next to it. The passwords and access sequences for the various parameters and functions are listed below.

PASSWORD	FUNCTION/PARAMETER	DESCRIPTION
0000	dy	Delayed start of heating cycle
0003	tm	Temperature limit for sample protection
	Po	Restart mode after power failure
	AL	Temperature limit for overheating alarm
	Pb	Temperature offset at a point
	PK	Temperature offset over the entire ramp
	PA	Temperature offset on the ambient temperature sensor

Delayed start function - Delay

You can set a delay (in hours and minutes) for the start of the operating cycle.
Use the **adjustment keys** to set the desired delay (hh:mm). To move quickly between digits, use the **SHIFT** key. Confirm with **SET/PROG**, after which the display will return to the standby screen.
By pressing and holding **START/STOP** (4-5 seconds), the instrument will start the programme but will not immediately begin heating. The word "end" and the delay time will flash alternately until the programme actually starts, at which point the regular timer will appear on the display.

Sample protection limit temperature – (tm)

The instrument allows you to limit the maximum working temperature to protect samples from incorrect temperature settings. Follow the instructions in paragraph 13 and enter the password **0003** using the **adjustment keys**. Use **SHIFT** to move quickly between digits and confirm with **SET/PROG**. The **tm** (maximum temperature) parameter will appear on the display with the maximum value set for the instrument.

Set the desired maximum temperature, beyond which the instrument must not go, using the **adjustment keys**. Confirm the value with **SET/PROG**.

NOTE: It is necessary to take into account the initial temperature peak that the water bath may have during thermostating.

Application example: if the set temperature is 100 °C and the tm limit is set to 70 °C, the instrument will attempt to reach 100 °C, but when it reaches 70 °C, the alarm will be activated and the heating element will be deactivated until the temperature falls below the set limit.

Restart mode after power failure – (Po)

It is possible to set the mode in which the instrument resumes operation after a power failure:

Po VALUE	DESCRIPTION
0	When power is restored, the instrument does not automatically resume the heating cycle but must be restarted manually.
1	When the power supply is restored, the instrument automatically resumes operation from the start of the interrupted heating cycle. operation from the start of the interrupted heating cycle.
2	When power is restored, the instrument automatically resumes operation from the precise point in the heating cycle where it was interrupted.

Follow the instructions in paragraph 13 and set the password **0003** using the **adjustment keys**. Use **SHIFT** to move between digits and confirm with **SET/PROG**. The parameter **tm** (maximum temperature) will appear in the top right of the display. Press **SET/PROG** again to move to the next parameter, **Po** (Power). Set the desired value (0, 1, 2) using the **adjustment keys** and confirm with **SET/PROG**.

Temperature limit for over-temperature alarm – (AL)

The instrument allows you to set specific temperature limits that trigger an alarm in the event of **over-temperature** or **under-temperature**.
Although the values can be changed, the parameter is factory preset and calibrated according to the type of instrument.
It is advisable not to alter these settings, as normal temperature fluctuations, especially in natural convection models, could generate false alarms if the set limit is too close to the working temperature.

To modify the **AL** parameter, refer to the instructions in paragraph 13. After entering the default password **0003** and confirming with the **SET/PROG** key, you can access the parameter. Using the **adjustment keys**, set the desired value for the alarm limit and confirm again with **SET/PROG**.
The value set for **AL** defines both the upper limit for the **over-temperature** alarm and the lower limit for the **under-temperature** alarm. The instrument will signal an anomaly if the detected temperature exceeds the upper limit or falls below the lower limit.
For example, with a set temperature of **37.0°C** and an **AL** value of **3.0°C**, the instrument will activate the alarm if the temperature exceeds **40.0°C** (37.0°C + 3.0°C) or if the temperature falls below **34.0°C** (37.0°C - 3.0°C).
To silence the alarm, press any key.

15. Temperature offset - Calibration

The instrument allows the user to set offset values, i.e. calibrations, at a temperature point, across the entire temperature range and at ambient temperature.

Technical note: These values are already calibrated at the factory with Accredia-referenced instruments. It is recommended not to change them unless discrepancies are found between the instrument readings and those of a certified digital thermometer. Follow the instructions in paragraph 13 and enter the password 0003. Use **SHIFT** to move between digits and confirm with **SET/PROG**. Scroll to the desired offset parameters and adjust as necessary.

PARAMETER	DESCRIPTION
Pb	By modifying this parameter, it is possible to correct the reading of the PT100 temperature sensor inside the instrument at a single temperature point. The correction will therefore refer to a single specific point.
PK	By modifying this parameter, it is possible to correct the reading of the PT100 temperature sensor inside the instrument across the entire temperature range, i.e. by varying the slope of the sensor's reading ramp.
PA	By modifying this parameter, it is possible to correct the reading of the PT100 ambient temperature sensor installed on the instrument (refrigerated versions only) at a single temperature point. The correction will therefore refer to a single specific point.

NOTE: for a quick correction of the temperature reading on ArgoLab thermocryostats, it is recommended to modify the Pb offset.

To correct the Pb offset, follow the instructions:

1. Calculate the temperature difference between the temperature measured by the external thermometer and the temperature read on the instrument.
   NOTE: it is recommended to take average values at regular time intervals (e.g. 10 measurements, one every 2 minutes).
2. Add the value of the difference just calculated to the value of the instrument's current Pb parameter (taking into account the sign).
3. Wait at least one hour and then check the calibration.
4. Repeat the operation if the result obtained is not satisfactory.

Example:
Temperature measured by the external probe = 35.5°C
Temperature indicated by the thermocryostat = 37.0°C
Temperature difference = (35.5 – 37.0) °C = - 1.5 °C
Value of the instrument's Pb parameter = 2.3
Calibration = -1.5 + 2.3 = 0.8

16. Introduction of samples into the thermocryostat

DANGER	
	**Risk of explosion and risk of death** □ Never place materials that are explosive or flammable at the selected operating temperature inside the instrument. □ Never place materials containing flammable or explosive solvents in the instrument. □ Never introduce materials into the instrument that, due to sublimation or pyrolysis, give rise to the formation of flammable materials at the selected working temperature.
	**Risk of poisoning and risk of death** □ Never introduce materials into the instrument whose combustion could result in the formation of poisonous gases. □ Never introduce materials into the instrument that can react with moisture and form explosive gases.

17. Emptying the tank, cleaning and maintenance

To empty the tank, use the tank drain tap located at the rear of the instrument.
If necessary, remove any residual liquid with a cloth or absorbent paper, taking care that the fibres do not end up inside the drain nozzle located at the bottom of the tank. Proper maintenance and cleaning of the instrument will ensure it remains in good condition. The internal chamber of the instrument is made of stainless steel, so it can be cleaned with any detergent as long as it is not aggressive and/or corrosive.

DANGER	
	**Risk of electric shock and risk of death** □ DO NOT spray water or detergents on the external surfaces. □ Turn off the main switch and unplug the appliance before cleaning. ➢ Dry the appliance completely before switching it back on. ➢ Before cleaning the appliance, ensure that it is not connected to the mains.

We recommend cleaning the internal and external surfaces with a normal multi-purpose detergent sprayed onto a soft, damp cloth, so as not to use it in concentrated form. Before cleaning or decontaminating, the user must ensure that the method used will not damage the instrument.

WARNING	
	**Risk of injury and fire** □ Before cleaning the thermocryostat, wait until the devices used to increase and decrease the temperature inside the tank have reached room temperature. ➢ Wait until the fluid inside the tank has reached room temperature.

WARNING	
	**Risk of corrosion - Damage to the appliance** □ DO NOT use detergents containing halide acids. □ DO NOT use neutral detergent on other surfaces (e.g. on the galvanised parts of the hinges or on the rear wall of the external structure).
	**Eye contact - Eye damage caused by chemical burns** □ DO NOT discharge into the sewage system. ➢ Wear protective eyewear.

18. *Preparing the instrument for technical assistance*

If the instrument needs to be sent to the technical service department, it must be cleaned properly and, if necessary, completely decontaminated of any pathogens. This operation ensures the safety of operators during the handling and repair of the instrument.

We recommend using the original packaging for transport. If the original packaging is not available, you must provide suitable packaging to ensure the instrument is protected during transport.

NOTE: Any damage caused by inadequate packaging during shipping will not be covered by the warranty.

19. **Checking the refrigeration unit compartment, heat sink and fan**

Before checking the refrigeration unit compartment and its components, you must stop the instrument's operating cycle, switch it off using the main ON/OFF button and disconnect the power cable from the electrical socket. After switching off the instrument, wait at least 30 minutes to allow the heat sink and refrigeration unit to cool down, thus ensuring safety during inspection.
The grille panel, located at the bottom front of the instrument, is secured by magnets. To remove it, gently pull the top part outwards first, then the bottom part.





Ensure that the cooling unit compartment and its components are clean and free of blockages or obstructions. Pay particular attention to the heat sink's exchange surface, checking that it is clean and that the metal fins are not bent or damaged.
If cleaning is necessary, use a standard vacuum cleaner, keeping the suction nozzle at a suitable distance to avoid bending the metal fins. For other parts of the compartment, use a soft cloth and a non-aggressive or non-corrosive detergent. The detergent must always be diluted with water and never used undiluted. After cleaning, replace the front grille panel in its housing, ensuring that it is correctly aligned and secured.

20. **Warranty**

Under normal conditions of use, this instrument is guaranteed for a period of 24 months from the date of purchase. The warranty is valid only if the purchased product remains in its original condition and has not been modified. The warranty does not cover damage caused by incorrect installation, improper connections, misuse, accidents or abnormal operating conditions. Similarly, damage resulting from use not in accordance with the instructions, failure to perform the recommended maintenance or unauthorised modifications is excluded from the warranty.
NOTE: We accept no liability for any indirect or consequential damage resulting from failure to follow the instructions for use or unauthorised tampering with the instrument.

21. **Disposal of electronic equipment**

This equipment is subject to regulations for electronic devices.
Dispose of in accordance with local regulations.

