



TERSO
SOLUTIONS, INC.

Large ULT RFID Freezer

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Introduction

Read this manual carefully before using the freezer and follow the instructions for safe operation.

Terso Solutions does not guarantee safe operation if the freezer is not used as intended as outlined in this manual.

Keep this manual in an easily accessible place to refer to as necessary.

The contents of this manual are subject to change without notice due to improvement in performance or functions.

Contact Terso Technical Support if a page of the manual is lost or page order is incorrect.

Contact Terso Technical Support if any point in this manual is unclear or if there are any inaccuracies.

Precautions for Safe Operation

It is imperative that the user complies with this manual as it contains important safety advice.

Items and procedures are described so that you can use this freezer correctly and safely. If the precautions advised are followed, this will prevent possible injury to the user and any other person.

Precautions are illustrated in the following way:



WARNING

Failure to observe WARNING signs could result in a hazard to personnel possibly resulting in serious injury or death



WARNING

Only use the system as specified in these instructions



CAUTION

Failure to observe CAUTION signs could result in injury to personnel and damage to the freezer and associated property

Symbol shows:



This symbol means an action is prohibited.

- This symbol means an instruction must be followed.

Be sure to keep this manual in a place accessible to users of this freezer.



Caution, read all accompanying documents before operating the device.



This mark is labeled on the cover in which the electrical components of high voltage are enclosed to prevent electrical shock. The cover should be removed by qualified engineers or service personnel only.



This mark indicates the location of the protective earth conductor. Do not disconnect. Disconnection of the protective earth conductor may impair the protection provided by the device.



WARNING

- **Risk of shock is present inside the device.** The cover should be removed by qualified engineers or service personnel only.

 **Do not use the freezer outdoors.** Current leakage or electric shock may result if freezer is exposed to rain water.

- **Be sure to install the freezer on a sturdy floor.** If the floor is not strong enough or the installation site is not adequate, injury may result from the freezer falling or tipping over.

 **Never install the freezer in a flammable or volatile location.** This may cause explosion or fire.

 **Never install the freezer where acid or corrosive gases are present** as current leakage or electrical shock may result due to corrosion.

- **Make sure a dedicated power source is used** as indicated on the rating label attached to the freezer.

- **Make sure to remove dust from the power supply plug** before inserting in a power source. A dusty plug or improper insertion may pose a hazard.



WARNING

- **Use a power supply outlet with ground (earth)** to prevent electric shock. If the power supply outlet is not grounded, it will be necessary to have qualified engineers install a ground.

- **When removing the plug from the power supply outlet, grip the power supply plug, not the cord.** Pulling the cord may result in electric shock or fire by short circuit.

 **Never damage or break the power supply plug or cord. Do not use the supply plug if its cord is loose.** This may cause fire or electric shock.

 **Do not touch any electrical parts such as power supply plug or any switches with a wet hand.** This may cause electric shock.

 **Never ground the freezer through a gas pipe, water main, telephone line or lightening rod.** Such grounding may cause electric shock in the case of an incomplete circuit.

 **Do not insert metal objects such as a pin or wire into any outlet, vent or gap** for inner air circulation. This may cause electric shock.

- If this freezer is to be used for storing poisons, radioactive material or other harmful products, ensure that it is in a safe area.** Failure to do so may lead to an adverse effect on the health of personnel in the area and local environment. In this case, a request for repair or maintenance will necessitate a safety check sheet for maintenance personnel and that the unit is clearly labeled to show such materials.
-

 **Never splash water directly onto the freezer** as this may cause electric shock or short circuit.

 **Never disassemble, repair, or modify this freezer yourself.** Any such work carried out by an unauthorized person may result in fire or injury due to a malfunction.

- **Disconnect the power supply plug if there is something wrong with the freezer.** Continued abnormal operation may cause electric shock or fire.

- If the freezer is to be stored unused in an unsupervised area for an extended period of time, ensure **that children do not have access and that doors cannot be closed completely.**



WARNING

- **Make sure to prepare a safety check sheet** when you request any repair or maintenance for the safety of service personnel.
- **Select a level and sturdy floor for installation.** This precaution will prevent the freezer from tipping. Improper installation may result in injury from the freezer tipping over.



CAUTION

- ⊘ **Do not disconnect the protective earth conductor.** Disconnection may impair the protection provided by the device.
- ⊘ **Do not place any switches or disconnect devices in the earth conductor.**
- ⊘ **Do not touch any stock, especially metal objects, in the freezer with a bare hand.** This may cause frostbite.
- ⊘ **Do not climb onto the freezer.** This may cause injury by tipping or damage to the freezer.
- **Always hold the handle when closing the door.** This will reduce the likelihood of a trapped finger.
- ⊘ **Do not lean on the door.** This may cause injury if the freezer tips over.
- **Always disconnect the power supply plug before moving the freezer.** Take care not to damage the power cord. A damaged cord may cause electric shock or fire.
- **Be careful not to tip over the freezer** during movement to prevent damage or injury.
- **Always disconnect the power plug** when the freezer is not used for long periods of time.
- **Always disconnect the power supply to the freezer prior to any repair or maintenance** of the freezer in order to prevent electric shock or injury.

Cautions for Usage

1. Always use gloves when handling items within the freezer.
2. Never store corrosive materials such as acid or alkali unless the container is completely sealed up. Corrosion may lead to failure of the freezer in time.
3. Always close the door firmly. The door open buzzer will sound after the door is open for five minutes unless configured otherwise. The buzzer can be canceled automatically when the door is closed.
4. Always open and close the door gently. Rough operation may lead to stored items falling down, incomplete closing, or damage of the door and/or locking mechanism.
5. A vacuum can be created after a door opening. This freezer is equipped with a vacuum relief port to equalize the pressure within the freezer after a door opening. It takes between 30 and 120 seconds for the pressure to equalize and during this time, the freezer cannot be accessed.
6. Items should be added to the freezer in small batches to minimize temperature increase.
7. If condensation forms on the door or frame surface, wipe it off with a dry soft cloth.

Environmental Conditions

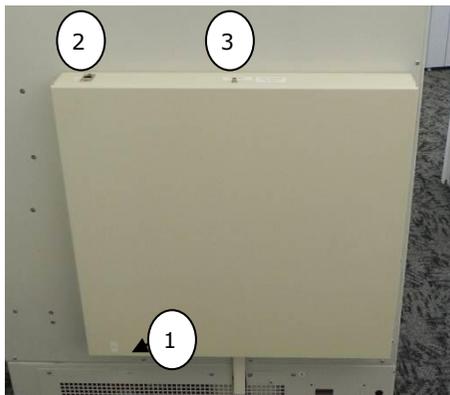
This equipment is designed to be safe at least under the following conditions:

1. Indoor use
2. 2000m / 6550ft altitude
3. 15° C to 30° C / 59° F to 86° F, ≤80% relative humidity
4. Over Voltage Category II
5. Pollution Degree 2 (normal office conditions)
6. Peak operating noise level of 60 dB
7. Mains supply voltage fluctuations up to ±10% of the nominal voltage.

Components

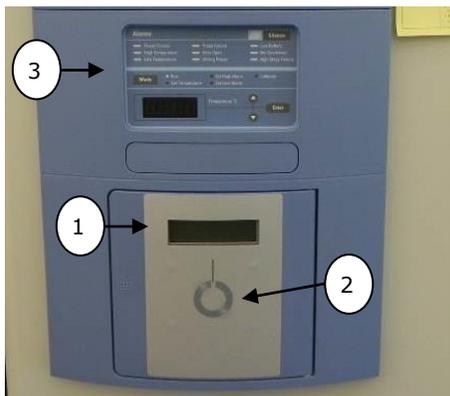
Back Panel

1. AC On/Off Switch and Power Inlet
2. WAN Ethernet Jack
3. Cell Router Power Jack



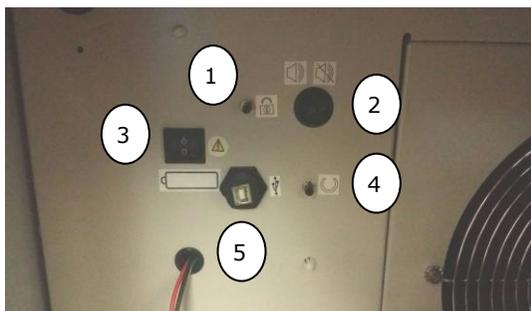
Freezer Front

1. LCD Screen
2. Proximity Badge Reader
3. Reference the Thermo Scientific manual for instructions on how to use the screen and remaining buttons.



Freezer Bottom

1. Emergency Door Release
2. Buzzer Mute Switch
3. Factory Battery On/Off
4. Hardware Reset
5. USB Interface Jack



Installation

Site

To operate this freezer properly and to obtain maximum performance, install the freezer in a location with the following conditions:

- **A location with correct power outlets**
The freezer requires a dedicated grounded 120V 20A NEMA 5-20 outlet.
- **A location with a sturdy and level floor**
Install the freezer on a sturdy floor to ensure proper door alignment



WARNING

Be sure to install the freezer on a sturdy floor. If the floor is not strong enough or the installation site is not adequate, this may result in injury from the freezer falling or tipping over.



CAUTION

Select a level and sturdy floor for installation. This precaution will prevent the freezer from tipping.

- **A location not prone to high humidity**



WARNING

Do not use the freezer outdoors. Current leakage or electric shock may result if the freezer is exposed to rain water.

Never install the freezer in a humid place or a place where it is likely to be splashed by water. This may result in current leakage or electric shock.

Do not install the freezer under water pipes or steam pipes. This may result in current leakage or electric shock.

- **A location without a flammable or corrosive gas**



WARNING

Never install the freezer in a flammable or volatile location. This may cause explosion or fire.

Never install the freezer where acid or corrosive gases are present as current leakage or electric shock may result due to corrosion.

Installation

Inspection

With packaging in place, inspect the freezer for any damage that may have occurred during transit. If any damage is present, please contact Terso Technical Support at +1 (888) 376-0257 in the US or +49 621 8501 233 in Europe.

Unpacking

- Remove the straps and remove all packaging. Gently position the freezer in place on the ground.
- **Remove accessories from inside the freezer.** Items included are a **Power Cable and Ethernet Cable.** Other items may also be included such as an Ethernet Hub or other freezer specific items.

Proper Handling

Move the freezer to the installation site. There are wheels on the freezer to aid in positioning. Roll the freezer by firmly pushing on the middle section of the body. Always move the freezer with the door facing you. Carefully roll the freezer into position leaving at least a 6" gap between the freezer and the wall.

Connecting AC Power

Plug the freezer into a grounded wall outlet with a minimum of a 20A rating. See specifications for more detail on the requirements for your model.

Plug the electronics panel into a grounded wall outlet. See specifications for more detail on the requirements for your model.

If a new power cord is needed, contact Terso Solutions to ensure the correct replacement is found or issued.

The power outlet must be within 3m / 6ft of the freezer and must be easily accessible unobstructed outlet. Ensure that the on/off switch is easily accessible.

In an emergency, the cord can act as an off switch.

Connecting Communications

Plug the Ethernet cable into the back panel and then into the appropriate wall data jack or cellular router.

Access Verification

Present a pass below the LCD screen on the front panel. The LCD text should indicate that the door is now unlocked. The door can be closed at any time and will be locked upon doing so. This can be verified by gently pulling on the door handle.

Remote Alarm Contacts

Alarm contacts on the back of the freezer are available to wire the freezer into an alarm system. These contacts can alarm on high/low temperature, power outages, and control probe or microboard failures. Reference the Thermo Scientific Manual for further details.

Backup System Installation

Please ensure that the installation of the CO₂ or LN₂ backup system is done by a licensed Thermo representative. Please see the Thermo Scientific Manual for further details about the installation of these backup systems and reference Appendix A and B for details about the dangers and proper handling of LN₂ or CO₂.

Operating Instructions

Basic Access Process

An end user will present an access badge to the proximity badge reader on the freezer. The badge needs to be presented close to the proximity reader to be read. The LCD screen will indicate granted access when a valid badge has been presented.

The end user now can open the door for a predetermined time period, normally about five seconds. Otherwise the user will need to present the pass again. Desired products may now be taken out. The freezer will give an audible alarm if the door is left open for, typically, more than five minutes.

Close the freezer door once products have been retrieved. The freezer will automatically lock the door and begin its inventory process. The updated inventory will then be sent to Terso Solutions for processing. The freezer will not be accessible during the inventory process. Typically, the inventory process will take about a minute to complete. Access will then be restored and the process can be repeated.

Alarms

All freezer alarms are automatically sent to Terso Solutions. Terso Solutions staff may contact on site staff to assist in correcting a potential problem.

Alarm Types

Door Ajar

When the freezer's door is left open for longer than five minutes, an audible alarm will sound until the door is closed. If the door appears to be closed, verify nothing is obstructing the door and attempt to re-close.

Power Outage

In the event of a power outage, an audible alarm will sound. The alarm will continue until AC power has been restored or the onboard UPS system runs out of power. Once power has been restored, the freezer will perform an inventory scan and be ready for normal use.

Temperature

The freezer continuously monitors its internal temperature where inventory items are kept. If the temperature becomes too hot or cold, Terso Solutions staff will contact on site staff to attempt to troubleshoot and/or move temperature sensitive products to a safe location. The freezer may also prevent access if the inventory items have become compromised.

Hardware Failure

The freezer will automatically attempt to correct any hardware errors preventing the freezer from functioning correctly. However, in the event that a hardware component fails, the freezer may lock itself down to prevent access. Terso Solutions staff will be in contact with on site staff if this is the case.

Door Breach

If the freezer's door is forced open, a notification indicating a forced entry occurred will be sent to Terso Solutions. Any products taken will be reported. This is a rare occurrence but may result in damage to the freezer.

Maintenance

There are no serviceable parts in the freezer. Please contact Terso Solutions for any service related inquiries.



WARNING

Always disconnect the power supply to the freezer prior to any repair or maintenance in order to prevent shock or injury.

Exterior Cleaning

Use a dry cloth to wipe off small amounts of dirt on the outside and inside of the freezer and all accessories. If the outside panels are dirty, clean them with a diluted neutral dishwashing detergent. (Undiluted detergent can damage the plastic components. For the dilution refer to the instruction of the detergent.) After cleaning with diluted detergent, always wipe off the same areas with a wet cloth. Then wipe off the freezer or accessories with a dry cloth.

Never pour water onto or into the freezer. Doing so can cause electric shock or a short circuit.

Do not clean the freezer with scrubbing brushes, acid, thinner, solvents, powdered soap, cleanser or hot water. These agents can scratch the paint or cause it to peel. Plastic and rubber parts can be easily damaged by these materials. Especially never use any volatile solvent to clean the plastic or rubber parts. When a neutral dishwashing detergent is used to clean the freezer, wipe it up thoroughly with a cloth soaked in clean water.

Interior Cleaning

If the interior of the unit requires cleaning, refer to in house safety procedures to ensure any harmful materials are handled and cleaned correctly.

Cleaning the Air Filter

The air filter should be cleaned four times a year, at a minimum.

1. Open the lower front door by grasping the bottom left corner.
2. Locate the grille on the door. Grasp the middle of the grille material and gently pull out to remove.
3. Wash the filter material using water and a mild detergent.
4. Dry by pressing between two towels.
5. Install the filter back into the grille and attach the grille.

Cleaning the Condenser

The condenser should be cleaned once per year, at a minimum

1. Open the front lower door by grasping the bottom left corner.

2. Clean the condenser using a vacuum cleaner exercising care to not damage the condenser fins.

Depending upon environmental conditions, the condenser may need to be cleaned more frequently.

Defrosting the Chamber

The chamber should be defrosted when any ice accumulation is inhibiting the use of the freezer or whenever deemed necessary by in house procedures.

1. Remove all products and place in another freezer.
2. Turn the freezer off and disconnect it from the power source.
3. Turn off the battery switch (O).
4. Open all of the doors and place towels on the chamber floor.
5. Allow the frost to melt and become loose.
6. Remove the frost with a soft cloth.
7. Clean the interior with a non-chloride detergent after defrosting is complete. Rinse thoroughly with clean water and dry with a soft cloth.
8. Plug unit in and turn power switch on.
9. Turn the battery power switch to Standby mode.
10. Allow the freezer to operate empty overnight before reloading the products.

Cleaning the Door Gasket

The door gasket should be cleaned monthly, at a minimum. Using a soft cloth, remove any frost build-up from the gasket and door(s). The door gasket may need to be cleaned more frequently if dirt or excessive frost build-up prevents the door from closing properly.

Troubleshooting

If the freezer appears to not be operating correctly, check to ensure that it is plugged into a wall outlet and powered on. If further support is needed, contact Terso Technical Support at +1 (888) 376-0257 in the US or +49 621 8501 233 in Europe. Support can also be contacted by visiting <http://support.tersosolutions.com>.

Disposal

Terso Solutions will handle the disposal of the freezer and its components. Please contact Terso Solutions at +1 (888) 376-0257 in the US or +49 621 8501 233 in Europe to arrange for freezer disposal.

Specifications

| Attribute | Specification (Imperial) | Specification (Metric) | |
|-------------------------------|--|--|--|
| External Dimension | 78H x 36W x 36D in | 1981H x 914W x 914D mm | |
| Internal Dimension | 52H x 19W x 23D in | 1308H x 492W x 586D mm | |
| External Space | 83H x 52W x 75D in | 2018H x 1321W x 1905D mm | |
| Volume | 13 ft ³ | 368 L | |
| Unit Weight | 750 lbs. | 340 kg | |
| Control Range | -58° F to -121° F | -50° C to -85° C | |
| Maximum Shelf Weight Capacity | 100 lbs. | 45 kg | |
| Electrical Input Rating | TS057-US-115 | TS057-US-208 | TS057-EU |
| | 120VAC, 60Hz, 16A (Freezer); 120VAC, 60Hz, 5A (Electronics) | 230VAC, 60Hz, 12A (Freezer); 120VAC, 60Hz, 5A (Electronics) | 208VAC, 50Hz, 12A (Freezer); 208VAC, 50Hz, 5A (Electronics) |
| Power Consumption | 1920W max | | |
| Battery | 12VDC, 1.3A, Sealed lead acid, qty 2 | | |
| Security Device | Electromagnet | | |
| Access Control | EM4102/EM4200 Proximity Reader | | |
| Environmental Protection | IPX0 | | |
| Refrigerant | CFC/HCFC-Free Environmentally Safe Refrigerant Mixtures / Non-Flammable in both stages | | |
| Cooling Method | Cascade CO ₂ backup system standard. LN2 Option available upon request. | | |
| Communications | Ethernet based LAN DSL optional Cellular optional | | |

Model Specifics

| Model | Country | RFID Frequency | Plug Style | Door Style |
|-------------------------|---------|----------------|---|------------|
| TS057-US-115-CO2 or LN2 | US | 902-928 MHz | NEMA 5-20P (Freezer) x 1 NEMA 5-15 (Electronics) x 1 | Metal |
| TS057-US-208-CO2 or LN2 | US | 902-928 MHz | NEMA 6-15 (Freezer) x 1 NEMA 5-15 (Electronics) x 1 | Metal |
| TS057-EU | EU | 865-868 MHz | CEE 7/7 x 2 (Freezer and Electronics) | Metal |

Note: Design or specifications are subject to change without prior notice

Safety Check List



CAUTION

Please fill out this form before servicing and ensure that the unit is properly marked with any applicable markings to denote any hazards inside.

Provide this form to the service engineer to keep for safety purposes.

Safety Check List

Freezer Contents:

| | | |
|-----------------------------------|-----|----|
| Risk of infection | Yes | No |
| Risk of toxicity | Yes | No |
| Risk of radioactive sources | Yes | No |

Please list any potentially hazardous materials that have been stored in this freezer:

Contamination of the Freezer

| | | |
|------------------------|-----|----|
| No contamination | Yes | No |
| Decontaminated..... | Yes | No |
| Contaminated | Yes | No |

Appendix A: Handling Liquid Nitrogen

The safe handling and use of liquid nitrogen in cryogenic refrigerators and dewar flasks is largely a matter of knowing the potential hazards and using common-sense procedures based on that knowledge. There are two important properties of liquid nitrogen that present potential hazards:

- It is extremely cold. At atmospheric pressure, liquid nitrogen boils at -320°F (-196°C).
- Very small amounts of liquid vaporize into large amounts of gas. One liter of liquid nitrogen becomes 24.6 cu. ft. (700l) of gas.

The safety precautions in this booklet must be followed to avoid potential injury or damage which could result from these two characteristics. Do not attempt to handle liquid nitrogen until you read and fully understand the potential hazards, their consequences, and the related safety precautions. Keep this manual handy for ready reference and review.

Note: Because argon is an inert gas whose physical properties are very similar to those of nitrogen, the precautions and safe practices for the handling and use of liquid argon are the same as those for liquid nitrogen.

CAUTION

Use only containers designed for low temperature liquids.

Cryogenic containers are specifically designed and made of materials that can withstand the rapid changes and extreme temperature differences encountered in working with liquid nitrogen. Even these special containers should be filled SLOWLY to minimize the internal stresses that occur when any material is cooled. Excessive internal stresses can damage the container.

CAUTION

Do not cover or plug the entrance opening of any liquid nitrogen refrigerator or dewar. Do not use any stopper or other device that would interfere with venting of gas.

These cryogenic liquid containers are generally designed to operate with little or no internal pressure. Inadequate venting can result in excessive gas pressure which could damage or burst the container. Use only the loose-fitting necktube core supplied or one of the approved accessories for closing the necktube. Check the unit periodically to be sure that venting is not restricted by accumulated ice or frost.

CAUTION

Use proper transfer equipment.

Use a phase separator or special filling funnel to prevent splashing and spilling when transferring liquid nitrogen into or from a dewar or refrigerator. The top of the funnel should be partly covered to reduce splashing. Use only small, easily-handled dewars for pouring liquid. For the larger, heavier containers, use a cryogenic liquid withdrawal device to transfer liquid from one container to another. Be sure to follow instructions supplied with the withdrawal device. When liquid cylinders or other large storage containers are used for filling, follow the instructions supplied with those units and their accessories.

CAUTION

Do not overfill containers.

Filling above the bottom of the necktube (or specified maximum level) can result in overflow and spillage of liquid when the necktube core or cover is placed in the opening.

CAUTION

Never use hollow rods or tubes as dipsticks.

When a warm tube is inserted into liquid nitrogen, liquid will spout from the top of the tube due to gasification and rapid expansion of liquid inside the tube.

WARNING

Nitrogen Gas Can Cause Suffocation Without Warning!

CAUTION

Store and use liquid nitrogen only in a well-ventilated place.

As the liquid evaporates, the resulting gas tends to displace the normal air from the area. In closed areas, excessive amounts of nitrogen gas reduce the concentration of oxygen and can result in asphyxiation. Because nitrogen gas is colorless, odorless and tasteless, it cannot be detected by the human senses and will be breathed as if it were air. Breathing an atmosphere that contains less than 18% oxygen can cause dizziness and quickly result in unconsciousness and death.

Note: The cloudy vapor that appears when liquid nitrogen is exposed to the air is condensed moisture; not the gas itself. The issuing gas is invisible.



CAUTION

Never dispose of liquid nitrogen in confined areas or places where others may enter.

Disposal of liquid nitrogen should be done outdoors in a safe place. Pour the liquid slowly on gravel or bare earth where it can evaporate without causing damage. Do not pour the liquid on pavement.

Appendix B: Handling Liquid CO₂

WARNING

High concentrations of CO₂ gas can cause asphyxiation!

OSHA Standards specify that employee exposure to carbon dioxide in any eight hour shift of a 40-hour work week shall not exceed the eight-hour time weighted average of 5000 PPM (0.5% CO₂). The short term exposure limit for 15 minutes or less is 30,000 PPM (3% CO₂). Carbon dioxide monitors are recommended for confined areas where concentrations of carbon dioxide gas can accumulate.

CAUTION

Store and use liquid CO₂ only in a well-ventilated place.

As the liquid evaporates, the resulting gas tends to displace the normal air from the area. In closed areas, excessive amounts of CO₂ gas reduce the concentration of oxygen and can result in asphyxiation. Because CO₂ gas is colorless, odorless and tasteless, it cannot be detected by the human senses and will be breathed as if it were air. Breathing an atmosphere that contains less than 18% oxygen can cause dizziness and quickly result in unconsciousness and death.

Note: The cloudy vapor that appears when liquid CO₂ is exposed to the air is condensed moisture; not the gas itself. The issuing gas is invisible.

CAUTION

Never dispose of liquid CO₂ in confined areas or places where others may enter.

Disposal of liquid CO₂ should be done outdoors in a safe place. Pour the liquid slowly on gravel or bare earth where it can evaporate without causing damage. Do not pour the liquid on pavement.

Appendix C: Expected Temperature Performance

