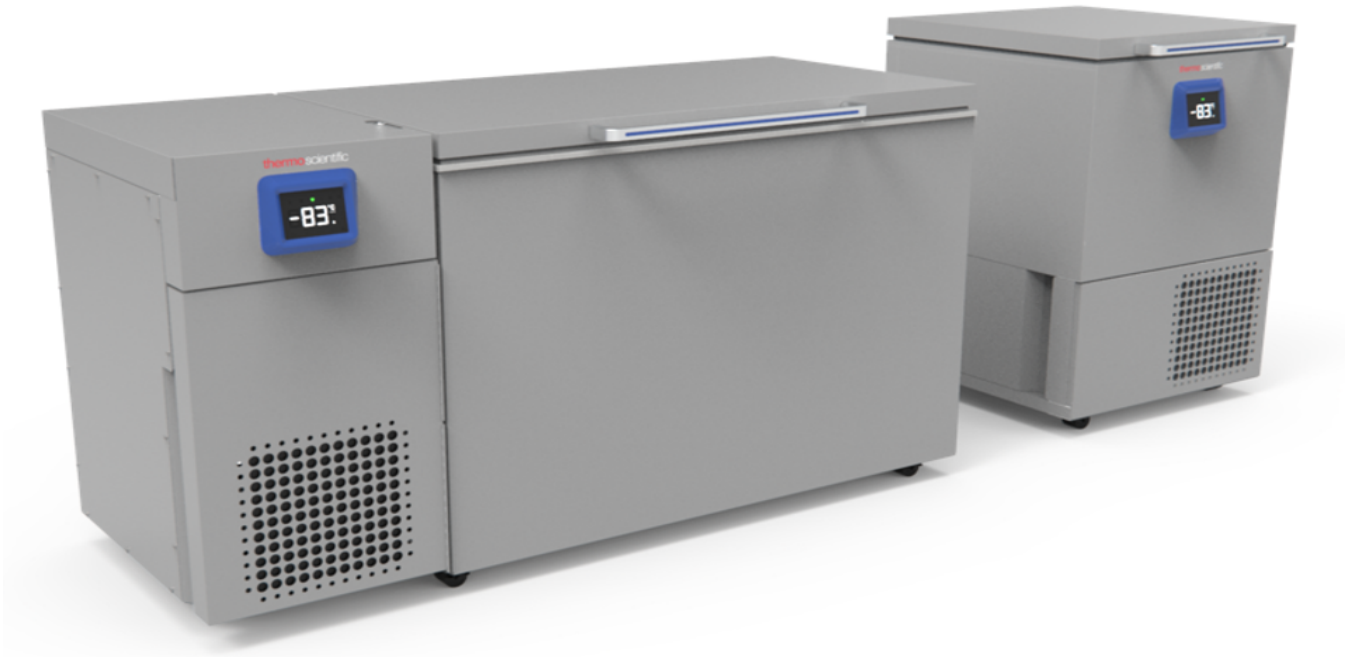
thermo scientific



Ultra-Low Temperature Freezers Thermo Scientific™ TDE Series

Installation and Operation

332851H01 • Revision B • November 2023

ThermoFisher SCIENTIFIC

IMPORTANT Read this Installation and Operation manual. Failure to follow the instructions in this manual can result in damage to the unit, injury to operating personnel, and poor equipment performance.

CAUTION All internal adjustments and maintenance must be performed by qualified service personnel.

Material in this manual is for informational purposes only. The contents and the product it describes are subject to change without notice. Thermo Fisher Scientific makes no representations or warranties with respect to this manual. In no event shall Thermo be held liable for any damages, direct or incidental, arising from or related to the use of this manual.

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Contents

Models 1

Safety Considerations 2
- ELECTROMAGNETIC COMPATIBILITY (EMC) 4
- Symbols Glossary 6

Unpacking 7
- Packing List 7

General Recommendations 8
- Temperature Monitoring system 8
- General Usage 8
- Initial Loading 8
- Grille Door Opening/Closing 8

Operating Standards 9
- Electrical Specifications 9

Installation 10
- Location 10
- Protective Conductor current 10
- Wiring 10
- Leveling 11
- Ice Scraper 11
- Backup System (Optional) 11
- Door Operation 11
- Installing the Remote Alarm Connector 11
- Intended Use: 11

Operation 12
- Initial Start Up 12

Operation Overview 12
Display 12
Settings 13
Power Down 14

Ice Scraper Instruction 15
Purpose 15

Backup System (Optional) 16
CO2 and LN2 Precautions 16
Installation 16
Start Up 17
Operation 17

Chart Recorders (Optional) 18
Set Up and Operation 18
Changing Chart Paper 18
Calibration Adjustment 18

Maintenance 19
Cleaning the Condenser 19
Cleaning the Condenser Filter 19
Gasket Maintenance 19
Defrosting the Freezer 19
Battery Maintenance 19
Maintenance Schedule 20

Troubleshooting Guide 21

Error Codes 25

Warranty 26

Warranty (International) 27

Appendix A: Alarm Summary 28

Appendix B: Modbus ASCII
Parameter Table 30

End of Life Care 38

Contact Information 39

Models

Table 1. Applicable Models

Model	Size (xxx)	Voltage (*)	Description
TDECxxx86L*	063/252/396	A/D/V	Medical Device

Safety Considerations

In this manual, the following symbols and conventions are used:



Refer to instruction manual/booklet
https://www.thermofisher.com/usermanual



WARNING: Low Temperature Hazard



WARNING: Crushing of hands



General warning sign



WARNING: Flammable material



WARNING: Device susceptible to electrostatic discharge



This symbol used alone indicates important operating instructions which reduce the risk of injury or poor performance of the unit.



CAUTION: This symbol, in the context of a CAUTION, indicates a potentially hazardous situation which if not avoided could result in minor to moderate injury or damage to the equipment.



WARNING: This symbol indicates potentially hazardous situations which, if not avoided, could result in serious injury or death.



WARNING: This symbol indicates situations where dangerous voltages exist and potential for electrical shock is present.



The snowflake symbol indicates extreme low temperatures and high risk of frostbite. Do not touch bare metal or samples with unprotected body parts.



This symbol indicates a need to use gloves during the indicated procedures. If performing decontamination procedures, use chemically resistant gloves. Use insulated gloves for handling samples and when using liquid nitrogen.



Before installing, using or maintaining this product, please be sure to read this manual and product warning labels carefully. Failure to follow these instructions may cause this product to malfunction, which could result in injury or damage.

Below are important safety precautions that apply to this product:



Use this product only in the way described in the product literature and in this manual. Before using it, verify that this product is suitable for its intended use. If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.



Do not modify system components, especially the controller. Use OEM exact replacement equipment or parts. Before use, confirm that the product has not been altered in any way.



WARNING: Your unit must be properly grounded in conformity with national and local electrical codes. Never connect the unit to overloaded power sources.



WARNING: Disconnect the unit from all power sources before cleaning, troubleshooting, or performing other maintenance on the product or its controls.



WARNING: “Caution, risk of fire”. This unit is charged with hydrocarbon refrigerants.



WARNING: Ensure all ventilation openings are not obstructed.



WARNING: Do not use mechanical devices or other means to accelerate the defrosting process, other than those recommended by the manufacturer.



WARNING: Do not damage the refrigerant circuit.

WARNING: In order to reduce flammability HAZARDS the installation of this equipment shall only be carried out by a suitably qualified person.

WARNING: Use of this equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, this equipment and the other equipment should be observed to verify that they are operating normally.

WARNING: Use of accessories, transducers and cables other than those specified or provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.

WARNING: Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the ULT freezer, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.

IMPORTANT NOTE: The EMISSIONS characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.

CAUTION: Risk of fire or explosion due to flammable refrigerant used. Follow handling instructions carefully in compliance with U.S. government regulations.

DANGER: Risk of fire or explosion. Flammable refrigerant used. To be repaired only by trained service personnel. Do not puncture refrigerant tubing.

CAUTION: This unit is intended for use in laboratories in commercial, industrial or institutional occupancies as defined in the safety standard of refrigeration systems, ASHRAE 15.

CAUTION: Risk of fire or explosion. Dispose of properly in accordance with federal or local regulations. Flammable refrigerant used.

CAUTION: Risk of fire or explosion. Flammable refrigerant used. Consult repair manual/owner's guide before attempting to install or service this product. All safety precautions must be followed.

ELECTROMAGNETIC COMPATIBILITY (EMC)

Guidance and Manufacturer's Declaration—Electromagnetic Emissions		
Emission Test	Compliance	Electromagnetic Environment Guidance
RF emissions CISPR 11	Group 1	The EMISSIONS characteristics of the freezer make it suitable for use in commercial, industrial or institutional occupancies (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required), this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or reorienting the equipment.
RF emissions CISPR 11	Class A	

Guidance and Manufacturer's Declaration—Electromagnetic Immunity			
Immunity Test	IEC 60601-1-2 Test Level	Compliance Level	Electromagnetic Environment Guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±8 kV contact ±15 kV air	±8 kV contact ±15 kV air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%
Electrical fast transient/burst IEC 61000-4-4	±1 kV for input/output lines ±2 kV for AC powerlines	±1 kV for input/output lines ±2 kV for AC powerlines	Mains power quality should be that of a typical commercial or industrial environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or industrial environment
Voltage dips, short interruptions, and voltage variations on power supply input lines IEC 61000-4-11	0% UT (100% dip in UT) for 0.5 cycle at 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315° .0% UT (100% dip in UT) for 1 cycle at 0° 70% UT (30% dip in UT) for 25/30 cycles at 0° 0% UT (100% dip in UT) for 250/300 cycles	0% UT (100% dip in UT) for 0.5 cycle at 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°. 0% UT (100% dip in UT) for 1 cycle at 0° 70% UT (30% dip in UT) for 25/30 cycles at 0° 0% UT (100% dip in UT) for 250/300 cycles	Mains power quality should be that of a typical commercial or industrial environment
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	30 A/m	30 A/m	Mains power quality should be that of a typical commercial or industrial environment.

Guidance and Manufacturer's Declaration—Electromagnetic Immunity			
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz 6Vrms for ISM bands between 150 kHz and 80 MHz	3 Vrms 150 kHz to 80 MHz 6Vrms for ISM bands between 150 kHz and 80 MHz	Mains power quality should be that of a typical commercial or industrial environment.
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.7 GHz 27 V/m 385 MHz 28 V/m 450 MHz 9 V/m 710/745/780 MHz 28 V/m 810/870/930 MHz 28 V/m 1720/1845/1970 MHz 28 V/m 2450 MHz 9 V/m 5240/5500/ 5785 MHz	10 V/m 80 MHz to 2.7 GHz 27 V/m 385 MHz 28 V/m 450 MHz 9 V/m 710/745/780 MHz 28 V/m 810/870/930 MHz 28 V/m 1720/1845/1970 MHz 28 V/m 2450 MHz 9 V/m 5240/5500/ 5785 MHz	Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the ULT freezer, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.
NOTE 1: UT is the AC mains voltage prior to application of the test level.			

EMC Registration is done on this equipment for professional use only. It may cause interference when the product would be used in home.

This equipment has been tested and found to comply with the limits for a Class A digital device. Class A covers devices for usage in all establishments other than domestic and that are not directly connected to a low voltage power supply network, which supplies domestic environment.

FCC (where applicable)

This device complies with Part 15 Subpart B of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canadian ISED IC Notice

This ISM digital apparatus complies with Canadian ICES-001, Class A.
Cet appareil ISM est conforme à la norme NMB-001 du Canada, Classe A.

This product has been tested as per IEC 60601-1-2:2014 standard. This product has been tested for all applicable EMC tests such as Conducted emissions (Class A, CISPR 11), Radiated Emissions (Class A, CISPR 11), Electrostatic discharge (IEC 61000-4-2), Radiated RF immunity (IEC 61000-4-3), Electrical fast transients (IEC 61000-4-4), Surges (IEC 61000-4-5), RF Conducted susceptibility (IEC 61000-4-6), Power frequency magnetic field (IEC 61000-4-8) and Voltage dips & interrupts (IEC 61000-4-11).

This unit is not intended for use in classified hazardous locations, nor to be used for the storage of flammable inventory.

NOTICE / AVIS:

WE RECOMMEND THE USE OF A REDUNDANT AND INDEPENDENT TEMPERATURE MONITORING SYSTEM AND THAT FREEZER BE MONITORED 24/7 FOR PERFORMANCE COMMENSURATE WITH THE VALUE OF PRODUCT STORED.
NOUS RECOMMANDONS L'UTILISATION D'UN SYSTÈME DE SURVEILLANCE DE LA TEMPÉRATURE INDÉPENDANT ET DE SURVEILLER LE CONGÉLATEUR TOUS LES JOURS 24 HEURES SUR 24 AFIN QUE LE RENDEMENT CORRESPONDE À LA VALEUR DU PRODUIT ENTREPOSÉ.



Internally Powered 4-20mA analog output
DO NOT APPLY EXTERNAL POWER.

Symbols Glossary



Environment Friendly Use Period (EFUP): 25 years



UL Listed in United States and Canada



Air Transport Prohibited



Medical Device

Unpacking

At delivery, examine the exterior for physical damage while the carrier's representative is present. If exterior damage is present, carefully unpack and inspect the unit and all accessories for damage.

If there is no exterior damage, unpack and inspect the equipment within five days of delivery. If you find any damage, keep the packing materials and immediately report the damage to the carrier. Do not return goods to the manufacturer without written authorization. When submitting a claim for shipping damage, request that the carrier inspect the shipping container and equipment.

The packaging can be stored and re-used.

Sublids provided with the unit should not be discarded and are to be used with freezer.

- Sublids are provided with the unit and number of sublids provided depend on the size of the unit.

Size(cu.ft)	No. of Sublids
3	1
13	2
20	3

Packing List

Inside the freezer cabinet is a bag containing:

- A handle lock key
- Certificates of conformance and calibration.
- A remote alarm contact connector
- Posts for rear spacing
- Ice Scraper & Magnetic hook

If you have ordered a chart recorder, the bag will also contain:

- Recorder installation instructions
- Extra paper

If you have ordered a backup system, the cabinet will also contain:

- A hose assembly
- English and metric connectors

If specified on the order, the bag may also include:

- A QC temperature graph and test log
- Calibration information

General Recommendations

Temperature Monitoring system

IMPORTANT NOTE: Thermo Fisher Scientific recommends the use of a redundant and independent temperature monitoring system so that the freezer can be monitored continuously for performance commensurate with the value of product stored.

General Usage

This refrigeration system is designed to maintain ultra-low temperatures with safety in an ambient environment within 15°C to 32°C (59°F to 90°F), only when the freezer is used for storage.

WARNING: This unit is not a “rapid-freeze” device. Freezing large quantities of liquid, or high-water content items, will temporarily increase the chamber temperature and will cause the compressors to operate for a prolonged time period.

Avoid opening the door for extended time periods since chamber temperature air will escape rapidly. Also, keep the inner doors/sublids closed as much as possible. When room air, which is higher in humidity, replaces chamber air, frost may develop in the chamber more rapidly.

Initial Loading

Remove and set aside inner sublids prior to loading. Allow the freezer to operate at the desired temperature for a minimum of 12 hours before loading.

- Load the freezer one shelf at a time, beginning with the bottom. After loading each shelf, allow the freezer to recover to the desired set point before loading the next shelf. Repeat this process until the freezer is fully loaded. After fully loaded, replace the inner sublids to ensure temperature control.
- Fill a chest by starting at the left side near the probe. Filling with room temperature racks will result in a long pull-down time.

CAUTION: Failure to follow these procedures or overloading the unit may cause undue stress on the compressors or jeopardize user product safety.

Grille Door Opening/ Closing

To open the grille door, pull the door from the left as shown in the figure below.

To close the grille door, push the door against frame to hold latch in position.

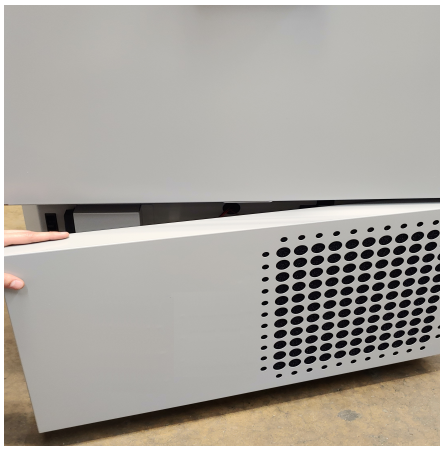


Figure 1. Door Opening

Operating Standards

The freezers described in this manual are classified for use as stationary equipment in a Pollution Degree 2 and Over voltage Category II environment.

These units are designed to operate under the following environmental conditions:

- Indoor use.
- Altitude up to 2000 m.
- Maximum relative humidity 60% for temperatures within 15°C to 32°C (59°F to 90°F).
- Main supply voltage fluctuations not to exceed ±10% of the nominal voltage for 115 V/60 Hz, 230 V/50 Hz & 200V/60Hz.
- Main supply voltage fluctuations not to exceed -10% or +6% of the nominal voltage for 208-230 V/60 Hz.
- Main supply voltage fluctuations not to exceed -5% or +10% of the nominal voltage for 100 V/60 Hz.

Electrical Specifications

The last character in the model number listed on the data-plate identifies the electrical specifications for your unit. Specific unit current rating is listed on the data-plate.

The voltage types are A, D, V, L & K as specified in the following table:

Table 2. Electrical Specifications by Size and Voltage

Size/ Voltage	Voltage	Frequency	Current*
063A	115 V	60 Hz	10.7 A
063V	230 V	50 Hz	5.6 A
063L	100 V	60 Hz	10.7 A
252A	115 V	60 Hz	11. 2 A
252D	208-230 V	60 Hz	5.4 A
252V	230 V	50 Hz	5.2 A
252K	200 V	60 Hz	5.4 A
396A	115 V	60 Hz	13.6 A
396D	208-230 V	60 Hz	5.8 A
396V	230 V	50 Hz	5.5 A
396K	200 V	60 Hz	5.8 A

* Values subject to change

Installation

The safety of any system incorporating this equipment is the responsibility of the assembler of the system.



WARNING: Do not exceed the electrical rating printed on the data plate located on the lower left side of the unit.



WARNING: Use care when closing the door/lid so that fingers are not pinched between cabinet and door/lid.



WARNING: The maximum weight capacity for the TDEC25286 (13 cu. ft) and TDEC39686 (20 cu. ft) chest freezers is 700 lbs/317.5 kgs. The maximum weight capacity for the TDEC06386 (3 cu. ft) chest freezer is 510 lbs/231.3kgs. The weight must be uniformly distributed across the bottom of the cabinet floor while stationary. All cabinets must be **completely empty** before moving.

Location

Install the unit in a level area free from vibration with a minimum of 8" (20 cm) of space on the sides, and 6" (15 cm) in back. For Upright cabinets, allow 8" (20 cm) of space on the top and for Chest cabinets, allow 6" (15 cm) of space in the front. Refer to **Leveling** for further instructions on leveling cabinets. Allow enough clearance so that door/lid can swing open at least 85°.

The rear spacing posts provided with the freezer can be used to ensure proper clearance. To install the spacing posts, screw them into the back side of the unit, in the rear deck area.

Do not position the equipment in direct sunlight or near heating diffusers, radiators, or other sources of heat. The ambient temperature range at the location must be 15°C to 32°C (59°F to 90°F).

Protective Conductor current

The maximum limit of 10mA shall not be exceeded when tested according to clause 5.5 (Measurement of protective conductor current) of EN 50678 or DIN VDE 0701-1 or DIN EN 50678 VDE 0701.

Wiring



CAUTION: Connect the equipment to the correct power source. Incorrect voltage can result in severe damage to the equipment.



CAUTION: For personal safety and trouble-free operation, this unit must be properly grounded before it is used. Failure to ground the equipment may cause personal injury or damage to the equipment. Always conform to the National Electrical Code and local codes. Do not connect the unit to overloaded power lines.



CAUTION: Do not position the unit in a way that impedes access to the disconnecting device or circuit breaker in the back of the unit.



CAUTION: Always connect the freezer to a dedicated (separate) circuit. Each freezer is equipped with a service cord and plug designed to connect it to a power outlet which delivers the correct voltage. Supply voltage must be within ±10% of the freezer rated voltage for 115 V/60 Hz, 230 V/50 Hz, & 200 V/60Hz. Supply voltage must be within -10% to +6% of the freezer rated voltage for 208-230 V/60 Hz. Supply voltage must be within -5% to +10% of the freezer rated voltage for 100 V/60 Hz. If cord becomes damaged, replace with a properly rated power supply cord.

Table 3. Power Cord Specification

Model	Power Cord Specification
A	3-G 12 AWG, NEMA 5-20P, 20 A/125 V
D	3-G 12 AWG, NEMA 6-15P, 15 A/250 V
V	3-G 1.5 mm², CEE 7/7, 16 A/250 V



CAUTION: Never remove or disable the grounding prong from the service cord plug. If the prong is removed, the warranty is invalidated.

Note: Any external electrical equipment connected to these chest freezers must meet the insulation requirements of IEC 61010-1.

Leveling

Make sure that the floor is level. The unit must be level both front to back and side to side.

Ensure to lock the brakes for units equipped with casters.

Ice Scraper

Remove the packing and make sure the scraper and magnetic hook are in good condition.
Do not use a damaged scraper as it may cause injury.
Use the magnetic hook to hang the scraper on the unit of convenience. The magnetic hook should be placed in the recommended area on either side of the unit as shown in figure 2.



Figure 2. Ice scraper

Backup System (Optional)

If you are using a CO_2 or LN_2 backup system, refer to **Backup System (Optional)** for installation and operation instructions.

Door Operation

Chest freezer models are equipped with a lid and handle for ultra-low temperature freezers.

Features include:

a. One-hand operation

b. A front-accessible lock

c. Sublids are provided as part of the unit to provide additional insulation.

Installing the Remote Alarm Connector

The remote alarm contacts are located on the back of the freezer above and to the left of the power switch. After installing the wiring from the remote alarm to the connector, install the connector to the freezer micro-board.

The pin configuration is shown in Figure 3 below.

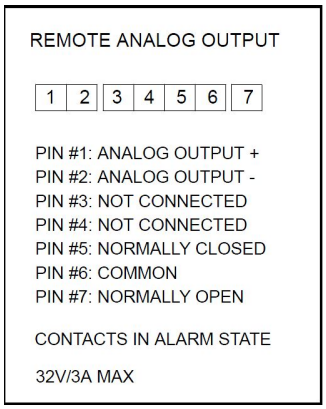


Figure 3. Remote Alarm Pin Configuration

For systems that alarm in closed state, connect to pins 5 & 6.
For systems that alarm in open state, connect to pins 6 & 7.

The contacts will trip in the event of a power outage, high temperature alarm, low temperature alarm or door ajar alarm.

Intended Use:

The -86°C ultra-low temperature freezers are intended for the storage and preservation of blood cells and blood components between -50°C and -86°C stored in suitable closed containers. The blood cells and blood components may be reintroduced into the human body. Additionally, the ULTs may be used for pharmaceutical and Vaccine between -50°C and -86°C.

The ULTs are intended to be used by medical and laboratory professionals. The ULTs are for use in a clinical laboratory environmental.

The ULTs are contraindicated for samples not compatible with the environmental storage conditions this product is designed to maintain

Essential Performance of this equipment is considered to be Maintaining temperature of the Clinical samples (Red blood cells, Plasma etc) and Vaccine/Pharmaceuticals as per storage condition.

Operation

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Initial Start Up

To start the freezer, complete the following steps:

1. Plug the freezer into the power outlet.
2. Turn the power switch ON. You can find the switch behind the front grille, on the left side.
3. Once the freezer is turned ON, the user interface will begin a start up procedure. Once ready for operation, the temperature is displayed on the screen.

Operation Overview

Once you have successfully completed the initial start up procedures, the freezer starts operating normally and the only actions required are:

- Setting the operating and alarm set points.
- Activating the CO_2 or LN_2 backup system if installed. For instructions on backup settings and activating the system, refer to **Backup System (Optional)**.

Display

The display screen below is the default screen.

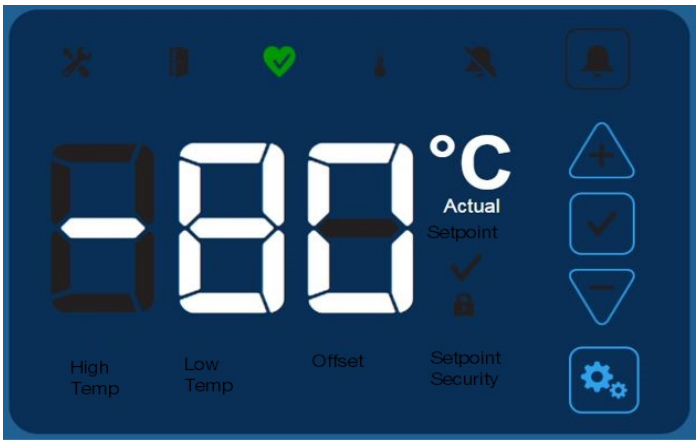


Figure 4. Display

The control panel consists of the 5 touch-point buttons located on the right side of the display.

1. **Alarm Bell –** This icon indicates visual and audible alarm that accompanies various alarm states. Pressing the alarm bell while in an alarm state will snooze the audible alarm for 10 minutes.
2. **Plus –** Increases the value of the selected setting.
3. **Check Mark –** Saves a change to the selected value.
4. **Minus –** Decreases the value of the selected setting.
5. **Settings –** The settings icon represents the various settings including:

- **Warm Alarm value** - The range of the warm alarm temperature is –40°C to within 5°C of setpoint.

  Note : The warm alarm will be disabled for 12 hours from a warm start condition.

- **Cold Alarm value** - The range is –99°C to within 5°C of setpoint.

  Note : A setpoint change may automatically change the warm/cold alarm setpoints as well to maintain a minimum 5°C separation from the control setpoint.

- **Offset value -** This is used for calibration. Range is –10°C to +10°C. Default is 0.

  Entering a positive offset value will yield a colder cabinet temperature.

  Entering a negative offset value will yield a warmer cabinet temperature.

  Press the gear icon three times and then press +/- to enter value.

- **Setpoint security code –** This code is a 3-digit numeric code. Refer to **Setpoint Security**.
- **Backup system type** (if backup system is installed) – Set the type to either LN_2 or CO_2 corresponding to the backup system that is installed.

- **Backup system setpoint** (if backup system is installed) - This setpoint indicates the temperature at which the backup system will begin cooling the cabinet. It is recommended to set the backup system setpoint at a minimum of 10°C warmer than the control setpoint. For more information, refer to **Backup System (Optional)**.

The message panel on the top indicates freezer health status and the various alarm or warning states.

1. **Wrench –** This is a generic service warning which corresponds to an intermittent flashing error code displayed on the screen. Refer to **Error Codes** for a list of error codes.
2. **Door –** This icon will illuminate during a door ajar alarm. A door open for more than 3 minutes will result in an audible door ajar alarm.
3. **Heart –** The heart is the health status for the freezer. A green heart indicates normal freezer operation. In an alarm state, this icon is not illuminated.
4. **Thermometer –** This indicates when the cabinet temperature exceeds either warm alarm or cold alarm setpoints and the audible alarm will occur.
5. **Snooze Bell –** This is only illuminated during an active alarm that has been silenced by the user.

Settings

If setpoint security is enabled, you must first enter the security code to make any setpoint changes. Refer to **Setpoint Security** to adjust setpoint security.

Control Setpoint

To modify the control temperature setpoint:

- Press the plus or minus button while displaying unit temperature ("Actual" is illuminated). The control setpoint is displayed.
- Adjust setpoint to desired temperature.
- Select the checkmark button to save the new control setpoint.

Other Setpoints and Settings

- Press the settings button to enter Settings menu.
- Continue pressing the settings button until the desired setting is illuminated on lower horizontal panel. (If backup system is installed, CO_2 or LN_2 is displayed after pressing the settings button 5 times.)
- Adjust the setting to desired temperature or value using the plus or minus buttons
- Press the checkmark button to save the new temperature or value
- After the value is saved, display will show the next option in the settings menu.

To return to the unit temperature display:

- Press the settings button until unit temperature is displayed ("Actual" is illuminated)
- If there is no activity after 5 minutes, the unit will automatically return to the temperature display.

Warm Alarm Test

Press the plus and checkmark buttons at the same time to initiate the warm alarm test. During the warm alarm test, the actual cabinet temperature will not be displayed. The display temperature will increase. Once the display temperature reaches the warm alarm setpoint, the alarm is activated. After 5 seconds, the test will automatically end and the display will return to the actual cabinet temperature.

Setpoint Security

- To adjust setpoint security in the settings menu, press the settings button 4 times
- The setpoint security code consists of 3 digits, each of which must be set in sequence from left to right
- Use the plus or minus button to adjust each value, and the checkmark button to save each value of the 3-digit security code



Figure 5. Set point

- If you forget the setpoint security code, contact customer support.

Power Down

To power down the ULT, first turn the breaker switch, located behind the front grille, to the off position. Once the switch is in the off position, the display will show “OFF” followed by “YES” and then “NO” in 2 second intervals. The checkmark will also be illuminated while “YES” and “NO” are showing. Press the checkmark while “YES” is showing. With a flashing “YES”, you are required to confirm by pressing the checkmark button a second time. Power down will then be complete.

If the checkmark button is pressed while “NO” is illuminated or if no action is taken for 5 minutes, this is interpreted as a power failure. In this case, the user interface will stay on (using battery power only) and an audible alarm will sound to indicate power failure. If installed, the backup system will remain active and inject per the backup system settings.

Ice Scraper Instruction

Purpose

The ice scraper is used to scrape any frost accumulated on the cabinet breaker and other hard surfaces inside the freezer.

It is recommended that the ice scraper is used every month to obtain the best performance of the freezer.

To help minimize ice build-up, try to move samples in and out as quickly as possible.

Informational Notice

The ice scraper should not be used as any other tool and for any other purpose except for scraping hard surfaces.
Do not use the scraper as a tool to open the door before the PEP time expires.(Uprights only).

Precautions and Usage

- Read the following instructions carefully, since they provide useful safety information about installation, use and maintenance to help avoid mishaps and possible accidents.
- Remove the packing and make sure the scraper and magnetic hook are in good condition.
- Do not use a damaged scraper as it may cause injury.
- Use the magnetic hook to hang the scraper on the unit for convenience. The magnetic hook should be placed in the recommended area on either side of the unit as shown in Figure 2.
- Use the scraper provided with your equipment to scrape the ice or frost formed on the cabinet breaker and other hard surfaces inside the freezer.
- To prevent gasket damage, do not use the scraper on the gasket.
- To remove the ice from the gasket, refer to the **Gasket Maintenance** section.

CAUTION: Do not misuse the scraper for any purpose other than the defined purpose.

CAUTION: The manufacturer cannot be responsible for any damages deriving from improper, wrong or incautious use.

Backup System (Optional)

For all ultra-low temperature cold storage products, we recommend the use of a backup system (BUS) for the security of your samples.

When you purchase a built-in CO_2 or LN_2 optional backup system for the freezer, backup control is integrated into the main user interface.

Note: For stand-alone backup systems, refer to installation instructions provided with the backup system kit.

WARNING: Always purchase the cylinders which are equipped with siphon tubes for withdrawing liquid from the bottom of the cylinder. CO_2 cylinders must be kept at room temperature to function properly. LN_2 bottles are functional at any reasonable temperature.

CO_2 and LN_2 Precautions

The following are precautions for using liquid CO_2 and LN_2 backup systems.

WARNING: If a CO_2 or LN_2 cylinder falls and a valve is knocked off, the cylinder becomes a deadly and completely unguided missile. Transport the cylinders in a hand-truck or cart with secure chain ties for the cylinder. After cylinders are connected to the equipment, securely attach them with chains to a solid stationary object such as a building column.

WARNING: CO_2 and LN_2 liquids are non-poisonous but are very cold and will burn unprotected skin. Always wear protective eye wear and clothing when changing cylinders or working on the piping systems attached to an active source of liquid refrigerant.

WARNING: The gases produced by evaporation of CO_2 or LN_2 are non-poisonous but displace the oxygen in a confined space and can cause asphyxiation. Do not store the cylinders in subsurface or enclosed areas.

WARNING: When closing the cylinder valve, make sure that the injection solenoid is energized to allow all the liquid to bleed off instead of being trapped in the supply hose. Failure to do this results in activation of the pressure relief device, which could damage the freezer and requires replacing if it is activated.

WARNING: For models ordered with factory installed built-in backup systems, the flow of liquid CO_2 or LN_2 will be discontinued if the door/ lid is opened during operation of the backup system. For units operated with free-standing, field installed type backup system, the flow of liquid CO_2 or LN_2 will be discontinued upon door/ lid opening only if the switch provided with the free-standing package is installed on the freezer.

Installation

Field installed systems are supplied with complete installation and operating instructions. If your system is factory installed, the freezer is shipped with a coiled length of hose to connect the freezer to the bottles:

- 1/4" Flexible Hose with fittings for connection to the CO_2 supply.
- 1/2" Flexible Hose with fittings for connection to the LN_2 supply.

To install,

1. Straighten the coiled hose.
2. Connect one end to the labeled connection on the freezer.
   - Tighten the nut two flats past finger tight, approximately 120 degrees.

Note: For CO_2, remove the threaded fitting from the nut on the end of the copper tubing to access nut for connection to the freezer. Discard the threaded fitting.

3. Attach the other end to the supply bottle or building supply fitting.

- For CO_2:
  - Remove Nipple from adapter (NPT Connection). Remove cable tie to release alternative nut and washer. Ensure the correct nut fitting is supplied over the nipple (US or European).
  - Add 2 wraps of Teflon tape clockwise to the 1/4" NPT fitting (on the nipple) when viewed from the threads. Tighten the NPT fittings approximately 2 turns from finger tight (approximately 720°).

    Note : The top of the nipple has a hex configuration, allowing for use of a wrench when the nut is pulled down.
  - Add washer to nipple inside of nut (unless CO_2 supply has a built in washer).

    Note : Small raised area of washer fits into groove of nipple. The washer will feel snug when trying to shift side-to-side on nipple. The washers are designed for a limited number of attachments/disconnections from the supply and may wear over time. If washer appears worn and causes CO_2 leakage, replace washer (Part Number 45705H03).
  - Wrench tighten the supply nut to the supply.
  - For LN_2: Attach the fitting to the supply and wrench tighten.

Note: Do not twist, torque, or subject the flexible hose to sharp bends. Doing so may shorten the life of the hose.

Start Up

When the unit is started, it will recognize if a backup system is installed.

1. Follow the instructions in **Backup System (Optional)** to set the backup system type and setpoint.
2. It is recommended to test backup system operation prior to sample storage.

Test BUS Operation

After the freezer has stabilized and both batteries are fully charged, the BUS can be tested to verify proper operation.

1. Disconnect the AC power to the freezer by turning the power switch off.
2. As the freezer warms up, verify the BUS injects at the desired temperature. Displayed temperature may vary by a few degrees from injection temperature due to the differences in probe locations.

Note: On a monthly basis, it is recommended to test your backup system, check the supply tank system levels, and check the backup battery voltage.

Operation

The backup system can run for a minimum of 24 hours on battery power.

On average, a backup system in operation uses 8 to 10 lbs. per hour of CO_2 (3.6 to 4.5 L/hr) or LN_2 (4.5 to 5.6 L/hr) at an ambient temperature of 25°C.

This rate will vary depending on set point, load, ambient temperature and freezer size.

Chart Recorders (Optional)

Panel-mounted six-inch seven-day recorders are available as options for all freezer models except for the smaller 300 box capacity models.

Set Up and Operation

To prepare the recorder to function properly, complete the following steps:

1. Open the grille door to access the recorder.
2. Install clean chart paper (refer to **Changing Chart Paper**).
3. Remove the plastic cap from the pen stylus or ink pen and close the recorder door.

Recorder operation begins when the system is powered on. The recorder may not respond until the system reaches temperatures within the recorder's range.

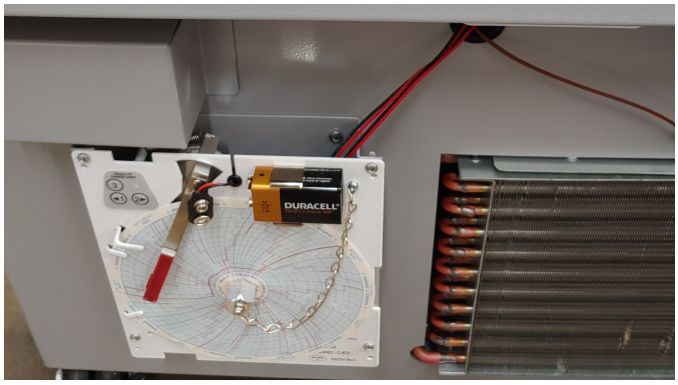


Figure 6. Chart Recorder

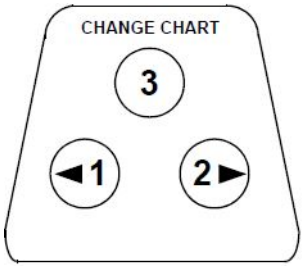


Figure 7. Chart Buttons

CAUTION: Do not use sharp or pointed objects to depress the chart buttons. This may cause permanent damage to the recorder.

Changing Chart Paper

To change the chart paper, complete the following steps:

1. Locate the pressure sensitive buttons at the front, upper left of the recorder panel.
2. Press and hold the Change Chart button (#3) for one second. The pen will move off the scale.
3. Unscrew the center nut, remove the old chart paper, and install new chart paper. Carefully align the day and time with the reference mark (a small groove on the left side of the recorder panel).
4. Replace the center nut and hand tighten. Press the Change Chart button again to resume temperature recording.

Calibration Adjustment

This recorder has been accurately calibrated at the factory and retains calibration even during power interruptions. If required, however, adjustments can be made as follows:

1. Run the unit continuously at the control set point temperature. Continue steady operation for at least two hours to provide adequate time for recorder response.
2. Measure cabinet center temperature with a calibrated temperature monitor.
3. Compare the recorder temperature to the measured cabinet temperature. If necessary, adjust recorder by pressing the left (#1) and right (#2) chart buttons.

Note: The stylus does not begin to move until the top center button (#3) is held for five seconds.

Maintenance

WARNING: Unauthorized repair of your freezer will invalidate your warranty. Contact Technical Service. See **Contact Information** for phone numbers.

CAUTION: Maintenance should only be performed by trained personnel.

Cleaning the Condenser

Clean the condenser at least every six months; more often if the laboratory area is dusty.

To clean the condenser, complete the following steps:

1. Pull the grille door open.
2. Vacuum the condenser.
3. Inspect the filter cleanliness and clean as required.
4. Close the grille door.

Cleaning the Condenser Filter

Clean the condenser filters every two or three months.

1. Pull the grille door open.
2. Remove the filter.
3. Shake the filter to remove loose dust, rinse the filters in clean water, shake the excess water from the filter, and replace the filter.
4. Close the grille door.

Gasket Maintenance

Periodically check the gaskets around the door/ lid for punctures or tears. Leaks are indicated by a streak of frost which forms at the point of gasket failure. Ensure that the cabinet is level (refer **Leveling** for leveling information).

Keep the door gaskets clean and frost free. Wipe with a soft cloth or cryo-gloved hand. If needed, a rubber mallet may be gently used to loosen ice.

Defrosting the Freezer

Defrost the freezer once per year or whenever the ice buildup exceeds 3/8". To defrost, complete the following steps:

1. Remove all products and place in another ULT freezer.
2. Turn off the freezer.
3. Open the outer door/lid and all inner doors/sublids (set aside when performing the defrost).
4. Let the freezer stand with doors/lid open for at least 24 hours. This allows both the interior and foamed refrigeration system to warm to room temperature.
5. Dispose of the ice and wipe out any water standing in the bottom of the cabinet.
6. If there is freezer odor, wash the interior with a solution of baking soda and warm water.
7. Clean the exterior with any common household cleaner.
8. Close the doors, restart the freezer and reload. Refer **Initial Loading** to follow the instructions.

Battery Maintenance

The freezer monitors the voltage status of the battery daily and indicates the battery's voltage via visual and auditory alarm. Replace the battery as indicated by system alarms or as necessary per individual status evaluation. Check the battery connections regularly. Although not required, annual battery replacement is recommended to ensure proper battery status in the event of power failure.

For safety, it is recommended to power off the unit and disconnect it from the power source before replacing the battery. Battery terminals are color coded in red and black. Ensure the corresponding colored wires are connected to the matching color terminals on the battery.

The unit must be turned off and disconnected from power before removing the side panel. To install a new battery,

remove the side panel, remove the battery bracket, install the new battery, then replace bracket and side panel.

Failure to properly connect the battery can damage electrical components and potentially hinder normal operation of the freezer. Consult a certified service technician if there are any questions or concerns about battery maintenance.

Battery Specification:

Rechargeable sealed lead-acid battery, 12 V, 7.0 Amp Hr.

Replacement batteries can be purchased directly from Thermo Fisher Scientific.

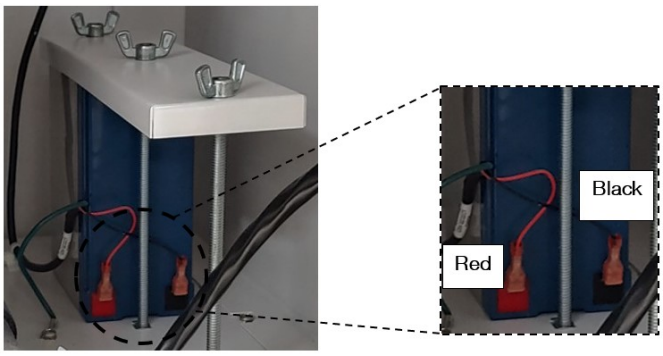


Figure 8. Battery Specification

Maintenance Schedule

Regular maintenance is important to keep the unit working properly. Inspect/clean as directed in the manual.

Item	Interval
Ice/Frost build up	To maintain proper closure of sublids, remove any ice or frost build up around the gasket, sublids and breakers as necessary.
Gasket	Periodically check the gaskets around the lid for punctures or tears. Periodically clean the ice-build up around the gasket.
Filter	Clean the condenser filter(s) every two to three months.
Condenser	Clean every six months, more often if the laboratory area is dusty.
Battery	Replace the battery as indicated by system alarms or as necessary per individual status evaluation. Check the battery connections regularly. Although not required, annual battery replacement is recommended to ensure proper battery status in the event of power failure.
Defrost	Defrost the freezer once a year or when the ice build exceeds 3/8" (0.95 cm)

Troubleshooting Guide

This section is a guide to troubleshoot general operational problems.

Problem	Cause	Solution
Unit warming. Not reaching set point. Unit recovers slowly to set point.	Warm load/Over load.	Allow ample time to recover from loading warm product. Do not overload cabinet. Refer **Initial Loading** in user manual for loading procedures.
	Hot environment.	Check, if the location meets ambient requirements (within 15°C to 32°C or 59°F to 90°F) and away from hot objects.
	Dirty condenser and condenser filter.	Clean condenser and filter. Refer **Cleaning the Condenser** and **Cleaning the Condenser Filter** in user manual.
	Not enough space for air circulation.	Install the unit in a level area free from vibration with a minimum of 8" (20 cm) of space on the top and sides, 6" (15 cm) in back.
	Icing/Frost due to high relative humidity.	Check if the location meets requirements. Maximum relative humidity 60% for temperatures within 15°C to 32°C (59°F to 90°F).
	Excess frost build-up in chamber.	Defrost the unit. Refer **Defrosting the Freezer** in user manual.
	Frost build-up on lid gasket.	Wipe with a soft cloth or cryo-gloved hand. Do not use a sharp tool. Be careful not to puncture the rubber gasket.
	Gasket damage.	Check for punctures or tears on gasket. Replace if necessary. Refer **Gasket Maintenance** in user manual.
	Prolonged lid openings.	Avoid opening of lid for a prolonged time. Allow ample time for recovery after door opening.
	Inadequate power supply.	Check for proper voltage to the unit.
	Either of the compressors are not working.	Call service.
User interface (Display) failure.	Breaker switch off.	Check circuit breaker and reset to on position. Always use a dedicated, properly grounded circuit.

Problem	Cause	Solution
	Electromagnetic fields	Call service. The freezer continues to maintain its set temperature
	For any other reason:	Contact service person we recommend the use of a redundant and independent temperature monitoring system and that freezer be monitored 24/7 for performance commensurate with the value of product stored. Remote alarm continues to function and it provides any alarm as needed when temperature changes or power outage or door ajar. Connect the remote alarm to monitor the alarms on the unit.
Power failure to the unit.	Power supply stopped/ Breaker switch off.	Confirm that the cord is securely plugged in. Plug another appliance into the outlet to see if power is present. Always use a dedicated, properly grounded circuit.
Unit tripping the circuit breaker.	Shared power source.	Never connect unit to overloaded power source. Always use a dedicated (separate) circuit.
	Unit plugged into wrong power outlet.	Plug the unit into proper power source to deliver correct voltage.
	Unit not grounded.	Your unit must be properly grounded in conformity with national and local electrical codes. Troubleshooting procedures involving live voltage is dangerous and if done improperly can result in injury and/or death. This troubleshooting should be performed by trained personnel only.
	Use of extended cords.	Do not use an extension cord. Make sure the unit supplied power cord is plugged directly into power outlet.
Excessive frost build-up around perimeter of door.	Icing/Frost due to high relative humidity.	Check if the location meets requirements. Maximum relative humidity 60% for temperatures within 15°C to 32°C (59°F to 90°F). Occasionally scrape the ice on the lid. Be careful not to puncture the rubber gasket.
	Excessive and prolonged lid openings.	Avoid opening lid for a prolonged time.
	Gasket damage.	Check for punctures or tears on gasket. If replacement is necessary, call service. Refer **Gasket Maintenance** in user manual.
Unit is over cooling.	Set points may have changed.	Adjust the setpoint to run at desired setpoint under settings.
	Temperature offset may have changed.	Try adjusting the offset. Temperature offset can be set by accessing the settings menu via the settings button.
	Unknown.	Try re-starting the unit. If this doesn't help call service.

Problem	Cause	Solution
Unit compressors run continuously.	Freezer set point is low.	Check whether the setpoint is in operating range. Change the setpoint if necessary.
	Frost build up.	Defrost the unit. Refer **Defrosting the Freezer** in user manual.
	Dirty condenser.	Clean the condenser and condenser filter.
	Gasket damage.	Check for punctures or tears on gasket. If replacement is necessary, call service. Refer **Gasket Maintenance** in user manual.
Cabinet temperature reached an alarm condition, but suitable alarm is not activated.	Alarm setpoints may be changed.	Check the present setpoints for temperature alarm conditions. Change the setpoints if required.
Problem with temperature validation/calibration.	Cabinet temperature displayed doesn't match with actual temperature.	Customers performing on-site temperature calibration may observe as much as a 2°C variation when an external probe is placed next to the freezer control probe. This variation is normal due to optimisation of the control system to ensure temperature uniformity throughout the cabinet.
Unit is constantly alarming.	Exterior lid is closed but not sealed completely.	Clean any ice build-up on gasket and/or cabinet surface. Check for punctures or tears on gasket.
	Door open alarm, exterior door not closing completely.	Open door completely and immediately close and latch it.
	Door open alarm, lid is closed but not sealed completely.	Defrost exterior lid gasket and make sure the door is completely sealed.
	Alarm set points may have changed.	Change the set points as required.
Unit cycle on-percentage is increasing (Compressors are running more often than before).	Ambient conditions.	Unit performance is directly impacted by these causes mentioned. Try maintaining ambient conditions, reducing load, reducing door openings.
	Warm load (or) over load.	
	Frequent and prolonged lid openings.	Once temperature is stable, cycle dynamics should return to normal range. If not call service.
Difficult to close/open the outer door.	Unit is not level.	Make sure the unit is level. Refer **Leveling** in the user manual for levelling procedure.
Outer door alignment issues.	Frost accumulated on lid gasket.	Wipe with a soft cloth or cryo-gloved hand. Do not puncture gasket.
Difficult to close/open the sublid.	Frost accumulated around inner sublid.	Remove frost or ice build-up from sublid assembly.

Problem	Cause	Solution
Vibration noise.	Unit is not level.	Check if the unit is installed in a level area free from vibration. (Refer to **Leveling** in user manual).
Rattling noise/Loud noise.	Loose side panels.	Check side panel screws, tighten them if necessary.
	Rubber tubing separators and/or compressor dampeners may have loosened.	Call service.

Error Codes

Error Code	Description
E00	Undefined model
E01	Firmware Build Incompatible
E02	Control Probe Failure
E03	Heat Exchanger Probe Failure
E04	Power Failure
E05	Failure to Reach Setpoint
E06	BUS Battery - Low Voltage
E07	System Battery - Low Voltage
E08	Lost Communication Failure (Main to UI)
E09	Lost Communication Failure (BUS)
E10	Stuck Button
E11	Ambient Probe Failure
E12	System Battery Disconnected
E13	BUS Probe Failure
E14	BUS Battery Disconnected
EA1	Wrong Power

Warranty

Be sure to register your warranty online:

www.thermofisher.com/labwarranty

THERMO FISHER SCIENTIFIC USA FREEZER WARRANTY FOR Thermo Scientific TDE series.

The Warranty Period starts two weeks from the date your equipment is shipped from our facility. This allows for shipping time so the warranty will go into effect at approximately the same time your equipment is delivered. The warranty protection extends to any subsequent owner during the warranty period.

Component parts proven to be non-conforming in materials or workmanship will be repaired or replaced at Thermo Fisher Scientific's expense, labor included, for a period of five years. Installation and calibration is not covered by this warranty agreement. The Technical Services Department must be contacted for warranty determination and direction prior to any work being performed. Expendable items, i.e., glass, filters, pilot lights, light bulbs, batteries and door gaskets are excluded from this warranty.

Replacement or repair of component parts or equipment under this warranty shall not extend the warranty to either the equipment or to the component part beyond the original five year warranty period. The Technical Services Department must give prior approval for the return of any components or equipment.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL, OR IMPLIED. NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY. Thermo shall not be liable for any indirect or consequential damages including, without limitation, damages relating to lost profits or loss of products.

Your local Thermo Fisher Scientific Sales Office is ready to help with comprehensive site preparation information before your equipment arrives. Printed instruction manuals carefully detail equipment installation, operation, and preventive maintenance.

If equipment service is required, please call your Technical Services Department at 1-866-984-3766 (USA and Canada). We're ready to answer your questions on equipment warranty, operation, maintenance, service, and special applications. Outside the USA, contact your local Thermo Fisher Scientific office or distributor for warranty information.

Warranty (International)

THERMO FISHER SCIENTIFIC FREEZER INTERNATIONAL WARRANTY FOR Thermo Scientific TDE series.

The Warranty Period starts two months from the date your equipment is shipped from our facility. This allows for shipping time so the warranty will go into effect at approximately the same time your equipment is delivered. The warranty protection extends to any subsequent owner during the warranty period. Dealers who stock our equipment are allowed an additional four months for delivery and installation, providing the warranty card is completed and returned to the Technical Services Department.

Component parts proven to be non-conforming in materials or workmanship will be repaired or replaced at Thermo Fisher Scientific's expense, labor excluded, for a period of five years. Installation and calibration is not covered by this warranty agreement. The Technical Services Department must be contacted for warranty determination and direction prior to any work being performed. Expendable items, i.e., glass, filters, pilot lights, light bulbs, batteries and door gaskets are excluded from this warranty.

Replacement or repair of component parts or equipment under this warranty shall not extend the warranty to either the equipment or to the component part beyond the original five year warranty period. The Technical Services Department must give prior approval for the return of any components or equipment.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL, OR IMPLIED. NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY. Thermo shall not be liable for any indirect or consequential damages including, without limitation, damages relating to lost profits or loss of products.

Your local Thermo Fisher Scientific Sales Office is ready to help with comprehensive site preparation information before your equipment arrives. Printed instruction manuals carefully detail equipment installation, operation, and preventive maintenance.

If equipment service is required, please contact your local Thermo Fisher Scientific office or local distributor.

We're ready to answer your questions on equipment warranty, operation, maintenance, service, and special applications. Outside the USA, contact your local Thermo Fisher Scientific office or distributor for warranty information.

Appendix A: Alarm Summary

Alarm Summary			
Alarm Message	**Warning Icon**	**Remote Alarm Event**	**Description**
Warm Alarm	Thermometer	Yes	The freezer temperature has exceeded the warm alarm set point. Prolonged lid openings and warm product loading may cause warm alarms.
Cold Alarm	Thermometer	Yes	The freezer temperature has exceeded the cold alarm set point.
Lid Open Ajar	Door/Lid	Yes	Lid open for greater than 3 minutes will cause door open alarm.
Control Probe Failure	Wrench	Yes	Cannot display cabinet temperature. The freezer will continue to operate in full run mode. Contact customer service. Display will intermittently show “E02”.
Heat Exchange Probe Failure	Wrench	Yes	The freezer will continue to operate with current freezer setpoints, but cabinet temperature variation will increase. Contact customer service. Display will intermittently show “E03”.
Ambient Probe Failure	Wrench	Yes	Ambient Probe TC has malfunctioned. This doesn't affect the performance of the unit. Contact service for further assistance. Display will intermittently show “E11”.
Main to UI Lost Communication	Wrench	Yes	A communication error has occurred within the system. Contact customer service. Display will intermittently show “E08”.
BUS Lost Communication	Wrench	Yes	A communication error has occurred within the backup system. Contact customer service. Display will intermittently show “E09”.
Failure to Reach Set point	Wrench	Yes	Lid openings or product loading may cause this notification. Allow unit to stabilize. If condition persists, contact customer service. Display will intermittently show “E05”.
Power Failure Alarm	Wrench	Yes	Unit in power failure mode. Display operating on battery power. Check unit plug, unit circuit breaker in the ON position, and supply voltage. Display will intermittently show “E04”.

Alarm Summary			
Alarm Message	**Warning Icon**	**Remote Alarm Event**	**Description**
Wrong Model Alarm	Wrench	Yes	Invalid Control Model Alarm. Contact service to ensure the correct model is selected for the system to avoid cargo loss. Display will intermittently show “E00”.
Firmware Build Incompatible	Wrench	Yes	Firmware build indicates incompatibility that can result in modules to be non-coherent. Display will intermittently show “E01”.
System Battery Low Voltage Alarm	Wrench	Yes	System Battery voltage is too low. If error persists, the battery may need to be replaced. Display will intermittently show “E07”.
BUS Battery Low Voltage Alarm	Wrench	Yes	BUS Battery voltage is too low. If error persists, the battery may need to be replaced. Display will intermittently show “E06”.
Stuck Button Alarm	Wrench	Yes	A button has been pressed for more than 5 minutes. Display will intermittently show “E10”.
System Battery Failure Alarm	Wrench	Yes	System Battery disconnected or failed. Display will intermittently show “E12”.
BUS Probe Failure Alarm	Wrench	Yes	BUS cannot detect temperature. BUS will continuously inject. Contact Customer service. Display will intermittently show “E13”
BUS Battery Failure Alarm	Wrench	Yes	BUS battery disconnected or failed. Display will intermittently show “E14”.
Wrong Power Alarm	Wrench	Yes	The unit has detected the Wrong Power connected. Verify the proper voltage. Display will intermittently show “EA1”.

Appendix B: Modbus ASCII Parameter Table

The MODBUS interface is intended to be used with cable DLCPTDATA101 (328928H02)

If you plan to use your own harness:
J6, pin 3 is RS485A
J6, pin 2 is RS485B
J6, pin 5 is ground

Protocol	MODBUS ASCII
Baud Rate	2400bps to 57.6Kbps
Data Bits	7
Stop Bits	1
Parity	Even
Flow Control	None
Address	0 to 255

S.No	Parameter	Function code	Address in hexadecimal	Size	Modbus command	Relay Enclosure Response	Data	Data Type	Remarks
1	cabinet setpoint (c)	0x03	530	2	3a 31 39 30 33 **30 35 33 30** 30 30 30 32 41 44 0d 0a	3A 31 39 30 33 30 34 **46 46 46 46 46 46 43 45 30** 30 32 0D 0A	0xFFFFFCE0	int	Convert the data value into signed 2's complement and divide with 10, which gives the setpoint. Ex: Signed 2's complement of the 0xFFFFFCE0 is equal to 800. –800/10= –80. So the setpoint is –80C.
2	Warm Alarm Setpoint (C)	0x03	538	2	3a 31 39 30 33 **30 35 33 38** 30 30 30 32 41 35 0d 0a	3A 31 39 30 33 30 34 **46 46 46 46 46 46 44 34 34** 39 44 0D 0A	0xFFFFFD44	int	covert the data value int0 signed 2's complement and divide with 10, which gives the setpoint. EX: signed 2's complement of the 0xFFFFFD44 is equal to -700. -700/10=-70. so the WA setpoint is -70C.

S.No	Parameter	Function code	Address in hexadecimal	Size	Modbus command	Relay Enclosure Response	Data	Data Type	Remarks
3	Cold Alarm Setpoint (C)	0x03	53C	2	3a 31 39 30 33 **30 35 33 43** 30 30 30 32 41 31 0d 0a	3A 31 39 30 33 30 34 **46 46 46 46 46 46 43 37 43** 36 36 0D 0A	0xFF FFFC 7C	int	convert the data value into signed 2's complement and divide with 10, which gives the setpoint. EX: signed 2's comple-ment of the 0xFFFFFC7 is equal to -900. -900/10=-90. So the CA setpoint is -90C.
4	System Bill of Material Part Number	0x03	570	10	3a 31 39 30 33 **30 35 37 30** 30 30 30 41 36 35 0d 0a	3A 31 39 30 33 32 34 **33 31 33 33 35 33 35 34 34 35 32 33 30 34 31 33 30 33 31 35 32 32 30 32 30 32 30 30 32 30 30 32 30 32 30 30 32 30 32 30 30 32 30** 44 30 0D 0A	155D R0A0 1R	String	All the remaining are spaces.
5	Product ID	0x03	598	2	3a 31 39 30 33 **30 35 39 38** 30 30 30 32 34 35 0d 0a	3A 31 39 30 33 30 34 **30 30 30 31 45 32 34 30** 42 39 0D 0A	0x00 01E2 40	unit	123456 would be enclosed as 0x01E240.
6	Control Model	0x03	59C	1	3a 31 39 30 33 **30 35 39 43** 30 30 30 31 34 32 0d 0a	3A 31 39 30 33 30 32 **30 34** 44 45 0D 0A	0x04	uchar	Note: bits b4:b1 0000: PEEK Production code (CNTRL 0) 0002: Variable speed compressor (CNTRL 2) 0003: single Speed and Cascade System (CNTRL 3) 0004: Single Speed and Single Stage System (CNTRL 4) 0005: Single Speed and Cascade System (CNTRL 5)

S.No	Parameter	Function code	Address in hexadecimal	Size	Modbus command	Relay Enclosure Response	Data	Data Type	Remarks
7	Size	0x03	59D	1	3a 31 39 30 33 **30 35 39 44** 30 30 30 31 34 31 0d 0a	3A 31 39 30 33 30 32 **30 32** 45 30 0D 0A	0x02	uchar	5 units sizes 1 - 300, 2 - 400, 3 - 500, 4 - 600, 5 - 700
8	TC1	0x03	4C8	2	3a 31 39 30 33 **30 34 43 38** 30 30 30 32 31 36 0d 0a	3A 31 39 30 33 30 34 **34 31 42 34 33 31 39 31** 32 31 0D 0A	0x41 B831 91	Float	Convert the Float to decimal with below steps: 1.Open the link https://www.h-schmidt.net/FloatConverter/IEEE754.html 2.Paste the data in “Hexadecimal Representation” and press Enter. 3.The temp value is shown in “Decimal representation”
9	TC2	0x03	4CC	2	3a 31 39 30 33 **30 34 43 43** 30 30 30 32 31 32 0d 0a	3A 31 39 30 33 30 **34 34 31 42 42 34 34 45 34** 42 34 0D 0A	0x41 BB48 E4	Float	Convert the Float to decimal with below steps: 1.Open the link https://www.h-schmidt.net/FloatConverter/IEEE754.html 2.Paste the data in “Hexadecimal Representation” and press Enter. 3.The temp value is shown in “Decimal representation”

S.No	Parameter	Function code	Address in hexadecimal	size	Modbus command	Relay Enclosure response	Data	Data type	Remarks
10	TC3	0x03	4D0	2	3a 31 39 30 33 **30** **34 44 30** 30 30 30 32 30 45 0d 0a	3A 31 39 30 33 30 34 **34 31** **42 42 30** **43 41 43** 32 34 0D 0A	0x41 BB0 CAC	Float	Convert the Float to decimal with below steps: 1.Open the link https://www.h-schmidt.net/FloatConverter/IEEE754.html 2.Paste the data in “Hexadecimal Representation” and press Enter. 3.The temp value is shown in “Decimal representation”
11	TC4	0x03	4D4	2	3a 31 39 30 33 **30** **34 44 34** 30 30 30 32 30 41 0d 0a	3A 31 39 30 33 30 34 **34 31** **45 35 34** **31 36 45** 43 37 0D 0A	0x41 E581 6E	Float	Convert the Float to decimal with below steps: 1.Open the link https://www.h-schmidt.net/FloatConverter/IEEE754.html 2.Paste the data in “Hexadecimal Representation” and press Enter. 3.The temp value is shown in “Decimal representation”
12	TC5	0x03	4D8	2	3a 31 39 30 33 **30** **34 44 38** 30 30 30 32 30 36 0d 0a	3A 31 39 30 33 30 34 **43 32** **46 45 30** **30 30 30** 31 43 0D 0A	0xC2 FE00 00	Float	Convert the Float to decimal with below steps: 1.Open the link https://www.h-schmidt.net/FloatConverter/IEEE754.html 2.Paste the data in “Hexadecimal Representation” and press Enter. 3.The temp value is shown in “Decimal representation”
13	TC6	0x03	4DC	2	3a 31 39 30 33 **30** **34 44 43** 30 30 30 32 30 32 0d 0a	3A 31 39 30 33 30 34 **43 32** **46 45 30** **30 30 30** 31 43 0D 0A	0xC2 FE00 00	Float	Convert the Float to decimal with below steps: 1.Open the link https://www.h-schmidt.net/FloatConverter/IEEE754.html 2.Paste the data in “Hexadecimal Representation” and press Enter. 3.The temp value is shown in “Decimal representation”

S.No	Parameter	Function code	Address in hexadecimal	size	Modbus command	Relay Enclosure response	Data	Data type	Remarks
14	TC7	0x03	2E0	2	3a 31 39 30 33 **30** **34 45 30** 30 30 30 32 46 45 0d 0a	3A 31 39 30 33 30 34 **43 32** **46 45 30** **30 30 30** 31 43 0D 0A	0xC2 FE00 00	Float	Convert the Float to decimal with below steps: 1.Open the link https://www.h-schmidt.net/FloatConverter/IEEE754.html 2.Paste the data in “Hexadecimal Representation” and press Enter. 3.The temp value is shown in “Decimal representation”
15	TC8	0x03	4E4	2	3a 31 39 30 33 **30** **34 45 34** 30 30 30 32 46 41 0d 0a	3A 31 39 30 33 30 34 **34 31** **42 43 43** **44 39 46** 37 33 0D 0A	0x41 BCC D9F	Float	Convert the Float to decimal with below steps: 1.Open the link https://www.h-schmidt.net/FloatConverter/IEEE754.html 2.Paste the data in “Hexadecimal Representation” and press Enter. 3.The temp value is shown in “Decimal representation”
16	TC9	0x03	4E8	2	3a 31 39 30 33 **30** **34 45 38** 30 30 30 32 46 36 0d 0a	3A 31 39 30 33 30 **34 34 31** **42 45 32** **34 41 31** 31 34 0D 0A	0x41 BE28 A1	Float	Convert the Float to decimal with below steps: 1.Open the link https://www.h-schmidt.net/FloatConverter/IEEE754.html 2.Paste the data in “Hexadecimal Representation” and press Enter. 3.The temp value is shown in “Decimal representation”
17	TC10	0x03	4EC	2	3a 31 39 30 33 **30** **34 45 43** 30 30 30 32 46 32 0d 0a	3A 31 39 30 33 30 34 **34 31** **42 45 32** **43 37 45** 33 33 0D 0A	0x41 BE2 C7E	Float	Convert the Float to decimal with below steps: 1.Open the link https://www.h-schmidt.net/FloatConverter/IEEE754.html 2.Paste the data in “Hexadecimal Representation” and press Enter. 3.The temp value is shown in “Decimal representation”

S.No	Parameter	Function Code	Address in hexadecimal	Size	Modbus	Relay Enclosure Response	Data	Data Type	Remarks
18	Display Managed RTD Temperature	0x03	500	2	3a 31 39 30 33 **30** **35 30 30** 30 30 30 32 44 44 0d 0a	3A 31 39 30 33 30 34 **46 46** **46 46 46** **46 42 33** 32 43 0D 0A	0xFF FFFB 2	int	Convert the data value into signed 2's complement which gives the data. Ex: Signed 2's complement of the 0xFFFFFB2 is equal to –78. So the Display Managed RTD Temperature value is –78°C.
19	Alarms	0x03	514	2	3a 31 39 30 33 **30** **35 31 34** 30 30 30 32 43 39 0d 0a	3A 31 39 30 33 30 34 **30 30** **30 30 30** **34 30 32** 44 36 0D 0A	0x00 0004 02	unit	1 = Active / 0 = Inactive b19 BUS Battery Disconnection, b18 System Battery Disconnection, b17 Water temperature, b16 Wrong Power, b15 Refrigeration System Failure (TSX only), b14 Reserved for factory use only (Water Cooled pressure alarm if applicable), b13 Unused, b12 Clean filter Alarm, b11 Reserved for factory use only, b10 Buck boost ineffective, b9 BUS battery low, b8 Setpoint attain timed out (every cycle), b7 Health of compressor (sump temp), b6 - Extreme Ambient, b5 - System Battery Low, b4 - Control Probe Fail, b3 - Door Open, b2 - Cold Alarm, b0 - Power Failure Alarm

S.No	Parameter	Function Code	Address in hexadecimal	Size	Modbus	Relay Enclosure Response	Data	Data Type	Remarks
20	System Status	0x03	671	1	3a 31 39 30 33 **30 36 36 46** 30 30 30 31 36 45 0d 0a	3A 31 39 30 33 30 32 **32 38** 42 41 0D 0A	0x28	uchar	b0 - Temperature pull down attained, b1 - Power failure, b2 - Main - UI comm failure, b3 - Service Mode Active, b4 - main shutdown, b5 - BOT status (set only after entry to BOT), b6 - unused, b7 - Bus comm failure
21	Relay Enclosure Status	0x03	674	2	3a 31 39 30 33 **30 36 37 30** 30 30 30 32 36 43 0d 0a	3A 31 39 30 33 30 34 **30 30 30 35 30 30 30 30** 44 37 0D 0A	0x00 0500 00	unit	b0 - Bus Solenoid Injection b1 - Bus Pressure switch b2 - Reserved for factory use only b3 - Line voltage circuit state change (normal, buck, boost) b4 - Compensated line voltage change b5 - Reserved for factory use only b6 - Short cycle active b7 - 4-20mA digital to analog converter data corrupt b8 - Next Power up state b9 - Door1 Open b10 - Door2 Open b11 - Warm temperature alarm test Active b12 - Read Reset status register b13 - Water cool system pressure sensor state (water cooled units only) b14 - 4-20mA digital to analog converter over temp fault b15 - 4-20mA digital to analog converter over current of the integrated chip fault b16 - Main memory corrupt b17 - Back up memory corrupt

S.No	Parameter	Function Code	Address in hexadecimal	Size	Modbus	Relay Enclosure Response	Data	Data Type	Remarks
22	Build Number	0x03	524	2	3a 31 39 30 33 **30 35 32 34** 30 30 30 32 42 39 0d 0a	3A 31 39 30 33 30 34 **30 30 30 30 30 30 44 30 31** 43 45 0D 0A	0x00 000D 01	unit	XX/XX Minor (numbers after decimal point)/ Major (numbers before decimal point) Ex: 1301 translates to Build number is 1.13
23	Cabinet Calibration Offset	0x03	534	2	3a 31 39 30 33 **30 35 33 34** 30 30 30 32 41 39 0d 0a	3A 31 39 30 33 30 34 **30 30 30 30 30 30 30 30 30** 44 43 0D 0A	0xFF FFFC E0	int	Convert the data value into signed 2's complement and divide with 10,which gives the setpoint. Ex: Signed 2's complement of the 0xFFFFFCE0 is equal to –800. –800/10=–80.So the setpoint is –80C.
24	Line Voltage	0x03	4F8	2	3a 31 39 30 33 **30 34 46 38** 30 30 30 32 45 36 0d 0a	3A 31 39 30 33 30 34 3**0 30 30 30 30 30 30 45 34** 46 34 0D 0A	0x00 0000 E4	unit	Convert hex to decimal gives the voltage. Ex. Here 0xE4 is equal to 228 V

End of Life Care

Some considerations and suggestions are listed below for proper disposal of this product. While addressing these actions for safe recycling and disposal, please follow all guidelines, Safety Data Sheets (SDS), or regulations applicable to your country and region.

- This product has materials and components that may be recycled or reused according to local guidelines and regulations.
- Remove any batteries present before disposal. Batteries, battery packs, and accumulators should not be disposed of as unsorted household waste. Please use the public collection system to return, recycle, or treat them in compliance with the local regulations
- Remove all samples and items before defrosting a unit to room ambient temperatures.
- Clean up any chemical or biological safety hazards using appropriate methods.
- Remove the cabinet door to help prevent entrapment inside of a unit.
- Have a certified technician remove the refrigerant and compressor, drain the compressor and oil from the system, and dispose properly. Note that oil may be infused with refrigerant and should be handled with care by someone experienced with refrigerants used in this product, as listed on the serial data plate.
- Have a certified technician remove the Refractory Ceramic insulation from the unit then dispose properly.

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