

STX Small Size Deep Freezer Application's Guidelines

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1 Introduction

This document contains guidelines for optimum use of Liconic Small Size Deep Freezer Plate Storage Systems. This document contains additional information to the standard STX User Manual and is considered to be an addendum to the STX user manual.

Due to the nature of small physical dimensions certain limitation in using these products exist. Read this document carefully and follow its instructions.

2 Climate Considerations

Liconic Small Size Deep Freezer are relatively small plate storage systems allow automatic plate access. Capacity of these plate storages systems range from 44 to 240 MTP respectively 20 to 110 DWP. Because of the small dimensions of Liconic Small Deep Freezer and their ability of automatic plate access these instruments differ from manual deep freezer or large deep freezer systems. Special precautions have to be taken when operating these instruments.

In order to maintain physical dimensions small, relatively thin thermal insulation is used in these products. Relatively low temperatures may occur on the outer skin of the incubator housing. Use the instrument in low humidity environments only. Keep environment temperature at 22°C or lower. Great care on environmental temperature must be taken when installing the instrument in an enclosure or when placing the instrument next to a heat emitting device.

Because of the small size of the climate chamber, the interior climate inside the chamber is more influenced by accesses. Keep manual access as short as possible. Avoid long periods of time with the manual door opened. Do not put warm or humid samples inside the unit. Remote accesses should be minimized when designing the process. Accesses should be “grouped” over time. A short sequence of a high number of accesses leads to better results than accesses with pauses of a long period of time.

The climate chamber of Liconic Small Deep Freezers are made of stainless steel. Metal surfaces tend to condense more easily than plastic surfaces used in most manual deep freezers. Condensation may occur during or after accesses. The Liconic Small Size Deep Freezer are designed to automatically remove such condensation / frost in normal operation. The time to remove such condensation / frost may be some minutes to an hour. In normal operation plates, cassettes and walls of the climate chamber are clean and frost free.

All Liconic deep freezer have the ability to automatically defrost. Defrost intervals are programmed in the firmware and greatly depend on the usage of the instrument. During defrost the temperature inside the chamber may increase above freezing point. Also, relative humidity inside the chamber may increase significantly.

The time required to reach target temperature depends on the

- End Temperature Set Point
- Content Loaded (Mass)
- Accesses during cooling down

When selecting operating temperatures too low, the instrument may not operate correctly. In order to ensure correct operation active cooling percentage should be 90% or less. Liconic supplies special programs that allow to monitor system's cooling performance (e.g. STXMEX32).

Note that the compressor's cooling power lowers with evaporator temperature. This means that the a compressor having cooling power of 300 Watts when running at -10°C , typically has cooling power of only 200 Watts when running at -30°C . This means that changing temperature settings at low temperature settings of a few degrees may have a significant impact on system's operation.

Cooling power is also affected by the condenser temperature. In general the cooling power is increased by lowering the condenser temperature. Great care should therefore be taken that no obstacles are placed in front of the ventilation in- and outlets and that the condenser is kept clean and dust free at all times.

The total loaded mass should be as low as possible. Plates should be sealed off lidded when ever possible. Accesses should be avoided during cooling down periods.

Be aware that Liconic Small Size Deep Freezer are therefore not intended for use as long term storages. These instruments are also not intended for extensive or frequent accesses over long periods of time.

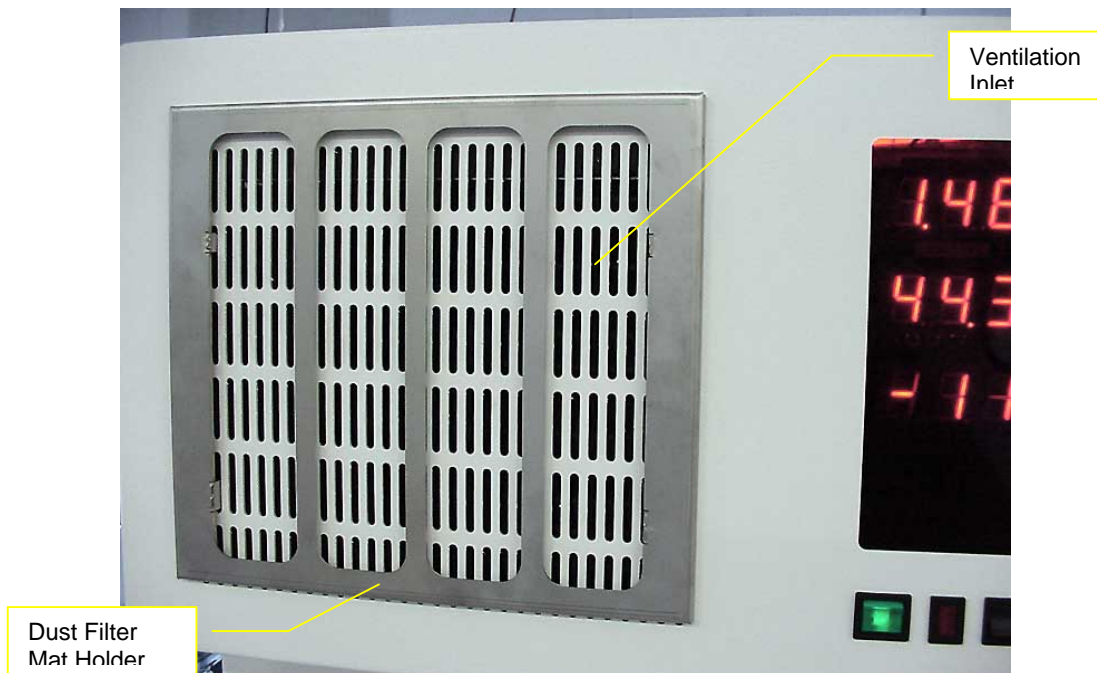
3 Installation

Liconic Small Size Deep Freezer should be operated in a cold and dry ambience only. Operating temperature of 22°C or lower is recommended. Note, when installing instrument in an enclosure are when setting-up instrument next to equipment with heat dissipation, this may cause the effective temperature of the ambience of the instrument to increase. Ambient humidity should be kept at 60..70% RH or lower.

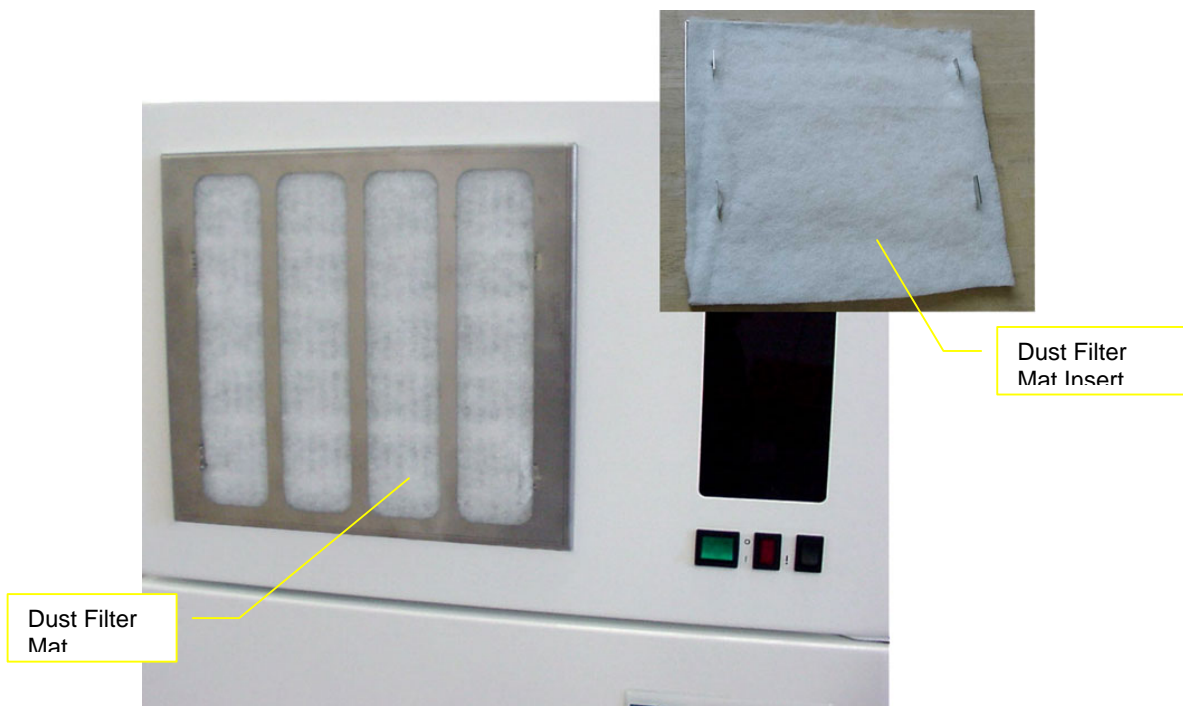
All Liconic Small Deep Freezer have a Drain for condense water disposal. The drain outlet may be located under the instrument or on the lower back side of the instrument. A drain hose must be connected to the drain outlet. The inner diameter of the drain hose should be ?? mm. Silicon or soft PVC tubing materials are recommended. Great care must be taken that there are no inclination, kinks or sharp bents along the drain hose. The drain hose should allow continues and steady flow.

For evaporation of the surplus condense water an electric evaporator pan may be used. Since the amount of water generated by the instrument depends on the usage of the instrument capacity and power of such pan has to be sufficient to avoid flooding. There should be no electric equipment not cables located on the floor near the pan. Special care must be taken when main outlets are located on or under the ground.

Cooling power is greatly affected be the condenser temperature. When installing the instrument no obstacles must be placed in front of the ventilation in- and outlets. The instrument should be able to suck cold air at the ventilation inlet. The warm air leaving the instrument at the ventilation outlet on the rear side should not be able to reed back to the ventilation inlet. If necessary, an active exhaust ventilator must be installed at the ventilation outlet.

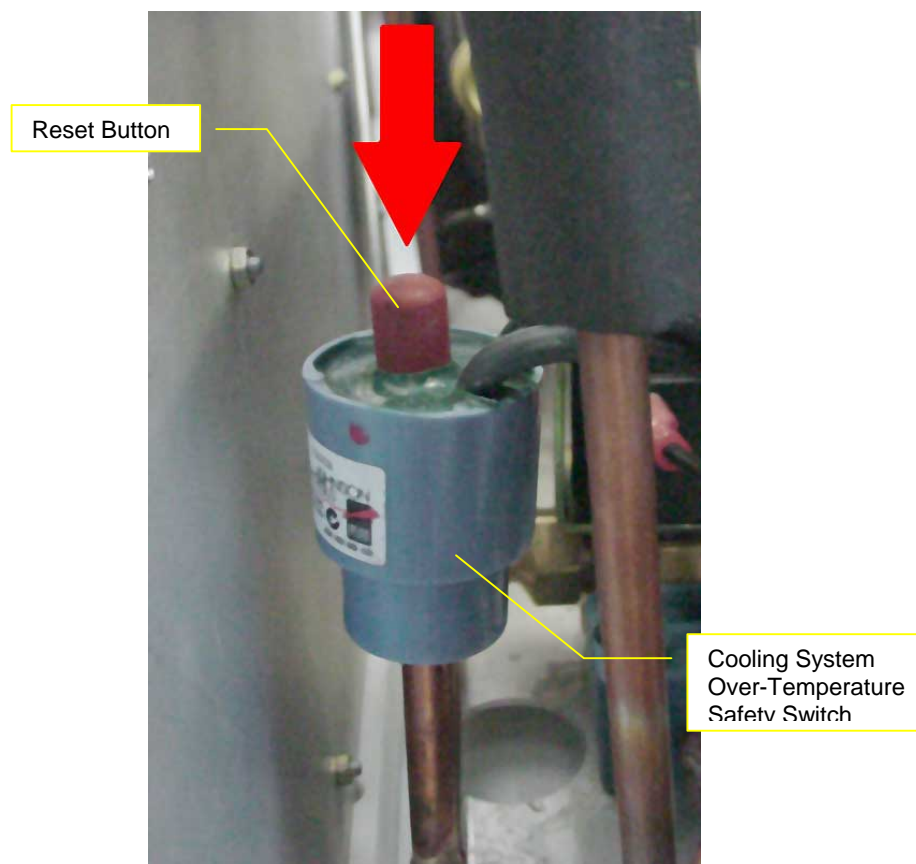


Great care must be taken that the condenser is kept clean and dust free at all times. Liconic recommends the use of Liconic Dust Filter Mat Holder. Filter mats are available in hardware stores. Filter mats should have wide meshes not preventing air flow. Mats must be kept clean and are to be cleaned or replaced when changing color.



Liconic Small Deep Freezers are protected against over-temperature and over-pressure of the cooling system. Over-temperatures may occur when airflow through the ventilation holes is blocked or hindered. If over-temperature are registered by the protection system, the compressor and the cooling ventilator are permanently switched off.

In order to bring the cooling system back to operation, the Cooling System Over-temperature Safety Switch has to be reset manually. Note that over-temperature shut-offs are caused by failures inside or around the instrument. The cause for such failures have to be analysed in all cases. Do not simply reset over-temperature protection without knowing the cause that led to the shut-off.



The Cooling System Over-Temperature Safety Switch is located inside the controls cabinet of the instrument. Special care must be taken when opening covers of the instrument. Namely, the instrument has to be powered off and disconnected from power prior to working on the instrument. Note that work under the instrument's covers must be carried out by Liconic trained personnel only.

4 Manual Usage

4.1 Manual Access

Some surfaces of the instrument may be cold or warm. Beware of warm surfaces at the user door ($\sim 40^{\circ}\text{C}$) specially, when instrument temperature is set to high values. In the area around the Gate low temperatures may occur ($\sim -7^{\circ}\text{C}$).

Manual accesses should be minimized. Access times (time when inner glass door is open) should be kept as short as possible. The user door should be kept closed whenever possible. Leaving user door open may will cause condensation on the inner glass door.



4.2 Evaporator Temperature Display

In addition to temperature and humidity inside the chamber, the temperature of the evaporator is displayed on Liconic Small Deep Freezers.



The evaporator temperature gives an excellent indication of the cooling performance of the instrument's cooling system. During active cooling operation the evaporator temperature is slightly lower than the temperature inside the climate chamber. When target temperature is reached the evaporator temperature may significantly drop below the chamber's temperature.

When defrost the evaporator temperature steadily increases until it reaches approximately +20°C. The time to rise to this temperature depends on the amount of icing build up inside the chamber.

Continuous values above freezing on the evaporator display indicate a faulty cooling system.

4.3 Manual Defrost / Cleaning

The instrument should regularly be manually defrost and cleaned. When instrument is powered off more than one day , manual defrost should be carried out before instrument is power-off. In order to avoid excessive condensation of the interior of the climate chamber following procedure is recommended. Communication through the instruments serial port is required.

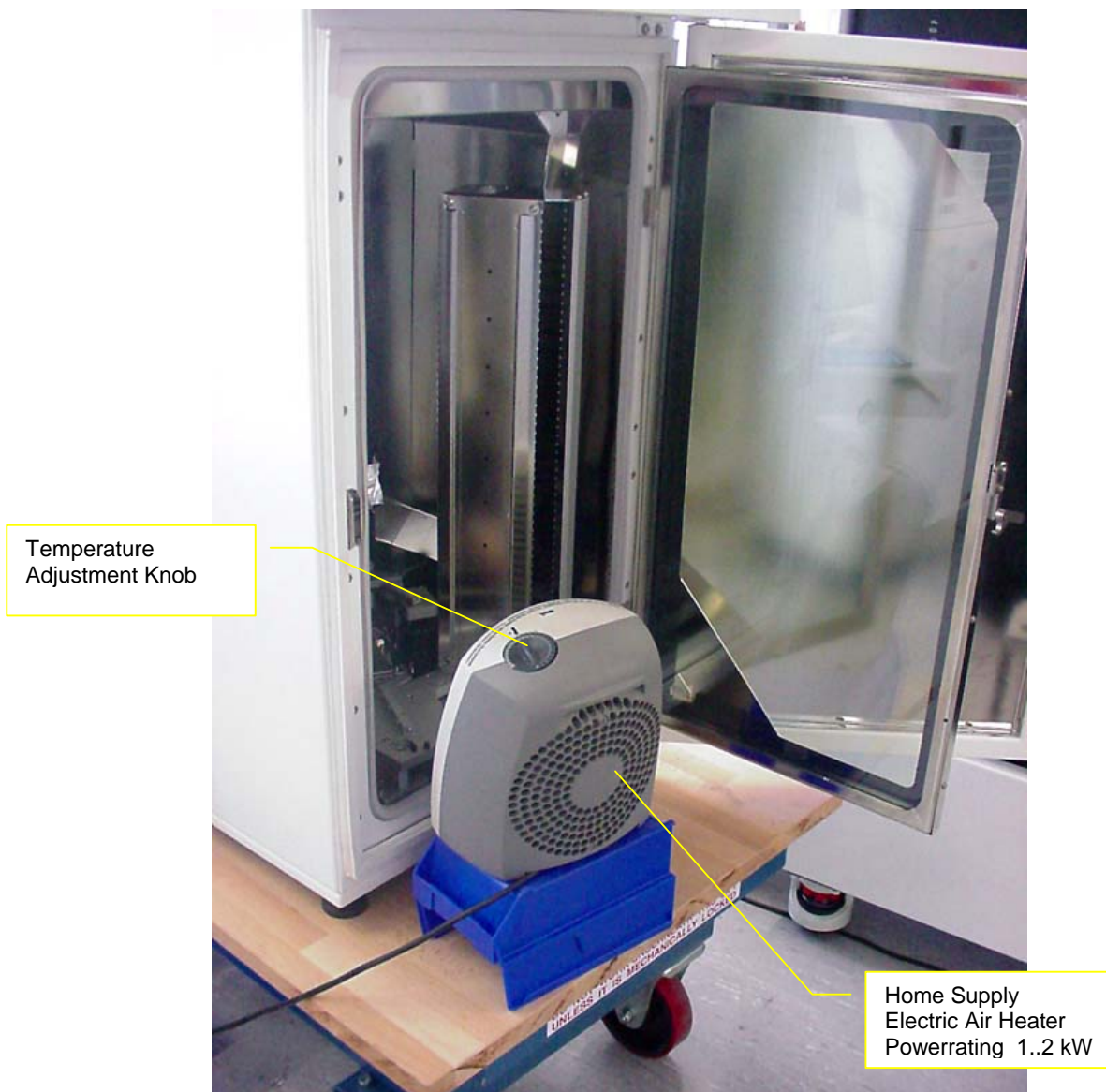
Start defrost by forcing instrument's automatic defrost cycle. By any terminal program send command

ST 1405

This will start the Service Defrost program. The Service Defrost program first carries out the standard automatic defrost program and then switches off the system's cooling system.

The instrument may now be left turned on and with door closed until the chamber temperature has reached ~15°C or higher.

An electric air heater may be used to speed-up defrost. After the cooling system has turned off, turn instrument off and open the user door and the glass door. Place the electric air heater in front of the chamber directing the warm air stream in side the open chamber.



On larger capacity instruments, the electric air heater is placed inside the climate chamber and the glass door is closed.

For safety reasons make sure that the electric heater has adjustable temperature setting and over-temperature protection.

4.4 Powering Instrument off

When powering the instruments off for long periods of time (more than one day) the instrument should be prepared according following procedure.

1. Follow steps “manual defrost / cleaning”
2. Leave glass door and user door open for at least one week in order to allow residual moisture to evaporate.

Not following above procedure will cause fungi or bacteria to grow inside the climate chamber and will destroy the instrument.

4.5 Lubrication

Special care must be taken when lubricating the handling of the instrument. Lubrication should be carried out regularly. Lubrication should be carried out by Liconic-trained personal only. Special lubricants must be applied. Using other than Liconic qualified lubricants may cause the handling to stop operation at low temperatures. Contact Liconic field service for details,

5 Remote Operation

5.1 Automatic Defrost

Force Automatic Defrost ST 1406

Minimum Time to next defrost DM88

Minimum Time to next Fixed Interval Defrost DM87

5.2 Remote Accesses

Over time

5.3 Defrost Inhibit

DM88

DM87