



SLXi Hybrid-Operator's Manual SLXi Hybrid-Manuel de l'utilisateur SLXi Hybrid-Manuale dell'operatore SLXi Hybrid-Betriebshandbuch SLXi Hybrid-Manual del operador SLXi Hybrid-Podręcznik operatora SLXi Hybrid-Bedieningshandleiding SLXi Hybrid-Bedieningshandleiding SLXi Hybrid-Kullanıcı Kılavuzu SLXi Hybrid-Manual do operador SLXi Hybrid-Brugermanual SLXi Hybrid-Brugermanual SLXi Hybrid-Driftmanual







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SLX-Hybrid System Focused on Frigoblock Power Electronics Kit

TK 61569-2-OP (Rev. 0, 03-18)

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Sale of product shown in this manual is subject to FRIGOBLOCK's terms and conditions including, but not limited to, the FRIGOBLOCK Limited Express Warranty. Such terms and conditions are available upon request. FRIGOBLOCK warranty will not apply to any equipment which has been so repaired or altered outside the manufacturer's plants as, in the manufacturer's judgment, to effect it is stability.

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Revision History

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Table of Contents

Disclaimer	
Table of Contents1	
List of Abbreviations3	
Introduction	
About this Manual	
Maintenance and Repair 5	
Contact	
Safety Precautions	
Safety Symbols Explanation	
General Safety Practices	
Emergency shutdown	
First Aid	
Disposing of the Product	
Safety Decals	
Unit Description12	

General Information12
Manual Pretrip Inspection
Operating Instructions20Controllers Overview20Start23Operating Modes24Universal Remote Control Unit Settings28
Fault Codes
Loading and Enroute Inspections
Specifications
Warranty and Liability

Maintenance Inspection Schedule	37
Inspection and Service intervals	37
•	
Serial Number Locations	38

List of Abbreviations

The following abbreviations can be used in this document.

HMI	Human Machine Interface – controller	
M0A	Mains-0-Alternator box	
SR-3 Smart Reefer 3 controller for the SL> refrigeration unit		
URCU	Universal Remote Control Unit = Power Electronics Kit controller	

List of Abbreviations

4

Introduction

There is nothing complicated about operating and maintaining your FRIGOBLOCK system, but a few minutes studying this manual will be time well spent.

Performing pre-trip checks and enroute inspections on a regular basis will minimize on-the-road operating problems. A regular maintenance program will also help to keep your system in top operating condition.

If factory recommended procedures are followed, you will find that you have purchased the most efficient and dependable product available.

About this Manual

This document contains basic information about your system, operating instructions and safety precautions.

Observe safety precautions at all times! If ignored serious injury or damage can occur.

Maintenance and Repair

Maintenance and repair work, major and minor, may only be carried out by authorized FRIGOBLOCK service partner for these very important reasons:

- They have factory trained and certified technicians
- They have genuine FRIGOBLOCK replacement parts
- They are equipped with the factory recommended tools to perform all service functions
- The warranty on your new unit is valid only when the repair and replacement of component parts is performed by an authorized FRIGOBLOCK dealer.

WARNING: Do not carry out a maintenance and repair work by yourself. It can only be carried out by authorized service technician. Always contact the FRIGOBLOCK service partner. IMPORTANT: This manual is published for informational purposes only and the information furnished herein should NOT be considered as all-inclusive or meant to cover all contingencies. If more information is required, consult your FRIGOBLOCK service partner or your contact at FRIGOBLOCK company.

Contact

In case of general inquiries, emergency or just regular maintenance contact your local FRIGOBLOCK service partner.

You can locate your local service partner on our website at: www.frigoblock.com

Or, you can contact the FRIGOBLOCK company directly at:

FRIGOBLOCK Grosskopf GmbH Weidkamp 274 D-45356 Essen Tel.: +49 (0) 201 - 61301-0 Fax: +49 (0) 201 - 61301-48 E-Mail: <u>email@FRIGOBLOCK.de</u>

6

Before you contact us you need the following information:

- Inverter-Filter serial number
- Fault text from the HMI display
- Probable cause of fault
- Warranty details of the system
- Payment details for the repair

Leave your name and contact number and your FRIGOBLOCK contact will call you back. At this point you can give details of the service required and the repair will be organized.

Safety Precautions

Although the servicing may only be carried out by authorized service technician, you should be aware of several safety practices. This chapter gives basic safety precautions and describes the safety stickers on your equipment that you should be familiar with.

All FRIGOBLOCK equipment may only be used and operated by a qualified personnel and exclusively within the limits of the technical specifications and in accordance with the safety instructions and regulations outlined in this document.

The FRIGOBLOCK company offers training and instruction courses for operators.

Also, observe the different national provisions and legislation.

Safety Symbols Explanation

	General warning
4	Electrical shock warning
	Belt drive warning
	Danger of fall warning
	General mandatory label

Safety Precautions



General Safety Practices

DANGER: Denotes immediate danger of serious injury or death.

WARNING: Denotes the possibility of serious equipment damage or serious personal injury.

CAUTION: Denotes the possibility of minor to severe equipment damage or personal injury.



WARNING: Keep hands and loose clothing clear of belts at all times.



WARNING: Turn off the Universal Remote Control Unit located inside the driver's cab and turn the vehicle's engine off before inspecting any part of the system.

Turn off the vehicle's engine before going under the vehicle to inspect the engine compartment or before tilting the cab.



DANGER: If handled improperly, electric voltage can cause internal and external burns or death. Refrigeration machines in the Mains mode operate at 400 Volts and in the Alternator mode up to 700 Volts.



CAUTION: Do not connect other manufacturer's equipment or accessories to the FRIGOBLOCK system. This could result in severe damage to equipment and void the warranty.

WARNING: Do not remove or render ineffective any guard or safety device.

CAUTION: Observe the performance data and limits on the nameplate of the power electronics kit.

Emergency shutdown



- 1. Turn the vehicle's engine off.
- 2. Set M0A switch to position "0".



This isolates the refrigeration unit from the Power Electronics Kit and from the mains power.

First Aid



Electrical Shock

The FRIGOBLOCK Power Electronics Kit is a state of the art product and is very safe to operate.

However, in a very unlikely scenario of electrical shock proceed with the following steps:

IMMEDIATE action must be initiated after a person has received an electrical shock.

DO NOT TOUCH THE VICTIM!

You can receive a shock from current flowing through the victim's body. The person may still be in contact with the electrical source. The source of electricity must be removed first.

CALL FOR EMERGENCY AND MEDICAL ASSISTANCE! TURN THE VEHICLE'S ENGINE OFF! Remove the source of electricity, if possible. If not, move the source away from you and the person, using a dry, nonconducting object made of card-board, plastic or wood. The electrical wire should be cut with either an insulated instrument (e.g. wooden handled axe or cable cutters with heavy insulated handles) or by a rescuer wearing electrically insulated gloves and safety glasses. Whichever method is used, DO NOT LOOK AT THE WIRE while it is being cut. The ensuing flash can cause burns and blindness.

After separating the victim from power source, check immediately for presence of a pulse and respiration. If the victim has no pulse, start CPR (Cardio Pulmonary Resuscitation) until the emergency medical assistance arrives. If the victim has a pulse, respiration may be restored by using mouth-to-mouth resuscitation.

Disposing of the Product



Please dispose of your product according to your national and local regulations at the end of it's life. Contact your service partner for information about disposing of this product in your region of the world.

Safety Decals

The following safety decal is placed on or around the FRIGOBLOCK's Power Electronics Kit components. It combines several safety signs together.



1.	. Electrical shock warning	
2.	Warning – Read instructions before handling.	

Figure 1: Safety Decal

Unit Description

General Information

The SLX-Hybrid system consists of several key components:

- 1. The FRIGOBLOCK Power Electronics Kit
 - a. Universal Remote Control Unit (controller, HMI)
 - b. Alternator (also called generator) kit
 - c. Inverter-Filter box
 - d. Spiral cable (spring coil cable)
 - e. Mains-0-Alternator box (M0A)
 - Mains-0-Alternator switch (M0A switch)
 - f. CEE socket (the mains connection)
- 2. The Thermo King SLX refrigeration unit
 - a. Smart Reefer 3 controller (SR-3 controller)

NOTE: For instructions on how to operate the Thermo King SLX refrigeration unit please refer to the manual TK 61451.



3.	Universal Remote Control Unit (in cab)	7.	CEE socket
4.	Inverter-Filter	8.	Mains-0-Alternator control box (M0A)
5.	Alternator (connected to the engine belt drive)	9.	Spiral cable
6.	SLX refrigeration unit	10.	Alternative location for the CEE socket and the M0A box

Figure 2: Location of the Key Components

The Power Electronics Kit

Intended use

The purpose of the FRIGOBLOCK Power Electronics Kit is to provide electrical energy for the refrigeration unit, in this case the Thermo King SLX, SLXe or SLXi.

Proper use includes compliance with safety, transport, installation, commissioning, operation, maintenance and repair instructions.

Limits of use

The Power Electronic Kit can only be operated with the genuine FRIGOBLOCK parts and equipment.

The performance specifications and operating limits on the nameplates must always be kept.

Abuse (prohibited use)

The Power Electronic Kit is only approved for operation in conjunction with the Thermo King SLX refrigeration system.

14

It must not be used in any other way apart from what is described in this manual.

Components Appearance



Figure 3: The Thermo King SLX Refrigeration Unit



Figure 4: Inverter-Filter



Figure 5: Mains-0-Alternator Box



Figure 6: CEE Socket



Figure 8: Alternator Kit

BEC965



Figure 7: Universal Remote Control Unit

Manual Pretrip Inspection

Before Starting the System

Pretrip inspections are an important part of a preventative maintenance program designed to minimize operating problems and breakdowns. Perform this pretrip inspection before every trip involving refrigerated cargo.

NOTE: Please refer also to the "Loading and Enroute Inspections" on page 33 before commencing your journey.

NOTE: Pretrip inspections are not intended to take the place of regular maintenance inspections.

Visual Inspection



CAUTION: Turn the vehicle's engine off before inspection and set the MOA switch to position "0". Disconnect the mains cable from the CEE socket. **Belts:** Make sure the belts on the engine are in good condition and adjusted to the proper tension. For more information please refer to your vehicle's specification).

NOTE: Listen also for unusual noises of the belt drive.

Electrical: Check the electrical connections to make sure they are securely fastened. Wires and terminals should be free of corrosion, cracks and moisture.

Close all electrical sockets, that are not in use.

Structural: Visually inspect the unit for leaks, loose parts, screw or bolt connections, broken parts and other damage.

Cargo Box: Check the interior and exterior of the cargo box for damage. Any damage to the walls or insulation must be repaired.

Cargo Doors: Make sure that the cargo doors and weather seals are in good condition. The doors should latch securely and the weather seals should fit tightly.

NOTE: Listen also for other unusual noises, vibrations, etc.



CAUTION: Before separating tractor from the trailer make sure to disconnect all the connecting cables (spiral cable etc.). Make sure to disconnect the spiral cable on both sides, the tractor and the trailer.



CAUTION: Disconnect the mains power cable before driving the vehicle!

Cleaning

- Clean water should be sufficient for the cleaning.
- The use of cleaning agents or detergents is strongly discouraged due to the possibility of degradation of the construction.
- Temperature of the water should not exceed +60 °C (+140 °F).
- If using a power washer, the nozzle pressure should not exceed 600 psi (41 bar).

- If necessary to use a chemical cleaner or detergent use a cleaner that does not contain any hydrofluoric acids and is between 7 and 8 on the pH scale. Ensure dilution instructions provided by the detergent supplier are followed. In case of doubt about the compatibility of the detergent with the type of materials listed above, always ask the supplier a written confirmation of the compatibility.
- Should a chemical cleaner be required, it is MANDATORY that after chemical cleaning is done, all the surfaces are thoroughly rinsed with clean water even if the instructions of the cleaner specify that it is a "no rinse" cleaner.
- Do not clean plug connections and control boxes by high pressure liquid. Not used socket outlets should be covered to be watertight.

WARNING: Failure to comply with the above mentioned guidelines will lead to a shortened life of the equipment to an indeterminable degree and may also void your warranty. NOTE: For instructions on how to Inspect the Thermo King SLX refrigeration unit please refer to the manual TK 61451 available at <u>www.emea-user-manuals.thermoking.com</u>.

NOTE: For further best practices, please go to <u>www.europe.thermoking.com/best-practices</u>.

Operating Instructions

Controllers Overview

Universal Remote Control Unit

Universal Remote Control Unit (controller, HMI) is a device used for controlling and monitoring the Power Electronics Kit. It is located in the driver's cabin.

Learning to operate this controller is not complicated and a few minutes studying the contents of this manual will be time well spent.



WARNING: Do not operate the unit until you are completely familiar with the location and function of each control.



Figure 9: Universal Remote Control Unit

Control Display

The control display is capable of showing both text and graphics. It is used to supply information to the operator about the state of the Power Electronics Kit and possible errors in the system.

NOTE: The default message "Cooling device deactivated" does not mean the refrigeration unit is not working!

Universal Remote Control Unit (URCU) is a multipurpose device commonly used to control not only the Power Electronics Kit but also the refrigeration unit.

However, in case of SLX Hybrid system there is no electronic communication between URCU and the SLX refrigeration unit.



Figure 10: Control Display

¹ "Classic Device" = refrigeration unit; "Fresh" = chosen cooling mode (see page 28).

Function Keys Overview

	Press briefly to switch the Power Electronics Kit on/off.	
0	Function not used in the SLX Hybrid system.	
	Press briefly to browse through the menu items.	
۲Y ۲	 Press briefly to change the cooling power (see page 28). Press and hold to open the main menu (see 	
	page 29).Use the key to confirm a selection in the menu.	
	Press briefly to go back in the menu.	

M0A Box Overview



Figure 11: M0A Box

Start

- 1. Start the vehicle's engine.
- 2. Press briefly on/off key on the controller.



First the light inside the key will flash on and off and when the power-up sequence is complete the light will stay constantly on.

If the controller does not switch on (black screen) or light inside the key does not stop flashing please check the fuses in the driver's cabin.

Error	Burned Fuse
Controller does not switch on (black screen).	F31 or F33
Light inside the key does not stop flashing.	F32

Figure 12: Starting Errors

If the fuses are not burn out and the system still does not start please contact the authorized FRIGOBLOCK service partner. For contact information please see page 6.

Operating Modes

The refrigeration unit can be powered from different sources. According to these sources we recognize three operating modes:

1. Diesel mode

The refrigeration unit receives no power from the external sources (such as the mains or the alternator) and runs only on the diesel engine located inside the unit.

2. Mains mode

The refrigeration unit receives power from the mains via CEE socket.

3. Alternator mode

The refrigeration unit receives power from the FRIGOBLOCK Power Electronics Kit (from the alternator mounted on vehicle's engine).

Diesel Mode Activation

In this mode the vehicle's engine does not have to be running.

1. Set M0A switch to position "0".



2. Press the ON key on the Smart Reefer 3 controller located on the refrigeration unit.



 Continue according to the instructions described in the manual TK 61451 available at <u>www.emea-user-manuals.thermoking.com</u>.

NOTE: If the SLX unit does not receive power from the external source it automatically starts in the diesel mode.

As soon as the SLX unit starts receiving the power from the external source it automatically switches to the electric mode and the internal diesel engine stops.

Mains Mode Activation

1. Set M0A switch to position "0".



2. Connect the mains cable to the CEE socket.



3. Set M0A switch to position "NETZ MAINS".



4. Press the ON key on the Smart Reefer 3 controller located on the refrigeration unit.

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NOTE: If the refrigeration unit was already running in the diesel mode when the MOA switch was set to this position the refrigeration unit will automatically switch to the Mains mode and the internal diesel engine stops.

Operating Instructions

 Continue according to the instructions described in the manual TK 61451 available at <u>www.emea-user-manuals.thermoking.com</u>.

Disconnecting the mains power

1. Set M0A switch to position"0".



2. Disconnect the mains power cable from the CEE socket.

WARNING: Do not disconnect the mains power cable with the M0A switch in position "NETZ MAINS". Switch it to position "0" first.



CAUTION: Disconnect the mains power cable before driving the vehicle!

Alternator Mode Activation



DANGER: Do not connect or disconnect electrical cables with the vehicle still running. Turn the engine off first.

- 1. Turn the vehicle's engine off.
- 2. Set M0A switch to position "0".



BEC962

Operating Instructions

3. Make sure the spiral cable is connected on both sides.





CAUTION: Be careful when inspecting elevated and not easily accessible areas.

4. Set M0A switch to position "GENERATOR".



- 5. Start the vehicle's engine.
- 6. Press briefly on/off key on the controller.



First the light inside the key will flash on and off and when the power-up sequence is complete the light will stay constantly on.

7. Press the ON key on the Smart Reefer 3 controller located on the refrigeration unit.



NOTE: If the refrigeration unit was already running in the diesel mode when the M0A switch was set to this position the refrigeration unit will automatically switch to the Mains mode and the internal diesel engine stops.

8. Continue according to the instructions described in the manual TK 61451 available at *www.emea-user-manuals.thermoking.com*.

Universal Remote Control Unit Settings

Changing the Cooling Power

- 1. Switch to the Alternator mode (see page 26).
- 2. Press briefly key 🔀 .

BEC983

3. The display now shows the following.



BEC984

BEC985

Operating Instructions

FRESH - Select when fresh products (set point is above 0° C) are loaded inside the trailer.

FROZEN - Select when frozen products (set point is below 0° C) are loaded inside the trailer.

MULTTEMP - Select in case of multi-temperature compartment configuration of the trailer.

Opening the Main Menu



To browse through the menu items press key nepeatedly.



To go back in the menu press key .

Faults Reading

When a fault (error) is detected the fault icon **the** appears on the display.



In such case the operator needs to contact the authorized FRIGOBLOCK service partner. For contact information please see page 6.

Operating Hours

1. Press and hold key 🔂 to open the main menu.

- 2. Press key to browse to the item "Operating Hours".
- 3. Press key again to select the item.
- 4. The display now shows the time the individual components have been running.

Operating Mains: Generator: Diesel:	Hours FBF 0 hrs. 0 hrs. N/A hrs.	
		BEC974

NOTE: Use this information to determine if there is time for the next inspection or maintenance – see "Maintenance Inspection Schedule" on page 37.

Contrast Adjustment

- 1. Press and hold key 🔁 to open the main menu.
- 2. Press key to browse to the item "Contrast".

Operating Instructions

- 3. Press key to select the item.
- 4. The display now shows the following:



5. Press keys 🔘 and 🕕 to adjust the display contrast.

BEC976

6. Press key \checkmark to confirm the change.

Date and Time Setting

- 1. Press and hold key 🔁 to open the main menu.
- 2. Press key to browse to the item "Date / Time".
- 3. Press key to select the item.

4. The display now shows the following:



- 5. Press keys to change the value of the selected parameter.
- 6. Press keys 🔘 to go to the next parameter.
- 7. Press key to confirm the changes.

NOTE: The menu items "Software Version", Status Information" and "Settings" are relevant only for the service technicians.

Fault Codes

Introduction

When the microprocessor inside the Universal Remote Control Unit (controller, HMI) senses an abnormal condition a fault

code (error, alarm) is generated and the fault icon **period** appears on the display.

In such case the operator needs to contact the authorized FRIGOBLOCK service partner. For contact information please see page 6.

If the controller does not start at all, please follow instructions stated on page 23.

Loading and Enroute Inspections

For the instructions on loading and enroute inspection please refer to the manual TK 61451.

Specifications

For identification of FRIGOBLOCK components the FRIGOBLOCK type and serial number are required.

The technical specifications of the FRIGOBLOCK Power Electronics Kit are listed in the customer service book.



They are also written on the nameplate that is fixed on the casing of the Inverter-Filter box.

1.	FRIGOBLOCK component type
2.	Serial number
3.	Year of manufacture
4.	Electrical voltage
5.	Electrical current
6.	Frequency
7.	Date of the next maintenance





CAUTION: Observe the performance data and limits on the nameplate of the power electronics kit. Remember the maximum ambient temperature: +50 °C for the Alternator mode and +55 °C for the Mains and Diesel mode.

For specification of the SLX refrigeration unit please refer to the manual TK 61451.

Warranty and Liability

FRIGOBLOCK Power Electronics Kit

The agreed warranty period is specified in the order confirmation.

FRIGOBLOCK Grosskopf GmbH is not responsible for damage caused by:

- any use that is not intended;
- service and repairs not carried out correctly and in time, or undertaken by personnel with insufficient qualifications and experience.

Any liability to third parties is excluded.

Warranty claims will only be accepted if the owner of the refrigeration machine can demonstrate that all maintenance operations prescribed in the maintenance schedule were carried out by our service partners during the warranty period. No warranty can be claimed if maintenance intervals have not been observed or maintenance work has not been carried out properly.

Changes and/or modifications of the refrigeration machine are not permitted and if made release FRIGOBLOCK Grosskopf GmbH from any warranty obligation.

More details on our warranty and liability terms are contained in our General Terms of Delivery and Payment.

Thermo King SLX Refrigeration Unit

Terms of the Thermo King Trailer Unit Warranty are available on request from your Thermo King Dealer.

Please also refer to TK 61508-2-WA Thermo King EMEA Trailer Unit Limited Warranty for SLXi Units.

Maintenance Inspection Schedule

Inspection and Service intervals

Inspection and Service intervals are determined by the number of unit operating hours and by the age of the unit.

First inspection: Not later than 2 weeks after delivery of the system.

Regular maintenance: Every 6 months or 1500 hours, whichever comes first.

NOTE: For the number of operating hours, see "Operating Hours" on page 30.

The maintenance intervals specified above were determined under normal operating conditions. If the operating conditions are different the different maintenance intervals may be required. For example, the devices mounted close to the ground should be cleaned more often in winter than in summer. The FRIGOBLOCK service partners are familiar with the detailed scope of inspection, test and maintenance required for your system.

All FRIGOBLOCK products are in process of constant improvement. Consequently, the scope of maintenance may change.



WARNING: Do not carry out maintenance and repair work by yourself. It can only be carried out by authorized service technician. Always contact the FRIGOBLOCK service partner.



Each maintenance performed should be recorded in the Service Check Book.

NOTE: For inspection and service intervals of the SLX refrigeration unit please refer to the manual TK 61451.

Serial Number Locations

The FRIGOBLOCK Power Electronics Kit serial number plate is located on the Inverter-Filter box.

The SLX refrigeration unit's serial number plate is located on a frame inside the unit's door.

See "Figure 2: Location of the Key Components," on page 13.



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