FRIGOBLOCK

Operator's Manual

DK and EK

for electrically-powered FRIGOBLOCK transport refrigeration machines

Revision A

November 2023

FB 10068-22-OP-EN

TRANE TECHNOLOGIES

Introduction

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 Directory for the location and telephone number of the local dealer.

FRIGOBLOCK's warranty shall not apply to any equipment which has been "so installed, maintained, repaired or altered as, in the manufacturer's judgment, to affect its integrity."

Manufacturer shall have no liability to any person or entity for any personal injury, property damage or any other direct, indirect, special, or consequential damages whatsoever, arising out of the use of this manual or any information, recommendations or descriptions contained herein. The procedures described herein should only be undertaken by suitably qualified personnel. Failure to implement these procedures correctly may cause damage to the FRIGOBLOCK unit or other property or personal injury.

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

 The information contained in this version of the document corresponds to the current status at the time of printing. FRIGOBLOCK products are subject to constant improvement. Therefore, specifications, design, operation or equipment details may change without prior notice.

Performing pre-trip checks and enroute inspections on a regular basis will minimize operating problems. A regular maintenance program will also help to keep your unit in top operating condition. If factory recommended procedures are followed, you will find that you have purchased the most efficient and dependable temperature control system available.

All service requirements, major and minor, should be handled by a FRIGOBLOCK dealer for four very important reasons:

- They are equipped with the factory recommended tools to perform all service functions.
- They have factory trained and certified technicians.

- They have genuine FRIGOBLOCK replacement parts.
- The warranty on your new unit is valid only when the repair and replacement of component parts is performed by an authorized FRIGOBLOCK dealer.

About This Manual

This document provides the operator with information on the general operation of the refrigeration machine and its optional components; it contains information on transport refrigeration and on the identification and rectification of minor faults. Always read and observe all specified safety instructions. In addition to the operating instructions, this document contains information on:

- Transport and storage.
- Installation and start-up.
- Cleaning, maintenance, servicing and repair.
- Dismantling and disposal Proper, safe and economical operation of the refrigeration machine, including all components, requires professional and regular maintenance and/or repairs.

Machine Information Policy

Use of this product serves as acceptance of the FRIGOBLOCK Machine Information Policy available at: www.europe.thermoking.com. This product includes an optional feature that collects and shares Machine Information with FRIGOBLOCK. Separate terms may apply when a customer has entered into an agreement with FRIGOBLOCK. Customers that would like to opt-out of sharing Machine Information with FRIGOBLOCK should forward such inquiries to the email address Opt-Out@ThermoKing.com.

Software License

The product includes software that is licensed under a non-exclusive, non-sublicensable, terminable and limited license to use the software as installed on the product for its intended purpose. Any removal, reproduction, reverse engineering, or other unauthorized use of the software is strictly prohibited. Hacking the product or installing unapproved software may void the warranty. The owner or operator shall not reverse engineer, decompile, or disassemble the software, except and only to the extent that such activity is expressly permitted by applicable law notwithstanding this limitation. The product may include third party software separately licensed as specified in

any documentation accompanying the product or in an about screen on a mobile application or website that interfaces with the product. You are obliged to complete the declaration for “THERMO KING EQUIPMENT SOFTWARE LICENSE AGREEMENT” before you put your unit in operation.

This is located in your language at the following location: https://www.emea-user-manuals.thermoking.com

Emergency Assistance

Thermo Assistance is a multi-lingual communication tool designed to put you in direct contact with an authorized Thermo King dealer.

Thermo Assistance should only be contacted for breakdown and repair assistance.

To use this system, you need the following information before you call: (phone charges will apply)

- Contact Phone Number
- Unit Type
- Thermostat Temperature Setting
- Ambient temperature
- Present Load Temperature
- Probable Cause of Fault
- Warranty Details of the Unit
- Payment Details for the Repair

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

No payment at point of repair for customers with a ThermoKare service contract or with a guaranty of payment from their Thermo King or FRIGOBLOCK home-dealer

THERMO KING
ThermoAssistance
00800 80 85 85 85

Belgium	+32 270 01 735
Denmark	+45 38 48 76 94
France	+33 171 23 05 03
Germany	+49 695 00 70 740
Italy	+39 02 69 63 32 13
Spain	+34 914 53 34 65
The Netherlands	+31 202 01 51 09
United Kingdom	+44 845 85 01 101
Kazakhstan	+7 7273458096
Russia	+7 4992718539
Others	+32 270 01 735

BEA261

General Inquires and Unit Maintenance

For general inquiries please contact your local Thermo King and/or FRIGOBLOCK dealer.

Go to www.europe.thermoking.com and select dealer locator for your local Thermo King/FRIGOBLOCK dealer.

Or refer to the Service Directory for contact information.

Customer Satisfaction Survey

Let your voice be heard!

Your feedback will help improve our manuals. The survey is accessible through any internet-connected device with a web browser.

Scan the Quick Response (QR) code or click Technical Publications EMEA Feedback to complete the survey.

Table of Contents

Safety Precautions

Safety Instructions

Important: *Safety instructions are product markings that serve to avoid hazards. Therefore, all safety instructions must be observed.*

The FRIGOBLOCK refrigeration machine is a state-of-the-art product and can be safely operated. However, residual hazards can arise from the refrigeration machine if it is used and operated improperly by untrained personnel.

The appropriate personal protective equipment (PPE) must be worn for all work on the refrigeration machine!

Anyone who is commissioned with the installation, start-up, maintenance, repair or operation of the refrigeration machine must have read and understood this documentation, in particular the safety instructions.

Installation, maintenance and repair works may only be performed by authorised and competent FRIGOBLOCK installation and service partners.

The FRIGOBLOCK refrigeration machine may only be used and operated by qualified personnel and exclusively in accordance with the technical specifications, and in accordance with the safety regulations and provisions outlined in this document. Qualified personnel are people who are familiar with the operation of the FRIGOBLOCK refrigeration machine and who have the appropriate qualifications to carry out the required work.

Specific control components described within this documentation may be positioned at different points on the machine, depending on customer requirements. Familiarise yourself with the installation positions of these components before using the FRIGOBLOCK refrigeration machine (see also “Position of the main components,” p. 32).

The work area must be secured for hot work, e.g. soldering. Hot work may only be carried out in approved areas.

Observe the relevant legal and safety regulations and the contents of this documentation.

The upper area of the FRIGOBLOCK refrigeration machine features an open design. For this reason, damaging influences to the pipes or fans cannot be ruled out. For example, always consider the vehicle's height when driving under trees or bridges.

Ensure that every person who operates this FRIGOBLOCK refrigeration machine has received a safety briefing in accordance with BGR 500 (operation of refrigeration systems, heat pumps and refrigeration

equipment) and the Industrial Safety Regulation, as well as operator instructions based on the documentation and that they have carefully read and understood the documentation.

Before opening switch boxes and when working on the refrigeration machine, the Mains-0-Alternator switch must be set to "0" and the mains plug must be unplugged. Secure the system before switching on again!

When opening the doors and gates of the refrigeration machine and when removing covers, the rotating parts, electrical voltage, heat and cold all pose a risk. The refrigeration machine must be switched off before entering the refrigerated box.

Any plug connections may only be connected or disconnected when the refrigeration machine is switched off. The vehicle's engine must be switched off. Unused sockets must be covered. The mains plug must be disconnected before starting the trip.

It is essential to check that all plug connections are correctly connected for all tractor units, trailers, articulated trains and swap bodies. The plugs must be locked in the dummy sockets with the covers closed when not in use.

Following damage to components of the entire system due to external influences (e.g. an accident), the condition of the system must be properly checked by a qualified electrician in accordance with DIN EN 50110-1.

If plug connections are disconnected during the repair process, they must be protected from external influences (e.g. dirt, moisture and mechanical stress). Defective lines, plugs and other components must be immediately replaced.

As part of the vehicle handover, FRIGOBLOCK GmbH offers operating personnel training.

Please pay attention to the relevant country-specific regulations and laws.

Danger, Warning, Caution, and Notice

Thermo King®/ FRIGOBLOCK recommends that all service be performed by a Thermo King/FRIGOBLOCK dealer and to be aware of several general safety practices.

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this unit depend upon the strict observance of these precautions. The four types of advisories are defined as follows:

⚠ Danger

Hazard!

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ Warning

Hazard!

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ Caution

Hazard!

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury and unsafe practices.

Notice

Hazard!

Indicates a situation that could result in equipment or property-damage only accidents.

Explanation of the symbols and terms used in this manual

Explosive hazard symbol: **Explosion hazard due to impact, friction, sparking, fire or heat.**

High flammability hazard symbol: **Substances burn and form potentially explosive mixtures with air.**

Health hazard symbol: **Larger quantities of substance can cause health damage or death.**

Environment hazard symbol: **Substances are toxic to aquatic or soil organisms and can damage ecosystems.**

Warning symbol: **Warns of dangerous electric voltage.**

Warning Symbol: **Low temperature or freezing conditions**

Warning symbol: **Warns of a hot surface**

Warning symbol: **Warns of rotating parts**

Warning symbol:**Warns of a sharp object (cut injuries)**

Warning symbol: **Warns of corrosive substances.**

Warning symbol:**Warns of a fall hazard**

Personal protective equipment:**Wear safety glasses**

Personal protective equipment:**Wear gloves**

Personal protective equipment:**Wear a hard hat**

Personal protective equipment:**Wear protective footwear**

Advisory symbol: **First aid action.**

Advisory symbol:**Wash hands thoroughly.**

Advisory symbol: **No smoking.**

Advisory symbol: **No naked flames.**

General Safety Practices

⚠ Danger

Hazardous Voltage!
The DC-Link capacitor built into the power electronics can still be charged and it can discharge a hazardous high voltage.

⚠ Danger

Risk of Injury!
Keep hands and loose clothing clear of fans and belts at all times when the unit is operating with the doors open.

⚠ Danger

Confined Space Hazards!
Avoid engine operation in confined spaces and areas or circumstances where fumes from the engine could become trapped and cause serious injury or death.

⚠ Warning

Hazardous Voltage!

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 460 Volts.

⚠ Caution

Risk of Injury!

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

Notice

Equipment Damage!

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.

Warnings

⚠ Warning

Equipment Damage and Risk of Injury!

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.

⚠ Warning

Risk of Injury!

Turn off the universal remote control located inside the driver's cab and turn the vehicle's engine off before any installation work or 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. Make sure that the vehicle's engine may not be started unintentionally.

⚠ Danger

Hazardous Voltage!

This unit is equipped with high voltage electrical components capable of causing serious injury or death. Turning the unit's Service Switch to the Off position ONLY prevents the unit from operating. The refrigeration machine is operated at a voltage of 400 V in mains operation mode and up to 690 V in alternator operation mode. Electrical current is life-threatening! Working on electrical systems requires specialist knowledge and specialised training. ONLY qualified individuals should service, repair, or replace any of the electrical power system components, including fuses.

To avoid accidents, the five safety rules must be observed and adhered to prior to working on an electrical refrigeration machine:

1. Isolate
2. Secure against being switched on again
3. Ascertain that there is no voltage
4. Earth and short-circuit
5. Cover or block off adjacent live parts

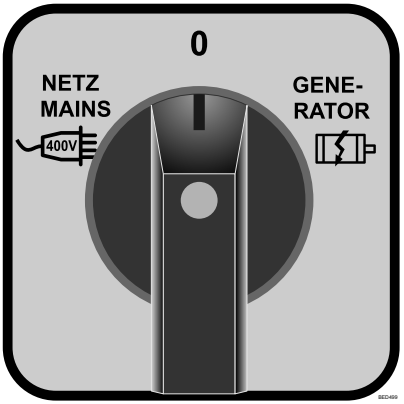
Important: *Appropriate PPE (personal protective equipment) must be worn!*
Potential hazards include:

- Electrical hazards from electric shock
- Thermal hazards from arcing

Important: *Measuring devices, tools, aids and personal protective equipment (PPE) must be in perfect condition according to the manufacturer's specifications.*

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.

Automatic Start/Stop Operation

⚠ Caution

Risk of Injury!

The unit can start and run automatically any time the unit is turned on. Turn the Microprocessor On/Off switch Off before doing inspections or working on any part of the unit. Please note that only Qualified and Certified personnel should attempt to service your Frigoblock unit.

Battery Installation and Cable Routing

⚠ Warning

Hazard of Explosion!

Improperly installed battery cables could result in a fire, explosion, or injury. Battery cables must be installed, routed, and secured properly to prevent them from rubbing, chaffing, or making contact with hot, sharp, or rotating components.

⚠ Warning

Hazard of Explosion!

Always cover battery terminals to prevent them from making contact with metal components during battery installation. Battery terminals grounding against metal could cause the battery to explode.

⚠ Warning

Hazard of Explosion!

An improperly installed battery could result in a fire, explosion, or injury. A Thermo King approved battery must be installed and properly secured to the battery tray.

⚠ Warning

Fire Hazard!

Do not attach fuel lines to battery cables or electrical harnesses. This has the potential to cause a fire and could cause serious injury or death.

⚠ Caution

Hazardous Service Procedures!

Set all unit electrical controls to the OFF position before connecting battery cables to the battery to prevent the unit from starting unexpectedly and causing personal injury.

⚠ Warning

Personal Protective Equipment (PPE) Required!

Overcharging or over-discharging of an AGM Battery. There is a very real possibility of inducing enough heat into an AGM battery to initiate thermal runaway if the battery is charged at too high a voltage. This could cause your AGM battery to get very hot. Always wear personal protective equipment when working with a battery.

Notice

Equipment Damage!

Do not connect other manufacturers' equipment or accessories to the unit or to the Thermo King batteries unless approved by Thermo King. Failure to do so can result in severe damage to equipment and void the warranty.

Refrigerant



⚠ Danger

Hazardous Gases - Personal Protective Equipment (PPE) Required!

Refrigerant in the presence of an open flame, spark, or electrical short produces toxic gases that are severe respiratory irritants which can cause serious injury or possible death. When working with or around hazardous chemicals, ALWAYS refer to the applicable Material Data Safety Sheets (MSDS) and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection, and handling instructions.

⚠ Danger

Refrigerant Vapor Hazard!

Do not inhale refrigerant. Use caution when working with refrigerant or a refrigeration system in any confined area with a limited air supply. Refrigerant displaces air and can cause oxygen depletion, resulting in suffocation and possible death. When working with or around hazardous chemicals, ALWAYS refer to the applicable Material Data Safety Sheets (MSDS) and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection, and handling instructions.

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⚠ Warning

Personal Protective Equipment (PPE) Required!

Refrigerant in a liquid state evaporates rapidly when exposed to the atmosphere, freezing anything it contacts. Wear butyl lined gloves and other clothing and eye wear when handling refrigerant to help prevent frostbite. When working with or around hazardous chemicals, ALWAYS refer to the applicable Material Data Safety Sheets (MSDS) and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection, and handling instructions.

Although fluorocarbon refrigerants are classified as safe, use caution when working with refrigerants or in areas where they are being used.

Refrigerant Oil

Observe the following precautions when working with or around refrigerant oil:

⚠ Warning

Personal Protective Equipment (PPE) Required!

Protect your eyes from contact with refrigerant oil. The oil can cause serious eye injuries. Protect skin and clothing from prolonged or repeated contact with refrigerant oil. To prevent irritation, wash your hands and clothing thoroughly after handling the oil. Rubber gloves are recommended. When working with or around hazardous chemicals, ALWAYS refer to the applicable Material Data Safety Sheets (MSDS) and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection, and handling instructions.

First Aid

REFRIGERANT

- **Eyes:** For contact with liquid, immediately flush eyes with large amounts of water and get prompt medical attention.
- **Skin:** Flush area with large amounts of warm water. Do not apply heat. Remove contaminated clothing and shoes. Wrap burns with dry, sterile, bulky dressing to protect from infection. Get prompt medical attention. Wash contaminated clothing before reuse.
- **Inhalation:** Move victim to fresh air and use Cardio Pulmonary Resuscitation (CPR) or mouth-to-mouth resuscitation to restore breathing, if necessary. Stay with victim until emergency personnel arrive.
- **Frost Bite:** In the event of frost bite , the objectives of First Aid are to protect the frozen area from further injury, warm the affected area rapidly, and to maintain respiration.

REFRIGERANT OIL

- **Eyes:** Immediately flush with large amounts of water for at least 15 minutes. Get prompt medical attention.
- **Skin:** Remove contaminated clothing. Wash thoroughly with soap and water. Get medical attention if irritation persists.

- **Inhalation:** Move victim to fresh air and use Cardio Pulmonary Resuscitation (CPR) or mouth-to-mouth resuscitation to restore breathing, if necessary. Stay with victim until emergency personnel arrive.
- **Ingestion:** Do not induce vomiting. Immediately contact local poison control center or physician.

ENGINE COOLANT

- **Eyes:** Immediately flush with large amounts of water for at least 15 minutes. Get prompt medical attention.
- **Skin:** Remove contaminated clothing. Wash thoroughly with soap and water. Get medical attention if irritation persists.
- **Ingestion:** Do not induce vomiting. Immediately contact local poison control center or physician.

BATTERY ACID

- **Eyes:** Immediately flush with large amounts of water for at least 15 minutes. Get prompt medical attention. Wash skin with soap and water.
- **Skin:** Immediately remove contaminated clothing. Wash skin with large volumes of water, for at least 15 minutes. Wash skin with soap and water. Do not apply fatty compounds. Seek immediate medical assistance.
- **Inhalation:** Provide fresh air. Rinse mouth and nose with water. Seek immediate medical assistance.
- **Ingestion:** If the injured person is fully conscious: make the person drink extensive amounts of milk. Do not induce vomiting. Take the injured person immediately to a hospital.

ELECTRICAL SHOCK

Take IMMEDIATE action after a person has received an electrical shock. Get quick medical assistance, if possible.

The source of the shock must be quickly stopped, by either shutting off the power or removing the victim. If the power cannot be shut off, the wire should be cut with an non-conductive tool, such as a wood-handle axe or thickly insulated cable cutters. Rescuers should wear insulated gloves and safety glasses, and avoid looking at wires being cut. The ensuing flash can cause burns and blindness.

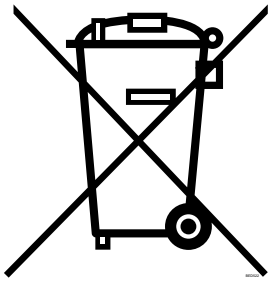
If the victim must be removed from a live circuit, pull the victim away with a non-conductive material. Use wood, rope, a belt or coat to pull or push the victim away from the current. DO NOT TOUCH the victim. You will receive a shock from current flowing through the victim's body. After separating the

victim from power source, immediately check for signs of a pulse and respiration. If no pulse is present, start Cardio Pulmonary Resuscitation (CPR). If a pulse is present, respiration might be restored by using mouth-to-mouth resuscitation. Call for emergency medical assistance.

ASPHYXIATION

Move victim to fresh air and use Cardio Pulmonary Resuscitation (CPR) or mouth-to-mouth resuscitation to restore breathing, if necessary. Stay with victim until emergency personnel arrive.

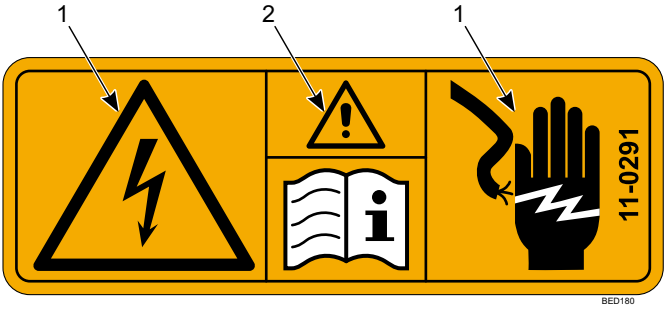
Disposing of the Product



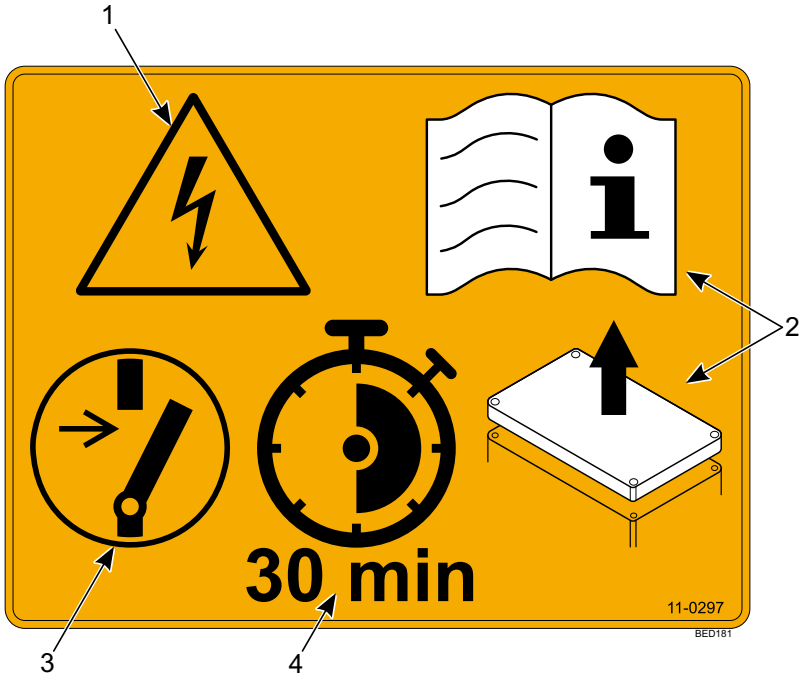
Please dispose of your product according to your national and local regulations at the end of it's life. Contact your service partner for information about disposing of this product in your region of the world.

Safety Decals

The following safety decals are placed on or around the FRIGOBLOCK's Power Electronics Kit components. They combine several safety signs together.



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



1.	Electrical shock warning.
2.	Read instructions before opening the cover.
3.	Turn off the system before handling.
4.	Wait XX minutes before opening the cover. (Please wait the time specified on your particular Unit label).

General Information

Correct use of the FRIGOBLOCK systems

The FRIGOBLOCK refrigeration machine maintains the temperature of goods during transport in insulated vehicle bodies. FRIGOBLOCK refrigeration machines are powered electrically, either via the mains (connection 400 volts / 50 Hz, 32 A, slow-blow fuse), the FRIGOBLOCK alternator, the battery of a BEV (Battery Electric Vehicle) vehicle or an approved battery pack (energy pack).

A residual current protective device must be installed for mains operation. Your qualified electrician will advise you on this.

The FRIGOBLOCK alternator and the inverter filter are only approved for operation in conjunction with a FRIGOBLOCK / Thermoking refrigeration machine. Any use other than this is considered improper.

To ensure safe operation, the FRIGOBLOCK refrigeration machine may only be used in accordance with the information in this documentation. Its use is subject to the applicable legal and safety regulations required for the respective application. This also applies to the use of accessories. If the FRIGOBLOCK refrigeration machine is operated in open spaces, the ambient temperature of the installation room must not exceed the application limits of the transport refrigeration machine. Operation in technically closed rooms or in rooms intended for living persons or animals is prohibited.

The FRIGOBLOCK refrigeration machine is exclusively for commercial use!

Unauthorised modifications and changes to the systems are not permitted.

To ensure the safe operation, the FRIGOBLOCK refrigeration device must not be used in any other way from that described in the installation manual.

The use of the FRIGOBLOCK refrigeration device is subject to the applicable national legal and safety regulations. This also applies to accessories.

If the FRIGOBLOCK refrigeration device is operated indoors, the ambient temperature of the room in which it is installed must not exceed the limits of the transport refrigeration device.

Observe the performance data and limits on the nameplate of the FRIGOBLOCK refrigeration machine.

Limits for the operation of the FRIGOBLOCK refrigeration device:

- Ambient temperatures up to +40°C with refrigerants R410A and R507

- Control range for cooling and heating in the refrigerated body: from –35° C to +40°C

Identification of a FRIGOBLOCK refrigeration device

Depending on the application and the installation conditions, the following models are delivered:

Figure 1. EK Unit

Compact condensing unit with the evaporator in the cargo space. Variable installation position beneath the truck body.

Figure 2. RE Unit

Flat evaporators are used in split unit installations (in combination with an EK condenser unit) or as additional evaporator in multi-compartment installations.

The design of the refrigeration device and their components with all respective identification numbers are managed and stored by FRIGOBLOCK GmbH.

For unique identification of a FRIGOBLOCK refrigeration device or a component (e.g., additional evaporator) the FRIGOBLOCK type and machine number is required.

In addition to the nameplate, the technical specifications of the FRIGBLOCK refrigeration device are also entered in the customer service book. The latter is part of the machine documentation.

The nameplate is fixed to the outside of the unit casing.

Information on the nameplate:

Figure 3. Refrigeration Unit Information Nameplate

1. FRIGOBLOCK serial number
2. FRIGOBLOCK type number
3. Refrigerant used
4. GWP (Global Warming Potential)
5. Maximum working pressure
6. Flow rate
7. Full load current
8. Italian homologation
9. FRIGOBLOCK type
10. Year of manufacture
11. Amount of refrigerant in unit (Multitemp systems use additional sticker for total amount of refrigerant filling)
12. CO_2 equivalent to
13. MOP pressure / temperature (suction pressure limit)
14. Voltage

15. Frequency
16. E1 marking

Figure 4. Nameplate for RE Auxiliary Evaporator

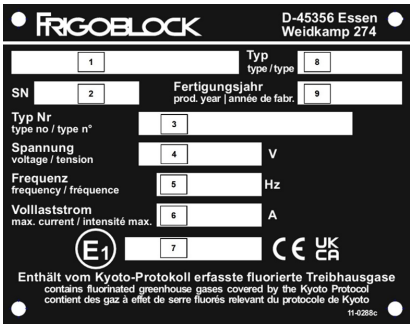
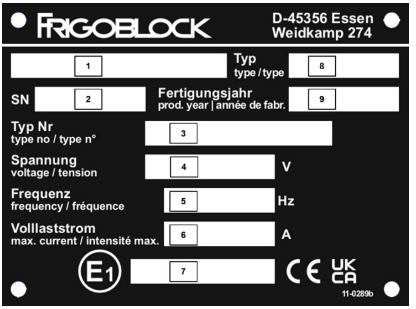


Figure 5. Nameplate for Inverter Filter

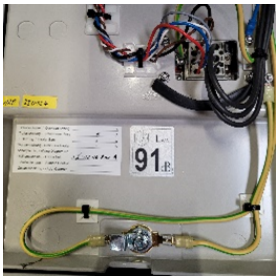


1. Designation of components
2. FRIGOBLOCK serial number
3. FRIGOBLOCK type number
4. Voltage
5. Frequency
6. Full load current
7. E1 marking
8. FRIGOBLOCK type
9. Year of manufacture

Figure 6. Refrigeration Nameplate

Additional sticker for total amount of the refrigerant filling in Multi Temperature systems. The sticker is glued beside the Unit Nameplate.

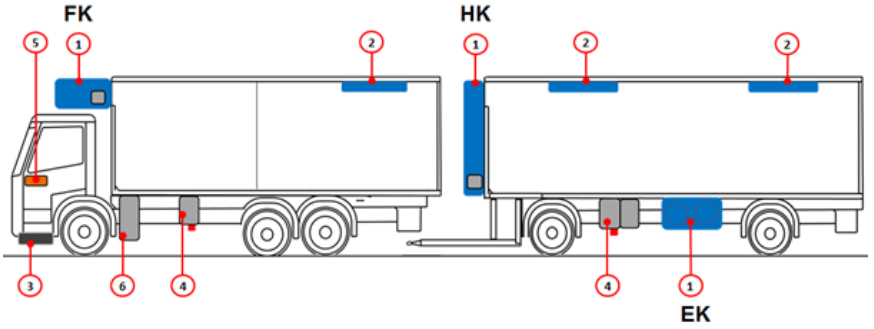
Figure 7. Sound Power Label



Information on the sound power level of the FRIGOBLOCK refrigeration machine can be found on a label in the machine's control cabinet. The noise values have been determined in accordance with the Outdoor Noise Directive 2000/14 EC (directive on environmentally harmful noise emissions from devices and machines intended for outdoor use).

Other technical specifications for FRIGOBLOCK refrigeration machines and auxiliary components can be found in the annex hereto.

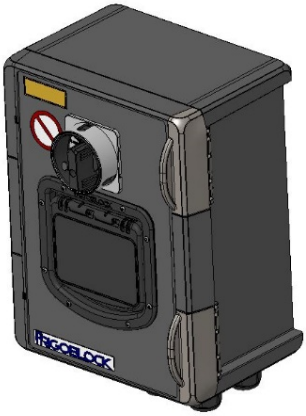
Position of the main components



1.	FRIGOBLOCK refrigeration device	4.	Mains-0-Alternator switch box with optional 400 V CEE socket and universal remote control (HMI)
2.	Type RE additional evaporator	5.	Driver's cab universal remote control (HMI), optionally available as an additional rear remote control.
3.	Alternator	6.	Inverter filter (for operation via AW alternator)

Additional Required Components

Depending on the equipment, the following additional components are required to operate a FRIGOBLOCK refrigeration machine:



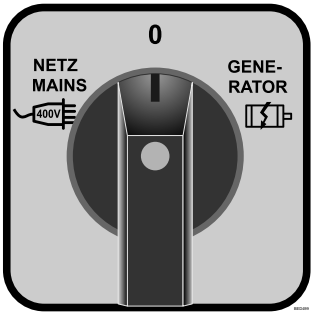
Mains-0-Alternator switch box
Variant R2

- Connected high-voltage cables (load cables AC/HVDC) have an orange sheath.
- Control lines have a black sheath.
- Optionally available with 400 V CEE socket and/or universal remote control (HMI).

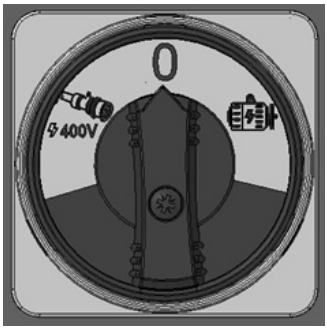
Mains-0-Alternator switch box
Variant R

- All connected lines have a black sheath.
- Optionally available with 400 V CEE socket and/or universal remote control (HMI).

CEE socket



Mains-0-Alternator switch (M-0-A)
For refrigeration machines with variant R switch box



Mains-0-Alternator switch (M-0-A)
For refrigeration machines with R2 variant switch box

0-1 switch
Battery electric vehicles (BEV)

Operating Instructions

Universal Remote Control

⚠ Caution

Risk of Injury!

Do not operate the HMI Control Panel until you are completely familiar with its function.

The universal remote control (HMI) is a refrigeration system control point and is suitable for single and multi-compartment refrigeration systems. It can be installed in various locations.

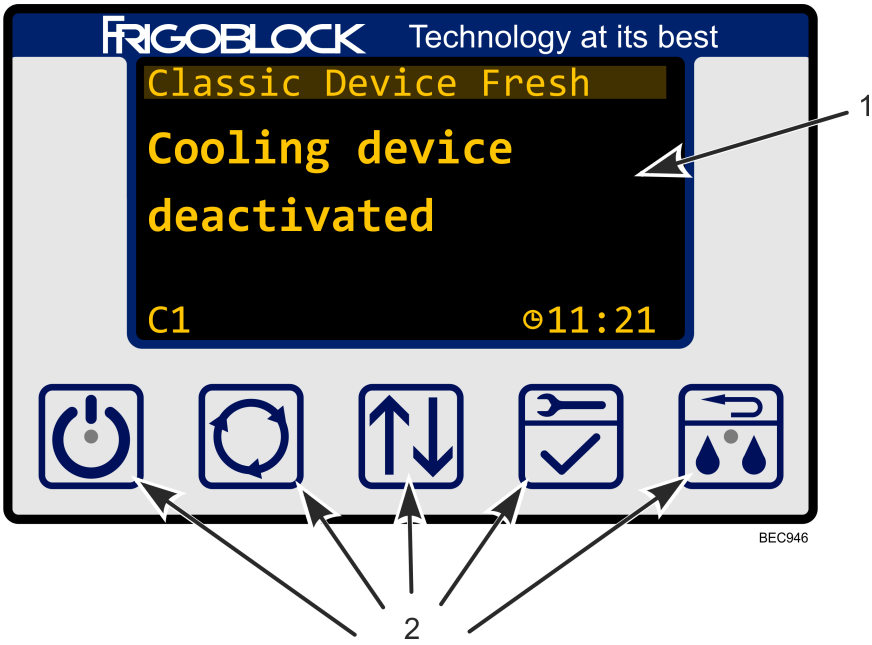
- In the cab,
- In the Mains-0-Alternator switch box,
- As a rear remote control (in the cargo area)

The universal remote control has the following functions:

- Switching the refrigeration system on and off
- Turning the compartments on and off
- Target temperature pre-selection for the individual compartments
- Changing the speed of the motors in the refrigeration system (low-noise operation)
- Manual starting and/or aborting the defrosting process
- Display of the refrigeration system's status
- Display of the compartment's status

Please refer to the Universal Remote Control Drivers Guide “Drivers Guide for Universal Remote Control Unit” on our User Manuals Website for further instructions on how to use and navigate.

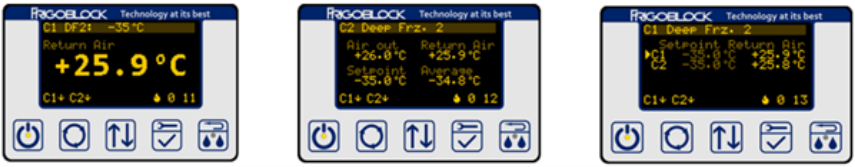
Figure 8. Universal Remote Control



1.	Controller Display
2.	Function Keys

Standard Display Layout Variants

You can configure between three display views for the HMI.



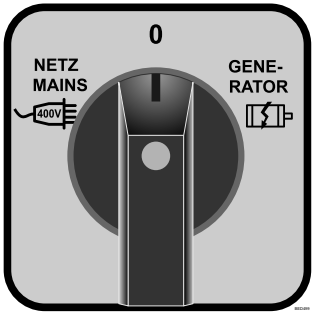
1. Left: Default
2. Middle: EHI (European Trade Institute)
3. Right: Overview

These can currently be set by the service partner using a diagnostic tool.

The display shows both, text and graphics. With this system, operators can obtain data regarding the refrigeration machine and identify possible faults in the system.

Operation Modes

MAINS operating mode (supply via 400 V CEE socket)



The figure shows the classic version for all refrigeration machines. Always select this supply if a CEE socket is available and the refrigeration machine supports this supply.

To ensure the refrigeration machine's safe and reliable operation in mains operation mode, observe the following recommendations:

- The mains supply cables must comply with the specifications of the applicable regulations at the site of use. We recommend using type H07BQ-F cable.
- The mains cable must be completely unwound. The maximum cable length must not exceed X metres.
- Power connection to a 5-pin CEE socket with 400 Volt / 50 Hz output. 32 A D-characteristic automatic circuit breaker, slow-blow fuse or motor protection switch. The series resistance of the fuse must not exceed X ohms.
- If a ground-fault circuit interrupter is used (see DIN VDE 010-410/DIN VDE 0100-530), FRIGOBLOCK recommends using an RCCB2-type 30 mA all-current sensitive variant.

Plug in the mains cable with switch position set to "0" and then select the "Mains" switch position. The universal remote control indicates operational

readiness. If the "Phase error" error message is displayed, the pins marked red in the CEE plug must be turned with a screwdriver.

- The CEE plug has two pins (contrasting in colour) that can be turned.
- Turn these pins in the CEE plug about 180° using a screwdriver.
- Plug the CEE plug back into the socket.
- Set the Mains-0-Alternator switch to the "Mains" position.
- Turn on the FRIGOBLOCK refrigeration machine using the universal remote control.
- Check the direction of rotation once again using the flag.
- FRIGOBLOCK refrigeration machines that are equipped with a direction of rotation monitor now run in the correct direction of rotation.

ALTERNATOR operating mode (while driving)

The image shows the R2 M-0-A variant

Important: *Disconnect the mains plug before setting off!*

1. Switch: "Alternator" position

   Note: *In the case of articulated trains or semi-trailers, check whether the connecting cables (spiral cables) are plugged in; if necessary, plug in the connecting cables.*

2. Start the truck engine

While driving, the refrigeration system(s) can be operated using the universal remote control(s) in the driver's cab.

Articulated trains have a second universal remote control for operating the refrigeration system on the trailer in the driver's cab.

The refrigeration machine can be operated when the vehicle is idling during short downtime periods. However, the refrigerated body should be pre-cooled in mains operating mode. To prevent damage caused by overheating, the alternator is switched off with a temperature switch. In the event of overheating, the alternator switches off. After cooling down, the switch resets and the refrigeration system can be put back into operation.

Vehicle High-Voltage Battery Mode

Note: *The operation of the refrigeration machine depends on the charge level of the high-voltage battery. If the charge level is low, the refrigeration machine may be switched off by the vehicle. The message "Waiting for approval" appears on the HMI display.*

Refrigeration System With Inverter Filter

Mains operation is as described under "Mains" operating mode.

For operation on the high-voltage battery, the "Alternator" switch position must be selected.

In the case of articulated trains or semi-trailers, check whether the connecting cables (spiral cables) are plugged in; if necessary, plug in the connecting cables.

Activate the vehicle's high-voltage system while observing the user instructions specified by the vehicle manufacturer.

Important: *Disconnect the mains plug or the vehicle's charging cable before setting off!*

Full Inverter Refrigeration System

Figure shows the switch for battery-operated vehicles

An additional 0-1 switch is required for some vehicle manufacturers. To operate the refrigeration machine, select position "1"

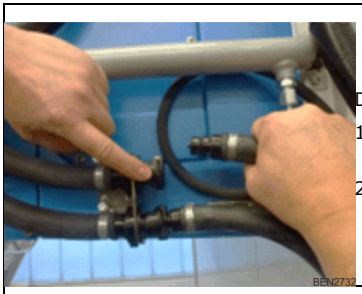
Hydraulic Tilting Device (If Installed)

Important: *The safety instructions within these operating instructions for electrically operated FRIGOBLOCK transport refrigeration machines must be observed for the operation of the hydraulic tilting device!*

⚠ Caution

Risk of Injury!

When working on components at a height, make sure that there is adequate protection against falling!

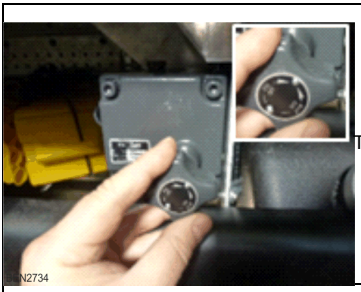


Disconnect coolant pipes (if present)

1. Press the release button on the coolant pipes (refrigeration unit side)
2. Disconnect the coolant pipes.

On both sides of the refrigeration unit

1. Pull cotter pin out of quick release clips.
2. Open quick release clips.



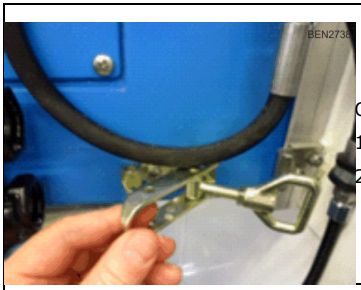
Turn the pump wheel clockwise to position „off ".

Operate the pump with the lever until the refrigeration unit is in the raised position.

Refrigeration unit in raised position

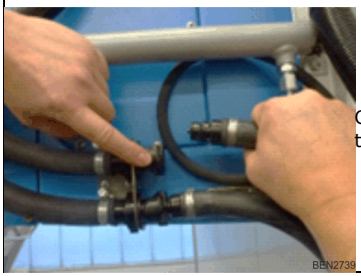
1. To lower the refrigeration unit, slowly turn the pump wheel counterclockwise to the "on" position. The refrigeration unit lowers down.
2. After the refrigeration machine has been lowered, the pump wheel remains in the "on" position (system without pressure)

Important: *Do not trap and squash any pipes between the refrigeration unit and the body.*



On both sides of the refrigeration unit

1. Close quick release clips.
2. Insert the cotter pin into quick release clips.



Connect coolant pipes (if present) and check for tightness.

Loading and Inspection Procedures

This chapter describes pre-loading inspections, loading procedures, post-loading procedures, post-loading inspections, and enroute inspections. FRIGOBLOCK refrigeration units are designed to maintain the required product load temperature during transit. Follow these recommended loading and enroute procedures to help minimize temperature related problems.

Loading and Enroute Inspections

Notice

Preventative Maintenance FRIGOBLOCK!

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

Important: *Make sure cargo is pre-cooled to the proper temperature before loading. The Reefer unit is designed to maintain temperature, not cool an above-temperature load.*

⚠ Caution

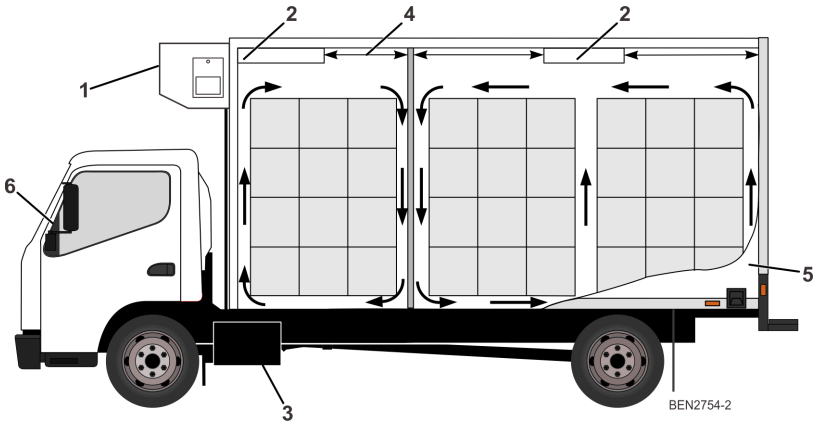
FRIGOBLOCK PreTrip!

Turn the vehicle's engine off before inspection and set the M0A switch to position "0". Disconnect the mains cable from the CEE socket.

⚠ Caution

Risk of Injury!!

Disconnect the mains power cable before driving the vehicle.



1.	Inspect unit condenser grille openings to ensure they are free of debris.
2.	Inspect evaporator defrost drains to ensure they are not plugged or kinked.
3.	Confirm there is sufficient fuel in tank to operate unit for time required for deliveries.
4.	Make sure that there is a minimum of 1219 mm (48 in.) between evaporator air outlets and wall or bulkhead.
5.	Inspect cargo box compartment inside and out for: • Inspect condition of door seals. They must seal tightly with no air leakage. • Damaged walls, missing insulation or blocked floor channels. • Inspect bulkheads (if applicable) for a air tight fit at ceiling, walls, and floor.
6.	Using the HMI Controller, turn the unit on to pre-cool cargo compartment: • Adjust setpoint to desired cargo temperature and allow unit to run a minimum of 30 to 60 minutes (longer if possible) before loading cargo.

Important: *As product is being loaded, make sure evaporator air inlets and outlets are not blocked. Maximum air circulation is necessary to properly maintain the temperature of the entire load.*

Note: *Listen also for other unusual noises, vibrations, etc.*

Note: *For instructions on how to Inspect your refrigeration unit please refer to the manual available at www.emea-user-manuals.thermoking.com*

Note: *For further best practices, please go to www.europe.thermoking.com/best-practices*

Post-Loading Inspection

Post-loading inspections verify the cargo has been loaded properly. To perform a post-load inspection:

1. Inspect the evaporator outlets for blockage.
2. Turn the unit off before opening the cargo box doors to maintain efficient operation.

   Note: *The unit can be operated with the cargo box doors open if the truck is backed into a refrigerated warehouse and the dock door seals fit tightly around the trailer.*
3. Perform a final check of the load temperature. If the load is above or below temperature, make a final notation on the manifest.

   Important: *Cargo must be pre-cooled to proper temperature before loading. The unit is designed to maintain temperature, not cool an above-temperature load.*
4. Close or supervise the closing of the cargo box doors. Verify they are securely locked.
5. Verify the setpoint is at the temperature listed on the manifest.
6. If the unit was stopped, restart using the correct starting procedure. See the Operating Instruction chapter in this manual.
7. Start a manual defrost cycle 30 minutes after loading. See the Manual Defrost procedure in the manual.

Enroute Inspections

Complete the following enroute inspection every four hours. This will help minimize temperature related problems.

Inspection Procedure

1. Verify setpoint is correct.
2. Check the return air temperature reading. It should be within the desired temperature range.
3. Initiate a manual defrost cycle after each enroute inspection.

Inspection Troubleshooting

1. If a temperature reading is not within the desired temperature range, refer to the troubleshooting table (Table 1, p. 48). Correct problem as required.

2. Repeat the Enroute Inspection every 30 minutes until the compartment temperature is within the desired temperature range. Stop the unit if the compartment temperature is not within the desired temperature range on two consecutive 30 minute inspections, especially if the compartment temperature appears to be moving away from the setpoint.
3. Immediately contact the nearest Thermo King or FRIGOBLOCK Dealer or your company office.
4. Take all necessary steps to protect and maintain proper load temperature.

Notice

Cargo Loss!

Stop the unit if the compartment temperature remains higher than the desired temperature range from the setpoint on two consecutive 30 minute inspections. Contact the nearest Thermo King or FRIGOBLOCK Dealer or your company office immediately. Take all necessary steps to protect and maintain proper load temperature.

Table 1. Inspection Troubleshooting

Problem: A return air temperature reading is not within desired temperature range of the setpoint.	
Cause	**Remedy**
The unit has not had time to cool down to correct temperature.	Refer to the load log history. Look for above temperature load records, properly pre-cooled cargo compartment, length of time on road, etc. Correct as required. Continue monitoring return air temperature until the reading is within the desired temperature range of the setpoint. ***Note:*** *Ensure cargo is properly pre-cooled prior to loading onto trailer. If 'warm cargo' is loaded onto trailer and reefer is used to cool to setpoint this will result in longer time required to cool down to correct temperature and possibly plugging of evaporator with frost due to increased humidity in trailer compartment.*
The unit may have a low refrigerant charge.	Check the receiver tank sight glass for refrigerant level. If fluid is not showing in the receiver tank sight glass, the refrigerant charge may be low. A competent refrigeration technician is required to add refrigerant or repair the system. Contact the nearest dealer, authorized Service Center, or refer to "Emergency Assistance," p. 4 section for contact information..

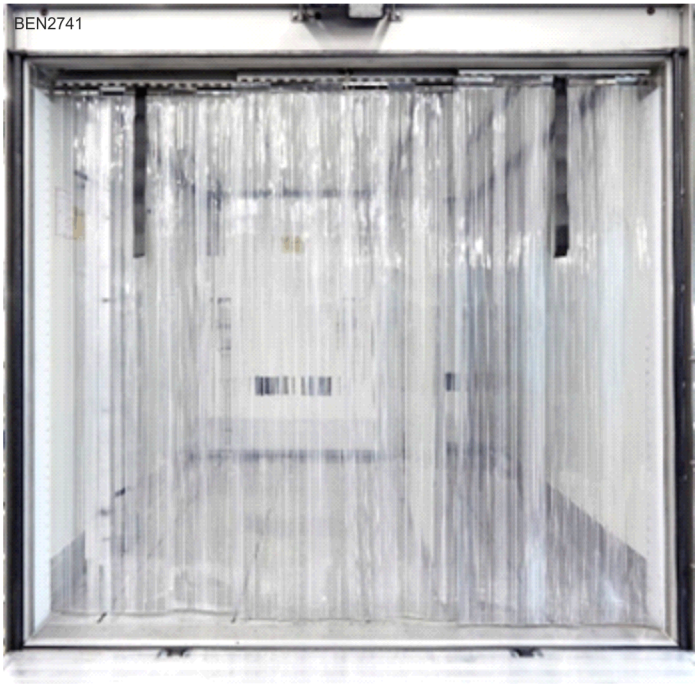
Table 1. Inspection Troubleshooting (continued)

Problem: A return air temperature reading is not within desired temperature range of the setpoint.	
Cause	**Remedy**
The unit is in defrost or has just completed a defrost cycle.	Monitor the return air temperature after the defrost cycle is completed to see if the temperature returns to the desired temperature range of the setpoint.
The evaporator is plugged with frost.	Initiate a manual defrost cycle. The defrost cycle will automatically terminate when complete. Continue monitoring the return air temperature until the reading is within the desired temperature range of the setpoint.
Improper air circulation in the cargo compartment.	Inspect the unit and cargo compartment to determine if the evaporator fan (3) are working properly circulation the air. Poor air circulation may be due to improper loading of the cargo, shifting of the load, or depending on unit, fan belt slippage or faulty electrical fans. Correct as required. Continue monitoring return air temperature until problem is corrected.
The unit did not start automatically.	Determine the cause for not starting. Correct as required. Continue monitoring return air temperature until reading is within desired temperature range of the setpoint.
Multi-Temp Units Only– The unit is being used to cool/ heat a single temperature load and does not have the capacity to cool the entire trailer.	A multi-temperature unit may not have the cooling or heating capacity to maintain a specific temperature range throughout an entire trailer.

During Delivery / Unloading Inspections

Regularly check the current temperature in the body while driving. Opening the doors more frequently allows high quantities of warm air to enter. The goods should be delivered to the customers in the order in which they were loaded onto the vehicle. The FRIGOBLOCK refrigeration machine must be switched off during delivery (with the doors open).

Note: *When picking the goods and when leaving the body, the cold curtain must remain completely closed. A cold curtain minimises the air exchange with the environment, keeps the air temperature in the refrigerated body more constant and prevents heat loss. Avoid opening the doors unnecessarily.*



Important: *If there are people in the cold store, the doors MUST NOT be locked.*

Empty roll cages, pallets, etc. are an additional heat load and should therefore not be transported together with the refrigerated goods. The moisture content in the refrigerated body is affected by the number of times the doors are opened and/or the nature of the goods. This leads to ice formation on the evaporator's surface and consequently results in the reduced performance of the FRIGOBLOCK refrigeration machine.

Note: *f you notice ice formation, initiate a defrost. (For this, see: defrosting / heating up)*

After Delivery

Clean the body and remove any loose packaging material. Heat up the body completely at least once a week (for this, see: defrosting / heating up).

Inspection and Maintenance Instructions

Notice

Operational Safety!

To ensure the operational safety and efficient operation of the FRIGOBLOCK refrigeration machine, perform daily inspections of the refrigeration machine and observe the following instructions for maintenance work. Observe the occupational safety regulations and the safety instructions in this documentation for all works

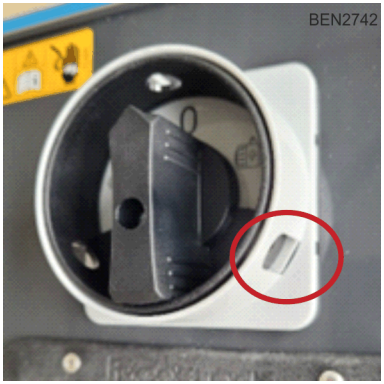
Depending on the application and operating conditions, regular maintenance must be performed on the entire refrigeration system by a service partner who has been authorised and trained by FRIGOBLOCK. Details can be found in the Service Check Book.

⚠ Caution

Risk of Injury!

The unit can start and run automatically any time the unit is turned on. Turn the unit On/Off and unit maintenance switches off before opening doors, doing inspections, or working on any part of the unit.

- Switch off the FRIGOBLOCK refrigeration machine
- Turn off the vehicle's ignition
- Set the Mains-0-Alternator switch to the "0" position or press the emergency switch in case of battery-powered vehicles.
- If connected, disconnect the mains cable from the mains supply
- The system must be secured against being switched on again with a lock on the M-0-A switch or on the vehicle's emergency stop switch.



Protective gratings, doors, covers and gates that have been opened or removed for maintenance purposes must be reinstalled and/or closed before starting up again.

⚠ Warning

Risk of Injury!!
Rotating parts. Take precautions.

⚠ Warning

Risk of Injury!
The surfaces of components of the refrigeration machine may be hot (above +60°C) or cold (below 0°C). Before starting work, wait until the temperature has equalised.

⚠ Caution

Risk of Injury!
When working on components at a height, make sure that there is adequate protection against falling!

Visual inspections before the Start of the Trip

Check

- that the mains cable is disconnected,
- that the Mains-0-Alternator switch is in the correct position,
- whether the electrical connections at plugs or sockets are loose,
- whether unused plugs are plugged into the parking sockets provided, and that the covers of unused sockets are closed. See also “,”

Inspections and Maintenance Services Performed by the Operator

- According to the Food Hygiene Ordinance (LMHV), the inside of body should be regularly cleaned in accordance with current regulations (e.g., DIN10516).
  - The condenser in the FRIGOBLOCK refrigeration machine (outside the cargo hold) and the evaporator (inside the insulated body) must be cleaned using a high-pressure cleaner every 4 weeks, with the FRIGOBLOCK refrigeration machine is turned off.
  - The cleaning jet must not be too strong and must be vertical to the surface so that the slats are neither bent nor damaged. The temperature must not exceed +60°C.
  - The cleaning agent should contain a corrosion protection additive and should not react aggressively to the metallic materials.
- The alternator, the inverter filter, all plug connections and the switch boxes must not be cleaned with a high-pressure cleaner.
- According to EU Regulation No. 517/2014, the operator of transport refrigeration machines is obliged to subject them to regular leak tests.
- According to DIN EN 13486, all installed, operating and approved (according to 12830 and TLMV) temperature recorders must be inspected regularly every year.
- Regular "electrical safety tests" must be performed in accordance with DIN VDE 0133 EN62 at intervals to be determined by the operator (following a risk assessment).
- Observe the country-specific legal provisions for the tests mentioned.
- Longer periods of refrigeration machine downtime accelerate the ageing of the seals in the refrigeration system. Therefore, the refrigeration machine should be operated in "cooling" mode at least once a month.

- If the FRIGOBLOCK refrigeration machine has been out of use for more than 12 months, it must be started up by a FRIGOBLOCK service partner.

Recording Duty

Leaking refrigerants contribute to the greenhouse effect. Records of topped up and/or disposed refrigerant, as well as proof of the annual leak tests, must be carefully archived by the operator and presented to the supervisory authorities upon request. All applicable national regulations must be observed.

Thermo King – by Trane Technologies (NYSE: TT), a global climate innovator – is a worldwide leader in sustainable transport temperature control solutions. Thermo King has been providing transport temperature control solutions for a variety of applications, including trailers, truck bodies, buses, air, shipboard containers and railway cars since 1938. For more information, visit www.thermoking.com or www.tranetechnologies.com.

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