

OPERATION MANUAL

Electrically powered FRIGOBLOCK
transport refrigeration machines



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Introduction

This FRIGOBLOCK refrigeration machine is a quality product designed and built to the state of the art and complying with all applicable European directives.

The term refrigeration machine refers to the complete unit, including all additional components.

Please keep the attached conformity declaration of FRIGOBLOCK GmbH safe. The refrigeration machine is a unit requiring inspection as prescribed by the German Gerätesicherheitsgesetz (Equipment Safety Act). This implies specific requirements regarding the qualification of the personnel for operation and repair.

This Operation Manual and the completed customer service book are part of the product. Please read these documents carefully before starting the refrigeration machine and always have them ready at the refrigeration machine.

About this Manual

This Operation Manual contains information on the general operation of the refrigeration machine and the optional components and safety instructions. Read and strictly observe all safety instructions.

The proper, safe and economic operation of the refrigeration machine, including all components, can only be ensured if the machine is maintained and repaired by qualified personnel. Maintenance and repairs must only be performed by authorised and qualified FRIGOBLOCK service partners.

Make sure that only original FRIGOBLOCK parts are used for repair and replacement. Detailed information on maintenance, e.g., maintenance intervals and maintenance scope can be found in the FRIGOBLOCK customer service book. The maintenance personnel must have read and understood the operation and maintenance manual before work is started.

If warnings are ignored, serious physical injury and damage to assets can be caused, for which FRIGOBLOCK GmbH is not responsible.

In addition, this Operation Manual contains information on refrigeration during transportation and on troubleshooting and repair of minor defects.

If you have other questions regarding the refrigeration machine, please contact your FRIGOBLOCK service partner or your contact at FRIGOBLOCK GmbH by calling +49 (0)201/61301-0 or at email@frigoblock.com.

Warranty and liability



The agreed warranty period is specified in the order confirmation.

FRIGOBLOCK 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 GmbH from any warranty obligation.

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

Transport and packaging



Inspect the consignment for damage when the machine arrives at the destination. Any visible damage should be noted on the consignment documents and FRIGOBLOCK GmbH informed of them without delay (within 24 hours).

All components of the FRIGOBLOCK refrigeration machine must be stored dry and in the original packaging. To avoid transport damage, all components which must not be stacked are marked with a don't-stack symbol.

Observe the center of gravity mark and all other signs and symbols on the packages. Dispose of packaging material as prescribed.

Explanation of the notice sticker used on the FRIGOBLOCK packaging:



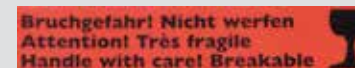
Center of gravity mark.



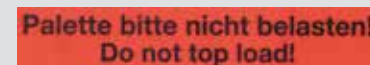
Arrows up.
Fragile goods.
Goods must be stored dry.



Don't-stack symbol, do not stack.



Risk of breakage! Do not throw!



Do not place load on the pallet.

Safety instructions



Safety instructions are product markings for avoiding hazard. Therefore, all safety instructions must be observed.

The FRIGOBLOCK refrigeration machine is a state-of-the-art product and is safe in operation. However, the refrigeration machine can involve residual risks if it is used improperly or operated by untrained personnel.

Anyone instructed to install, start-up, maintain, repair or operate the refrigeration machine must have read and understood this Operation Manual and particularly the safety instructions.

The FRIGOBLOCK refrigeration machine must only be used and operated by qualified personnel and exclusively within the limits of the technical specifications and in accordance with the safety instructions and regulations outlined in this document. Qualified personnel must be familiar with the operation of the FRIGOBLOCK refrigeration machine and have the experience to carry out the tasks required.

Some of the components described in this Operation Manual may be located at parts of the machine other than described herein if this has been agreed with the customer. Make yourself familiar with the installation positions of these components before you start up the FRIGOBLOCK refrigeration machine (also see the chapter "positions of the main components").

Observe all legal and safety regulations and the instructions in the Operation Manual.

Make sure that anyone operating this FRIGOBLOCK refrigeration machine,

- has been instructed in safety aspects according to Health and Safety requirements and operational safety has been given in the operation of this product as prescribed in this Operation Manual.
- has read and understood this Operation Manual.

FRIGOBLOCK GmbH offers training and instruction courses for operators in connection with the delivery of the truck.

Observe the different national provisions and legislation.

Definition of potential hazards:

1. The term **DANGER** indicates a directly hazardous situation which, if ignored, will result in serious injury or death.
2. The term **WARNING** indicates a potentially dangerous situation which, if ignored, could result in serious injury or death.
3. The term **CAUTION** indicates a potentially dangerous situation which, if ignored, could result in damage to property or light or medium physical injury.



Reference to possible residual risks and their effects is made in the different chapters of the Operation Manual.

Explanation of the symbols used in this Operation Manual



Explosion 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 water and soil organisms and can damage ecosystems.



Warning symbol:

Warns of dangerous electric voltage.



Warning symbol:

Warns of cold.




Warning symbol:


Warns of a hot surface.





Warning symbol:


Warns of rotating parts.


 Warning symbol:
Warns of caustic substances.


 Warning symbol:
Fall warning.


 Warning symbol:
Explosion hazard.

 Important note
Indicates important information on the product or on handling the product.


 Personal protection equipment:
Wear safety boots.


 Personal protection equipment:
Wear protective goggles.


 Personal protection equipment:
Work gloves.

 Personal protection equipment:
Wear protective helmet.

 Alert:
First aid.

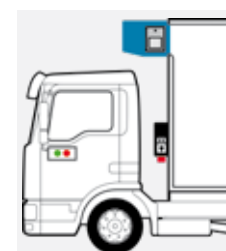
 Alert:
Wash hands thoroughly.

 Alert:
No smoking.

 Alert:
No naked flame.

FRIGOBLOCK

1. General information on the FRIGOBLOCK refrigeration machine



Correct use of the FRIGOBLOCK system



The FRIGOBLOCK refrigeration machine maintains the temperature of goods in insulated truck bodies in transit. FRIGOBLOCK refrigeration machines are powered electrically either from the mains (400 Volt / 50 Hz, 32 A, slow fuse), the FRIGOBLOCK alternator or a FRIGOBLOCK diesel alternator unit.

The FRIGOBLOCK alternator and the FRIGOBLOCK diesel alternator unit are only permitted for use together with a FRIGOBLOCK refrigeration machine. Any other use is not intended.

To ensure the safe operation, the FRIGOBLOCK refrigeration machine must not be used in any other way from that described in the Operation Manual. The use of the FRIGOBLOCK refrigeration machine is subject to the applicable national legal and safety regulations. This also applies to accessories.

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

CAUTION:

Never remove or render ineffective any guard or safety device.

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

Limits for the operation of the FRIGOBLOCK refrigeration machine:

- Ambient temperatures up to +40°C with refrigerants R410A and R507
- Control range for cooling and heating in the refrigerated body from -40°C to +25°C

Emergency shut-down

1. Stop the truck engine or diesel alternator unit (if installed).
2. Set the Mains-0-Alternator switch (Figure 1) to "0". This isolates the FRIGOBLOCK refrigeration machine electrically.

Figure 2 shows the possible Installation positions of the Mains-0-Alternator switch.



Figure 1

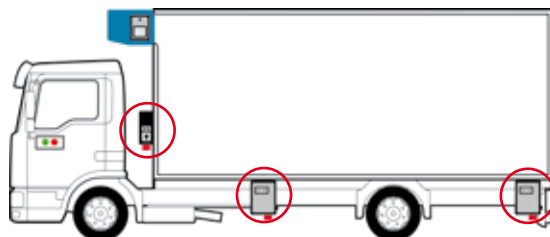


Figure 2

Identification of the FRIGOBLOCK refrigeration machine

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

FK



Installation of this machine type in rigid trucks above the driver's cab.

HK



Special flat version for installation at the front of trailers or semitrailers.

EK



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

RE



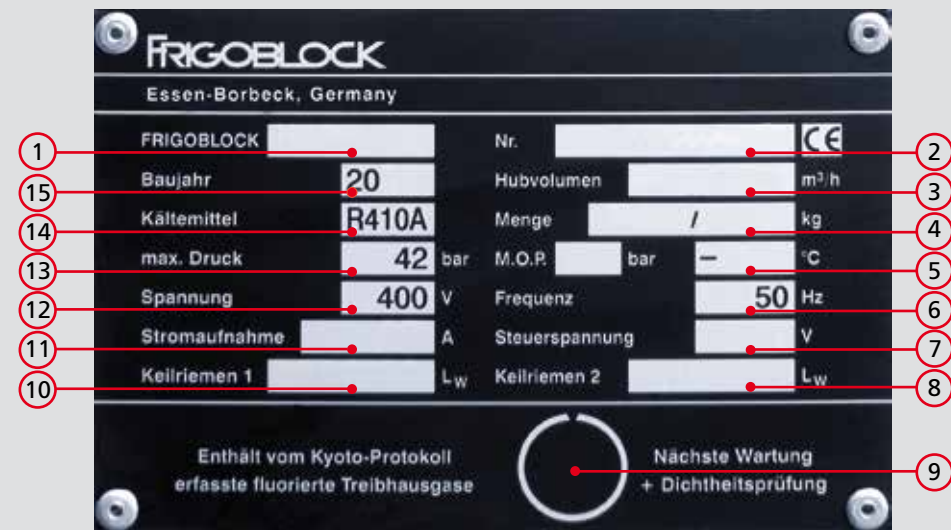
Flat evaporators are used in split unit installations (in combination with an EK condenser unit) or as additional evaporator in multi-compartment installations.

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

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

In addition to the nameplate, the technical specifications of the FRIGOBLOCK refrigeration machine 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:



- | | |
|--|--|
| ① FRIGOBLOCK type | ⑧ Length of second V-belt |
| ② FRIGOBLOCK machine number | ⑨ Date of next maintenance / leak test |
| ③ Compressor swept volume | ⑩ Length of first V-belt |
| ④ Refrigerant filling volume of the main unit / filling volumes of additional components | ⑪ Power rating |
| ⑤ MOP pressure (suction pressure limit) | ⑫ Nominal voltage |
| ⑥ Frequency at Rated output | ⑬ Maximum working pressure |
| ⑦ Control voltage 12/24 Volt | ⑭ Refrigerant used |
| | ⑮ Year of production |

Other technical specifications and installation dimensions are available in separate data-sheets.

SL version:

To reduce noise emission, e.g., during delivery in built-up areas, the FRIGOBLOCK refrigeration machine types FK13, FK25, HK25, HK34 and EK25 are optionally available in SL design (2-step speed control). Machines of SL design can operate both at normal (S = fast) speed or slow (L = low).

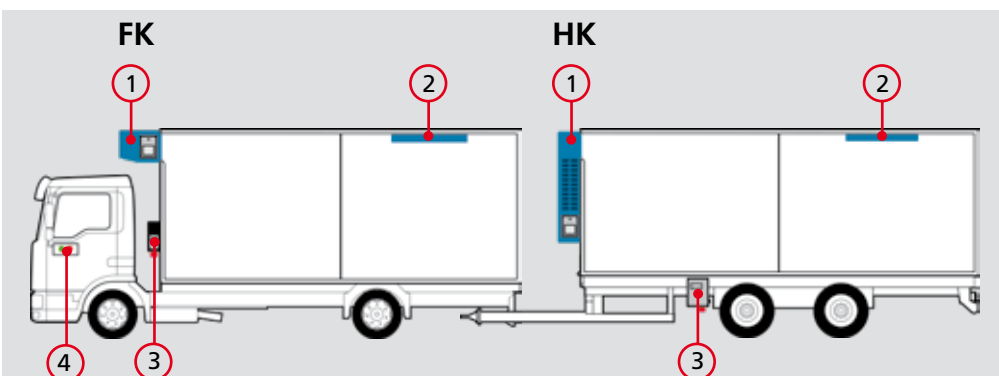
Noise emission data of the FRIGOBLOCK refrigeration machine is provided on the label in the machine control cabinet.



The noise levels were determined according to the outdoor directive 2000/14 EC (Directive on the noise emission in the environment by equipment for use outdoors).

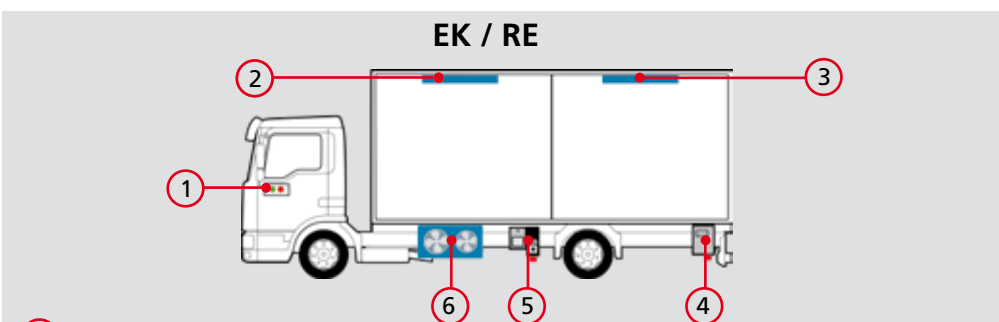
1.1. Position of the main components

FRIGOBLOCK refrigeration machine types FK and HK with optional additional evaporator for multi-compartment operation



- ① FRIGOBLOCK refrigeration machines FK/HK with machine control cabinet
- ② Additional flat evaporator type RE (variable installation position), for multi-compartment operation
- ③ Mains-0-Alternator control box (variable installation position)
- ④ Remote operation

FRIGOBLOCK refrigeration machine EK / RE as split unit with optional additional evaporator for multi-compartment operation type EK with external evaporator



- ① Remote operation
- ② Split flat evaporator type RE compartment 1 (variable installation position)
- ③ Additional flat evaporator type RE (variable installation position), for multi-compartment operation
- ④ Optional 400-V CEE socket outlet (variable installation position)
- ⑤ Machine control cabinet and Mains-0-Alternator switch (variable installation position)
- ⑥ FRIGOBLOCK refrigeration machine type EK undermount with split unit

1.2. Authorisation



Please have all maintenance and repairs performed by a FRIGOBLOCK service partner.



DANGER: Refrigerants are harmful to health; some refrigerants can be flammable and explosive.

The refrigerating system contains high pressure gas (refrigerant).

The refrigeration system may be opened for maintenance or repairs only by competent (as defined by DIN EN 13313) and personnel authorised by FRIGOBLOCK GmbH. This includes charging of refrigerant. All applicable safety instructions must be observed.



DANGER: If handled improperly, electric voltage can cause internal and external burns or death. FRIGOBLOCK refrigeration machines in mains operation mode operate on 400 Volt and in alternator mode at up to 690 Volt.

Work on electrical components of the FRIGOBLOCK refrigeration machine and the alternator must only be performed by competent persons with required training (electrician for defined work item) or generally by a skilled electrician. All applicable safety instructions must be observed.

1.3. Installation and start-up



The FRIGOBLOCK refrigeration machine must only be installed and started up by service personnel authorised by FRIGOBLOCK GmbH in accordance with the installation drawings, installation instructions and circuit diagrams. Warranty claims will only be accepted if the above requirements are met.



Lift and move the FRIGOBLOCK refrigeration machine only at the lifting eyes provided on the machine.



Figure 1



Figure 2

FRIGOBLOCK refrigeration machines of type FK35 (Figure 1), HK and HD (Figure 2) must only be lifted by means of a cross-beam. The weight of the FRIGOBLOCK refrigeration machines is specified in the technical datasheet.

Refrigerant, refrigeration machine oil and refrigeration system



Always wear suitable personal protection equipment when handling refrigerant or refrigeration machine oil.



No special hazards are known if the usual precautions and instructions for handling such materials and using personal protection equipment are observed.

Refrigerant



Make sure that the refrigerant on the nameplate of the FRIGOBLOCK refrigeration machine is used.

FRIGOBLOCK transport refrigeration machines operate on the powerful refrigerants R410A and R507. Neither of these is flammable.



DANGER: Refrigerant collecting in a closed space can displace oxygen and cause suffocation. Breathing vapor with high concentration of refrigerant is harmful to health and can cause cardiac arrhythmia, unconsciousness or death.

Make sure of sufficient ventilation when working on the refrigeration system or when handling refrigerant generally.



WARNUNG: Refrigerants tend to evaporate quickly at atmospheric pressure. Objects in contact with the evaporating refrigerant become very cold. This can cause serious injuries.



First aid:

Breathing:

Remove the affected person to fresh air. In case of nausea, call a doctor immediately.

Skin contact:

Treat freezes in the same way as burns, rinse with copious amounts of water, to NOT remove clothing (it may stick to the skin). If skin burns are found, call a doctor immediately.

Eye contact:

Open the patient's lid widely and rinse constantly (at least for 15 minutes) with water. Call an eye doctor immediately.

Refrigeration machine oils



DANGER: Refrigeration machine oils contaminate water. Oil is hazardous waste and must be disposed of as prescribed by the applicable hazardous waste regulations. Proof of disposal/collection documents must be archived for the prescribed period as per hazardous waste regulations.



Depending on the compressor type and the refrigerant, different refrigeration machine oils are used in FRIGOBLOCK refrigeration machines. Always make sure that the prescribed type of oil is used.

No special hazards are known if the precautions usually taken when handling mineral oil and chemical products are observed and suitable personal protection equipment is used.



Avoid prolonged skin contact and carefully wash your hands with water and soap after handling refrigeration machine oil.



First aid:

General:

Change clothing and boots soaked or contaminated with product.

Never carry cloth contaminated with product in the pockets of your clothes.

Skin contact:

Wash with lots of water and soap.

Swallowing:

Rinse your mouth. If complaints persist, consult a doctor.

In addition to the instructions in this Operation Manual, observe the information in the safety data sheets for refrigerants and refrigeration machine oils. These are available on the web sites of the manufacturers/suppliers of these products.

Refrigerant circulation system

In normal operation, the pressurised refrigeration system is technically leak tight. Leak tightness ensures that there are no dangerous situations and escape of refrigerant to the atmosphere. To maintain the integrity of the refrigeration system, observe the service intervals in the customer service check brochure.

If a leak in the refrigeration system is suspected, immediately contact a FRIGOBLOCK service partner.

1.4. Fundamental information on temperature controlled transportation with FRIGOBLOCK refrigeration machines

Before start of the trip



WARNING: If handled improperly, electric voltage can cause internal and external burns or death. FRIGOBLOCK refrigeration machines in mains operation mode operate on 400 Volt and in alternator mode at up to 690 Volt.

Disconnect the mains plug. (For this, see: Operation of the refrigeration machine/alternator)



The condenser must be clean and dirt should not be allowed to build up on it. The evaporator in the refrigerated body must not be blocked by loose packaging material. Either would impair the function and reduce the cooling capacity of the FRIGOBLOCK refrigeration machine.

Inspect the complete refrigerated body for holes and damage regularly.



Damage to the body insulation reduces the insulating properties of the body panel, causes the FRIGOBLOCK refrigeration machine to run longer than necessary and consumes more energy.

Correct loading

To maintain the temperature while cargo is moved in and out of the truck, the refrigerated body must be precooled and cargo of different temperature should be transported separate from each other.



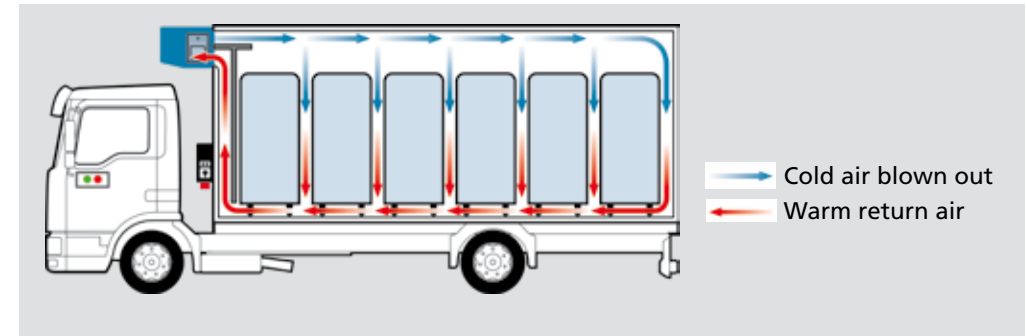
Turn off the refrigeration machine while cargo is loaded. Load the cargo in the sequence in which it will be unloaded.

Check the goods for correct temperature immediately before loading it and set the temperature for the goods at the thermostats.



The output of the refrigeration machine is designed in such a way that the temperature required for the goods moved can be maintained.

Air must be able to circulate around the goods in the refrigerated body freely. The return flow of the air to the evaporator is ensured by the correct use of pallets and roll cages (e.g., these should never be film-wrapped down to the bottom of the container).



Make sure that a sufficient distance is maintained between the cargo and front wall, roof and floor of the truck body. Do not load cargo higher than permitted.

The flow of return air (air inlet at the evaporator) must not be obstructed by incorrectly placed objects such as empty boxes, pallets or loose packaging.

The air flow should be such that any short circuit between the air outlet and the air inlet at the refrigeration machine is avoided.



Air transports heat inside the refrigerated body. Therefore, optimum air flow is a precondition for uniform product temperature and quality of the goods being transported.

Observe the guidelines for protecting the cargo from shifting. Observe the maximum loading height of the cargo.

Telescopic bars securing the cargo must not be positioned under remote evaporators.

During delivery

Check to make sure that the target temperature is maintained while you are on the road. Opening the doors frequently allows lots of warm air to enter the cargo space. The goods should be delivered to the customers in the order in which they were loaded on the truck.



During picking of goods and when the goods are moved out of the truck body, the door curtains must remain closed completely. A door curtain reduce the air exchange with the environment, keeps the air temperature in the refrigerated body more constant and helps to prevent the entry of warm air from outside. Do not open the doors more often than necessary.

Empty roll cages pallets etc are additional heat load and should not be carried together with the refrigerated cargo.

The frequency at which the doors are opened and/or the properties of the goods carried affect the moisture level in the refrigerated body. Ice forms on the surface of the evaporator and the output of the FRIGOBLOCK refrigeration machine is reduced.



If you see that ice forms, start a defrost cycle.
(For this, see: defrosting / heating)

After delivery

Clean the body and remove all packaging waste. Heat the body completely at least once every week (For this, see: defrosting/heating).

1.5. Inspection and maintenance by the owner



To ensure the safety and the economic operation of the FRIGOBLOCK refrigeration machine, make daily inspections of the refrigeration machine and observe the following instructions. Observe the operational safety and all other safety instructions in the Operation Manual.

WARNING: Electric voltage, rotating components, hot and cold surfaces, falling hazard



Make sure that the FRIGOBLOCK refrigeration machine is isolated electrically before protective gratings, doors, covers and gates are opened and before work on the machine begins.

For this:

- Turn off the FRIGOBLOCK refrigeration machine,
- Turn off the truck engine and the diesel alternator unit, if installed,
- Set the Mains-0-Alternator switch to "0" ,
- If connected, disconnect the mains cable from the mains supply.



There are rotating and reciprocating parts inside the machine. Do not touch such parts either with your hands or with a tool. Wait for the machine to come to standstill.



The surfaces of components of the refrigeration machine can be hot (more than +60°C) or cold (below 0°C). Wait until these components take on normal temperature, then start work.



When working on cab roofs follow all working at height instructions and depot safety procedures.

Protective gratings, doors, covers and access panels that were removed for maintenance work, must be installed/closed before the refrigeration machine is started.

Visual inspections before start of the trip

Check to make sure

- That the mains supply cable is disconnected,
- That the Mains-0-Alternator switch is at the correct position,
- That the drive belt/s are in good condition, check the belts make no abnormal noise and are not damaged (such as e.g., cracks or broken teeth),
- That there are no leaks, oil, refrigerant,
- That all screw/bolt connections are seated properly and tight,
- That no electrical connections in plugs or socket outlets are loose or wet.

Inspections and cleaning by the owner

- Clean the condenser in the FRIGOBLOCK refrigeration machine (outside the cargo hold) and the evaporator (inside the insulated body) with a high-pressure cleaner at least once every 4 weeks. The FRIGOBLOCK refrigeration machine should be turned off for that work.
- The water jet should not be too hard and should impact in perpendicular direction so that the fins are not damaged or bent. Do not exceed a temperature of +60°C.
- The cleaner should contain corrosion inhibitor and not react aggressively to the metals.
- Do not clean plug connections and control boxes by high pressure liquid. Socket outlets not used should be covered to be watertight.
- Follow current Food hygiene regulations and company requirements that the inside of the body should be cleaned and sanitised regularly.
- According to the Chemicals Climate Protection Ordinance (based on EC Directive 842/2006), owners of transport refrigeration machines operating on refrigerant containing fluoride and containing more than 3 kg refrigerant are obliged to make a yearly leak check.
- According to DIN EN 13486, all installed, operating and approved (according to 12830 and TLMV) temperature recorders must be inspected regularly every year. Extended period in which the FRIGOBLOCK refrigeration machine is not used speed up the aging process of seals and gaskets in the refrigeration circulation system. Therefore, the FRIGOBLOCK refrigeration machine should be operated for a short while at least once every month in "Cooling" mode.
- A FRIGOBLOCK refrigeration machine that has not been used for more than 12 months, must be started up by a FRIGOBLOCK service partner.

Refrigerant Recording duty

Leaking refrigerants R410A and R507 increase the greenhouse effect. Protocols of topped up and/or disposed refrigerant and proof of the annual leak tests should be archived carefully by the owner and presented to the supervising authority on request. All applicable national regulations should be observed.

1.6. Operation of the FRIGOBLOCK refrigeration machine



DANGER: Electric voltage can cause internal and external burns or death.



FRIGOBLOCK refrigeration machines in mains operation mode operate on 400 Volt and in alternator mode at up to 690 Volt.

The FRIGOBLOCK refrigeration machines are powered either by

- An external power supply (5-pole 32-Ampere-CEE socket outlet) with 400 Volt / 50 Hz,
- The FRIGOBLOCK alternator powered by the truck engine, or
- A FRIGOBLOCK-Diesel alternator unit.

Turning on the FRIGOBLOCK refrigeration machine

1. In mains mode, power supplied from a 400-Volt-CEE socket outlet

Use this mode whenever a CEE socket outlet is available.

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

- The mains supply cables should satisfy the requirements applicable at the site of use (we recommend cable type H07BQ-F)
- The mains cable must be fully laid out.
- Power supply (5-pole 32-A-CEE socket outlet) with 400 Volt / 50 Hz (automatic circuit breaker characteristic D, slow or motor protection switch).



- Set the Mains-0-Alternator switch to position "0".
- Plug the CEE connector in the socket outlet.



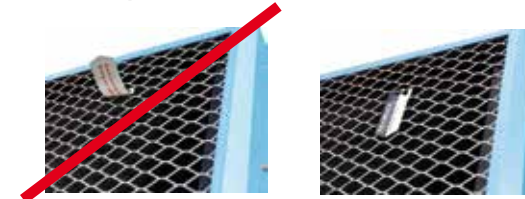
- Set the Mains-0-Alternator switch to position "Mains".



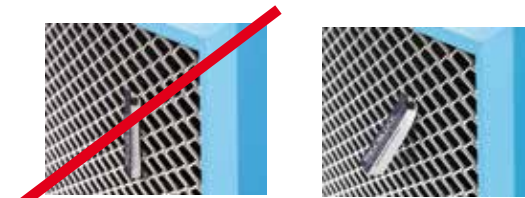
- Turn on the FRIGOBLOCK refrigeration machine at the machine control cabinet at the switch "FRIGOBLOCK On".
- Check the electrical rotation of the FRIGOBLOCK refrigeration machine in mains mode.

The direction of rotation is indicated by a little flag at the condenser or can be monitored by an optional wrong direction of rotation sensor.

Visual inspection



With FRIGOBLOCK refrigeration machine **types FK and HK**, air must be taken in by the condenser. The flag is sucked to the protective grille.



With FRIGOBLOCK refrigeration machine **type EK** the air is blown out the condenser. The flag is blown away from the protective grille.

Electrical test



If the rotation is wrong, the "Rotation" indicator lamp at the Mains-0-Alternator control box lights and the FRIGOBLOCK refrigeration machine cannot run.

If wrong rotation is indicated by the flag or the rotation indicator LED, proceed as follows:

- Turn off the FRIGOBLOCK refrigeration machine at the "FRIGOBLOCK On" switch.
- Set the Mains-0-Alternator switch to position "0".
- Pull the CEE plug at the socket outlet. The CEE plug is isolated electrically now.



- The CEE plug has two pins that can be turned.
- These pins in the CEE plug can be turned by 180° using a screwdriver.
- Insert the CEE in the socket outlet.
- Set the Mains-0-Alternator switch to position "Mains".
- Turn on the FRIGOBLOCK refrigeration machine at the "FRIGOBLOCK On" switch.
- Check the rotation at the flag again.
- FRIGOBLOCK refrigeration machines with a rotation monitor now rotate in the correct direction.



- The "FRIGOBLOCK" indicator lamp at the refrigeration machine control cabinet indicates that the machine is ready for operation.
- For turning off the FRIGOBLOCK refrigeration machine in mains mode, set the "FRIGOBLOCK On" switch to position "Off".

2. In alternator mode on the road

Before the trip, set the Mains-0-Alternator switch to position "0" and stow away the mains supply cable.



- Set the switch to "Alternator".



- Turn on the FRIGOBLOCK refrigeration machine at the "FRIGOBLOCK On" switch at the machine control cabinet.
- Before starting the truck engine, check to make sure that the green "Alternator On" button at the remote control panel is switched off.
- Start the truck engine.
- Raise the engine speed to approx. 1200 -1400 rpm by pushing down on the accelerator pedal.



- At that higher speed, press the "FRIGOBLOCK ON/OFF" button at the remote control panel in the driver's cab. The FRIGOBLOCK alternator and the FRIGOBLOCK refrigeration machine turn on.



The "FRIGOBLOCK" lamp at the refrigeration machine control cabinet indicates that the machine is ready for operation.

Note: Before you stop the truck engine, first turn off the refrigeration machine at the "FRIGOBLOCK ON/OFF" button.

3. In alternator mode in trucks with programmed modules and manual speed setting



- Set the Mains-0-Alternator switch to the "Alternator" position. Then start the truck engine.



- Turn on the FRIGOBLOCK. The switch can remain at "ON" position as long as the refrigeration or heater mode is active.



- If necessary, the idling speed should be raised to the speed defined for the particular truck type.



- In idle/neutral, raise the engine speed (to between 1100 and 1300 rpm) by pushing down on the accelerator for 5 seconds.



- The FRIGOBLOCK is turned on by the truck module at the elevated speed.
- If the truck engine is stopped or the FRIGOBLOCK is switched off at the "FRIGOBLOCK ON" switch, repeat the above procedure if you want to restart the FRIGOBLOCK.

4. FRIGOBLOCK diesel alternator unit type DS (optional)

If the truck is equipped with a FRIGOBLOCK diesel alternator unit, observe the separate part of this Operation Manual for start-up.

Faults



The FRIGOBLOCK refrigeration machine turns off completely on its own.



If installed, the optional "Overload" lamp in the alternator/diesel mode lights. This means that the automatic circuit breaker (motor protection switch) has tripped.

The motor protection switch is installed either in the Mains-0-Alternator or the motor protection switch box.

For switching on the motor protection switch, proceed as follows:

- Turn off the truck engine or, if installed, the FRIGOBLOCK diesel alternator unit.
- Turn off the FRIGOBLOCK refrigeration machine at the "FRIGOBLOCK On" switch.
- Set the Mains-0-Alternator switch to "0"
- If connected, pull out the CEE plug at the socket outlet. The control box is now isolated electrically



Figure 1



Figure 2



Figure 3

- Depending on the type of refrigeration machine, proceed as follows:
 - a. Press the black button of the motor protection switch through the transparent cover (Figure 1).
 - b. Open the control box and press the black button of the motor protection switch. Close the control box (Figure 2).
 - c. Open the control box and press the lever of the motor protection switch up. Close the control box (Figure 3).

- Start the refrigeration machine (for this, see chapter “Operation of the FRIGOBLOCK refrigeration machine”).

If the refrigeration machine shuts down in alternator mode, also check the additional FRIGOBLOCK fuses F1 and F2 in the fuse panel of the truck.

If the motor protection switch or the fuses trip again or a problem occurs that is not described here, please contact your FRIGOBLOCK service partner without delay.

FRIGOBLOCK

2. Operation of FRIGOBLOCK transport refrigeration machines Series FK / HK, single and multi-compartment Control by mechanical thermostat



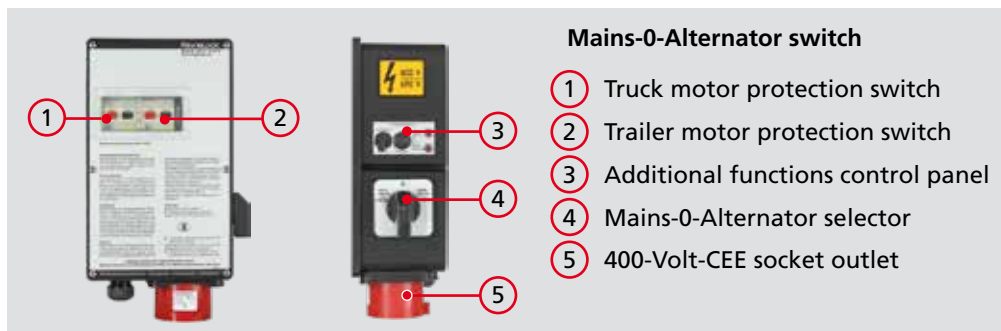
2.1. At a glance

Controls



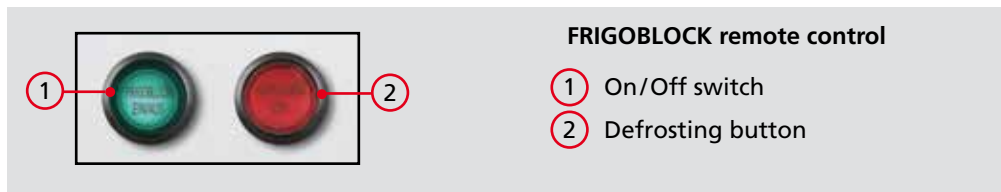
Machine control cabinet – single compartment unit

- | | |
|-----------------------------------|-----------------------------|
| ① Machine plug | ⑥ Fan lamp |
| ② Switching thermostat | ⑦ Heating mode lamp |
| ③ Defrost Start button | ⑧ Cooling mode lamp |
| ④ FRIGOBLOCK on switch | ⑨ Ready lamp |
| ⑤ FRIGOBLOCK fast/slow (optional) | ⑩ Run hour meter (optional) |



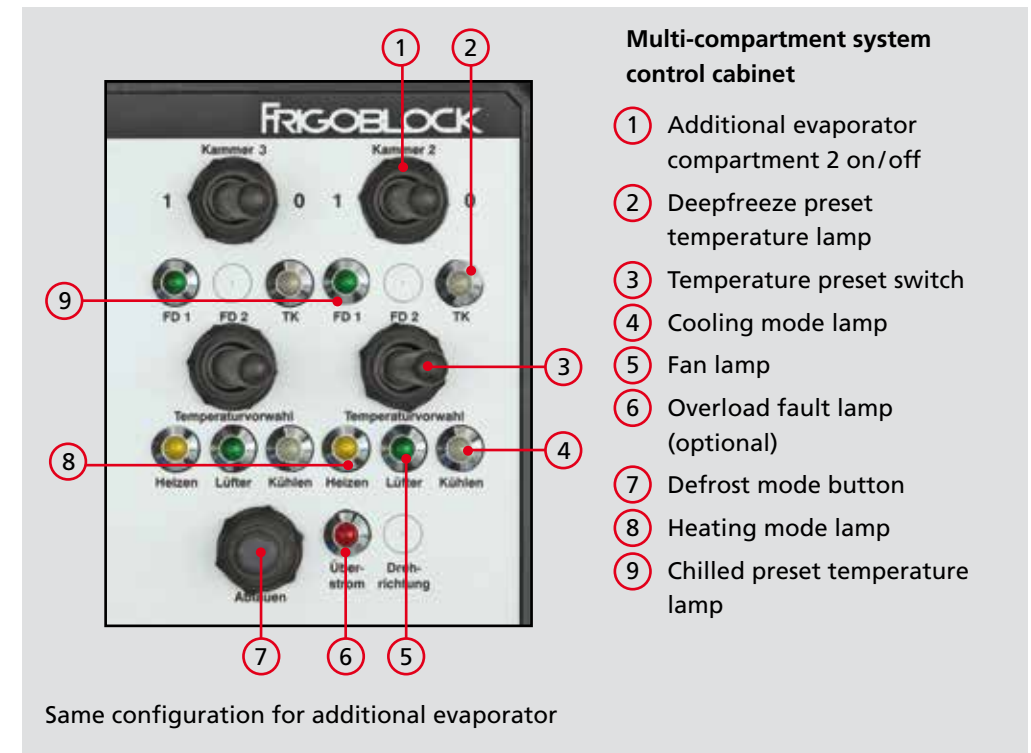
Mains-0-Alternator switch

- | |
|--------------------------------------|
| ① Truck motor protection switch |
| ② Trailer motor protection switch |
| ③ Additional functions control panel |
| ④ Mains-0-Alternator selector |
| ⑤ 400-Volt-CEE socket outlet |



FRIGOBLOCK remote control

- | |
|---------------------|
| ① On/Off switch |
| ② Defrosting button |



Multi-compartment system control cabinet

- | |
|--|
| ① Additional evaporator compartment 2 on/off |
| ② Deepfreeze preset temperature lamp |
| ③ Temperature preset switch |
| ④ Cooling mode lamp |
| ⑤ Fan lamp |
| ⑥ Overload fault lamp (optional) |
| ⑦ Defrost mode button |
| ⑧ Heating mode lamp |
| ⑨ Chilled preset temperature lamp |

Same configuration for additional evaporator

Control cabinet symbols

- | | |
|--|--|
| | Cooling, indicated by white lamp |
| | Heating, indicated by yellow lamp |
| | Deepfreeze preset, indicated by white lamp |
| | Chilled preset, indicated by green lamp |
| | FRIGOBLOCK "slow" run |
| | FRIGOBLOCK "fast" run |
| | Fan running, indicated by green lamp |
| | Defrost, press button to activate |
| | Overvoltage, indicated by red lamp (optional) |
| | Wrong rotation, indicated by red lamp (optional) |

2.2. Operation

Drive type

Select the required drive type at the Mains-0-Alternator-Diesel selector switch. See chapter "Operation of the refrigeration machine".

High speed / low speed (optional)



To reduce noise emission, SL version FRIGOBLOCK refrigeration machines can be operated at low speed. For this set the "FRIGOBLOCK fast/slow" switch at the machine control cabinet to "Slow". This function is available in mains and alternator modes.

Temperature preset – main compartment



In single and multi-compartment systems, the required temperature of the main unit is set at the thermostat in the refrigeration machine control cabinet. The FRIGOBLOCK refrigeration machine automatically selects the cooling and heating modes and works towards the present temperature.

Temperature preset – additional compartment



Where there are several additional evaporators in multi-compartment systems, the temperature is controlled by thermostats integrated in the additional evaporator. The chilled thermostat(s) is/are mounted on the outside of the RE evaporator and protected by a Perspex cover. The deepfreeze thermostat is located inside the additional evaporator. That thermostat has been preset in the factory.

The deep frozen setting can only be changed by the FRIGOBLOCK service partner.



The preset temperatures can be selected separately for every additional compartment. For this, set the preset temperature switch at the respective compartment control box to the required temperature of the goods FD 1 (chill temperature 1), FD 2 (chill temperature 2, OPTION) or TK (deepfreeze temperature).

The preset temperature is indicated by LED's.

Turning on the refrigeration machine



After the temperatures are set, turn on the main compartment at the refrigeration machine control cabinet. (MOA box)



Turn on the additional evaporators at the appropriate switch at the control cabinet. (MOA box)

Operation modes

After turning the machine on, the operation modes are indicated by the appropriate LED's.



Cooling



Heating



Temperature obtained (fan in continuous mode)



Defrosting (fan not running in this mode)

Defrosting / heating

Defrost the FRIGOBLOCK refrigeration machine regularly, several times a day when on the road. Required time: approx. 15 min. each defrost cycle. During that time neither the refrigeration machine nor the truck engine (in alternator mode) should be stopped. Defrosting is started by pressing one of the following buttons and ends automatically.



At the remote panel in the driver's cab when on alternator drive



At the control box of the refrigeration machine or at the Mains-0-Alternator control box



The empty cargo body should be heated once every week. For this, run all evaporators in "Heating" mode at least for 1 hour. Using heating-up switch (if fitted) or Thermostat setting: +25°C. Heating can be in mains or in alternator mode (when on the road).

FRIGOBLOCK

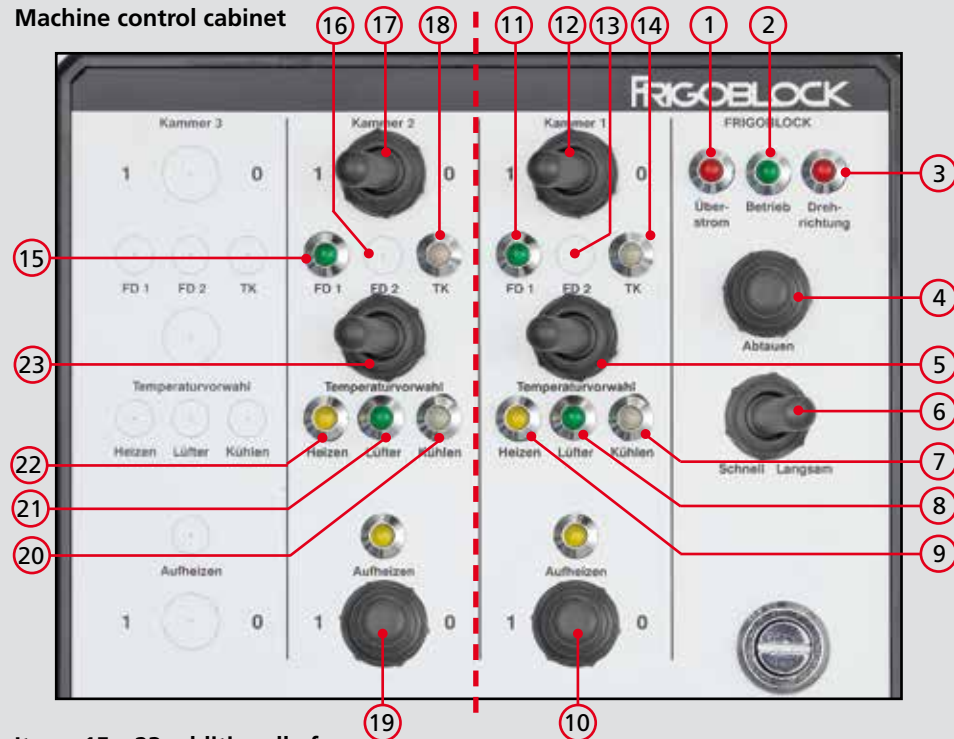
3. Operation of FRIGOBLOCK transport refrigeration machines Series EK, single and multi-compartment Control by mechanical thermostat



3.1. At a glance

Controls

Machine control cabinet

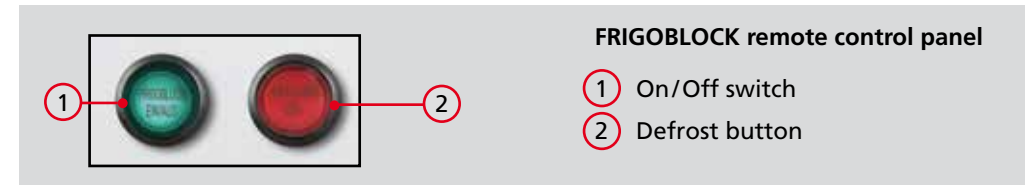


Items 15 – 23 additionally for multi-compartment operation

- 15 Chilled 1 preset temperature
- 16 Chilled 2 preset temperature
- 17 Compartment 2 evaporator on/off
- 18 Deepfreeze preset temperature LED
- 19 Heating switch (optional)
- 20 Cooling mode lamp
- 21 Fan lamp
- 22 Heating mode lamp
- 23 Compartment 2 temperature preset switch

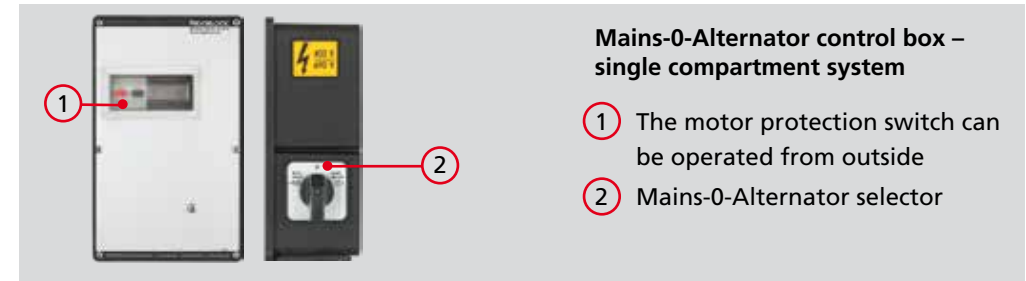
Items 1 – 14 single-compartment operation

- 1 Overload lamp (optional)
- 2 Ready lamp
- 3 Direction of rotation lamp (optional)
- 4 Defrosting Start button
- 5 Compartment 1 temperature preset switch
- 6 FRIGOBLOCK fast/slow (optional)
- 7 Cooling mode lamp
- 8 Fan lamp
- 9 Heating mode lamp
- 10 Heating switch (optional)
- 11 Chilled 1 preset temperature lamp
- 12 Chilled 1 evaporator on/off
- 13 Chilled 2 preset temperature lamp
- 14 Deepfreeze preset temperature lamp



FRIGOBLOCK remote control panel

- 1 On/Off switch
- 2 Defrost button



Mains-0-Alternator control box – single compartment system

- 1 The motor protection switch can be operated from outside
- 2 Mains-0-Alternator selector













Mains-0-Alternator control box – multi-compartment system

Open the control box for operating the motor protection switch.

Refer to chapter "Faults".

Control cabinet symbol

	Cooling, indicated by white lamp
	Heating, indicated by yellow lamp
	Deepfreeze preset, indicated by white lamp
	Chilled preset, indicated by green lamp
	FRIGOBLOCK "slow" run
	FRIGOBLOCK "fast" run
	Fan, indicated by green lamp
	Defrost, press button to activate
	Overvoltage, indicated by red lamp (optional)
	Wrong direction of rotation, indicated by red lamp (optional)

3.2. Operation

Drive type

Select the required drive type at the Mains-0-Alternator-Diesel selector switch. See chapter "Operation of the refrigeration machine".

High speed / low speed (optional)



To reduce noise emission, SL version FRIGOBLOCK refrigeration machines can be operated at low speed. For this set the "FRIGOBLOCK fast/slow" switch at the machine control cabinet to "Slow". This function is available in mains and alternator modes.

Temperature preset – all compartments



In single and multi-compartment systems, the required temperature is controlled by the thermostats in the RE evaporator. The cold storage thermostat(s) is/are mounted on the outside of the RE evaporator and protected by a perspex cover.

The FRIGOBLOCK refrigeration machine selects heating/cooling mode automatically and works towards the thermostat temperature.

This procedure is the same for all compartments.

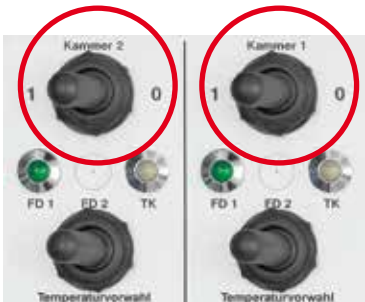
The deepfreeze thermostat is located inside the RE evaporator. That thermostat has been preset in the factory. The setting can only be changed by a FRIGOBLOCK service partner.



The preset temperatures can be selected separately for every additional compartment. For this, set the preset temperature switch at the respective compartment control box to the required temperature of the goods FD 1 (chilled temperature 1), FD 2 (chilled temperature 2, OPTION) or TK (deepfreeze temperature).

The preset temperature is indicated by LED's.

Turning on the refrigeration machine



After setting the temperature/s, turn on the FRIGOBLOCK refrigeration machine and then each compartment separately at the refrigeration machine control cabinet. (MOA box)

Operation modes

After turning the machine on, the operation modes are indicated by the appropriate lamps.



Cooling



Heating



Temperature reached (fan in continuous mode)



Defrosting (fan not running in this mode)

Defrosting/heating

Defrost the FRIGOBLOCK refrigeration machine regularly, several times a day when on the road. Required time: approx. 15 min. each defrost cycle. During that time neither the refrigeration machine nor the truck engine (in alternator mode) should be stopped. Defrosting is started by pressing one of the following buttons and ends automatically.



At the remote panel in the driver's cab when in alternator drive.



At the control box of the refrigeration machine when plugged-in to a mains supply.



The empty cargo body should be heated once every week. For this, run all evaporators in "Heating" mode at least for 1 hour. Heating-up switch (if fitted) or Thermostat setting: +25°C. Heating can be in mains or in alternator mode (when on the road).

FRIGOBLOCK

4. Operation of the FRIGOBLOCK diesel alternator unit DS 24 NG



4.1. General information on the FRIGOBLOCK diesel alternator unit

Use

The FRIGOBLOCK diesel alternator unit is approved only for supplying electric power to FRIGOBLOCK transport refrigeration machines when on the road or if no mains power is available.

The main components of the diesel alternator unit are the FRIGOBLOCK alternator and the diesel engine. A separate control box for selecting between mains and diesel mode with controls and displays is part of the refrigeration machine.

Use the diesel alternator unit only at standstill if no 400-Volt CEE socket outlet is available.

Safety instructions



CAUTION: The exhaust of the diesel engine is harmful to health. Do not run the engine indoors. Make sure of sufficient oxygen when running the FRIGOBLOCK diesel alternator unit.



CAUTION: Battery acid emits hydrogen gases. Hydrogen gases are explosive and can cause serious injury and blindness. No smoking when batteries are tested.



WARNING: Starter batteries contain acid which causes burns if handled improperly.



WARNING: Electric voltage can cause internal and external burns or death. A FRIGOBLOCK diesel alternator unit generates electric voltage. When working at the diesel alternator unit and/or the control box, turn off the FRIGOBLOCK refrigeration machine and the FRIGOBLOCK diesel alternator unit and prevent turning on.



WARNING: The maximum operating temperature in the diesel engine is controlled by liquid coolant. If handled improperly, hot coolant can cause burns.

Never open the radiator cap while the engine is hot. If the cap must be opened while the engine is hot, do it very slowly so that the pressure in the cooling system can expand without coolant loss.



WARNING: There are rotating and reciprocating parts inside the machine. Do not touch such parts either with your hands or with a tool. Wait for the machine to come to standstill.

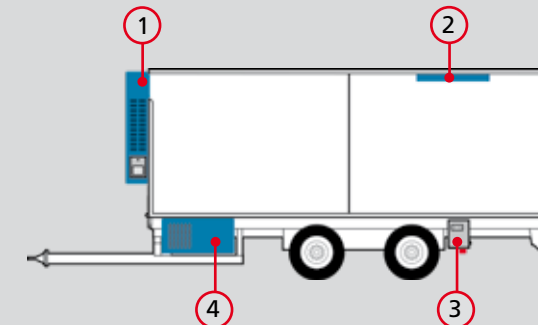


WARNING: The surfaces of components inside and outside the diesel engine can be hot (more than +60°C). Wait until these components take on normal temperature, then start work.

4.2. At a glance

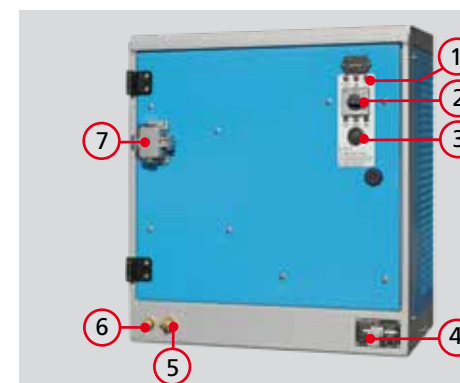
Installation position of the main components (schematic view)

Operation of a FRIGOBLOCK refrigeration machine with optional FRIGOBLOCK diesel alternator unit



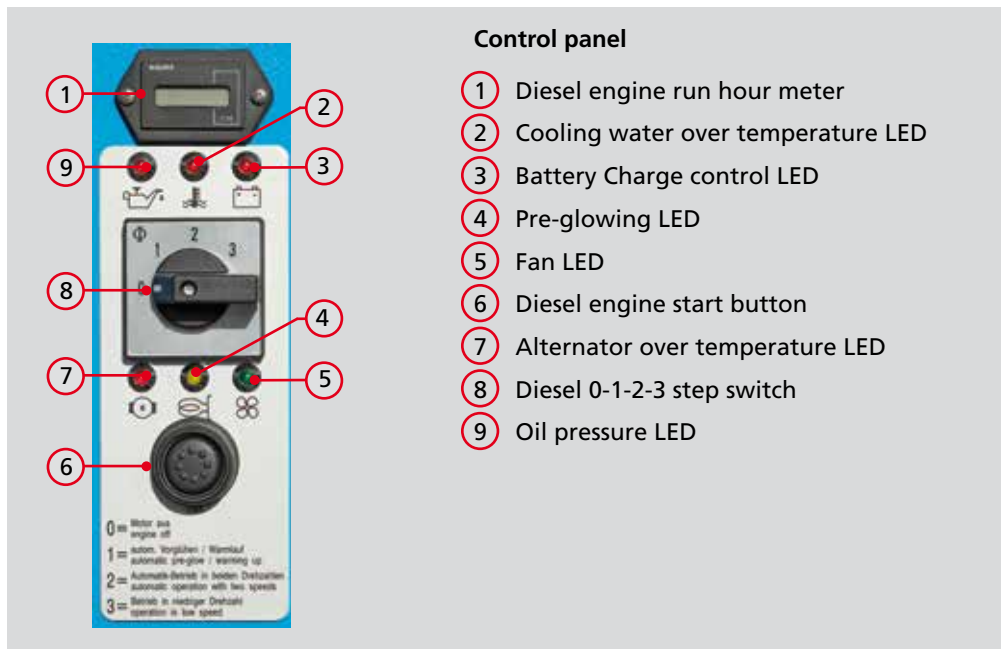
- ① FRIGOBLOCK refrigeration machine type HK with machine control cabinet
- ② Additional flat evaporator type RE (variable installation position), for multi-compartment operation
- ③ Mains-0-Alternator control box (variable installation position)
- ④ FRIGOBLOCK diesel alternator unit (variable installation position)

Controls



FRIGOBLOCK diesel alternator unit

- ① Control panel
- ② Control power switch
- ③ Start button
- ④ Nameplate
- ⑤ Fuel feed line
- ⑥ Fuel return line
- ⑦ Plug connector



Displays

Symbol	Display	Color	Comment
	Low oil pressure	Red	Engine stop at switch position 2, 3
	Cooling water over temperature	Red	Engine stop at switch position 1, 2, 3
	Generator failure	Red	Generator defective
	Alternator winding over temperature	Red	Control voltage is switched off
	Fan motor winding temperature OK	Green	Extinguishes when over temperature is detected
	Glow indicator	Yellow	Glow plug heating

4.3. Operation mode of the diesel alternator unit



Before start-up

- Do not use any starting aid gases such as Easystart or similar products. The early ignition of the gas-air mixture under high pressure in the diesel engine can damage the engine.
- Use diesel fuel suitable for the season of the year.
- Do not use biodiesel or fuel oil in the diesel engine.
- Check the oil and cooling water levels every day before starting the engine.



Checking the oil level:

- Use the oil dipstick at the oil filler neck.
- Unscrew the oil dipstick and clean the dipstick.
- Fully screw in the oil dipstick and then unscrew it.
- The oil level should be between the MIN and MAX marks.
- The difference between MIN and MAX is 4.5 liters.
- Fill mineral oil of 15 W 40 viscosity.



Checking the coolant level:

- Check the coolant level at the expansion vessel.
- Open the radiator cap when the engine is cold (the cooling system is pressurised when the engine is hot).
- Coolant liquid should be visible in the expansion vessel.
- Fill only a mixture of water and original FRIGOBLOCK antifreeze in 50/50 ratio.

Starting the diesel alternator unit



Set the switch to "Diesel/Genset".



- Set the control switch at the diesel alternator unit to position "1"
- Check to see whether the oil pressure, battery and preheat lamps light.
- When the preheat lamp goes out, press the start button until the engine fires.
- Now only the fan lamp should be illuminated.



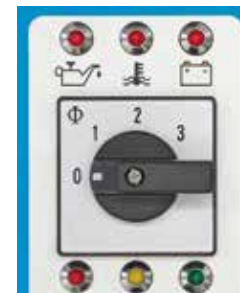
- After about 5 minutes of engine run, set the control switch at the alternator unit to position "2". The compressor of the refrigeration machine starts running with some delay. When the target temperature is obtained, the refrigeration machine turns off and the diesel engine speed changes automatically.

Noise-reduced operation of the diesel engine



- To operate the refrigeration machine and the diesel alternator unit at reduced noise level, set the switch to position "3". The engine and the alternator speeds are reduced.
- The refrigeration machine can start operation at switch position "2" or "3". For details of the start-up of the refrigeration machine, see the appropriate chapter.

Turn off the diesel engine



- Turn the control switch to position "0".

Faults

Fault	Remedy
V-belt tension, wear	Tension or change the V-belt*
Diesel turns off when at switch position "2" or "3"	Check the oil level
"Oil pressure" lamp comes on	Turn off immediately; check the oil level
Diesel turns off and the "Cooling water" lamp comes on	Check the cooling water level, clean the radiator, if necessary. Check to see if air has entered the cooling system*
Refrigeration machine is not running and the "Alternator over temperature" lamp comes on	Check the power consumption of the refrigeration machine/the alternator*
Filter indicator lamp lights	Clean/replace the air filter*
Fan indicator lamp does not light when the fan is running	Check the fan*
Charge control lamp lights during operation	Check the charging alternator V-belt, check the charging alternator*
Refrigeration machine is not running and the "Overload" lamp at the separate control box lights	Check the motor protection switch in the separate control box
Battery is depleted	When the battery is down, start the engine using a jumper cable. Connect the positive cable to the terminal beneath the battery and the ground cable to the negative pole of the battery. Caution: 12 Volt battery voltage
Refrigeration machine has no control voltage	Check fuse F1 in the diesel alternator unit*
Diesel alternator unit has no control voltage	Check fuse F2 in the diesel alternator unit*

Work items with an asterisk (*) shall only be performed by a FRIGOBLOCK service partner.

Technical specifications

Diesel alternator unit DS 24 NG	
Dimensions:	1274 x 525 x 600 mm
Weight:	430 kg (ready for service)
Diesel engine type:	Yanmar 4TNV88 BNBK – water-cooled
Swept volume:	2,2 l
Cylinders:	4
Fuel supply:	Direct injection
High diesel engine speed:	2400 rpm \triangle alternator speed 3000 rpm
Low diesel engine speed:	1600 rpm \triangle alternator speed 2000 rpm
Engine output:	28.8 KW at 2400 rpm.
Emission standard:	EC (NRMM) stage IIIA
Alternator output:	24.0 kVA at high speed 16.1 kVA at low speed
Nominal current:	35 A
U (Volt) / f (Hz) high speed:	400 V / 50 Hz
U (Volt) / f (Hz) low speed:	266 V / 33.3 Hz
Engine oil:	15 W 40
Engine antifreeze (at least -30°C):	BASF Glysantin® Protect Plus/G48

Notes _____



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