

Technology at its best  
**FRIGOBLOCK**

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## EK/DK SERIES

Split refrigeration machines / Single and Multitemperature

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**IR** Ingersoll Rand®

**ECO-FRIENDLY**

**PROFITABLE**

**EFFICIENT**

**FLEXIBLE**

**RELIABLE**

**ECO-FRIENDLY**

- Up to 75% less CO<sub>2</sub> emissions
- Up to 75% less energy consumption
- 50% less greenhouse effect by using refrigerant type R410A
- Up to 95% less noise and exhaust emissions

**PROFITABLE**

FRIGOBLOCK alternator:

- Highest efficiency of all drive systems
- Loss-free, reliable electric control
- Up to 5,000 litres fuel savings potential per year and vehicle

**EFFICIENT**

- Unmatched cooling, heating and air flow capacities
- Temperature pull-down and recovery in record time
- Defrost within minutes thanks to the 4-way heat pump system

**FLEXIBLE**

- Guaranteed temperatures right up to the delivery point
- Multi-compartment technology with up to 200% more cooling, heating and air flow capacities
- Simple exchange of refrigeration unit within minutes

**RELIABLE**

- More than 20 years technical lead using high-capacity refrigerant R410A
- More than 40 years technical lead in alternator drive
- For more than 40 years evaporators outside the body

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## EK/DK SERIES

### Split refrigeration machines



EK 8



EK 11



EK 13



EK 25



DK 23/25

Low height truck bodies or through-loading trailers can be equipped with a split refrigeration machine consisting of the chassis mounted EK condenser unit and the RE evaporator unit installed in the load space. On the other hand, the DK refrigeration unit with the RE evaporator unit can be fully integrated into the roof of the body and is the ideal refrigeration machine for large-volume truck-trailer combinations and swap bodies.

#### Main features

- Highest refrigeration capacity up to 23,600 W
- Ø 50% less fuel consumption
- Large heat exchange surfaces with high efficiency
- Environmentally friendly refrigerant R410A
- Most compact dimensions, GRP housing

## RE SERIES

### Flat evaporators for multiple-compartment trucks



RE 11-1s



RE 42-1



RE 11-2



RE 22-2



RE 44-2

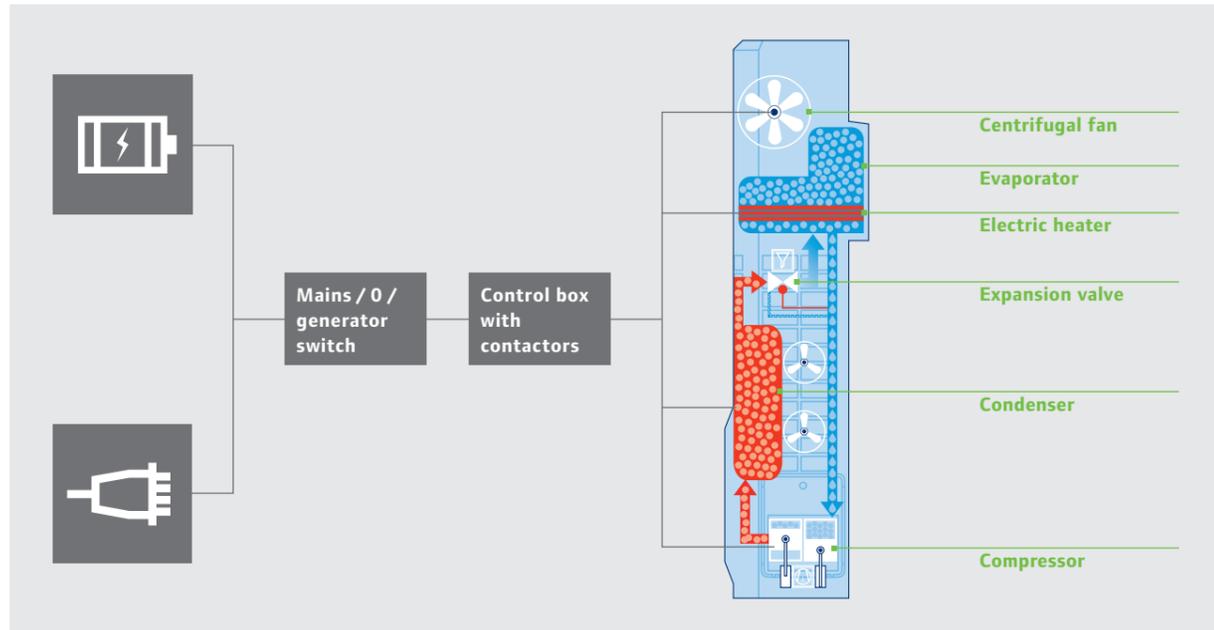
The FRIGOBLOCK RE 11–44 range of flat evaporators can not only be used as evaporators in the split combinations EK/DK + RE but also as additional evaporators for multi-compartment trucks. Double-deck loading or multi-compartment bodies divided longitudinally in three sections can be realized without problem due to the compact RE dimensions: lowest height = 100 mm, minimum width = 720 mm.

#### Main features

- Maximum flexibility; compartment lengths from 1,200 mm to full body length
- 4-way heat pump system for extremely fast defrosting
- Radial flat fan of 355 mm dia. For up to 7,000 m<sup>3</sup>/h air output
- High-strength GRP housing, can be hinged down, 100% access to all components

# ALTERNATOR DRIVE

## Conventional drive technology



Conventional refrigeration machine drive technology

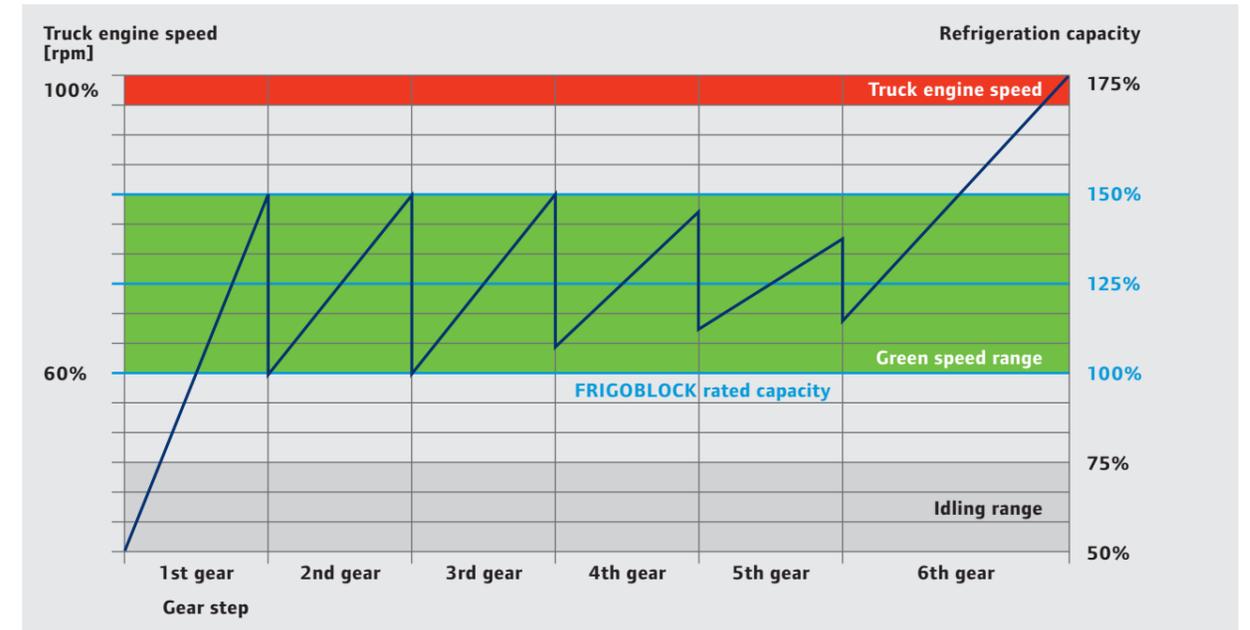
Alternator drive has been the technology used for generating electricity for refrigeration since the FRIGOBLOCK Grosskopf GmbH was formed. Like an electric generator, the alternator is integrated in the belt drive of the truck engine. As the truck engine revs up, the rotary frequency of the alternator increases and generates voltage and power.

The frequency provided by the alternator is directly fed to the electric motors for compressor, fan and blower. Consequently, these units rotate at a frequency that depends on the speed of the truck engine. When supplied from the electric mains, the speeds are constant due to the constant frequency of 50 Hz.

### What are the advantages of alternator drive?

- Absorption of electric power from the truck engine in
  - idle (standstill)
  - acceleration
  - constant speed
  - overrun mode
- More energy efficient than compared with an external industrial diesel combustion engine

- Low-noise operation (slight extra noise emission)
- Utilization of the high efficiency of a truck engine compared with an industrial diesel engine
- Lower maintenance costs
- The drive of the components by electric motors and the absence of a diesel engine
  - permit the installation of heat exchangers with larger surfaces. This reduces the temperature differences in the refrigeration system which, in turn, extends the life of the refrigeration compressor and of other components
  - avoids any critical increase of condenser temperature due to heat emitted by the engine = more refrigeration capacity
  - enables the complete integration of the evaporators in the refrigeration system and double-deck loading of goods up to the bulkhead
  - reduces wear by up to 50% in comparison with the start-stop mode of the diesel engine



Up to 50% more refrigeration capacity during driving operation

### What are effects of variable rotational frequencies?

The rotational frequency of the refrigeration system depends on the engine speed. The compressor, fan and blower are running proportional to the speed of the truck. Consequently, the output of the refrigeration system varies. It would be desirable if the system was controlled at the most efficient operating point. The inverter technology enables speed control of the components as a function of the refrigeration output.

Since the early 70s, FRIGOBLOCK refrigeration units have been purely electrically powered using the FRIGOBLOCK alternator, driven via a V-belt from the

truck engine. The alternator produces the same voltage and frequency as the European power supply system so that there is no problem to run FRIGOBLOCK units on a mains supply without the need for any extra equipment.

For applications demanding an independent diesel drive FRIGOBLOCK offers a chassis mounted fully encapsulated, splash-proof diesel generator set which is separate from the refrigeration machine. Today, the FRIGOBLOCK diesel generator set is as reliable as the alternator driven system and therefore exceeds the reliability of conventional diesel driven products.

## FRIGOBLOCK ALTERNATORS

### Alternator systems

#### Aircooled alternator



A 6

A 8

G 12

G 17

#### Watercooled alternator



G 24

AW 22,5

AW 30

- Efficient and fuel-saving energy production by modern truck engines
- One alternator supplies the energy for a truck-trailer unit
- Over 30 years experience in alternator drive systems and fitting by leading truck manufacturers on their own production line
- Highest efficiencies thanks to very large copper coil and core sections
- High temperature resistant winding, vibration and moisture protected
- Long life
- Splashwater protected aluminium housing, no entry of dirt in the bearings
- Compact size, simple installation, low weight

#### Only type A – G

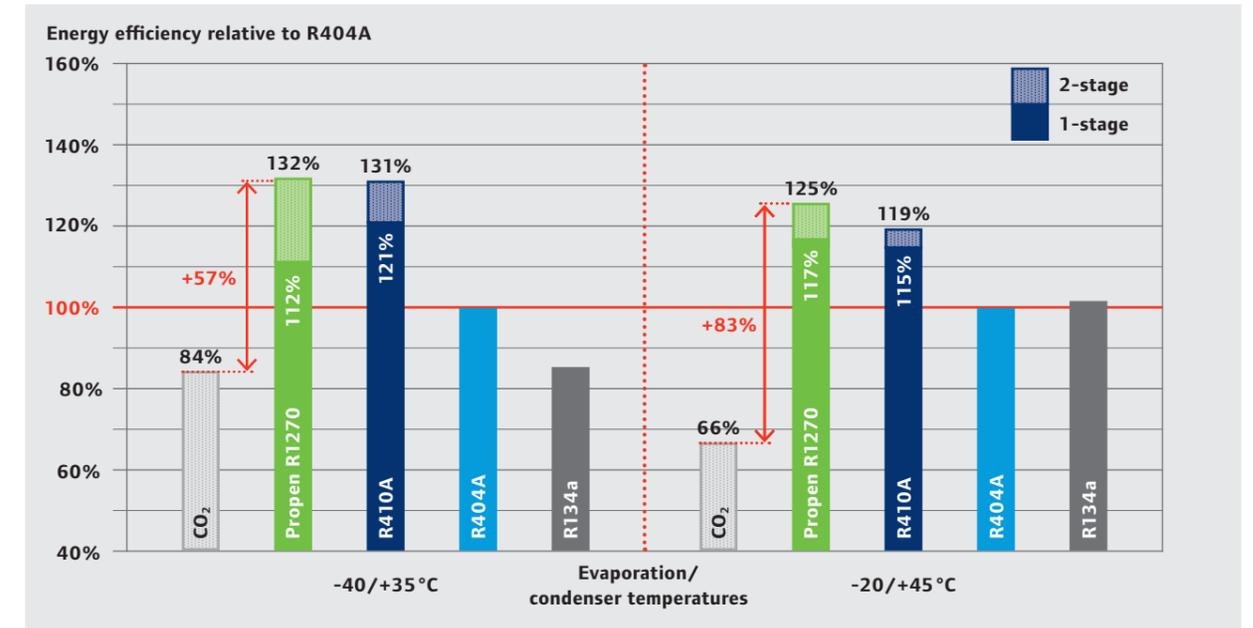
- Large speed range, no turning off in idle or at high speeds

#### Only type AW

- At least 80% of the nominal rated capacity is already achieved at idling speed of the truck engine

## REFRIGERANT R410A

### High-capacity refrigerant



Comparative measurements in heat pumps and refrigeration technology

As comparative measurements undertaken by the Testing and Further Training Centre in Heat Pumps and Refrigeration Technology (Test- und Weiterbildungszentrum Wärmepumpen und Kältetechnik, TWK-Karlsruhe) on behalf of FRIGOBLOCK showed in 2010, the refrigerant R410A has already in an one-stage refrigeration circuit a higher energy efficiency compared with CO<sub>2</sub> manufacturer's data.

The refrigerant is the transport medium for the absorbed heat in the refrigeration cycle. In the past decade, there have been many developments in regard to refrigerants. Here, their environmental compatibility, effects on the ozone layer or climate warning have mainly played a role.

#### Advantages of high-capacity refrigeration R410A

- Box temperatures down to -30°C
- No reduced capacity in mains operation
- On average a 50% increase in available refrigeration and heating capacity
- Energy savings of up to 20% when compared with R404a
- Substantial reduction in environmental impact
- 50% lower GWP when compared with R404a
- F-GAS Compliant with 2020 EU standards
- More than 20 years standard in all FRIGOBLOCK units
- Readily availability and cost effective

## NEW! FRIGOBLOCK REMOTE CONTROLLER

All at a glance



### Advantages of the FRIGOBLOCK remote controller

- Digital Thermostats, comfortable controlling by FRIGOBLOCK remote controller
- Everything at a glance: Temperatures of all compartments in the driver cabin
- Easy change of pre-selected set points
- 5 predefined set points – easy to change on one keypress
- Monitoring and initiating of defrost, FRIGOBLOCK remote controller reminds the defrost time
- Hours meter integrated
- Flexible positions to install FRIGOBLOCK remote controller in driver cabin, radio slot, dashboard and loading area
- CAN-Bus network on the truck: Monitoring, Programming and updating over PC Software

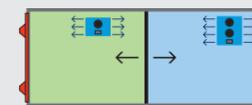
## MULTITEMP

Multi-temperature application

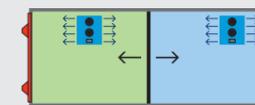


### Possible 2 zones configuration EK Series

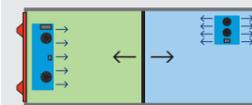
EK 13-25 L + RE 22-2 + RE 11-2



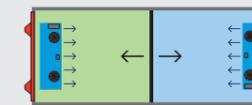
EK13-25L + 2x RE 22-2



EK 13-25 L + RE 22-2 + RE 42-1



EK 13-25 L + 2x RE 42-1

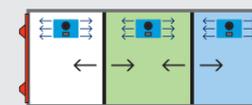


EK 25 + RE 44-2 + RE 42-1

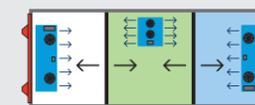


### Possible 3 zones configuration EK Series

EK 13-25 SL + 3x RE 11-2



EK 25-25 SL + RE 22-2 + RE 42-1



FRIGOBLOCK is a synonym of highest transport quality and efficiency not only in the deep-frozen segment. The FRIGOBLOCK is also extremely flexible to use. FRIGOBLOCK refrigeration machines are ideal for all kinds of temperature-controlled transport, from frost-sensitive vegetables or fruits to dairy products, meat or deep-frozen cargo.

What is more: These goods can even be transported by the same truck. Because the advantages of FRIGOBLOCK, such as high refrigeration and heating capacity, large heat exchange surfaces and quick defrosting, can be realized particularly well with the multi-compartment technology.

# TECHNICAL INFORMATION

## EK Series and DK Series

### EK Series



FRIGOBLOCK Type	EK 8	EK 11	EK 13 L	EK 13 *
<b>Refrigeration capacity at +30 °C ambient temperature</b>				
box temperature at 0 °C	5,000	7,600	11,300	14,100
box temperature at -20 °C	2,800	4,100	5,800	7,800
box temperature at -30 °C	1,800	2,700	3,500	5,100
<b>Heating capacity</b>				
electric heaters	2,500	4,500/4,100	4,100	7,600
<b>Refrigerant</b>				
HFC	R410A	R410A	R410A	R410A
<b>Compressor</b>				
cylinders	2	2	2	2
piston displacement	10.5	15.1	16.9	24.8
rpm	1,450	1,750	1,200	1,750
<b>Electric motor</b>				
capacity	3	4	5	7.5
rpm	1,450	1,450	1,450	1,450
<b>Condenser</b>				
surface area	14.6	26.3	38.6	38.6
axial fans Ø	2 x 282	2 x 320	386/348	386/348
<b>Dimensions EK</b>				
height	320	400	475	475
width	750	810	930	930
depth	430	505	550	550
<b>3-phase alternator</b>				
capacity	6	8	12	17
<b>Mains</b>				
fuse protection (slow)	(20) 10	20 (16)	(20) 16	20
<b>Weight</b>				
refrigeration unit	55	80	125	120
refrigeration machine	-	-	-	-
alternator	38	48	59	76
<b>RE selection</b>				
for split units (EK + RE)	RE 11-1s	RE 42-1/11-2	RE 11-2	RE 22-2

### DK Series



	EK 25 L	EK 25	EK 25 SL	DK 23	DK 25	DIM.
<b>Refrigeration capacity at +30 °C ambient temperature</b>						
box temperature at 0 °C	16,600	21,100	23,300	14,000	23,600	W
box temperature at -20 °C	8,500	11,100	13,100	7,500	13,200	W
box temperature at -30 °C	5,200	6,900	8,500	-	-	W
<b>Heating capacity</b>						
electric heaters	7,600	11,600	11,600	7,600	7,600	W
<b>Refrigerant</b>						
HFC	R410A	R410A	R410A	R410A	R410A	
<b>Compressor</b>						
cylinders	4	4	4	2	4	
piston displacement	28.0	40.5	48.8	24.8	48.8	m <sup>3</sup> /h
rpm	1,000	1,450	1,750	1,750	1,750	1/min
<b>Electric motor</b>						
capacity	7.5	11	13	7.5	13	kW
rpm	1,450	1,450	2,900	1,450	2,900	1/min
<b>Condenser</b>						
surface area	70.2	70.2	70.2	70	70	m <sup>2</sup>
axial fans Ø	440/386	440/440	440/386	440/386	440/386	mm
<b>Dimensions EK</b>						
height	525	525	525	485	485	mm
width	1,095	1,095	1,095	1,180	1,180	mm
depth	645	645	645	630	630	mm
<b>3-phase alternator</b>						
capacity	17	24	24	17	24	kVA
<b>Mains</b>						
fuse protection (slow)	20	25	35	20	35	A
<b>Weight</b>						
refrigeration unit	172	180	184	-	-	kg
refrigeration machine	-	-	-	142	172	kg
alternator	76	98	98	76	98	kg
<b>RE selection</b>						
for split units (EK + RE)	RE 22-2	RE 44-2	RE 44-2	-	-	

Approx. 2% capacity reduction has always to be considered per m of pipe run.

Standard with electrical heating/defrost. For multi evaporator systems hotgas is optional.

Technical specifications at 60% of the truck engine rated speed, 400/415V, 50 Hz. Specifications are subject to change. Patents awarded.

\* Optional: 2-speed SL-version, high speed: same technical data, low speed: capacity reduced down to approx. 60%

## TECHNICAL INFORMATION

### Flat evaporators for multiple-compartment trucks and FRIGOBLOCK alternators

#### Flat evaporators for multiple-compartment trucks

FRIGOBLOCK Type	 <b>RE 11-1s</b> single discharge	 <b>RE 42-1</b> single discharge	 <b>RE 11-2</b> dual discharge	 <b>RE 22-2</b> dual discharge	 <b>RE 44-2</b> dual discharge	DIM.
<b>Evaporator</b>						
air capacity	1,500	3,800	2,200	4,200	7,000	<b>m<sup>3</sup>/h</b>
air throw, without ducting	7-8	6-7	6-7	6-7	6-7	<b>m</b>
crossflow fan, Ø x H	355 x 125 (1x)	355 x 100 (2x)	355 x 125 (1x)	355 x 125 (2x)	355 x 100 (4x)	<b>mm</b>
motor capacity	1 x 370	2 x 250	1 x 370	2 x 370	4 x 250	<b>W</b>
surface area	13.4	26	26.8	47.9	66.1	<b>m<sup>2</sup></b>
<b>Heating/Defrosting</b>	single compartment vehicles: electrical heating is standard, multi-compartment vehicles: 4-way-heat pump system (hotgas) is optional		single compartment vehicles: electrical heating is standard, multi-compartment vehicles: 4-way-heat pump system (hotgas) is optional			
<b>Dimensions RE</b>						
height **	160	140	160	160	140	<b>mm</b>
length	780	680	1,120	1,120	1,020	<b>mm</b>
width	720	2,160	720	1,160	2,160	<b>mm</b>
<b>Weight</b>						
flat evaporator	31	52	46	74	92	<b>kg</b>
<b>EK selection</b>						
for split units (EK + RE)	EK 8	EK 11	EK 11	EK 13	EK 25	
<b>RE as additional evaporator</b>						
selection for unit types	11-13 L	13-35 ***	13-35	13-35	25	

\*\* can be recessed 40mm into the roof.

\*\*\* on request the RE 42-1 can, in combination with RE 44-2, also be selected with unit types 25.  
Please note: FK 11/FK 12 plus additional evaporator only with electric heating, hot gas not possible.

#### FRIGOBLOCK alternators

FRIGOBLOCK alternator Type	 <b>A 6</b>	 <b>A 8</b>	 <b>G 12</b>	 <b>G 17</b>	 <b>G 24</b>	 <b>AW 22,5</b>	 <b>AW 30</b>	DIM.
<b>Alternator</b>								
capacity	6.24	8.31	12.47	17.32	24.25	22.5/28.0	30.0/37.5	<b>kVA</b>
voltage	400	400	400	400	400	400/500	400/500	<b>V</b>
frequency	50	50	50	50	50	-	-	<b>Hz</b>
current	9	12	18	25	35	32	43	<b>A</b>
speed	3,000	3,000	3,000	3,000	3,000	3,000	3,000	<b>1/min</b>
<b>Speed-range</b>								
min.	1,200	1,200	1,200	1,200	1,200	1,500	1,500	<b>1/min</b>
max.	5,250	5,250	5,250	5,250	5,250	6,000	6,000	<b>1/min</b>
<b>Dimensions</b>								
length	350	400	385	460	560	336	441	<b>mm</b>
height	180	180	214	214	214	186	186	<b>mm</b>
width	206	206	245	245	245	186	186	<b>mm</b>
shaft	28	28	43	43	43	30	30	<b>mm</b>
<b>Alternator</b>								
weight	38	48	59	76	98	49	60	<b>kg</b>

Subject to technical changes without prior notice.



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