

ENGINEERING
TOMORROW



Danfoss BOCK® compressors | Mobile CO₂ compressors

Naturally innovative solutions for **electric bus** and **railway** **thermo management**

BOCK® HR StarCO₂mpressor and HG CO₂ compressors

Up to
40%
more vehicle range

bock.danfoss.com

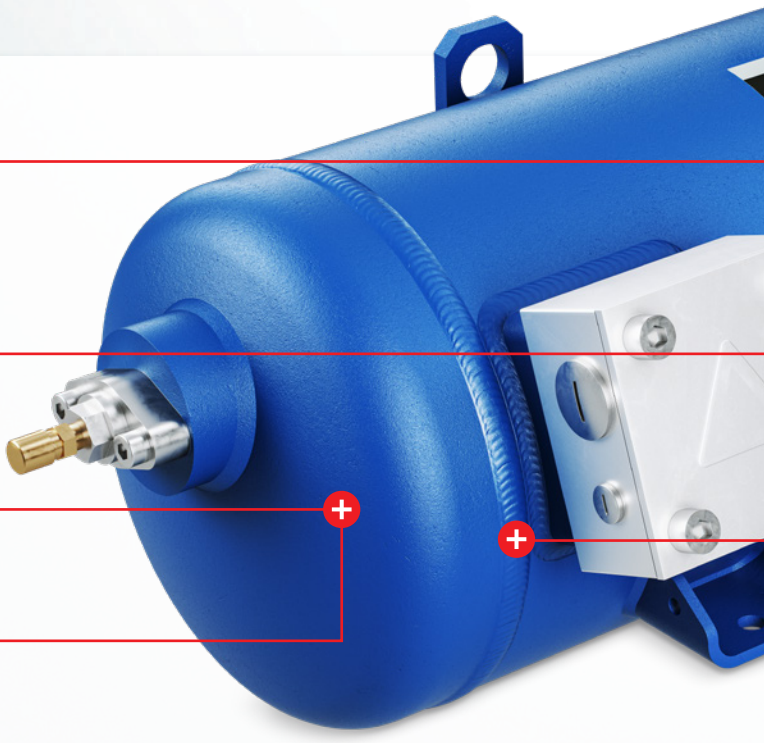
BOCK®

StarCO₂mpressor and heat pump

– optimal combination for electric bus and railway

The idea is as simple as it is innovative: With cylinders arranged in a star shape around the crankshaft, a compact system design perfectly adapted to the natural refrigerant CO₂ (R744) is realized. This is ideal for combination with a heat pump, which thus achieves significantly higher efficiency. The result for the user: a mobile CO₂ vehicle compressor with an overall height of only 219 mm and a weight of 81 kg especially for roof installation in electric buses and railways, which raises air conditioning and heating to a new level of efficiency for the market. Due to the very wide frequency range of the HR series, all requirements of complex thermal management systems can be covered. A groundbreaking solution from the specialist in piston compressors.

With its welded, robust steel housing, high-performance oil management and a valve design specially developed for mobile requirements, the StarCO₂mpressor sets new standards. This forward-looking technology has already proven its practicality with renowned manufacturers. A worthwhile investment for manufacturers and transport companies that secures important competitive advantages in the booming electromobility market and is unsurpassed in terms of environmental compatibility.

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- The image shows a blue, cylindrical StarCO₂mpressor and heat pump unit. It has a robust, welded steel housing. On the left side, there are two refrigerant ports with brass fittings. On the right side, there is a white electrical control box with several screws. A blue lifting eye is visible at the top. Red lines with plus signs connect the text features to specific parts of the unit.
- New drive gear design:** + cylinders arrayed in a star shape around the crankshaft, designed for transcritical use with R744 refrigerant
 - Very smooth operation due to robust drive gear with multiple bearings:** + high comfort for bus and train users
 - Lowest height:** + only 219 mm, perfect for space-saving roof installation
 - Lowest weight:** + only 81 kg, at least 25 % lighter than standard compressors of this performance class



NATURAL
REFRIGERANT



CO₂



EFFICIENCY



WEIGHT



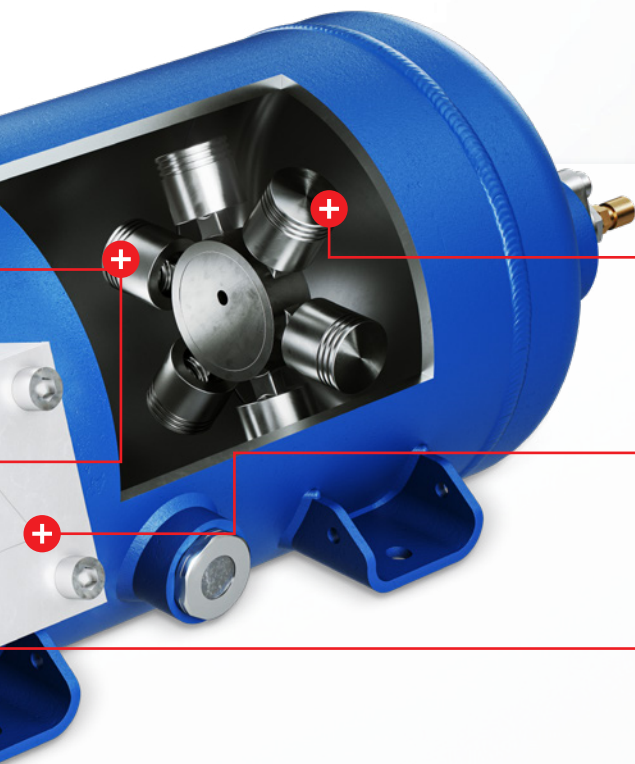
RELIABILITY

Technology that sets standards

- + Radial piston compressor four-cylinder **HR40** and six-cylinder **HR60**
- + Max. permissible overpressure: **150 bar/100 bar (HP/LP)**
- + Weight: **81 kg**, Height: **approx. 219 mm**, overall length: **600 mm**
- + Frequency range HR40: **12.5 - 75 Hz**, HR60: **12.5 - 65 Hz**
- + Maximum permissible inclination: **22°** continuous operation, 30° short-term
- + **Pipe connection** with flange connection, optional soldering sleeve
- + Displacement with 50 Hz / 2,900 1/min: HR40: **7.3 m³/h**; HR60: **10.9 m³/h**
- + Cooling¹/heating² capacity: HR40: **4 - 35 kW / 5 - 27 kW**; HR60: **5 - 45 kW / 5 - 35 kW**

1) based on evaporation temperature +10 °C, superheat 10K, high pressure 100 bar, gas cooler outlet +40 °C

2) related to evaporating temperature -20 °C, superheat 10K, high pressure 80 bar, gas cooler outlet +25 °C



- + **Wide speed range:**
for optimum coverage of the wide range of
heat pump performance requirements
HR40: 12.5 Hz - 75 Hz; HR60: 12.5 Hz - 65 Hz

- + **Special oil management with
high-performance oil pump:**
ensures constant oil supply up to 22° inclination
during continuous operation, 30° short-term

- + **Welded, robust steel housing:**
lowest leakage potential and
high reliability, especially developed
for mobile applications in transcritical CO₂

Series BOCK® HG12 and HG24 CO₂ T

– compact, reliable, powerful

Transcritical CO₂ compressors in semi hermetic design

The BOCK® HG series for the natural refrigerant R744 convinces with highest compressor and system efficiency, safety and reliability – equipped with all the necessary features for use with CO₂. BOCK® relies on the proven oil pump for reliable oil supply in the compressor even under demanding conditions especially in mobile applications. The basis for this is a CO₂-optimized driving gear design combined with proven BOCK® compressor technology.

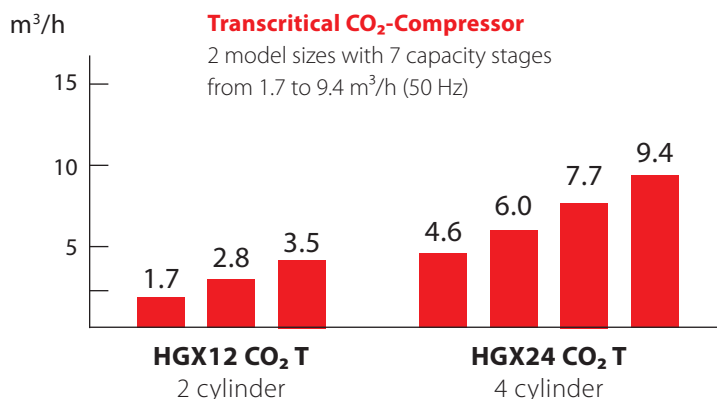
Advantages and benefits that set standards

The advantages: significantly reduced energy and operating costs with a long service life and low maintenance effort, ensuring reliability and durability. And maximum flexibility for mobile use in all applications and performance ranges.

At the same time, setting benchmarks regarding low-noise and low-vibration operation. The compact and lightweight design of the HGX12 CO₂ and HGX24 CO₂ ranges sets new standards in terms of user comfort, space requirements and connection, e.g. in bus and railway applications.

Attractive Options

- **BOCK® flexxCO₂NTROL**, the new capacity regulator for the almost stepless capacity adjustment of transcritical BOCK® CO₂ compressors. The great capacity range can be controlled between 100 percent and 25 percent – depending on the operating conditions. An attractive alternative to the use of frequency inverters
- **BOCK® HGX** compressors are optionally available with **energy efficient LSPM motors** (Line Start Permanent Motors)
- **UL-certified versions** for the North American market



MAIN BENEFITS



Lowest energy and operating costs

Highest efficiency and reliability thanks to more than 25 years of BOCK® expertise in CO₂ compressor technology



Wide range of applications

From cooling to air conditioning to heat pump application – with reliable and flexible partial and full load



Outstanding running comfort

Low noise and vibration, compact and lightweight design and minimal oil carry over rate

Large capacity range +
5 - 43 kW/3 - 35 kW
(Cooling-¹/heating capacity)

Displacement at 50 Hz +
1.7 - 9.4 m³/h
(7 capacity stages)

Optional: +
robust metal terminal box +
with access protection

CO₂-specific +
pressure design
max. (LP/HP)
100/150 bar

Frequency range +
30 - 70 Hz (20 Hz on request)

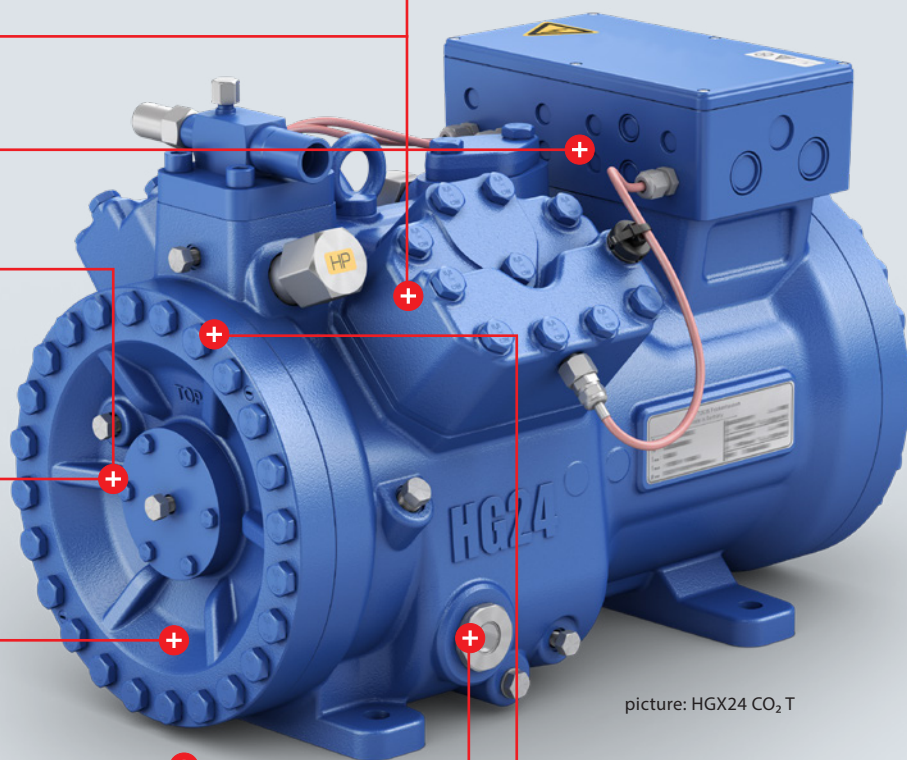
Oil pump for reliable +
lubrication system

Compact dimensions and +
standard connections

Low weight +
95 kg (HGX12 CO₂ T)
112-116 kg (HGX24 CO₂ T)
(Including shut-off valves)

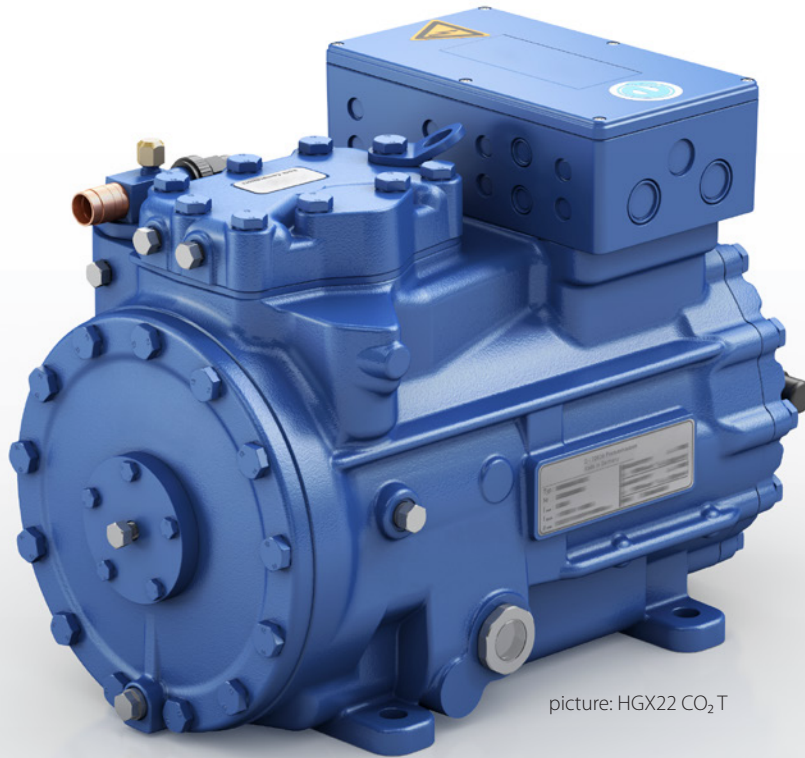
Maximum permissible +
inclination
15° continuous
operation,
30° short-term

Lowest oil +
carry over rate



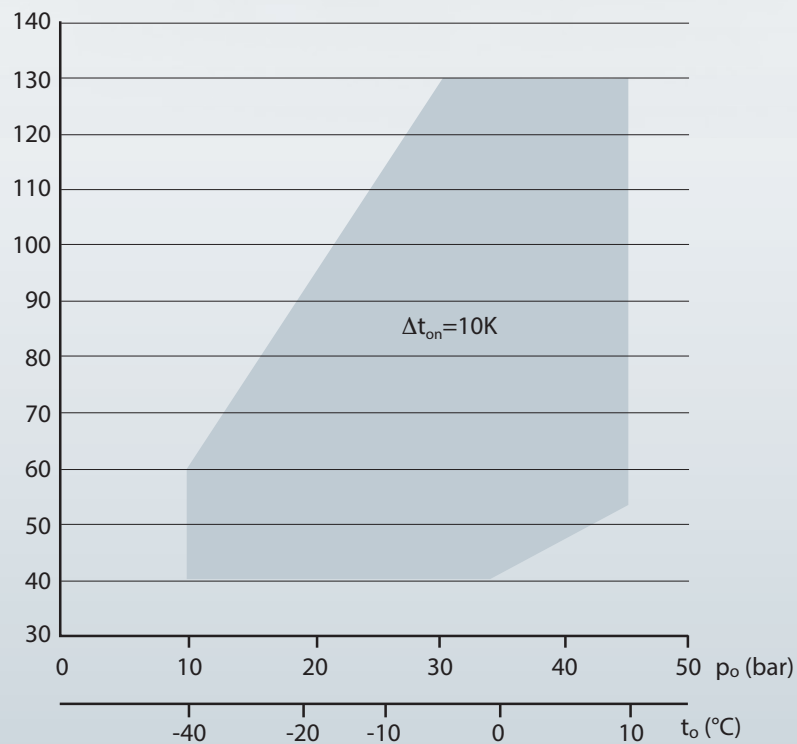
picture: HGX24 CO₂ T

¹ +10 °C/40 °C (100 bar)/10 K/30 - 70 Hz | -20 °C/+25 °C (80 bar)/10 K/30 - 70 Hz



picture: HGX22 CO₂ T

Operating range for HGX12 CO₂ / HGX24 CO₂ T



Max. permissible operating pressure (LP/HP) 100/150 bar
Compressor version S – compressor ranges HGX12 CO₂ and HGX24 CO₂ T



Danfoss BOCK®

Service and support

Up-to-date information, training and tools about BOCK® CO₂ compressors, compressors for hydrocarbons and solutions for other refrigerants. Use our expertise for your daily practice – online and free of charge.



VAP tool

Current information on technical data, performance data, operating limits and much more can be done online via the BOCK® compressor selection program (VAP): vap.bock.de

BOCKCO₂ Tool

The strengths of the BOCKCO₂ Tool based on Excel: Support for the selection of CO₂ compressors, e.g. by displaying the system schematic as RI flow diagram and refrigeration circuit in log-p-h-diagram, as well as selecting compressors in rack systems and for special CO₂ systems such as booster systems.



BOCKshop

The online catalog in the **BOCKshop** is the best choice to find spare parts for your BOCK compressor easily and quickly around the clock. Including all Ex-drawings and parts lists also for printing: bockshop.bock.de



Danfoss training

Learn everything about compressors for mobile applications in our interactive online webinars, both about the open compressors of the FK series and the semi-hermetic HG compressors for synthetic and natural refrigerants.

Our on-site practitioner workshops give you the opportunity to get to know our mobile compressors better. The disassembly and assembly of a compressor in the practical part of the workshop is particularly helpful here.

