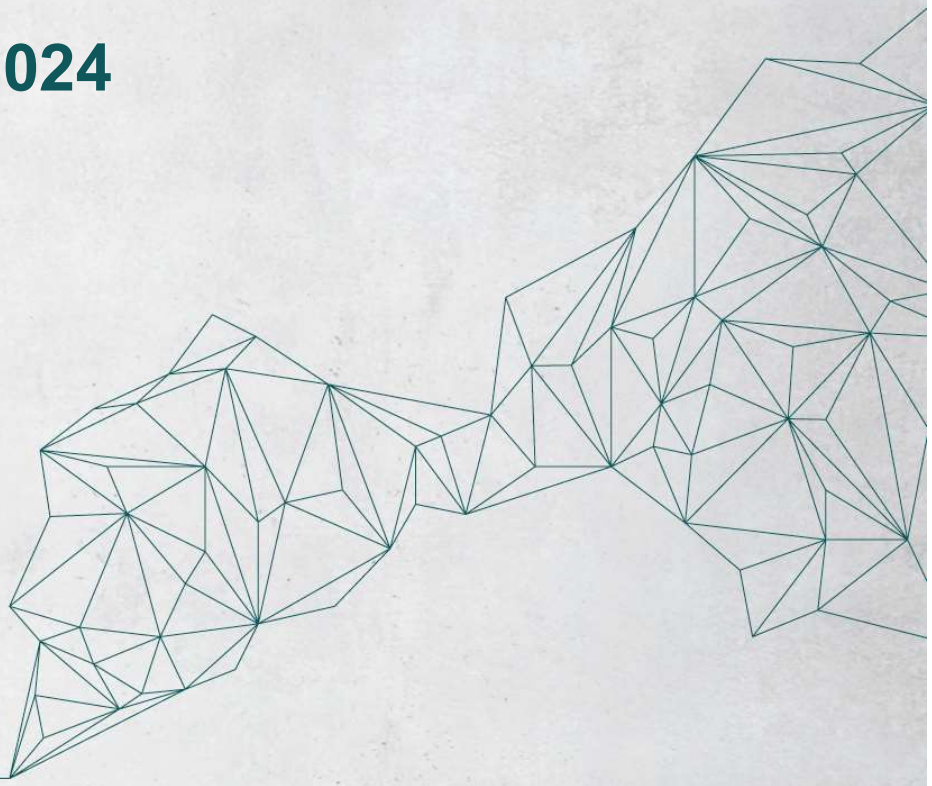
Hall 7A

CHILLVENTA

Chillventa Specialist Forums 2024
Chillventa Fachforen 2024

CONNECTING EXPERTS.



Mattia Sarati

Product Development Specialist

TK HD SERIES

A NEW STATE OF THE ART IN THE R-744 MARKET

Frascold

www.frascold.it

AGENDA

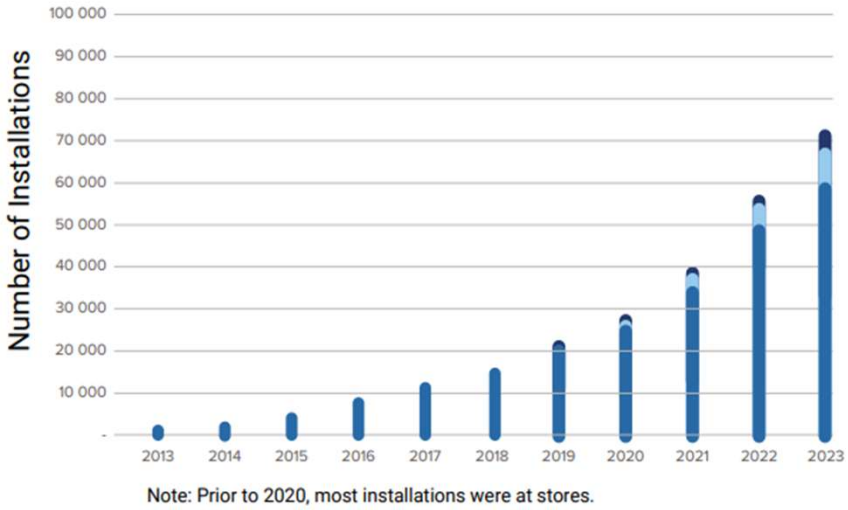
1. REFRIGERATION & HEAT PUMP CO_2 MARKET
2. CO_2 TK HD SERIES
3. CO_2 TK HD with LSPM motor

REFRIGERATION & HEAT PUMP MARKET

Transcritical CO_2 installations in major regions

STORES AND INDUSTRIAL SITES IN EUROPE, AS OF DECEMBER 2023

(source by ATMO REPORT 2024)

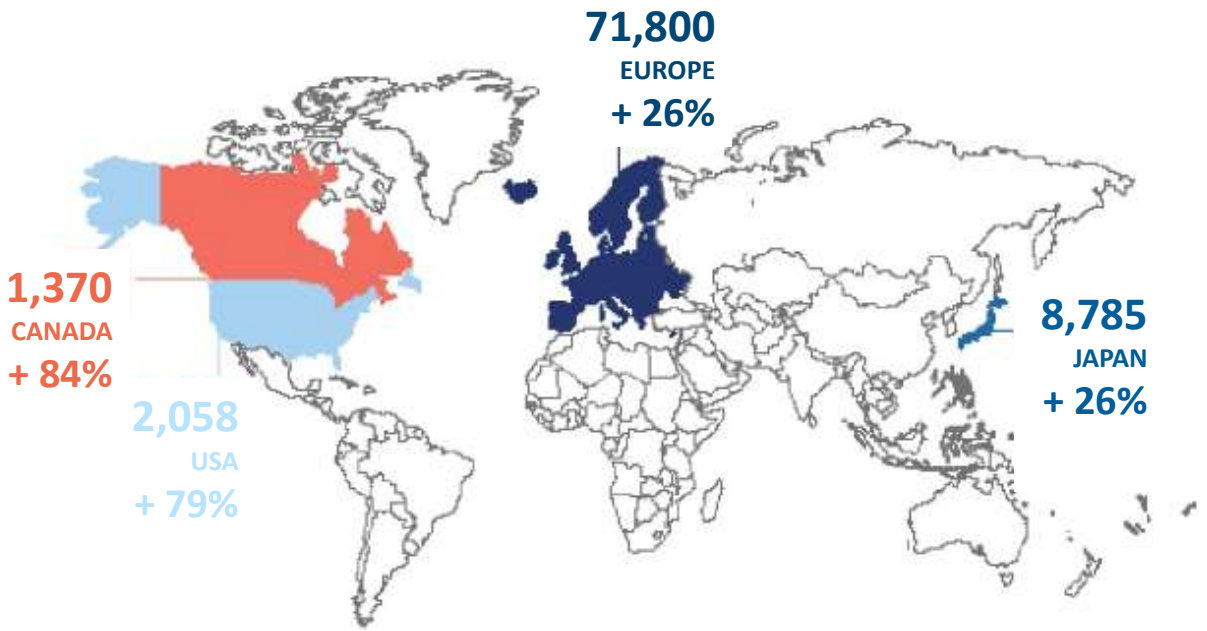


REFRIGERATION & HEAT PUMP MARKET

Transcritical CO_2 installations in major regions

STORES AND INDUSTRIAL SITES IN THE WORLD, AS OF DECEMBER 2023

(source by ATMO REPORT 2024)

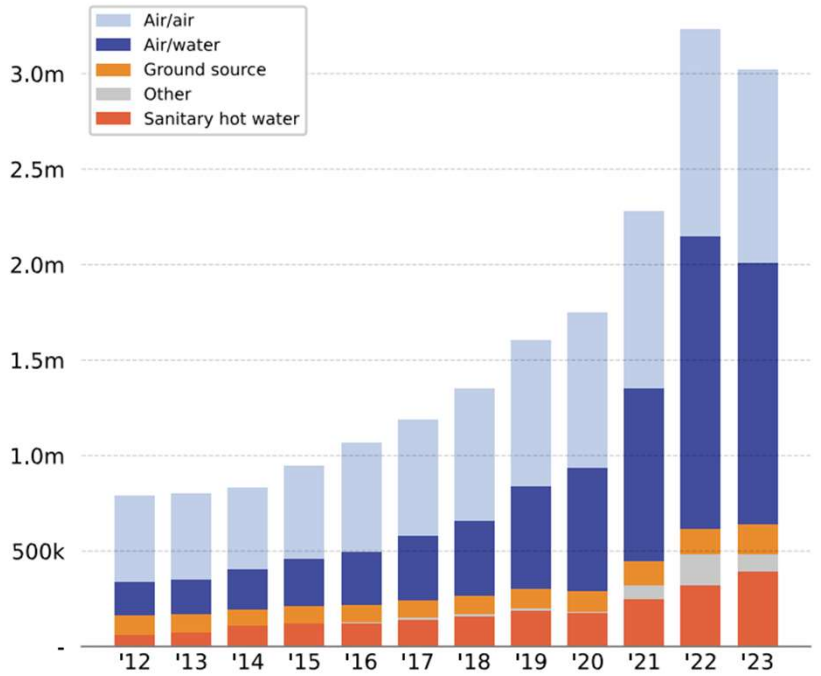


REFRIGERATION & HEAT PUMP MARKET

Heat pump installations in Europe

SALES HEAT PUMP IN EUROPE, AS OF 2023

(source by EHPA REPORT 2024)



23,9

Million units of heat pump installed in Europe up to 2023

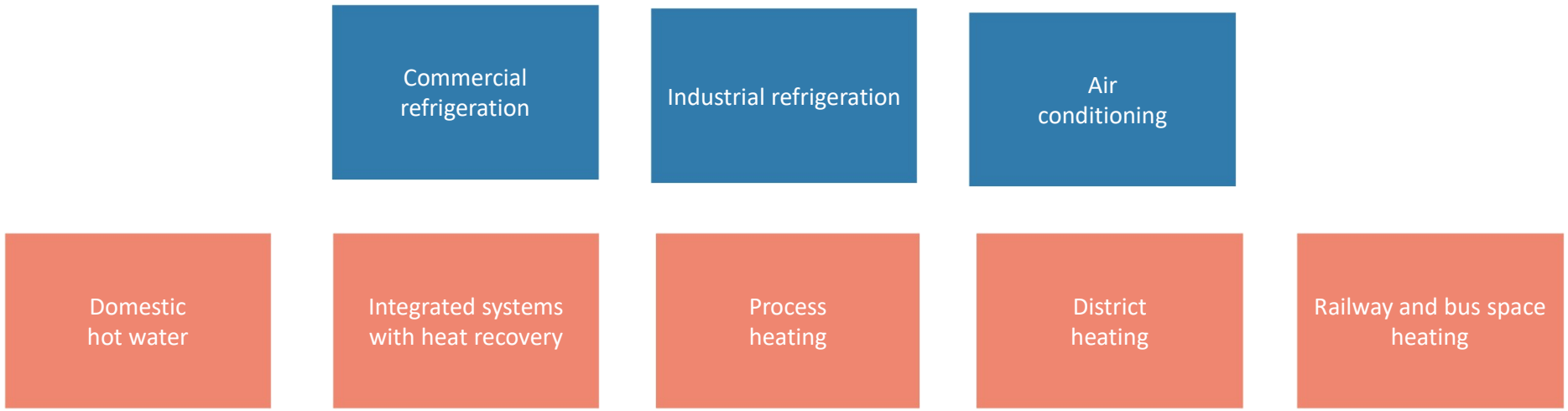
+17%

Heat pump Installed compared to 2022

REFRIGERATION & HEAT PUMP MARKET

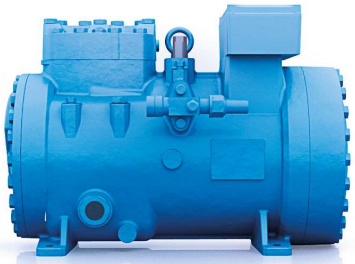
CO_2 target applications

In a fast-growing industry driven by the need to decarbonize the cooling & the heating sector, CO_2 can carve out a role in several target applications:



CO_2 TK HD SERIES

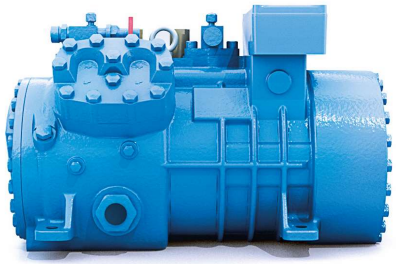
Models



D-TK HD
2 cylinders

7 models | 3 – 5 HP

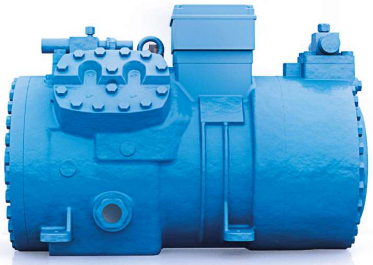
1,9 - 3,5 m^3/h @50 Hz
2,2 – 4,1 m^3/h @60 Hz



Q-TK HD
4 cylinders

10 models | 5 – 10 HP

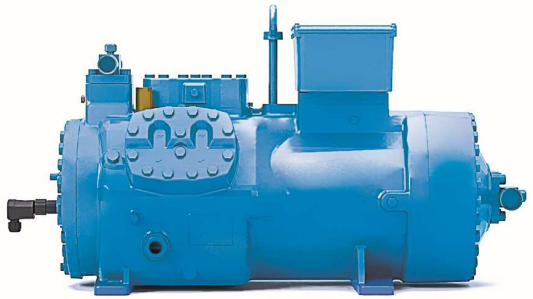
3,8 – 9,6 m^3/h @50 Hz
4,5 – 11,5 m^3/h @60 Hz



S-TK HD
4 cylinders

14 models | 8 – 40 HP

7,9 – 25,3 m^3/h @50 Hz
9,4 – 30,3 m^3/h @60 Hz



Z-TK HD
6 cylinders

3 models | 40 – 50 HP

30,7 – 37,9 m^3/h @50 Hz
36,9 – 45,5 m^3/h @60 Hz

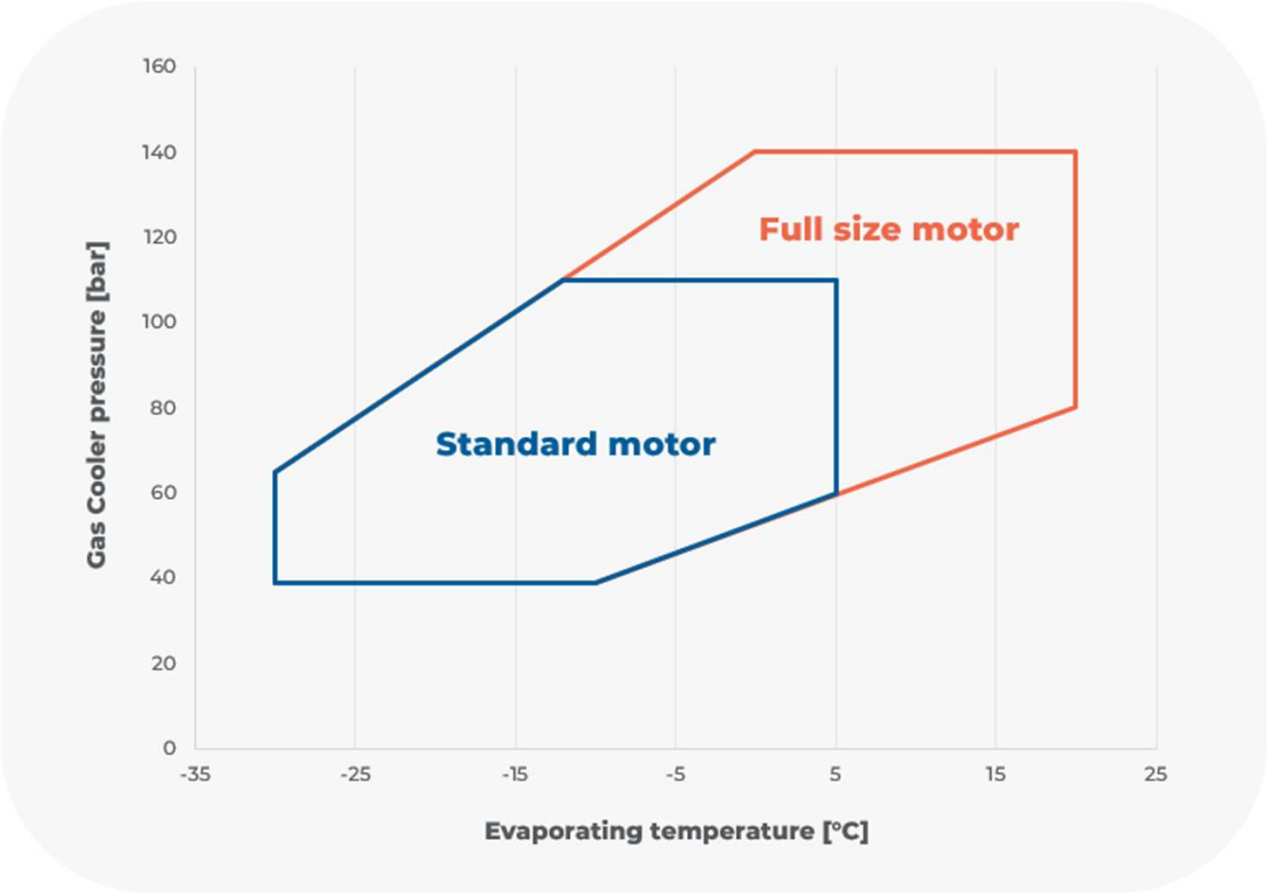
From 3.8 to 76 kW in Cooling

From 11 to 186 kW in Heating

Cooling Capacity -10° evap / 10 K superheat. / 83,7 bar gas cooler press. / 33 °C gas cooler outlet temp.
Heating capacity 5 °C evap / 10 K superheat. / 90 bar gas cooler press. / 15 °C gas cooler outlet temp.

CO_2 TK HD SERIES

Application envelope



CO_2 TK HD SERIES

Skill point

N. 34 CPS
From 1.9 to 38 m^3/h

HIGH RELIABILITY
Due to the use of dedicated materials & new machining tech

ECO-FRIENDLY
More durable and less impact on the environment

SPECIFICALLY DESIGNED
For always on application h. 24

LOW NOISE – LOW VIBRATION
Thank to mechanical balance

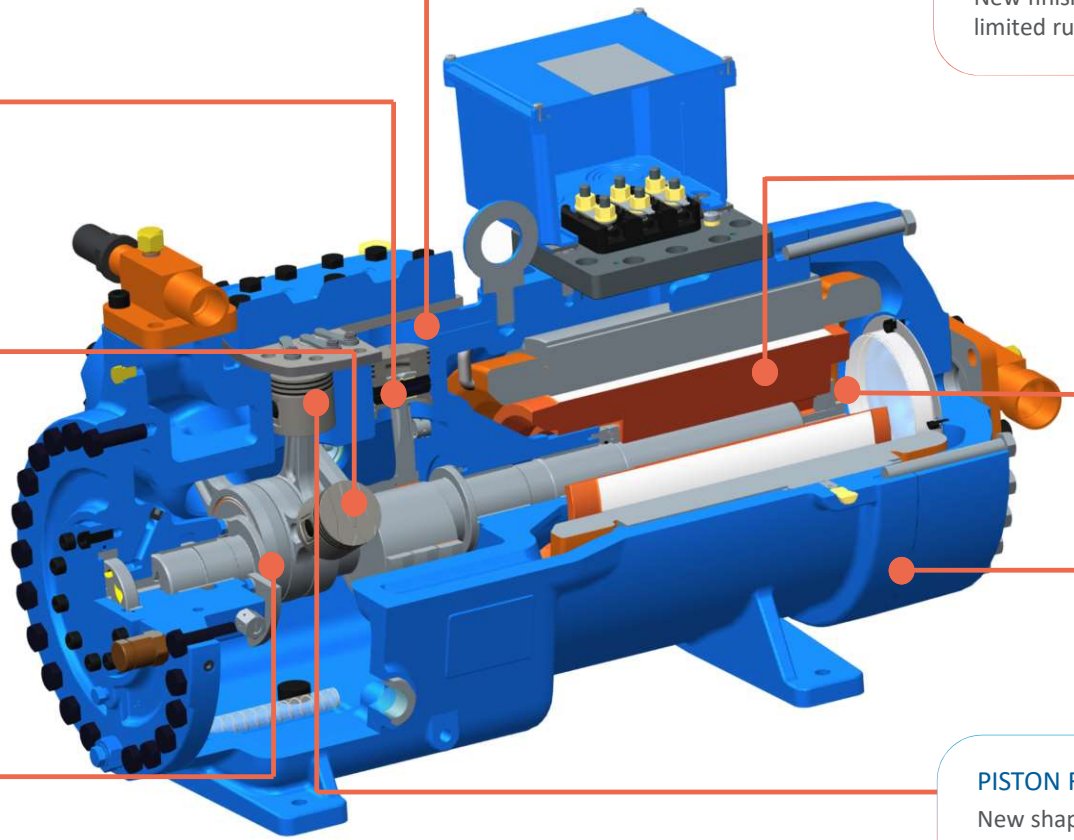
HIGH FLEXIBILITY
The best solution with inverter

HIGH EFFICIENCY
The best solution for heat pump & recovery application

100% COMPATIBLE
With existing installation (as retrofit)

CO_2 TK HD SERIES

Skill points



PISTON PIN

Longer, with hard antifriction coating.

PISTONS

New material with hard nitrurating surface for long service life.

Less sensitive to thermal variations even under severe conditions.

CONNECTING RODS

New stronger material, with new hard bushings.

CYLINDER SURFACE

New finishing for lower friction and limited running-in.

MOTORS

High efficiency asyncronous version.

COUNTERWEIGHT

New balance for further improvement of vibrations & noise

PSS

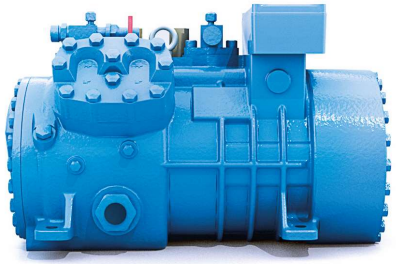
Up to 100 bar

PISTON RINGS

New shape with antiwear surface treatment.

CO_2 TK HD SERIES + LSPM MOTOR

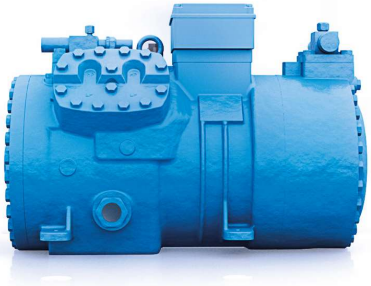
Models



Q-TK HD LSPM 4 cylinders

9 models | 5 – 10 HP

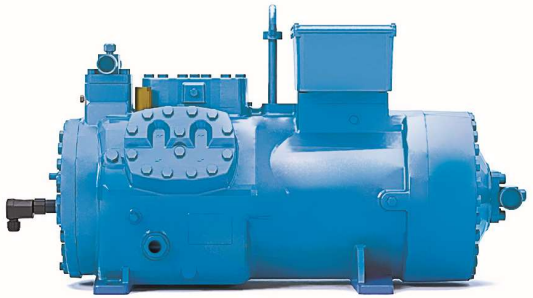
3,8 – 9,6 m^3/h @50 Hz
4,5 – 11,5 m^3/h @60 Hz



S-TK HD LSPM 4 cylinders

13 models | 10 – 40 HP

7,9 – 25,3 m^3/h @50 Hz
9,4 – 30,3 m^3/h @60 Hz



Z-TK HD LSPM 6 cylinders

3 models | 40 – 50 HP

30,7 – 37,9 m^3/h @50 Hz
36,9 – 45,5 m^3/h @60 Hz

CO_2 TK HD SERIES + LSPM MOTOR

Skill points

N. 25 CPS
From 4 to 38 m^3/h
The largest range with this technology

HIGH RELIABILITY
Based on TK HD technology

ECO-FRIENDLY
More durable and less impact
on the environment

UP TO +15% MORE EFFICIENT
@50Hz in reference to async version
AVG +8%

UP TO + 25% MORE EFFICIENT
@ Minimum frequency

COMPATIBLE WITH INVERTER
Usable with or without inverter
Only DOL start

HIGH EFFICIENCY
The best solution for always on applications
Easy payback of initial investment

LOW NOISE – LOW VIBRATION
Thank to optimized mechanical balance

CO_2 TK HD SERIES + LSPM MOTOR

Case study – “TK HD” vs “TK HD LSPM” in a simple booster system

Booster system with flash gas bypass and LT desuperheater

MT (T0 = -8°C | Evaporator OH = 10K)

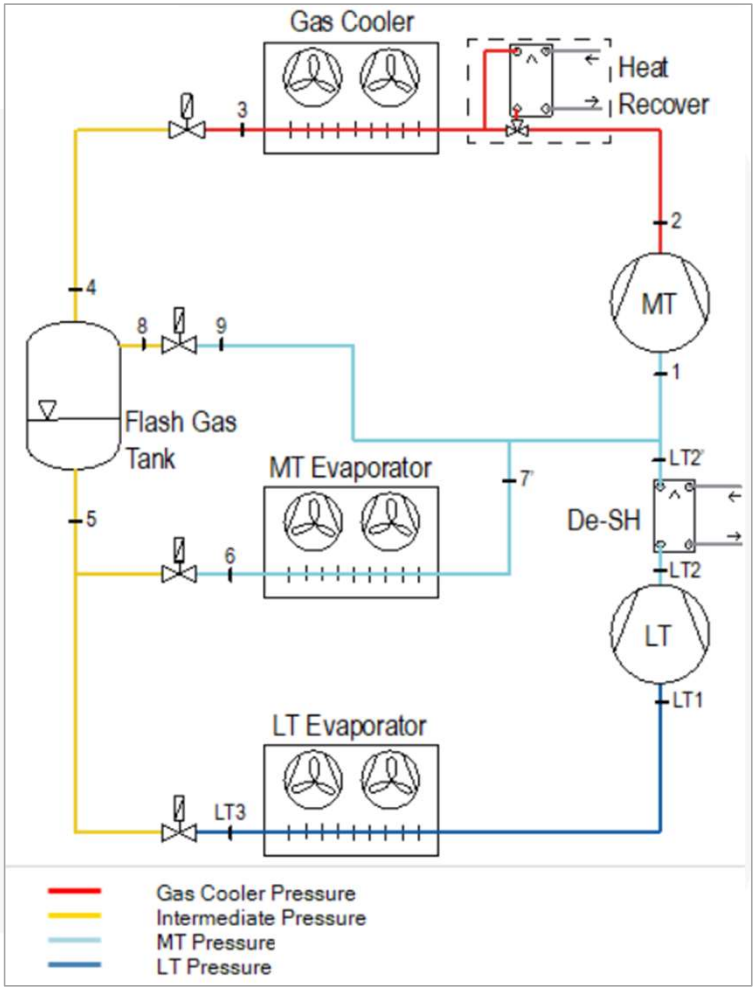
- **1 x Q9-7TK HD LSPM inverter VS 1 x Q9-7TK HD with inverter**
- **2 x Q9-7TK HD**

LT (T0 = -30°C | Evaporator OH = 10 K)

- **1 x A1.5-3SK3 with inverter**
- **2 x A1.5-3SK3**
- **LT desuperheater (Tout = 30°C)**

MT Target = 25 kW | LT Target = 5 kW | HR1 Target = 5 kW

Source: Frascold CO2 TOOL



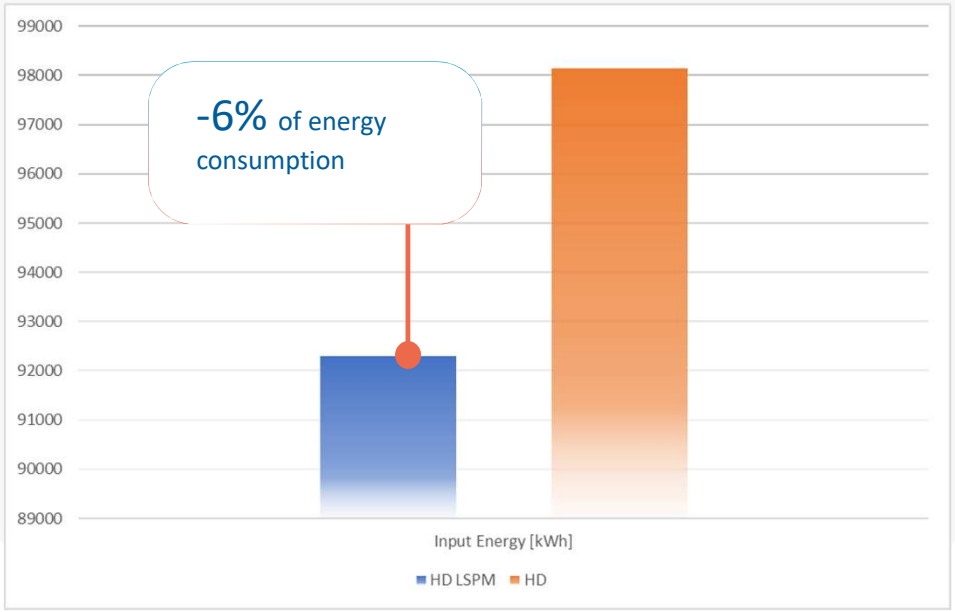
CO_2 TK HD SERIES + LSPM MOTOR

Case study – “TK HD” vs “TK HD LSPM” in a booster system

	HD LSPM	HD
Refrigerating Energy MT [kWh]	203579	206253
Refrigerating Energy LT [kWh]	40128	40128
Input Energy [kWh]	92306	98151
Average COP ref [W/W]	2,75	2,6
Seasonal COP ref [kWh/kWh]	2,64	2,51
Average COP system [W/W]	3,12	2,93
Seasonal COP system [kWh/kWh]	2,96	2,81
Heat Recovery Energy (1st) [kWh]	29200	29200
Maximum Gas Cooler Capacity [kW]	56,526	57,001
Maximum DeSH Capacity [kW]	0,584	0,584
Transcritical operation hours [h]	7005	7005
Subcritical operation hours [h]	1755	1755

Source: Frascold CO2 TOOL

System advantage with the use of a TK HD LSPM a leader compressor



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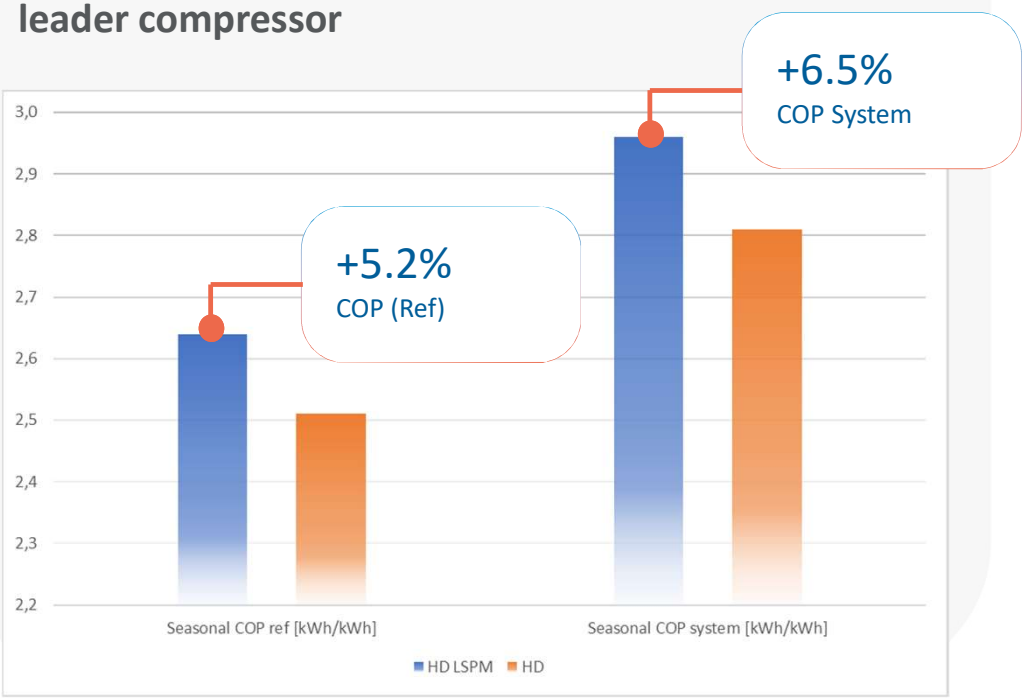

Thank you

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CONNECTING EXPERTS.