

CONNECTING  
EXPERTS.

# CHILLVENTA eSPECIAL

Refrigeration | AC & Ventilation | Heat Pumps

13.–15.10.2020

NÜRNBERG MESSE





## **COLD CHAIN challenges and how to FACE THEM**

**Livio Calabrese**  
Sales & Marketing Director

# Agenda

- **Frascold Overview**
- **Direct Emissions**
  - HC with ATEX solutions
  - CO<sub>2</sub> solutions
  - Low-GWP HFO blends
- **Indirect Emissions**
  - Efficiency @ Part Load for natural refrigerants
  - RSH for HC and HFO blends
  - Capaflex for CO<sub>2</sub>
  - Condensing Units Complying with Ecodesign
- **Trainings**
  - CO<sub>2</sub> System Simulator
  - Cold Room Calculator
  - FSS3
- **Conclusions**

Our segments and solutions

## FRASCOLD SEGMENTS

We support our customers during their development journey, providing refrigeration and air conditioning solutions for the specific cooling challenge.



COMMERCIAL REFRIGERATION



PROCESS COOLING



INDUSTRIAL REFRIGERATION



COMFORT



# How to face environmental impact?

From EU community regulations to Frascold solutions

**How we face every day environmental impact?**

**Direct emissions**

**Indirect emissions**

**Trainings**

## How we face every day environmental impact?

### Direct emissions

- **HC with ATEX solutions**
- CO<sub>2</sub> solutions
- Low-GWP HFO blends


### Indirect emissions

- Efficiency @ Part Load for natural refrigerants  
**RSH** for **HC** and **HFO** blends  
**Capaflex** for **CO<sub>2</sub>**
- Condensing Units Complying with Ecodesign

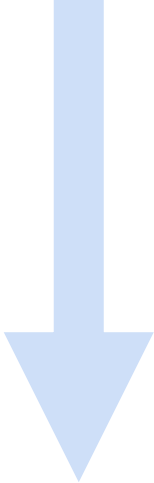
### Trainings

- CO<sub>2</sub> System Simulator
- Cold Room Calculator
- FSS3

## Advantages:

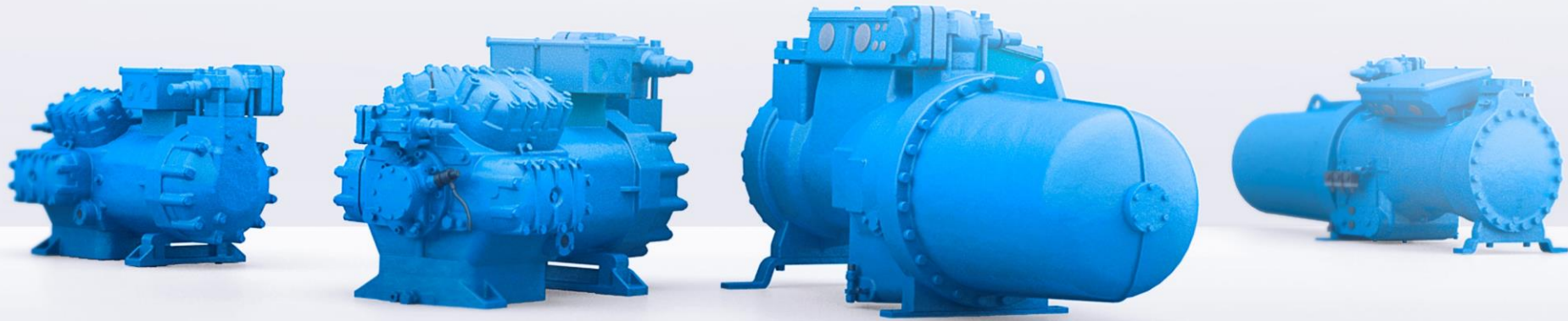
- High market availability
  - Simple thermodynamic cycle
  - Very good performance
  - Low operating pressures
  - Cheap refrigerant
  - Low GWP (3)
- 

## Challenges:

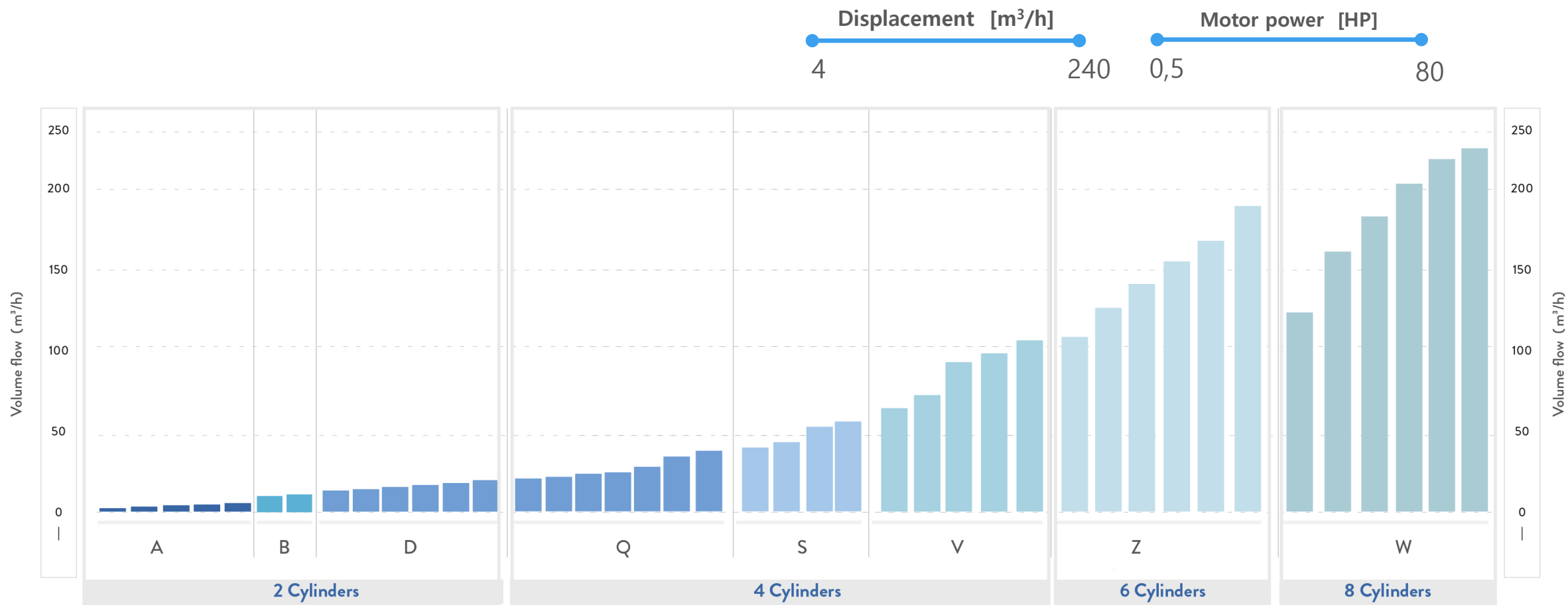
- Flammable
  - Energetic consumption of the system (cabinet condensation, auxiliary)
- 



# Atex Series

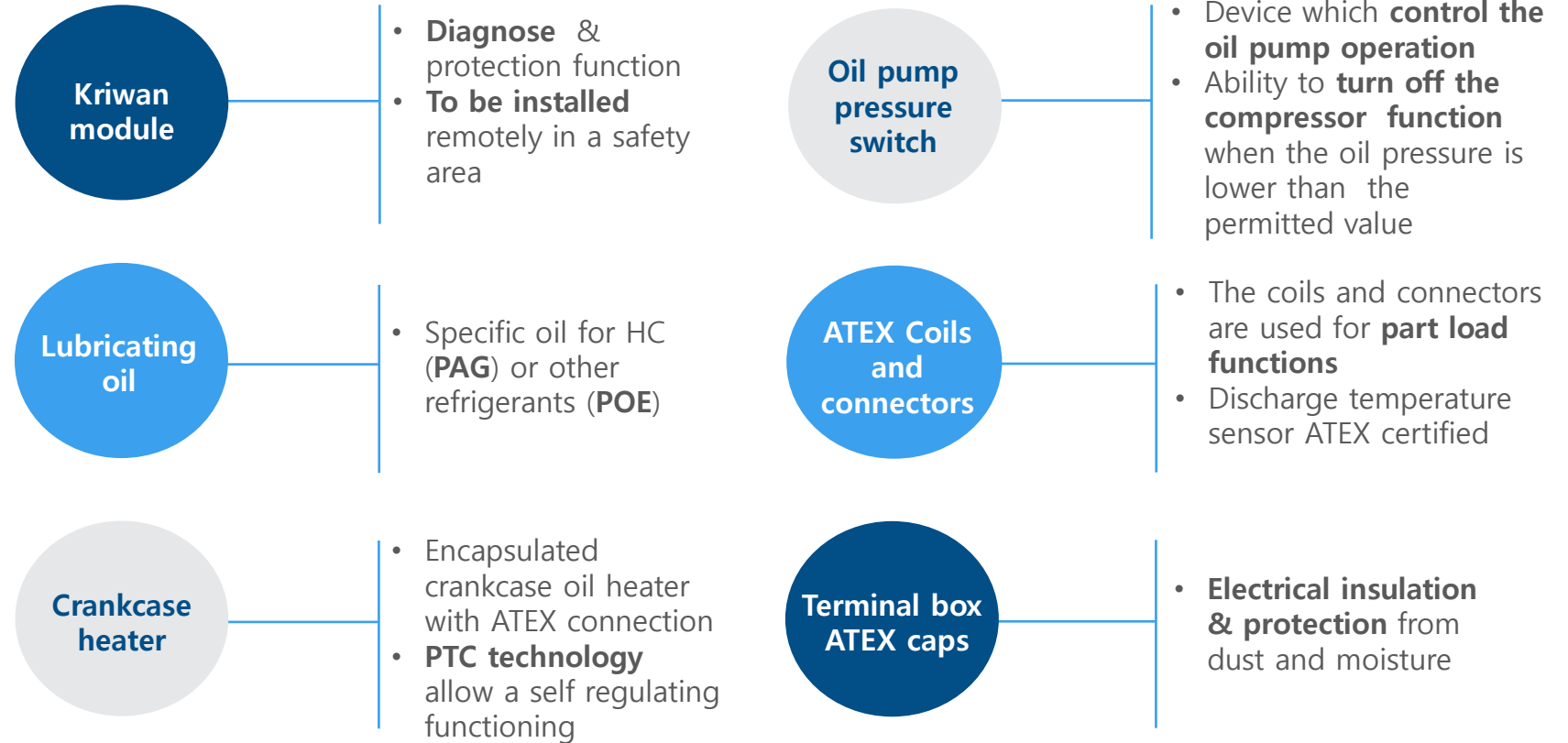


RANGE FOR SEMI-HERMITIC RECIPROCATING

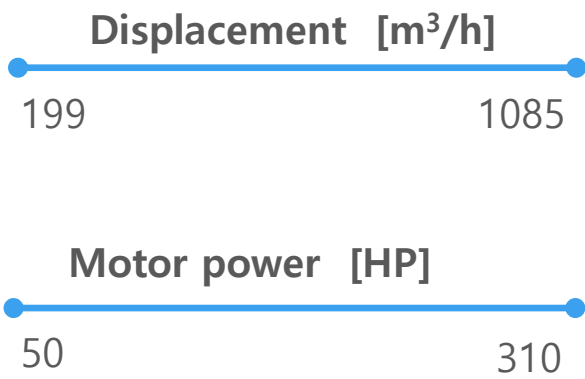


## MAIN FEATURES

Semi-hermetic  
Reciprocating are  
ATEX certified

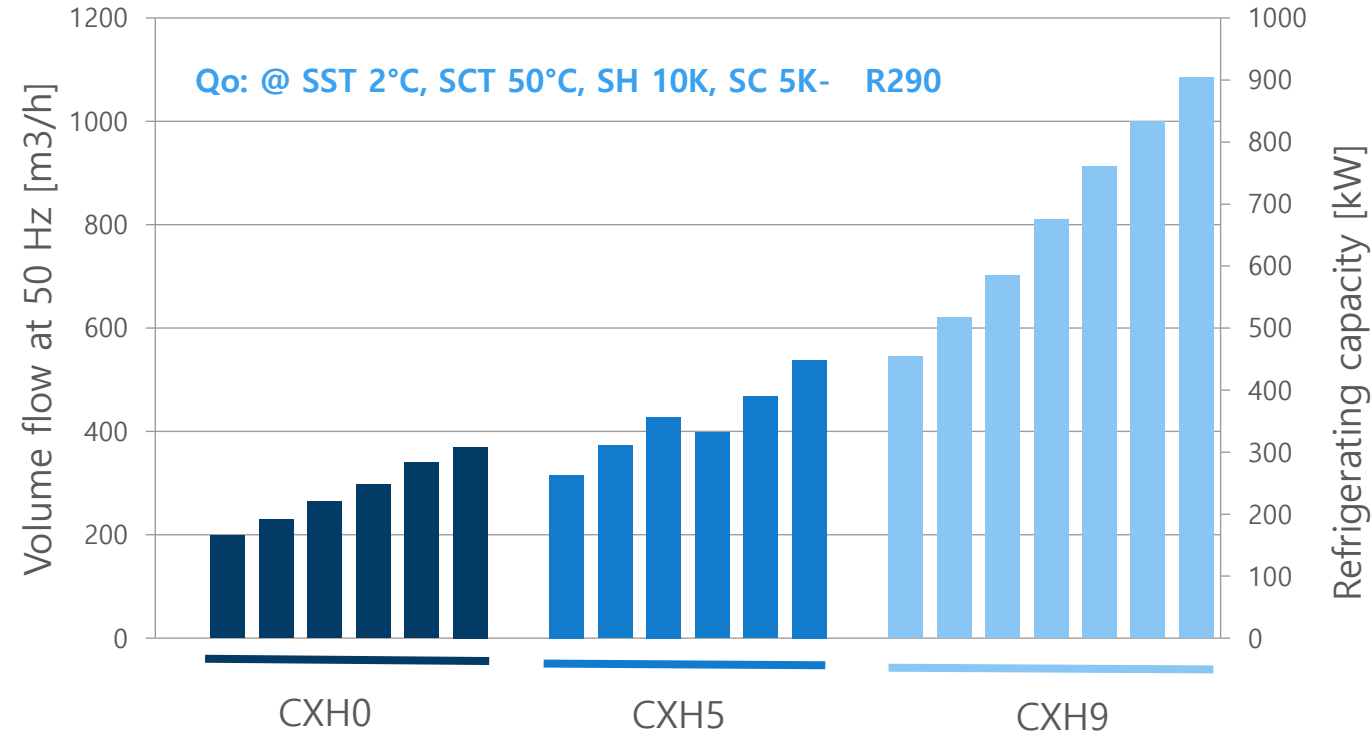


RANGE FOR COMPACT SCREW CX ATEX SERIES



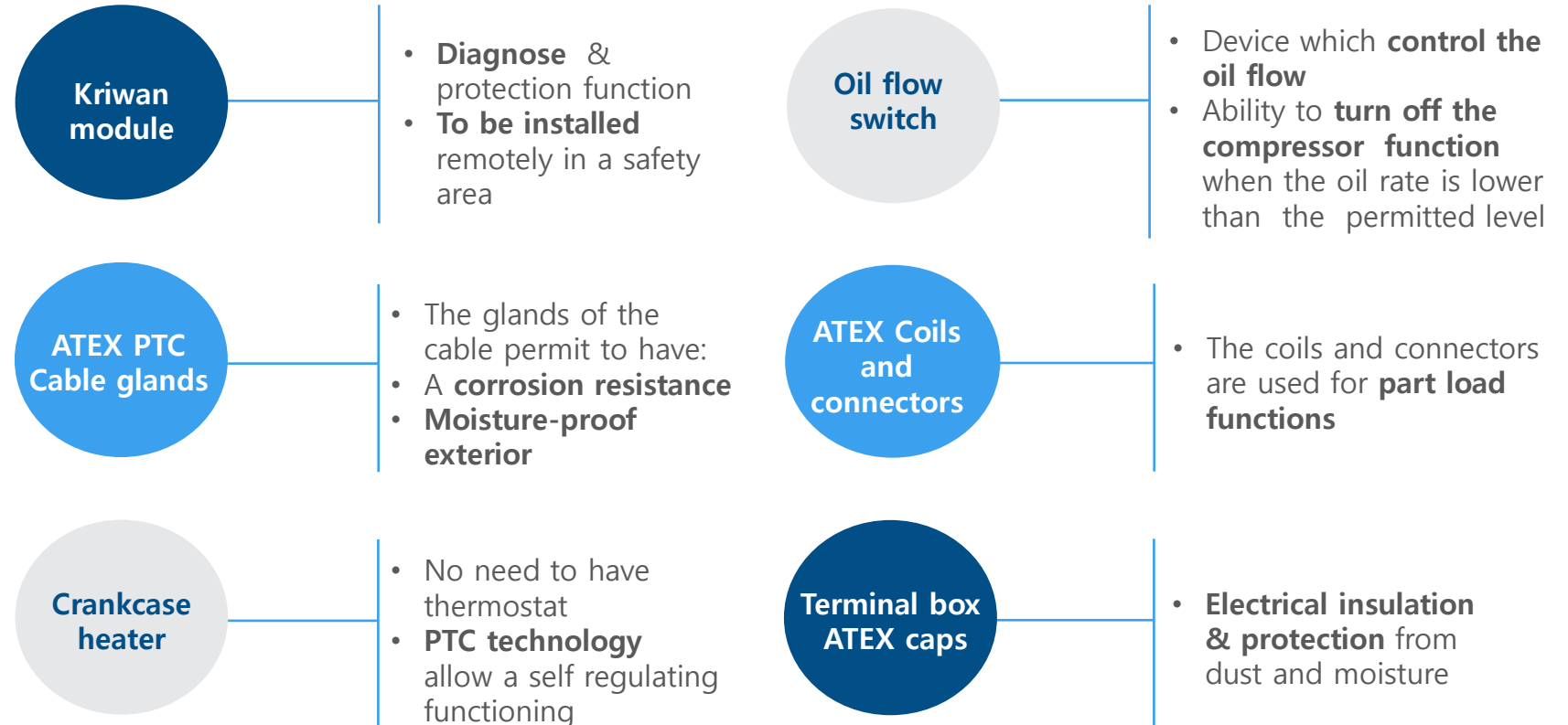
According to application:

- Standard motor
- Full-size motor



## MAIN FEATURES

### CX compressors are ATEX certified



## How we face every day environmental impact?

### Direct emissions

- HC with ATEX solutions
- **CO<sub>2</sub> solutions**
- Low-GWP HFO blends

### Indirect emissions

- Efficiency @ Part Load for natural refrigerants  
**RSH** for **HC** and **HFO** blends  
**Capaflex** for **CO<sub>2</sub>**
- Condensing Units Complying with Ecodesign

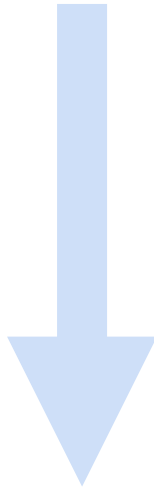
### Trainings

- CO<sub>2</sub> System Simulator
- Cold Room Calculator
- FSS3

## Advantages:

- High market availability
  - Long-term refrigerant
  - Cheap refrigerant
  - Good performance in integrated system
  - Low GWP (1)
  - Very good thermodynamic propriety (heat exchange, viscosity, vol. refr. Capacity)
- 

## Challenges:

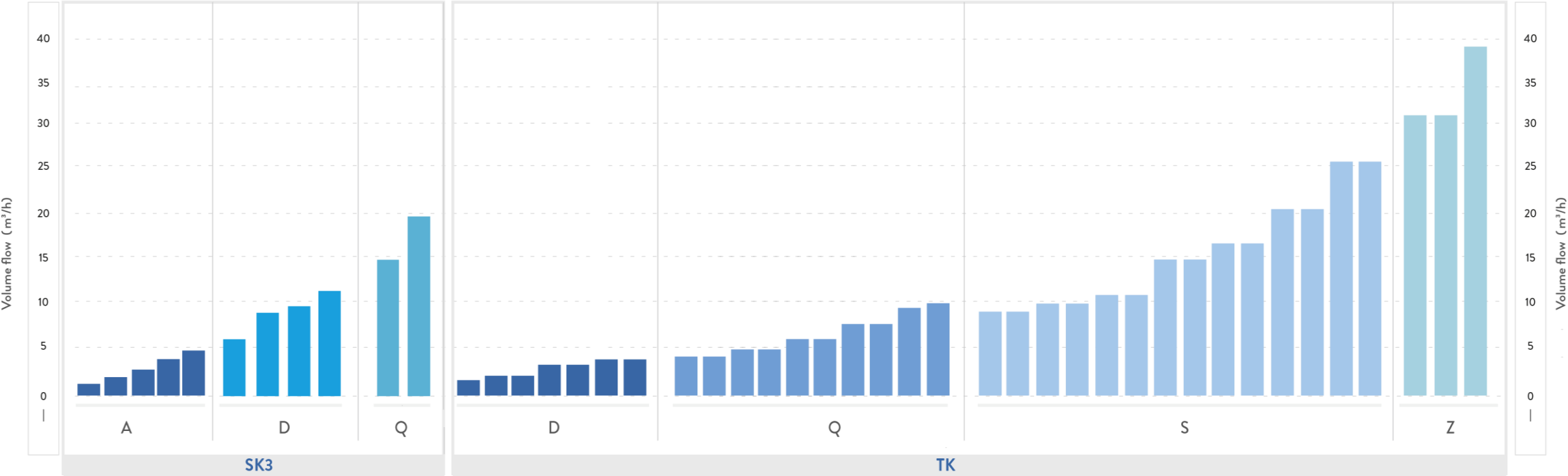
- High operating and standstill pressures
  - Complex cycle for high efficiency
  - Necessity to have more qualified technicians
  - Dedicated components
- 



# CO<sub>2</sub> Series



PRODUCT RANGE – SK & TK



## Natural refrigerant CO<sub>2</sub> SOLUTIONS

Frascold commitment to sustain the change:

### DEDICATED DESIGN

Advanced solutions  
Dedicated fluid dynamics  
Low heat exchange from low and high pressure sides  
Balancing (bore-stroke ratio)

### RANGE EXPANSION AND INNOVATION

Series Z-TK transcritical compressors 6 cylinders  
Series STK two-stages compressors 2/4 cylinders  
New Q10-TK  
Mechanical part-load Capaflex



## How we face every day environmental impact?

### Direct emissions

- HC with ATEX solutions
- CO2 solutions
- **Low-GWP HFO blends**

### Indirect emissions

- Efficiency @ Part Load for natural refrigerants  
**RSH** for **HC** and **HFO** blends  
**Capaflex** for **CO<sub>2</sub>**
- Condensing Units Complying with Ecodesign


### Trainings

- CO<sub>2</sub> System Simulator
- Cold Room Calculator
- FSS3

Synthetic refrigerants

## LOW-GWP HFO-blends

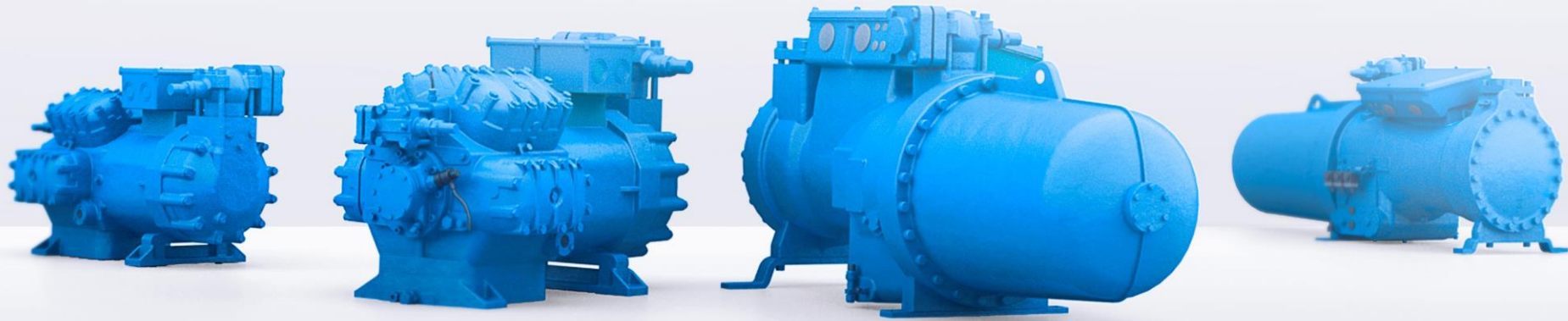
### Advantages:

- Very similar system concept to HFC
  - Simple thermodynamic cycle
  - Very good performance
  - Low operating pressures
  - Standard components
  - Low GWP (<150)
- 

### Challenges:

- Flammable
  - Glide
- 

# Atex Series



## Low-GWP HFO blends

# MAIN FEATURES

Frascold commitment to sustain the change:

### DEDICATED DESIGN

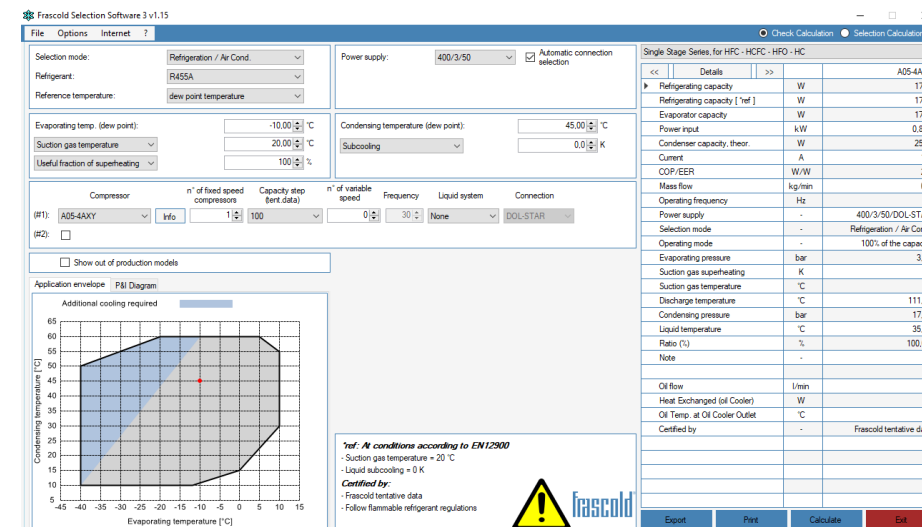
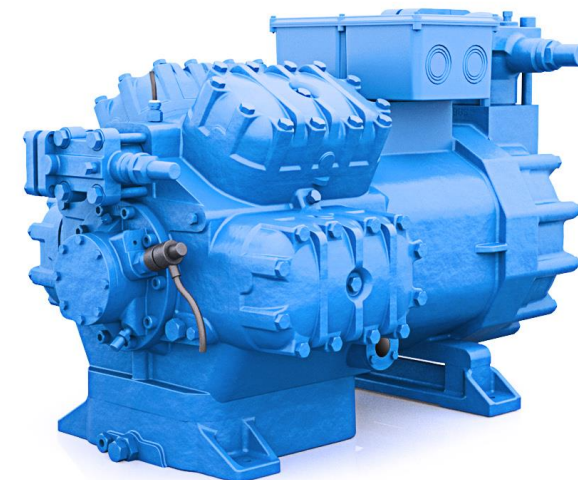
- Low heat exchange from low and high pressure sides
- Balancing (bore-stroke ratio)
- Specific oil (POE)
- Assembly certification (easier risk assessment)
- ATEX certified electric and electronic accessories

### RANGE AND INNOVATION

- Largest range certified ATEX zone 2
- From 4 to 240 m<sup>3</sup>/h reciprocating AXY
- From 199 to 1085 m<sup>3</sup>/h screw AX

### TECHNICAL SUPPORT

- Selection Software
- Test performance in our test rigs for multiple models and field test with some costumers
- Technical support from the selection to the after-sales





## How we face every day environmental impact?

### Direct emissions

- HC with ATEX solutions
- CO<sub>2</sub> solutions
- Low-GWP HFO blends

### Indirect emissions

- **Efficiency @ Part Load for natural refrigerants**  
**RSH for HC and HFO blends**  
Capaflex for CO<sub>2</sub>
- Condensing Units Complying with Ecodesign

### Trainings

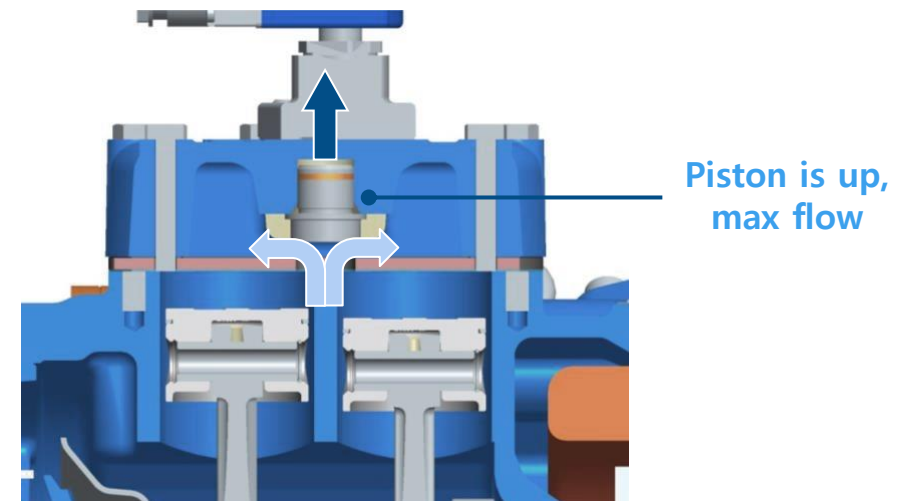
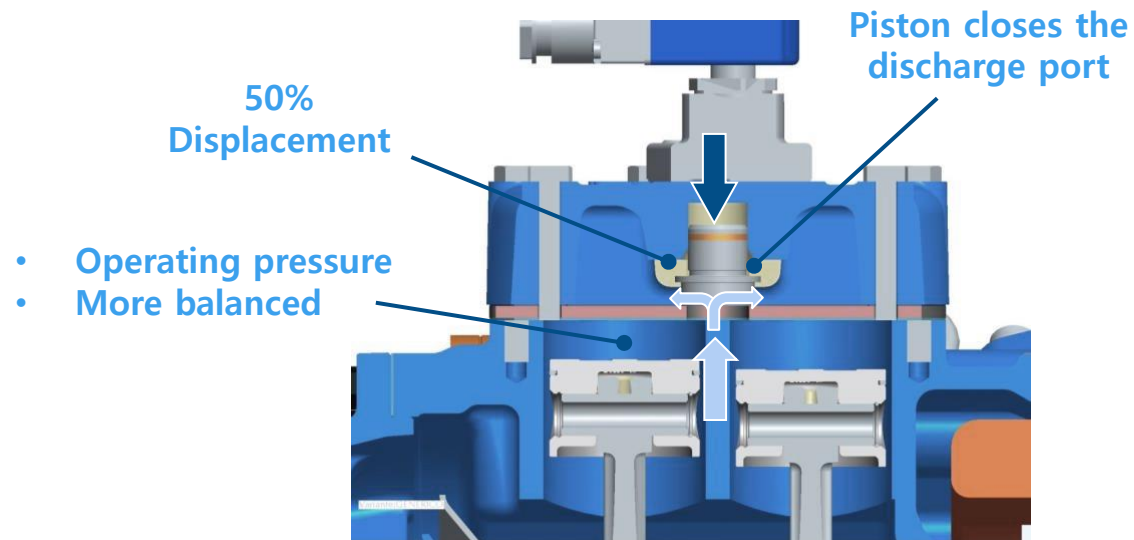
- CO<sub>2</sub> System Simulator
- Cold Room Calculator
- FSS3

## Efficiency at Part Load for natural refrigerants

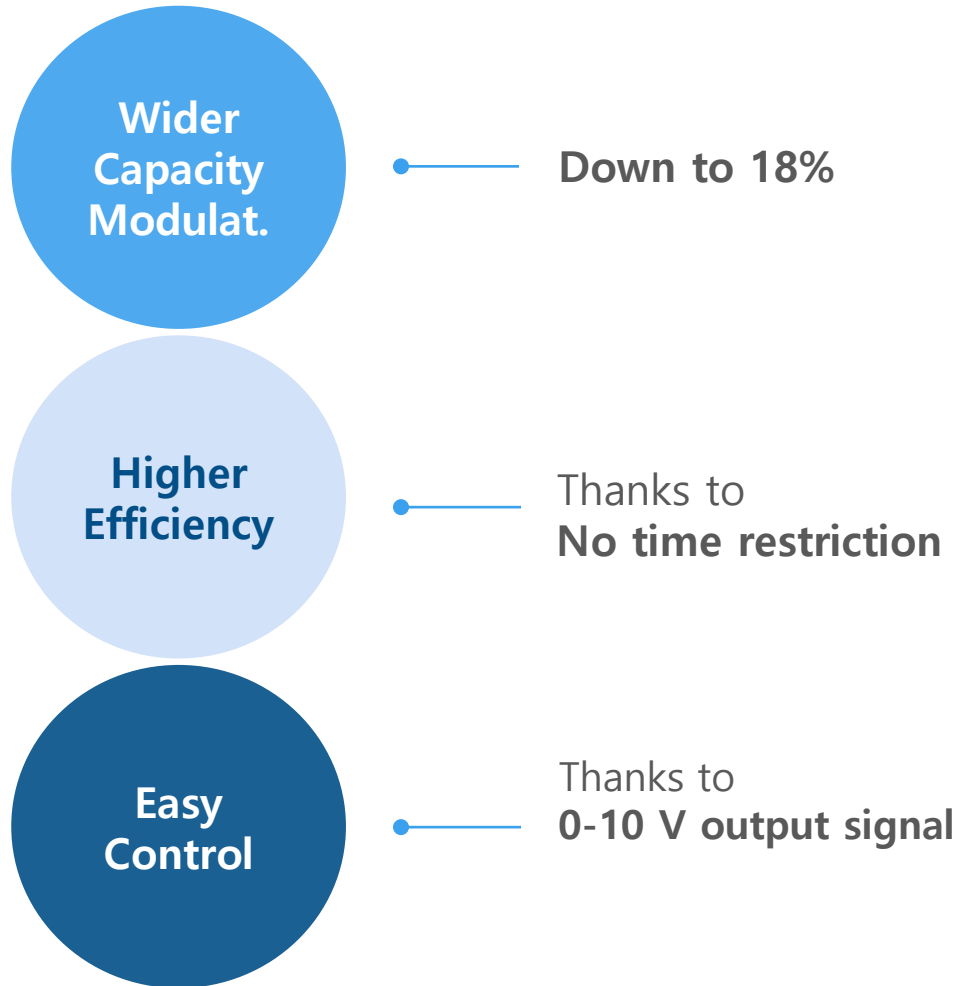
### RSH HEAD for HC/HFO in ATEX applications

RSH equipped systems guarantee optimal operations throughout the life cycle of the compressors:

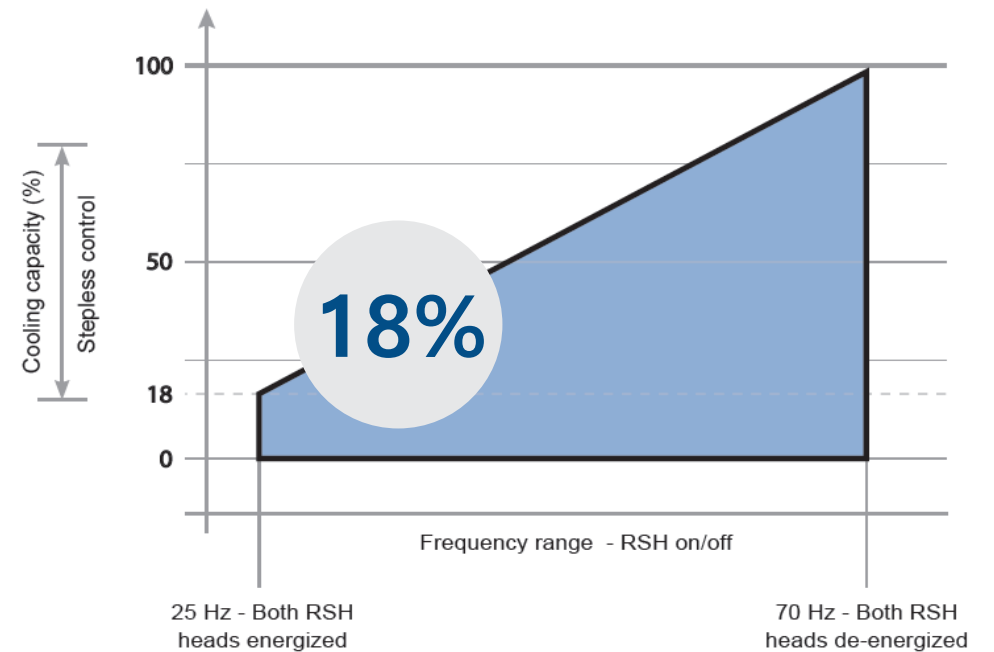
- Greater unbalance control which **reduces vibrations**.
- **Better lubrication** (or constant lubrication) due to the absence of vacuum.
- The compressor is much smoother in operation.  
**Less mechanical stress** and greater **reduction of potential system breakdowns**.



## RSH HEAD for HC/HFO in ATEX applications



RSH benefits in combination with inverter



## How we face every day environmental impact?

### Direct emissions

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### Trainings

- CO<sub>2</sub> System Simulator
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- FSS3

## A NEW TECHNOLOGY - CAPAFLEX

### Stepless capacity control

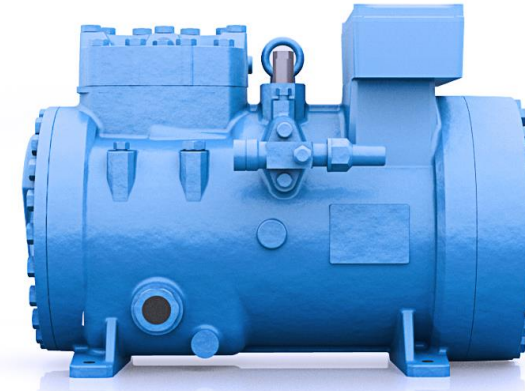
Transcritical CO<sub>2</sub> compressors can for the first time be stepless controlled and energy efficient without the use of a variable frequency driver.

### Decrease installation and maintenance cost

Easy installation or replacement  
Easy to control with existing control signals

### Secure your cooling system running

If any control malfunction occurs, the system operates at full load and compressor runs at full capacity.  
Uninterrupted operation of the cooling system is ensured.



CO<sub>2</sub>  
Capacity  
Control

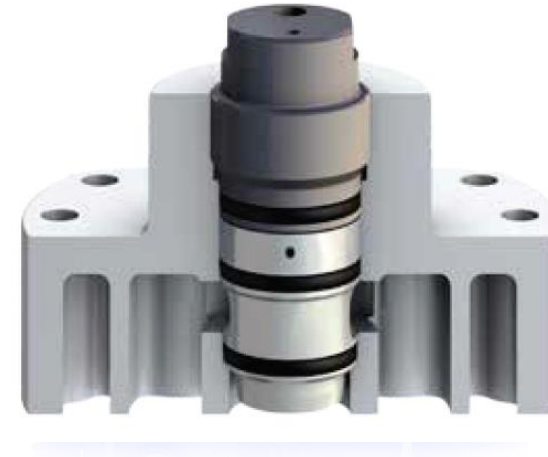
Innovative  
System

Stepless  
Operations

## A NEW TECHNOLOGY - CAPAFLEX

A single compressor with CapaFlex allows a wider capacity variation compared to a single compressor with VFD.

The same capacity regulation range can only be obtained by coupling a compressor with VFD and a fixed speed compressor.



CO<sub>2</sub>  
Capacity  
Control

Innovative  
System

Stepless  
Operations

## How we face every day environmental impact?

### Direct emissions

- HC with ATEX solutions
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- Efficiency @ Part Load for natural refrigerants  
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- **Condensing Units  
Complying with  
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### Trainings

- CO<sub>2</sub> System Simulator
- Cold Room Calculator
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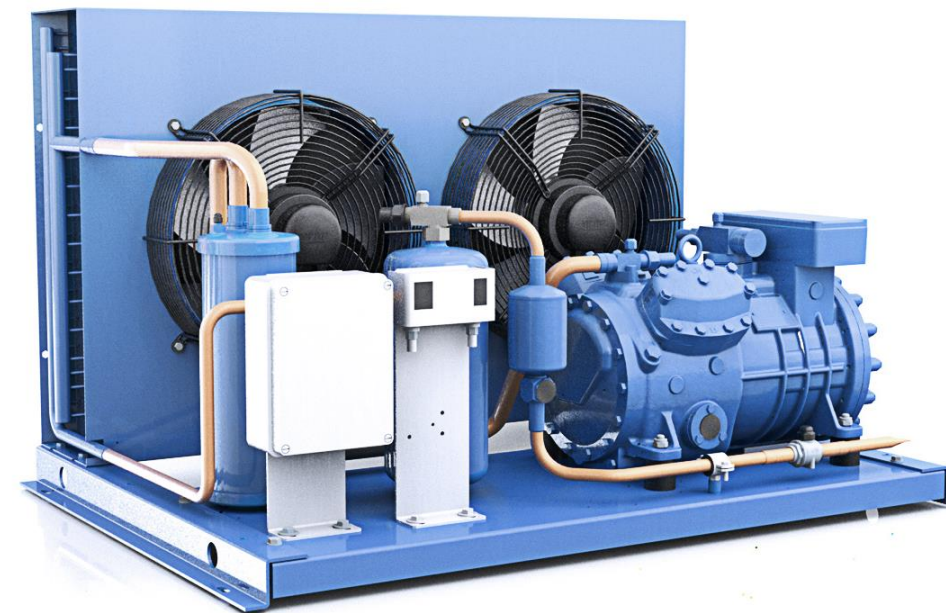


## CONFORMITY DECLARATION

Frascold condensing units comply with the following \*Directives:

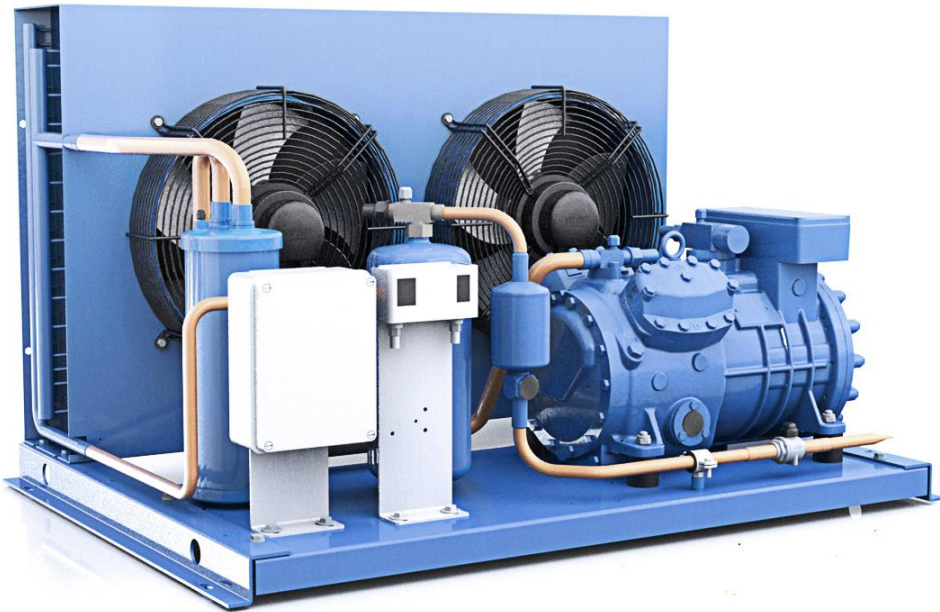
- EcoDesign Directive 2009/125/CE
- Machinery Directive 2006/42/EC
- Low Voltage Directive 2014/35/EU

EU Ecodesign Regulation 2015/1095 Minimum efficiency to be observed			
Working temperature	Capacity at 32 °C ambient	COP/SEPR	Value
MT T <sub>0</sub> = -10 °C	0,2 kW ≤ Q <sub>0</sub> ≤ 1 kW	COP	1,40
	1 kW < Q <sub>0</sub> ≤ 5 kW	COP	1,60
	5 kW < Q <sub>0</sub> ≤ 20 kW	SEPR	2,55
	20 kW < Q <sub>0</sub> ≤ 50 kW	SEPR	2,65
LT T <sub>0</sub> = -35 °C	0,1 kW ≤ Q <sub>0</sub> ≤ 0,4 kW	COP	0,80
	0,4 kW < Q <sub>0</sub> ≤ 2 kW	COP	0,95
	2 kW < Q <sub>0</sub> ≤ 8 kW	SEPR	1,60
	8 kW < Q <sub>0</sub> ≤ 20 kW	SEPR	1,70



\*For all approved refrigerants  
(see our Product Selection Software FSS3).

## MAIN ADVANTAGES



- **New design** for condenser
- Reduced refrigerant **charge**
- Optimised **airflow**
- **New design** for conveyor
- EC **fans** for EcoBlue (EB) Series
- AC **fans** for LB2
- Two configurations: **Standard** and **Package**

## How we face every day environmental impact?

### Direct emissions

- HC with ATEX solutions
- CO<sub>2</sub> solutions
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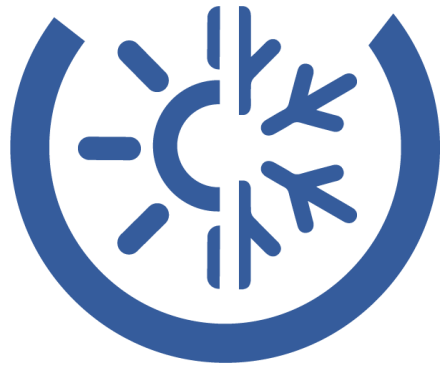
### Indirect emissions

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### Trainings

- **CO<sub>2</sub> System Simulator**
- Cold Room Calculator
- FSS3

# All in one



**CO<sub>2</sub>  
System Simulation Tool**



**Cold Room  
Calculator**



**FSS3 - Frascold  
Selection Software**

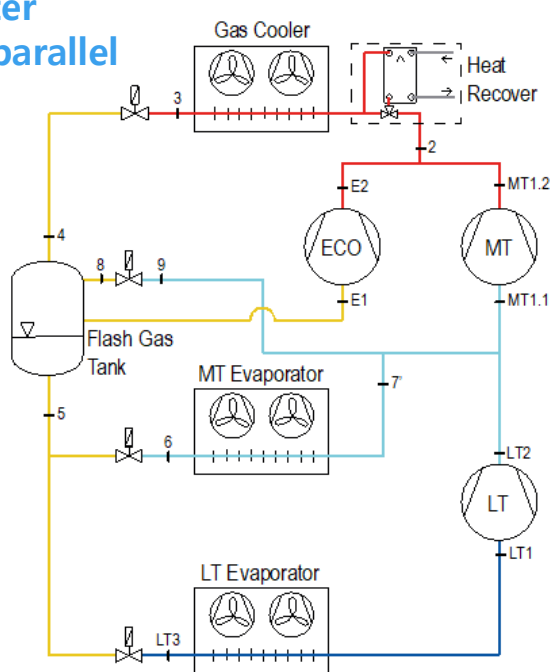
## FEATURES AND BENEFITS

### SIMULATION OF DESIGN CONDITIONS

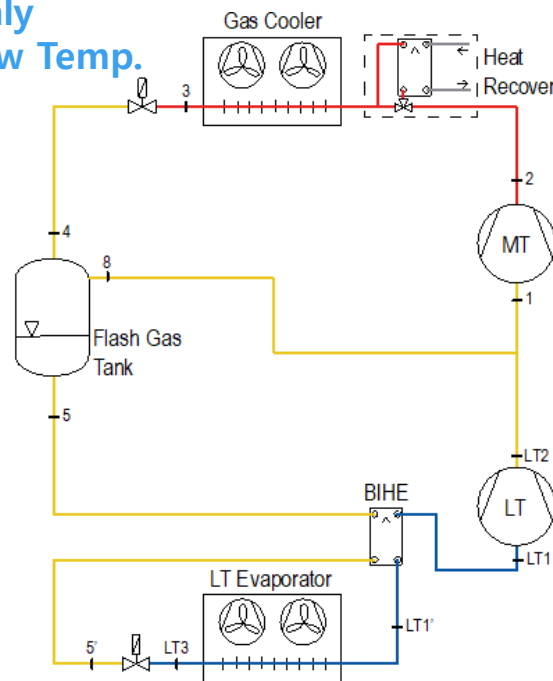
For each layouts it is possible to simulate design conditions and verify off-design situations.

Seasonal calculation section permits to have a dynamic selection, based on the climate of the selected city. The result is the yearly functioning of the system.

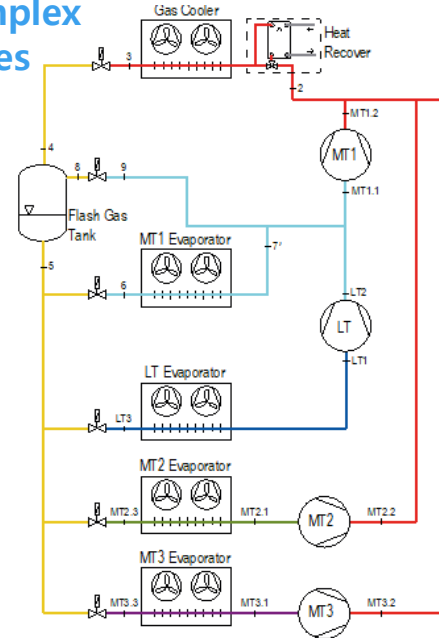
#### Booster with parallel



#### Only Low Temp.



#### Complex cycles



with up to 5 different level  
of evaporating temperature

CO<sub>2</sub> System Simulation Tool

# SEASONAL CALCULATION

Yearly profile  
for each load

P&I Diagram

Seasonal Calculation

Start Seasonal Calculation

Tamb step [K]: 1.0

Location: Milan

MT

LT

A/C

HR1

HR2

MT2

Nominal Refrigerating Capacity [W]: 25000

Load profile with ambient temperature: Linear

Ambient temperature at Nominal load [°C]: 32.00

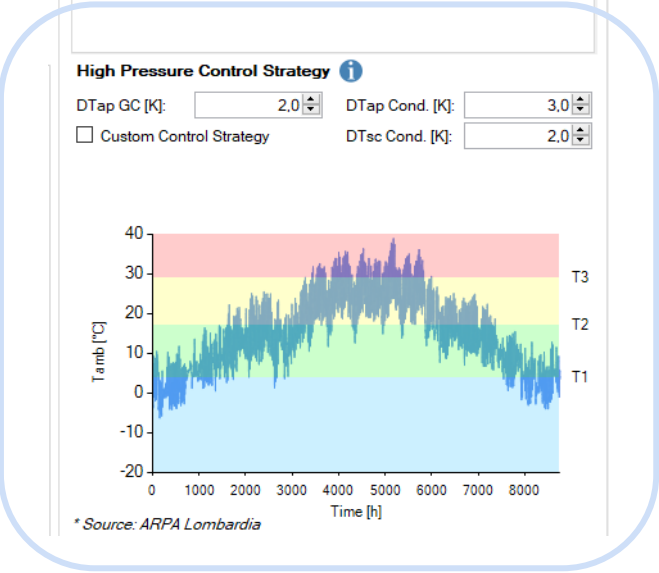
Ambient temperature at Minimum load [°C]: 4.00

Minimum load Fraction [%]: 86.00

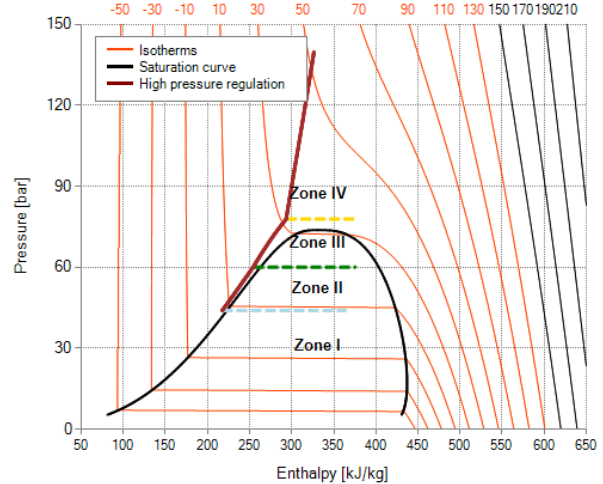
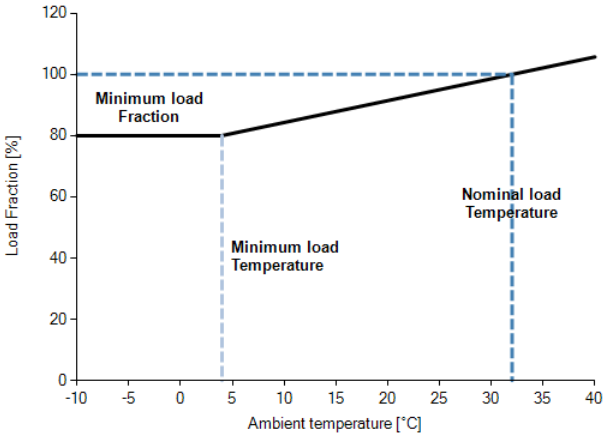
More parameters in "Options > Settings"

Location

High pressure  
control strategy



MT load profile



## How we face every day environmental impact?

### Direct emissions

- HC with ATEX solutions
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### Indirect emissions

- Efficiency @ Part Load for natural refrigerants  
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### Trainings

- CO2 System Simulator
- **Cold Room Calculator**
- FSS3



## HOW TO OBTAIN A PERFECT ESTIMATION

### Heat transmission through the room

Heat transferred into the refrigerated space through walls, floor and ceiling

### Infiltration of air

Heat associated with air entering the refrigerated space due to doors opening

### Cooling / freezing of products

Heat removed from products brought into and kept in the refrigerated space

### Internal heat generation

Heat produced by living food and internal sources (e.g., lights, cooler fans, defrosting and people working inside the room)

It therefore becomes essential to consider all these **aspects to obtain a precise estimation of the cooling capacity required.**

## COLD ROOM CALCULATOR – HOW TO USE

### Creating and maintaining specific room conditions

Lower temperatures than the surroundings and an appropriate level of humidity

### Decreasing the heat transfer into the room

Insulating materials allow to create a thermal barrier for the refrigerated space

### Considering different storage requirements

Chilled or frozen products, with storage temperatures higher than 0 °C and lower than -18 °C respectively

### Choosing the right equipment, starting from the compressor!

To realise the cooling capacity required



## How we face every day environmental impact?

### Direct emissions

- HC with ATEX solutions
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### Indirect emissions

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### Trainings

- CO2 System Simulator
- Cold Room Calculator
- **FSS3**

In the Selection Software it is possible to find the approved refrigerants:

- HCs
- CO<sub>2</sub>
- HFOs

Fracold Selection Software 3 v1.15

File Options Internet ?

Selection mode: Refrigeration / Air Cond.

Refrigerant: R404A

Reference temperature: R134a, R22, R290, R404A, R407A, R407C, R407F, R448A, R449A, R450A, R452A, R507, R513A, R600a, R1234yf, R1234ze, R1270, R455A, R454C

Evaporating temp. (dew point): Suction gas temperature, Useful fraction of superheating

Compressor (#1): V25-71Y, (#2): ☐

☐ Show out of production models

Application envelope P&I Diagram

Additional cooling required

Condensing temperature [°C]

Evaporating temperature [°C]

Selection mode: Refrigeration / Air Cond.

Refrigerant: R404A

Reference temperature: R134a, R22, R290, R404A, R407A, R407C, R407F, R448A, R449A, R450A, R452A, R507, R513A, R600a, R1234yf, R1234ze, R1270, R455A, R454C

Evaporating temp. (dew point): Suction gas temperature, Useful fraction of superheating

Compressor (#1): V25-71Y, (#2): ☐

☐ Show out of production models

\*ref: At conditions according to EN12900

- Suction gas temperature = 20 °C
- Liquid subcooling = 0 K

Certified by: ASERCOM (ref. EN12900, 50 Hz, 100% cap.)

CERTIFIED PRODUCT ASERCOM

Oil Temp. at Oil Cooler Outlet	°C	
Certified by	-	ASERCOM (ref. EN12900, 50 ...

Export Print Calculate Exit

**Do you want to know  
more?**

## PROGRAM OCTOBER 13<sup>th</sup>



11:00 am – 12:00 pm

**“Because sometimes you don't need the full Frascold power.  
*Innovative capacity regulation.*”**

Speaker: Marco Perri (R&D and Technical Support Manager)



14:00 – 15:00 pm

**“An insight on commercial refrigeration with natural  
refrigerants and A2L.”**

Speaker: Kaven Nourrice (Selection SW & Tech. Trainings Specialist)



15:00 – 16:00 pm

**“The responsible choice: ATEX Solutions by Frascold.”**

Speaker: Marco Bortolussi (Application & Pre-Sales Tech. Support Specialist)



## PROGRAM OCTOBER 14<sup>th</sup>



11:00 am – 12:00 pm

**“How big should be my Cold Room? *Cold Room Calculator by Frascold.*”**

Speaker: Corrado De Gioia Carabellese (Product Development Specialist)

14:00 – 15:00 pm

**“What CO<sub>2</sub> system for each climate? *CO<sub>2</sub> Seasonal Calculation Tool by Frascold.*”**

Speaker: Kaven Nourrice (Selection SW & Tech. Trainings Specialist)



15:00 – 16:00 pm

**“Your day by day engineering assistant. *Frascold Selection Software FSS3.*”**

Speaker: Kaven Nourrice (Selection SW & Tech. Trainings Specialist)



## PROGRAM OCTOBER 15<sup>th</sup>



11:00 am – 12:00 pm

**“The smoothest screw compressor for refrigeration: the new FVR Series by Frascold.”**

Speaker: Matteo Iobbi (Product Manager - Screw Compressors)



14:00 – 15:00 pm

**“When you need to go low. *Two Stage Compressor by Frascold.*”**

Speaker: Marco Perri (R&D and Technical Support Manager)



15:00 – 16:00 pm

**“Your pathway in EcoDesign. *Condensing Units by Frascold.*”**

Speaker: Marco Bortolussi (Application & Pre-Sales Tech. Support Specialist)





For more updates, follow us!



Thanks!

Thank you for your attention.

CONNECTING  
EXPERTS.

