

CHILLVENTA

International Exhibition
Refrigeration | AC & Ventilation | Heat Pumps

Nuremberg 11–13.10.2022

CONNECTING
EXPERTS.

R-744 Scroll Compressors for Efficient and Cost Optimized Booster Systems

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Emerson's Mission To Help The Retail Industry With Simplifying & Cost Reducing CO2 Systems At Low Operating Cost



HELP THE INDUSTRY REDUCE THE CO2 COST PREMIUM

Less Compressors

Simpler Design

Compact Compressors

€ Installation Cost Saving



LET INNOVATION RESOLVE COMPLEXITY

Dynamic Vapor Injection into Scrolls to Handle Flash Gas

Parallel Compression Designed into Compressor „2-in-1 Design“

€ System Cost Saving



PROVIDE EFFICIENCY EVERYWHERE WITH ONE DESIGN

Scroll Design Optimized for Booster Application

High Efficiency Motors

One Design Fits all Climates at Highest Efficiency

€ Operating Cost Saving



OFFER TECHNOLOGY OPTIONS FOR HIGHER SYSTEM RESILIENCE

High Standstill Pressures (PS)

Smart Control

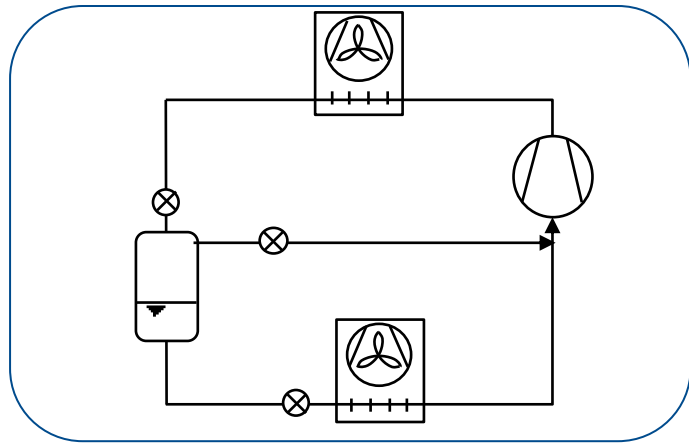
€ Maintenance Cost Saving

Emerson CO2 Program To Resolve The 2 Biggest Challenges Of CO2 Applications

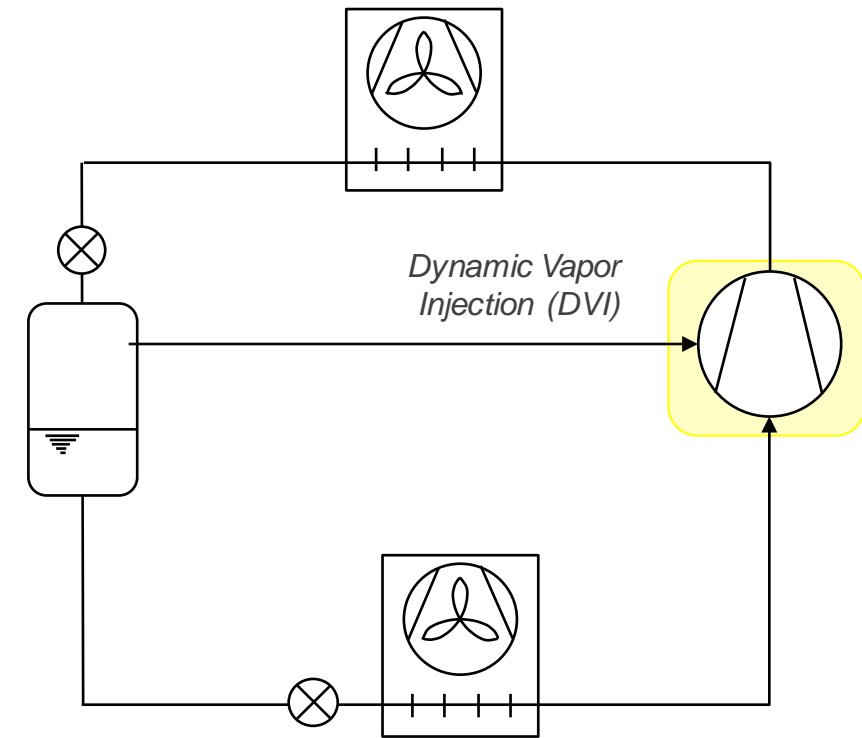
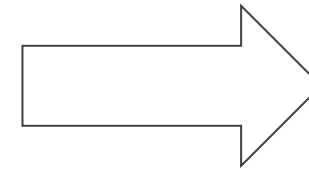
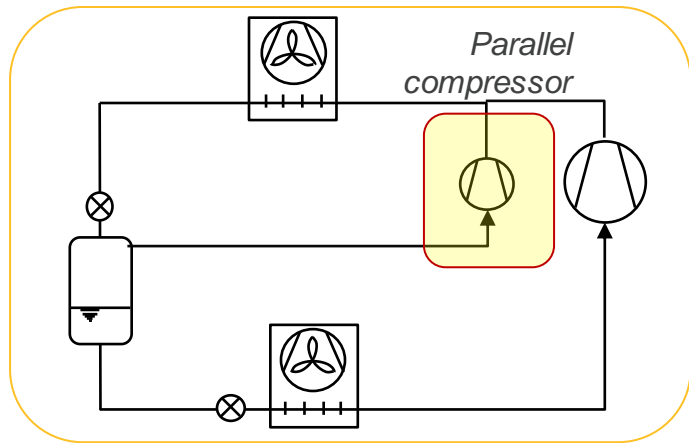
Copeland CO2 Scroll compressors allow to [reduce booster system cost](#) and are designed to provide [low operating cost in all climates](#) thanks to its innovative [Dynamic Vapor Injection](#)

CO₂ Scroll Dynamic Vapour Injection: 2-in-1

Standard CO₂ System Design



Design Variant Warm Climate



CO₂ Scroll System for All Climates

- Single design for moderate and hot climates
- Good performances in all climates

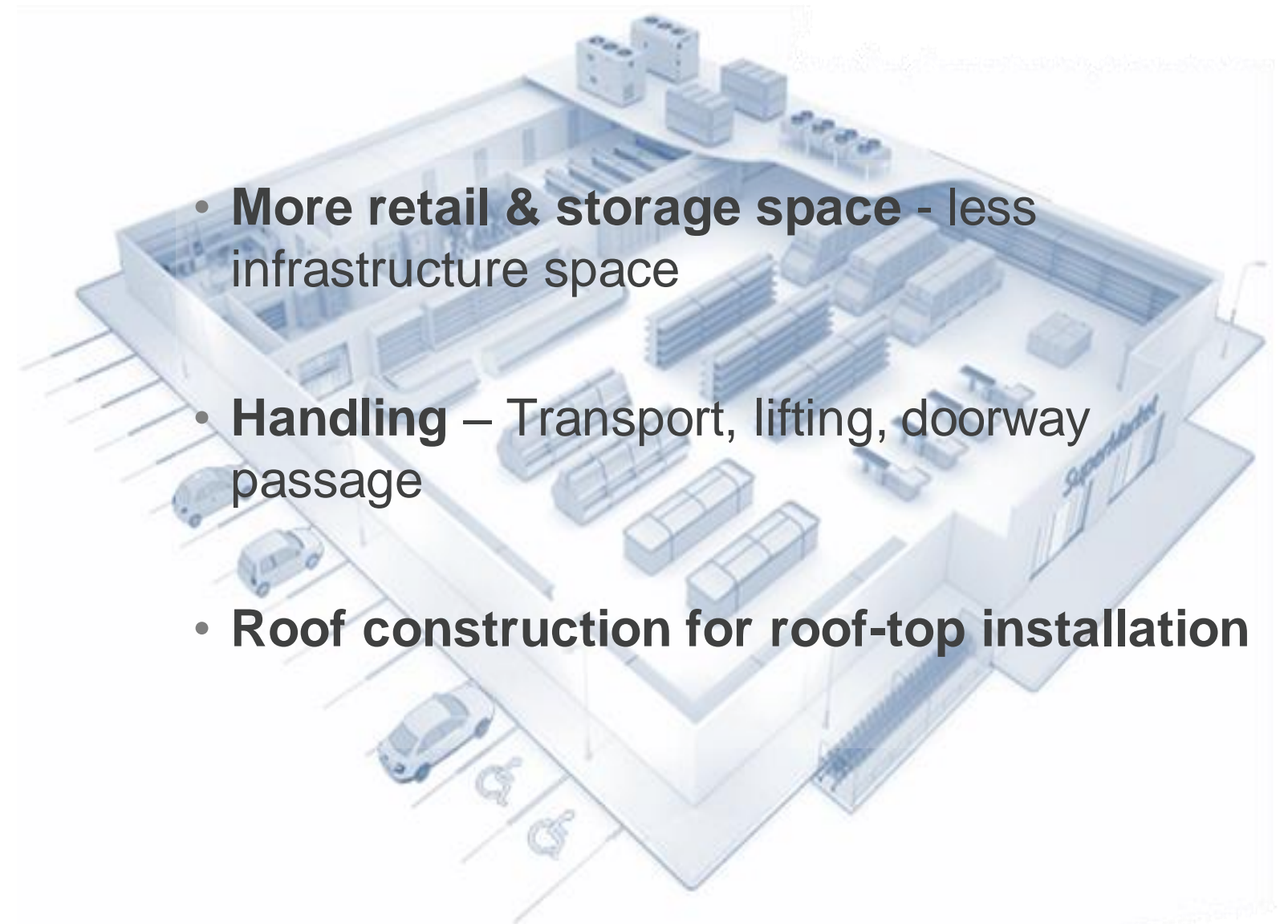
Compactness – Significant Reduction in Weight and Installed System Footprint for Limited Space Applications



50%
lighter than
traditional
semi-hermetic
compressors

length
width

🛒 Cooling System Weight -10 %, e.g. - 500 kg
☑️ Cooling System Size -10 to -20 %, e.g. - 2 m²

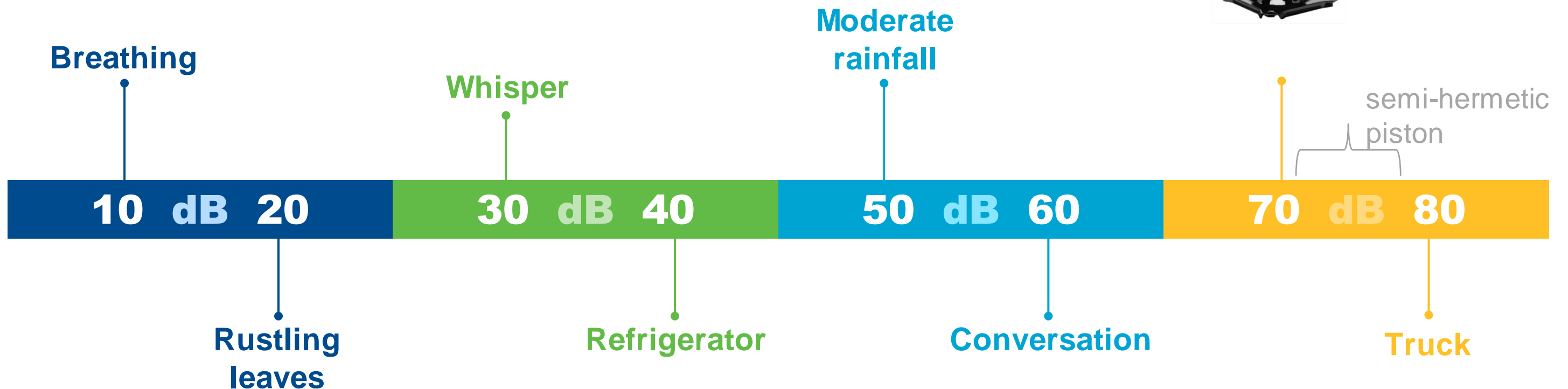


Noise & Vibration at Lowest Level

- EU Noise Emission Directive Compliance
- Perceived noise is also a matter of frequency spectrum
- Avoiding Cost of noise insulation
- Low vibration to ensure longevity & reliability



19kW MT
Transcritical
Variable Speed
Compressor
Sound Power
Level dB(A)*
*at 3000rpm



Line-Up, Application Range & Key Benefits

ZT

Medium temperature CO₂ scroll compressor range 110/140 bar

- 4 models, 8 to 19 kW* nominal
- Fixed and variable speed

ZL

Low temperature CO₂ scroll compressor range – 110/140 bar

- 4 models, 4 to 11 kW** nominal
- Fixed and variable speed

ZO

Low temperature CO₂ scroll compressor range – 45/60 bar

- 4 models, 6 to 15 kW** nominal
- Fixed and variable speed



1 Reduces system complexity

2 Low operating costs in all climates due to vapour injection technology

3 One system design fits all climates

4 Enables the most compact & light system designs

5 Flexible choice of high & standard standstill pressure low temperature scrolls

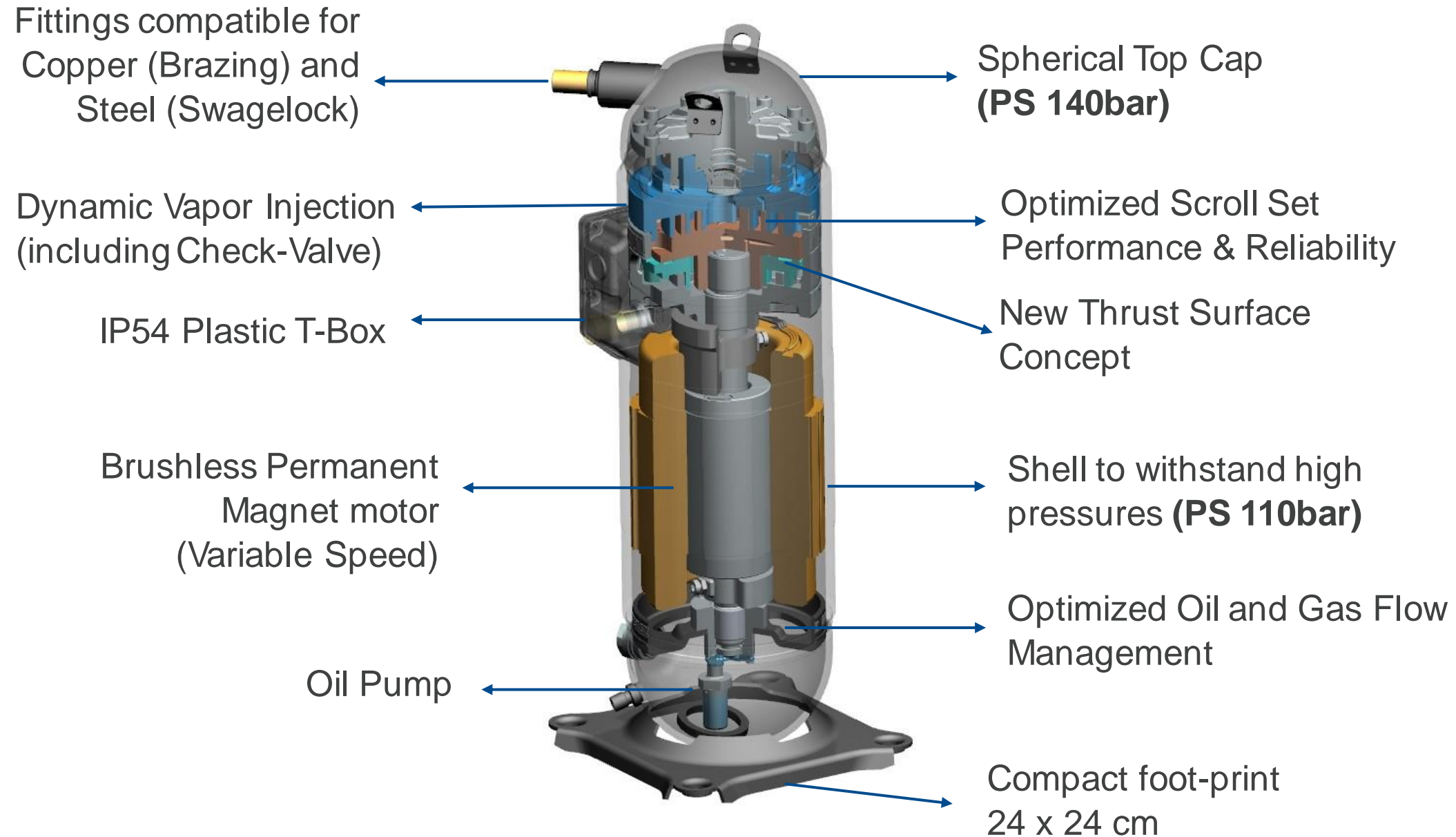


Minimizing Total Cost of Ownership 

Ideal for 20 – 100 kW* MT
& 4 – 50 kW** LT
C-Stores to Small Supermarkets

* -10°C Evap / 35°C Gas Cooler Outlet / 90bar Discharge / 10K SH
** -35°C Evap / -5°C Cond / 10K SH / 0K SC

CO2 Transcritical Scroll Design with Vapor Injection ZT Compressor



Innovative Design for CO2 Transcritical Application (12 patents)

Products Have Been Qualified Thru Extensive Testing!

**>350
compressors
>150,000 h of
testing**



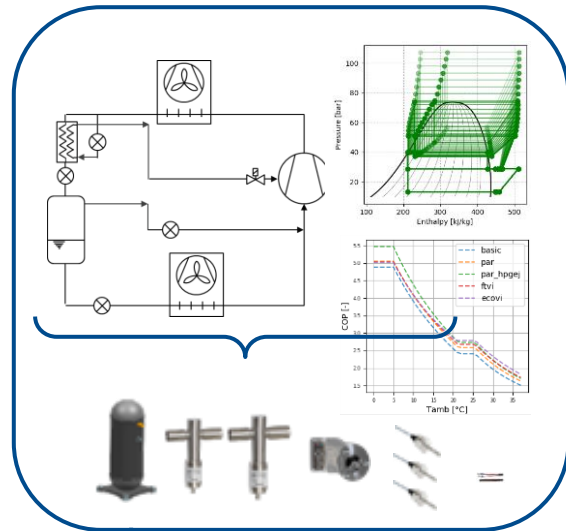
Some keys numbers from the program:

Item	Amount
Development Compressors	145pc
Performance Test	>24,000 hours
Reliability Test	90 Compressors / >135,000h
Pilot Compressors	120pc
Sound & Vibration	185 test
In-house Booster Testing	> 3500h
Field Testing	> 3 years

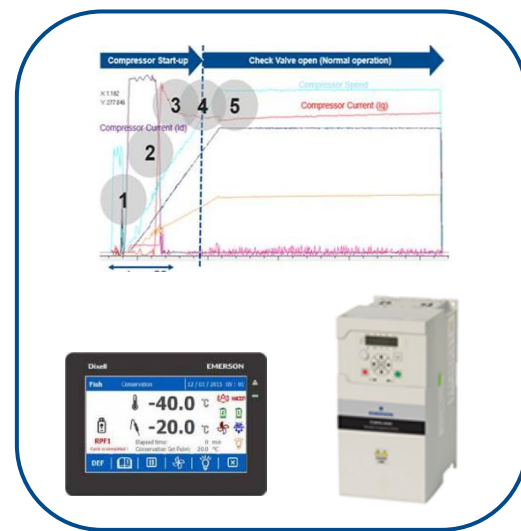


Developing & Validating Solution Platforms On Real Systems To Accelerate Integration & Enable Late Customization

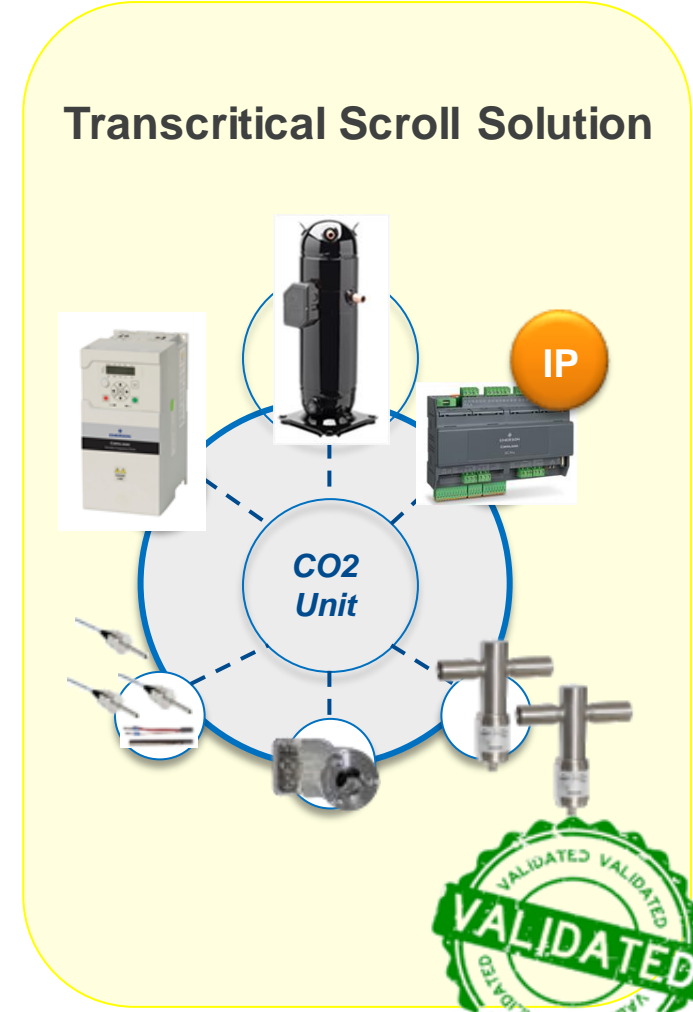
Solution Design



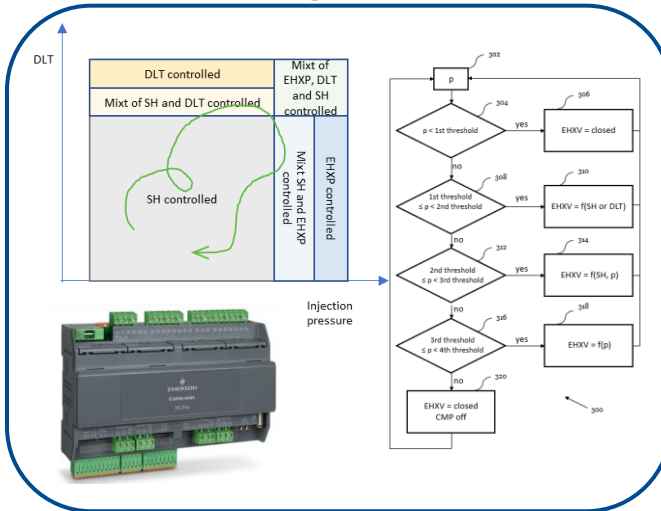
Drive and iPro Tuning



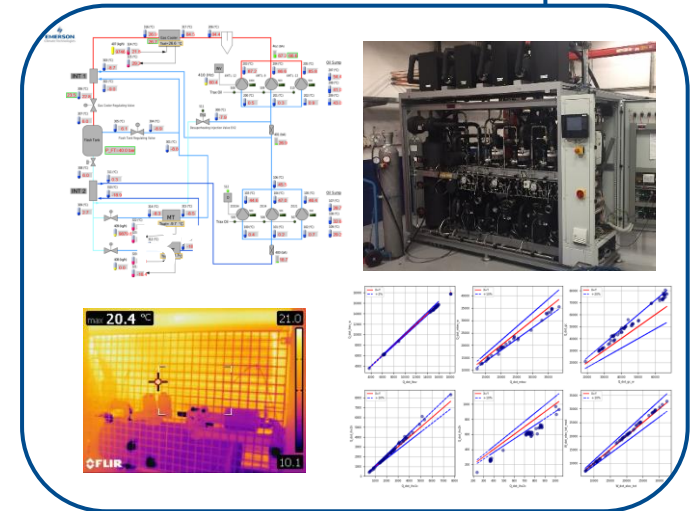
Solution Validation and Improvements



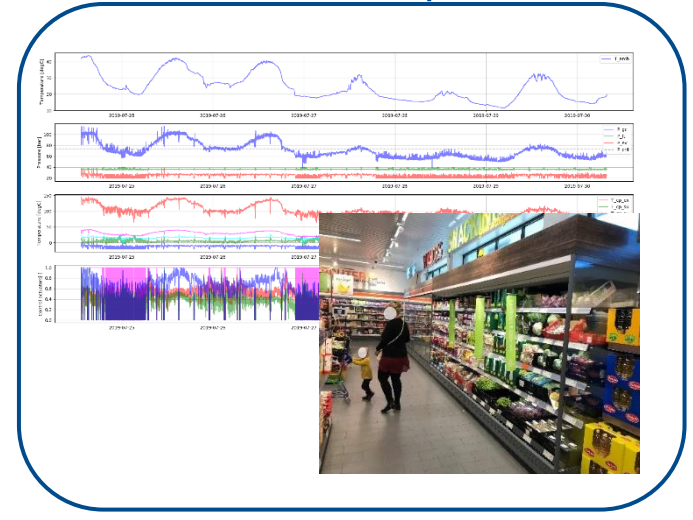
TRL: Technical Readiness Level
Control Logic Development



Experimental Testing and Qualification



Field Tests

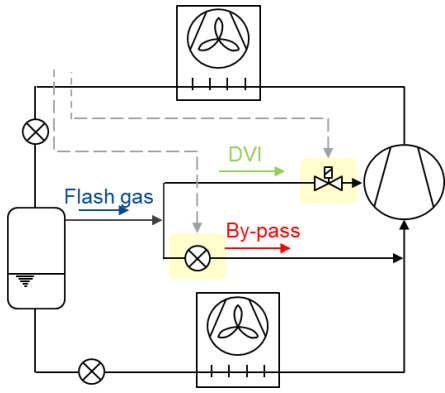


TRL = Technology Readiness Level



New XC-Pro Controller for CO2 Racks with Scroll DVI Compressors

Flash Tank Gas Injection Control



Fault Detection and Diagnostics



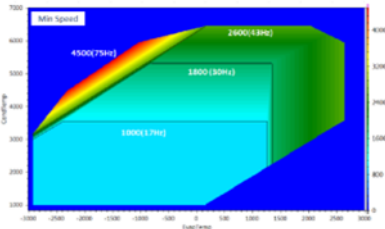
Fixed & Variable Speed Compressor Management

Sound and Vibration

Compressor Envelope Protection



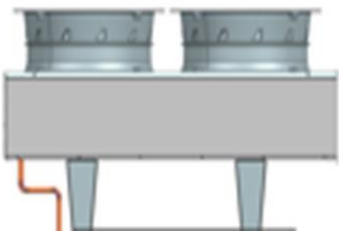
Alarms Management



Gas cooler EC Fans and HP Valve Optimized Control



Heat Recovery



Enhanced Communication

Field Testing

- First one started 2019
- Convenience store & discounter
- Racks & Condensing Units
- Ran fine during hot summers
- Customer feed-backs:
 - Compactness
 - Quiet
 - Smooth operations
 - Easy to run



CO₂ Scroll Summary



- Scroll Now applicable to **Transcritical CO₂** (20 – 100kW MT Rack)
- **Dynamic Vapor Injection** allows simple system design in all climates
- Compactness & quiet operation, ideal for urban convenience stores
- Optimized **Solution package** including drives and controller
- Wide choice of compressors for flexibility
 - Fixed speed and BPM variable speed
 - high and standard standstill pressure for subcritical
- **Proven technology:** running > 3 years in the field

COPELAND™ | **100 YEARS OF INVENTIVENESS**

Hall 7A

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For more info:

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