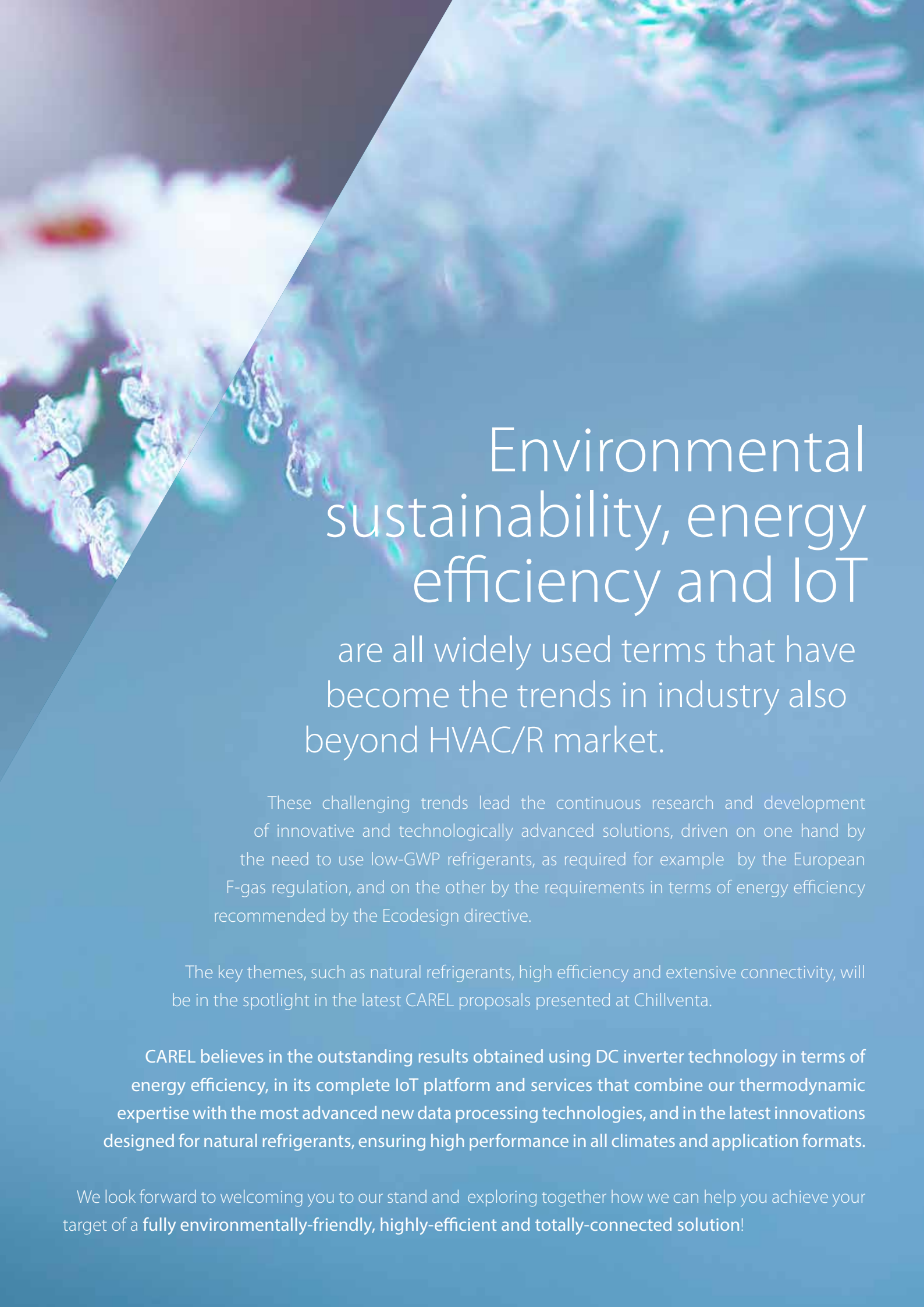
onShow

CAREL

Discover our world, experience our solutions, take part of it!

The natural evolution of connected efficiency



Environmental sustainability, energy efficiency and IoT

are all widely used terms that have become the trends in industry also beyond HVAC/R market.

These challenging trends lead the continuous research and development of innovative and technologically advanced solutions, driven on one hand by the need to use low-GWP refrigerants, as required for example by the European F-gas regulation, and on the other by the requirements in terms of energy efficiency recommended by the Ecodesign directive.

The key themes, such as natural refrigerants, high efficiency and extensive connectivity, will be in the spotlight in the latest CAREL proposals presented at Chillventa.

CAREL believes in the outstanding results obtained using DC inverter technology in terms of energy efficiency, in its complete IoT platform and services that combine our thermodynamic expertise with the most advanced new data processing technologies, and in the latest innovations designed for natural refrigerants, ensuring high performance in all climates and application formats.

We look forward to welcoming you to our stand and exploring together how we can help you achieve your target of a **fully environmentally-friendly, highly-efficient and totally-connected solution**!


CONNECTIVITY
more information on iot.carel.com

Intelligence of Things

From controllers in the field to cloud services, all the solutions for users of HVAC/R applications.

A complete platform of value-added services allows a **new experience in interacting with units**, from users in the field to managers in the office, all via cloud services.

New data processing technologies combined with CAREL's thermodynamic expertise are integrated into the cloud portals to provide users with useful information to make **everyday activities easier and more effective**. The useful data are in fact collected and presented on dashboards for energy managers, service teams and quality departments. Specific views are customised for marketing managers and property managers, for different applications. Data from the field are processed using the latest **machine learning technologies**, applying predictive models for the development of new predictive maintenance services and performance optimisation.

"Our RemotePRO, tERA and Armilla portals, and indeed all the products in the system, are constantly evolving: new data processing technologies allow us to create even more precise models", commented Serena Ometto, IoT Marketing Manager. "Data analysis extends the understanding of real system operating conditions, while the availability of remote control services creates new needs and allows new services to be proposed. In this extremely dynamic environment, CAREL intends to be the right partner to face these new challenges!"

Easy Control

Remote control of any equipment through the simplest interaction with the unit. Make all of the system's technical capabilities available in an easy and effective way.

Maintenance cost reduction

Save hours on alarm management by focusing only on any current critical conditions, thanks to alarm priority and filters. Reduce journeys on site with in-depth, remote technical analysis.

Energy Saving

Focus the experts on the most critical sites only, using a normalised league table. Drive the priority of analysis with targeted consumption clustering.

Quality Improvement

Manage standard reports automatically and increase global quality by focusing only on critical equipment. Reduce any waste of goods and customer claims, increasing user satisfaction.


NATURAL
REFRIGERANTS
more information on natref.carel.com

Natural & low GWP refrigerants

The transition to natural refrigerants and the development of new technology in Europe are being incredibly fast

On one hand, cold climate in north Europe has facilitated the **use of CO_2 as refrigerant**. The special features of CO_2 have made the use of efficient control and monitoring systems essential, together with specific components to withstand the high pressures of CO_2. This is not enough for warmer climates, such as south of Europe's countries, where components and configurations to increase the efficiency of CO_2 systems in transcritical mode are required.
On the other hand, the **use of propane** is gaining attention: 2018 will be a key year for propane, and its use may also be extended to bigger applications if the modification of IEC 60335-2-89 is finally approved to allow the use of 500 grams in commercial appliances.
The big reduction of HFC quota dictated by **F-gas** will have a huge effect on manufacturers.

The consequences that have already been noticed during the last year, with a drastic increase of prices and **reduction of availability of HFC refrigerants**, will have a great impact on the market in 2018. Most of the systems are still using very high GWP refrigerants such as R-404A whereas refrigerant distributors have already announced that they will soon not be sold. Despite most of the F-gas restrictions deadlines are from 2020, the reduction of availability, or even elimination, of high GWP refrigerants will force manufacturers to find different solutions.

Natural refrigerant technology has been an important focus for CAREL development during the last years. In 2018, we will continue to promote several solutions for natural refrigerants increasing our actual portfolio and developing new ones, based mostly on modulating DC inverter technology, electronic expansion valves and efficient controllers to ensure high performances for all climates and application formats.

Our latest innovation path is the use of DC inverter driven compressors, especially with propane and CO_2 as refrigerants, thanks to **specific partnership with leading compressors manufacturers**.

This technology, quite new for the refrigeration market, combined with our electronic controls, drives and valves portfolio can bring enormous advantages in terms of efficiency, regulation stability, size and weight compared to traditional technologies.


A
B
C
HIGH EFFICIENCY
DC
Technology

High efficiency HVAC/R applications

In the last 15 years CAREL has introduced numerous control systems for refrigeration and air-conditioning units and systems that help to respect the new regulation requirements and reduce operating costs

Many are based on the use of advanced technology such as variable speed compressors, electronic expansion valves and efficient control systems.

Variable speed compressors driven by inverters provide the best way to avoid inefficient ON/OFF cycles that reduce seasonal energy efficiency of the compressor.

Electronic expansion valve allows to save energy by an adaptive optimization of the system parameters during operation. In particular, it is able to operate with a lower pressure difference, allowing a more radical decrease in condensation temperature and reducing the power consumption of the compressor, consequently lowering operating costs.

An **advanced control and supervisory system** with energy saving functionalities is particularly important to adapt its operation to the climatic conditions and the requirements of the end user.

Compressor with permanent magnet motors controlled by DC inverter is the heart of the most efficient technologies available in the world for HVAC/R applications. In the last years CAREL has been introducing this technology in both refrigeration and air-conditioning applications, especially the most energy-hungry, such as heat pumps, air-conditioners for data centers, condensing units and refrigerated showcases.

Their benefits?

The **results are astonishing**: power consumption reduced by up to 40%, fine temperature control and constant control and optimisation of operating conditions to maximise compressor reliability and performance.

New compressors jointly developed by Toshiba and CAREL.
Exclusively distributed by CAREL.

CAREL proposal shown at Chillventa is completed by a vast range of DC Inverter compressors made by some of the world's leading manufacturers, whom CAREL has been working with for several years in order to offer the most reliable control solutions.

New releases include **a new range of Toshiba horizontal and vertical compressors for CO_2,** developed in partnership with CAREL and distributed exclusively by CAREL.

boss

The power of the boss system supervisor range

Fully responsive **web** design

The new compact boss enriches CAREL's offering of local monitoring systems

At Chillventa, CAREL will be presenting **boss mini**, the new system supervisor that meets the needs of commercial refrigeration, datacentre and light commercial HVAC applications.
Following on from the success of boss, the top-of- the-range version, boss mini inherits the **same usability and connectivity features, as well as the typical boss user experience**, all now available in a new, more compact solution, and suitable for all system sizes.
From one single access point, **boss mini monitors the site in real time**, using maps and intuitive displays to show data on all the refrigeration and air-conditioning units, lighting and energy consumption.

The **pre-loaded templates and dashboards** for the connected devices ensure easy configuration and quick system commissioning.
Indeed, from first start-up through to routine activities, all the information on the system can be directly accessed from a smartphone or tablet, via a completely customisable web-based user interface.
The WiFi hotspot included in the top-end models means the user interface is available without needing to connect to other network infrastructure.
Together with the entire boss range, **boss mini is integrated into the CAREL enterprise remote monitoring service proposal, RemotePRO**.
Using RemotePRO and the boss or boss mini solutions, users from different organisations and with different access profiles can connect to the central service, displaying overall system dashboards and global statistics, or connect directly to the local supervisor for more in-depth system analysis.

tested by
REGENT

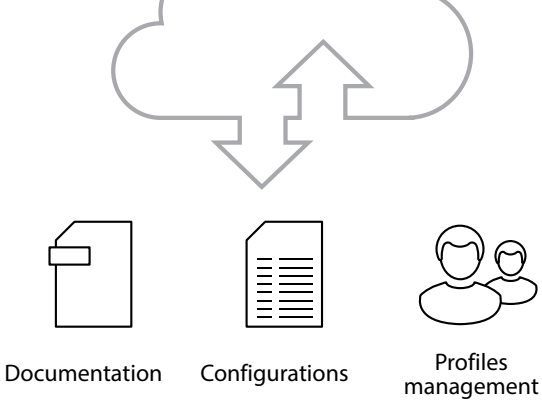
Heez

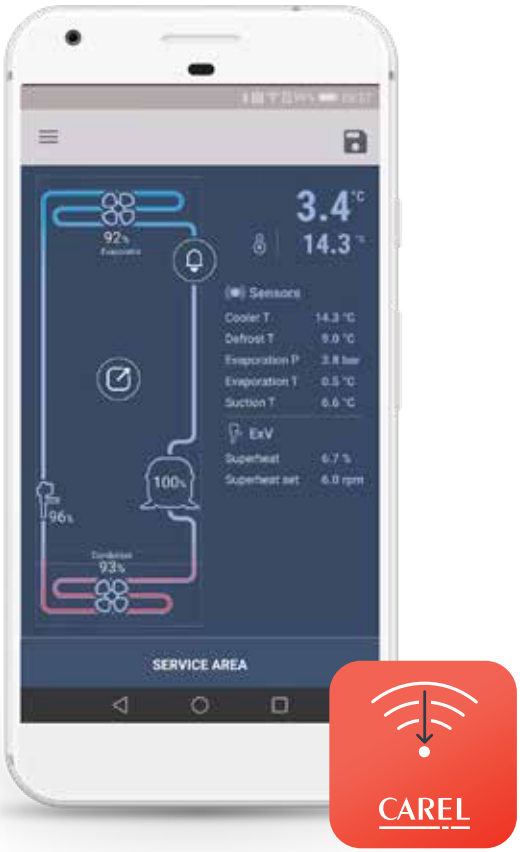
Energy efficiency, performance and connectivity

The control solution for beverage coolers

Energy efficiency and pull-down performance are the main strengths of Heez, CAREL's solution for refrigerated merchandisers that exploits the continuous modulation of variable-capacity rotary compressors (DC inverter), combined with an advanced control system that includes self-adaptive and machine learning algorithms.

At the heart of this solution are **propane compressors with DC rotary technology** designed by Qin'an - an AVIC group company with decades of experience in the development of rotary DC inverter compressors - based on CAREL's specifications in terms of performance, reliability and operating conditions. These compressors are part of the **Orione series**, premiered at Chillventa





APPLICA

with a significant extension of capacities and operating conditions to meet the needs of low storage temperatures.

The Heez solution for high efficiency plug-in units therefore expands the field of application by making the adoption of new technologies more competitive, so as to comply with new energy and environmental regulations coming into force around the world.

Another upgraded innovation compared to the success at Drinktec 2017 (winner of the World Beverage Innovation Awards in the "Best environmental sustainability initiative category") involves **interaction with mobile devices** through integrated wireless connectivity and the availability of a new user interface with APPLICA, the CAREL app for smartphones, providing access all the useful information on the unit in a controlled and up-to-date manner via cloud services.

Wireless technology also allows the main operating data to be acquired from the units installed in the field for analysis and the creation of control dashboards on a **dedicated portal, called ARMILLA**, developed by CAREL to support digital marketing strategies and improve maintenance operations.

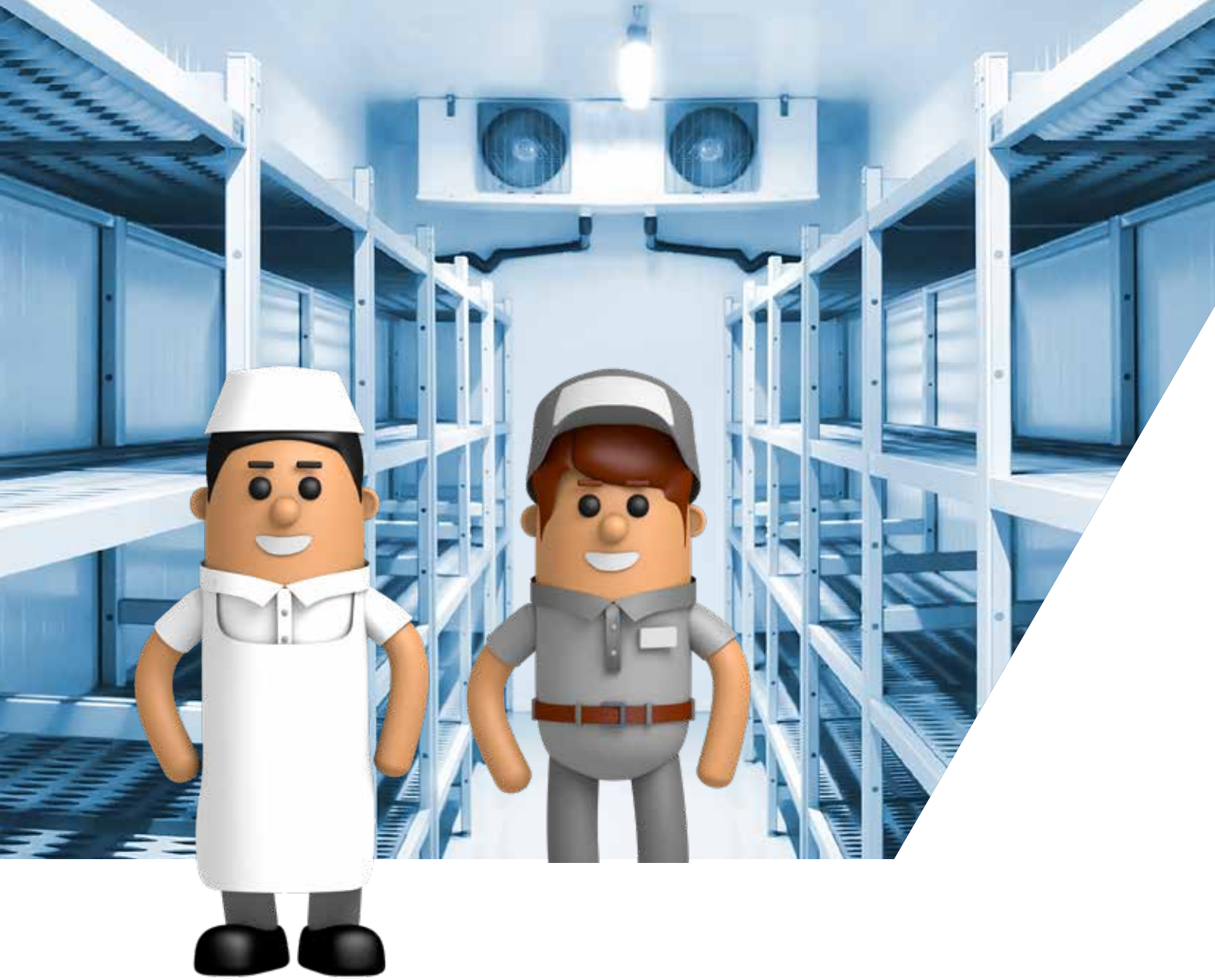
Orione

Orione M1 4 cc **Orione M2** 5.7 cc

Orione DC rotary compressor

It is a fundamental and innovative component of the Heez proposal that guarantees top efficiency and top performance thanks to its **wide modulation range**. It has been exclusively designed based on CAREL's specifications by world-class compressor manufacturer Qing'an*, an affiliate of AVIC (Aviation Industry Corporation of China) and based in the Xi'an Hi-tech Development zone.

*Relying on Qing'an Group manufacturing technology and equipment, and with 30 years of R&D experience in rotary compressors, Qing'an has now reached a yearly production capacity of 6 million high-efficiency and energy-saving rotary compressors.



Innovation, simplicity and performance for cold rooms

The new integrated, high-usability system for cold rooms with DC inverter technology and compatible with CO_2 refrigerant

"Out of the box" means **innovation, simplicity and performance**, characteristics that perfectly describe CAREL's new integrated system for high-efficiency cold rooms. Created by combining the features of technologically-advanced solutions (HECU, UltraCella and EVD Ice) and enhanced by CAREL's system approach, DC Cella SPLIT is a solution that guarantees high performance, maximum usability and special

DC Cella SPLIT

watch our latest video on **youtube.com**

focus on simplifying installation, configuration and use. **Energy savings up to 25% higher** than with on/off units and **excellent quality control** of the stored products are just some of the main benefits for end users, in addition to **extremely simple installation and maintenance**.

With DC Cella SPLIT, CAREL's customers and partners can for the first time exploit the power of CAREL DC Technology and E2V proportional expansion valves in an integrated way to **develop their own custom business proposal**. Indeed, different solution profiles are available for OEMs and Distributors, all however centred around a single vertical, **one-stop-shop solution that is ready for installation**: a customised system, optimised in the factory, comprising the condensing unit with on-board BLDC compressor, cold room control panel and evaporator with integrated driver and electronic expansion valve.
Additional accessories and services, including custom IoT services, can then augment the offering, allowing customers to expand their product portfolio with an increasingly innovative and differentiated solution.

Usability, now also for CO_2 refrigerant
DC Cella SPLIT aims to solve the perceived complexities in adopting high-efficiency systems, both in terms of difficulties and costs: in fact, installation times and above all configuration times have been slashed, both for CO_2 systems and the more traditional HFO and HFC systems, thanks to the extensive range of compatible compressors and refrigerants.
Fast and error-free connections, multilingual textual commissioning wizard - further simplified - and factory pre-configuration of the devices all considerably reduce cold room commissioning time.

Even higher reliability
The already solid foundations underlying HECU, ensuring total reliability in operation at part load, have been further strengthened through the DC Cella SPLIT system approach: it can constantly monitor and send, to both local and remote supervisors, the status and any alarms relating to all connected devices.
The operating logic has been further integrated with new safety routines that ensure correct delivery of cooling even in fault conditions, preserving the quality of stored products.

mpxone

Extensive connectivity for food retail refrigeration units

New solution for supermarket showcases and cold rooms that, for the first time in the sector, revolutionises human-machine interaction through direct connectivity with mobile devices

MPXone stands out for its **extensive connectivity options** that simplify human-machine interaction using APPLICA, the new CAREL app for mobile devices.

MPXone is based on a flexible, scalable, high-connectivity platform, available in several different versions to meet all the needs of end users and manage a wide range of solutions (from entry-level to high-efficiency).

MPXone manages all the typical functions of supermarket remote refrigerated showcases, allowing synchronisation of groups of units using a new generation local subnetwork and connection to the BMS.

With MPXone, certain **energy saving features can even be activated in simple applications**: load modulation and advanced control algorithms are no longer limited solely to the most advanced systems.

MPXone introduces the possibility to manage the most innovative high-efficiency modulating devices via serial connection and the standard Modbus® protocol.

This makes it possible to **increase integration and synergy between components**, greatly increasing the possibilities for saving both energy and maintenance costs.

An absolute first in this sector, wireless connectivity - using both NFC and Bluetooth® technologies - revolutionises interaction with the refrigerated units, simplifying the user experience with the dedicated app and Cloud support. This architecture means that contents, such as parameter configurations and documentation, user profiles and related access levels, can all be synchronised, thus guaranteeing rapid commissioning.

APPLICA has been specifically designed to work with MPXone: **the mobile device thus becomes the user interface** that, thanks to its specific graphics and multimedia functions, overcomes the limits of traditional, integrated user interfaces.

APPLICA is also an access point for CAREL's Cloud services, used to store online specific contents relating to the type of application and retrieve them easily at any time.

APPLICA

Heos

Increasing the offering for natural refrigerants

CAREL expands its partnership with Asian compressor manufacturers to offer a wider range of solutions for both CO_2 and propane

The continuous search for new global partnerships with manufacturers of variable-speed BLDC compressors has made it possible to considerably expand the **range of compressors that can be used with the Heos sistema**, thus offering differentiated solutions for all requirements, with both CO_2 and propane.

Implementation of the European F-gas regulation that limits the use of HFC refrigerants with a high environmental impact, the ever-decreasing availability of such refrigerants, and the consequent increase in price, is leading the market to seek solutions for the use of natural refrigerants.

Moreover, the revision of international standard IEC 60335 - with work currently in progress - providing for an increase in the charge limit of flammable refrigerants per circuit up to a maximum of 500 g (today 150 g), is shifting the balance between CO_2 and propane solutions in small applications.

To meet these requirements, CAREL will be presenting an upgraded version of the **Heos sistema** - already presented at Euroshop 2017 - which has been **enhanced to be able to manage CO_2 and propane solutions**, with the goal of offering the best system for every need.

Heos is the CAREL high-efficiency solution for managing refrigerated showcases that, rather than the classic architecture with a compressor rack serving the showcases via long refrigerant distribution lines, offers a solution comprising **plug-in cabinets fitted with variable-capacity DC inverter compressors cooled by a water loop**.
This solution, **available in both the HFC/HFO version and for natural refrigerants**, combines the traditional energy efficiency, temperature control inside the showcase, fast installation and design flexibility of Heos with the latest innovations in the use of natural or low-GWP refrigerants.
Continuous modulation is the fundamental concept underlying the Heos sistema. Synergic operation of DC inverter compressors and stepper-motor electronic expansion valves controlled by technologically-advanced systems brings exceptional results in terms of control stability, optimisation of operating conditions and consequently energy efficiency, and preservation of product quality. All backed by a substantial improvement in robustness when compared to traditional systems, ensured by dedicated control, monitoring and predictive diagnostics procedures.

Considerable innovations have also been introduced regarding **supervision, with comparative analysis down to an individual showcase level**, a degree of detail that is not available on traditional centralised systems, and that guarantees a drastic **reduction in maintenance times and helps prevent any malfunctions** in advance. Indeed, it is now possible to analyse a comparison between individual or uniform groups of showcases in detail, with specific dashboards that clearly highlight the differences in performance and control, immediately distinguishing the units with best performance and those where improvements are possible.

Leading control for high efficiency CO_2 racks

pRack is now able to provide coefficient of performance calculation, real-time heat recovery evaluation and a faster synchronization with consumers through its connection with the new controller for monitoring unit performances pR COP+.

pRack pR300T represents the complete offer for control and management of centralised CO_2 compressor racks. Its main strengths are user simplicity, energy saving and high efficiency. pRack is moreover the first controller on the market that is able to control up to three separate suction lines at the same time.

Unique platform capable to fit from small to big compressor racks

- Flexible HW platform
- Innovative algorithms for energy saving;
- Wide monitoring and integration capabilities

pGD^X
intuitive programming user interface with advanced graphic features

pR COP+
- real time Coefficient of Performance calculation
- faster synchronisation with refrigerated units

Fully Integrated

- All electronic devices working together in a fully connected store, sharing information and control algorithms
- Advanced control algorithms to smoothly manage all modulating devices
- Cabinets and racks synchronised to maximise performance and reliability
- Fast reaction and adaptations to variations in operating conditions

Continuous modulation ONLY

- E^{X}V: cooling capacity continuos modulation for all refrigeration applications, stepper control regulation for excellent flow control and stability
- EmJ: the new modulating device to drive CO_2 in all latitude, matching any rack requirements and operating conditions
- Speed control: all components driven by speed modulating devices to increase control stability

Easy to use

- Dedicated user interface to maximise the user experience
- Extreme ease of use for complete management of the whole system
- Full access and complete logs for maintenance and service
- Defaults based on extensive experience to minimise the time needed to set-up a complete system
- Diagnostics and monitoring tools to improve serviceability

Maximum perfomance

- From cabinets to racks: all advanced algorithms for maximum system optimisation:
  - Smooth lines
  - Inverter management
  - Parallel compressor changeover
  - DSS: double system synchronisation
  - Optimal transcritical pressure control
  - Optimal receiver pressure control
  - Floating suction and condensing
- Coefficient of Performance calculation
- Energy analysis and reports from supervisory systems

Complete range of modulating ejectors

From small convenience stores to large supermarkets, transcritical CO_2 systems can now be optimised to operate in warmer climates

The energy efficiency of transcritical CO_2 refrigeration systems can now also be optimised in warm and temperate climates.

The **complete range of "EmJ" modulating ejectors** on show will extend the concept of continuous modulation to small and medium formats through the introduction of pR multi DC, the first controller able to manage multiple DC compressors on the same line.

The EmJ modulating ejector is available in six different sizes in order to provide an efficient response for every type of store. **Transcritical CO_2 systems can thus be installed in supermarkets of all sizes**, always maintaining high performance and ensuring energy savings compared to traditional solutions.
One essential feature of the solution is the continuous modulation provided by the ejectors that, through dedicated control algorithms, allow the system to continuously adapt to the variations in operating conditions that are typical of refrigeration systems.

pR multi DC

Continuous modulation for transcritical CO_2 system

Small/Medium convenience stores

The **pR multi DC controller offers new possibilities for small and medium systems, up to 40 kW**. Extended modulation capacity, guaranteed by the use of a DC inverter on each compressor, ensures new levels of efficiency: **up to 20% more efficient** than conventional technologies.
Through synchronisation with pRack pR300T, pR multi DC can manage up to 4 MT compressors and 2 BT compressors for CO_2 booster applications. The product features are completed by precise envelope management and full compatibility with CAREL supervisory systems, thus simplifying system management and increasing reliability and efficiency.

At the heart of the system is the CAREL **pRack pR300T controller for compressor racks**, providing integrated and synchronised management of all the rack components. **Modulating ejectors and now also DC compressors are managed by advanced algorithms that guarantee energy efficiency and precise control**. Further system simplifications are guaranteed by integrated management of all system components, such as transcritical valves, ejectors and now also DC compressors.

Continuous modulation represents the cutting-edge of CAREL's solutions, from electronic expansion valves, to control systems for DC compressors and modulating ejectors. With its precise continuous modulation systems, CAREL can ensure maximum system efficiency at all times, optimally managing the different operating conditions and adapting to different system requirements, especially at part load.

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