



Heos sistema

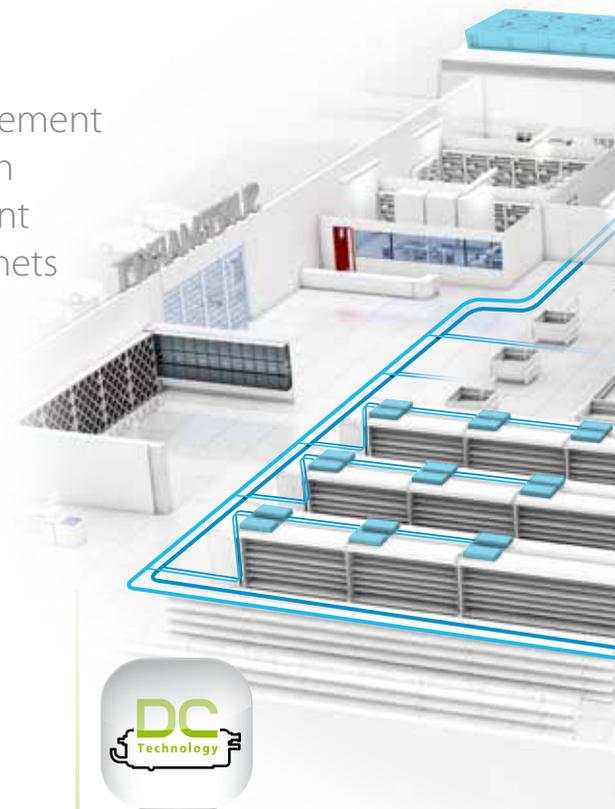
High efficiency waterloop system,
now refrigerant neutral

Continuous modulation for waterloop systems in commercial refrigeration

Heos is CAREL's high-efficiency solution for the management of showcases that replaces the classic architecture with compressor racks serving showcases via long refrigerant distribution lines, with a system featuring plug-in cabinets fitted with variable-speed DC inverter compressors cooled by a water loop.

Key advantages of the solution available with every type of refrigerant:

- High efficiency
- Easy installation and maintenance
- Flexibility
- Environmentally friendly

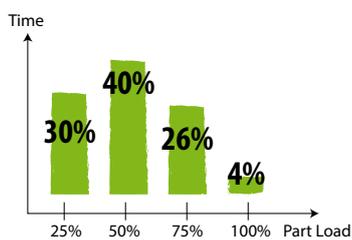


High efficiency

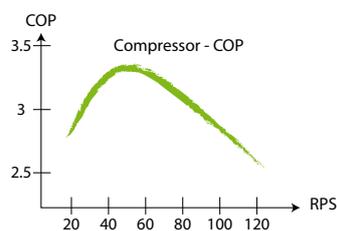
The continuous modulation thanks to the combination of DC compressors and electronic expansion valve - EEV - managed by an advanced electronic controller means that all units always operate in the best conditions, independently of the others.

Stand-alone system with variable-speed compressors ensures excellent stability and the highest evaporation possible temperature for the operating conditions, making it the most efficient solution by far.

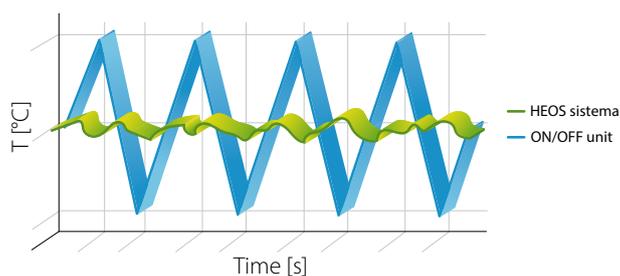
- Wide modulation range and maximum energy efficiency at part loads
- Optimum food temperature control
- Full control of units: preventive diagnostics and maintenance
- Carel's experience in DC compressor control



Weighting factors for SEER calculation



Typical COP curve for DC compressor



Fluctuation in food temperature around the average



Lower maintenance costs

Due to:

- stable and simple solution
- optimised preventive diagnostic algorithms
- lower refrigerant charge and less leaks



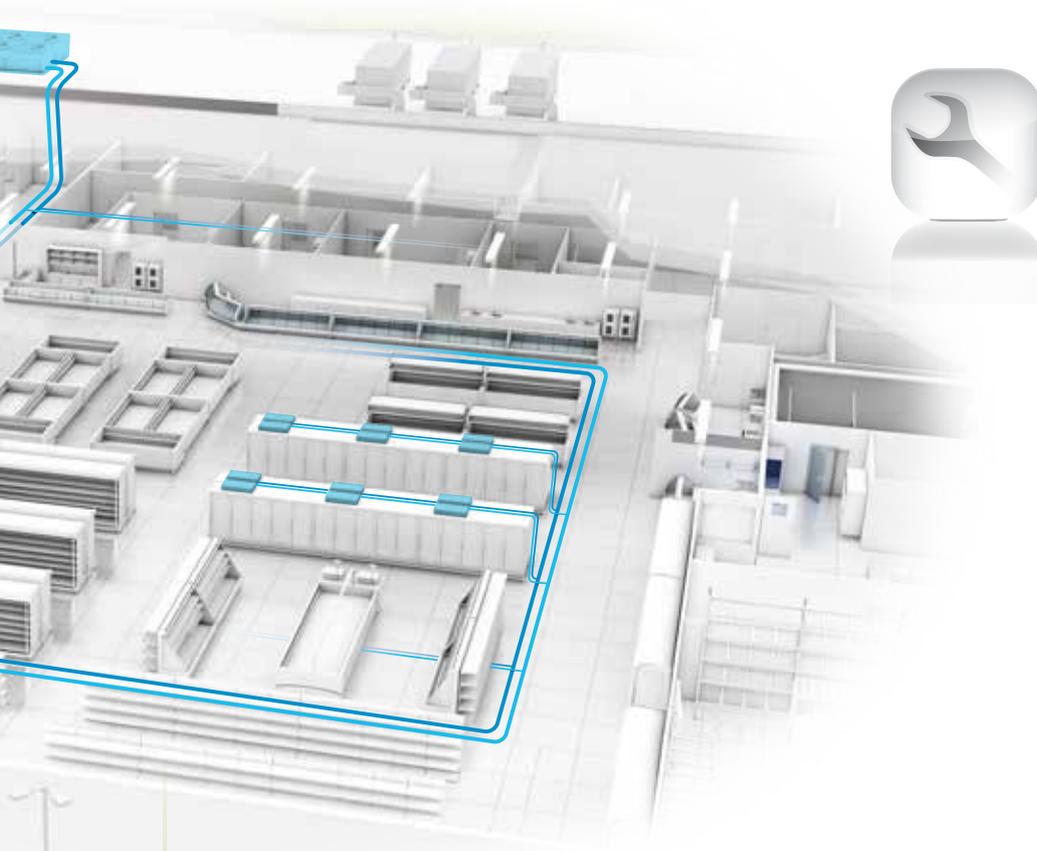
More selling area available

The self-contained solution frees up the space typically occupied by the compressor racks in a traditional system. Heos sistema therefore allows the store's selling area to be expanded.



Longer food preservation

Synergy between DC compressors and electronic expansion valves allows stable temperature control, thus ensuring maximum quality of food preservation. This means an extra 2 days' shelf-life for the goods.



Easy installation and maintenance

- Easy installation with plug & play cabinets
- Only power supply and water connections in the field
- No welding in the field, plastic pipe connections only
- Low noise and vibrations
- Full and continuous control of the units
- Full monitoring of all operating conditions, warnings and detailed alarms
- Advanced algorithms for preventive diagnostics

Reliability

- Compressor always running in safe conditions
- Advanced warnings and alarms to preserve unit and cabinet safety
- Compressor control and performance approved by the manufacturer



Flexibility

Self contained water-cooled units allow:

Easy layout change

- Possibility to easily move cabinets inside the supermarket

Flexible sales area

- Easy installation or removal of new/promotional cabinets

Larger sales area

- No more need for compressor racks: more selling area available

High investment recovery in the event of store relocation

- Critical components fully contained in the cabinet



Compressor rack of a traditional system



Greater sales area with Heos sistema



High efficiency plug-in showcases

DC inverter technology and Electronic expansion valves combined together with advanced control system to maximize the continuous modulation experience.

Heos controller

- Real-time COP calculation
- Real defrost on demand
- Optimum temperature control
- Refrigerant leak control



Power+ inverter

- High efficiency
- Compressor envelope control
- Increased reliability



Variable speed DC compressor

- Very high efficiency
- Wide control range
- Minimum ON/OFF cycles



Electronic expansion valve

- Optimum superheat control
- Synergy with envelope control



Environmentally friendly

The total equivalent warming impact – TEWI - is the sum of a greenhouse gas's direct and indirect GWP. This value takes into consideration both the direct factor of release of the gas into the atmosphere and the indirect factor of the manufacture and lifetime operation of the system in which the gas is used. Self-contained cabinets that are fully assembled and tested in the factory significantly reduce this global impact, creating greater environmental awareness while reducing leaks and the related annual maintenance.

All these benefits are obtainable independently of the type of refrigerant used and, even more so, the availability of combining Heos sistema with natural refrigerants ensures additional benefits in terms of climate-friendly solution.



Less refrigerant leaks

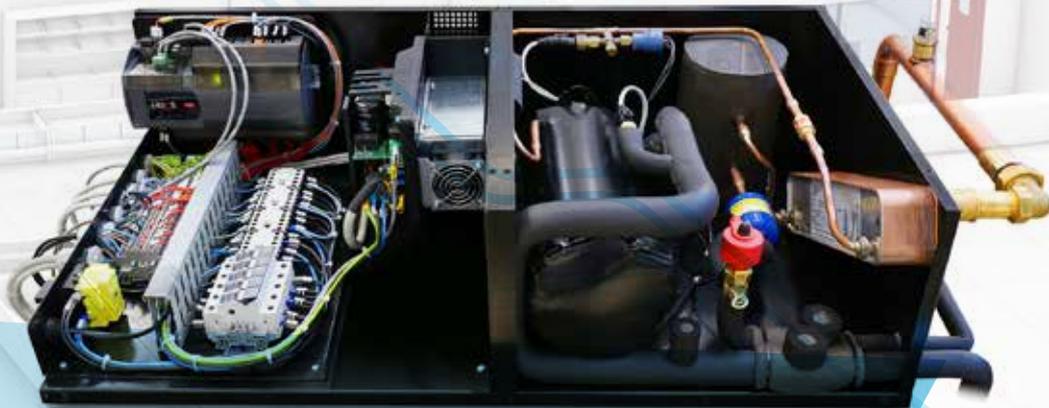
- No welding in the field
- Factory-tested units



Lower refrigerant charge

- No long copper pipes
- No compressor rack





Units assembled in factory

- Factory tested and optimized units
- Refrigerant leaks free
- High production quality
- Fast and flexible installation

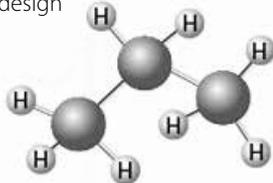


Refrigerant-neutral solution

The new frontier of Heos sistema is represented by the new refrigerant neutrality concept: all Heos sistema benefits can be combined with the specific characteristics of each individual refrigerant.

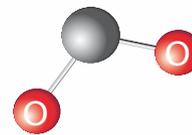
Hydrocarbons – Propane R290

- Standard operating pressures
- Ideal for small units with max charge 150g
- Single or multiple circuit design
- GWP = 3.3



Carbon dioxide – CO₂ R744

- Optimal heat transfer
- Transcritical single EEV circuit design
- Wide availability of compressors
- No charge limitations
- GWP = 1



Hydrofluoro-olefin HFO blends

- Traditional circuit design
- Wide availability of compressors
- Wide range of refrigerants (low GWP) available
- F-gas compliant for field installation

Hydrofluorocarbon HFC

- Consolidated technology
- High system performance
- Wide availability of compressors
- Non-flammable and low toxicity refrigerant

A complete platform for the full system management

Waterloop controller

Heos sistema guarantees control of water loops in the most-commonly used commercial refrigeration configurations, in which Heos manages the showcases.

Main features:

- management of a drycooler, including evaporative cooling (ChillBooster)
- use of tandem pumps
- enable chiller operation for low temperature units
- possibility of integration with supervisory system
- management of time bands for chiller operation



Supervisor - boss

The supervisory system, as well as optimising system operation, controlling routine maintenance and special service operations, also allows advanced statistical analysis of site energy consumption. All this can be performed locally and/or via remote. As concerns system supervision, alongside the consolidated PVPRO, a new mobile ready local supervisor is also available: boss. Designed for medium-sized and large systems, boss can be used on any mobile device, and thanks to built-in Wi-Fi, can access the supervisor without requiring any other network infrastructure.



Usability

- Fully mobile compatible from first boot to routine maintenance
- Easy development of customised graphics by c.web
- Integrated Wi-Fi hotspot for access without any other network infrastructure
- Instant messaging to manage alarms in teams



Reliability

- Rugged fanless HW suitable for many different environments
- Secure SW in compliance with advanced standards
- Backup on SD card
- Automatic data and alarm centralisation by RemotePRO
- Parameter protection against unauthorised changes



Optimisation

- Safe compressor restart
- Optimised suction pressure
- Energy consumption control and management
- Unit performance dashboard
- Integration with Modbus and BACnet systems



Compatibility with all climates

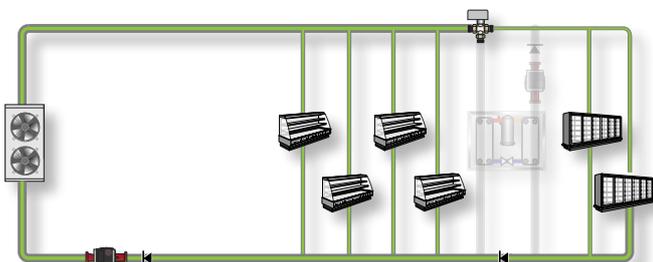
The diagrams below illustrate the possible configurations for a waterloop system, based on the local climate.

FREE COOLING ONLY: one loop only, controlling the condensing stage on both medium temperature and low temperature units.

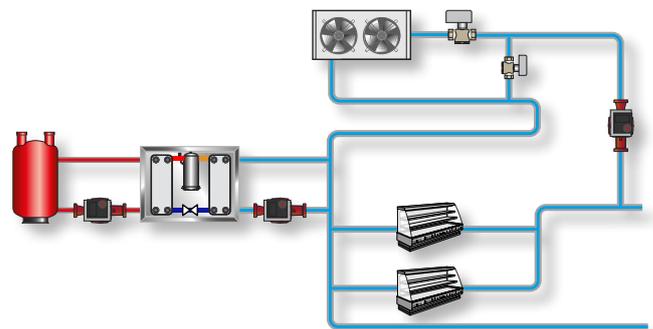
LT CHILLER: to maximise the energy efficiency of the low temperature compressors, the two loops can be separated, and operate at two different temperatures. Can be fitted with adiabatic evaporation systems for operation in summer.

HEAT RECOVERY: Recovery of the heat produced by the condensing unit is always possible. The most flexible and practical solution involves installation of a water-to-water heat pump whose cold water source is the showcase condenser cooling water, and which produces hot water at the most suitable temperature for the specific installation, even 60-70°C or higher.

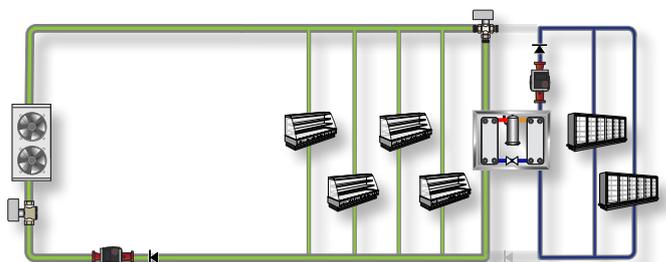
Free cooling operation



Heat recovery operation



Operation with Chiller for LT showcases



Heos dashboards

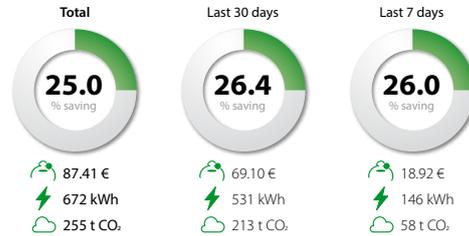
Energy efficiency, preventive diagnostics and maintenance analysis, from store level to detailed cabinet-by-cabinet breakdown



Saving

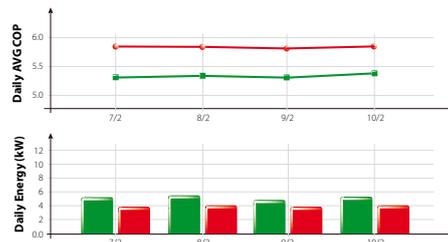
Performance comparison against a traditional system. Graphic representations of:

- Energy and economic savings and environmental impact;
- Evaporation temperature of the different refrigeration units



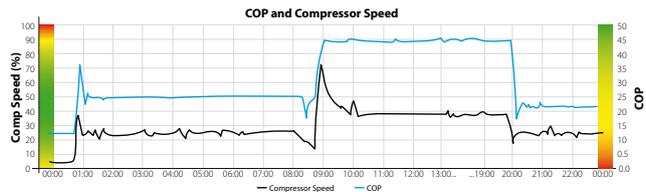
Efficiency

Tabulated and graphic representations of energy performance of individual units compared against group average



Group Efficiency

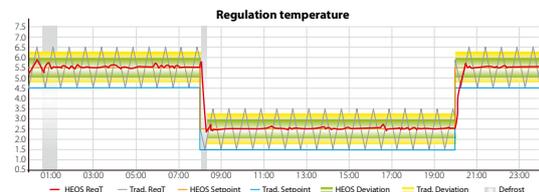
Performance comparison in terms of COP and compressor operating speed on each device, in relation to average trends across the group.



Quality Control

Comparative analysis between Heos and traditional technology via:

- Different control temperature trends
- Mean deviation in control from reference



Headquarters ITALY

CAREL INDUSTRIES Hqs.
Via dell'Industria, 11
35020 Brugine - Padova (Italy)
Tel. (+39) 0499 716611
Fax (+39) 0499 716600
carel@carel.com

Sales organization

- CAREL Asia
www.carel.com
- CAREL Australia
www.carel.com.au
- CAREL China
www.carel-china.com
- CAREL Deutschland
www.carel.de
- CAREL France
www.carelfrence.fr
- CAREL HVAC/R Korea
www.carel.com
- CAREL Iberica
www.carel.es

Affiliates

- CAREL India
CAREL ACR Systems India (Pvt) Ltd.
www.carel.in
- CAREL Nordic AB
www.carel.com
- CAREL Russia
www.carelruussia.com
- CAREL South Africa
CAREL Controls S.A. (Pty)
www.carelcontrols.co.za
- CAREL Sud America
www.carel.com.br
- CAREL U.K.
www.careluuk.co.uk
- CAREL U.S.A.
www.carelnusa.com
- CAREL Czech & Slovakia
CAREL spol. s.r.o.
www.carel-cz.cz
- CAREL Ireland
FarrahVale Controls & Electronics Ltd.
www.carel.com
- CAREL Japan Co., Ltd.
www.carel-japan.com
- CAREL Korea (for retail market)
www.carel.co.kr
- CAREL Mexicana S de RL de CV
www.carel.mx
- CAREL Thailand
www.carel.co.th
- CAREL Turkey
CFM Sogutma ve Otomasyon San. Tic. Ltd.
www.carel.com.tr