High
Efficiency
Solutions.

CAREL



pRack platform

the complete solution for compressor racks

pRack platform
the power of simplicity

pRack is the complete offering from CAREL for the control and management of centralised compressor racks

The ideal solution to respond to a variety of market requirements, as regards

- high number of inputs and outputs for control needs;
- innovative management algorithms for energy savings;
- comprehensive fitting of control requirements;
- multiple integration/ supervision possibilities

The pRack platform now comprises:

- **pRack pR300:** evolution of the standard version, increases instrument integration with additional communication lines (supervisor and fieldbus), direct built-in expansion valve management and higher performance hardware. Ideal for managing subcritical CO_2 systems
- **pRack pR300T**: designed to manage transcritical CO_2 booster systems, includes management of high pressure valves, now controlled directly by built-in driver, oil recovery and heat recovery systems, in more compact and higher performance hardware.

pRack size&more
the pRack tool for retail applications.
This app has been designed for:

- SIZING To suggest the most matching codes and architecture. It is also possible to export a pdf file with summary information about your choice.
- FINDING information, starting from: CAREL codes, Mask Index, Supervisory name and Alarm codes.
- MORE To provide a useful contribution both in the office and in the field, when product information is needed during selection or installation or maintenance.

Available on the App Store

Google play



User simplicity

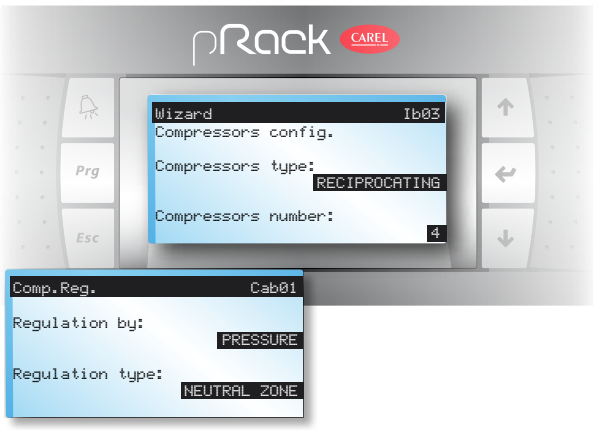
Developed with special focus on being easy to use, pRack features numerous details, procedures and tools to help users use the controller.

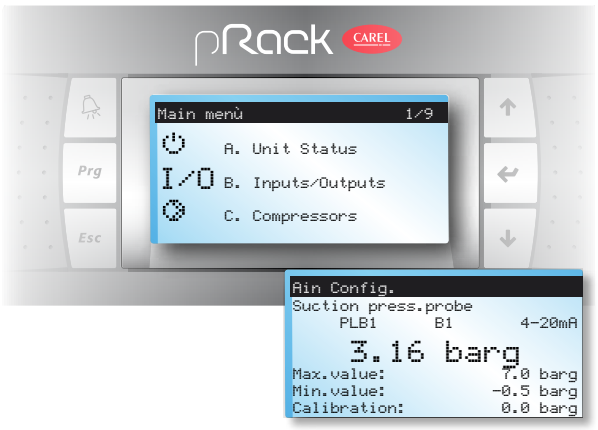
Energy saving

pRack features ESS – Energy Saving Suite, a group of functions designed for energy saving that can also be applied together with the supervisory system.

System optimisation

Management of modulating devices to guarantee maximum efficiency in the control of operating pressure and consequently ensure greater system stability.





Wizard

Procedure to guide the user step-by-step through the initial configuration of pRack. By simply responding to the questions displayed automatically by the tool, pRack can independently set the main parameters required for the unit to start safely.

Display

The graphic LCD makes the user interface extremely functional. Browsing the various menus is intuitive and simple, all the information is grouped into functional areas to make browsing even faster. The display is therefore always simple and fast to use.

Easy operation

Easily accessible information, guided self-configuration procedures, easy browsing inside the menus to minimise commissioning and service times

Pre-configurations

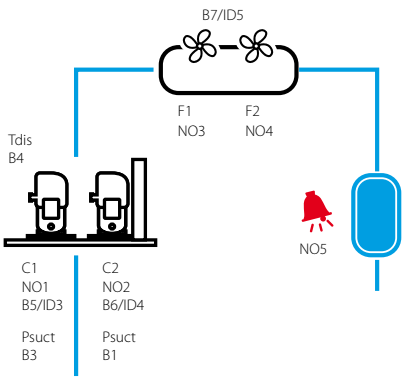
Series of configurations for each application already featured inside the instrument. By simply choosing one of the applications described in detail in the special "Quick Guide", pRack can independently set the main parameters required for the unit to start safely.

pRack manager

SW program for storing and managing different configurations. With pRack manager users can also save their own settings directly from the instrument, modify them on a PC and copy them to other instruments, simply and intuitively. pRack manager also allows the SW to be updated and real time connection to verify unit operation during commissioning.

Smart key/USB

Programming key to copy the complete configuration of the instrument, making it easily transportable to other instruments running the same application.







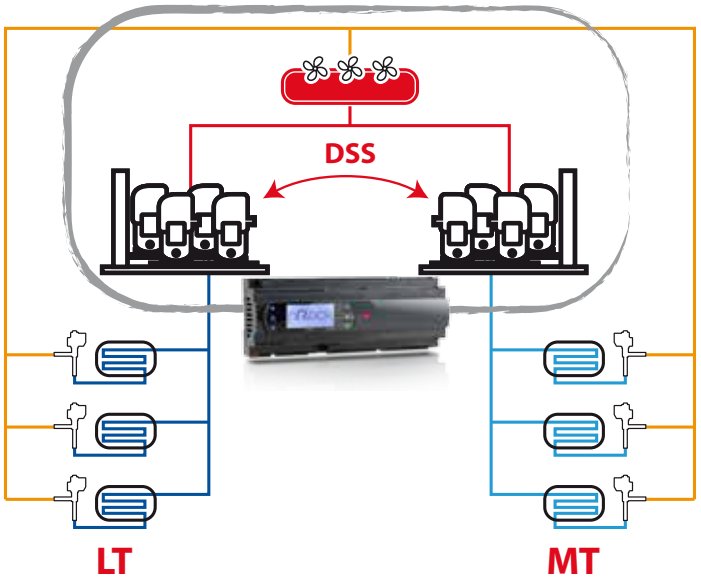
pRack platform
flexibility and configurability

Just one device that responds to the needs of both small and large compressor racks. pRack can adapt operation to the type of systems and the specifications of the electrical panel.

Two lines

pRack allows complete management of an entire low/medium temperature installation with just one controller. As well as traditional configurations with one suction line and one condenser line, now up to two suction lines and two condenser lines can be managed, either split or shared.

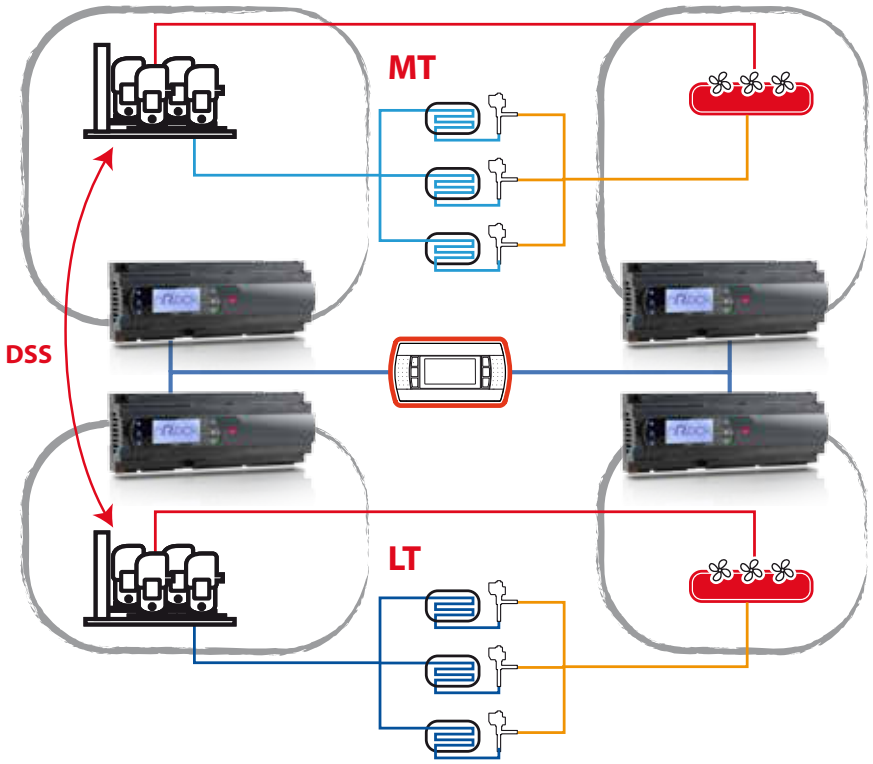
Two suction lines, one condenser line



Multi-board

The flexible pRack architecture allows multiple controllers to be connected together and make up part of a system that manages up to two complete circuits. These configurations increase the number of inputs and outputs available for implementing special control functions and allow a dedicated instrument to be installed near the system being controlled, avoiding unnecessary wiring costs.

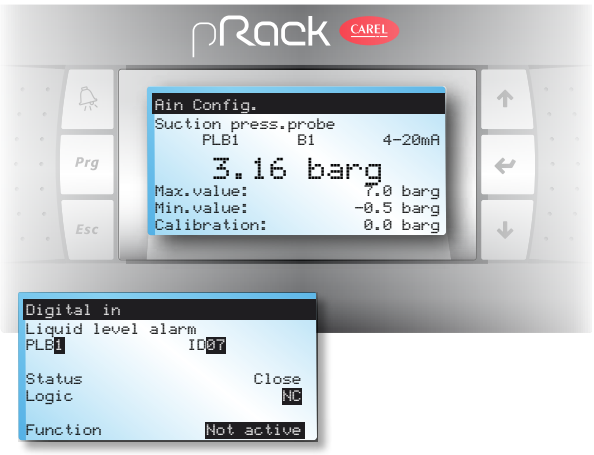
Two suction lines, two condenser lines



Double system synchronization



For booster or cascade systems, the low temperature and medium temperature circuits communicate with one another so as to optimise operation of the entire system. Communication between the lines speeds up system response to sudden variations in operating conditions.



Input/output configuration

All the inputs and outputs on pRack feature completely configurable attributes. Up to 10 universal channels, each configurable as an input or output.

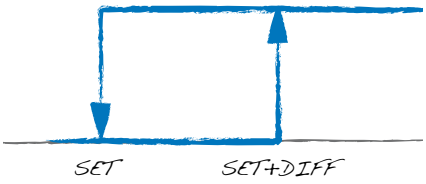
Free configurable functions

pRack features up to 10 completely configurable functions that can be used to satisfy specific market requirements. By using free analogue inputs or system variables, the system can be customised with specific logic directly from the user interface, without having to customise the product.

Safety

pRack not only features traditional safety systems such as compressor alarms (up to 4 digital inputs available for each compressor), common high and low pressure switches, high condensing pressure prevention etc., as available on previous controllers for compressor racks, but also several new safety systems:

- backup pressure probes, only if the main probes fail;
- discharge temperature monitoring on each compressor;
- ChillBooster as protection against high condensing pressure
- protection against low suction superheat
- sign-of-life for activation of backup systems
- anti-liquid return output
- double alarm priority
- internal log;
- internal configuration backup



Refrigerant leaks detection

In reply to the F-gas regulations on the refrigerant leaks, pRack can directly manage the refrigerant leak sensors through a report to a supervisor or dedicated outputs.





pRack
energy saving

pRack offers several different possibilities to increase efficiency and reduce overall energy consumption of the compressor rack.

Set point compensation

Possibility to modify the system working set point based on time schedules. Independent reduction of energy consumption at night and in winter.

Modulating suction set point

Using the PlantVisorPRO or PlantWatchPRO supervisory system, the CAREL system can recognise the current operating status of the entire installation and independently adapt its operating conditions to the actual demand from the field.

Modulating condensing pressure set point

pRack can adapt its operation based on outside conditions by simply adding an outside temperature probe. The condensing pressure set points are automatically modified so as to minimise compressor energy consumption.

ESS

Energy Saving Suite

Smooth line control

Energy saving maximised by using MPXPRO with the CAREL E^{2}V expansion valve on showcases and in cold rooms.





Economizer / Liquid injection

Ideal for scroll and screw compressors, pRack can also manage liquid injection and economizer systems, by monitoring the discharge temperature and operating conditions of each individual compressor to increase compressor efficiency, reducing discharge temperature and maximising overall system COP.

Warm climate efficiency

pRack manages ChillBooster, the evaporative cooling system for air-cooled condensers, maximising performance during operation at high summer temperatures and minimising energy consumption.
Ideal for CO_2 gas coolers, ChillBooster can be activated as the last condenser stage or as an emergency procedure.



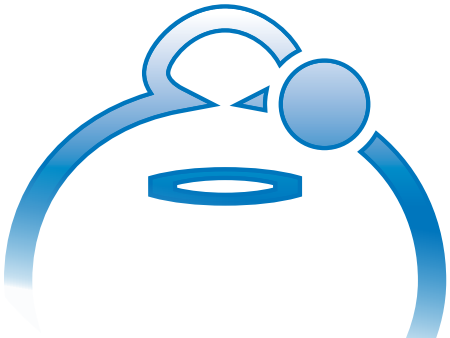
Load shedding

pR300 can interface with the intelligent control system for energy saving pLOADS. These two control systems together allow modulating the supplied refrigerating power, optimizing the electrical consumption
as to avoid absorption peaks and maintaining at the same time proper functioning of the refrigerating unit.



Heat Recovery

pRack manages the heat exchanger fitted upstream of the condenser to recover heat for domestic hot water production, by monitoring the refrigerant temperature entering the condenser. Once activated by digital input, scheduler or when high condensing pressure prevention is activated, the operating conditions of the condenser can be adjusted to maximise system efficiency.



pRack platform
system total control

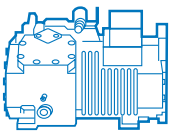
pRack optimizes compressor rack operation by applying available modulating devices, as well as control and rotation algorithms to stabilise operating pressure.

Types of compressors

pRack manages all types of compressors currently available on the commercial refrigeration market.

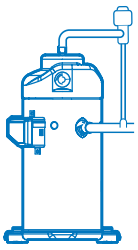
Piston

- maximum 12 compressors on each line;
- pre-configured capacity steps;
- different sizes (max 4);
- up to 4 configurable digital alarms for each compressor;
- first compressor with inverter;
- first compressor Bitzer© CRII (unloaders fast cycling).



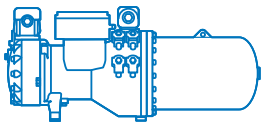
Scroll

- maximum 12 compressors on each line
- different sizes (max 4)
- up to 4 configurable digital alarms for each compressor
- first compressor Emerson-Copeland© digital scroll.



Screw

- pre-configured Bitzer©, Refcomp, Hanbell© models;
- pulsing valves managed by SSR (Solid state Relays, optoelectronic devices with a very high number of switching cycles);
- step - stepless - inverter management;
- dedicated starting procedures;
- internal star delta / part winding starting;
- envelope monitoring and safety procedures.



Control and rotation

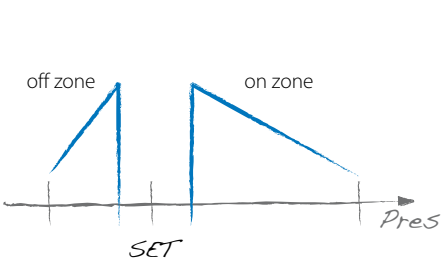
pRack ensures optimum management of compressors and fans by applying three distinct control functions and four types of rotation.

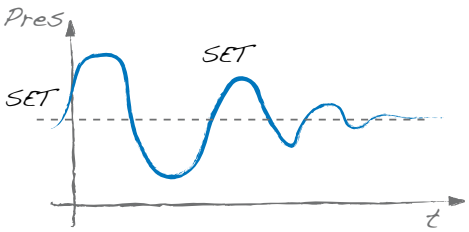
Control

- proportional: suitable for simple on-off control (above all fans);
- dead band: above all for compressors, ensures stable pressure within a set range and allows staggered on and off times;
- proportional – Integral: suitable for compressors and fans, above all modulating devices (inverter, digital scroll, EC fans), ensures very fine control and thus stable operating pressure.

Rotation

- FIFO: First in first out, used to balance the number of starts between compressors, normally applied to compressors that have the same capacity;
- LIFO: Last in first out, used to give priority to the first compressors over the last, normally applied to compressors with different capacities;
- TIME: used to balance operating hours between devices, normally applied to compressors that have the same capacity;
- CUSTOM: defined by the user, used to give priority to some devices over others based on specific needs.







pRack pR300
evolution of the range

Innovative features on a platform that stands out for flexibility, ease of use and energy saving functions.



pvpro
pwpro
tService
Rack

Connectivity

Supervision: connection to two independent supervisory systems so as to increase and differentiate access levels

Fieldbus: integration of the EVD Evolution driver to improve system performance

USB: direct connection to laptop and/or USB pendrives for simpler configuration

I/O flexibility

New "I/O chip" technology further increases the flexibility of the inputs available and measurement precision. Each analogue input channel can be freely configured as NTC, PTC, PT100, PT500 or PT1000 probe, 0/1V, 0/5V, 0/10V, 0/20mA or 4/20mA, voltage-free digital input (standard and fast) • analogue output (0/10V and PWM).

Cloud service tool

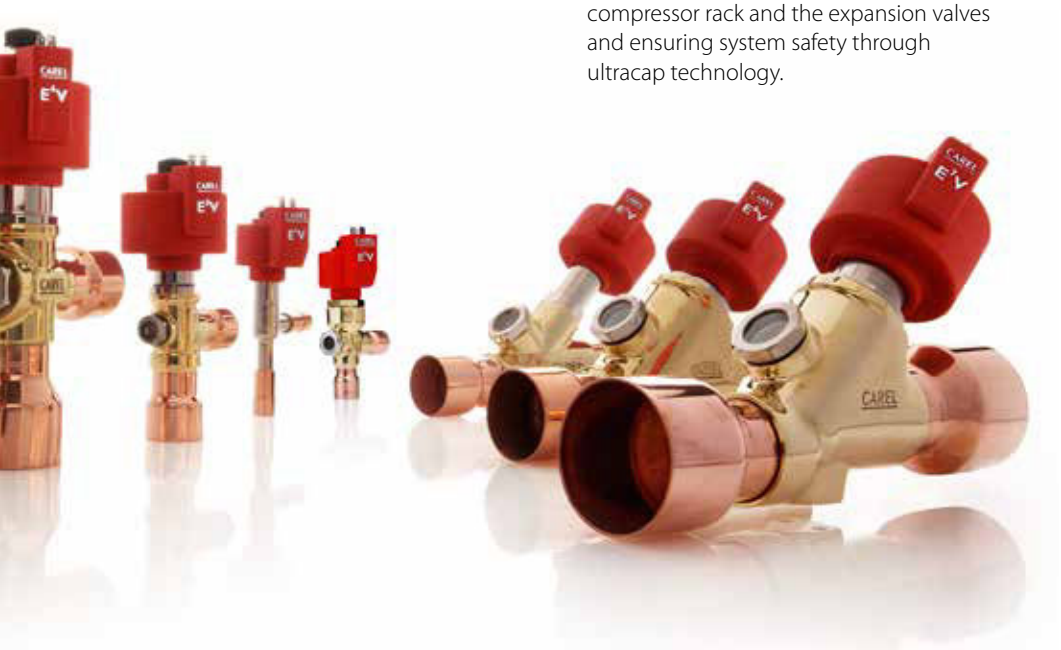
Simple connectivity system fully independent from any other supervisor system.
GPRS connection for dedicated remote access usable for OEMs that want to expand their services.

- Cut maintenance costs thanks to remote analysis of system operation
- Improve service levels through faster troubleshooting
- Cloud computing: the information is where you need it, when you need it (smartphone, tablets, PC, etc)

built-in driver
with Ultracap Tech.

Built-in EVDEVO driver

Possibility to directly manage up to two stepper electronic expansion valves, meaning less wiring in the panel and smaller overall controller dimensions, while further optimising unit performance, increasing interaction between the compressor rack and the expansion valves and ensuring system safety through ultracap technology.



Bitzer CRII compliant

Bitzer officially declared pR300, part of pRack range, compatible with its CRII series compressors.

Subcritical CO_2

Ideal for subcritical CO_2 systems by integrating the electronic expansion valve that controls the plate heat exchangers.

pRack pR300 introduces integration between the compressor rack and the heat exchangers, increasing control stability and safety procedures, cutting costs and reducing installation dimensions.

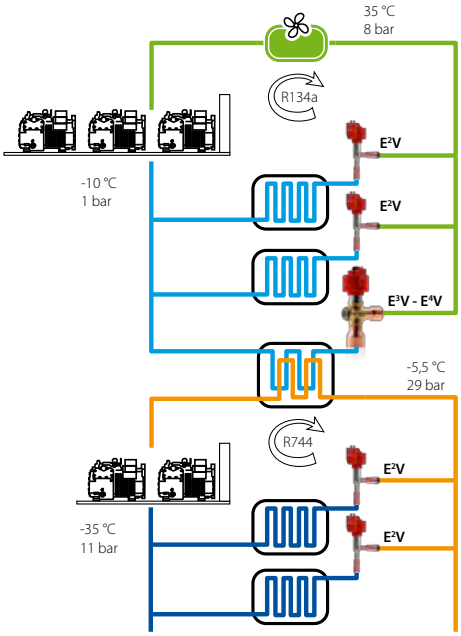
Exchanging information between the compressor rack and the Heat Exchanger can improves traditional superheat control with factors that are vital for this type of installation, such as variation in rack cooling capacity and trend in CO2 pressure:

LT compressors

MT compressors.

Cascade

Pumped



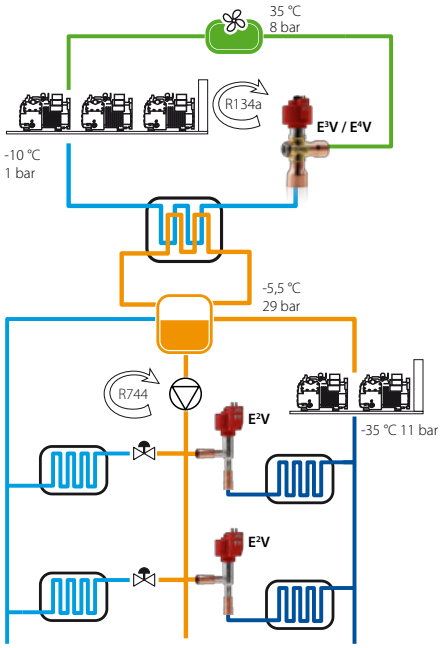
EEVS

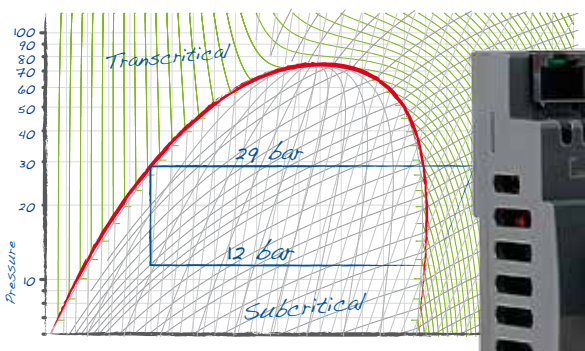
Electronic Expansion Valve Synchronization

System for direct communication between the compressors rack and electronic expansion valve driver on the plate heat exchanger, built-in on pRack pR300.

The low temperature rack can in this case tell the driver of any changes in cooling capacity and thus modulate evaporator capacity based on CO2 **condensing pressure**, without requiring additional probes and ensuring fine and precise condensing pressure control.

The medium temperature rack can in this case use an **auxiliary temperature/ pressure probe** and set proportional or neutral zone regulation with all parameters and alarms customizable.







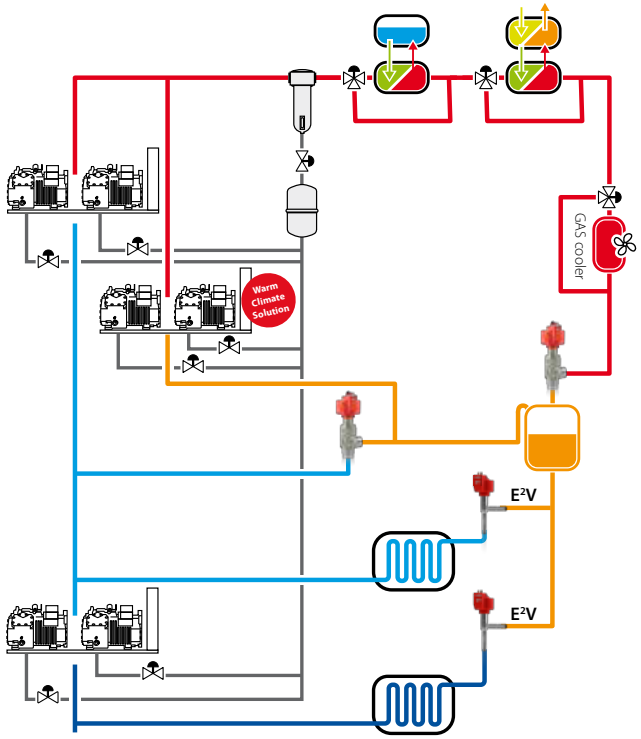
pRack pR300T solution for CO_2 transcritical systems

Advanced controller for the complete management of all components of transcritical CO_2 booster applications

Direct management of HPV and RPRV valves.
The built-in stepper expansion valve driver means no external divers need to be installed to manage the valves. Ultracap technology moreover maximises system safety.

The new pRack pR300T platform is a high performance solution for transcritical CO_2 systems that helps the user manage intrinsically complex units:

- Complete management of transcritical CO_2 systems on one single controller;
- Simple and intuitive user interfaces (with customisation available);
- Easy access to supervisory systems;
- Easy access to programming (USB host and device);
- Safety and backup procedures;
- Extensive flexibility (multi-board, configurable I/Os)



pRack Expansion board for transcritical CO_2

The new expansion board for pR300T allows to integrate the available I/O with 10 further universal I/O and 6 additional digital outputs.
Ideal for managing a large number of compressors' alarms and/or for the probes related to the two possible stages of heat recovery.







High pressure valve

E^3V-C, electronic expansion valve ideal for CO_2 booster systems, can be used as a back-pressure valve or flash gas valve. The different capacities in the E3V-C range allow control of gas coolers and receivers in the high pressure stage of transcritical circuits.

High pressure valve (HPV)

- Pre-configured optimisation
- Customisable algorithm
- Safety procedures

Subcooler

- Gas cooler integration
- Scheduled or on demand

ChillBooster

- Adiabatic cooling system for air condensers
- Activation by high condensing pressure or as last control stage
- High efficiency with high outside temperatures during summertime

Double heat recovery

- Recovery for domestic hot water
- Recovery for space heating
- Optimisation of operating conditions
- Gas cooler bypass as last step of heat recovery

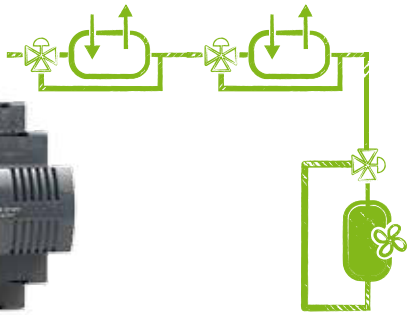
Parallel compression

- System higher efficiency at high gas cooler pressure and at high outside temperature
- syncronization with RPRV working
- regulation based on receiver pressure

Warm Climate Solution







Receiver pressure regulating valve (RPRV)

- Control based on receiver pressure
- Safety procedures
- High pressure alarm

Gas cooler

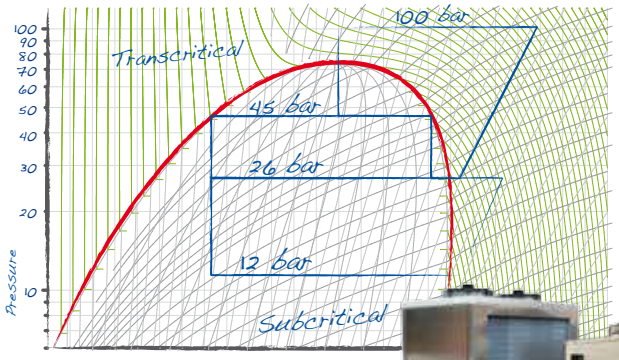
- Optimised fan management
- Speed drive (EC, VFD)

Recovery procedures

- Backup with single board
- Hardwired fault synchronisationwith case controllers
- PlantVisorPRO 2 also for case controller synchronisation via serial line
- Plug-in Safe Restore

Oil management

- Cooling
- Injection
- Separator
- Pressure differential monitoring



pRack pR300T is a single controller able to manage a transcritical CO_2 booster rack with dedicated algorithms for transcritical valves, medium and low temperature compressors, including parallel compression, gas cooler and double heat recovery.



CO_2 transcritical condensing unit

CAREL can offer a complete high pressure range of controls for CO_2 applications in transcritical systems. The E2V offers a range of capacities to suit small store formats refrigeration CO_2 condensing units and mini racks with up to 140 bars and. The E^3V can be applied, as wells, as the main high pressure and flash gas bypass valve in transcritical CO_2 systems where a higher cooling capacity is needed.

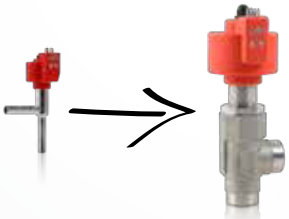
Modularity



pR100T+EVDEVO+ULTRACAP

- Built-in Display
- Safety Valves Closure
- Total flexible
- Fieldbus Communication
- Few KW of cooling capacity
- Electronic Expansion valves

More cooling capacity



Flexibility



pR300T, one board one system

- Built-in Driver to control Valvesi
- Safety Valves Closure
- Display Built-in
- BMS opto-insulated
- Different KW of cooling capacity
- Electronic Expansion valves

Technical features

+3000008EN - 3.2 - 18.11.2014

Inputs and outputs table pR300 and pR300T family

model	universal inputs	digital inputs	0-10V analogue outputs	digital outputs **	EEV
small	5	8 (24 V)	4	8 (2)	-
medium	8	12 (24 V) - 2 (230 V)	4	13 (2)	-
medium & driver	8 (+4)	12 (24 V) - 2 (230 V)	4	13 (2)	2
large	10	14 (24 V) - 4 (230 V)	6	18 (6)	-

* the number of analogue inputs that can be used as voltage-free digital inputs is shown in brackets ** the number of SSRs available based on the model is shown in brackets

Size	P/N	Description
pRack pR300 models		
Small	PRK300S3F0	pRack pR300 small, built-in white pGDe, RS485 fieldbus and BMS, USB
	PRK300S3FK	pRack pR300 small, external white pGDe with connection cable, RS485 fieldbus and BMS, USB
	PRK300S0E0	pRack pR300 small, no display, RS485 fieldbus and BMS, USB, 2 SSR
	PRK300S3E0	pRack pR300 small, built-in white, RS485 fieldbus and BMS, USB, 2SSR
Medium	PRK300M3F0	pRack pR300 medium, built-in white, RS485 fieldbus and BMS, USB
	PRK300M3FK	pRack pR300 medium, external white pGDe with connection cable, RS485 fieldbus and BMS, USB
	PRK300M0E0	pRack pR300 medium, no display pGDe, RS485 fieldbus and BMS, USB, 2 SSR
	PRK300M3E0	pRack pR300 medium, built-in white pGDe, RS485 fieldbus and BMS, USB, 2 SSR
Medium & EVD	PRK300D3F0	pRack pR300 medium and built-in twin driver, built-in white pGDe, RS485 fieldbus and BMS, USB
	PRK300D3FK	pRack pR300 medium and built-in twin driver, external white pGDe with connection cable, RS485 fieldbus and BMS, USB
	PRK300D0E0	pRack pR300 medium and built-in twin driver, no display, RS485 fieldbus and BMS, USB, 2 SSR
	PRK300D3E0	pRack pR300 medium and built-in twin driver, built-in white pGDe, RS485 fieldbus and BMS, USB, 2 SSR
Large	PRK300L3F0	pRack pR300 large, built-in white pGDe, RS485 fieldbus and BMS, USB
	PRK300L3FK	pRack pR300 large, external white pGDe with connection cable, RS485 fieldbus and BMS, USB
	PRK300L0E0	pRack pR300 large, no display, RS485 fieldbus and BMS, USB, 6 SSR
	PRK300L3E0	pRack pR300 large, built-in white pGDe, RS485 fieldbus and BMS, USB, 6 SSR
pRack pR300T models		
Small	PRK30TS3F0	pRack pR300T small, built-in white pGDe, RS485 fieldbus and BMS, USB
	PRK30TS3FK	pRack pR300T small, external white pGDe with connection cable, RS485 fieldbus and BMS, USB
Medium	PRK30TM3F0	pRack pR300T medium, built-in white pGDe, RS485 fieldbus and BMS, USB
	PRK30TM3FK	pRack pR300T medium, external white pGDe with connection cable, RS485 fieldbus and BMS, USB
Medium & EVD	PRK30TD3F0	pRack pR300T medium and built-in twin driver, built-in white pGDe, RS485 fieldbus and BMS, USB
	PRK30TD3FK	pRack pR300T medium and built-in twin driver, external white pGDe with connection cable, RS485 fieldbus and BMS, USB
Large	PRK30TL3F0	pRack pR300T large, built-in white pGDe, RS485 fieldbus and BMS, USB
	PRK30TL3FK	pRack pR300T large, external white pGDe with connection cable, RS485 fieldbus and BMS, USB
pRack pR100T models		
Compact	PRK10TY3C0	pRack pR100T compact, built-in pGD[1]

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