



Success story

Connectivity and energy saving with the new μ Rack

Energy efficiency for condensing units and compact compressor racks

For a new convenience store in Zagreb, MB Frigo asked CAREL to equip a small compressor rack with a control system able to guarantee extremely fast commissioning, simplified unit interaction and high energy efficiency. The new μ Rack hardware platform is a completely upgraded and evolved solution whose strengths are connectivity and energy saving.



Where

Local Store, Zagreb,
Croatia

What

C-Store equipped with

- MB-FRIGO compressor rack
- CAREL control system
- CAREL supervisory system.

Why

The customer required an upgraded and highly-efficient solution for compact compressor racks.

MB Frigo is a Croatian manufacturer and distributor specialising in the engineering, production and service of air conditioning and refrigeration units. The Group, with extensive experience in the HVAC/R sector and thousands of installations completed, has always stood out for its innovative approach centred around the adoption of the latest technologies.

To meet the needs of the end customer, including efficiency and energy saving, and with a view to guaranteeing the fastest and most effective installation possible, MB Frigo identified μ Rack, CAREL's latest controller for compact compressor racks, as the ideal solution for the specific project.

Through this collaboration with CAREL, the new store was supplied with a small compressor rack, equipped with a compact and new generation control solution, guaranteeing high energy efficiency. The flexibility of the system adopted, combined with the extremely easy to navigate user interface, also allowed parameter configuration and unit commissioning in record time.

The CAREL solution

The compressor rack supplied by MB Frigo (Fig. 1.a) is equipped with four Bitzer reciprocating compressors (R449A), the first of which with a frequency inverter to ensure precise pressure control and, consequently, significant energy savings.



Fig. 1.a - MB Frigo compressor rack equipped with the new CAREL μ Rack controller

The CAREL proposal was to use the new μ Rack to guarantee three key aspects in the installation:

- **Simplified interaction:** NFC and Bluetooth connectivity are used to replicate the traditional features of the user interface on the dedicated APPLICA mobile app, designed and developed by CAREL for interaction with parametric controllers.
- **Energy saving:** management of modulating loads makes it possible to achieve the highest efficiency, using the 0-10 V analogue outputs for variable speed fans and compressors.
- **Direct connection to the supervisory system:** the built-in BMS serial port means the controller can be connected directly to CAREL or third-party supervisory systems (ModBus protocol).

In terms of control, the new μ Rack controller adopted by MB Frigo (Fig. 1.b) manages the following functions:

- Control of 1 suction line, MT;
- 4 Bitzer reciprocating compressors, the first with modulating operation;
- Single condenser control, 1 ON/OFF step;
- High and low pressure protection;
- Active superheat protection at low suction pressures.

The units served by the compressor rack are 3 medium temperature cabinets and 4 cold rooms (Fig. 1.c), each of which managed by 1 MasterCella controller with an electronic expansion valve. Each of these has independent control and, using the boss micro supervisor, a CAREL monitoring solution for small systems, is connected to the μ Rack controller via ModBus.

The flexibility of the local supervisory system allowed MB Frigo to have a single point of access to the various settings, so as to optimise system operation and have an overview of alarms and configurations. The built-in 4G modem ensures virtually instant system commissioning times, thanks to a plug&play solution that is completely independent of the building's network infrastructure.



Fig. 1.b - μ Rack controller mounted inside the compressor rack electrical panel

CAREL complete control system

μ Rack: controller for condensing units and compact compressor racks operating with HFCs and HFOs. Unit configuration is made easier and more intuitive thanks to Bluetooth and NFC as standard across the entire range, allowing users to interface with the unit via smartphone using the Applica app.

μ Rack offers all possible features for optimum unit management: an intuitive procedure guides users through commissioning and setting the basic parameters, which can then be completed by more advanced functions. Dedicated operating modes are available for energy saving, such as floating suction and condensing pressure, as well as control logic to protect the compressor from liquid return. Remote services can also be enabled via the built-in BMS port (RS485).



MasterCella: controller that directly manages single-phase units with compressors up to 2 HP, including all the other actuators: evaporator fans, defrosting, lights and alarm relay. The high degree of protection – IP65 – allows installation even in particularly humid environments. It can also manage smart defrosts with consequent energy savings for the entire system, and can be equipped with a real-time clock for scheduling defrosts.



boss micro is a local supervisor solution for managing systems with up to 15 devices. Four different hardware models (Ethernet, Wi-Fi, 4G, and Wi-Fi with 4G) are available to meet different user needs in terms of local interaction and remote connectivity. boss micro includes all the features needed to manage and interact with refrigeration systems, for controlling and optimising the system in terms of thermodynamic performance and energy consumption. Different user interfaces have been developed according to the type of user (i.e. installer, maintenance technician, system manager) in order to make system commissioning simpler and faster.



Fig. 1.c - Cold room for produce storage inside the store

Conclusions

CAREL, in synergy with MB Frigo, has once again demonstrated expertise and a spirit of innovation in relation to the adoption of new technologies, achieving very high levels in terms of reliability and support and proving to be the ideal partner for the development of environmentally-sustainable projects.

The μ Rack electronic controller, thanks to the innovative control algorithms and the various connectivity options, allows the maximum to be achieved in terms of efficiency and energy consumption, as testified by CAREL's partner MB Frigo:

"The new CAREL μ Rack controller represents the ideal compromise in a context that sees the return of small supermarkets, where a complete system controller in a compact package is needed. Based on the system requirements for this project, it was clear from the beginning that the ideal solution was to equip our compressor rack with μ Rack, a perfect, reliable and economical solution.

The possibility of connecting the controller to a micro-supervisory system ensures constant and safe operation, giving customers greater peace of mind. Furthermore, the features of μ Rack in terms of wireless connectivity (NFC and Bluetooth) and the possibility of direct interaction with mobile devices via the CAREL "Applica" app offered the clear advantage of quick and simplified unit commissioning in the field.

The project achieved all the set objectives and the cold rooms were fully operational in record time, with complete customer satisfaction."

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