μC sistema

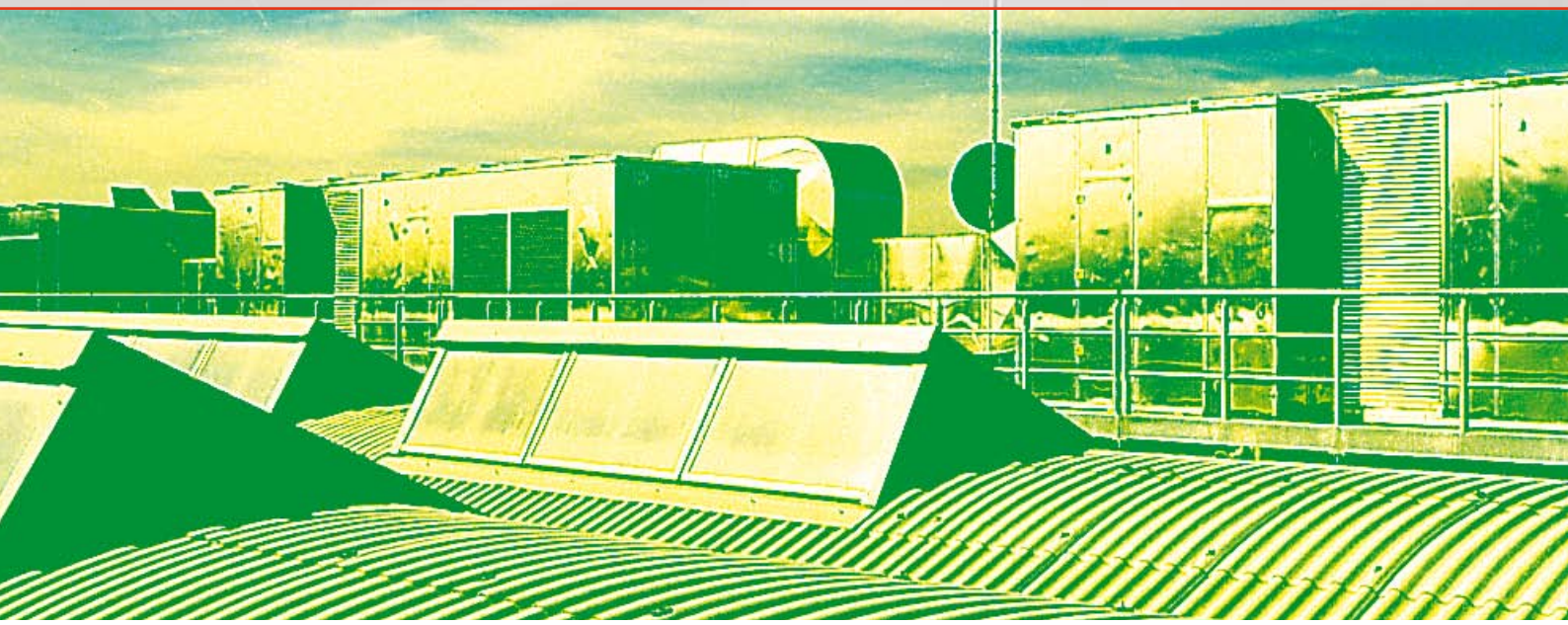
the range

CAREL

μC

Technology & Evolution

Multifunction digital controllers for air/water units



µC sistema

State of the Art technology for powerful, flexible and reliable controllers

µC sistema is the result of CAREL's decades' long experience in the design and production of parametric controllers for HVAC units.

µC sistema is made up of parametric controllers, in both the panel mounted and DIN rail versions, user interfaces, both local and remote, communication interfaces, input/output expansions and electronic expansion valve drivers.

Everything the OEM needs to operate in the HVAC sector with a flexible, cost effective and high performance control system. A wide range of applications can be customised by setting specific parameters, for **chiller/HP appliances: (air/water, water/water), air/air and roof-top units, up to two circuits, with a maximum of 3 compressors per circuit.**

µC²

The competitive solution

panel

DIN rail

programming key

built-in display

I/O expansion

remote display

15 I/O

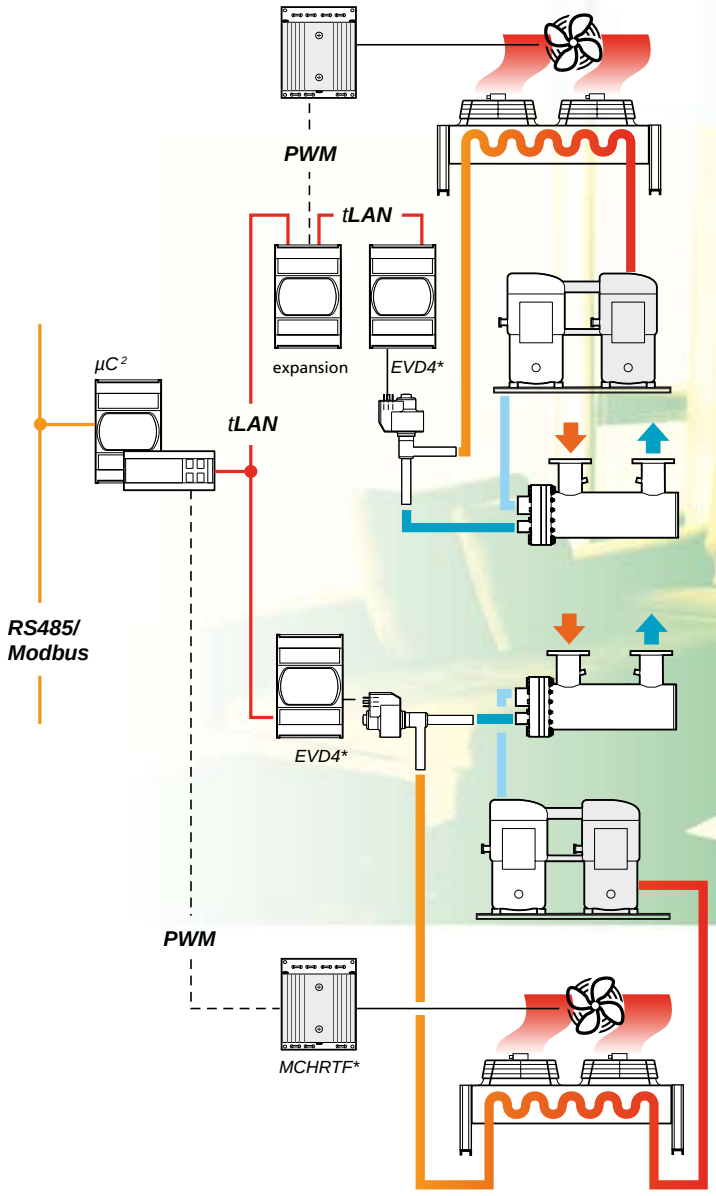
ratiometric inputs

electronic expansion valve

The µC² series is the family of CAREL controllers specifically developed for the management of chillers and heat pumps.

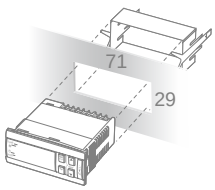
The µC² series can be panel or DIN rail mounted, and the wiring is plug-in with Molex® connectors, simplifying and speeding up the assembly of the entire system.

Like the other controllers in the ***µC sistema***, the µC² also features technologically advanced functions, such as EEV management, the elimination of the storage tank, etc. which reduce energy consumption and production costs for the OEM.



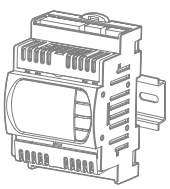
Applications

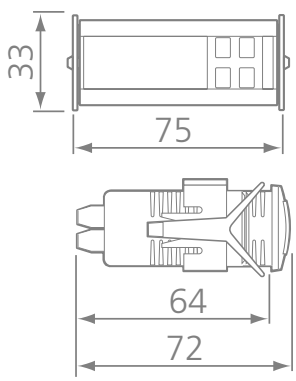
µC² can manage up to four hermetic compressors or two semi-hermetic with a maximum of two circuits, as well as controlling an electronic expansion valve in each circuit. With the large number of inputs and outputs it can optimally control air/water and water/water chillers and heat pumps, with reversal on the gas or water circuit, air- and water-cooled units with and without reverse cycle, air/air, direct cycle and heat pump units.

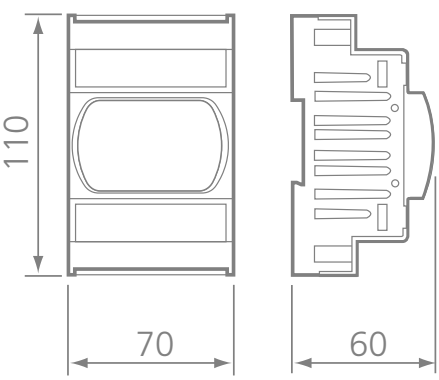


Panel mounting

DIN rail mounting







μC² SE

The evolution

panel

time bands and alarm memory

programming key

built-in display

I/O expansion

remote display

15 I/O

ratiometric inputs

electronic expansion valve

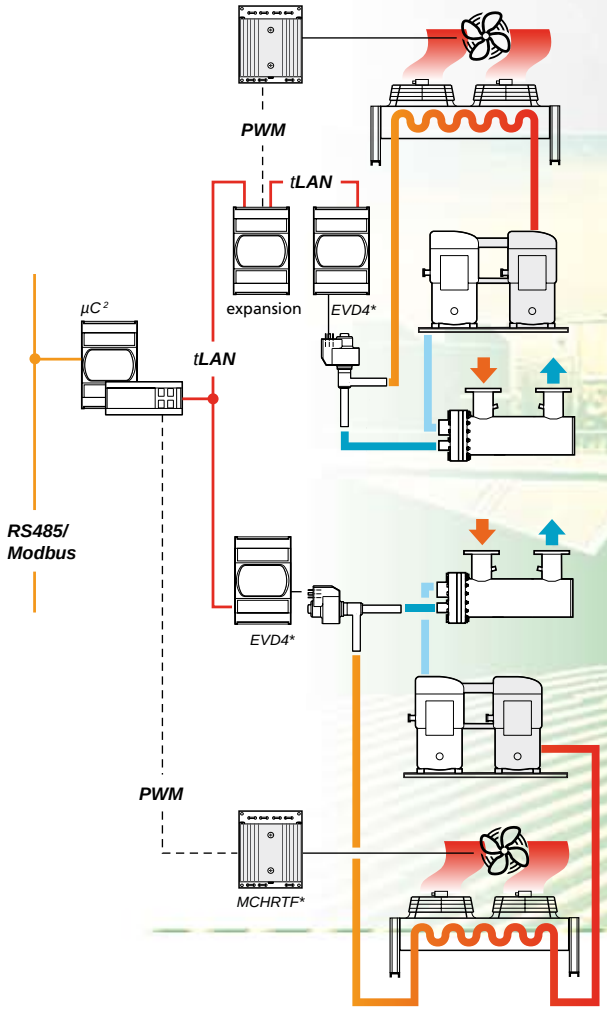
μC² SE represents the technological evolution of μC² series.

μC² SE controller in fact features a microprocessor with RISC technology and optional real time clock, ensuring top-of-the-range performance and user friendliness.

μC² SE series is available in the panel mounting version, and the wiring is plug-in with Molex® connectors, reducing dimensions, simplifying and speeding up installation.

Features

In addition to the already complete functions of μC², the Second Edition version comes with other innovative functions for simpler and more advanced control of the units. Functions relating to the RTC, such as time bands for low noise operating mode, or for logging the alarms.
Self-diagnostics, auto-tuning and smart defrost functions for optimising the maintenance of the unit and reducing running costs.



Applications

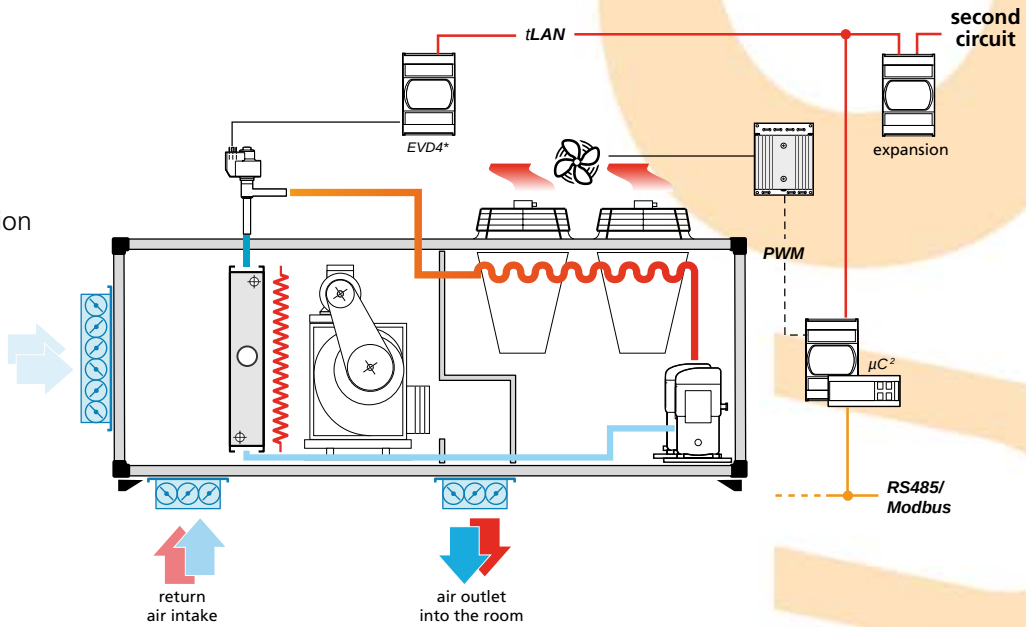
µC² SE can manage up to four hermetic compressors or two semi-hermetic with a maximum of two circuits, as well as controlling an electronic expansion valve in each circuit.

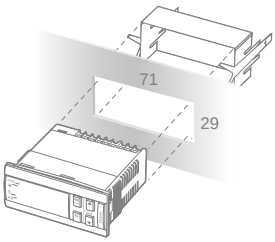
Chiller/HP

With the large number of inputs and outputs it can optimally control air/water and water/water chillers and heat pumps, with reversal on the gas or water circuit, air- and water-cooled units with and without reverse cycle, air/air, direct cycle and heat pump units.

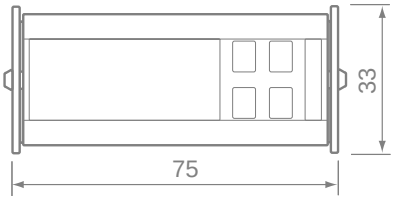
Roof-top

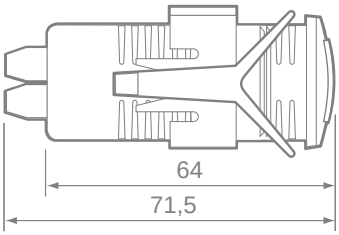
µC² SE can manage roof-top units with 2 compressors per circuit, up to a maximum of 2 circuits, as well as controlling an electronic expansion valve in each circuit.
Through the room terminal it can manage functions such as humidification, dehumidification and automatic change-over. It can also manage freecooling by temperature with three-point control.





Panel mounting





µC³

The top of range!

DIN rail

time bands and alarm memory

datalogging

programming key.

send SMS

multi-language

remote display

48 I/O

ratiometric inputs

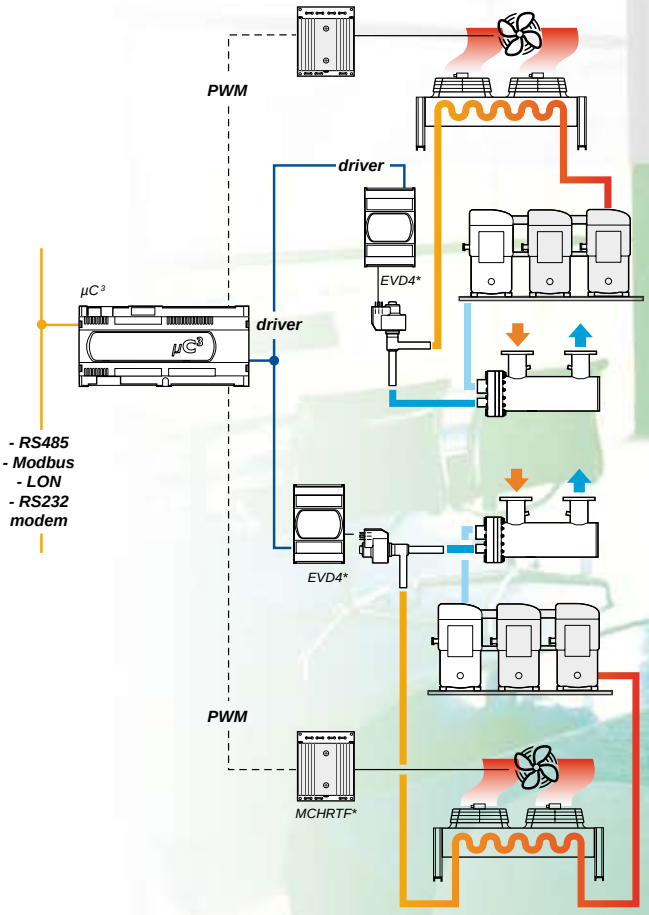
electronic expansion valve

The µC³ series is the top-of-the-range in ***µC sistema***. It has been designed to satisfy the most demanding and important manufacturers in the field who require increasingly high performance and competitive products.

The µC³ series can be installed with or without the DIN case, the wiring is plug-in with Molex® connectors. The case, strongly recommended, guarantees a high level of mechanical protection, reduces the risk of electrostatic discharges and reduces the assembly times for the entire system.

Features

µC³ introduces advanced functions such as smart defrost, auto-tuning to optimise the management of the evaporator, self-diagnostics for early warning of the decline in the performance of the unit, etc., all with the focus on energy savings and reducing the maintenance and running costs of the unit.



Applications

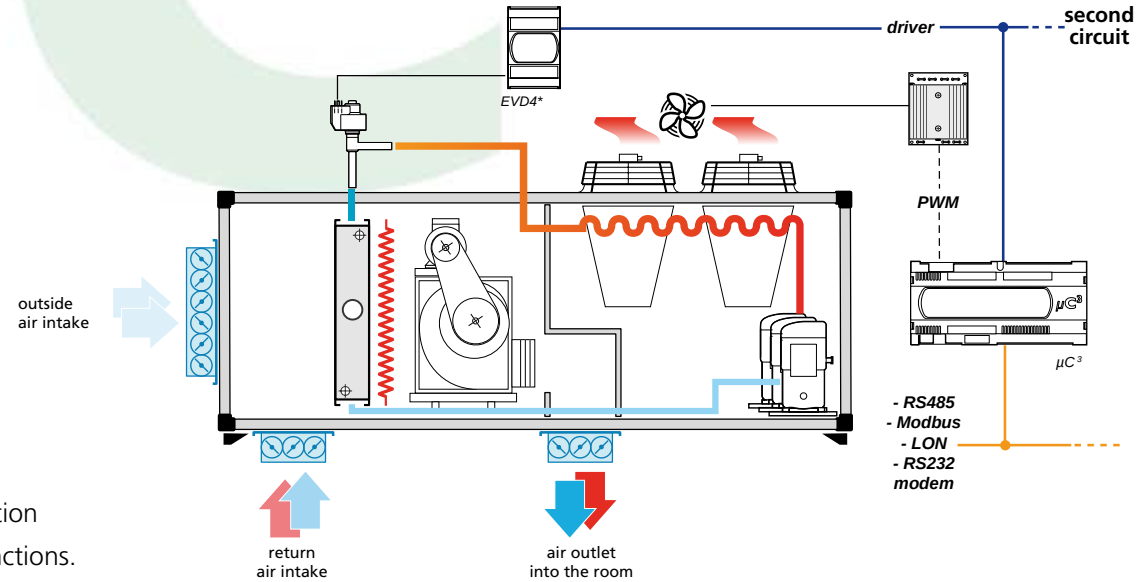
µC³ can manage up to six hermetic compressors or two semi-hermetic compressors in a maximum of 2 circuits, with the possibility to control one electronic expansion valve per circuit.

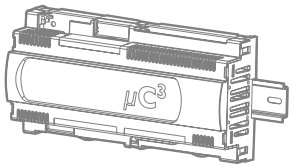
Chiller/HP

With the large number of inputs and outputs it can optimally control air/water and water/water chillers and heat pumps, with reversal on the gas or water circuit, air- and water-cooled units with and without reverse cycle, air/air, direct cycle and heat pump units.

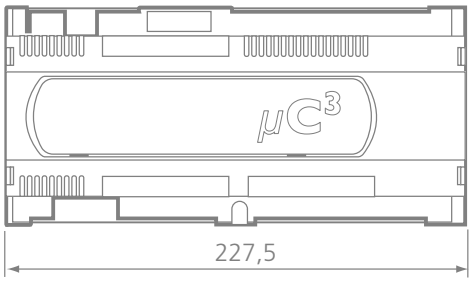
Roof-top

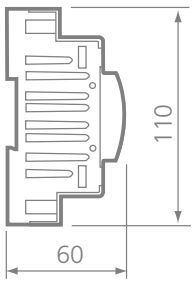
µC³ can manage roof-top units with and without freecooling by temperature and enthalpy. Based on the information received from the room terminal, µC³ can manage automatic change-over, as well as the humidification and dehumidification functions.

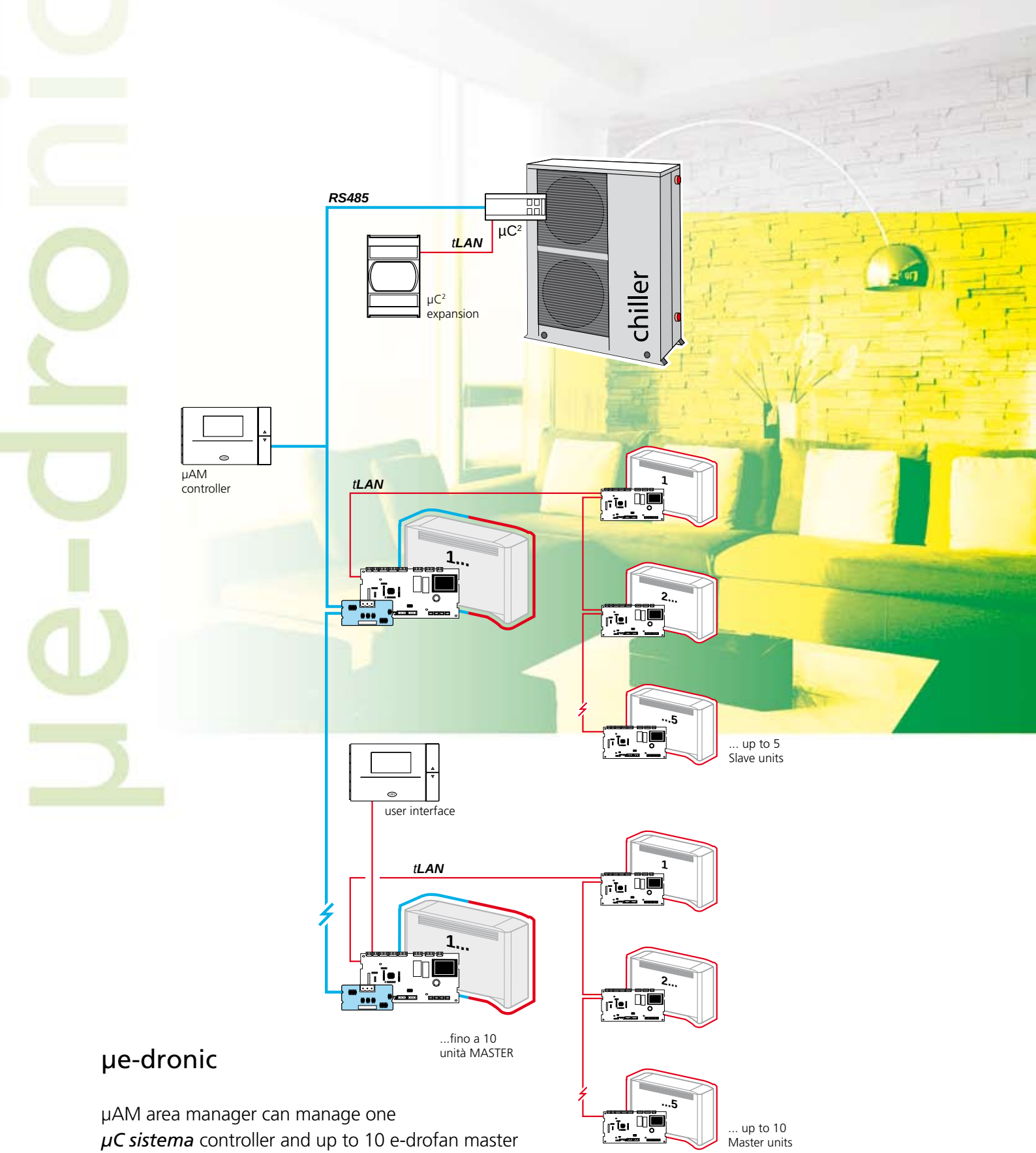




DIN rail mounting





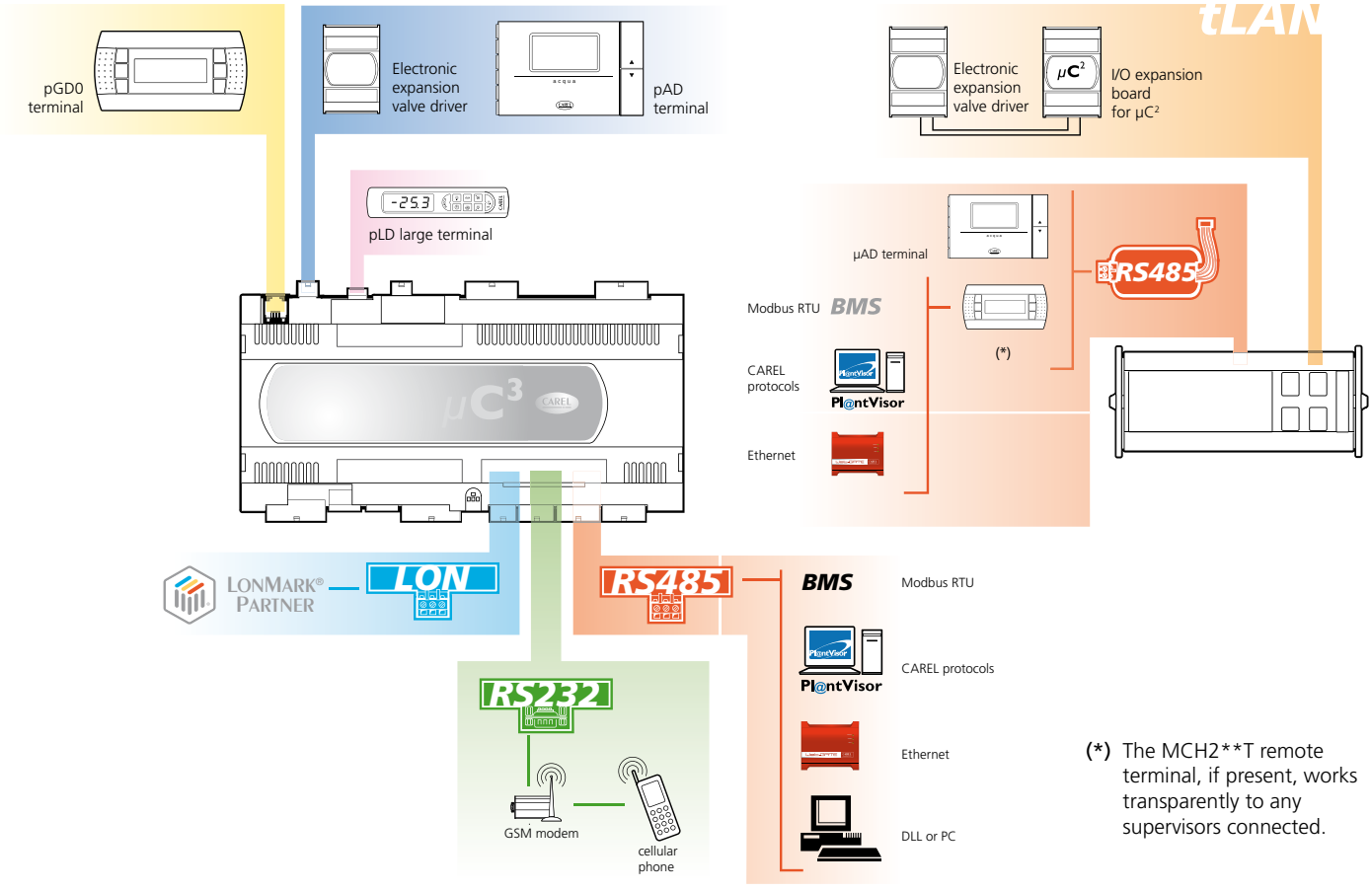


µe-dronic

µAM area manager can manage one ***µC sistema*** controller and up to 10 e-drofan master fan coil controllers in synergy. Each master can in turn be connected to up to 5 slaves. The µ-edronic system monitors the alarms in the installation, allows synchronised management of the fan coils, and implements energy-saving strategies according to the measured load and the temperature and humidity in the room.

Connectivity

µC sistema offers a range of communication interfaces.
All the controllers, from the µC³ to the µC², are compatible with the CAREL protocol (PlantVisor) and Modbus® RTU, for third party BMS systems.
In addition, DLLs (Dynamic Link Libraries) are available to developers and Systems Integrators for integrating communication via the CAREL protocol into third party systems, without needing direct knowledge of the protocol.
Likewise, connection to internet/intranet networks is available via the WebGATE gateway over Ethernet™ 10 Mb/s.
In particular, µC³ can be connected, as an alternative to the RS485, to an RS232 board for managing a GSM modem and consequently exchanging SMS messages, or a LON board for connection to LonWorks™ supervisory systems.



(*) The MCH2**T remote terminal, if present, works transparently to any supervisors connected.

User terminals

The wide range of user interfaces makes interaction with ***µC sistema*** family controllers simple and effective, according to specific requirements.

pAD is an LCD with icons for remote wall-mounting in the room as a simple user interface, and features a built-in temperature and humidity sensor and time band management, for use in residential or smaller commercial/ services applications.

µC³ offers 3 types of different interfaces, one for residential/light commercial applications and installation in the room, one more complete graphic interface, also used as a remote service terminal for the complete management of the unit, or alternatively price competitive LED display that can be installed on the unit.

pGD⁰ is a more sophisticated graphic LCD for panel mounting, installation on the unit, or remote wall-mounting, for the complete control of the unit. Access divided by level and complexity via password, the availability of multiple languages and the use of icons make the ***pGD⁰*** an excellent hand-held instrument for servicing and setting up the unit.

pLD is a simple and competitive LED display with function buttons for installation on the unit, displaying the main variables and allowing access to the main unit configuration parameters.

*MCH2**T* is a sophisticated graphic LCD for panel mounting, installation on the unit, or remote wall-mounting, for the complete control of the unit.
Access divided by level and complexity via password, the management of the units by graphic icons and access to the complete list of parameters make this terminal an excellent hand-held instrument for servicing and setting up the unit.

µC²

µAD, an LCD with icons for remote wall-mounting in the room as a simple user interface, with built-in temperature or temperature plus humidity sensor and time band management, for use in residential or smaller commercial services applications.

µC² offers 2 different types of interfaces in addition to the built-in LED display, one simple-to-use model for residential or smaller commercial applications and with installation in the room, featuring a built-in sensor, the other a more complete graphic model, used for the complete management of the unit from remote.

Terminals	µC³	µC² SE	µC²
pLD local terminal	●		
pAD room terminal	●		
µAD room terminal		●	●
pGD remote terminal	●		
MCH2**T remote terminal		●	●
µAM area terminal	●	●	●

● default

Options

Single-phase fan speed control board

MCHRTF**** phase control boards are used to control of the speed of the condenser fans; 2 – 4 – 6 – 8 – 12 A, 230 Vac single phase versions are available.

I/O expansion

This device allows μC² and μC² SE to manage the second refrigerant circuit on chillers, heat pumps and condensing units with up to 4 hermetic compressors or 2 semi-hermetic compressors with extra 15 I/O.

Three-phase fan speed control board

FCS series devices are electronic voltage controllers that use phase control to vary the output voltage supplied to the load according to an input control signal. CAREL FCS devices can control asynchronous axial motors (defluxed and class H), for example fans, pumps, mixers, etc.

Programming key

The programming key can be connected to the ***μC sistema*** controllers to copy the complete set of control parameters. The controller does not need to be powered on during the parameter upload or download operations.

Electronic expansion valve driver - EVD4

EVD4 driver for electronic expansion valves with stepper motor is an electronic controller that manages the expansion in a refrigerant circuit. EVD4 driver can be connected via serial line to ***μC sistema*** controllers. The condensing pressure probe must be connected to the controller, which then sends the reading to the driver.
The driver also allows the management of the pump down function in the circuit.

Fan ON/OFF control board and PWM / 0 to 10 Vdc (or 4 to 20 mA) conversion board

The CONVONOFF0 modules are used for the ON/OFF control of the condenser fans.
The control relay features a switchable power rating of 10 A at 250 Vac in AC1 (1/3 HP inductive).
The CONV0/10A0 modules convert the PWM signal from μC²/³ to a standard 0 to 10 Vdc (or 4 to 20 mA) signal.

Ratiometric pressure probe

μC sistema allows the connection of the new ratiometric pressure probes (0.5 to 4.5 V signal). Reliable, high performance and cost competitive.

Hardware features	µC³	µC² SE	µC²	µC² exp.
Real Time Clock	O	O		
EVD4* driver connection for E²V	O	O	O	O
Programming key	O	O	O	
Built-in display		●	●	
Remote display	O	O	O	
I/O expansion		O	O	
Alarm log	O	O		
Variable value logging	O			
CAREL protocol - Modbus® RTU	●	●	●	
RS485 connection	O	O	O	
RS232/SMS connection	O			
LON FTT10 connection	O			
Number of analogue inputs	10	4	4	4
Ratiometric inputs	2	1	1	1
4 to 20 mA inputs	1			
NTC inputs	7	3	3	3
Number of free contact inputs	18	5	5	5
Number of analogue outputs	6	1	1	1
0 to 10 V outputs	4			
PWM outputs	2	1	1	1
Number of digital outputs	14	5	5	5
SPST relay outputs	12	5	5	5
SPDT relay outputs	2			
Index of protection	IP40 / IP00	IP65	IP65 / IP40	IP40
Power supply	24 Vac/dc	24 Vac	24 Vac	
Operating temperature	-10T60 °C	-10T55 °C	-10T55 °C	-10T55 °C
Mounting	DIN rail or open board	panel	panel or DIN rail	DIN rail

Software functions	µC³	µC² SE	µC²
Proportional control with timed logic on water/air return and outlet	●	●	●
P+I control	●		
Step circuit control	3	2	2
Condenser/evaporator control	2 step or mod.	1 step o mod.	1 step or mod.
Part-winding management	●		
Solenoid valve control and pump down management	●	● (only E²V)	
Sliding defrost in HP mode	●	●	
Electric heater step as independent antifreeze support for the evaporator	● (2)	● (2)	● (1)
Control and warning of component operating hours	●	●	●
Part load for high pressure in chiller mode	●	●	●
Preventive ventilation when starting with high outside temperatures	●	●	●
Stop compressors due to low outside temperature values	●	●	
Part load for low pressure (HP)	●	●	
Low noise in chiller and HP mode	●	●	
Set point variation and ON/OFF from time band	●	●	
Management of electronic expansion valve drivers	●	●	●
Event logging: alarms with FIFO logic	● (200 alarms)	● (25 alarms)	
Data logging of temperature and evaporation and condensing pressure (last 7 days)	●		
Smart key - download logged data to PC	●		
Send alarms by SMS	●		
Auto-tuning	●	●	
Self-diagnostics	●	●	
Automatic change-over	●	●	
Smart defrost	●	●	
Programming key	●	●	●

● default O optional