# CAREL

solutions for air-conditioning units and systems

room applications

# the integrated solution for air handling unit control

# Air handling unit control solutions

CAREL: leaders for more than 30 years in control and humidification systems for HVAC/R applications. Innovation, experience and technological development applied to air handling units (AHUs)

Integrated air handling unit control solutions based on programmable controllers and a complete range of accessories

Air handling unit applications feature a very wide variety of system types, with differing degrees of specificity. CAREL can supply solutions for all installations, whatever their complexity: modular controllers, a wide range of humidifiers and accessories to ensure increased integration, up to complete system supervision so as to ensure total reliability and maximum energy saving. The system approach is combined with flexibility, both in relation to hardware, i.e. architecture and components, and software, starting with the standard application dedicated to AHUs, completely customisable using 1tool

### Flexibility
Standard, modular and configurable solutions to adapt to the widest variety of needs.

### Intuitiveness
The graphic interfaces are easy to navigate and provide immediate access to information.

### Customisation
Programmable controllers ensure maximum customisation both in terms of control and user interface

# pCO sistema+

The advantages of an integrated solution for air handling unit control, based on programmable controllers and a complete range of accessories

## Configurability

New I/O chip technology means up to 10 channels can be configured as digital/analogue inputs or analogue outputs, so as to connect all types of probes and smart actuators for AHUs (inverters, dampers, valves, humidifiers, etc.).

## Programmability

The 1tool development environment allows complete software customisation: control logic, display of parameters and serial communication. pCO5+ can be programmed directly from a PC, using a "plug & play" key or via USB (on models where available).

## User interfaces

A complete range of programmable displays for all performance, price and appearance requirements. The high-tech and attractive touchscreen terminal can be used to create intuitive interfaces with complete information, ideal for integrating complex units such as AHUs.

## Technology

A new microprocessor guarantees high program execution speed, effectively controlling even faster transients. Trends in different variables or events (e.g. alarms) can be saved for long periods.

## Communication

pCO sistema+ offers up to 7 communication ports to interface via the most commonly-used protocols. All pCO sistema+ components can be connected to pLAN or BMS networks, for remote system management. Fieldbus can be used to control smart actuators, i.e. devices featuring serial communication.

## Backward compatibility

The new pCO5+ controller guarantees backward compatibility with the entire range of pCO3 and pCO5 controllers, both regarding the software and hardware, thus protecting and guaranteeing the investments and know-how of CAREL customers.

## Energy saving

Controllers, accessories and management algorithms designed to achieve maximum energy saving

## Fieldbus

System solution based on serial integration of devices: optimised management of a higher quantity of information

## Connectivity

Programmable controllers with plug-in options for communication with the most commonly-used BMS systems.

# Integrated solutions for Energy Saving

Increasingly advanced and complete solutions to meet the demands of manufacturers and installers. Maximum performance and compatibility

**1**

## Temperature and humidity probes

CAREL offers a complete range of temperature and humidity sensors for different uses: probes for residential or industrial environments, duct-mounted and immersion, all featuring special care in the design and the possibility of RS485 communication via CAREL and Modbus protocols.

**4**

## Differential pressure transducer

Differential pressure transducers use a sensor to provide a voltage or current signal, calibrated and compensated for different temperatures. These are ideal for measuring low pressure values in air-conditioning systems, rooms, laboratories and cleanrooms (non-corrosive atmospheres).

**6**

## Inverter

Inverters represent the maximum in efficiency, as they modulate unit operation and consequently optimise energy consumption. The wide operating range, easy installation and high level of protection against electromagnetic disturbance mean these devices can be easily integrated into the system.

**2**

## Air quality probes: VOC, CO2, CO2+VOC

These analyse air quality and are ideal for ventilation and air handling systems in residential and commercial environments. Main functions:
• air quality measurement;
• analysis of contamination by polluting gases;
• sensitivity threshold settings;
• efficient management of room ventilation.

**5**

## Differential pressure switch

Ideal for control and safety applications, signalling when fans stop or filters are blocked.
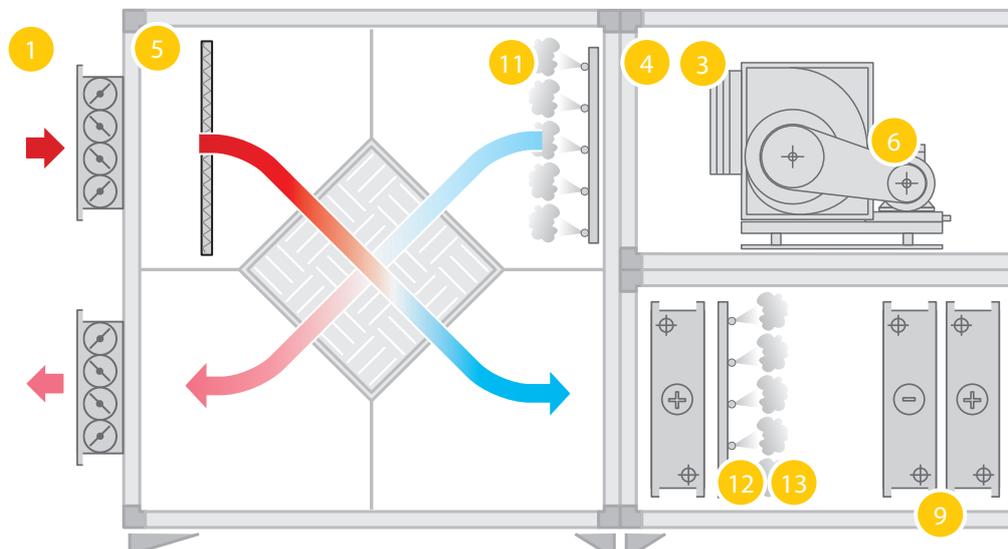
**7**

## Smoke and fire detector

These devices promptly detect dangerous and sudden rises in temperature or increase in smoke concentration.

**3**

## Air or gas flow switch

These measure absence or insufficient flow-rate in ducting, activating a switch.

## Evaporative Cooling: energy saving and lower system capacity

In an AHU, in certain circumstances the supply air can be cooled by humidifying it adiabatically (Direct Evaporative Cooling); the same is also true for the exhaust air, which can be cooled without limits in terms of humidity. This in turn lowers the temperature of the incoming outside air, via a heat exchanger, reducing power consumption and maximum cooling capacity.

### Electrical panels

Carel can supply complete electrical panels for AHU control, integrating the power and control electronics, using high quality components and developing solutions in compliance with system requirements and standards in force.



### pCO sistema+

Flexibility, connectivity, integration, energy saving and backward compatibility: the keys to the CAREL offering for maximum efficiency in the control of HVAC/R applications.



### Isothermal humidifiers

CAREL offers a range of isothermal humidifiers with different capacities: electric heaters, immersed electrodes and gas-fired boilers, complete with all the accessories needed for installation in AHUs. In particular, the gaSteam model offers an adjustable steam flow-rate and very high thermal efficiency, fully exploiting the cost advantages of gas fuel.



### Frost protection thermostat

This protects heat exchangers (evaporator coils) by managing electric heaters, making sure the temperature never falls below the preset safety value.
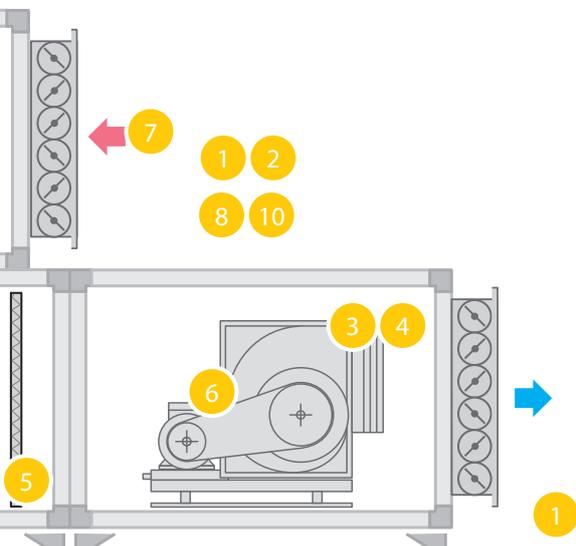


### Evaporative Cooling

Air can be effectively cooled by exploiting the evaporation of atomised water: the change in state absorbs energy from the air, which is cooled. Evaporation of 100 kg/h of water absorbs 69 kW of heat, for power consumption of less than 1 kW.



### Adiabatic humidifiers

Adiabatic humidifiers exploit the property of atomised water to provide significant advantages in terms of accuracy and efficiency in temperature and humidity control. Precise and continuous modulation of humidification capacity and very low energy consumption make Humifog and optimist ideal solutions for application in air handling units, in both cooling and heating operating modes.

# Standard AHU control application

The standard application guarantees maximum adaptability to every type of air handling unit

This software solution incorporates all of CAREL's know how in the management of air handling units. The type of AHU to be controlled is not based on selecting pre-configured units, but rather the actual devices installed on the AHU (ON/OFF or modulating devices: dampers, coils, humidifiers, fans, etc.) and then setting their parameters. The position of each input and output can be chosen, then making changes on site during installation. Configuration is made simple by an extremely intuitive and customisable user interface, set out into menus divided by macro-area: only the required parameters relating to the functions that have been enabled are shown on the screens.

## Full connectivity
- Up to 6 serial probes over RS485 Modbus
- Integration of fan inverters via serial
- BMS options for interfacing via the most common supervision protocols
- Integrated MP Bus® solution for controlling Belimo serial actuators

## Management of main AHU functions
- Various models of supply and return air fans, ON OFF and modulating;
- control of outside air, mixing and exhaust dampers;
- control of cooling and heating operation using PID algorithms with coil management;
- freecooling/freeheating based on temperature and enthalpy;
- management of heat recovery units;

- cascade control of different devices;
- humidity control with dehumidification and isothermal and adiabatic humidification;
- alarm management with log;
- management of up to 4 time bands per day, plus management of days of the week and special days;
- 4 generic control loops available for additional functions.

## Custom versions
Using 1tool, the development environment for CAREL programmable controllers, customers have a library of standard modules available that can be fully configured to optimise control of the main system components or integrate different devices.

# Solutions for connectivity and communication

pCO sistema: CAREL's experience in supervision and integration. Information management as the basis for energy saving

Up to 7 communication ports available with the most commonly-used protocols in HVAC/R applications, for complete system management: pLAN, BMS1, BMS2, FieldBus1, FieldBus2, USB host, USB device.

## pLAN

One multi-master RS485 communication port to connect terminals and manage distributed intelligence

## BMS

One RS485 BMS port, as standard, also available in the optically-isolated version, configurable with CAREL and Modbus® RTU protocols. A vast range of optional cards can also be installed during commissioning, to interface with the most commonly-used communication standards: Modbus® (RTU & TCP/IP), BACnet™ (MS/TP & IP), SNMP, LonWorks®, Konnex® and Johnson METASYS®.

## Fieldbus

One RS485 FB port, as standard, also available in the optically-isolated version, configurable with CAREL and Modbus® RTU protocols. This can be used to manage smart actuators such as inverters, EC fans, variable flow pumps, etc. without the cost of an additional card.

**pCOWeb/Net**    **LONWORKS**    **Konnex®**    **RS485**

BACnet™    ECHELON® THE LONWORKS COMPANY    KNX    tera

HTTP    pupro

e-mail

SNMP    OPC

Modbus® TCP/IP    Modbus® RTU

remotepro

RS485 Modbus®

RS485 CAREL

MP BUS TECHNOLOGY BY BELIMO

tLAN

# Solutions for system monitoring and supervision

Instruments for centralised remote system management. Supervision for efficiency

Completing the solutions for AHUs, a global monitoring and supervision solutions ensures synergic management of the entire installation. Easy to use, complete control over the systems managed, sophisticated configuration for alarm notification and analysis tools are all features that make CAREL supervisors a winning solution in terms of reliability, security of information and energy saving.

## tERA: the service ERA

A cutting-edge proposal for information management and optimising the performance of complete systems. Reduced maintenance costs and improved customer service, thanks to remote analysis. The ready-to-use solution for your service center: security and flexibility in providing your customers service... with just a few simple clicks!

## Global monitoring

CAREL can propose the best possible system to suit specific needs.

The embedded plug&play solution and tailor-made software reduce installation and configuration times. The data are saved in a specific database, guaranteeing integrity and reliability of the information managed.

### PlantWatchPRO

Compact embedded solution for small systems with max. 30 devices.

### PlantVisorPRO

Embedded solution for medium/large installations up to max. 300 devices.

### RemotePRO

Software solution for centralised servers, for quick and optimised maintenance of all systems installed.