



CAREL

Integral control solution

Air Handling Units

T e c h n o l o g y & E v o l u t i o n

Advanced technology for reliable and flexible custom controllers



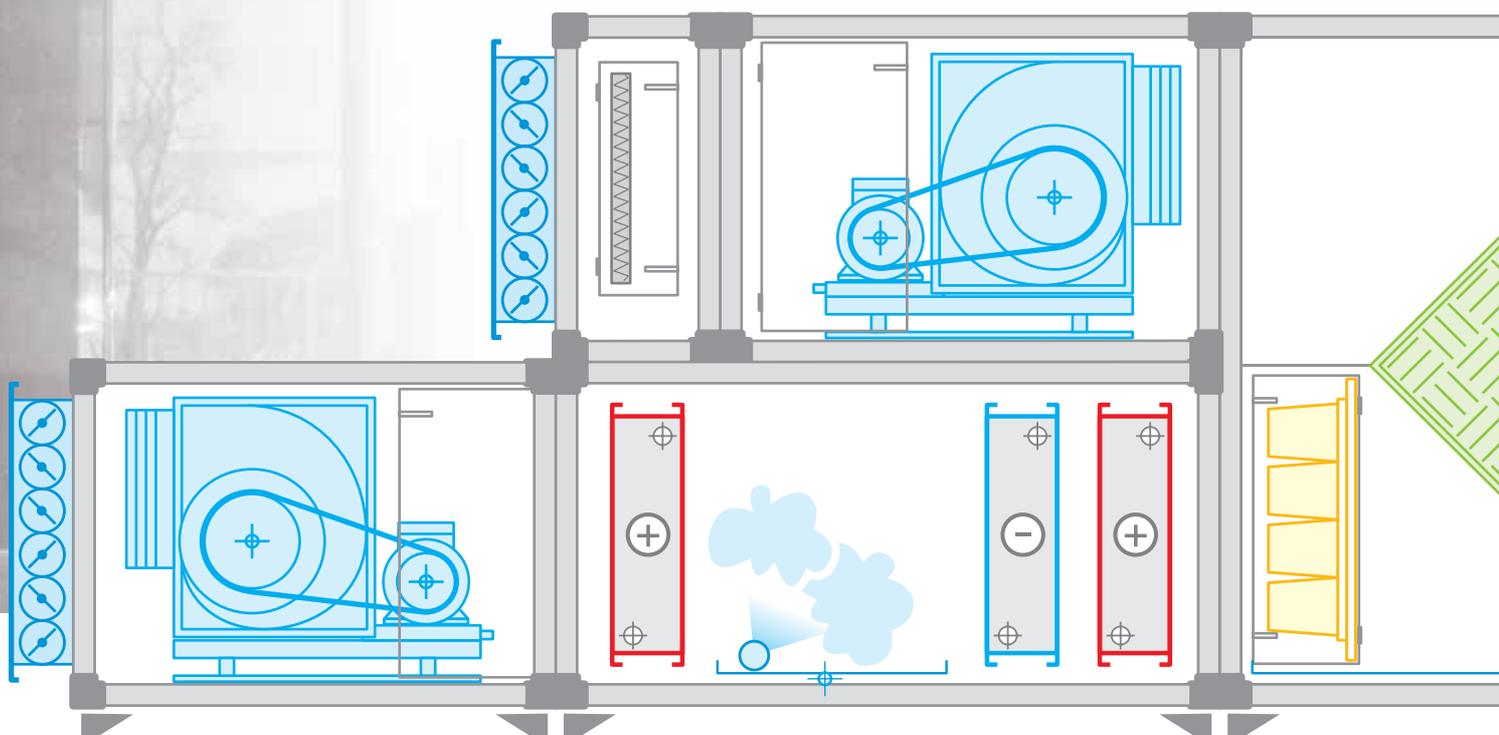
CAREL has been dealing with the design and production of electronic controllers and supervision systems for air-conditioning and refrigeration applications for over 30 years. The quality and innovation of its products and its increasing sales successes make CAREL today one of the world leaders in the sector.

CAREL's main customers are manufacturers (OEM) and installers, assisted by an extensive sales organisation present in the main countries around the world.

The CAREL solution for the Air Handling Unit market completes the range of solutions for air-conditioning and refrigeration, offering all the components required for the control of the different types of units.

Electrical panels, pressure, temperature, humidity and air quality probes, differential pressure switches, programmable controllers, humidifiers, new programming tools, supervision and technical service from the office and in the field, all provide manufacturers, designers and installers new opportunities for the control of even the more sophisticated installations, for a limited cost. All the above can be integrated into the main supervisory systems, as well as using the CAREL solution: the PlantVisor system.

CAREL



pCO sistema

the range of programmable controllers, terminals and accessories has been enriched by the pCO^{XS} controller, compatible with the BELIMO MP-Bus[®] system.

Software

a new standard software is available for controlling 24 different pre-configured systems, selected from the most commonly-used models available.

Sensors

new differential air pressure transducers, air quality probes, differential pressure switches and air flow switches, in addition to the vast range of temperature, humidity and pressure probes.

Electrical panels

standard or customised, sized for supply and return fans with one or two steps, with either direct or star/delta starting and power ratings of up to 75 kW.

Technical service

CAREL has extended its network with the addition of new service centres, providing service both during the design phase and for the commissioning of the application.

Remote management

the pCO sistema controllers can be interfaced to the main supervisory and remote management systems, using the more commonly-used communication protocols, such as Modbus[®], BACnet[™], LON, and TCP/IP.

The integral solution for the control of AHU

Temperature and humidity probes

CAREL has developed an entire range that can satisfy all the needs of installers and HVAC/R manufacturers for the control of their humidifiers. The range includes temperature and humidity sensors for different applications, featuring socket installation, duct installation, in residential or industrial environments.



Air quality probes and combined CO₂+VOC probes

These analyse the quality of the air using an SnO₂ mixed gas VOC (Volatile Organic Compound) sensor and a CO₂ sensor with a range from 350 to 2000 ppm:

- measurement of the air quality in offices, hotels, meeting rooms, homes, shops, restaurants, etc.;
- quantitative analysis of contamination by polluting gases.



Differential pressure transducer

The differential pressure transducer uses a new ceramic sensor.

It provides a voltage or current signal, calibrated and compensated for the temperature.

This is ideal for measuring low pressure values in Air-Conditioning systems, rooms, laboratories and clean rooms (air and non-corrosive gases).

Accessories

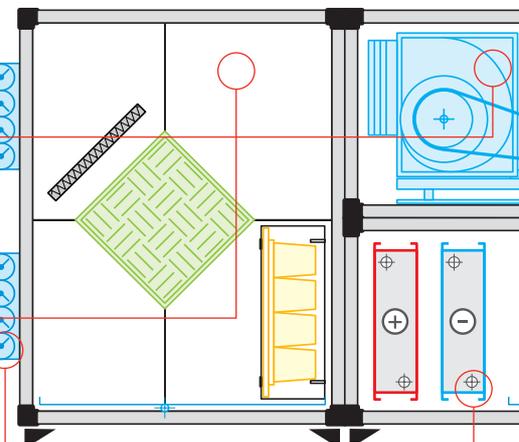
CAREL supplies differential air pressure sensors for filters, fans, air ducts and air-conditioning and ventilating systems in general.

CAREL also supplies flow switches for controlling the flow of air or non-aggressive gases inside the distribution ducts of air-conditioning or air handling systems.

Servo controls for valves and dampers

All the CAREL controllers can manage any servo control for dampers and valves.

BELIMO® has been chosen as our preferred partner for the supply of the actuators.



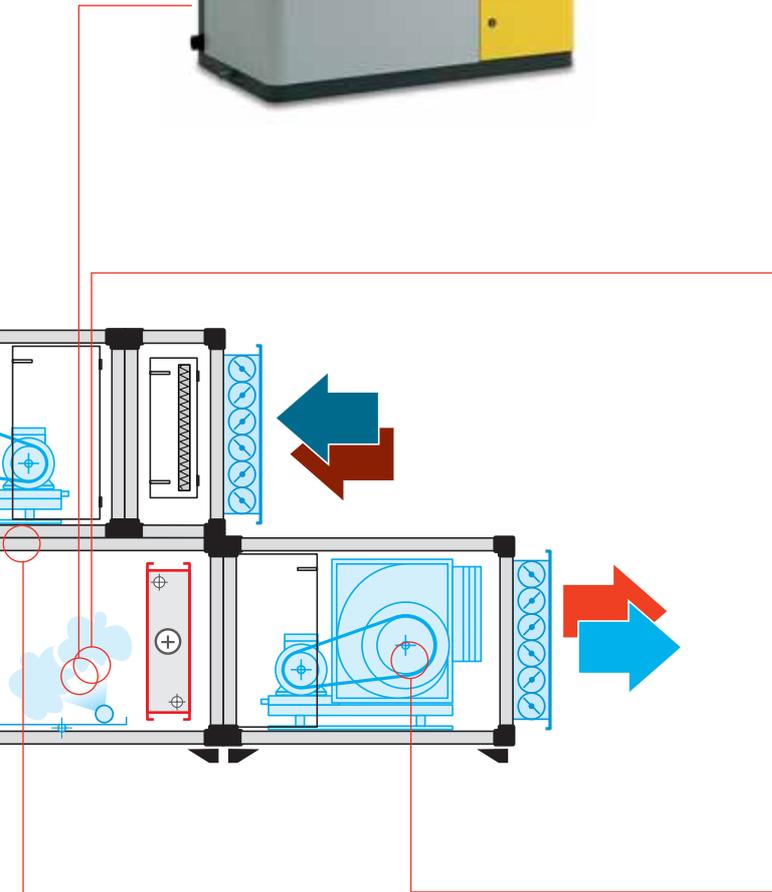
MP2-BUS



Isothermal humidifiers

CAREL produces a complete range of isothermal humidifiers, with different outputs, using electric heaters, immersed electrodes or gas boilers, and complete with all the accessories required for application in the installations.

In particular, the high energy efficiency and low running costs of gaSteam, our gas-fired humidifier, make this model highly competitive compared to adiabatic humidifiers, while still maintaining the advantages of isothermal humidification.



Adiabatic humidifiers

CAREL produces a complete range of adiabatic humidifiers, with different outputs and using atomised water (with and without compressed air).

The high efficiency of these units and the complete absence of recirculated water prevents any dangers associated with the Legionella bacteria.



The pCO sistema range of controllers

The pCO sistema is the result of CAREL's extensive experience in the design and production of programmable controllers for HVAC/R units. The pCO sistema consists of programmable controllers, user interfaces, software tools for developing applications, gateways and communication interfaces, remote management systems, etc.



Electrical panels

CAREL manufactures a complete range of electrical panels, available in versions for 1 or 2 fans, with direct or star-delta starting, for the various different controllers in the pCO sistema family, and can also supply special versions based on customer specifications.

The range of controllers for AHU



pCO³

The pCO³ programmable electronic controller represents the top of range of the pCO sistema control boards, and is designed for many different applications in the field of air-conditioning. The technology used in the pCO³ allows connection to some of the more commonly-used serial communication standards, without requiring additional gateways.

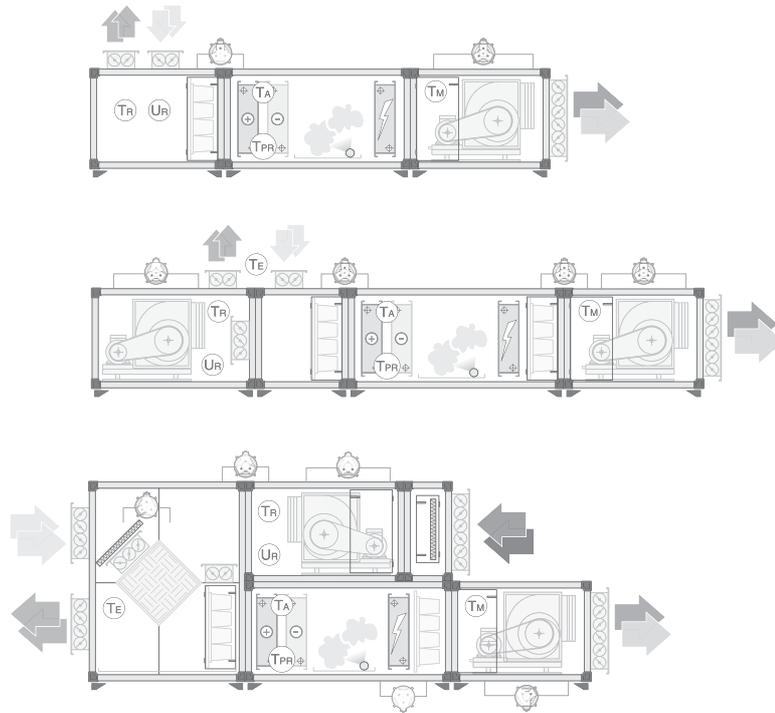
pCO^{XS}

The pCO^{XS} derives from the need to provide the power of the pCO sistema series programmable controllers to those applications that had until now only been covered by parametric controllers. Using this new controller, the control software for single-circuit chillers and heat pumps, small roof-top units and precision air-conditioners can be quickly customised based on the specific needs of the individual manufacturer.

Terminals

The range of user interfaces that can be combined with the pCO sistema controllers and control modules guarantees the OEM the optimum solution for each application.

The pCO series terminals are available in the panel or wall-mounted version, with LED, alphanumeric LCD and graphic displays, meaning that the messages can also be displayed in Chinese, Cyrillic, Arabic, Japanese.



Software for the Control of Air Handling Units

The new application for Air Handling Units has been designed to simply and flexibly satisfy the highest possible number of functions for the main models of Air Handling Unit currently on the market. A total of 24 different pre-configured systems are available, and can be selected by setting just one parameter.

For each model, the tables of inputs and outputs are provided, sized for the different pCO series controllers, with or without built-in terminal.

For each individual module of the air handling unit, all the main functions required for the operation of the system are available.

The following is a list of the main modules managed by the standard application:

- outside air and air mixture damper, with freecooling, free-heating and enthalpy control;
- intake and supply fan, with two steps or inverter control;
- water heating coil and electric heaters, with pre-heating management;
- water cooling coil;
- direct expansion with condenser control;
- direct expansion with three ON/OFF steps;
- cross-flow, rotary and double coil heat recovery unit;
- supply and return air filter;
- adiabatic/steam humidification with ON/OFF or modulating control;
- built-in daily/weekly timer;
- CAREL/ Modbus® supervision incorporated.

CAREL & BELIMO®

The market for the control of air handling systems has seen the launch of a new integral solution for all types of units. The partnership between BELIMO® and CAREL makes available all the control components required, from the controllers to the air dampers, from the temperature probes to the water valves, including the new-concept linear ball valves. The family of programmable controllers has been expanded with the addition of a new controller, the pCO^{XS}, featuring three serial lines and able to communicate with all the supervisory systems present on the market and with all the MFT and MFT2 series actuator via the BELIMO MP-Bus®, as well as with the other pCO sistema series controllers, via the pLAN network.

MP-BUS®
TECHNOLOGY BY BELIMO



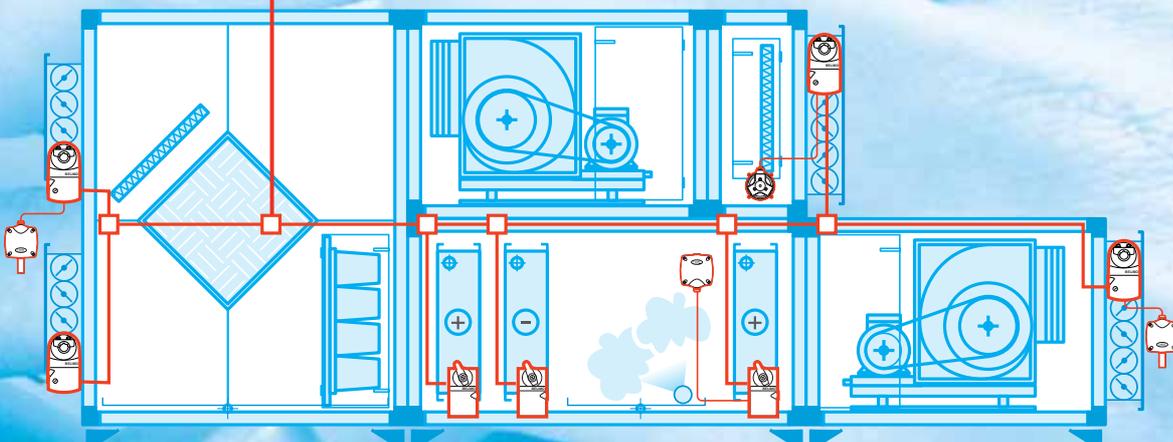
MP-BUS®
TECHNOLOGY BY BELIMO



Management of actuators over the digital MP-Bus®

The versions with BELIMO MP-Bus® protocol only require one 3-wire cable (2 for the power and 1 for the signal) to easily connect all the servo controls (max. 8) on the unit, as well as a sensor, active or passive, directly to each actuator, with any layout.

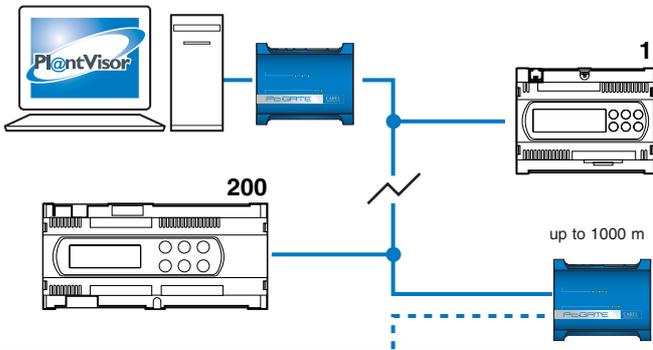
This allows the control of large installations for limited costs, thanks to the flexibility of the system and the simplicity of the connections.



BELIMO®

Web-based monitoring & telemaintenance system

Pl@ntVisor



PlantVisor is the CAREL monitoring and telemaintenance system based on a web server that allows ease of access to the information, alarm management and operating flexibility. CAREL proposes different solutions according to the type of installation:

- PlantVisor Enhanced, PC-based solution, for systems with a maximum of 200 refrigeration and air-conditioning utilities;
- PlantVisor Enhanced Remote, the program for the remote management of the PlantVisor Enhanced systems.

Why a Web Server?

A Web Server is a program that can generate and serve HTML pages to be displayed by an Internet browser.

All the versions of PlantVisor are Web Servers that can collect the data from your installation and make them available using Microsoft® Internet Explorer. PlantVisor Enhanced Local can be accessed via modem using PlantVisor Enhanced Remote and/or a PC with Microsoft® Internet Explorer.

If PlantVisor Enhanced Local is installed on a PC in a LAN network, the information from the installation can also be accessed by other PCs on the same network. PlantVisor can also be published on the web if a permanent Internet connection is available by different levels of password.

PlantVisor can be used to connect up to 200 CAREL instruments in a RS485 serial network, using the Pc-GATE RS232/485 serial converter.

Web-GATE



Using Web-GATE, the individual controllers can also be economically connected to Ethernet™ networks and consequently exploit the power of the TCP/IP protocol.

In fact, Web-GATE makes all CAREL controllers compatible with the most widespread communication standard in the world, the TCP/IP protocol, related to the Ethernet™ networks.

Web-GATE is also an SNMP gateway. It in fact converts the CAREL communication protocol to the Simple Network Management Protocol (SNMP), the protocol used to send data from the instruments on the Ethernet™ TCP/IP network to a local or remote supervisor for subsequent processing.

One of the main functions performed by Web-GATE is the Web Server function, using the HTTP (Hyper Text Transfer Protocol) standard.

pCO Web



pCO Web is a board for the pCO sistema controllers that interfaces the latter with the emerging protocols (BACnet™ and SNMP) in HVAC, and is based on both the physical Ethernet™ and EIA-485 standards.

This therefore allows connection to the following networks:

- SNMP v1, v2, v3 networks;
- BACnet™ Ethernet™, BACnet™/IP, BACnet™ MS/TP networks;
- LANs or the Internet.

With the web server capabilities of pCO Web, the user can download, via FTP, the HTML pages relating to the specific application and then use a browser for the remote management of the installation.

Integration with BMS

All of the pCO sistema series controllers can be connected to the more commonly-used supervisory systems, either directly or using additional boards. The following are the protocols and the connection methods used. The table lists the CAREL product codes and the codes of the SIEMENS, Honeywell and Johnson products.

Modbus®

The pCO sistema series controllers can communicate directly using the Modbus® protocol.
 Type of protocol supported: Modbus® slave, RTU mode;
 communication standard RS485 and RS232.

LONWORKS®

The pCO sistema series controllers, using the appropriate serial card, are LonWorks® compatible. The RS485 and FTT10 electrical standards are supported. CAREL is a LonMark® Partner.



This is the protocol designated in 1995 by ASHRAE. CAREL provides a gateway via which all CAREL controllers can interface to BACnet™ systems.
 Type of protocol supported: BACnet™ - Point-To-Point;
 communication standard RS232.



TREND is a building automation system that is very widespread above all in English-speaking countries, and in Europe in general. The pCO sistema series controllers, using an appropriate serial card, are TREND compatible.



METASYS® is a building automation system designed by Johnson Controls.

Johnson itself handles the integration into its system of the software for the control of the devices being interfaced.



OPC is an industrial standard created by a consortium of companies, in collaboration with Microsoft®, to standardise the drivers for proprietary devices. Using the CAREL OPC server, any Windows® OPC client application (SCADA, supervisors, management software, etc.) can communicate with all CAREL devices in user-friendly OPC mode, without requiring a gateway.

protocol table

Standard	CAREL		SIEMENS		Honeywell		Johnson	
	HW level	SW level	HW level	SW level	HW level	SW level	HW level	SW level
Modbus®	PCO*004850	Table of references from Application	IOCAR (for Desigo Unigr and Desigo PX systems)	DESIGO INSIGHT with direct integration into the management station		Cimetrics BACstac 3.2 Gould Modbus® protocol functions 01-06. Serial and Redundant Serial	METASYS® Integrator	Communication driver on MIG300
	PCO*00MDMO		NICAR (for Desigo Integral systems)			Modbus® TCP and Modbus® RTU supported		
BACnet™	GATEWAYBNO	Table of references from Application	DESIGO PX with FTT interface only	DESIGO INSIGHT with direct integration into the management station			METASYS® Integrator	BACnet™ PTP (under development)
Lon-ECHOLON	PCO*0000F0	Profiles	DESIGO PXR with XIF file or plug-in modules	DESIGO INSIGHT with direct integration into the management station		LonMaker 3.0 LNS 3.05	Network Supervisor (NCU) or alternatively METASYS® M-series OWS	
	PCO*0000R0	Special appl.						
LAN TCP/IP	Web-GATE	HTML appl.		DESIGO INSIGHT		S.O. NT4.0 SP6a S.O. WIN2000 Server/Prof.		
SNMP	Web-GATE	Table of references from Application (MIB)		DESIGO INSIGHT		Supports email via SMTP and SNMP "traps" Supports PET/PG1 and UCP protocol	METASYS® M-Series OWS	
CAREL PROT.	PCO*004850	CAREL prot.					METASYS® Integrator	Specific driver for database connection
	PCO*00MDMO							

*= 1 or 2 depending on the model

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