



Solutions for integration
of HVAC systems

Connected Efficiency

Ready-to-use solutions for integration of HVAC systems

A range of intercommunicating and integrated controllers and accessories for the efficient management of climate control and air-conditioning systems.

CAREL offers a complete solution for the control of HVAC systems.

The goal is to ensure maximum personal comfort while optimising energy consumption and reducing environmental impact.

CAREL proposes a new ready-to-use solution for managing all of the components in a water-source air-conditioning system. Efficient and distributed control of all the parts of the system: heating production, cooling production, fluid distribution circuits, domestic hot water, solar thermal and the air-conditioning and ventilation units.

Just like in a perfect team game, the systems share information with each other, so as to exploit their potential in synergy and increase overall system energy efficiency, without sacrificing comfort.

up to
20 %
energy savings



Flexibility

A range of completely configurable products, able to adapt to numerous system layouts, from the simplest to the most complex.



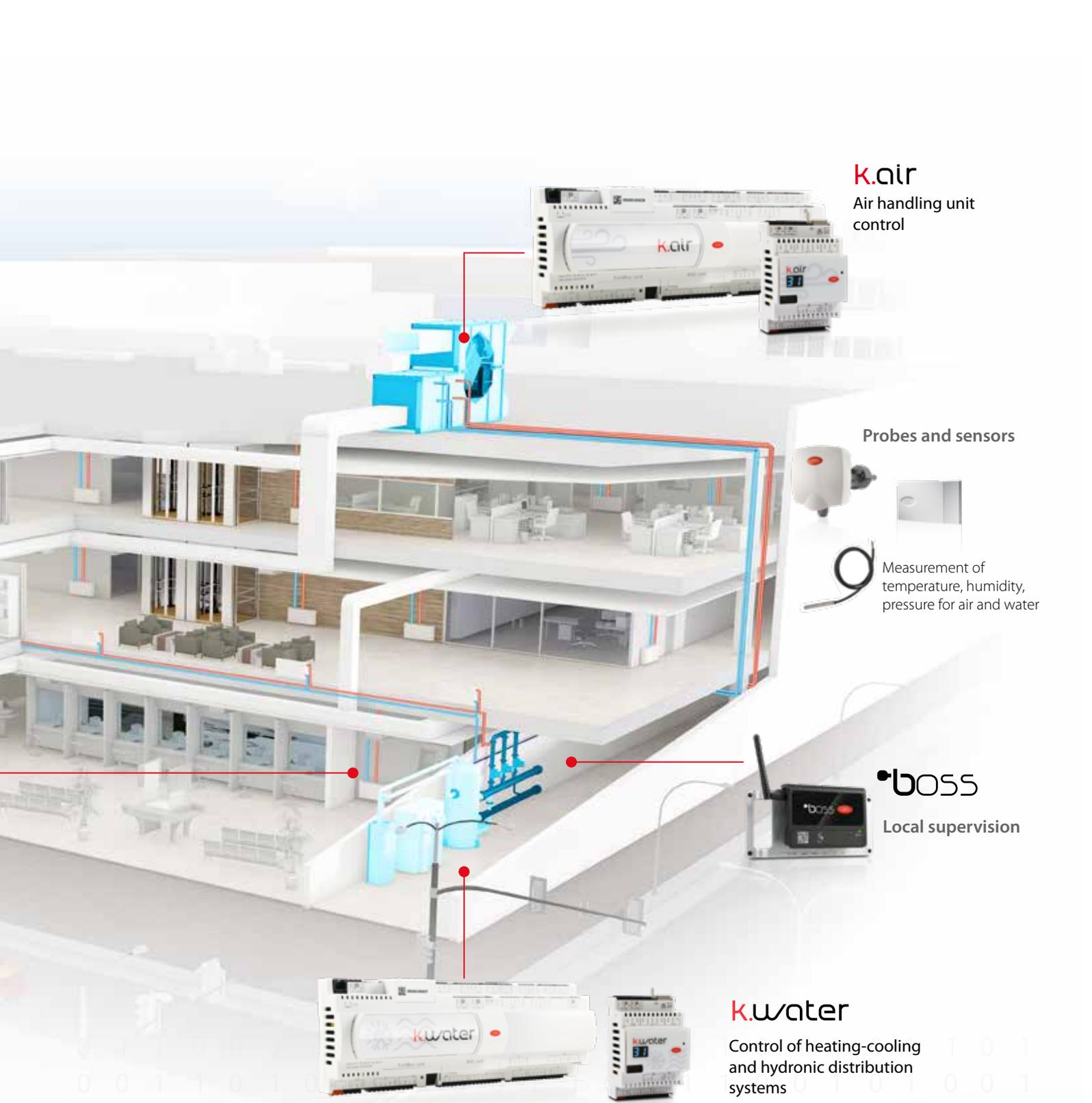
Simple commissioning

Faster design and commissioning time using selection and configuration tools.



Integration

Open system that uses the most common standard building automation protocols - BACnet™, Modbus®, Konnex - both over TCP/IP and RS485.



k.air

Air handling unit control

Probes and sensors



Measurement of temperature, humidity, pressure for air and water

boss

Local supervision

k.water

Control of heating-cooling and hydronic distribution systems

Cloud remote monitoring

CAREL provides a cloud platform for simple and direct access to the sites where k.water and k.air are installed, without requiring the installation of additional software.

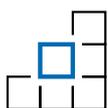
This makes it possible to:

- **control the system**, switch it on, switch it off and set time schedules from a PC or tablet, wherever you are;

- **improve maintenance** by reducing the costs of service through alarm notifications, reports and real-time monitoring of operation;
- **optimise operation** by analysing the consumption and operating data history, even across multiple sites.

Complete architecture for energy efficiency

A standard solution, from field devices to remote supervision.



Completeness

A ready-to-use and complete solution for HVAC systems, starting from

field devices up to local and remote supervision. A reliable solution, with tested and validated architecture, backed by complete documentation, and ready for rapid implementation by the designer and installer.

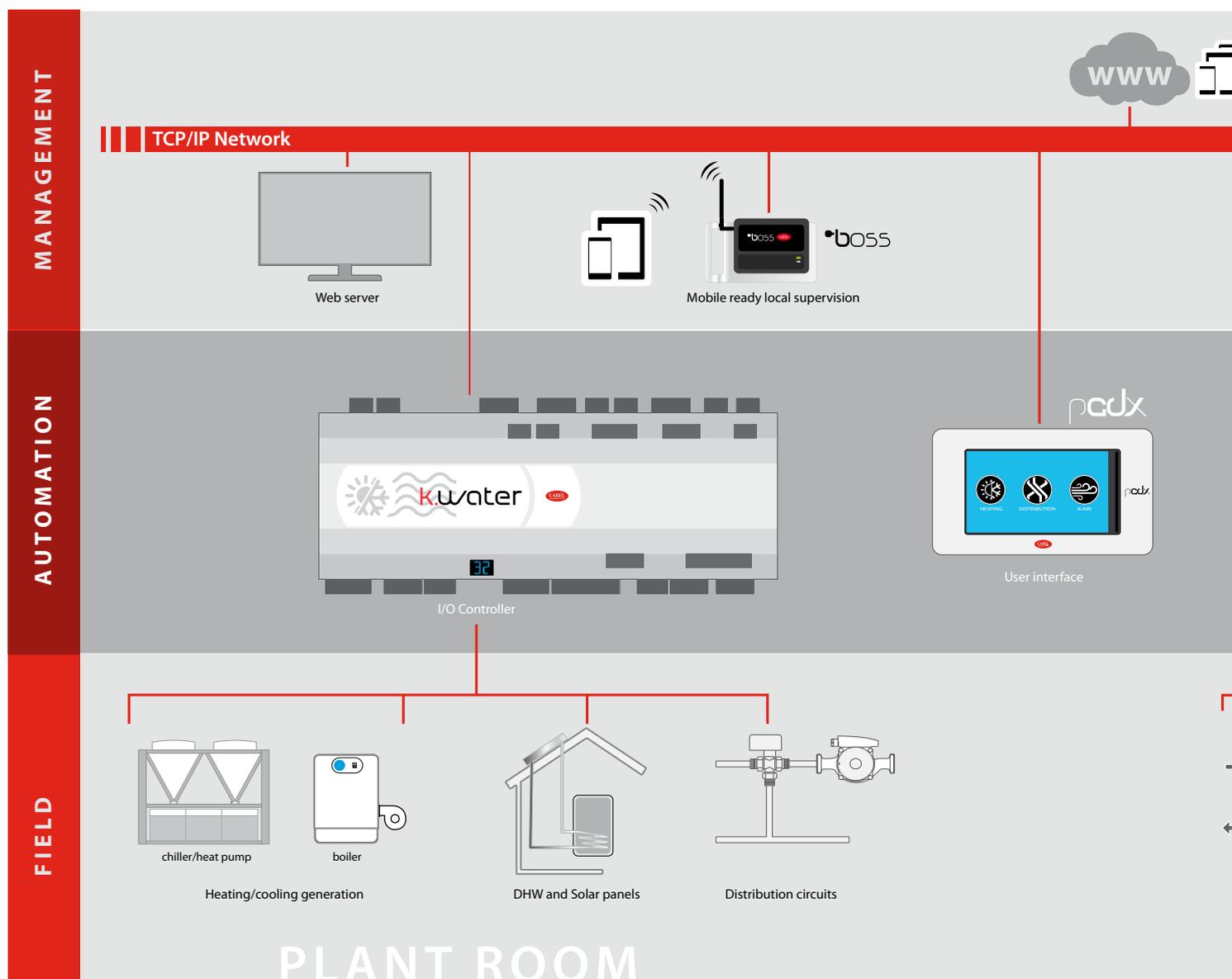


Efficiency

The control logic implements the most advanced automation

features, offering the possibility to obtain the highest energy savings, as defined by standards on energy efficient buildings.

Advanced schedulers, automatic set point adjustments based on indoor and outside conditions, are optimal tools for adapting energy consumption to actual building/system needs.

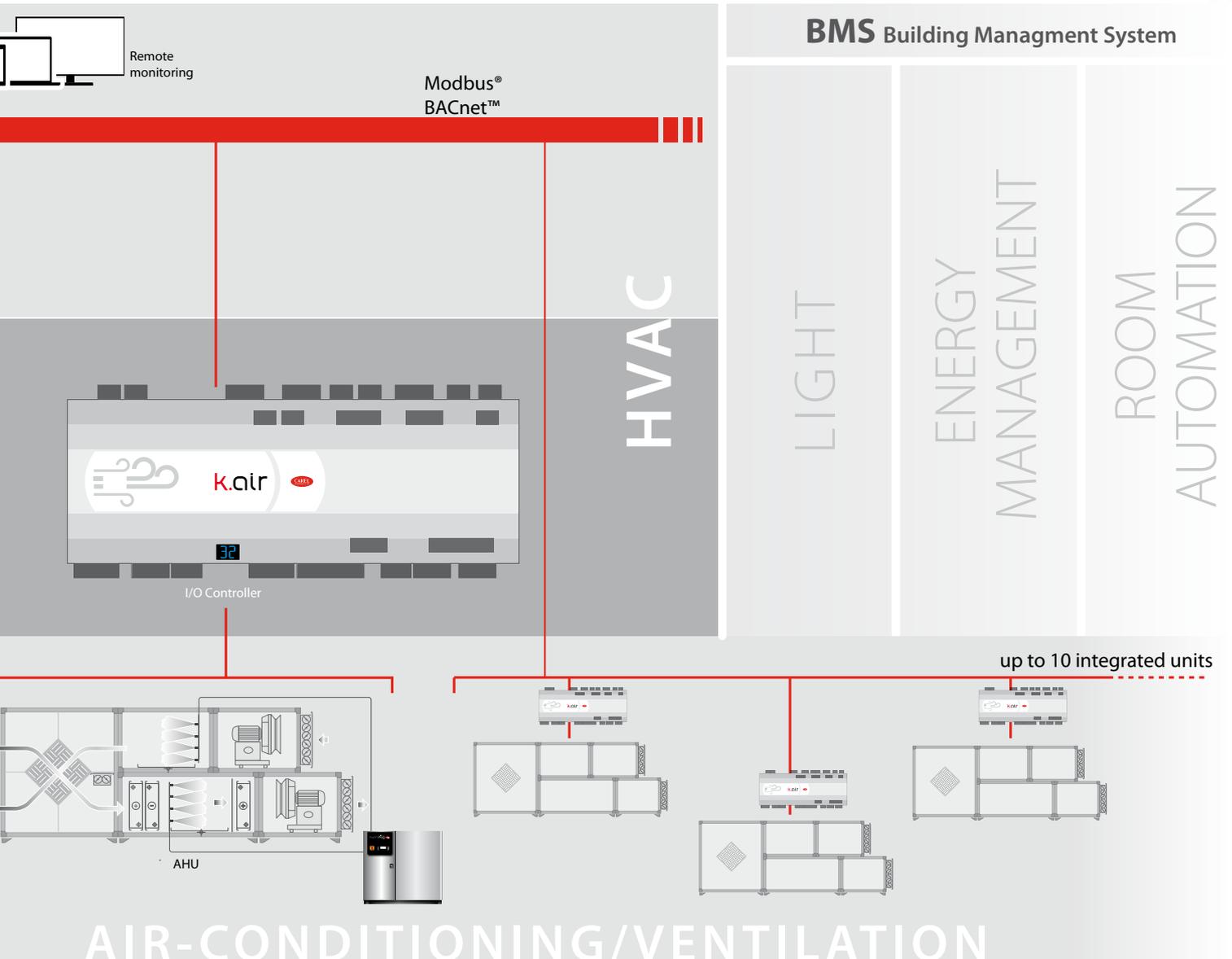


PLANT ROOM



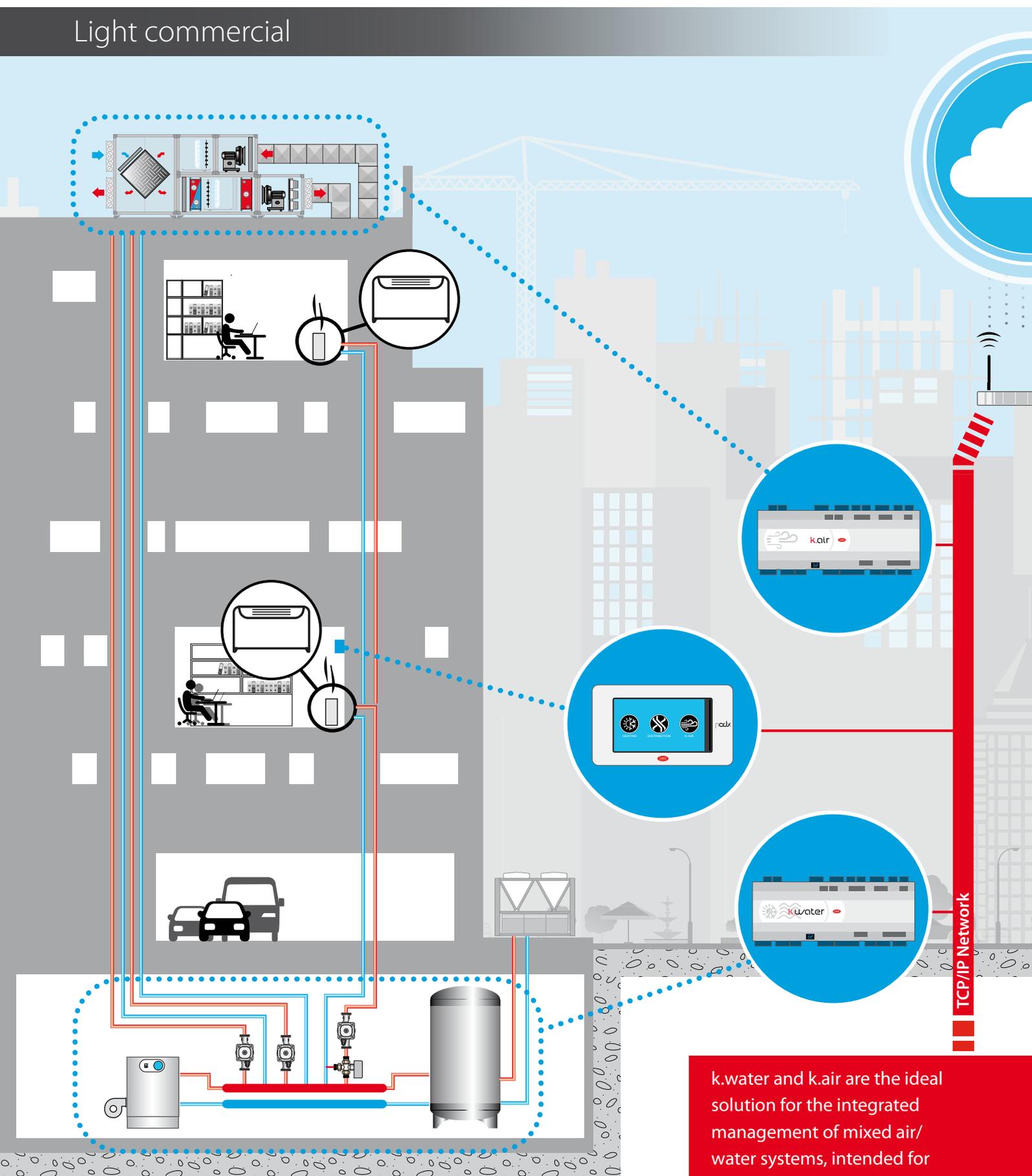
Usability

Thanks to the built-in webserver, a set of graphic pages for complete system management is available from the moment it is switched on. A single touch screen display can be used to manage the various k.water and k.air controllers connected to the same local network.



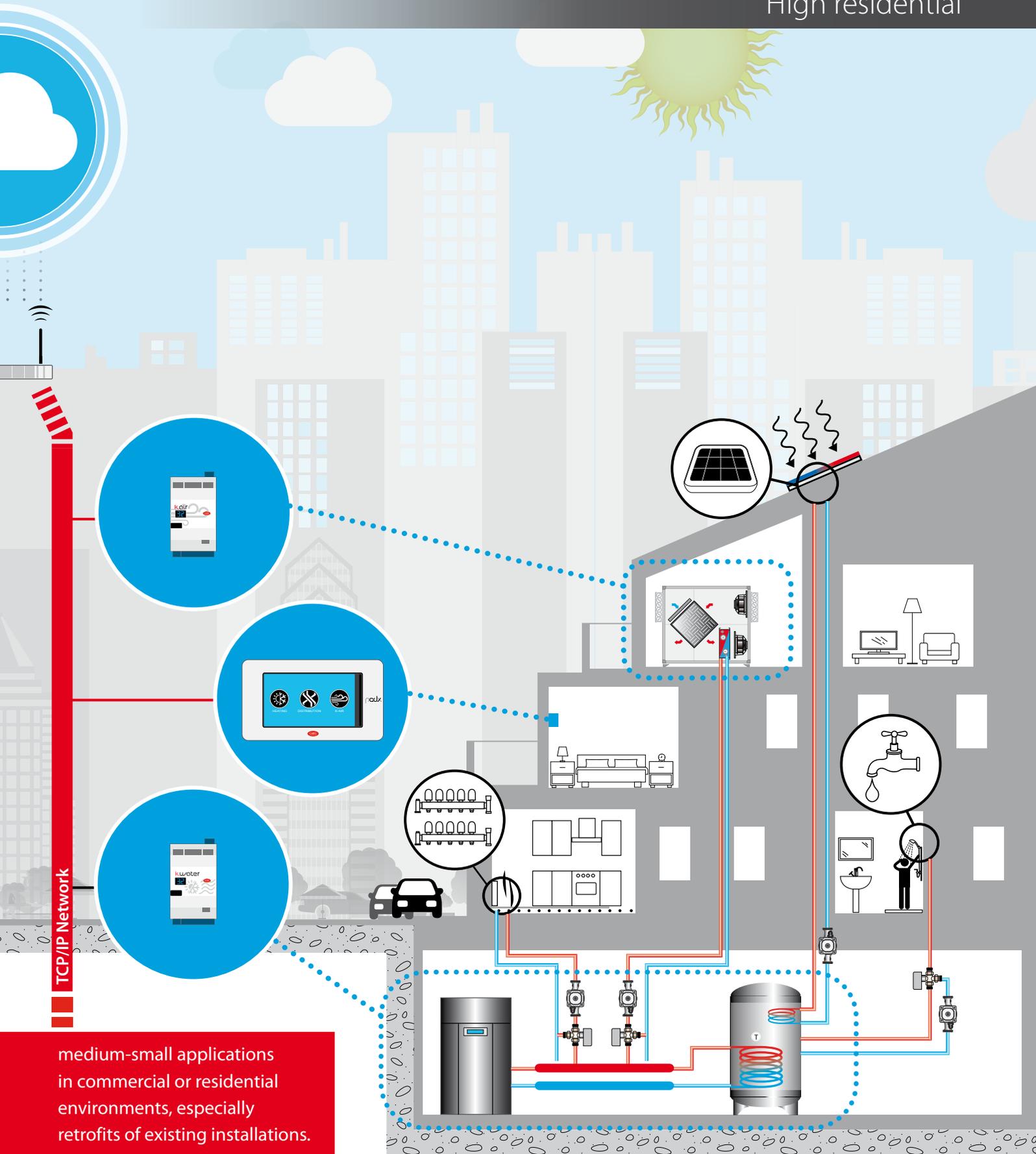
Integrated management of systems for commercial or residential applications

Light commercial



k.water and k.air are the ideal solution for the integrated management of mixed air/water systems, intended for

High residential



medium-small applications
in commercial or residential
environments, especially
retrofits of existing installations.

Programmed controller for central heating and cooling.



k.Water is the new solution for the integration and control of hydronic systems for air-conditioning.

It manages the heating, cooling, domestic hot water and solar thermal functions by controlling the request send to the heating or cooling devices, depending on demand from the hydronic circuit or the room terminals.

The maximum configuration can manage systems comprising:

- central heating system, with 2 boilers and/or 2 modulating or ON/OFF heat pumps chillers;
- distribution system, with 10 control circuits, configurable according to various system layouts.

Main functions

- **Comfort**
 - Heating with delivery water temperature control according to climate curve and correction based on ambient temperature;
 - Cooling with control of delivery water temperature, compensation based on outside temperature, room dew point control and activation of dehumidification;
 - Activation of heating/cooling devices priority based on outside temperature.
- **Programming**
 - 10 weekly programs with 4 different daily profiles based on 10 time bands and 3 operating modes (comfort, eco, OFF).
 - Annual calendar with 10 special days and 3 holiday periods.

- **Safety**
 - Legionella prevention cycle for DHW circuits;
 - Frost protection function with double threshold;
 - Pump management with anti-seize, backup and rotation functions.
- **Energy consumption**
 - Integration of up to 3 mains analysers for power consumption.

Specifications	MINI version	LARGE version
	P+DW00FHD0LFK	P+5W0SFC000LK
I/O		
Digital outputs	6	18
Digital inputs	2	18
Analogue outputs	2	6
Universal inputs/outputs	10	10
Connectivity		
Integrated RS485 BMS	-	1 (opto)
Integrated RS485 FieldBus	1	2 (opto)
RS485 display port	1	1
Optional RS485 BMS card	No	1
Optional RS485 FieldBus	-	1
Ethernet port	1 (10/100 Mbps)	2 (10/100 Mbps)
Integrated Ethernet switch	-	Yes
USB Host	Yes	Yes
USB device	Yes	Yes
Webserver	Yes	Yes
Communication protocols	Modbus® RTU and TCP/IP BACnet™ MS/TP and IP	Modbus® RTU and TCP/IP BACnet™ MS/TP and IP
Other		
Modules	4 DIN	18 DIN
Power supply	24 Vac – 28/36 Vdc	24 Vac – 28/36 Vdc
Driver probe power supply	+5 Vdc / +12 Vdc	+5 Vdc / +12 Vdc
Operating range	-40T70 °C	-40T70 °C
Terminal block	Connector kit included	Connector kit included
Accessories		
I/O expansion module P+E0000000000	10 universal inputs, 6 digital outputs	



Selection and configuration tool

Create your own application scheme, upload the configuration file via USB and k.water is ready to go.

Application examples

System with 3 mixed heating/cooling circuits

CONTROLLER

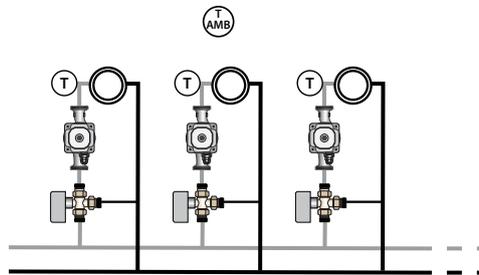


P+DW00FHDLFK

USER INTERFACE



PGB04000WECB0



System with 1 heat generator + 2 mixed circuits + boiler filling and DHW recirculation system + solar thermal

CONTROLLER



P+DW00FHDLFK

RS485

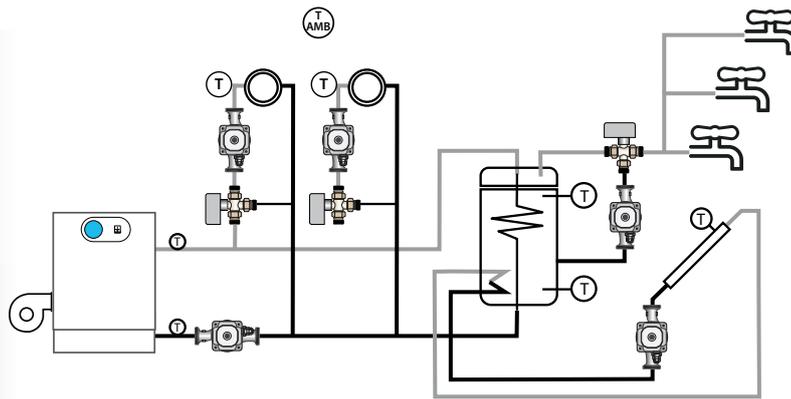


P+E0000000000

USER INTERFACE



PGB04000WECB0



Hybrid system with reverse-cycle combustion and electrical heat generator + 2 mixed circuits + boiler filling and DHW recirculation system + integrated solar thermal

CONTROLLER

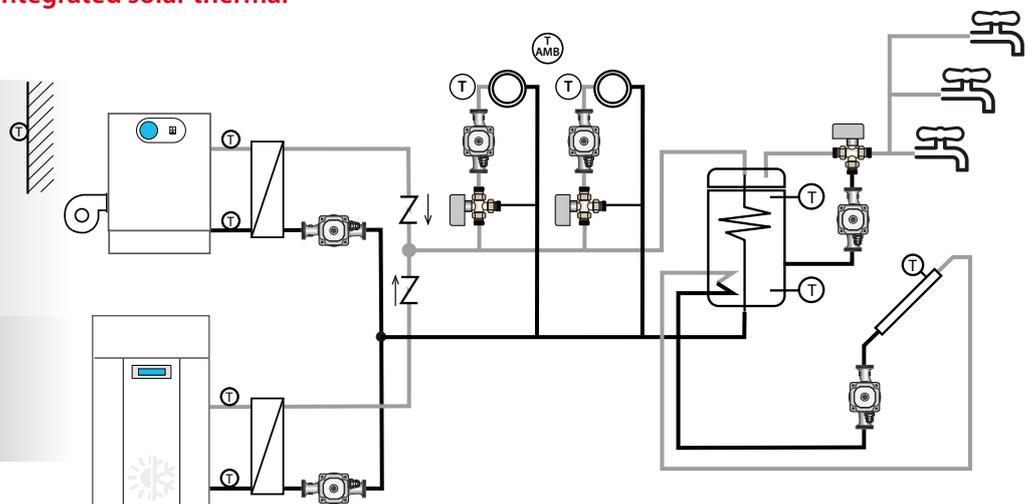


P+5W05FC000LK

USER INTERFACE



PGB04000WECB0





Controller programmed for air handling units.



k.air is the controller designed for the management of air-conditioning and ventilation units.

Thanks to its modular and flexible concept, it can be used to manage anything from small ventilation units up to medium/large air handling units.

k.air allows compliance with regulatory requirements in terms of energy efficiency, implementing advanced control and energy saving logic. The distinctive element of k.air is integration, both at a unit and system level.

Fans, CAREL humidifiers, direct expansion units managed by uChiller can be integrated via bus for control and optimisation.

Main functions

- **Comfort**
 - Temperature control with delivery, return and room set point;
 - Relative and specific humidity control.
- **Energy saving**
 - Free cooling, free heating and heat recovery management;
 - Sequential control of heating and cooling devices with up to 6 stages.
- **High efficiency**
 - Indirect evaporative cooling management;
 - Active heat recovery management with BLDC compressor;
 - Integration of direct expansion units with uChiller.

- **Air quality and hygiene**
 - Air quality control with CO₂ sensor;
 - Integrated CAREL humidifier management via RS485 bus;
 - Unit maintenance program in line with VDI 6022-1.

k.air also integrates with k.water, to create a complete system management solution.

Specifications	MINI version	LARGE version
	P+DA00FHD0LFK	P+5A0SFC000LK
I/O		
Digital outputs	6	18
Digital inputs	2	18
Analogue outputs	2	6
Universal inputs/outputs	10	10
Connectivity		
Integrated RS485 BMS	-	1 (opto)
Integrated RS485 FieldBus	1	2 (opto)
RS485 display port	1	1
Optional RS485 BMS card	No	1
Optional RS485 FieldBus	-	1
Ethernet port	1 (10/100 Mbps)	2 (10/100 Mbps)
Integrated Ethernet switch	-	Yes
USB Host	Yes	Yes
USB device	Yes	Yes
Webserver	Yes	Yes
Communication protocols	Modbus® RTU and TCP/IP BACnet™ MS/TP and IP	Modbus® RTU and TCP/IP BACnet™ MS/TP and IP
Other		
Modules	4 DIN	18 DIN
Power supply	24Vac – 28/36Vdc	24Vac – 28/36Vdc
Driver probe power supply	+5Vdc / +12Vdc	+5Vdc / +12Vdc
Operating range	-40T70°C	-40T70°C
Terminal block	Connector kit included	Connector kit included
Accessories		
I/O expansion module P+E0000000000	10 universal inputs, 6 digital outputs	



Selection and configuration tool

Create your own application scheme, upload the configuration file via USB and k.air is ready to go.

Application examples

All outside air unit, 2 processes and humidity control

CONTROLLER

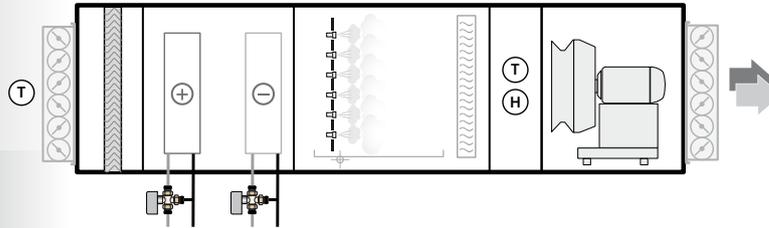


P+DA00FHD0LFK

USER INTERFACE



PGB04000WECB0



Unit with mixing chamber, 2 processes and humidity control

CONTROLLER



P+DA00FHD0LFK

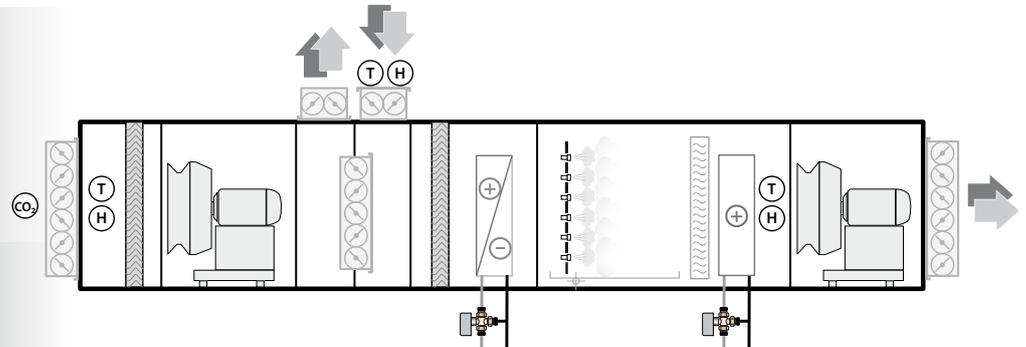


P+E0000000000

USER INTERFACE



PGB04000WECB0



Unit with enthalpy wheel, 2 processes and humidity control

CONTROLLER



P+DA00FHD0LFK

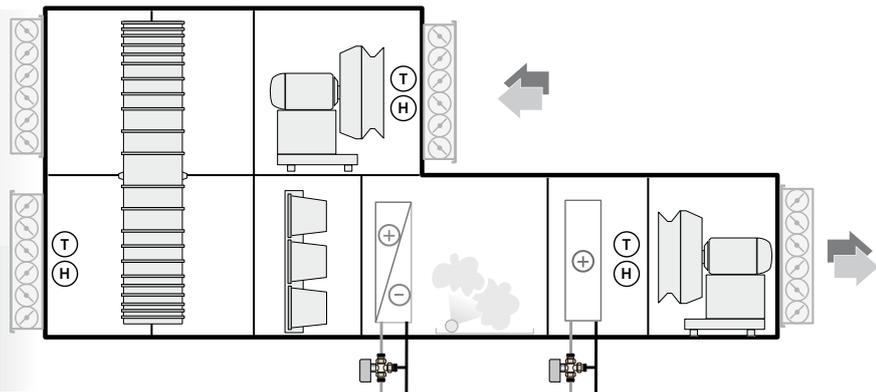


P+E0000000000

USER INTERFACE



PGB04000WECB0



Unit with static heat recovery, 3 processes, humidity control and indirect evaporative cooling

CONTROLLER

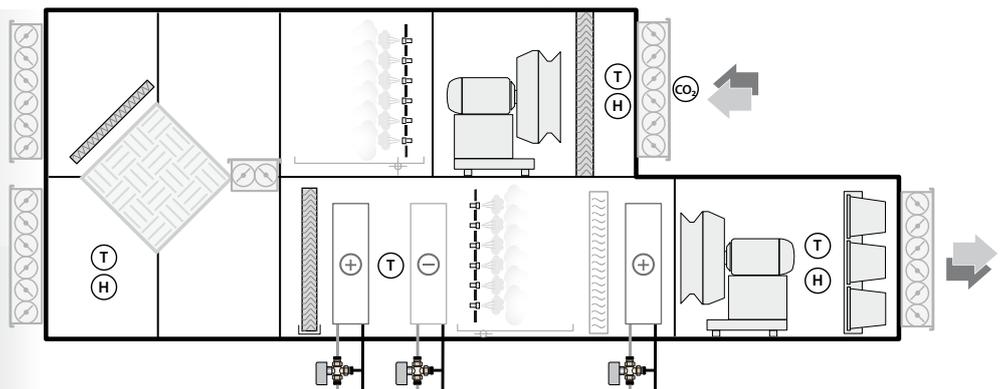


P+5A0SFC000LK

USER INTERFACE



PGB04000WECB0



System and room terminals

pGDx 4.3"



The new 4.3" touch screen designed to maximise the user's system management experience. System usability is enhanced by the web server pages shown on the display relating to each individual controller connected to the network, allowing users to monitor the situation across the entire system from just one single location. Ethernet connectivity makes installation even more practical, without any constraints in terms of location relative to the monitored system.

Available with different types of faceplates and, in the version with built-in temperature and humidity probe, represents an excellent room terminal solution.

Benefits



Ethernet connectivity



access point



built-in temperature/humidity probe

Part number	Description
pGDx	
PGB04000WERB0	pGDx 4.3" Browser wall without frame
PGB04000WECB0	pGDx 4.3" Browser wall with T/H sensor and without frame
PGB04000TERB0	pGDx 4.3" Browser front panel - IP65 - without frame
Accessories	
PGTA00SM40	Surface mounting case for pGDx 4.3"
PGTA00RM40	Flush mounting case for pGDx 4.3"
PGTA00TRX0	Power supply module for pGDx 110-230 Vac IN - 24 Vdc OUT
PGTA00FB10	Neutral black frame for pGDx 4.3" - panel mounting
PGTA00FT00	Standard CAREL white transparent frame with T/H probe holes for pGDx 4.3" - wall mounting
PGTA00FT10	Neutral white transparent frame with T/H probe holes for pGDx 4.3" - wall mounting
PGTA00FH00	Standard black transparent frame with T/H probe holes for pGDx 4.3" - wall mounting
PGTA00FH10	Neutral black transparent frame with T/H probe holes for pGDx 4.3" - wall mounting

pGDN



Simple backlit LCD display with buttons on the side for easy control of settings in the field when setting up and commissioning the system.

Part number	Description
PGNE000F00	pGDN1 132x64, white backlighting, panel mounting
PGNE000W00	pGDNE 132x64, white backlighting, wall mounting
S90CONN000	Telephone connection cable
S90CONN050	Connection cable for k.water and k.air mini

Supervision

boss



System for supervision, management and optimisation of small-medium sites. Total compatibility with mobile devices and integrated WiFi make it a centralised system for the different functions controlled inside the building. Plug-ins are available for advanced control and optimisation functions.

Accessories

BMESTPWA00: 230 Vac power supply.

Benefits



Specifications	BMEST00LE0	BMEST00RE0	BMEST00RS0
Version	advanced	basic	basic
Number of devices/variables logged	50/500	50/500	30/300
Dimensions	202x95x53 mm		
Power supply	24 Vdc (optional 230 Vac power supply)		
Hardware			
Built-in Wi-Fi connectivity to mobile devices	YES	NO	NO
Video output	YES: micro HDMI	NO	NO
Double Ethernet port (separation of LAN/Internet connections)	YES		
Built-in backup memory expansion	YES with SD card		
Embedded RS485 ports	1 opto-isolated 1 not opto-isolated		
Built-in digital outputs	3 outputs powered at +24Vdc		
USB host ports	1		
Status LED	2 front (ON/OFF, alarm)		
Possibility to connect an external UMTS modem to send SMS	YES		
Software			
Web connection with encrypted protocol (HTTPS)	YES		
Third-party device integration	YES (using device creator tool)		
Minimum variable sampling time	30 sec		
Other specifications	Modbus RTU master protocol; Modbus TCP/IP master protocol; sending emails, send instant messages (Telegram), send SMS; manual and/or automatic reports in CSV and PDF format; scheduled activity management		

tERA

tERA is the cloud platform that creates a centralised remote management system for all HVAC applications. tERA ensures immediate access to all the system information and optimises the work of the site's technical and service team.. Services are available at different levels.

tService

Application designed for maintenance personnel:

- Detailed view of the system with dashboard and pGD emulator;
- Real alarm monitoring and notification based on user profile;
- Setting of operating time schedules;

- Analysis of operating history;
- Increase your business with services!

tDisplay

Application designed for the user and site manager with:

- Alarm monitoring;
- Monitoring of operating conditions.

tTrace

Application designed for data analysts and energy managers:

- Graphs with system performance;
- Dashboard and reports for analysis.



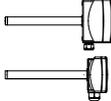
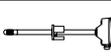
Field devices

Sensors, protection devices and energy meters



Wide range of field devices for the acquisition of information and status of all controlled systems. Temperature and humidity sensors, pressure transducers, air quality and energy consumption meters, which can be integrated into k.water and k.air via I/O interface or RS485 bus.

		Description	Operating conditions	Cable length (m)	
Active sensors - temperature and humidity					
T AMB		DPDC112000	Duct sensor	-10T60°C (0-10 Vdc out); 10-90% RH (0-10 Vdc out)	-
		DPDC110000	Duct sensor	-10T60 °C (0-1 Vdc, 4-20 mA out); 10-90% RH (0-10 Vdc, 4-20 mA out)	-
H AMB		DPWC112000	Wall sensor	-10T60°C (0-10 Vdc out); 10-90% RH (0-10 Vdc out)	-
		DPWC110000	Wall sensor	-10T60 °C (NTC res. out); 10-90% RH (0-10 Vdc, 4-20 mA out)	-
		DPUC110000	Outdoor sensor	-35T70 °C (NTC or 4-20 mA out); 10-90% RH (4-20 mA out)	-
Water temperature sensors					
T H ₂ O		NTC015WH03	NTC WH probe	-50 to 105 °C	1.5
		NTC030WH03	NTC WH probe	-50 to 105 °C	3
		NTC060WH03	NTC WH probe	-50 to 105 °C	6
		NTC030HF03	NTC HF probe (strap-on)	-50 to 90 °C	3
		NTC060HF03	NTC HF probe (strap-on)	-50 to 90 °C	6
		TSN1300000	AlSi316 direct immersion probe	-40T120	separately
		TSC1500030	Nickel-plated brass direct immersion probe	-40T90	separately
Accessories for water probes					
		1413306AXX	Nickel-plated brass socket for NTC*WH*	-	-
		1413309AXX	AlSi316 socket for NTC*WH*	-	-
		1309589AXX	Compression fitting for NTC*WH*	-	-
		TSOPZRV000	M14 3/8" GAS screw fitting for TSC1500030	-	-
		TSOPZRS000	M14 weld fitting for TSC1500030	-	-
		TSOPZPT000	Screw-on socket for TSN1300000	-	-
		TSOPZPT000	Weld fitting for TSN1300000	-	-
		TSPZCW030	Connector cable L=3 m for TSN1300000	-	-
Ratiometric water pressure sensors					
P SH		SPKT0053P0	0 to 5 V ratiometric	-1 to 4.2 bars	-
		SPKT0051C0	0 to 5 V ratiometric, hermetic	-1 to 4.2 bars	-
		SPKT0021C0	4-20 mA piezoresistive	-0.5 to 7 bars	-

		Description		Operating conditions	Cable length (m)	
Air temperature sensors						
		NTC015HP00	NTC HP probe IP67	-50T105	1.5	
		NTC025HP00	NTC HP probe IP67	-50T105	2.5	
		NTC030HP00	NTC HP probe IP67	-50T105	3.0	
		NTC035HP00	NTC HP probe IP67	-50T105	3.5	
		NTC015WF00	NTC WF probe IP67 FAST	-50T105	1.5	
		NTC030WF00	NTC WF probe IP67 FAST	-50T105	3.0	
		NTC060WF00	NTC WF probe IP67 FAST	-50T105	6.0	
Differential air pressure sensor						
		SPKD00C5N0	4 -20 mA differential pressure sensor	50 to 100 PA	-	
		SPKD00U5N0	Differential air pressure sensor with 4-20 mA OUT	1000-5000 PA	-	
Pressure switches, flow switches, air thermostats						
		DCPD000100	Differential pressure switch	0.5 to 5 mbars	-	
		DCPD001100	Differential pressure switch	0.2 to 2 mbars	-	
			DCFL000100	Flow switch	1 to 9 m/s	-
			DCTF000320	Frost thermostat 3M CAPILLAR CONTACT 24-230 V	-15 to 55°C	-
Air quality sensor						
		DPDQ402000	Duct CO2 air quality sensor (0-10 Vdc OUT)	0 to 2000 ppm / 0 to 5000 ppm	-	
			DPWQ402000	Wall CO2 air quality sensor (0-10 Vdc OUT)	0 to 2000 ppm / 0 to 5000 ppm	-
RS485 serial probes						
 		DPDT014000	Duct TEMP. sensor (opto-isolated RS485 serial output)	-10T60 °C	-	
			DPDC114000	Duct TEMP/HUMID. sensor (opto-isolated RS485 serial output)	-10T60°C, 10-90% RH	-
			DPWC114000	Wall TEMP/HUMID. sensor (opto-isolated RS485 serial output)	-10T60°C, 10-90% RH	-
Energy meters						
		MT300W3200	Three-phase energy meter without user interface, for panel or DIN rail mounting. Requires three external current transformers.	-	-	
Options for energy meters						
		MTOPZD0000	Removable user terminal (no batteries required) for MT300W1100 three-phase energy meter.	-	-	
		MTOPZT*	Current transformer: *= 1000: 100 A per wire/bar; 2000: 200 A per wire/bar.	-	-	
		MTOPZA*	Openable current transformer: *= 1000: 100 A per wire/bar; 2000: 200 A per wire/bar; 4000: 400 A per wire/bar.	-	-	

Headquarters ITALY

CAREL INDUSTRIES HQs

Via dell'Industria, 11
35020 Brugine - Padova (Italy)
Tel. (+39) 0499 716611
Fax (+39) 0499 716600
carel@carel.com



For more information

CAREL Poland
ALFACO POLSKA
www.carel.pl

CAREL Asia
www.carel.hk

CAREL Australia
www.carel.com.au

CAREL Central & Southern Europe
www.carel.com

CAREL Czech & Slovakia
CAREL spol. s.r.o.
www.carel.cz

CAREL Deutschland
www.carel.de

CAREL China
www.carel-china.com

CAREL France
www.carelfrence.fr

CAREL Korea
www.carel.kr

CAREL Ibérica
www.carel.es

CAREL Ireland
FarrahVale Controls & Electronics Ltd.
www.carel.ie

CAREL Italy
www.carel.it

CAREL India
www.carel.in

CAREL Japan
www.carel-japan.com

CAREL Mexicana
www.carel.mx

CAREL Middle East
www.carel.ae

CAREL Nordic
www.carelnordic.se

CAREL Russia
www.carelrussia.com

CAREL South Africa
www.carelcontrols.co.za

CAREL Sud America
www.carel.com.br

CAREL Thailand
www.carel.co.th

CAREL Turkey
CFM Sogutma ve Otomasyon San. Tic. Ltd.
www.carel.com.tr

CAREL U.K.
www.careluuk.com

CAREL U.S.A.
www.carelusa.com

CAREL

To the best of CAREL INDUSTRIES S.p.A. knowledge and belief, the information contained herein is accurate and reliable as of the date of publication. However, CAREL INDUSTRIES S.p.A. does not assume any liability whatsoever for the accuracy and completeness of the information presented without guarantee or responsibility of any kind and makes no representation or warranty, either expressed or implied. A number of factors may affect the performance of any products used in conjunction with user's materials all of which must be taken into account by the user in producing or using the products. The user should not assume that all necessary data for the proper evaluation of these products are contained herein and is responsible for the appropriate, safe and legal use, processing and handling of CAREL's products. The Information provided herein does not relieve the user from the responsibility of carrying out its own tests, and the user assumes all risks and liabilities related to the use of the products and/or information contained herein. © 2018 CAREL INDUSTRIES S.p.A. All rights reserved.