Energy saving solutions for data centres

Technologies to improve the efficiency of cooling and temperature-humidity control systems

Data centre air conditioning

Air conditioning of data centres guarantees service continuity in these essential yet extremely energy-intensive infrastructures. The types of systems used differ according to local climatic conditions and the characteristics of the buildings.

- 50 years of innovations in cooling technology;
- multiple product platforms designed for energy savings;
- specific knowledge of data centre applications and collaboration with manufacturers in identifying the best solution.

It is estimated that this sector accounts for around 1.5% of world energy demand***. Sustainability and energy saving objectives can be achieved through continuous improvement of cooling solutions, which starts by adopting innovative high-efficiency technologies.

*** International Energy Agency (iea.org)

Evaporative cooling units

Adiabatic humidification systems

Energy saving

CAREL's solutions are designed to achieve the highest air conditioning efficiency, both at a component and system level.

Mission critical

For these types of mission-critical applications, service continuity is essential, and therefore the solutions need to be highly reliable both in terms of component quality and system redundancy.

Flexibility

The energy-saving solutions can be adapted for use in all major application scenarios, including retrofits to improve the PUE of existing data centres.

Plate air-to-air heat exchangers

Rotary air-to-air heat exchangers

Monitoring systems

Programmable controllers

Dampers

Steam humidifiers

Sensors and protection devices

Electrical panels

Compressor inverters and electronic expansion valves

Cybersecurity

All CAREL products are developed in accordance with the latest security standards.

Connectivity

All products come with various connectivity options, while the programmable controllers in particular feature embedded solutions or optional boards for communication using the most widely-used protocols.

Temperature and humidity control

Keeping both these parameters within the guidelines suggested by ASHRAE TC 9.9 requires integrated solutions, especially in adiabatic cooling systems.

Solutions for direct freecooling + DEC

Systems that directly exploit the outside air, cooling it adiabatically with minimum energy consumption and at the same time controlling the temperature and humidity.

- Maximum efficiency with freecooling and evaporative cooling;
- Precise temperature and humidity control;
- Flexible installation.

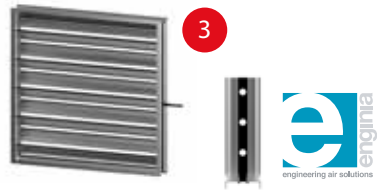
When the outside temperature is sufficiently low, fresh outside air can be introduced via an AHU or the building's ventilation system. When the climatic conditions are favourable, during the summer the air can be cooled adiabatically by increasing its humidity content (direct evaporative cooling); during the winter the same system maintains the minimum humidity level by exploiting the recirculation of warm air.

Reverse osmosis

Water treatment is essential to minimise nozzle maintenance and avoid the introduction of harmful dust.

humiFog multizone touch

High pressure adiabatic humidifier that atomises water through nozzles mounted on a rack into microscopic droplets, ensuring very high efficiency and precision. The inverter-driven pump and multi-zone configuration allow specific control of evaporative cooling in summer, and humidification in winter on the recirculated air.

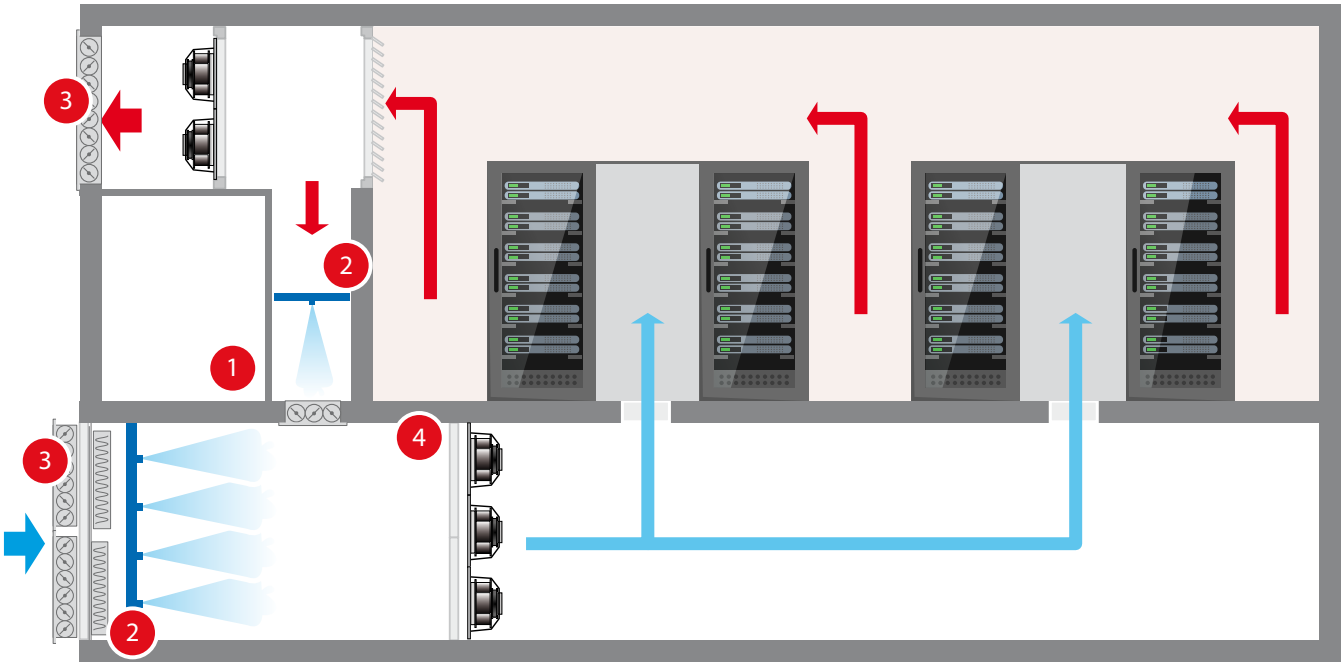


SER100 outside air damper

The SER100 thermal break dampers with leakage class 4 are ideal for preventing leakages and dispersion in the system; numerous mounting options are available to suit both units and installations in the building's structure.

Programmable controller

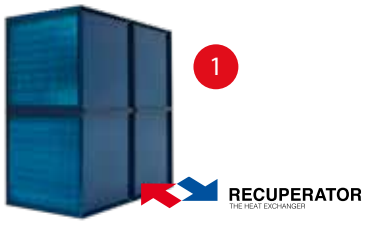
The programmable controller is the heart of the system, controlling temperature and humidity at the same time by coordinating the operation of the various devices, using a vast library of functions and CAREL's know-how of psychrometric processes.



Solutions for indirect freecooling + IEC

Systems that exploit evaporative cooling of the outside air cool the data centre air via a heat exchanger.

Indirect evaporative cooling units use a heat exchanger to cool the recirculated air in the data centre using outside air; the indirect heat exchange avoids the introduction of contaminants and exploits evaporative cooling of the outside air, bringing it to saturation. Units can also include a refrigerant circuit that supplements cooling when the environmental conditions are unfavourable, or as a backup.



B-BLUE air-to-air heat exchanger

B-Blue is a heat exchanger with an absorbent hydrophilic coating designed to optimise heat exchange and enhance evaporation due to surface wetting (efficiency up to 15% higher than traditional coatings); corrosion resistance and water tightness (tested on 100% of units manufactured) guarantee the highest reliability.

- Evaporative cooling extended to multiple climatic conditions;
- Air recirculation without introducing contaminants;
- Built-in refrigerant circuit.

High efficiency technologies

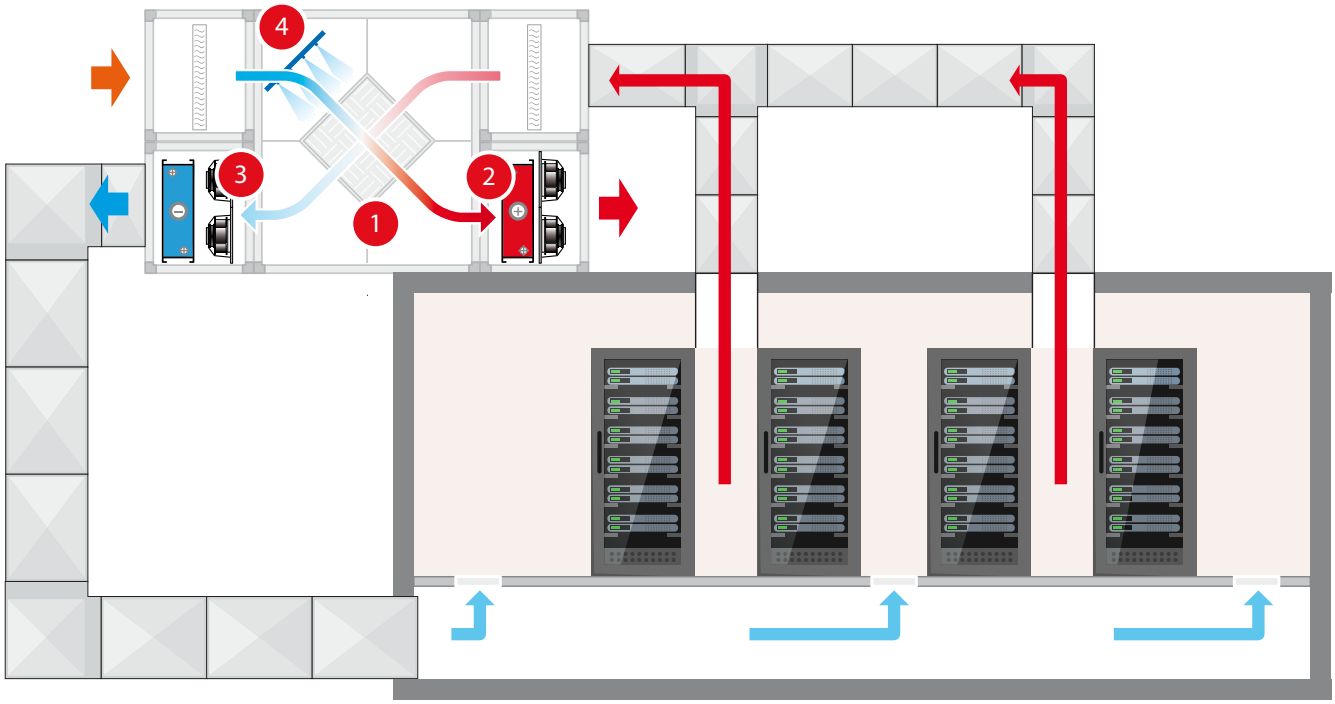
Essential for maximising the efficiency of the built-in refrigerant circuit and controlling air supply temperature and humidity.

c.pCO programmable controller

An integrated solution is essential for selecting the best operating mode based on outside conditions, between indirect freecooling, IEC and mechanical air conditioning.

KEC

Evaporative cooler that atomises water using a highly-flexible nozzle distribution system that can be adapted to the layout of different units. IEC Special baffles increase air turbulence for better droplet distribution. The pump is variable-speed and is controlled by an inverter (available on a separate module for installation flexibility) to optimise feedwater supply.



Solutions for recirculated air systems with CRAC/ CRAH/IN ROW COOLING and COOLING WALL

Systems with traditional yet more efficient CRAC technologies using the hot aisle/ cold aisle layout.

- solutions suitable for more traditional layouts and retrofits;
- high connectivity to field devices and monitoring systems;
- precise humidity control with minimum energy consumption.

Recirculation system solutions are very widespread, in particular those using chilled water; various air distribution configurations and compartmentalisation make it possible to increase the air supply temperatures, using freecooling to cool the water most of the year. Many recirculation systems do not include humidifiers in the air conditioning units due to the absence of dehumidification, however the effect of low outside humidity can lead to dangerous limits being reached in terms of electrostatic discharges, making a humidification solution in the room necessary.

c.pCO electronic controller and boss one

The programmable controller ensures optimum management of any type of recirculation unit: the boss one option it is ideal for integration into supervisory systems, feature high security of the protocols and access control. The flexibility of this family of controllers means they are the most widely-used controllers also on chiller units and outdoor evaporative towers.

Serial probes

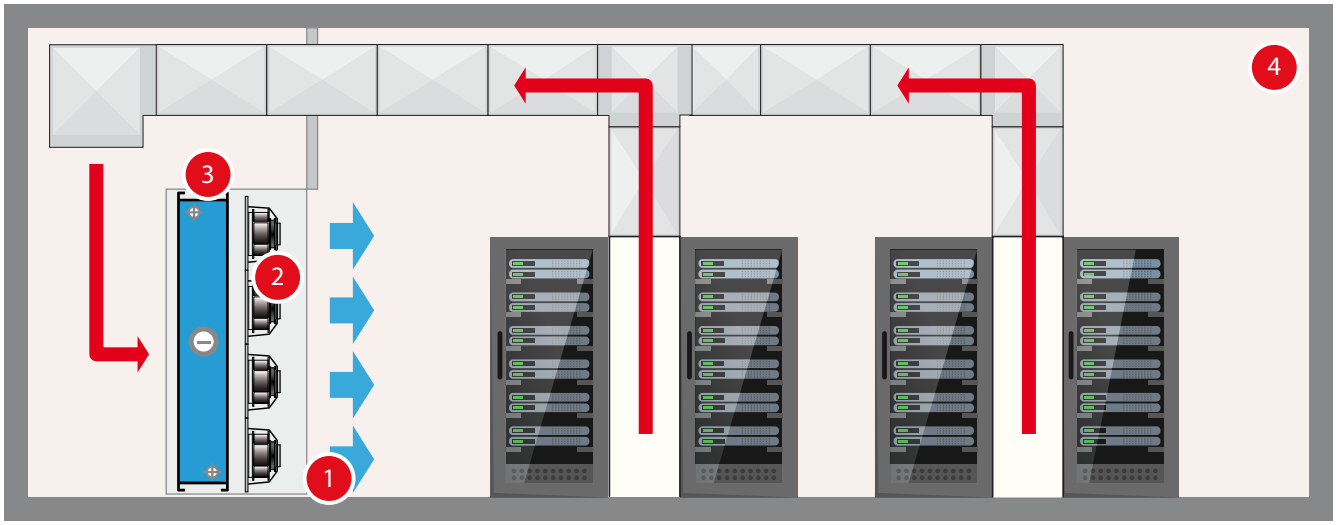
The adoption of large chilled water coils such as in cooling walls makes it necessary to measure temperature and humidity in several points of the air flow, so as to manage the devices appropriately and ensure optimal air distribution. Modbus communication makes it easy to install numerous probes on a single communication bus, with less wiring.

Overpressure damper

Extruded aluminium overpressure dampers with snap-on flanges and combined blade movement are ideal for fan wall configurations, as they prevent the recirculation of air when no fan is operating.

humiSonic direct

Ultrasonic humidifiers have a high modulation capacity and produce microscopic droplets that are absorbed in very small distances. They are ideal for various in-room installations, depending on the space available. Supplied with water from reverse-osmosis, they feature high reliability and low maintenance.



Solutions for liquid cooling and pumped refrigerant systems

Latest-generation cooling systems, ideal for high power density servers.

The growth in high performance computing is leading to a staggering increase in the density of heat to be expelled, so much so that liquid cooling solutions, both immersion and in contact, are needed to remove the heat. The two-phase liquid or fluid that carries away the heat makes it possible to produce water at 40-50°C, meaning only indirect water freecooling can be used, but also the heat can be recovered and used for heating. A similar concept involves the use of fluids that evaporate at high temperatures inside, and condense at lower temperatures oustide, requiring a simple pump to recirculate the liquid.

1

FLOE flood sensor

The use of water in units installed in data centres, often close to critical equipment, requires sensors that can detect leaks.

- flexible solutions for high-density high performance computing;
- low energy consumption and possibility of heat recovery;
- communication with IT standards.

2

c.pCO mini electronic controller

A flexible and compact solution for temperature control and for different types of cooling distribution units, as well as for management of he at recovery for heating systems.

3

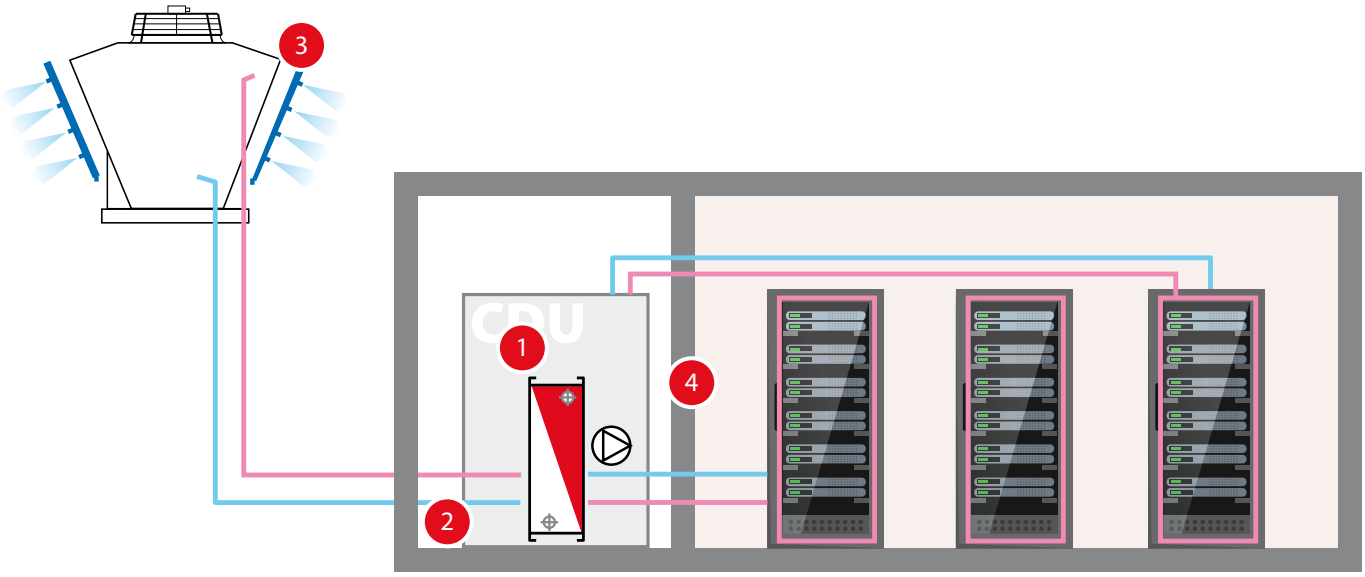
Chillbooster

The ideal solution to use evaporative cooling to maximise
the efficiency of liquid coolers or chillers used as the primary source:
the modular and flexible distribution rack also makes retrofits on existing units possible. The atomisation system is designed to minimise water consumption.

4

boss micro

The adoption of a liquid cooling solution is often based on a close interaction with the servers, and therefore the cooling system requires an edge device capable of communicating with DCIM systems, using the same security standards and sophisticated interfacing methods. Boss micro is the ideal solution for this purpose, both compact and extremely powerful.



A complete range of edge devices for data centre monitoring

Solutions for the integration of power and cooling infrastructures, both at a unit and system level, or remotely.

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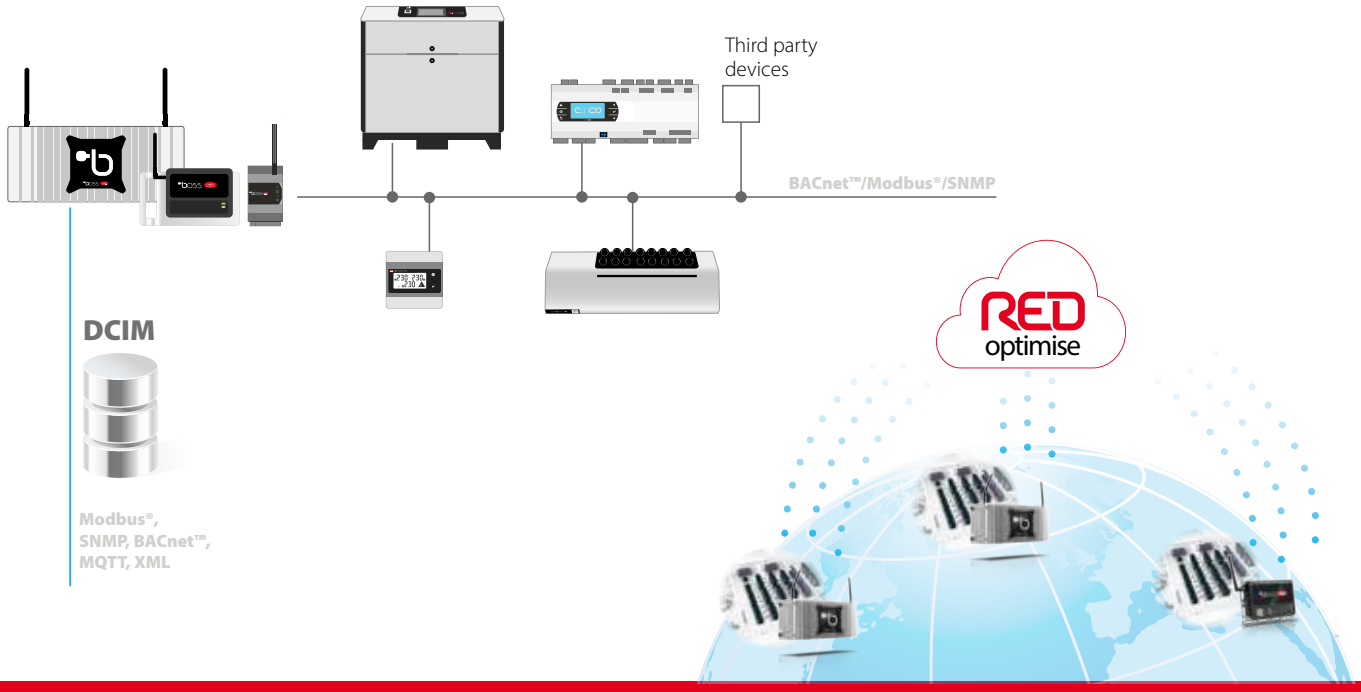

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