

Solutions for air humidification and evaporative cooling

Control Solutions and Humidification Systems for HVAC/R

high efficiency solutions

Can protecting the environment be reconciled with our industrialised society? Yes, today this is possible.

Indeed, this is the concept of sustainable development: improving the quality of the life, without overloading the supporting ecosystems that it depends on, now made possible by progresses in technology.

While until recently sustainable development was simply a desire, a cost and an obligation defined by legislators so as to bequeath a healthy planet to future generations, today it is the only plausible choice. Changing public awareness continues to focus on the more worthy companies, rewarding these with higher sales. A need has thus become an opportunity, a chance not to be missed to unite the need to develop products and services that save energy with the possibility to effectively reduce environmental impact.

To encourage sustainable development, many activities are underway as concerns both the environmental policies of individual nations and international organisations (above all the European Union), and specific research and development work.

Today, then, solutions to combat global warming and pollution, to live a sustainable existence, to make our cities more liveable and our factories more efficient and virtuous all exist: the technology is here.



CAREL has always developed and promoted evolved control systems, proposing innovative solutions in the HVAC/R sector. These are our “high efficiency solutions”, a clear response for environmental protection through optimised and integrated control systems, capable of bringing significant energy savings and consequently reducing environmental impact. These are new solutions for the market, yet the choices made are still in line with our tradition: we have always invested in R&D, right since we first started business, and we continued to do so despite the global recession.

These cutting-edge control solutions are now available, and their full potential is ready to be exploited, to achieve an effective competitive advantage on the world scene and be rewarded by the market.

Using CAREL “high efficiency solutions” today means doing something concrete to contribute to protecting the environment. It means looking to the future with confidence.

Humidify... ...cool while saving

Humidification for comfort and industrial processes

Air humidity is an important parameter for personal comfort in residential and commercial environments; the right level of air humidity guarantees a sense of well-being and productivity in the workplace. In industrial processes, air humidity control is needed to ensure process stability, product quality and quite often compliance with standards in force. CAREL products respond to the needs of residential, commercial and industrial applications, with special focus on running costs and energy consumption. Other important features of CAREL solutions for air humidification are simple use and installation, and reliability to ensure continuous service.

Energy savings: evaporative cooling

Air can be effectively cooled by exploiting the evaporation of water atomised into very fine droplets: the change in state, from liquid to vapour, absorbs energy from the air, which is consequently cooled. Evaporation of 100 kg/h of water absorbs 69 kW of heat from the air, for power consumption of less than 1 kW!. In an air handling unit, the supply air can be evaporatively cooled and humidified (direct evaporative cooling, DEC). Alternatively, if the outside air humidity is already high, the exhaust air can be cooled by several degrees without limits in terms of humidity, as it is discharged by the AHU; this cooling capacity, using a heat exchanger, can be used to cool the incoming fresh air with an efficiency that depends on the heat recovery unit used, yet easily exceeds 50%! (indirect evaporative cooling, IEC). All this means lower unit energy consumption and smaller dimensions and capacity of the cooling coil and chiller.

To develop these sophisticated solutions, CAREL has fitted a complete and modern air handling unit in its research centre, to optimise performance in all operating conditions and hence offer customers solutions that are together efficient, complete and easy to use.



With our innovative solutions, we can guarantee considerable energy savings for cooling air in AHUs.

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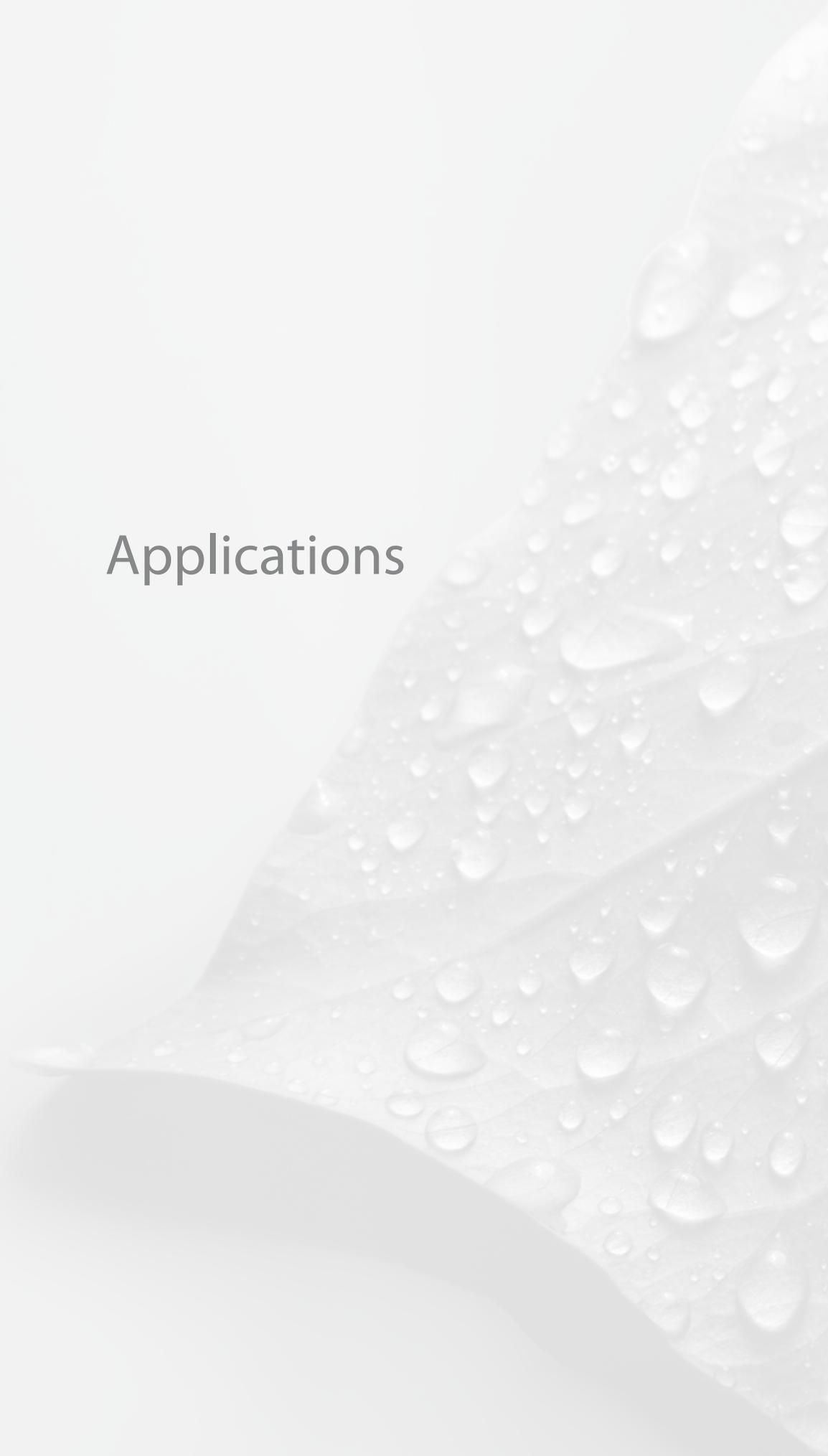
Sensors and protection devices

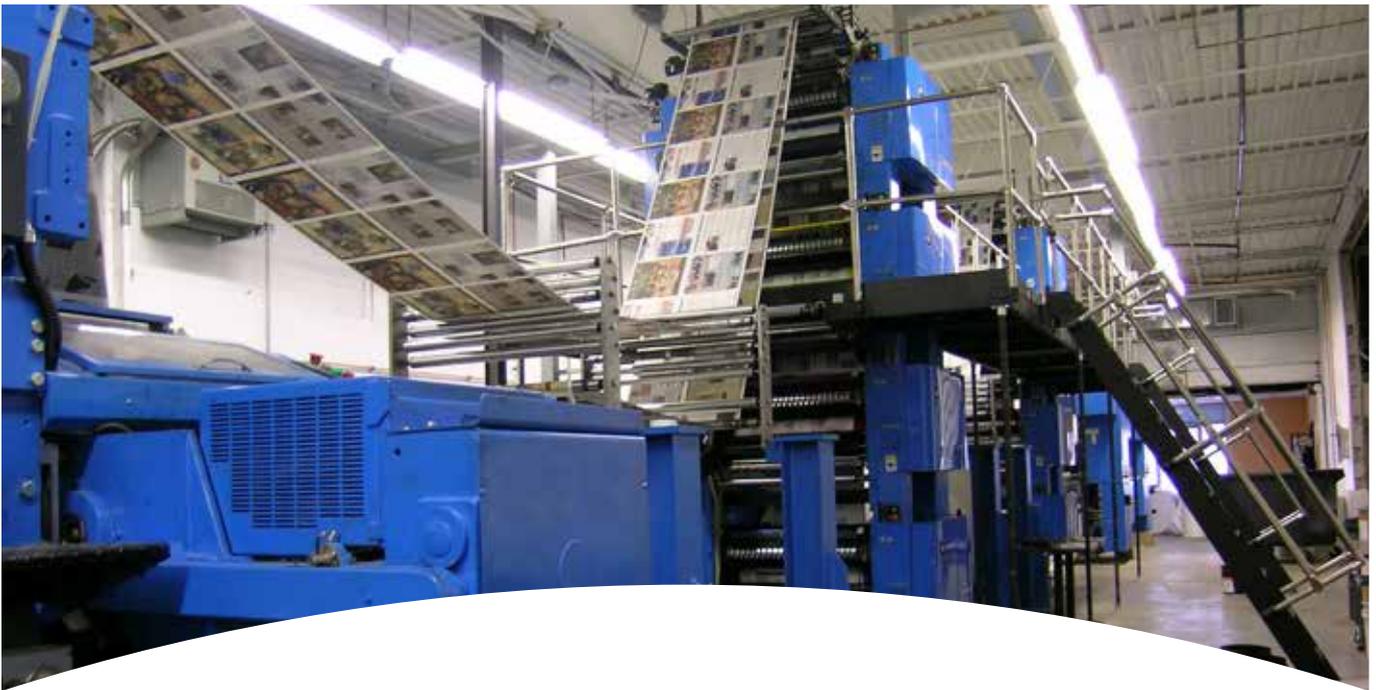
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Applications





Industry and process

Materials are defined as hygroscopic when their moisture content tends to reach equilibrium with the humidity of the surrounding environment.

If the moisture content of such materials changes, they will undergo variations in size, weight, firmness, quality and appearance.

In industrial processes, it is fundamental to control the humidity and temperature conditions so that hygroscopic materials can be processed without problems and that finished and stored products retain the desired features over time.

The right level of relative humidity also reduces electrostatic charges, which can cause damage during the production of

semiconductors, and can help limit dust suspended in the air.

CAREL has a vast range of adiabatic humidifiers for both room and AHU applications.

Adiabatic humidifiers, as well as guaranteeing the right level of humidity, also help control temperature by "absorbing", totally or partly, the heat generated by machinery and equipment, thus saving energy.

A wide choice of steam humidifiers is also available for small spaces, where aseptic conditions need to be guaranteed with extreme precision.

Increased productivity, quality and energy saving in production processes and storage, thanks to humidity control



Electrostatic charges

To limit electrostatic discharges that can damage electronic components, relative humidity must be kept above 30%.



Printing quality

Controlling humidity in printing processes avoids breakages and misalignment due to dimensional variations, and optimises ink absorption.



Occupational health and safety

Maintaining the correct humidity level in work environments increases worker comfort and reduces the proliferation of viruses and bacteria.



Ventilated distributors
"Pressurised water humidifiers" p. 73



humiFog multizone
"Pressurised water humidifiers" p. 73



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humiSonic
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compactSteam
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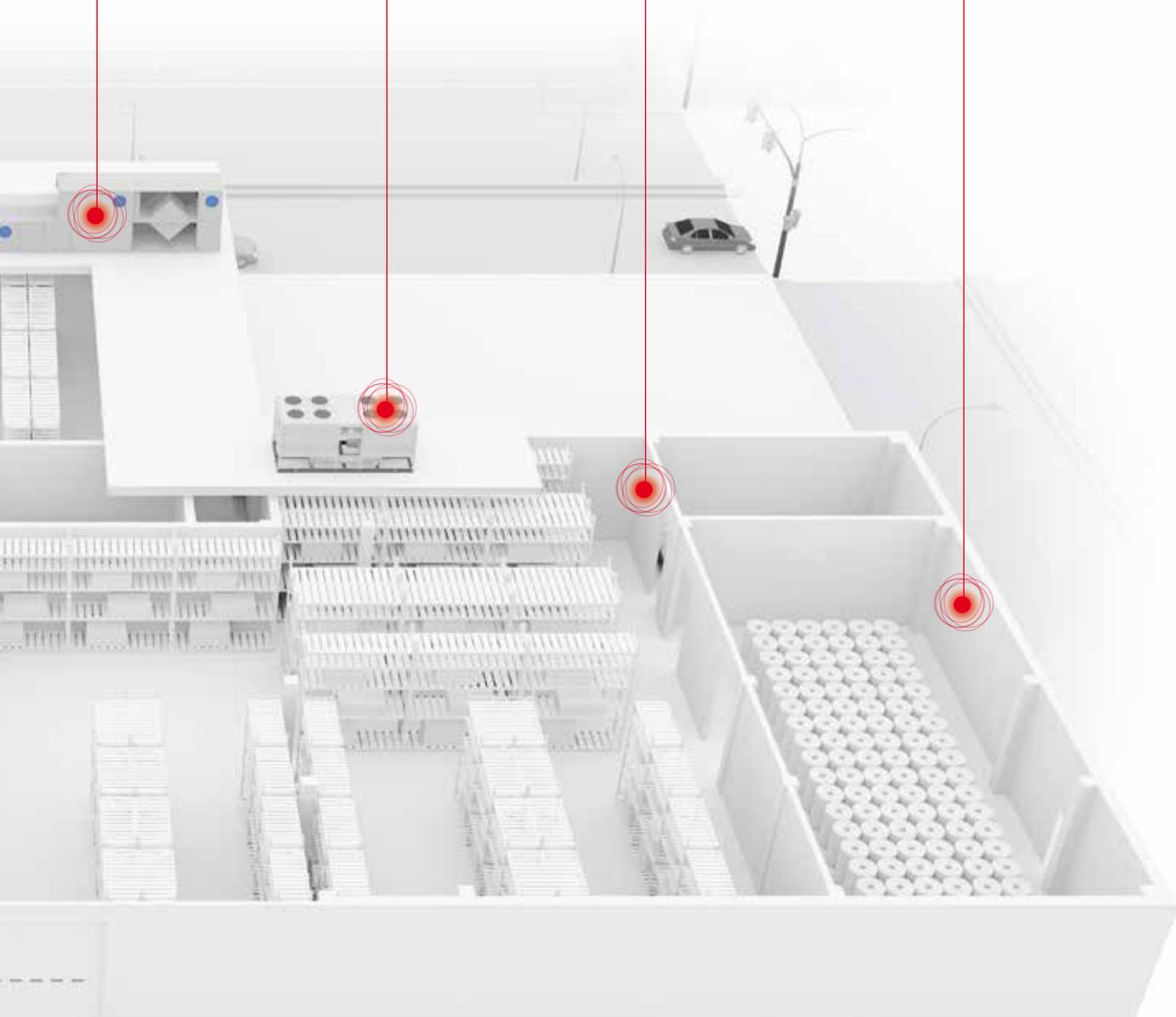
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mc multizone
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Typical applications

For reliable and safe air humidity control in large industrial environments, CAREL adiabatic humidifiers represent the ideal solution.

Adiabatic humidifiers combine humidity control with the advantages of evaporative cooling, neutralising the sensible heat loads of production machinery for very low power consumption.

For industrial applications where absolute precision and hygiene are required, humidifiers with electrical or gas-fired steam generators can be used. These humidify the air stream in the AHU or directly into the room by steam blowers.

CAREL humidification systems are successfully used in applications for:

- semiconductors and microelectronics;
- pharmaceutical and biotechnology;
- printing industry;
- textiles industry;
- timber industry;
- agri-food industry;
- fresh produce cold stores;
- wine industry.

Why CAREL?

Humidification and energy saving

Adiabatic humidification is the optimum solution for ensuring the right air humidity and “absorbing” the heat generated by production machinery.

Minimal maintenance

The combination of CAREL humidifiers and reverse osmosis water treatment systems drastically reduces maintenance requirements.

Certified hygiene

Not just steam: CAREL humiFog, high pressure water humidifier with VDI6022 certification that does not use harmful chemical biocides.

Redundancy

humiFog, high precision adiabatic humidifier featuring backup and rotation functions (redundant system) to ensure continuous operation.



humiFog multizone

Precision, high pressure water spray humidifier; capacity: 100 and 5000 kg/h.



optiMist

High pressure water spray adiabatic humidifier and evaporative cooler; capacity: 50 to 1000 kg/h.



mc multizone

Compressed air adiabatic humidifier; capacity: 60 to 230 kg/h.



humiDisk

Spinning disk humidifier; capacity: 1 to 6.5 kg/h.



heaterSteam

Electric heater steam humidifier; precision $\pm 1\%$ RH; steam production: 2 to 60 kg/h.



gaSteam

Gas-fired steam humidifier; steam production: 45 to 180 kg/h.



Paint booths

The need to develop industrial processes with a low environmental impact has led to growing use of waterborne paints in the aeronautical and automotive industries. These products however require extremely precise ambient temperature-humidity control all year round.

If air humidity is too high, for example, the layer of enamel sprayed onto the body may be excessively diluted, with consequent formation of minute "pockets" of liquid that evaporate when drying in the oven, creating defects and the formation of small craters on the painted surface. Vice-versa, too low relative humidity causes the early evaporation of the water contained in the droplets of spray paint,

decreasing fluidity and covering capacity. CAREL supplies a vast range of adiabatic humidifiers for both room and AHU applications.

CAREL has a vast range of adiabatic humidifiers for both room and AHU applications.

Adiabatic humidifiers, as well as guaranteeing the right level of humidity, also help control temperature by "absorbing", totally or partly, the heat generated by machinery and equipment, thus saving energy.

A wide choice of steam humidifiers is also available for small spaces, where aseptic conditions need to be guaranteed with extreme precision.

Silicon free: CAREL

humidifiers guarantee total absence of silicon particles, for a perfect finish to the paintwork without defects known as "fish eye".



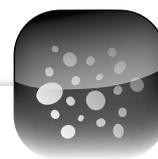
Electrostatic charges

To limit electrostatic discharges that can damage electronic components, relative humidity must be kept above 30%.



Occupational health and safety

Maintaining the correct humidity level in work environments increases worker comfort and reduces the proliferation of viruses and bacteria.



Airborne dust

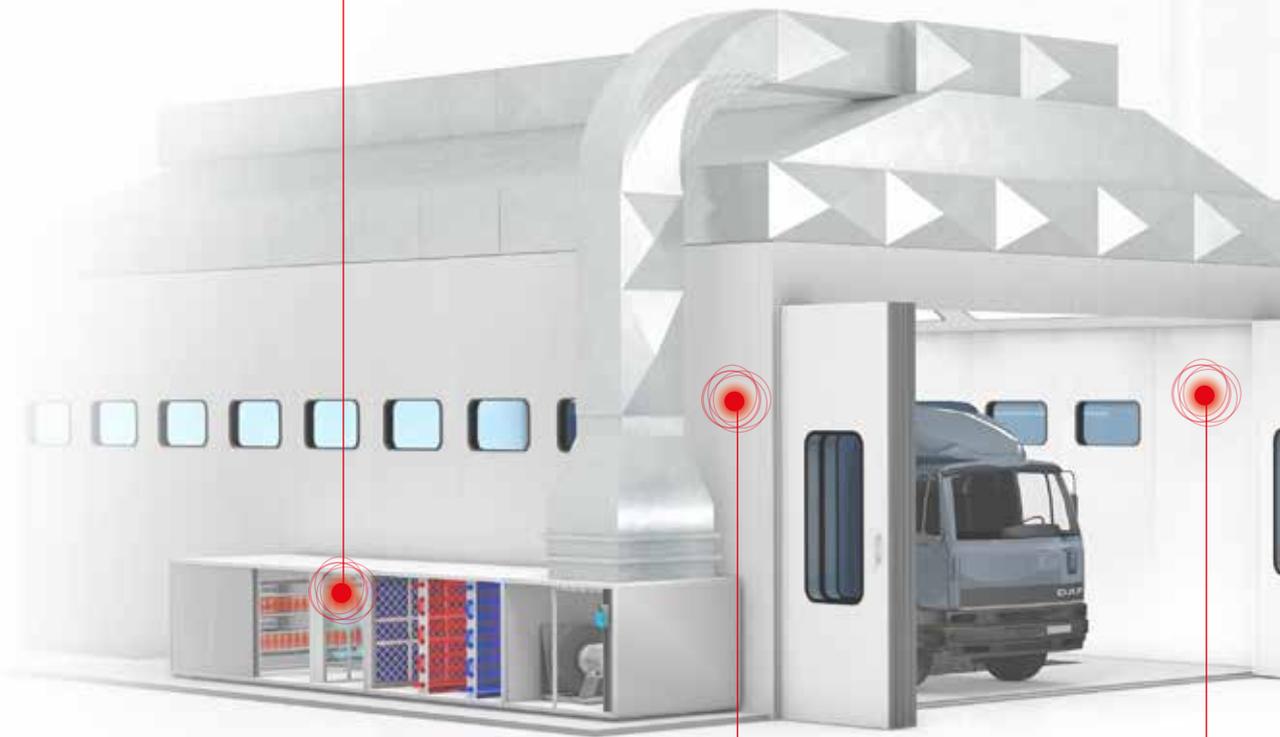
In industrial environments, dry air increases the level of airborne dust, which can create problems for production processes and operators.



WTS
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humiFog master
"Pressurised water humidifiers" p. 73



boss
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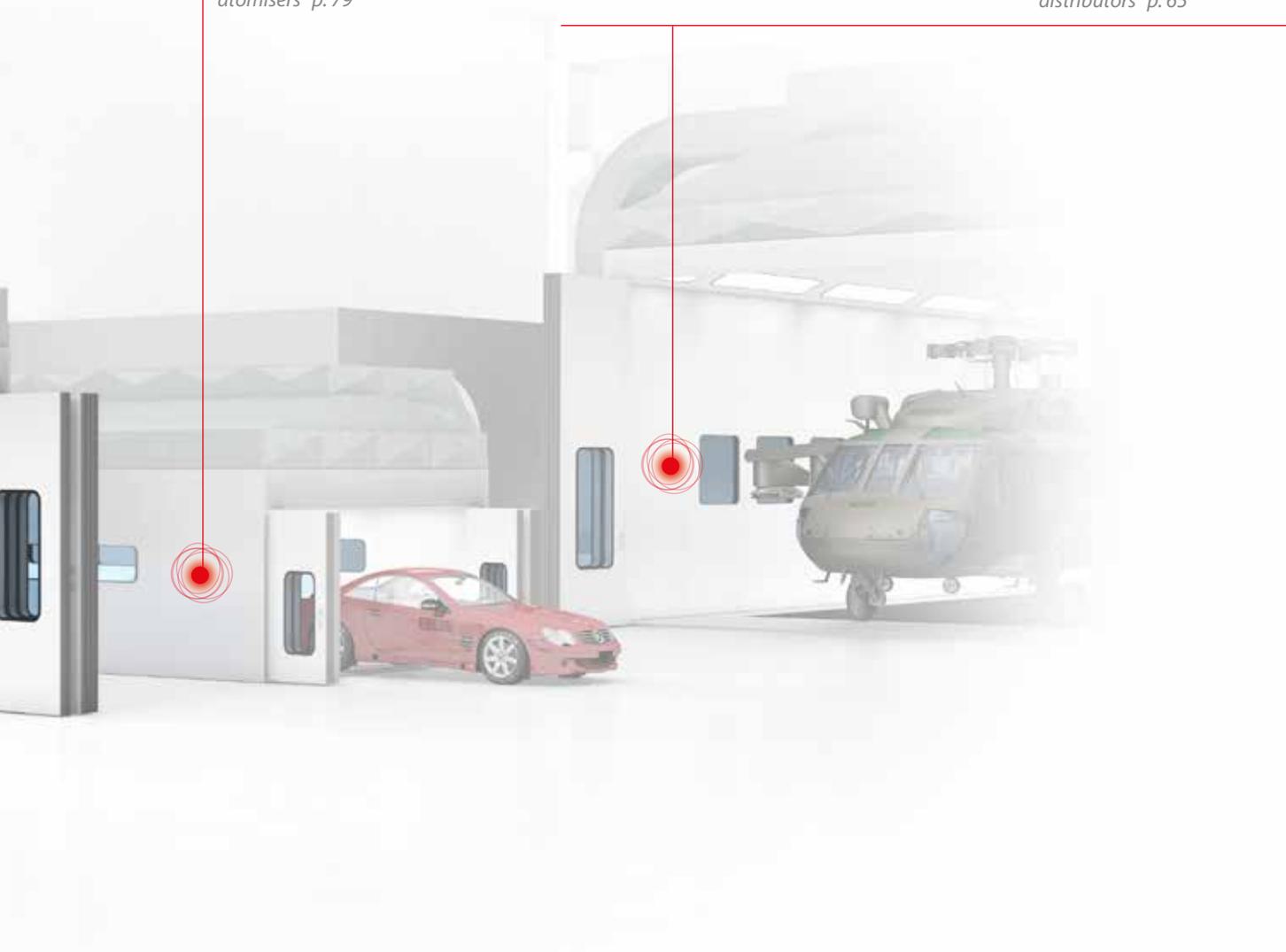
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ultimateSAM
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Temperature/humidity active probes
"Sensors and protection devices" p. 115

Typical applications

CAREL provides a vast range of humidifiers for reliable and safe air humidity control. For process applications, the best choice is adiabatic humidifiers, which can deliver high humidity levels at low energy costs, associating the benefits of achieving the desired humidity level with the effect of lowering the temperature by evaporative cooling.

humiFog, the precision adiabatic humidifier in the CAREL range, guarantees reliability in all operating conditions, being fitted with a redundancy function and having obtained seismic certification in accordance with Italian legislation.

CAREL humidification systems are successfully used in the following applications:

- automotive industry;
- aerospace industry;
- textiles industry;
- printing and packaging industry;
- timber industry;
- agri-food industry;
- wine industry;
- semiconductors and microelectronics;
- research laboratories.

Why CAREL?

Certified hygiene

CAREL humiFog is the high pressure water humidifier with VDI6022 certification that does not require the use of chemical biocides, but rather runs on pure and simple water.

Energy saving

CAREL adiabatic humidifiers guarantee energy saving thanks to minimum power consumption and negligible pressure drop in the duct.

Redundancy

The humiFog high precision adiabatic humidifier features redundancy to ensure continuous operation.

Minimal maintenance

The combination of CAREL humidifiers and reverse osmosis water treatment systems significantly reduces maintenance requirements.



humiFog multizone

Precision, high pressure water spray humidifier; capacity: 100 and 5,000 kg/h.



optiMist

High pressure water spray adiabatic humidifier and evaporative cooler; capacity: 50 to 1,000 kg/h



mc multizone

Compressed air adiabatic humidifier; capacity: 60 to 230 kg/h.



gaSteam

Gas-fired steam humidifier; steam production: 45 to 180 kg/h.



humiSonic compact

Ultrasonic humidifier for small spaces; capacity: 0.5 to 1 kg/h.



WTS

Reverse osmosis water treatment system; capacity: 25 to 1,200 kg/h.



Cold rooms

When storing foodstuffs, especially fruit and vegetables, air temperature and humidity control is needed to preserve the quality and freshness of the produce. Each product needs to be stored at a specification combination of temperature and humidity, the latter which is often very high, between 90 and 95%. Equipping cold rooms with a humidification system means the right amount of moisture can be introduced into the air, thus compensating for the portion lost through condensation on the evaporator or on the cold rooms walls. The purpose is to limit weight loss, preserve the exterior appearance and

organoleptic characteristics of the produce, thus ensuring quality remains constant from production to storage and sale. CAREL offers a vast range of humidification solutions, both adiabatic and steam.

Adiabatic humidifiers ensure the correct humidity level with very low energy consumption. CAREL adiabatic humidification solutions cover a vast range of requirements, from just a few up to several thousand litres per hour. CAREL steam humidifiers, on the other hand, are the best solution when maximum precision and hygiene are strict requirements.

Energy saving: CAREL high pressure humidifiers ensure the right humidity level with very low energy consumption (just 4 W/kg of atomised water).



Minimises weight loss

Fresh products maintain a constant weight, thus protecting revenue from sales to the end consumer.



Multizone

High pressure atomisers can manage up to 12 independent zones using just one pumping system.



Maximum hygiene

The humidifiers used in cold rooms are all hygienically safe and certified, so as to ensure maximum hygiene and safety.



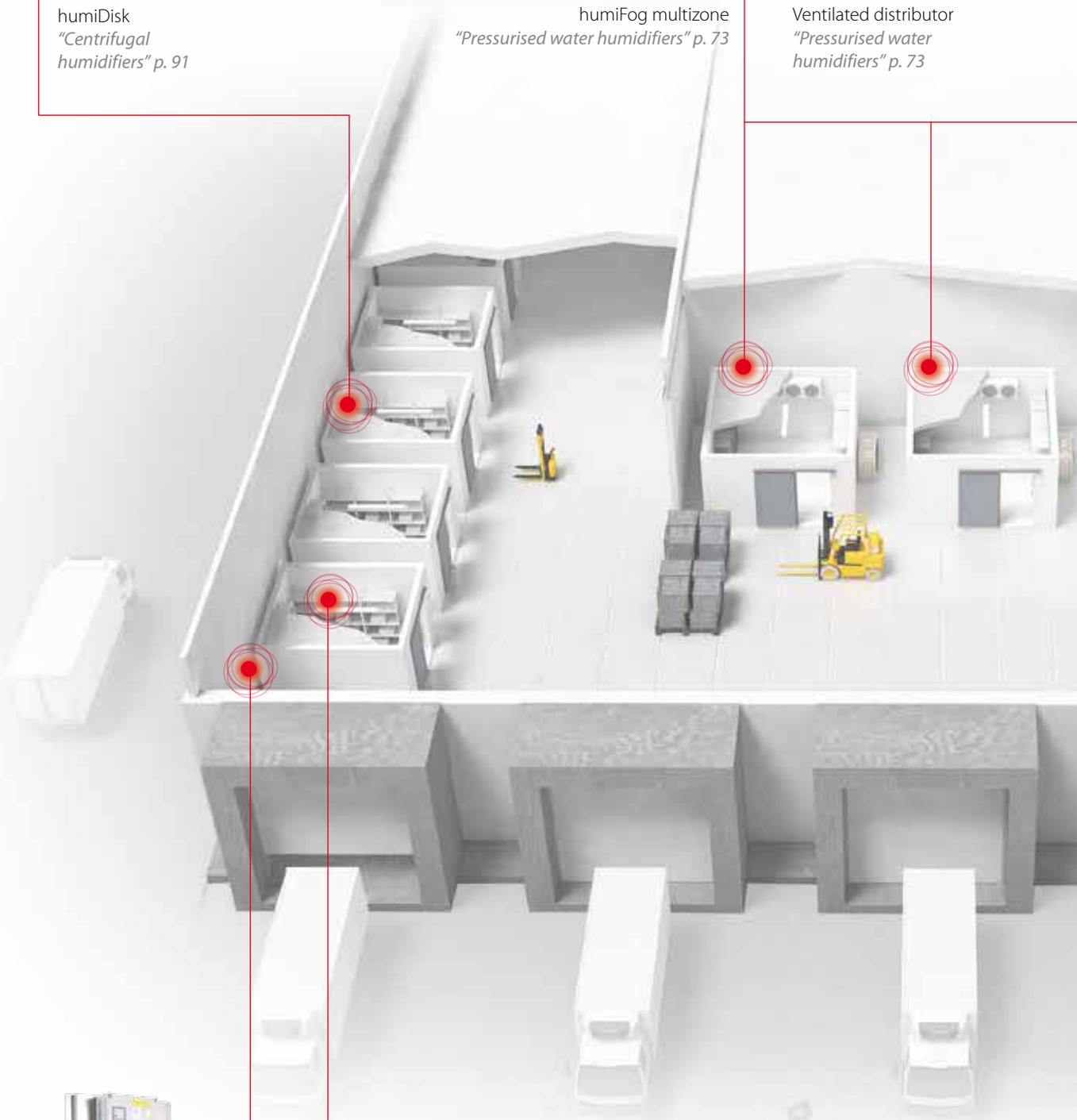
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humiFog multizone
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Ventilated distributor
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Active temperature/
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Energy meters
"System monitoring and supervision
solutions" p. 135



humiSonic compact
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Typical applications

CAREL provides a vast range of humidifiers for reliable and safe air humidity control. For agri-food applications, the best choice is adiabatic humidifiers, which can deliver high humidity levels at low energy costs, associating the benefits of achieving the desired humidity level with the effect of lowering the temperature by evaporative cooling.

humiDisk is the powerful and easy to install spinning disk humidifier. The very small droplet size ensures fast absorption in the air.

humiFog, the adiabatic humidifier for high capacity applications, guarantees reliability and precision in all operating conditions.

CAREL humidification systems are successfully used in applications for:

- food processing industry;
- fruit and vegetable cold stores;
- cold stores and maturing rooms;
- wine industry;
- dough retarding rooms;
- fresh produce display cabinets.

Why CAREL?

Certified hygiene

CAREL humiFog is the high pressure water humidifier with VDI6022 certification that does not require the use of chemical biocides, but rather runs on pure and simple water.

Connectivity

CAREL humidifiers can easily connect to other CAREL devices using a wide choice of protocols.

Complete solution

As well as humidification, CAREL offers a complete range of controllers to manage humidity and temperature inside cold rooms.

Minimum maintenance

The combination of CAREL humidifiers with reverse osmosis water treatment systems significantly reduces maintenance requirements.



humiFog multizone

Precision, high pressure water spray humidifier; capacity: 100 to 5,000 kg/h.



humiSonic direct

Ultrasonic humidifier for room applications; capacity: 2 to 8 kg/h.



mc multizone

Compressed air adiabatic humidifier; capacity: 60 to 230 kg/h.



humiDisk

Spinning disk humidifier; capacity: 1 to 6.5 kg/h.



humiSonic compact

Ultrasonic humidifier for small rooms; capacity: 0.5 to 1 kg/h.



WTS (water treatment system)

Reverse osmosis water treatment system; capacity: 25 to 1,200 kg/h.



Datacenters - evaporative humidification and cooling

Humidification is necessary in datacenters to prevent electrostatic discharges from damaging the electronic components. The drier the air, in other words, the lower the relative humidity, the higher the risk. Humidity is often quite low in datacenters, as a result of the considerable amount of heat generated by the electronic equipment. When air is heated, its relative humidity decreases and consequently the risk increases. Keeping relative humidity above 30% allows a film of liquid to form on surfaces, invisible to the naked eye yet able to earth electrostatic charges and prevent these from building up. In

addition, this film of liquid reduces friction due to rubbing and hence the generation of new charges. Energy saving is now a crucial aspect in the design of datacentres. Considering that most of the energy consumed by the datacenter is spent on removing the heat generated, evaporative cooling system can combine the advantages of humidification while saving energy.

CAREL has a vast range of humidification systems for datacentres, both steam and atomising units, the latter exploiting the effects of evaporative cooling.

Humidity control minimises the risk of electrostatic discharges, guaranteeing service continuity. Evaporative cooling maximises energy savings in large datacenters.



Electrostatic charges

To limit electrostatic discharges that can damage electronic components, relative humidity must be kept above 30%.



Service continuity

In datacenters, it is fundamental to prevent service interruptions. The humidification system must ensure reliability and redundancy.



Stability and precision

Electronic components are sensitive to sudden variations in humidity and temperature, and require stable and precise ambient conditions.



WTS compact
"Reverse osmosis water treatment systems (WTS)" p. 107



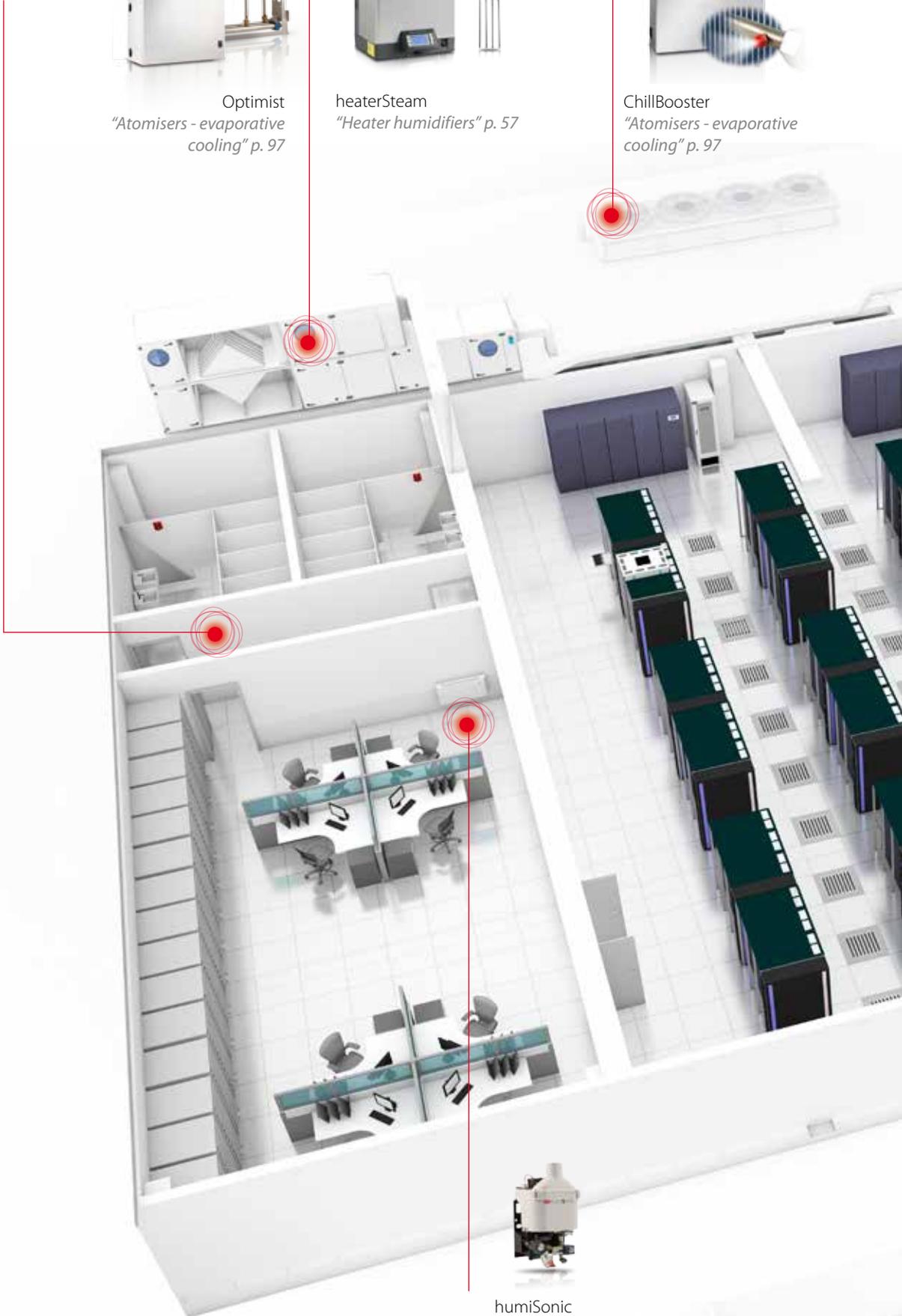
Optimist
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heaterSteam
"Heater humidifiers" p. 57



ChillBooster
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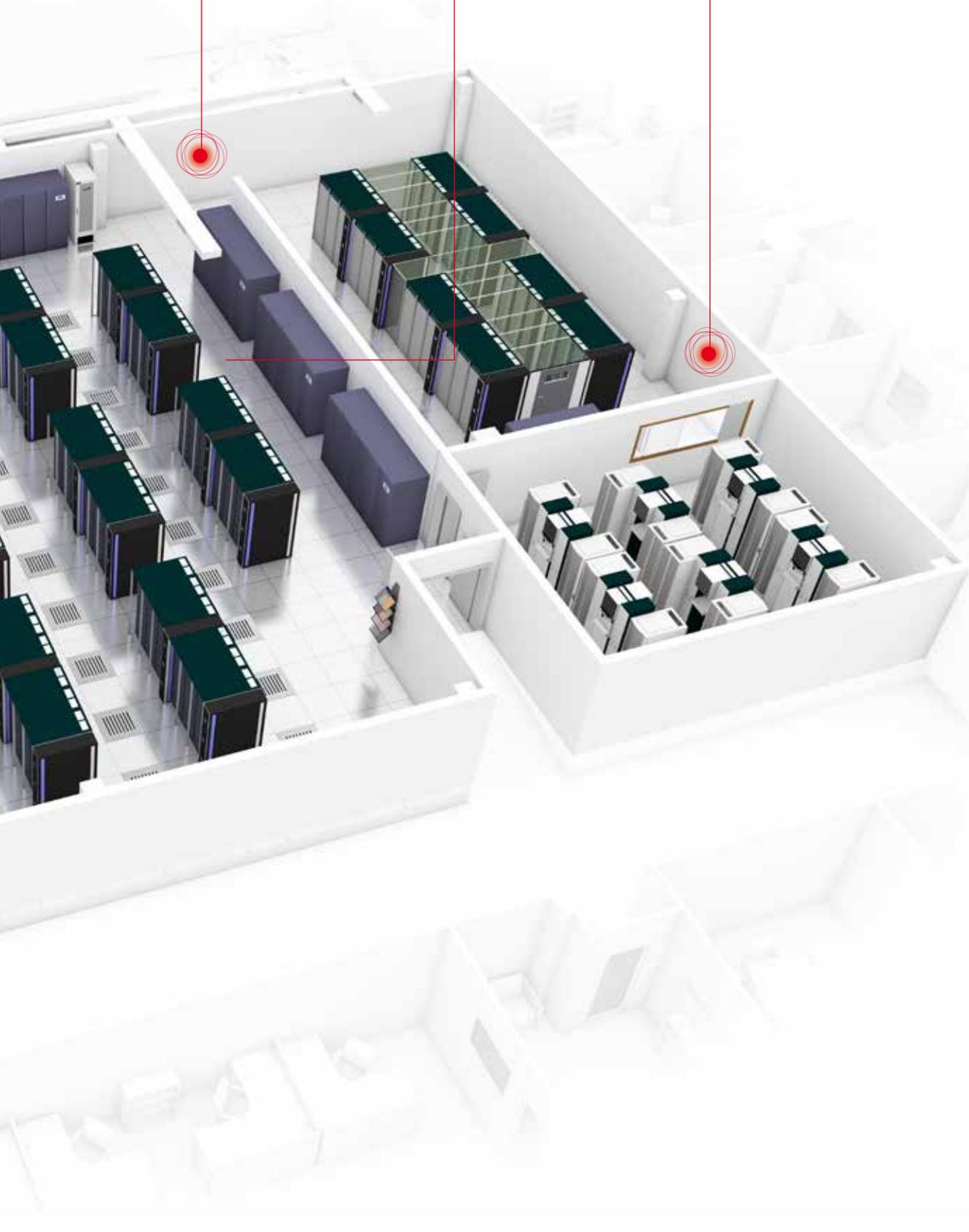
humiSonic direct
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Flood detector
"Sensors and protection devices" p. 115



Smoke and fire detector
"Sensors and protection devices" p. 115



Typical applications

The humidifiers installed inside Close Control Units (CCU), typically using immersed electrode technology for steam production, guarantee precision and vapour absorption in restricted spaces. The humidifiers installed in air handling units exploit high pressure atomisation technology, thus being effective both for humidification and direct or indirect evaporative cooling.

Wall-mounted systems are also used for local humidity control: ultrasonic adiabatic humidifiers that humidify and cool the air, or steam generators with blower units.

CAREL humidification systems are successfully used in the following applications:

- datacenters;
- electronics and semiconductor industry;
- nanotechnology industry;
- research laboratories;
- hospitals and operating theatres;
- pharmaceutical industry.

Why CAREL?

Humidification and energy saving

Adiabatic humidification is the optimum solution for ensuring the right air humidity and “absorbing” the heat generated by production machinery.

Efficiency and precision

Humidifiers and their control systems guarantee minimum water and power consumption at all times.

Reliability

The humiFog high precision adiabatic humidifier features redundancy to ensure continuous operation.

Minimal maintenance

The combination of CAREL humidifiers and reverse osmosis water treatment systems significantly reduces maintenance requirements.



optiMist

High pressure water spray adiabatic humidifier and evaporative cooler; capacity: 50 to 1,000 kg/h.



humiFog multizone

Precision, high pressure water spray humidifier; capacity: 100 and 5,000 kg/h.



humiSonic direct

Ultrasonic humidifier for room applications; capacity: 2 to 8 kg/h.



chillBooster

High pressure water spray evaporative cooler; capacity: 100 to 1,000 kg/h.



humiSteam

Immersed electrode humidifier; steam production: 1.5 to 130 kg/h.



WTS

Reverse osmosis water treatment system; capacity: 25 to 1,200 kg/h.



Hospitals and operating theatres

Low air humidity affects both the health and comfort of people. In winter, even if there is fog outside (100% relative humidity), a building's heating system increases air temperature to around 20 to 25 °C, consequently reducing relative humidity to values as low as 10 to 20%, perceived as dry air.

Dry air facilitates the evaporation of moisture from the skin, which cracks, and causes dryness of the mucous in the throat, nose and airways, helping spread typical winter afflictions. Consequently, hospital wards use air-conditioning systems that control both the air temperature and humidity.

Precise humidity control is not simply a desired attribute, but rather is required

by law. In operating theatres, the ideal temperature-humidity conditions need to be maintained in order to improve working conditions for doctors, while at the same time safeguarding the health of patients and guaranteeing hygiene, accessibility and service continuity.

CAREL humiFog is the only high pressure water humidifier in the world that is suitable for all applications that require a very high level of hygiene: it is in fact certified in accordance with VDI6022, published in the Official Gazette, and VDI3803/DIN1946, thus also providing the benefits of evaporative cooling in hospital environments.

Health, safety and energy saving in compliance with applicable standards, for the humidification of hospital wards and operating theatres.



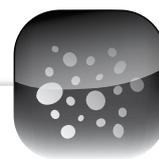
Electrostatic charges

Humidity control helps protect electronic equipment against electrostatic discharges: a safer place for both staff and patients.



Bacteria and biological contaminants

Controlling and maintaining relative humidity between 40% and 60% prevents the proliferation of bacteria and other biological contaminants.



Airborne dust

Dry air in winter increases the level of airborne dust, causing problems for people with allergies or asthma.



ChillBooster
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heaterSteam
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ultimateSAM
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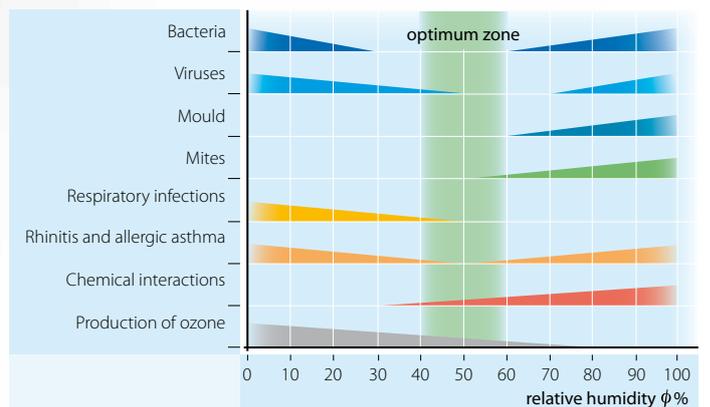
ultimateSAM
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ir33+
ir33+ range for commercial refrigeration



Optimum relative humidity ranges for health



Typical applications

CAREL offers both completely aseptic steam humidification solutions, and hygienically-certified adiabatic humidification solutions. Applications include common spaces, to improve personal comfort, and clinical environments, to ensure the ideal optimum in terms of hygiene, safety and well-being.

Keeping humidity within controlled levels in hospital environments is needed to ensure:

- the well-being of patients and staff;
- health: prevent proliferation of biological contaminants;
- safety: reduce the risk of electric discharges that damage equipment;
- quality: reduce the level of airborne dust;
- comply with standards on required ambient temperature-humidity conditions.

In hospital applications, humidification is often provided using a centralised steam generator. CAREL ultimateSAM guarantees a short absorption space, saving energy.

Why CAREL?

Certified hygiene

CAREL humiFog is the only high pressure water humidifier in the world to be certified in accordance with VDI6022, and does not require the use of chemical biocides, but rather pure and simple water.

Energy saving

Adiabatic humidification extends the benefits of evaporative cooling to hospital environments.

Seismic certification

CAREL humiFog has undergone seismic testing to verify its compliance with the requirements of Italian decree of 14 January 2008.

Minimal maintenance

The combination of CAREL humidifiers and reverse osmosis water treatment systems significantly reduces maintenance requirements.



ultimateSAM

Pressurised steam distributor (0.1 to 4 bars); capacity: 0.1 to 1,100 kg/h.



humiSteam

Immersed electrode humidifier; steam production: 1.5 to 130 kg/h.



heaterSteam

Electric heater steam humidifier; precision $\pm 1\%$ RH; steam production: 2 to 60 kg/h.



humiFog multizone

Precision, high pressure water spray humidifier; capacity: 100 to 5,000 kg/h.



WTS (water treatment system)

Reverse osmosis water treatment system; capacity: 25 to 1,200 kg/h.



gaSteam

Gas-fired steam humidifier; steam production: 45 to 180 kg/h.



Cleanrooms

Relative humidity is one of the parameters that define the standard operating conditions of a cleanroom. There are several reasons why precise humidity control is required; indeed, for some applications the specified tolerance is just 1%, due to the affect that relative humidity has from a physical/chemical point of view on material processing and storage. Precise humidity control therefore means better process control.

Keeping indoor relative humidity between 40% and 60% also ensures personal comfort, and therefore maximum operator productivity.

CAREL provides complete solutions for installation in cleanrooms, up to and including complete system supervision. All this ensures reliability, precision and maximum energy savings.

CAREL offers a vast range of steam humidifiers, featuring complete accessories for application in AHUs. In particular, the electric heater model guarantees precision of $\pm 1\%$ RH.

Moreover, a wide choice of adiabatic humidifiers is also available, whose advantages include an active contribution to temperature control, by "absorbing" some or all of the heat generated by the equipment.

Precise humidification to maximise energy savings and hygiene, for processes control and operator comfort.



Electrostatic charges

To limit the buildup of electrostatic discharges that can damage electronic components, relative humidity must be kept above 30%.



Bacteria and biological contaminants

Controlling and maintaining relative humidity between 40% and 60% prevents the proliferation of bacteria and other biological contaminants.



Chemical reactions

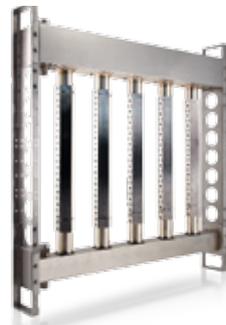
Humidity control also means better process control. The speed of many chemical reactions in fact depends on relative humidity.



humiFog multizone
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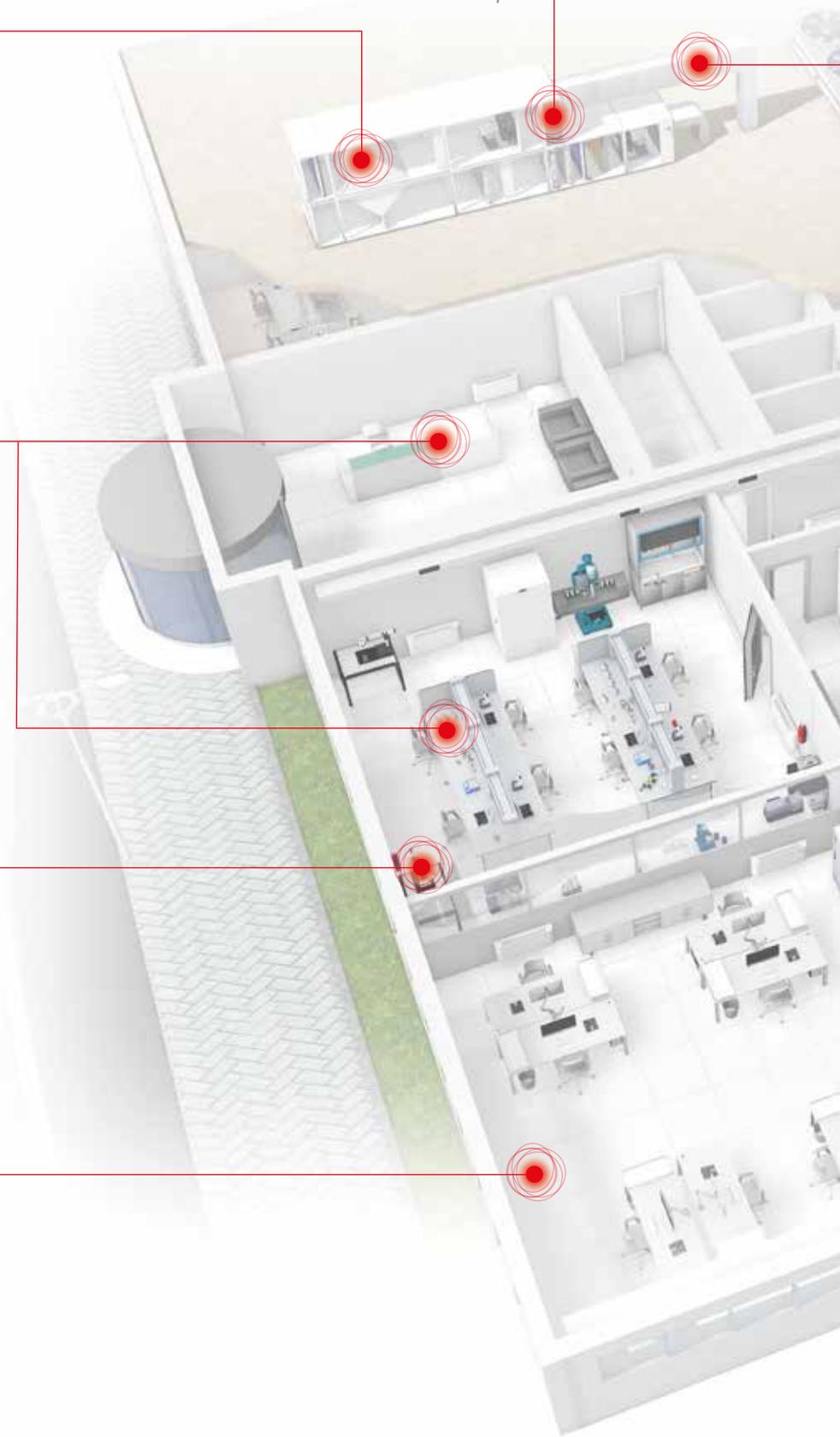
pGD touch
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tERA
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Active temperature/
humidity probe
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Air quality probe
"Sensors and protection devices" p. 115



chillBooster
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humiSonic compact
"Ultrasonic humidifiers" p. 83

Typical applications

The constant increase in the technological level of production processes requires increasing use of spaces in which contamination can be controlled, while also guaranteeing maximum operator comfort and thus improving efficiency. For example, humidity also has a considerable influence on the viscosity, and consequently the workability, of certain materials, such as photoresist in semiconductor production. Capillary forces can affect the precision and speed of processes. In particular, these forces increase adhesion of water particles on surfaces when relative humidity is high.

CAREL humidification systems are successfully used in the following applications:

- semiconductors and microelectronics;
- pharmaceutical and biotechnology;
- cosmetics;
- medical;
- hospitals and operating theatres;
- research laboratories;
- aerospace technology;
- micro and nanotechnologies;
- agri-food industry;
- automotive industry.

Why CAREL?

Certified hygiene

CAREL humiFog is the high pressure water humidifier with VDI6022 certification that does not require the use of chemical biocides, but rather runs on pure and simple water.

Evaporative cooling

Adiabatic humidification cools the environment. This means energy savings, especially in places with machinery and equipment that create large amounts of heat.

Redundancy

The humiFog high precision adiabatic humidifier features redundancy to ensure continuous operation.

Minimal maintenance

The combination of CAREL humidifiers and reverse osmosis water treatment systems significantly reduces maintenance requirements.



humiSonic direct

Ultrasonic humidifier for room applications; capacity: 2 to 8 kg/h.



humiSonic ventilation

Ultrasonic humidifier for duct applications; capacity: 2.4 to 18 kg/h.



heaterSteam

Electric heater steam humidifier; precision $\pm 1\%$ RH; steam production: 2 to 60 kg/h.



humiFog multizone

Precision, high pressure water spray humidifier; capacity: 100 to 5,000 kg/h.



ultimateSAM

Pressurised steam distributor (0.1 to 4 bars); capacity: 0.1 to 1,100 kg/h.



gaSteam

Gas-fired steam humidifier; steam production: 45 to 180 kg/h.



Comfort in offices and hotels

In winter, even if there is fog outside (100% relative humidity), a building's heating system increases air temperature to around 20 °C, consequently reducing relative humidity to values as low as 10-30%, perceived as dry air. Consequently, occupants feel dry skin on their hands and chapped lips.

As well as these unpleasant feelings, there are also negative consequences on the health. The human respiratory system is in fact sensitive to dry air: nasal and throat mucous dries out, making us more vulnerable to contagion by typical winter afflictions. The particles spread by a simple sneeze, rather than precipitating, evaporate and remain suspended in the air, even for up to several hours.

For these reasons, air humidity control has a positive effect on productivity in the workplace: not only do personnel feel more comfortable, but transmission of infective diseases is reduced.

Low humidity also has effects on perceived temperature. Dry air facilitates the evaporation of moisture from the skin, and consequently the room thermostat needs to be set 1-2 °C higher to feel an equivalent level of comfort.

An optimum level of comfort can be achieved by controlling air humidity, so as to maintain relative humidity values between 40 and 60%.

Relative humidity control, along with temperature control, is decisive in creating a comfortable environment.



Health and well-being

Controlling and maintaining relative humidity between 40% and 60% prevents the proliferation of bacteria and other biological contaminants.



Airborne dust

Dry air in winter increases the level of airborne dust, causing problems for people with allergies or asthma.



Preservation of objects

Low humidity causes breakages and cracks in wooden, paper and fabric objects, damaging books, paintings, precious wooden furniture and parquet floors.



humiFog
"Pressurised water humidifiers" p. 73



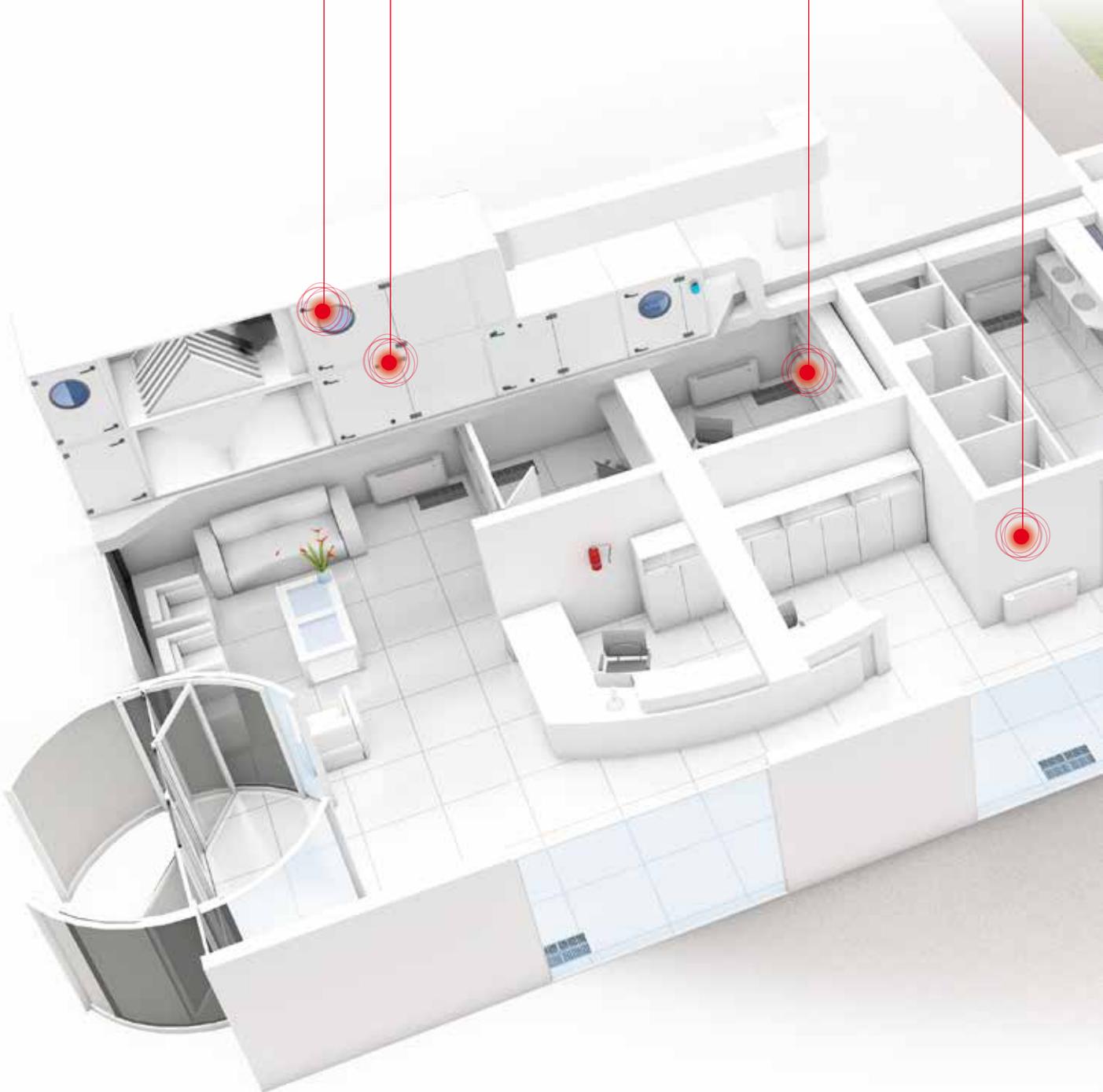
humiSteam
"Immersed electrode humidifiers" p. 49



WTS large
"Reverse osmosis water treatment systems (WTS)" p. 107



th-tune
"System monitoring and supervision solutions" p. 135





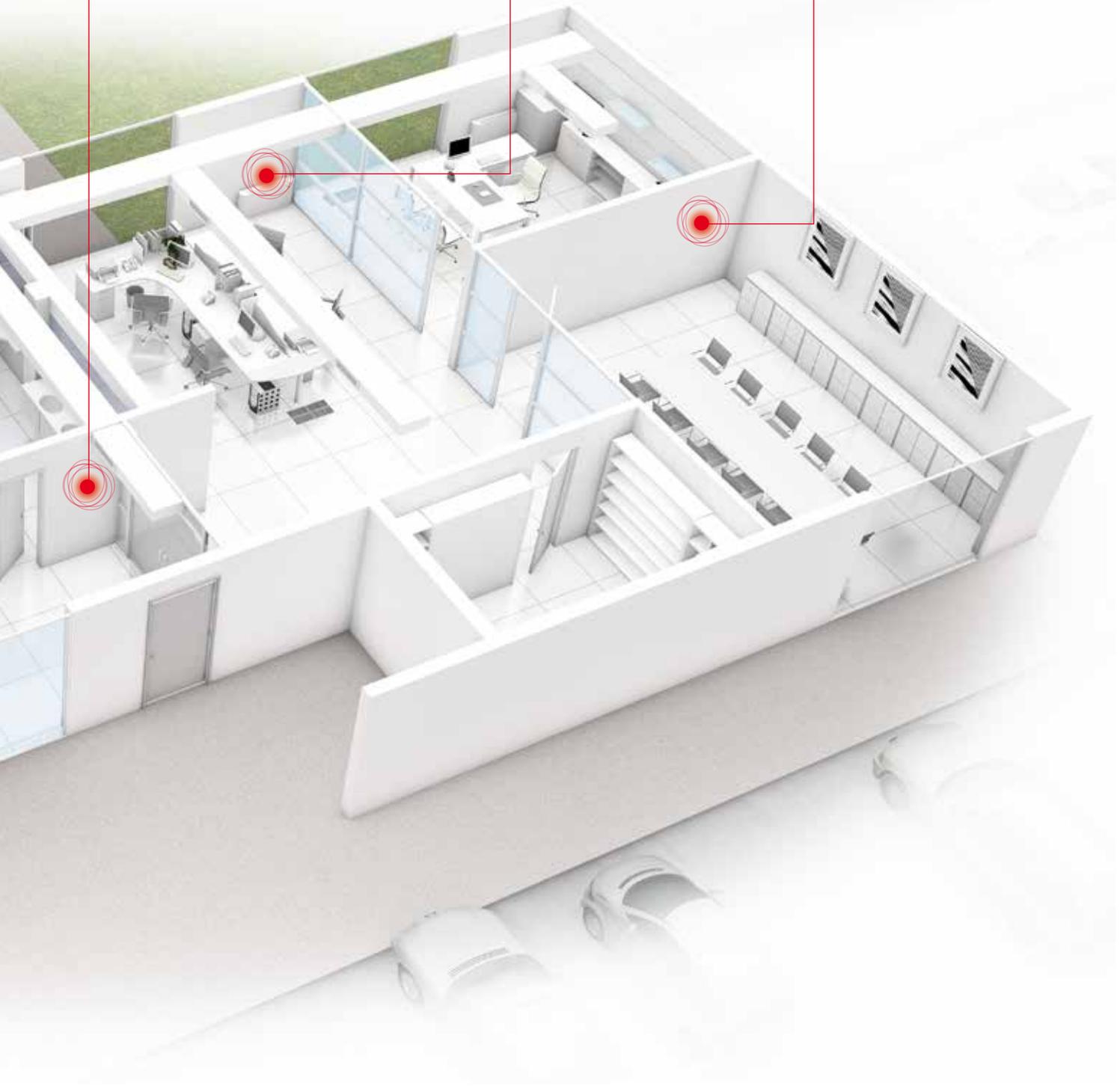
compactSteam
"Immersed electrode humidifiers" p. 49



humiSonic compact
"Ultrasonic humidifiers" p. 83



humiSonic direct
"Ultrasonic humidifiers" p. 83





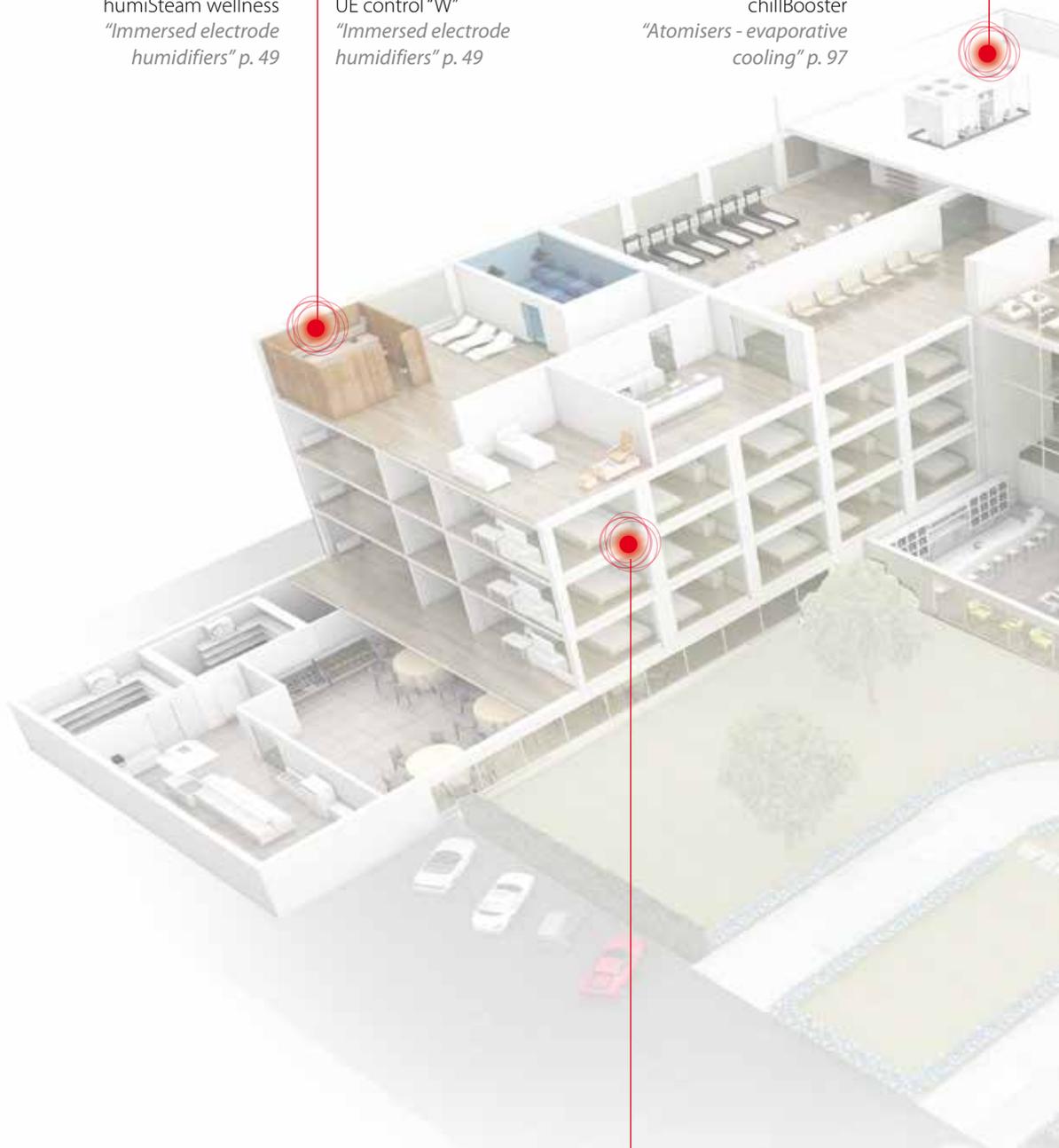
humiSteam wellness
"Immersed electrode
humidifiers" p. 49



UE control "W"
"Immersed electrode
humidifiers" p. 49



chillBooster
"Atomisers - evaporative
cooling" p. 97



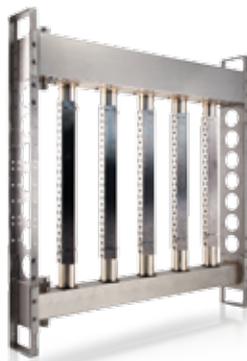
humiSonic compact
"Ultrasonic humidifiers" p. 83



Smoke and fire detector
"Sensors and protection devices" p. 115



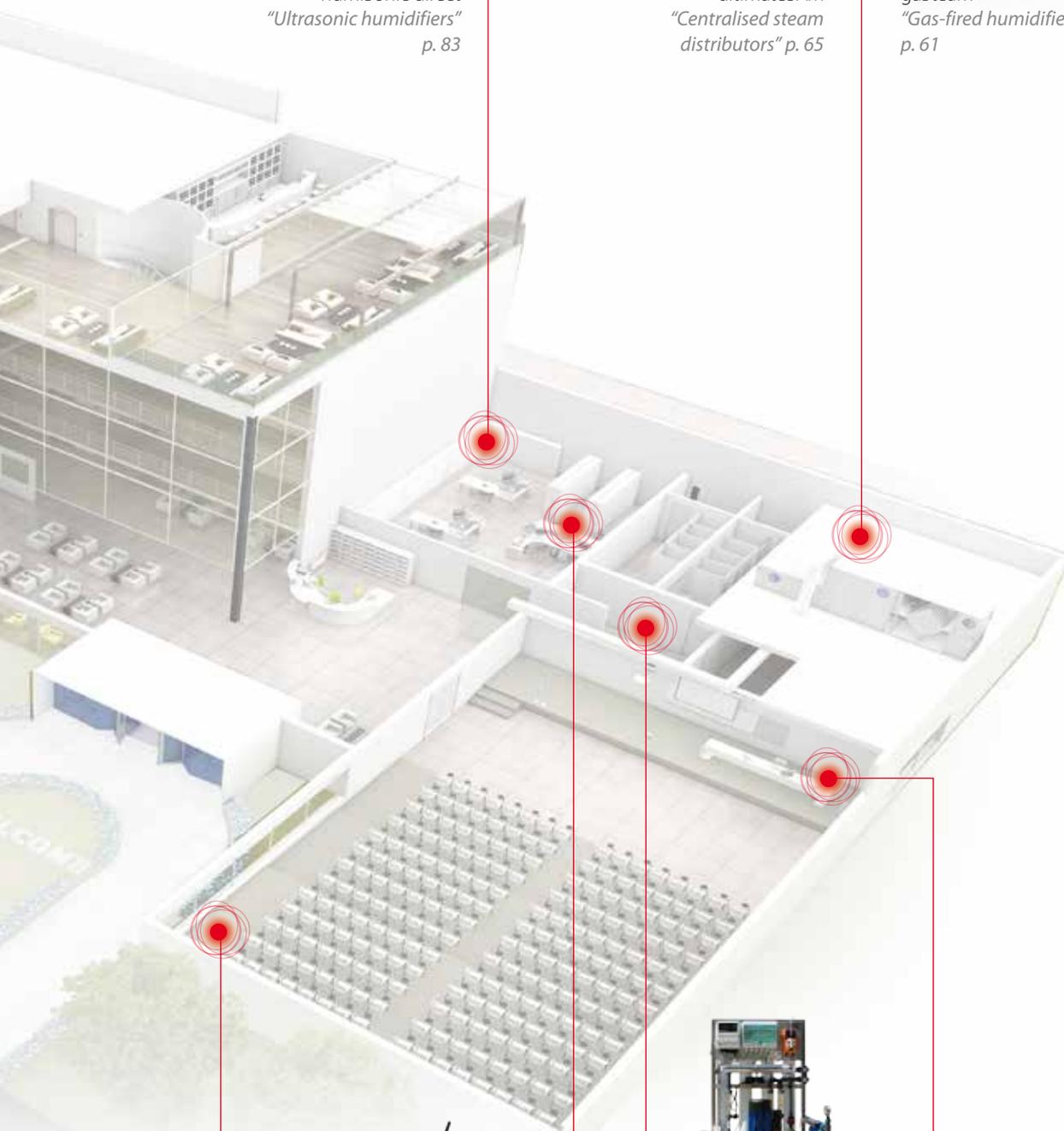
humiSonic direct
"Ultrasonic humidifiers"
p. 83



ultimateSAM
"Centralised steam
distributors" p. 65



gaSteam
"Gas-fired humidifiers"
p. 61



boss
"System monitoring and
supervision solutions" p. 135



WTS large
"Reverse osmosis water
treatment systems (WTS)"
p. 107



Active temperature and
humidity probes
"Sensors and protection
devices" p. 115

Typical applications

Offices

The right level of room humidity has an effect on the comfort people perceive and reduces the risk of respiratory illnesses, thus bringing an increase in productivity.

The right level of humidity guarantees:

- greater personal comfort: reduces the risk of dry skin, chapped lips, sore eyes;
- better air quality: less dust and related discomfort;
- better preservation of objects such as books, paintings and wooden furniture;
- higher perceived temperature: possibility to turn down the thermostat.

Hotels

Air temperature and humidity are undoubtedly among the most important aspects that affect indoor quality in places where people stay. To ensure comfort conditions, these properties need to be controlled precisely, both in the spaces used by individual guests, and in common areas, such as restaurants, halls or conference rooms.

Humidification in winter for maximum guest comfort means:

- avoiding discomfort due to excessively dry air;
- reducing the amount of dust in the air;
- limiting the buildup of static electricity;
- adiabatic systems for cooling the air;
- green solutions for cooling the air, with minimum energy consumption;
- specific solutions for steam baths or other guest services.

One other application often found especially in luxury hotels involves "Steam baths hammam" p. 43).

Why CAREL?

Energy saving

30% less power thanks to evaporative cooling.

Steam from gas

Possibility to use gas fuel rather than electricity, saving up to 70%.

Minimum maintenance

The use of demineralised water substantially reduces maintenance requirements.

Integrated solutions

Complete system supervision to guarantee optimum operation.



compactSteam

Immersed electrode humidifier for rooms/ ducts; steam production: 1.6 to 5.4 kg/h.



humiSonic ventilation

Ultrasonic humidifier for duct applications; capacity: 2.4 to 18 kg/h.



chillBooster

High pressure water spray evaporative cooler for chillers and drycoolers; capacity: 100 to 1,000 kg/h.



humiFog multizone

Precision, high pressure water spray humidifier; capacity: 100 to 5,000 kg/h.



humiSonic compact

Ultrasonic humidifiers for fan coil applications; capacity: 0.5 to 1 kg/h.



gaSteam

Gas-fired steam humidifier; steam production: 45 to 180 kg/h.



Museums and libraries

Air temperature and humidity control plays a fundamental role in museums and, more generally, in places where precious objects and works of art are kept.

A painting normally consists of wooden stretchers, a frame and the canvas (or wooden panel) where the paint is applied: these are all hygroscopic materials that expand or contract when the surrounding air undergoes variations in relative humidity. The result may be formation of cracks in the paint, with possible detachment from the support base and irreparably damage to the artwork.

Even wooden objects suffer from changes in humidity. In particular, excessively low humidity may cause cracks that affect quality and safe preservation.

The same principle also applies to the preservation of books in libraries and archives. The paper used for the pages and the covers is also hygroscopic, meaning it either releases or absorbs moisture according to the humidity of the surrounding environment, and consequently tends to contract or expand. In particular, low relative humidity values may cause paper and glue to dehydrate and crack.

Perfect preservation of works by maintaining the right temperature and humidity level in museums, libraries and archives, as well as prestige homes.



Wooden works

Excessively low humidity may cause cracks that affect quality and safe preservation.



Paintings

Variations in relative humidity cause cracks in the paint, with possible detachment from the support base and irreparably damage to the artwork.

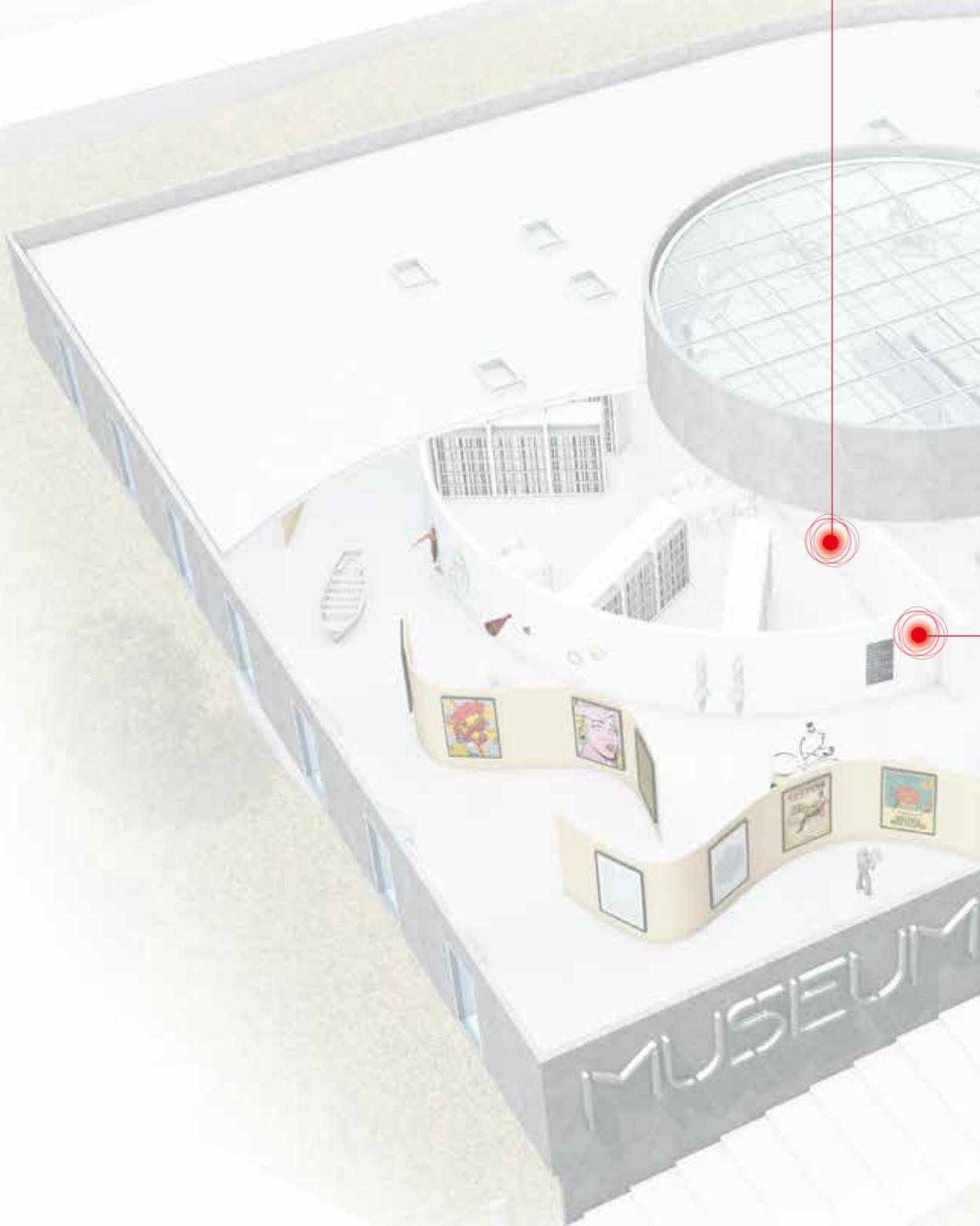


Books and parchments

Being made from hygroscopic material, low relative humidity values may cause paper and glue to dehydrate and crack.



compactSteam
"Immersed electrode
humidifiers" p. 49





Access Point
"Wireless devices for monitoring temperature, humidity, light and energy" p. 127



WTS compact
"Reverse osmosis water treatment systems (WTS)" p. 107



boss
"System monitoring and supervision solutions" p. 135



humiSonic direct
"Ultrasonic humidifiers" p. 83



Typical applications

CAREL offers a vast range of humidifiers and controllers, ideal for maintaining the correct temperature and humidity level in museums, libraries or archives, as well as prestige homes where artworks need to be preserved. The range includes precise and reliable steam humidifiers, as well as adiabatic humidifiers, which not only ensure high performance and very low energy consumption, but can both humidify and cool the air at the same time.

Maintaining the right level of relative humidity in these applications means:

- guaranteeing longer preservation of works of art;
- preventing damage to canvas and parchment due to variations in air humidity;
- preserving wooden objects, which tend to crack if the air is too dry;
- better care for books, avoiding dehydration and cracking of the paper and glue.

Why CAREL?

Energy saving with evaporative cooling

Adiabatic humidifiers both humidify and cool the environment, reducing power consumption by up to 30% through evaporative cooling.

Steam from gas

The possibility to use gas fuel rather than electricity to generate steam brings cost savings of up to 70%, also thanks to energy efficiency of 94-96%.

Aesthetics

Carel proposes solutions with a very low visual impact, for perfect integration into prestige environments.

Minimal maintenance

The combination of CAREL humidifiers and reverse osmosis water treatment systems significantly reduces maintenance requirements.



compactSteam

Immersed electrode humidifier for rooms/ ducts; steam production: 1.6 to 5.4 kg/h.



humiSteam

Immersed electrode humidifier; steam production: 1.5 to 130 kg/h.



heaterSteam

Electric heater steam humidifier; precision $\pm 1\%$ RH; steam production: 2 to 60 kg/h.



humiFog multizone

Precision, high pressure water spray humidifier; capacity: 100 to 5,000 kg/h.



humiSonic direct

Ultrasonic humidifier for room applications; capacity: 2 to 8 kg/h.



gaSteam

Gas-fired steam humidifier; steam production: 45 to 180 kg/h.



Steam baths hammam

Steam baths use steam for cleansing the body through transpiration of the skin.

The use of steam baths, Turkish baths, or hammams, as they are called Morocco, has a long history dating back to the ancient Greeks and Egyptians, and their cleansing effect and health benefits mean they continue to be used today.

A steam bath is a room where relative humidity is kept at 100%, with a fine mist produced due to stratified temperature, from 20 to 25 °C at floor level, up to 40 to 50 °C at head level. Compared to the dry environment of a sauna, perspiration is less intense, however considering that

the treatment can last longer, much more perspiration is produced, with numerous beneficial effects.

Steam humidifiers are the heart of steam baths, creating the ideal humidity and temperature conditions for the required treatment.

Essences are also added to the steam, such as eucalyptus oil, to further improve the feeling of well-being during the session. As well as humidity and the distribution of essences, CAREL wellness humidifiers can also control the lights and fans in the steam bath.

Steam humidification for treatments with benefits recognised since ancient times, and today used all over the world.



Cleansing the skin

Natural perspiration brings deep cleansing and purification of the skin.



Cardiorespiratory system

Excellent for the respiratory tracts, also dilates blood vessels and improves circulation.



Feeling of well-being

An invigorating and relaxing effect that helps relieve everyday stress.



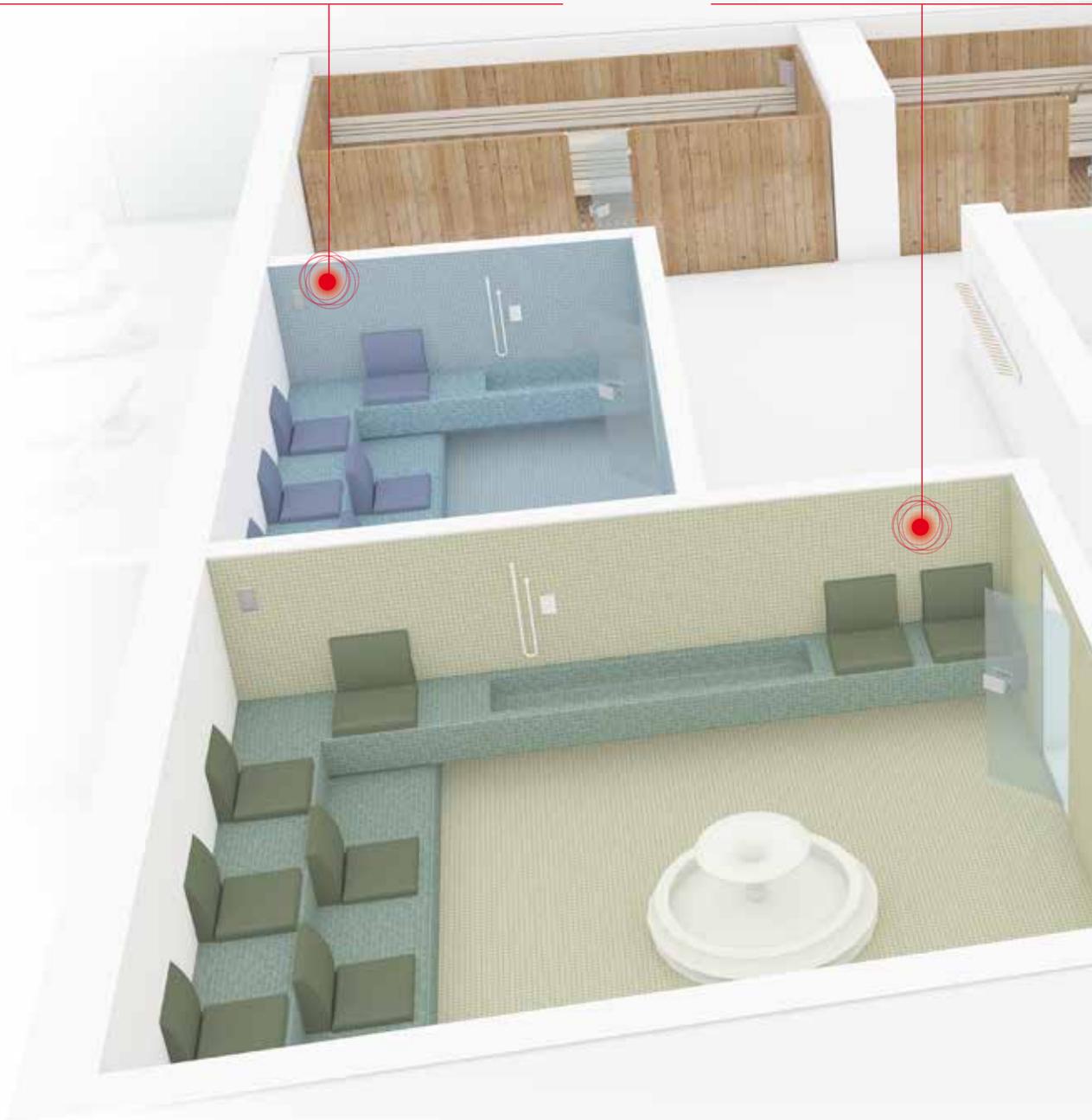
humiSteam Wellness
"Immersed electrode humidifiers"
p. 49



Active temperature/humidity probes
"Sensors and protection devices" p. 115



Steam nozzles
"Accessories" p. 69





gaSteam
"Gas-fired humidifiers" p. 61



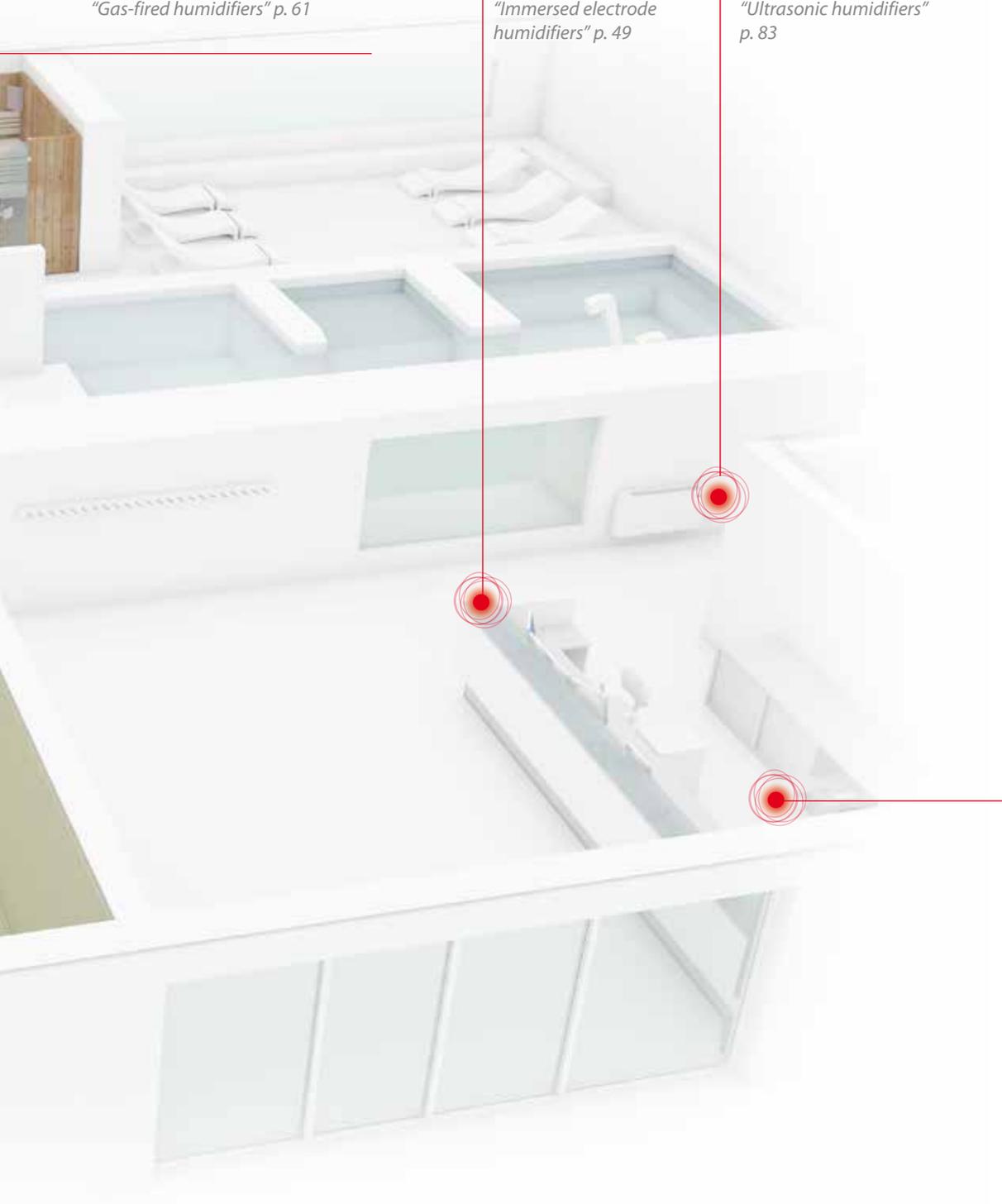
UE "W" control
"Immersed electrode humidifiers" p. 49



humiSonic compact
"Ultrasonic humidifiers" p. 83

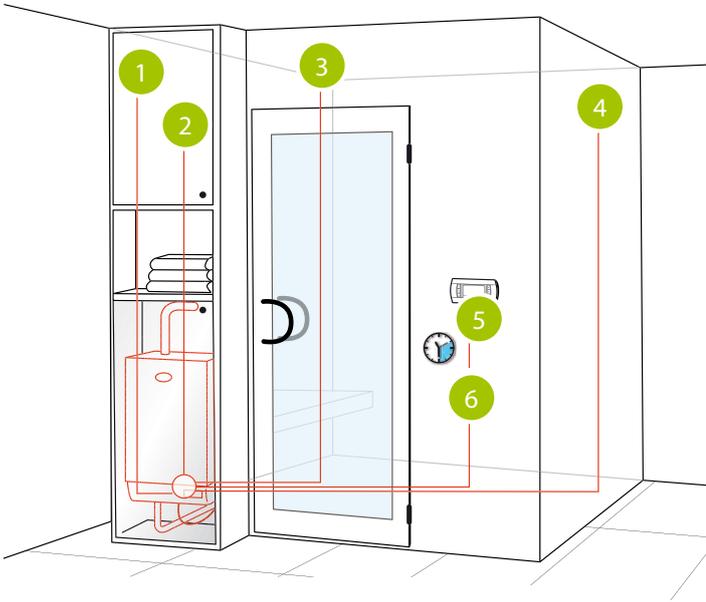


WTS compact
"Reverse osmosis water treatment systems (WTS)" p. 107



Typical applications

The applications depend on the size and use of the steam bath: from home to commercial/professional use, i.e. wellness centres, spas, gyms and hotels.



- 1 disinfection system control
- 2 essence control
- 3 light control
- 4 fan control
- 5 remote control display
- 6 clock programming function

Why CAREL?

Remote control

The controller's display can be detached from the humidifier and connected up to 200 metres away.

A complete...

The controller, based on pCO technology, can also manage external devices: 4 pumps (for essences and disinfection), fans and lights.

...and dedicated solution

CAREL solutions have been developed in close partnership with an important steam bath manufacturer.

Steam from gas

The possibility to use gas fuel rather than electricity to generate steam brings cost savings of up to 70%, also thanks to energy efficiency of 94-96%.



humiSteam wellness

Immersed electrode humidifier with dedicated controller; steam production: 1.5 to 130 kg/h.



heaterSteam

Electric heater steam humidifier; precision $\pm 1\%$ RH; steam production: 2 to 60 kg/h.



gaSteam

Gas-fired steam humidifier; steam production: 45 to 180 kg/h.



WTS (water treatment system)

Reverse osmosis water treatment system; capacity: 25 to 1,200 kg/h.

Isothermal humidification





Immersed electrode humidifiers

The operation of immersed electrode humidifiers is based on a very simple physical principle.

As common drinking water contains a certain quantity of dissolved mineral salts, and is consequently slightly conductive, applying a voltage to metal electrodes immersed in the water creates an electric current that heats the water until producing steam (Joule effect).

The quantity of steam produced is proportional to the electric current, which is in turn proportional to the water level.

This electric current is measured by a current transformer: by varying the level of water using a drain solenoid valve and due to the evaporation process, the current, and consequently steam production, can be modulated.

As the steam produced does not carry mineral salts, the salt concentration in the water and therefore the conductivity increases, and has to be periodically diluted by draining part of it using the drain pump and replacing it with new water.

In addition, lime scale is deposited over time and covers part of the cylinder, which must be replaced or cleaned.

Compared to electric heater or gas-fired humidifiers, immersed electrode humidifiers:

- are less expensive to purchase;
- operate with drinking water (not completely demineralised or softened);
- require periodical replacement (or cleaning) of the cylinder;
- feature modulation suitable for comfort or industrial applications, without extreme requirements.

CAREL has been manufacturing immersed electrode humidifiers since the 1970s and can draw benefit from its know-how in the field of electronic controllers: precision control, reliable electronics and sophisticated and complete control software.

The CAREL solutions for immersed electrode humidifiers are humiSteam and compactSteam.





humiSteam

UE*

humiSteam is suitable for installation in civil environments, offices, hospitals, industrial facilities, and steam baths. humiSteam is designed for installation in rooms, using the steam blower, and for installation in air ducts, using the new range of linear steam distributors. humiSteam works on mains water with a conductivity between 75 and 1250 µs/cm, and its control software automatically adjusts operation according to the characteristics of the water, so as to optimise operating life without maintenance.

The range of humiSteam humidifiers includes the following models

- humiSteam Xplus (X), suitable for all types of applications that require independent control with humidity probe, range from 1.5 to 130 kg/h;
- humiSteam basic (Y), ideal for applications in which the humidity is controlled by an external device, such as a BMS or a humidistat, with range from 1.5 to 65 kg/h;
- humiSteam "Wellness"(W) for steam baths, which features the same control electronics as the Xplus model.

Main pluses of this product:

- ease of use: all humiSteam models feature a large, simple and user-friendly alphanumeric LCD;
- reliability: all humiSteam models feature power connections that mean no tools are required when changing the cylinder, meaning more overheating due to less accurate maintenance;
- performance: the software makes the humidifier much faster to start and respond to variations in humidity demand. In addition, specific hygiene and safety functions are available (for example, the antifoam system), as well as a specific function for use with "problematical" water;
- connectivity: both the humiSteam Xplus (X) and humiSteam basic (Y) models offer the Modbus® RS485 connection as standard; in addition, the Xplus

high-end controller (deriving from the CAREL pCO family programmable controllers) includes a series of optional communication protocols and several advanced functions, such the possibility to program operation and set points according to daily and weekly time bands, event history (recording events and alarms with date and time) and the possibility of remote diagnostics via a GSM connection.

Advantages

- AFS system (Anti Foaming System): detects foam to prevent droplets of water being carried by the steam;
- cylinders with galvanised electrodes and anti-scale filter on the bottom; openable and fireproof cylinders are also available;
- steam production with continuous modulation from 20% to maximum rated output (from 10% for 90 and 130 kg/h models);
- built-in conductivity sensor and control software to optimise energy efficiency and operating life, with constant performance over the life of the cylinder;
- modulating limit probe for maximum safety in AHU/duct.

Controllers

Three different types of controller are available.

"Basic"(Y) (1.5 to 65 kg/h)

Steam production is controlled by an external humidistat in ON/OFF mode (voltage-free contact) or by an external controller proportionally to demand (0 to 10 V, 2 to 10 V, 0 to 20 mA, 4 to 20 mA; fitted with RS485 interface using Modbus® protocol

"Xplus" (X) (1.5 to 130 kg/h)

Built-in controller based on pH (technology pCO) with pGD:

- ON/OFF by external humidistat;
- proportional to an external signal (0 to 1 V, 0 to 10 V, 2 to 10 V, 0 to 20 mA, 4 to 20 mA);
- modulating based on an external signal from BMS or room humidity probe with configurable set point, plus a limit probe in the duct, where required;
- modulating based on the set point and temperature probe reading or signal from a BMS (Wellness model);

Other important features include:

- definition of daily and weekly time bands;
- connectivity via various types of LAN (e.g.: Modbus®, BACnet™, LON®);
- alarm log management.

W controller

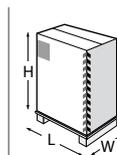
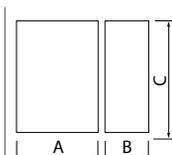
Same as the Xplus but for steam baths:

- definition of different temperature set points for different time bands;
- management of essences (3) and a "sanitation" cycle;
- management of fans (inside and exhaust) and inside light.

Features	UE001*	UE003*	UE005*	UE008	UE009*	UE010*	UE015*	UE018*	UE025*	UE035*	UE045*	UE065*	UE090*	UE130*	
General															
Rated steam production (kg/h)	1.5	3	5	8	9	10	15	18	25	35	45	65	90	130	
Power consumption (kW)	1.12	2.25	3.75	6.00	6.75	7.50	11.25	13.5	18.75	26.25	33.75	48.75	67.5	97.5	
Power supply (other voltages upon request) • 200, 208-230 Vac -15/10%, 50/60 Hz single-phase • 200, 208, 230 Vac -15/10%, 50/60 Hz three-phase • 400, 460, 575 Vac -15/10%, 50/60 Hz, three-phase	●	● ● ●	● ● ●	●	●	● ●	● ●	●	● ●	● ●	● ●	●	●	●	
Steam connection (mm)	Ø 22/30		Ø 30					Ø 40			Ø 2x40		Ø 4x40		
Outlet pressure limits (Pa)	-600 to 1500		-600 to 1300		-600 to 1350			-600 to 2000							
Number of cylinders	1														
Operating conditions	1T40 °C, 10 to 90% RH non-condensing														
Storage conditions	-10T70 °C, 5 to 95% RH non-condensing														
Degree of protection	IP20														
Certification	CE, ETL (UL998), TÜV and EAC (GOST)														
Water fill															
Connection	3/4"G male														
Temperature limits (°C)	1T40														
Water pressure limits (MPa - bar)	0.1 to 0.8 - 1 to 8														
Instant flow-rate (l/m)	0.6	0.6	0.6	0.6	1.1	1.1	1.1	1.1	5.85	5.85	5.85	7	14	14	
Total hardness (°fH) (*)	10 to 40														
Conductivity limits (µS/cm) (*)	75 to 1250														
Water drain															
Connection	Ø 40														
Temperature (°C)	≤100														
Instant flow-rate (l/m)	8								22				44		
Blower															
Number	1											2			
Type	VSDU0A*								VRDXL*						
Power supply (Vac)	24								230						
Rated power (W)	37								35						
Rated air flow-rate (m3/h)	192								650						
Network															
Integrated network connections	UEX*, UEY* and UEW*: Modbus®, CAREL protocol														
Optional network connections	UEX*, UEY* and UEW*: Modbus, BACnet RS485, BACnet Ethernet, LON, KONNEX (for UEY* using a gateway)														
Controller	UEY* / UEX* / UEW*												UEX*		

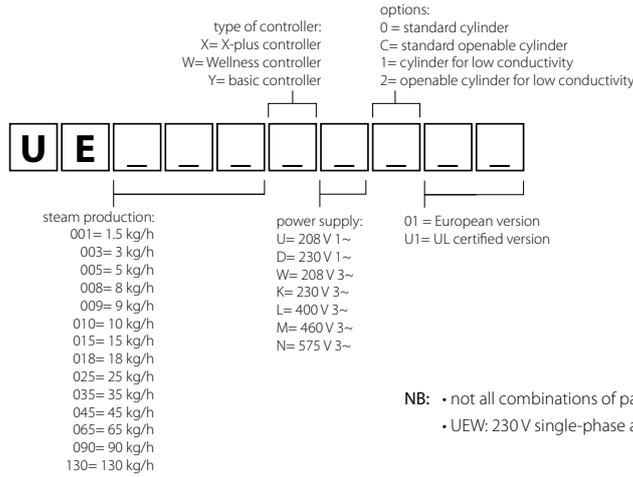
● standard

Dimensions in mm (in) and weights in kg (lbs)

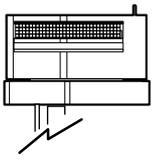


Model	AxBxC	weight	LxWxH	weight
UE001 to UE018	365x275x712 (14.37x10.83x28.03)	13.5 (29.76)	500x400x850 (19.68x15.75x33.46)	16 (35.27)
UE025 to UE045	545x375x815 (21.46x14.76x32.09)	34 (74.95)	665x465x875 (26.18x18.31x34.45)	39 (85.98)
UE065	635x465x890 (25x18.31x35.04)	44 (97)	750x600x940 (29.53x23.62x37.01)	51 (112.43)
UE090 to UE130	1150x465x890 (45.27x18.31x35.04)	70 to 74 (154.32 to 163.14)	1270x600x940 (50x23.62x37.01)	77 to 81 (169.75 to 178.57)

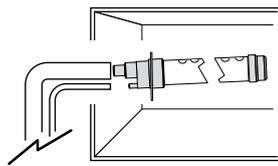
Unit code



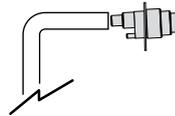
OVERVIEW DRAWING humiSteam Y-X-W



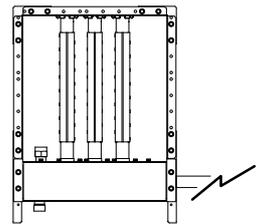
VSDU0A0001 & VRDXL0000:
steam blower, for room applications
VSDBAS0001: remote installation
support for VSDU0A, for room
applications



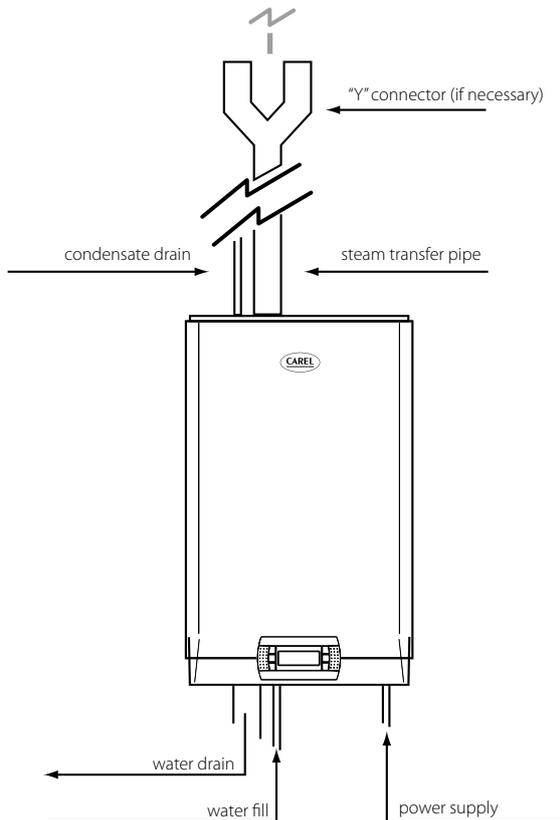
DP*: linear steam distributor (inlet Ø 22 mm,
Ø 30 mm, Ø 40 mm), for duct applications



SDPOEM*: plastic nozzle up to 18 kg/h
steam, for steam bath



SA*: steam distributor for short
absorption distances



Probes



DPW*: temperature and
humidity probe for civil
environments



DPP*: temperature and
humidity probe for industrial
environments



ASET*: temperature and
humidity probe for steam baths



DPD*: temperature and humidity
probe for ducts



NTC*: temperature probe for
UEW



Cylinders

BL*

All CAREL immersed electrode humidifiers feature sophisticated control software that automatically adapts the operating parameters to the characteristics of the water; nonetheless, the optimum balance between cylinder life, variation in steam production and speed of response depending on the type of water and power supply can only be achieved by changing the shape and the position of the electrodes. For this reason, CAREL immersed electrode humidifiers today feature the widest choice of cylinders, with specific electrodes for water with conductivity between 75 $\mu\text{S}/\text{cm}$ and 1250 $\mu\text{S}/\text{cm}$, for capacities between 1 and 65 kg/h, and for power supply voltages between 208 V and 575 V.

All humiSteam cylinders feature galvanised electrodes and are fitted with filters to avoid formation of lime scale at the bottom, consequently preventing blockage of the drain.

Openable cylinders

The new humidifiers can be fitted with "disposable" cylinders made from non-flammable polypropylene, class HB according to UL94, or alternatively openable and therefore cleanable cylinders, made from class V0 plastic (UL94 standard).

The openable cylinders feature quick click-on closing, with a rubber gasket to ensure perfect water-tightness between the two parts of the cylinder.

Cylinders: quick snap-on connection

The snap-on connectors (click onto the specially shaped terminal on the electrodes) ensure:

- higher reliability, avoiding the risk of overheating due to incorrect tightening of the nuts when replacing the cylinder,
- quicker cylinder replacement times, as the connections can be made in just a few seconds, with no tools required.

For backward compatibility with units already installed in the field, two adapter kits are available, comprising snap-on connector, protective gasket and fastening screw:

- 98C615P004 quick connector adapter for eyelet lugs, 5 mm pin (BL0*1* and BL0*R*);
- 98C615P005 quick connector adapter for eyelet lugs, 6 mm pin (BL0*2*, BL0*3*, BL0*4*).



A



B

Disposable cylinder selection tables

humiSteam: single-phase 230 Vac (220 to 240 V)

	water conductivity		
	low	medium	high
Capacity kg/h	75/350 µS/cm	350/750 µS/cm	750/1250 µS/cm
1, 3 ridotto	BLOSRE00H2	BLOSRE00H2	
1, 3	BLOS1E00H2	BLOS1F00H2	
5	BLOS2E00H2	BLOS2E00H2	
9	BLOS3E00H2	BLOS3F00H2	

humiSteam: single-phase 208 Vac

	water conductivity		
	low	medium	high
Capacity kg/h	75/350 µS/cm	350/750 µS/cm	750/1250 µS/cm
1, 3 ridotto	BLOSRE00H2	BLOSRE00H2	
1, 3	BLOS1E00H2	BLOS1F00H2	
5	BLOS2E00H2	BLOS2E00H2	
9	BLOS3E00H2	BLOS3F00H2	

humiSteam: three-phase 460 V

	water conductivity		
	low	medium	high
Capacity kg/h	75/350 µS/cm	350/750 µS/cm	750/1250 µS/cm
3	BL0T1B00H2	BL0T1D00H2	
5, 8	BL0T2C00H2	BL0T2D00H2	
10, 15, 18	BL0T3C00H2	BL0T3D00H2	
25	BL0T4D00H2 (*)		
35, 45, 90, (2x)	BL0T4C00H2	BL0T4D00H2 (*)	
65, 130 (2x)	BL0T5C00H0	BL0T5D00H0	

Openable cylinder selection tables

humiSteam: three-phase 400 V (from 380 a 415 V)

	water conductivity		
	low	medium	high
Capacity kg/h	75/350 µS/cm	350/750 µS/cm	750/1250 µS/cm
3	BLCT1A00W2	BLCT1C00W2	BLCT1D00W2
5, 8	BLCT2B00W2	BLCT2C00W2	BLCT2D00W2
10, 15, 18	BLCT3B00W2	BLCT3C00W2	BLCT3D00W2
25, 35	BLCT4C00W2	BLCT4D00W2	
45, 90 (2x)	BLCT4B00W2	BLCT4C00W2	
65, 130 (2x)	BLCT5B00W0	BLCT5C00W0	

humiSteam: three-phase 400 Vac (380 to 415 V)

	water conductivity		
	low	medium	high
Capacity kg/h	75/350 µS/cm	350/750 µS/cm	750/1250 µS/cm
3	BL0T1A00H2	BL0T1C00H2	BL0T1D00H2
5, 8	BL0T2B00H2	BL0T2C00H2	BL0T2D00H2
10, 15, 18	BL0T3B00H2	BL0T3C00H2	BL0T3D00H2
25, 35	BL0T4C00H2	BL0T4D00H2 (*)	
45, 90 (2x)	BL0T4B00H2	BL0T4C00H2 (*)	
65, 130 (2x)	BL0T5B00H0	BL0T5C00H0	

humiSteam: three-phase 208 and 230 V

	water conductivity		
	low	medium	high
Capacity kg/h	75/350 µS/cm	350/750 µS/cm	750/1250 µS/cm
3	BL0T1A00H2	BL0T1B00H2	
5, 8	BL0T2A00H2	BL0T2A00H2	
10, 15	BL0T3A00H2	BL0T3A00H2	
25	BL0T4B00H2	BL0T4C00H2 (*)	
35	BL0T4B00H2 (*)		
45	BL0T5A00H0	BL0T5A00H0 (BL0TSB00H0 e 230 V)	

humiSteam: three-phase 575 V

	water conductivity		
	low	medium	high
Capacity kg/h	75/350 µS/cm	350/750 µS/cm	750/1250 µS/cm
5, 8	BL0T2C00H2	BL0T2D00H2	
10, 15, 18	BL0T3C00H2	BL0T3D00H2	
25, 35, 45, 90 (2x)	BL0T4D00H2 (*)		
65, 130 (2x)	BL0T5D00H0		

humiSteam: single-phase 230 V (from 220 a 240 V)

	water conductivity		
	low	medium	high
Capacity kg/h	75/350 µS/cm	350/750 µS/cm	750/1250 µS/cm
1, 3	BLCS1E00W2	BLCS1F00W2	
5	BLCS2E00W2	BLCS2F00W2	
9	BLCS3E00W2	BLCS3F00W2	

(*) for models UE 25, 35, 45 kg/h manufactured until October 2003 or with serial number less than 501,000, use the Y connector.

(**) as well as the voltages shown here, openable cylinders are available for the following voltages: 208 V single-phase, 230 V three-phase, 460 V three-phase, 575 V three-phase.

Important: on models UEH and UEP fitted with cylinders featuring an electrical bridge between two or more electrodes, the new snap-on data connectors cannot be used, as it is not possible to connect more than one cable to the same pin. On these units the spare cylinders retain the threaded pins and the same part numbers must be purchased. The following models of cylinder are affected: BLOS2F00H0, BLC52F00W0, BLOS2E00H0, BLC52E00W0, BL0T2B00H0, BLCT2B00W0, BL0T2A00H1, BLCT2A00W1, BL0T3B00H0, BLCT3B00W0, BL0T3A00H1 and BLCT3A00W1.



compactSteam

CH*

compactSteam is the CAREL proposal for the humidification of prestigious residential environments, professional offices or small and medium retail premises.

compactSteam is an immersed electrode humidifier, with following main features:

- elegant and discrete design, ideal for installation in any environment;
- built-in steam distributor, with adjustable louvers and very silent operation;
- large graphic LCD for straightforward understanding;
- market-leading functionality, safety and user friendliness;
- models from 1.6 to 3.2 kg/h;
- electrical and water connections can be completely concealed from view, and drain water temperature never exceeds 60 °C. In addition, if no humidification is required for more than 3 consecutive days, the water is automatically drained for maximum hygiene.

A version without built-in distributor is also available, for steam distribution in the duct, as well as a remote blower, which allows steam to be distributed in a different room from where the humidifier is installed.

Other features

- maximum capacity selectable in steps of 5%;
- 0 to 10 V proportional control and modulation from 20 to 100%;
- automatic management of water concentration and foam;
- remote enabling signal input and alarm relay;
- cylinder operating hour counter, resettable.

Control

The sophisticated microprocessor controller automatically manages all the functions of the unit, and includes a self-diagnostic system with simple and straightforward indications, both numeric and using icons, on the large LCD.

The controller includes an ON/OFF and proportional 0 to 10 V input, a remote enabling input, an alarm relay, an input for a flow sensor and a 24 V power supply output. Steam production is modulated continuously from 20% to maximum capacity, and water level is controlled by a solenoid fill valve and a drain pump. The built-in fan is only on when steam is being produced, and is stopped with a delay to prevent condensation.

Room humidity control is managed by an external humidistat, for example Clima; this is powered by compactSteam and can manage the unit proportionally, for even more precise and comfortable humidity control.

compactSteam is available with or without steam blower, with capacities from 1.6 to 3.2 kg/h.

Features	CH*01V2001	CH*02V2001	CH*03V2001
General			
Rated steam production (kg/h)	1.6	2.5	3.2
Power consumption (kW)	1.18	1.86	2.36
Power supply	230 V, 50/60 Hz single-phase ⁽¹⁾		
Steam connection (mm) (2)	Ø 22		
Maximum steam pressure (Pa)	1000		
Current (A)	5	10	16,9
Operating conditions	1T40 °C, 10 to 90% RH non-condensing		
Storage conditions	-10T70 °C, 5 to 95% RH non-condensing		
Ingress protection	IP20		
Control range	20 to 100%		
Certification	CE, ETL (UL998) and EAC (GOST)		
Water fill			
Connection	3/4"		
Instant flow-rate (l/m)	1.7		
Conductivity limits (µS/cm)	125 to 1250		
Water drain			
Connection (mm)	OD 32		
Temperature (°C)	≤60		
Instant flow-rate (l/m)	5		
Fan			
Rated air flow-rate (m ³ /h) ⁽²⁾	120		
Network			
Connections for accessories	external fan, alarm relay, external enabling, 24 V		
Control	ON/OFF and 0 to 10 V proportional		

(1): 110 V 60 Hz models are also available, with 1.6 and 2.5 kg/h flow-rates.

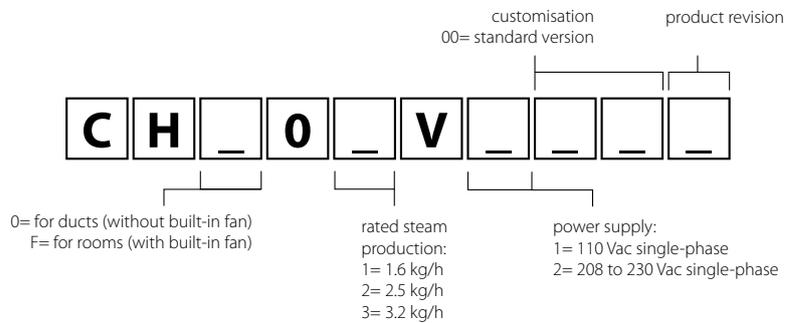
(2): models CH0*: for ducted humidification; models CHF*: with fan, for room humidification.

Dimensions in mm (in) and weights in kg (lb)

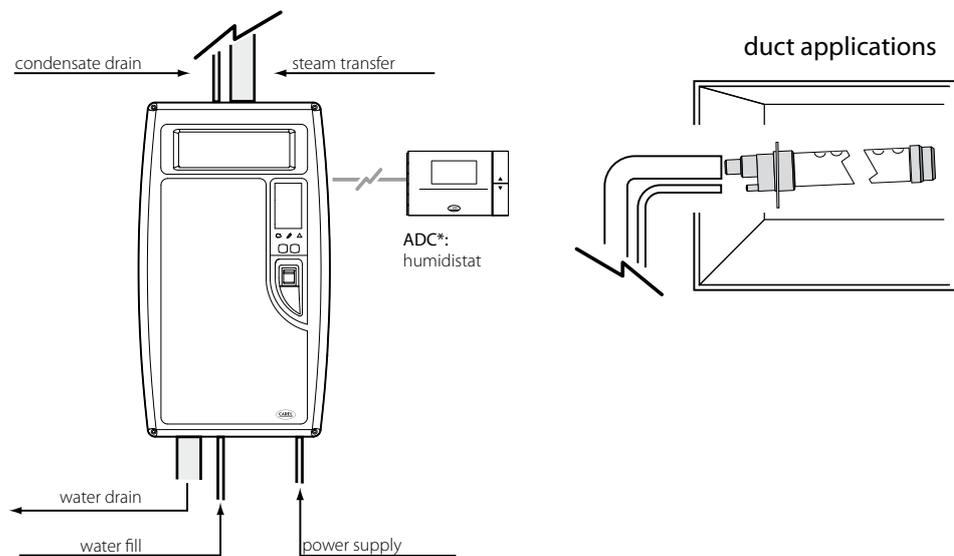


Model	AxBxC	weight	LxWxH	weight
CH001*	341x204x600 (13.42x8.03x23.62)	8 (17.64)	520x380x740 (20.47x14.96x29.13)	10 (22.05)
CH002*	341x204x600 (13.42x8.03x23.62)	8 (17.64)	520x380x740 (20.47x14.96x29.13)	10 (22.05)
CH003*	341x204x600 (13.42x8.03x23.62)	8 (17.64)	520x380x740 (20.47x14.96x29.13)	10 (22.05)

Unit code



OVERVIEW DRAWING compactSteam





Heater humidifiers

Immersed heater humidification is the ideal solution when:

- use of steam production;
- exceptional relative humidity control performance ($\pm 1\%$);
- a functional solution that is independent of the feedwater characteristics;
- service continuity.

The features of steam humidification make this technique the preferred solution in applications where the priority is hygiene, such as research laboratories and the agriculture and food industries, as well as for preserving works of art: steam is in fact completely aseptic and does not carry solid particles, an intrinsic quality that is assured without needing to treat the feedwater. Nonetheless, the operation of some types of isothermal humidification technology, such as immersed electrodes, is affected considerably by feedwater quality: in applications where feedwater properties are constant over time or softened water needs to be used, immersed electrode humidification is quite complex, if not impossible. In addition to these limits, which for example prevent the use of demineralised water (useful to drastically reduce maintenance requirements), there are also technological limits in terms of the obtainable relative humidity control precision.

Heater humidifiers are more complex devices than electrode versions: heat is transferred to the water via the completely

immersed heating elements. Solid state relays, managed by the PWM system with built-in humidity or temperature controller, modulate the quantity of heat delivered to the water so as to precisely control steam flow-rate.

The heaterSteam range, Carel's electric heater humidification solution, has been completely upgraded from all points of view, with unique hardware and software features and unprecedented performance.





Titanium heater



built-in webserver

heaterSteam

UR*

The air humidification technology currently on the market has made a significant step forwards with the upgraded CAREL heaterSteam range of high-precision heater humidifiers ($\pm 1\%$ RH), available with a capacity from 2 to 80 kg/h. The product has been overhauled in every aspect, from its mechanical components to the new electronic controller with graphic interface based on the c.pCO platform. The new software functions make heaterSteam even more reliable and versatile, while its extensive connectivity allows seamless communication with any BMS system.

heaterSteam is available in two versions: process and titanium. Both models share exclusive technological solutions, such as built-in overtemperature protection (unique on the market) and the patented Anti-Foaming System, further ensuring reliability. The modulating limit probe prevents condensate formation without sudden interruptions in steam production.

The built-in USB port, available on the entire heaterSteam range, provides immediate access to several functions:

- save data log and alarm log to USB flash drive;
- copy and paste configuration parameters from one unit to another;
- update the software directly in the field.

heaterSteam process features Incoloy® 825 heating elements, a highly-resistant material that allows operation in complex conditions, even when feedwater quality is not controlled.

heaterSteam titanium, on the other hand, is the world's only humidifier with titanium heaters. The reliability of titanium makes heaterSteam titanium the natural solution for applications in which service continuity is crucial. In particular, the unit can operate on any type of treated water, even extremely aggressive water with a conductivity below $1 \mu\text{S}/\text{cm}$ and softened down to 0°fH : the titanium

heating elements are completely resistant to corrosion.

heaterSteam titanium also features thermally insulated cylinders to ensure energy savings, and an internal Kevlar liner for fast and effective maintenance.

Control

The heaterSteam c.pHC electronic controller has been designed and developed by CAREL to ensure simple set-up and commissioning and exceptional performance. Steam production can be controlled either based on relative humidity (H) or temperature (T), for applications such as steam baths. Except when operating in ON/OFF mode, production is modulated linearly from 0 to 100% of maximum flow-rate, giving a precision of $\pm 1\%$ RH even with a high number of air changes.

The two versions of heaterSteam, despite being focused on different applications, share a number of important basic functions, such as:

- start-up wizard: simple and fast guided configuration of the main parameters when starting the unit the first time;
- patented AFS (Anti-Foaming System): automatic foam control to avoid droplets being released with the steam;
- modulating limit probe: to prevent condensate formation in the duct/AHU;
- thermal shock: periodical scale removal from the heating elements;
- connectivity: communication protocols available as standard on the units are Modbus®, BACnet™ and CAREL on the BMS serial port, and Modbus®, BACnet™ on the Ethernet port;
- preheating: keeps the water in the cylinder at a user-set temperature for immediate steam production when required;
- tERA ready: this service can be enabled via the Ethernet connection for remote

monitoring and control of the unit;

- master/slave: up to 20 units can be controlled via a proportional signal, so as to extend system capacity up to 1600 kg/h.

The titanium version is further enhanced by a number of unique software functions:

- redundancy and rotation: guarantees service continuity even during maintenance, for maximum reliability;
- wireless sensors: installation, even retrofits, has never been so simple;
- built-in webserver: allows the entire humidification system to be configured and monitored from a PC or tablet connected to the local network, using a simple web browser.

Features	UR002*	UR004*	UR006*	UR010*	UR013*	UR020*	UR027*	UR040*	UR053*	UR060*	UR080*	
General												
Rated steam production (kg/h)	2	4	6	10	13	20	27	40	53	60	80	
Power consumption (kW)	1.6	3.3	4.7	7.4	10	15.1	20	30.5	40	45.7	60	
Power supply (other voltages upon request) • 230 Vac -15/10%, 50/60 Hz single-phase • 400 Vac -15/10%, 50/60 Hz three-phase	●	●	●	●	●	●	●	●	●	●	●	
Steam connection (mm)	Ø 30					Ø 40			2x Ø 40			
Steam pressure (Pa)	0 to 1500					0 to 2000						
Number of heaters	1	1	3	3	3	6	6	6	6	9	9	
Operating conditions	1T40 °C, 10 to 60% RH non-condensing											
Storage conditions	-10T70 °C, 5 to 95% RH non-condensing											
Degree of protection	IP20											
Certifications	CE, ETL (UL998), TÜV and EAC (GOST)											
Water fill												
Connection (mm)	3/4"G male											
Temperature limits (°C)	1T40											
Water pressure limits (MPa - bar)	0.1 to 0.8 - 1 to 8											
Instant flow-rate (l/m)	1.1	1.1	1.1	1.1	1.1	4	4	4	10	10	10	
Total hardness (°fH) (*)	5 to 40											
Conductivity limits (µS/cm) (*)	0 to 1500											
Water drain												
Connection	Ø 40						Ø 50					
Temperature (°C)	<100											
Instant flow-rate (l/m)	5 (50 Hz); 9 (60 Hz)						17.5 (50 Hz); 22.5 (60 Hz)					
Blower												
Number	1								2			
Type	VSDU0A*						VRDXL*					
Power supply (Vac)	24						230					
Rated power (W)	37						35					
Rated air flow-rate (m³/h)	192						650					
Network												
Network connection	RS485 CAREL protocol With gateway: Modbus®, BACnet™, BACnet Ethernet, LON, Konnex											

(*) heaterSteam can be supplied with completely demineralised water (1 µS/cm). If supplied with softened water, the minimum hardness value indicated must be observed, and the instructions described in the manual must be followed.

Functions

Features	Process	Titanium
Heaters with thermal protection	Incoloy® 825	Titanium
Thermal shock	●	●
Master/slave function	"Mirror"	"Endurance"
Redundancy and rotation		●
Wireless sensors		●
Webserver		●
BACnet™, Modbus® and CAREL protocols	●	●
USB port	●	●
tERA ready	●	●
Preheating	●	●
Thermally insulated cylinder		●
Kevlar scale removal sack		●
Start-up wizard	●	●
Evaporation cycles before drain to dilute	40	50

● standard

Control

Continuous modulation (with SSR)	0 to 100%
Integrated control (probes not included)	RH or temperature
External proportional signal	●
Limit probe supported	●
Remote ON/OFF	●
Alarm relay	●
Type of signal (probe or external controller)	0 to 10 V; 0 to 1 V; 2 to 10 V; 0 to 20 mA; 4 to 20 mA
Alphanumeric display	●
RS485 interface	●

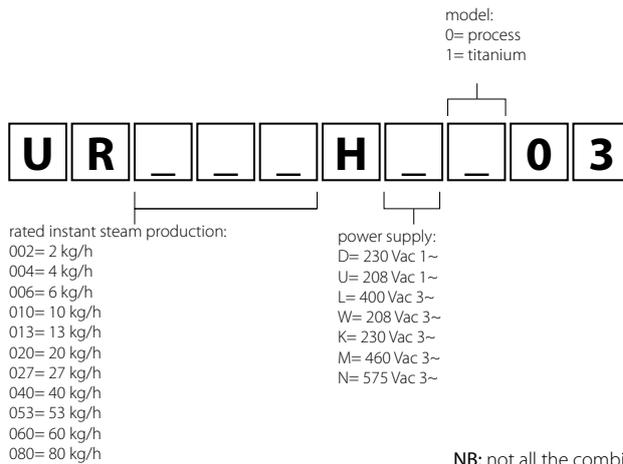
● standard

Dimensions in mm (in) and weights in kg (lb)



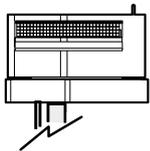
Model	AxBxC	weight	LxWxH	weight
UR002*, UR013*	365x275x712 (14.37x10.83x20.03)	26 (57.32)	510x410x870 (20x16x34.2)	31 (68.34)
UR020*, UR040*	690x445x888 (27.16x17.51x34.96)	63 (138.89)	820x570x1050 (32.2x22.4x41.3)	73 (160.94)
UR053*, UR080*	876x445x888 (34.48x17.51x34.96)	87 (191.80)	990x540x1050 (39x21.2x41.3)	98 (216.05)

Unit code

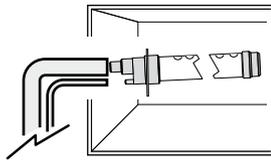


NB: not all the combinations of codes are available.

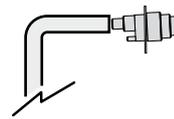
OVERVIEW DRAWING heaterSteam



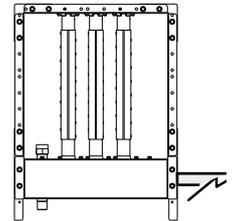
VSDU0A0001 & VRDXL0000: steam blower, for room applications
VSDBAS0001: remote support for VSDU0A, for room applications



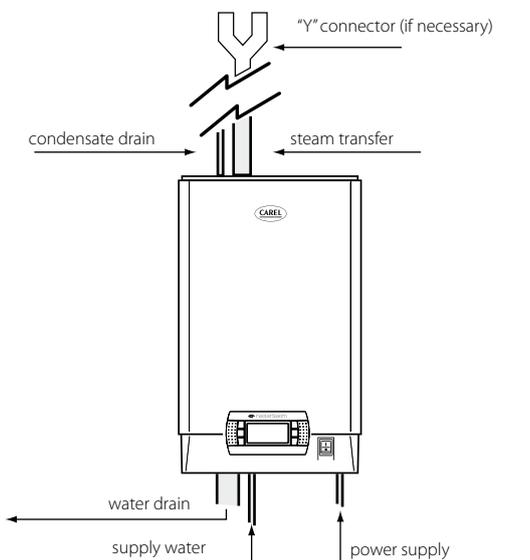
DP*: linear steam distributor (inlet Ø 22 mm, Ø 30 mm, Ø 40 mm), for duct applications



SDPOEM*: plastic nozzle up to 18 kg/h steam, for steam bath



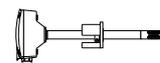
SA*: steam distributor for short absorption distances



Probes



DPP*: temperature and humidity probe for industrial environments



DPD*: temperature and humidity probe for ducts



DPW*: temperature and humidity probe for civil environments



SA*: room temperature and humidity sensor - wireless



WS01AB2M20: access point - wireless



Gas-fired humidifiers

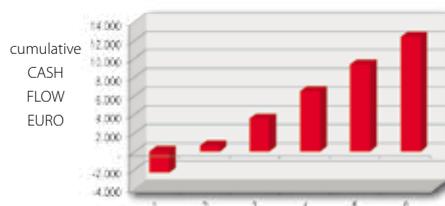
CAREL's extensive experience in the humidification sector has been used to develop the gaSteam range of gas-fired humidifiers, exploiting an energy source that is more economical than electricity. The humidifiers have been upgraded, becoming an even more professional solution and increasing reliability, in particular in cases where the feedwater is particularly aggressive. The range comprises 45, 90 and 180 kg/h models. CAREL gas-fired humidifiers can run on both natural gas and LPG: the changeover is made by simply modifying a number of parameters, without the need to replace any parts.

Cost effectiveness

To generate 1 kg of steam at atmospheric pressure, considering all the various factors, requires around 750 Wh of energy, either electrical or from other sources. One of the main factors when choosing solutions in the field of isothermal humidification is therefore energy cost, particularly for heavy-duty applications. Gas can be considered an ideal solution in terms of energy source, however to completely exploit its advantages, a system with high thermal efficiency is required, capable of minimising heat loss. The efficiency of our humidifiers is between 94 and 96%. The graph shows the economic comparison between a gaSteam and an immersed electrode humidifier,

expressed in terms of total cash flow in euro, including purchase, energy and maintenance costs. Even considering the higher purchase price compared to an immersed electrode humidifier, the break-even point for gas-fired humidifiers is reached quite quickly.

This graph compares the costs based on 2000 operating hours/year using 90 kg/h humidifiers, and with the current costs of gas and electricity in Italy. The break-even point is easily reached before two years, after which there are significant savings. In many other countries, the break-even point is reached even earlier, making gaSteam even more cost effective.



Certification

CAREL has paid significant attention to approval of gaSteam, so as to be able to guarantee complete product safety and achieve all major certifications. gaSteam is approved according to European CE standards, German TÜV standards and American ETL standards.

In Europe, specific DVGW certification has been obtained for gas-fired appliances; as well as AGA certification for the Australian market.

In addition, thanks to the low NOx emissions, gaSteam is approved as a class 5 appliance for all models: this means it can be installed in countries with very strict legislation in force.





gaSteam

UG*

The family of gaSteam humidifiers features very high thermal efficiency, so as to fully exploit the cost savings of gas. The heat exchanger has been upgraded to increase performance even with particularly aggressive water: new stainless steel design for high performance.

The gaSteam humidifiers all come with the pHc electronic microprocessor controller that adopts all the best features of the CAREL pCO programmable controllers. The user interface is made up of a backlit display that features simultaneous and flexible use of graphic icons and texts in various languages.

The pGD1 8-row display allows complete management of the humidifier's function, with graphic display of icons and alphanumeric characters.

The pHc controller also comes with network connection: via the pCO family pLAN protocol (RS485 interface included), or the Modbus®, Echelon®, BACnet™, RS485 and GSM communication protocols using optional interfaces. The controller can be connected to an active probe and optional second limit probe; operation is ON/OFF or proportional based on a signal from an external controller. It can also manage a dehumidifier, and includes a complete set of diagnostics for maintenance.

Safety

gaSteam is fitted with various safety devices, including:

- pre-mix, room-sealed burner with forced ventilation;
- an air/gas control valve with double safety closing;
- temperature sensor in the flue gas outlet that checks for malfunctions, and provides early warning of excessive scale on the heat exchanger;
- a flame detector in the burner that closes the gas valve in the event of malfunctions;
- the patented AFS antifoam system with corresponding sensor;

- a multi-stage water level sensor;
- an automatic water conductivity control system to avoid corrosion.

Added advantages

- continuous modulation from 25 to 100% (12.5% for the 180 kg/h model);
- low NOx emissions;
- boiler and components in contact with the water in stainless steel;
- preheating function for a faster response, can also be used as a frost protection function;
- supply with mains water or demineralised water. The controller can be set for use with softened water, within the limits described in the reference tables;
- precision: 2% RH

Accessories



Heat exchanger

The new stainless steel heat exchanger is made up of a series of parallel plates (elements), welded horizontally, using a repetitive and thus controllable process. The shape has been designed to ensure a high heat exchange surface area, and consequently very high efficiency, in the order of 94-96%. The stainless steel heat exchanger also features high resistance to corrosion, guaranteeing a long operating life.



Burner head (90 kg/h model)

Including ignition and flame detection device. The controller manages the production of steam by adjusting the burner fan speed. The gas inlet valve controls the flow of gas as a consequence. The flame sensor controls both the automatic ignition device and gas valve: with no flame the flow of gas is shut off.

gaSteam table

Features	UG045*	UG090*	UG180*
General			
Rated steam production (kg/h)	45	90	180
Modulation of steam production	25 to 100%	25 to 100%	12.5 to 100%
Heat input (kW)	34.8	65	130
Heat output (kW)	33	62.5	125
Power supply	230 Vac (-15/+10%), 50/60 Hz single-phase, depending on the market		
Power input at rated voltage (W)	110	140	190
Steam outlet pressure limits (Pa)	0 to 2000	0 to 2000	0 to 2000
Steam connection (dia. mm)	2x40	2x40	4x40
Gas connection	3/4"G	3/4"G	3/4"G
Types of gas	natural gas, LPG		
Flow-rate/pressure on natural gas (G20) (m ³ St/h - Pa)	3.68 - 2000	6.87 - 2000	13.4 - 2000
Flow-rate/pressure on natural gas (G25) (m ³ St/h - Pa)	4.2 - 2000	8.7 - 2000	17.5 - 2000
Flow-rate/pressure on butane (G30) (m ³ St/h - Pa)	1.10 - 3000	2.06 - 3000	4.12 - 3000
Operating conditions	1T40 °C, 10 to 90% RH non-cond.		
Storage conditions	-10T70 °C, 5 to 95% RH non-cond.		
Degree of protection	IP20		
Certification	CE, ETL (UL998), TÜV and AGA		
Water fill			
Connection	3/4"G male		
Temperature limits (°C)	1T40		
Water pressure limits (MPa - bar)	0.1 to 0.8 - 1 to 8		
Instant flow-rate (l/m)	10	10	18
Total hardness (°fH) (*)	5 to 50		
Maximum conductivity limits (µS/cm) (*)	1500		
Water drain			
Connection (dia. mm)	50		
Temperature (°C)	<100		
Instant flow-rate (l/m)	22.5		
Flue gas			
Air intake (dia. mm)	80	80	2x 80
Flue (dia. mm)	80	80	2x 80
Flue gas flow-rate (natural gas G20) (kg/s)	0.0163	0.0303	0.606
Flue gas temperature (natural gas G20) (°C)	135	170	165
NOx emissions class	5	5	4
Network			
Network connection	RS485 CAREL and Modbus protocols. With gateway: Modbus®, BACnet™, BACnet Ethernet, LON, Konnex		
Control			
Integrated controller	●	●	●
External ON/OFF or proportional controller	●	●	●
Preheating	●	●	●
Alphanumeric display	●	●	●
Remote ON/OFF; alarm relay	●	●	●
Limit probe supported	●	●	●

(*) gaSteam can run on completely demineralised water (0 °fH). If supplied with softened water, the minimum hardness value indicated must be observed, and the instructions described in the manual must be followed.

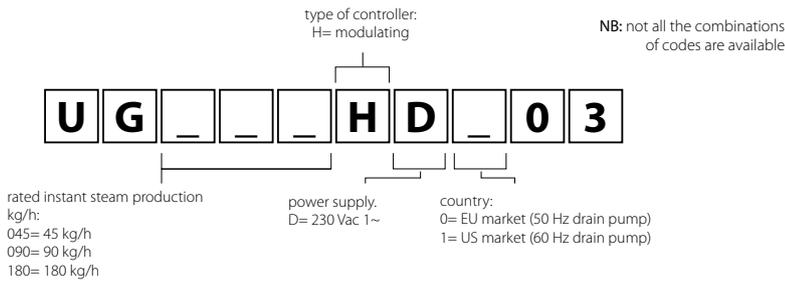
● standard

Dimensions in mm (in) and weights in kg (lb)

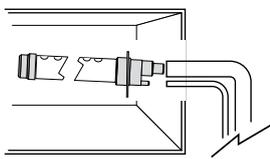


Mod.	AxBxC	peso	LxWxH	peso
UG045*	1020x570x1200 (40.16x22.44x47.24)	150 (330.69)	1090x620x1270 (42.91x24.41x50)	165 (363.76)
UG090*	1020x570x1200 (40.16x22.44x47.24)	150 (330.69)	1090x620x1270 (42.91x24.41x50)	165 (363.76)
UG180*	1020x930x1200 (40.16x36.61x47.24)	240 (529.11)	1090x980x1270 (42.91x38.58x50)	270 (595.25)

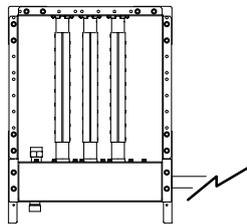
Unit code



OVERVIEW DRAWING gaSteam

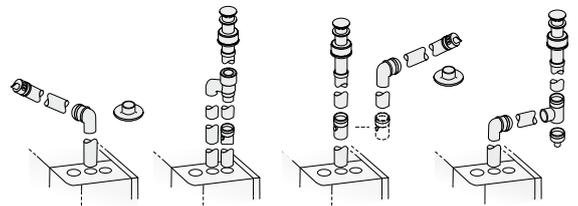


DP*: linear steam distributor (inlet Ø 22 mm, Ø 30 mm, Ø 40 mm), for duct applications

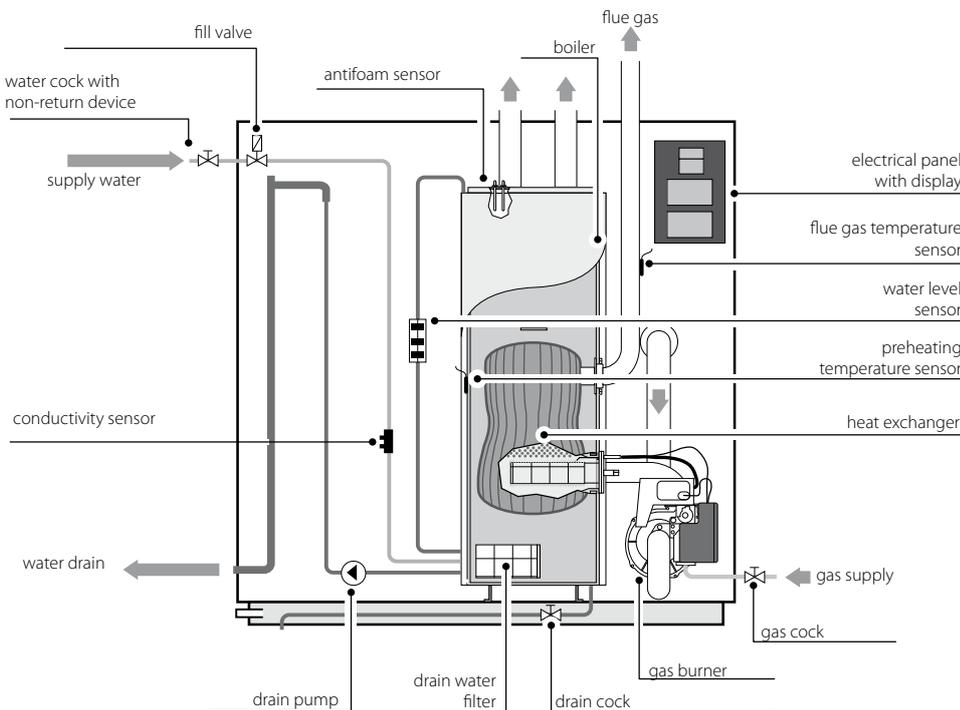


SA*: steam distributor for short absorption distances

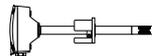
flue accessories



EXH* various flues and fittings



Probes

-  DPW*: temperature and humidity probe for civil environments
-  DPP*: temperature and humidity probe for industrial environments
-  ASET*: temperature and humidity probe for steam baths
-  DPD*: temperature and humidity probe for ducts



Centralised steam distributors

ultimateSAM is an atmospheric or pressurised steam dispersion system, designed to uniformly and effectively distribute dry steam into ducts or air handling units. SAM stands for Short-Absorption Manifold, in other words a steam dispersion system with a short absorption or non-wetting distance (even less than 0.5 m).

It has been designed to be built "to measure" for the AHU/duct, guaranteeing low heat gain (max. 2 °C/4 °F) and very low condensate formation, thanks to the air cushion insulation on the pipes.

All metal parts fitted in the AHU/duct are made from AISI 304 steel so as to guarantee hygiene and long operating life. The features of the ultimateSAM humidification system make it a perfect solution for all humidification requirements in AHUs/ducts, providing designers, installers and service personnel with the best solutions. The wide product range and choice of steam capacity, plus the numerous options, make the system ideal for use in various applications, including hospitals, the pharmaceutical industry, libraries, museums, offices, shopping centres, data centers, telecommunications and many, many others.

Main features

SAB*/SAT*

- steam: 20 to 1110 kg/h (44 to 2440 lbs/h), 0 to 4 barg (0 to 58 PSig), also

suitable for steam at atmospheric pressure;

- dimensions WxH: 447x598 mm to 3031x3181 mm in 152 mm steps (18"x24" to 120"x120" in 6" steps);
- can be supplied with/without insulation, with/without support frame, unassembled or completely assembled.

SA0*

- SA0* single-pipe version also available; steam flow-rate 20 to 140 kg/h (44 to 309 lbs/h), 0 to 4 barg (0 to 58 PSig), also suitable for steam at atmospheric pressure; dimensions from 503 mm to 2175 mm in 152 mm steps (from 19" to 86" in 6" steps).

Benefits

- holes set out along the entire height of the pipes deliver steam uniformly, ensuring a very short non-wetting distance;
- energy saving due to insulation on the pipes, decreasing air heat gain and condensate formation;
- hygiene: ultimateSAM is made from AISI 304 steel;
- ultimateSAM can be purchased with valves controlled by electric actuators for precise modulation of steam flow into the AHU/duct;
- different configurations of ultimateSAM are available for applications with high steam flow-rates or if the required non-wetting distance is particularly short;

- the single-pipe version is insulated and is supplied with a manifold that also acts as steam trap.

System composition

- AISI 304 steam distribution pipes with/without insulation. On insulated pipes, the nozzles are made from PPS (Ryton), which has a continuous operating temperature of 220 °C/428 °F;
- AISI 304 manifold that carries the steam to the distribution pipes. The manifold is placed at the bottom for steam flow-rates from 20 to 370 kg/h (SAB*); for steam flow-rates up to 1110 kg/h, the manifold is fitted at the top (SAT* top-feed models; these are nonetheless also suitable for steam flow-rates starting from 60 kg/h);
- silicone gaskets for high temperatures (min 150 °C/300 °F); EPDM when in contact with steam;
- AISI 304 support frame;
- model SA0*: insulated AISI 304 pipes with nozzles.





ultimateSAM

SAB*, SAT*

The ultimateSAM system can use both steam from a pressurised distribution network or from a generator at atmospheric pressure (humidifier). When supplied by a pressurised steam line, the fluid reaches the distributor via a regulating valve, which expands the steam until almost atmospheric pressure. When steam is supplied at atmospheric pressure, no valve is fitted between ultimateSAM and the steam generator, with steam flow-rate being modulated based on demand and managed directly by the humidifier.

To minimise condensate formation, the steam distribution pipes have been designed with baffles and nozzles that ensure only dry steam is delivered into the AHU/duct.

ultimateSAM can be ordered with insulated upright distribution pipes, featuring a cushion of air that reduces both heat gain and condensate formation.

On insulated distributors, the nozzles pressed into the pipes take dry steam from the centre of the distributors so as to prevent the release of condensate into the air stream. On the other hand, if the uprights are not insulated, no nozzles are fitted. Insulated models with nozzles reduce condensate formation by 30% compared to non-insulated models. In both cases, naturally, a short not-wetting distance is guaranteed (around ½ a metre).



ultimateSAM single pipe

SA0*

This can be used with pressurised steam or steam at atmospheric pressure. The manifold in this case also acts as a steam trap, being fitted with a baffle on the inside, as well as ensuring condensate drainage. The single-pipe version comes with insulation and nozzles to reduce condensate formation and non-wetting distance.

Accessories available for the single-pipe version:

- SAKC*S10*0: condensate drain hose kit;
- SAKCO*T0*0: condensate drain T connection kit
- SAKD0*10*0 and SAKD0*20*0: steam inlet kit for double-pipe version.

Accessories



Modulating valves

(SAKV*)

Modulating valves with electric actuator and automatic safety closing in the event of power failures: the modulating valves control steam flow-rate based on a signal from an external controller; this is required for systems supplied by pressurised steam.



Steam inlet connections

(SAK*)

The ultimateSAM humidification system includes a variety of steam inlet adapters, so as to offer maximum installation flexibility. All the adapters are made from stainless steel and are sized for easy connection to all the other components in the system.



Steam traps, condensate drains and Y-strainers

(SAKT*P*, SAKT*D*, SAKT*B*) and (SAKT*F*)

The steam trap + condensate drain assembly prevents condensate from forming in the supply line to the valve and steam dispersion system. The filters remove all types of impurities that may be entrained in the piping.



Condensate drain kit

(SAKC*S10*0) for SA0*; (SAKC*ST100, SAKC*S1200) for SAB/SAT

Stainless steel condensate drain connection for single pipe models.

Stainless steel condensate drain connection and pipe for the ultimateSAM Bottom and Top versions.

Spare parts

Distribution pipes

(SAKU*)

Spare distribution pipes are sold in kits including:

- distribution pipe;
- 1 O-ring;
- bolts to fasten the distributor to the horizontal manifold.

Gaskets

(SAKG*) (for models SAB*/SAT*)

Each kit contains:

- 2 O-rings;
- 2 gaskets for condensate drainage.

Distribution manifolds

(SAKM*, SAKMS*, SAKMD*)

Each SAKMS*00 kit for SAB* and SAT* contains only the horizontal steam distribution manifold; gaskets are not included, as the existing ones are used.

Each SAKMD*00 kit for SAT* contains:

- horizontal condensate collection manifold;
- gaskets for connection to the upright distributors.

Kit SAKMSA00*0 kit for SA0* contains:

- manifold;
- gasket;
- fastening bolts.

Metal support structure parts

(SAKF*, SAKS*) (for models SAB*/SAT*)

SAKS**0000: top and bottom supports for installing ultimateSAM in duct/AHU

SAKFB00000: top corner for ultimateSAM SAB* for assembling the support frame (the kit includes the fastening bolts).

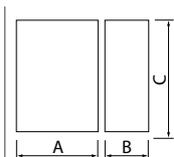
SAKFR*0000: locking rings for securing the uprights to the ultimateSAM SAB*.

SAKFF0*0000: frame shoulder and top side of the frame for the ultimateSAM SAB*.

ultimateSAM table

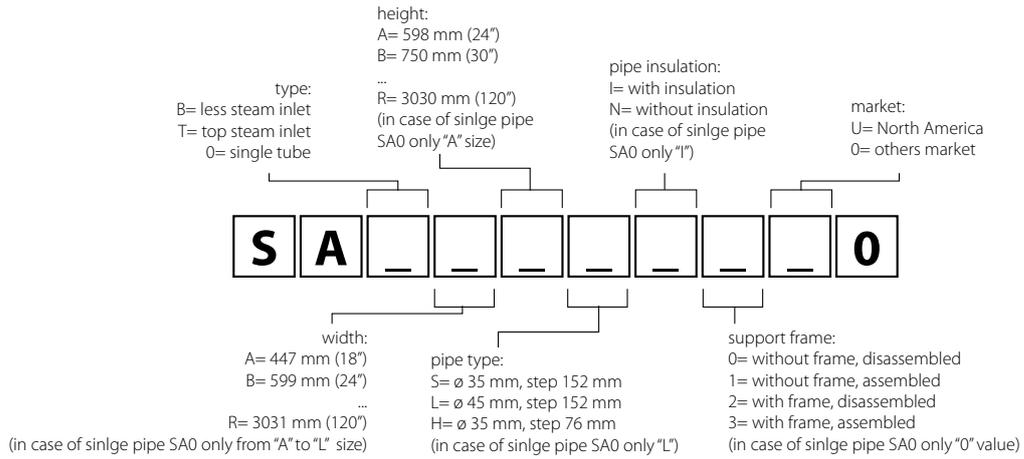
Features	SAB* (bottom steam feed)	SAT* (top steam feed)	SA0* (horizontal single-pipe version)
Insulation for energy and water savings	air cushion upon request		air cushion
Capacity kg/h (lbs/h)	20 to 370 (44 to 814)	60 to 1100 (132 to 2440)	20 to 140 (44 to 309)
Steam pressure - bar (Pa)	from around 0.01 bars (1000 Pa) to 4 barg		
Duct width (mm)	497 to 3081		383 to 2055
Duct height (mm)	623 to 3206		min 300
Material	AISI 304 stainless steel		
Certification	ETL certification		

Dimensions in mm (in) and weights in kg (lb)

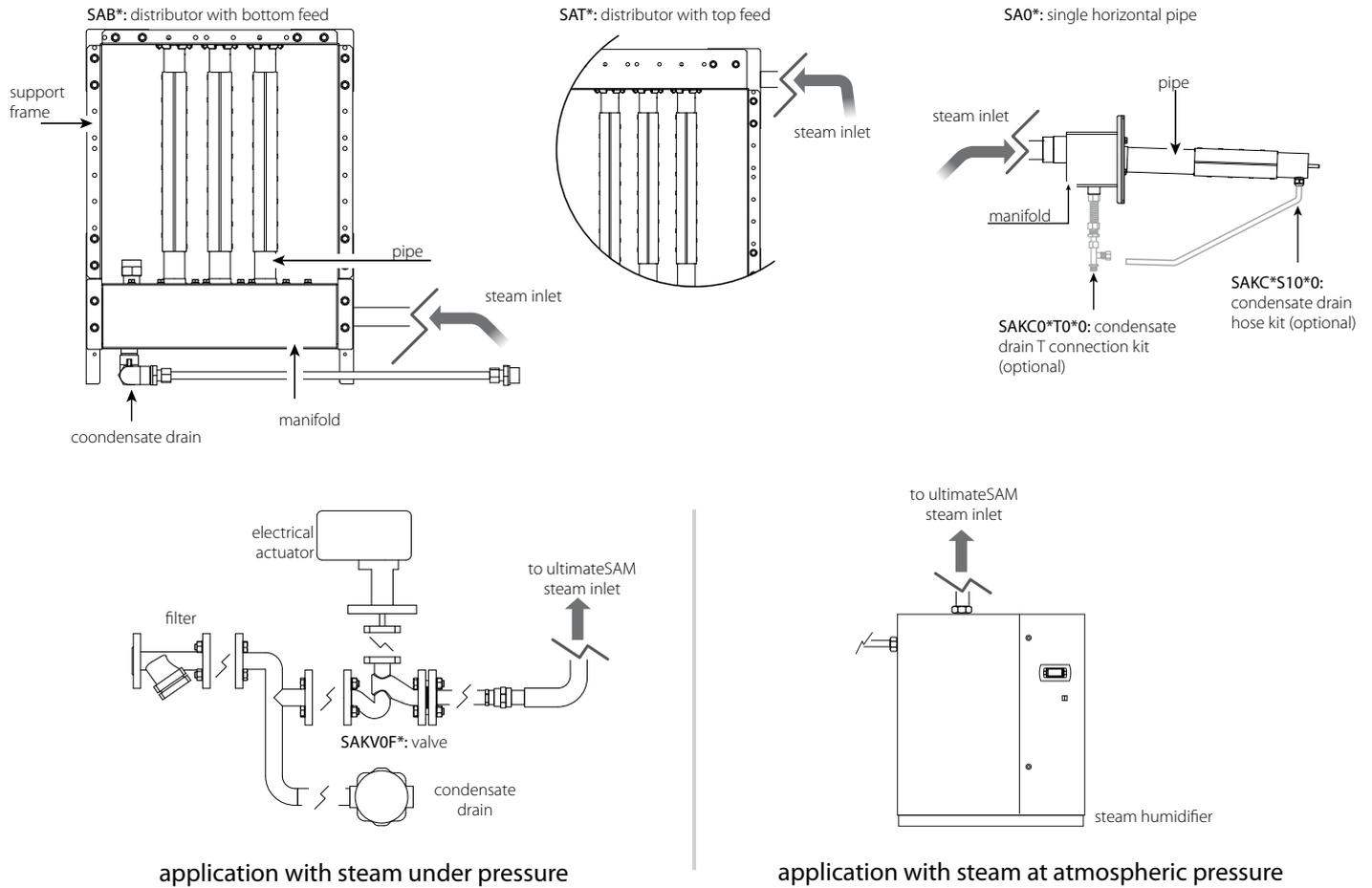


Model	AxBxC	weight
SAB*	447x135x598 / 3031x135x3030 (17.60x5.31x23.54 / 119.33x5.31x119.29) in 152 mm steps	7.5 to 202.5 (17 to 446)
SAT*	447x135x749 / 3031x15x3181 (17.60x5.31x29.49 / 119.33x5.31x125.24) in 152 mm steps	10 to 213.5 (22 to 470)
SA0*	pipe length 383 to 2055 mm (15.08-80.90) in 152 mm steps B=C= 160 mm (6.30)	4to 8.81 (8.7 to 19.4)

Unit code



OVERVIEW DRAWING ultimateSAM



Accessories

These accessories are available for the humiSteam, compactSteam, heaterSteam and gaSteam humidifiers.

The CAREL range of accessories for isothermal humidifiers have been especially developed to allow the creation of humidification systems that are complete and suitable for all types of application.



UE UR
 CH UG

Steam distributors for ducts

(DP***D**R*)

The wide range of linear steam distributors for ducts in the "DP" series is made up of perforated stainless steel pipes supported by a fastening bracket made from Ryton®.

This material combines excellent mechanical characteristics with extraordinary resistance to high temperatures.

The new fastening bracket allows the steam distributor to be fastened vertically to a wall, guaranteeing the correct incline of the distributor for draining condensate.

The stainless steel linear steam distributors are available in 3 different diameters (35, 45 and 60 mm), which couple respectively to the 22, 30 and 40 mm diameter steam hoses used on the entire range of CAREL humidifiers.

These distributors are designed to release steam in a uniform manner along the entire length, so as to minimise non-wetting distance.



UE UR
 CH UG

Steam nozzles

(SDPOEM00**)

Steam nozzles for distributing steam into small ducts or steam baths (SDPOEM0012 for models from 1 to 3 kg/h, SDPOEM0022 for models from 5 to 18 kg/h, SDPOEM0000).



UE UR
 CH UG

Fittings and connectors

(UEKY*****)

If the humidifier steam outlet lines need to be branched, two stainless steel Y connectors are available, one with 40 mm inlet and two 30 mm outlets (UEKY000000), and one with 40 mm inlet and two 40 mm outlets (UEKY40X400).

The fundamental idea is to guarantee optimum operation of the humidification system by providing the installer, maintenance personnel and user all the auxiliary components that simplify installation, steam distribution, operation and control of the humidifier.



UE UR
 CH UG

Fill hoses

FWHDCV0003: water fill kit
FWH3415003: hose L=1.5 m
FWH3430003: hose L=3 m
9997*ACA: straight and elbow quick connector
1312350APN: hose with 6 mm ID and 8 mm OD.

The FWHDCV0003 kit includes the FWH3415003 hose and a double non-return valve. The kit has been designed both to ensure conformity to standards that require the use of a double non-return valve upstream of the humidifier (WRAC), and to avoid breakages of the fill valve due to direct connection to metal mains water pipes. The plastic fill solenoid valve may be damaged if connected directly to metal mains water pipes: using hoses with plastic fittings, FWH3***003, eliminates this risk.

The FWH3***003 hoses are available in two lengths: 1.5 m and 3 m, with two ¾" female GAS connectors (one straight and one elbow). Alternatively, the 6 mm hose and the quick connectors described below can be used. The straight or elbow connector (999572*ACA) is screwed onto the fill solenoid valve and can be quickly fitted by tightening a nut to the 6 mm water fill hose (1312350APN).



UE UR
 CH UG

Steam hoses

(1312360AXX - 1312365AXX - 1312367AXX hose for cylinders with 22/30/40 mm fitting and harmonic steel coil - outside diameter 32/41/52 mm).

The steam distribution hoses are made from rubber resistant to 105 °C in continuous operation without the emission of odours, and suitable for use with foodstuffs. The harmonic steel coil immersed in the rubber gives the hose flexibility and strength, preventing it from being choked and blocking the flow of steam.



UE UR
 CH UG

Steam blowers

(VSDU* and VRDX*)

The steam blowers for rooms (VSDU0A0002) are suitable for humidifiers up to 18 kg/h. The steam blower can be fitted directly onto the humidifier, or in a remote position. In the latter case, a support is required for mounting the blower (VSDBAS0001), as well as a steam hose to connect the blower to the humidifier. The steam blower works in ON/OFF mode, and is controlled by a temperature device that is activated when steam is produced.

For humidifiers larger than 18 kg/h, the VRDXL00000 steam blowers are available, with 230 Vac power supply; these are designed for installation separately from the humidifier, and require two 30 mm diameter steam hoses.



UE UR
 CH UG

Gateway on supernode

(SNU0000EM0)

The gateway is used to connect a maximum of 20 devices for managing the variables. The protocol can be selected by choosing the corresponding optional serial card: Modbus/Carel RS485, BACnet RS485, BACnet Ethernet, LON, KONNEX.



UE UR
 CH UG

Condensate drain hoses

1312353APG: 7 mm, 1312368AXX: 10 mm, 1312357APG: 40 mm (1 m lengths)

The condensate that forms inside the steam distributors must be drained using the 7 mm hose for the steam blowers, and the 10 mm hose for the "DP" linear distributors for ducts, also used for SDPOEM00** distributors. The water drain hose is the same for all isothermal humidifiers and is made from rubber resistant to 100 °C.

Table for choosing duct steam distributors

																	for special applications only*					
	DP035D22R0	DP045D22R0	DP060D22R0	DP085D22R0	DP035D30R0	DP045D30R0	DP060D30R0	DP085D30R0	DP105D30R0	DP125D30R0	DP165D30R0	DP085D40R0	DP105D40R0	DP125D40R0	DP165D40R0	DP205D40R0	DP030D22RU	DP030D30RU	DP045D30RU	DP060D30RU	DP060D40RU	
inlet diameter (C)	22 mm				30 mm							40 mm						22 mm	30 mm			40 mm
length (A)	350	450	600	850	350	450	600	850	1.050	1.250	1650	850	1.050	1.250	1.650	2050	300	300	450	600	600	
CH001 - CH005	1	1	1	1													1					
UE001	1	1	1	1													1					
UE003	1	1	1	1													1					
UE005					1	1	1	1	1	1								1	1	1		
UE008						1	1	1	1	1								1	1	1		
UE009							1	1	1	1								1	1	1		
UE010							1	1	1	1								1	1	1		
UE015								1	1	1	1								1	1		
UE018								1	1	1	1											
UE025								2*	2*	2*	2*	1	1	1						2**	1	
UE035								2*	2*	2*	2*	2*	1	1	1	1					1	
UE045 230 V 3-phase												2	2	1**	1**	1**					1**	
UE045 other voltages												2**	2**	1	1	1					1	
UE065												4**	2	2	2	2					2	
UE090												4**	4**	2	2	2					2	
UE130													4	4	4	4					4	
UR002					1	1												1	1			
UR004					1	1	1	1	1	1								1	1	1		
UR006						1	1	1	1	1								1	1	1		
UR010							1	1	1	1								1	1	1		
UR013								1	1	1	1								1	1		
UR020							2*	2*	2*	2*	2*	1	1	1					2*	2*	1	
UR027								2*	2*	2*	2*	1	1	1					2*	2*	1	
UR040												2**	2**	1	1	1					1	
UR053												4**	2	2	2	2					2	
UR060												4**	2	2	2	2					2	
UR080												4**	4**	2	2	2					2	
UG045												2	2	2	2						2	
UG090												4**	4**	2	2	2					2	
UG180														4	4	4					4	

Note: the quantities with asterisks require branched connections

*: use CAREL "Y" kit P/N UEKY000000, 40 mm (1.6") inlet and 2 x 30 mm (1.2") outlets

** : use CAREL "Y" kit P/N UEKY40X400, 40 mm (1.6") inlet and 2 x 40 mm (1.6") outlets

Adiabatic humidification





Pressurised water humidifiers

humiFog multizone is a water spray humidifier that exploits the high pressure applied to the water by a volumetric pump, so as to achieve very fine atomisation through special nozzles. The most common application of these humidifiers is in AHUs, where the distribution system is installed.

In industrial environments for processing wood or paper, or in the textiles industry, systems are often used to distribute atomised water directly into the rooms.

As well as humidity control, pressurised water atomisers are the best solution for fully exploiting the potential offered by evaporative cooling, both direct and indirect.

One crucial aspect is the hygiene that pressurised water humidifiers must guarantee in the application where they are used. Management of washing cycles, the materials used and the configuration of the atomised water distribution system are the main features that guarantee CAREL humidifiers comply with the strictest hygiene regulations in force (VDI6022).

Energy saving

The only energy humiFog consumes is used to power the water pump, just 4 watts for every l/h of capacity. In addition, an inverter is used to modulate pump speed on the humiFog, meaning both more precise control and even lower power consumption.

Benefits

- **very low power consumption:** consumes just 4W per l/h capacity, less than 1% of any steam humidifier.
- **summer/winter operation:** humidifies the air during winter, cools the air in summer by direct and indirect evaporative cooling.
- **choice of models available:** single zone or multizone to best satisfy different requirements.
- **high capacity:** on the latest version of humiFog, capacity has been increased to 1,000 l/h. This aspect is crucial for applications with high humidity loads, above all paint booths and datacenters.
- **maximum hygiene:** suitable for all applications that require a high level of hygiene.
- "silicon free" version available with steel pump for painting applications;
- **seismic certification:** compliant with the requirements of Italian decree of 14 January 2008.

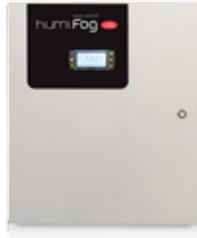
Backup & rotation

On the latest version of humiFog, the back-up & rotation function has been implemented, fundamental for process applications that that require continuous service and zero downtime.





pumping unit



zone controller



controllers

humiFog multizone

UA*H*, UA*Z*

Single-zone/multi-zone configurations

The humiFog system can be used in the following configurations:

Single zone

for applications in AHUs, the pump operates at variable pressure with flow control, for precise and continuous modulation of humidification capacity.

Multizone

for applications in AHUs and in rooms, in which a pumping unit (master) supplies multiple distribution systems (up to 6). Water pressure is kept constant (70 bars), capacity is modulated in steps. The multizone configuration rationalises the use of the humiFog pumping unit as, despite the lower precision due to stepped modulation ($\pm 5\%$ against the $\pm 2\%$ guaranteed by the single zone solution), it can manage multiple zones at the same time, without having to install a pumping unit for each AHU or industrial environment.

Direct humidification into rooms

humiFog multizone is the ideal system, as by keeping water pressure high (70 bars), each nozzle generates a cone of very fine droplets (average diameter 10 to 15 μm) that evaporate completely in a short time and space. The air temperature and humidity conditions, together with the presence of objects, may represent limits that must be considered in the installation to prevent the droplets from wetting objects, machinery and people in the room. When these limits are not satisfied, blowers can be used that, due to the cushion of air generated by the built-in tangential fan, carry the droplets of water in a substantially horizontal trajectory.

Hygiene aspects

Certification in accordance with the latest European standards (VDI6022) make humiFog for AHUs suitable for all applications, including the most demanding as regards hygiene, such as hospitals.

humiFog does not use chemical biocides but rather pure and simple water. Combining humiFog with reverse osmosis demineralisation and the UV lamp disinfection system guarantees maximum hygiene of the supply water.

HumiFog does not atomise recirculated water: the built-in controller automatically fills the water lines only when humidification is required. At the end of the humidification cycle, all the lines are emptied to avoid stagnation of water in the system. In the event where there is no humidification demand for an extended time, automatic periodical washing cycles are activated on the water lines. All the components in the distribution system in contact with water are made from AISI316 stainless steel.

Supply water characteristics

For correct operation, the humiFog multizone system should be supplied with demineralised water (with conductivity between 0 and 50 $\mu\text{S}/\text{cm}$). To reach these values, a reverse osmosis system is usually required. This treatment involves having the water pass through a special membrane that, being permeable only to molecules the same size as H_2O , eliminates almost all the mineral salts present. As well as representing a physical barrier to bacteria, reverse osmosis water treatment removes mineral salts, and limits maintenance requirements inside the duct to simple periodical inspections!

System composition

- Pumping unit with continuous pump modulation (by inverter);
- new rack layout so as to reduce the number of components, bringing improvements in both assembly and maintenance;
- Fibreglass or stainless steel mist eliminator for hygienically certified installations;
- Zone controller (for multizone version);
- High pressure connection pipes.
- Water treatment system (reverse osmosis).

Controllers

New, simple and intuitive user interface. A large display shows easily understandable messages even for users without detailed knowledge of the product

The user interface is available in 6 languages (Italian, English, French, German, Spanish and Chinese) while the menus can be browsed simply using the buttons with icons.

Solution for installation in AHUs



Atomising racks made-to-measure for AHUs

(RACK*)

Atomising rack made to measure for AHUs, comprising atomising nozzles and on-off valves to control the number of manifolds that are active, and drain valves for emptying the rack. All metal parts are stainless steel.



Certified mist eliminator for AHUs

(UAKDS*, ECDS10*)

The mist eliminator has the purpose of trapping the droplets of water that are not completely evaporated, so as to prevent them from leaving the humidification chamber. The eliminator is supplied in standard modules that can be assembled to cover the cross-section of the AHU.

It is available in two versions: with fibreglass or steel filtering material, the latter required for VDI6022 certified installations.



Nozzles

(UAKMTP*)

Choice of three different types of nozzles: 1.45 l/h, 2.8 l/h and 4 l/h. The smaller the nozzle, the better and more uniform atomised water distribution will be.

Solutions for installation in rooms



Blowers for all types of environment

(DL*)

This consists of a tangential fan located behind a manifold with nozzles. The tangential fan generates a flow of air that assists evaporation of the droplets and the sustains the droplets with a cushion of air, so as to produce an essentially horizontal trajectory.

The entire assembly is enclosed in a metal structure that also contains the on-off and solenoid drain valves, controlled by the pumping unit.

The blowers have capacities that reach 32 kg/h. The "Master" version, with a built-in pressure switch, can independently manage the on-off and drain solenoid valves.

Multiple blowers can be connected in series to make up a complete distribution line.



Room distributors

(UAKZCS*)

These consist of stainless steel manifolds (pipes) with fittings for nozzles that are installed inside the room being humidified/cooled. The manifolds are available in various models, to fit nozzles from one side only or on two opposing sides. A series of manifolds make up a line in the distribution system. The stainless steel manifolds are up to 2786 mm long, with an outside diameter of 16 mm.

Each distribution line is connected to the pumping unit and is shutoff by solenoid valves. . By controlling these solenoid valves, humiFog manages the capacity of the distribution system, thus obtaining stepped capacity modulation (up to 6 steps). Each line has a drain valve that is mainly used to quickly discharge the water pressure when the line stops atomising: when opening the drain valve, the pressure quickly drops from 70 to 0 bars and the line is emptied, preventing the nozzles from dripping. In addition, the drain valves are used for the periodical automatic washing cycles managed by humiFog.

Accessories and options



Pulsation damper

The damper reduces peaks in pressure generated by the pump pistons so as to limit pulsation along the pipes and the distribution system. Supplied as standard for high capacity systems, 320 kg/h and over..



tERA

(-HMSRT*)

Using wireless (GSM) or Ethernet connectivity, the tERA solution can read, write and log the unit variables and manage alarms. All this information is provided to users via a web connection to the tERA portal, accessible from any device: PC, tablet or Smartphone..



Connection pipes and fittings

(UAKT)

CAREL supplies hoses for connection between the pumping unit and the rack or the room distribution system.



Junction box

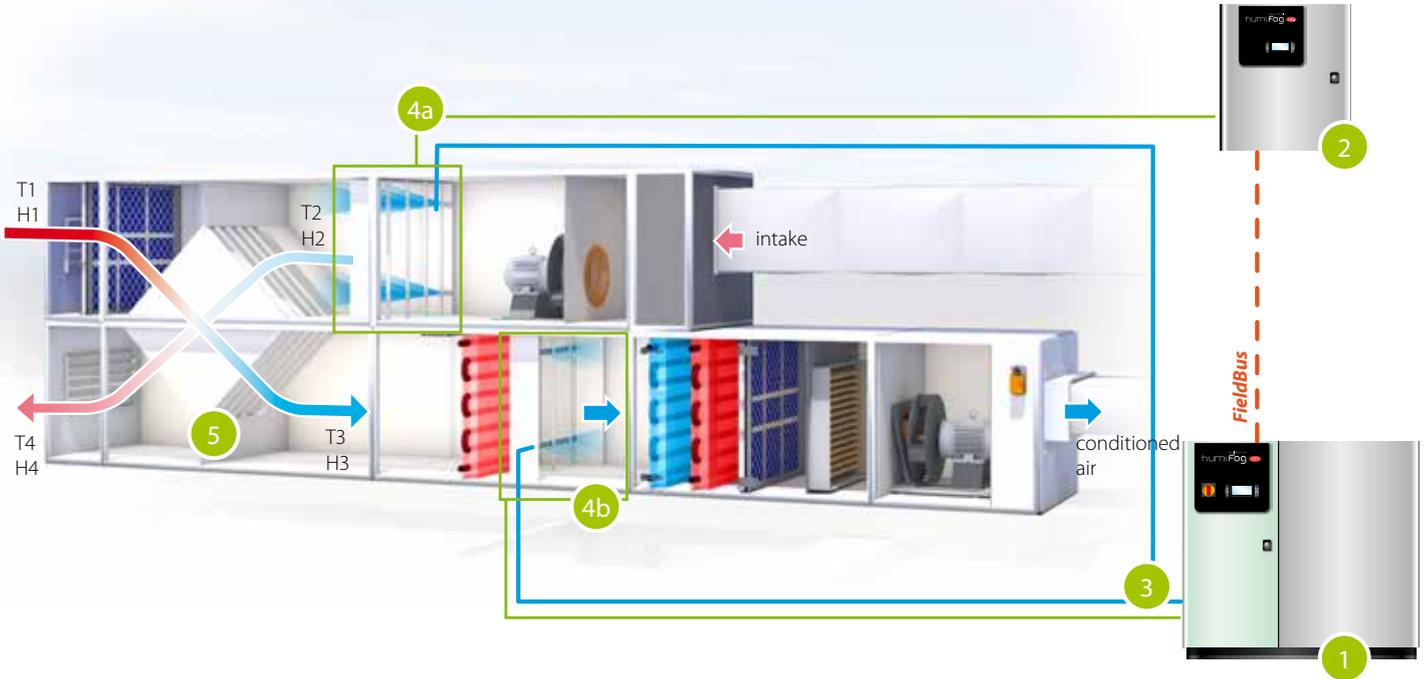
(UAKDER*)

Junction box for the solenoid valves fitted on the atomising rack in the duct. Models available for 4 to 8 solenoid valves.

A further two junction boxes have been added:

- UAKDER6000 with terminal block inside;
- UAKDERBK00 with terminal block and relays for activating the back-up and rotation function.

Example of operation with direct and indirect evaporative cooling



Winter/summer operation

The winter/summer function allows air humidification in winter, while in summer humiFog is used to evaporatively cool the inlet air.

Direct evaporative cooling

This extends the range in which free cooling can be used, by evaporatively cooling the inlet air, while always controlling the relative humidity set point (4b).

Indirect evaporative cooling

This is applied to the exhaust air, which can be cooled by several degrees without limits in terms of humidity (the air is

discharged by the AHU), by flowing first through a cross-flow heat exchanger together with the inlet air. This pre-cools the fresh air, reducing the capacity required by mechanical cooling (chiller) to bring the air to the desired conditions, thus reducing power consumption. The efficiency of this solution depends on the heat recovery unit used and the outside climatic conditions, yet easily exceeds 50% (see the example below). The humiFog multizone is perfect for these types of applications in AHUs.

- 1 *pumping unit and zone controller for humidification in winter*
- 2 *zone controller for cooling in summer*
- 3 *pressurised water line*
- 4 *a: rack for cooling in summer
b: rack for humidification in winter*
- 5 *heat recovery unit*

	Outside air		Exhaust air		Cooled outside air		Outlet air		Cooling capacity*
	T ₁	H ₁	T ₂	H ₂	T ₃	H ₃	T ₄	H ₄	
WITHOUT evaporative cooling	35 °C	40% RH	25 °C	50% RH	29 °C	56% RH	31 °C	36% RH	58 kW
WITH evaporative cooling	35 °C	40% RH	18 °C	saturation	25 °C	70% RH	28 °C	55% RH	100 kW
							Additional capacity		42 kW

In the example shown in the table, the exhaust air is pre-cooled to 18 °C and then used by the heat exchanger to cool the outside air from 35 to 25 °C, a decrease of 10 °C, without increasing absolute humidity.

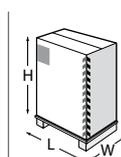
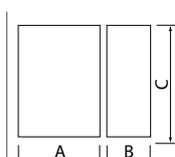
*: The cooling capacity is calculated based on an outside air flow-rate of 30000 m³/h, atomising 100 kg/h of water, and a heat recovery unit with an efficiency of 58%.

Features	UA100*	UA200*	UA320*	UA460*	UA600*	UA1K0
General						
Rated capacity kg/h	100	200	320	460	600	1000
Power supply	230 V, 1 phase, 50 Hz or 208 V, 1 phase, 60 Hz					• 400 V, 3 phase, 50 Hz • 460 V, 3 phase, 60 Hz
Pumping unit power consumption (kW)	0.955	0.955	1.15	1.15	1.95	2.75 (4 at 60 Hz)
Zone controller power consumption (kW)	0.28					
Operating conditions	1T40 °C <80 % RH non-condensing					
Storage conditions	1T50 °C <80 % RH non-condensing					
Degree of protection	IP20					
Water fill						
Connection	G3/4" F (NPT3/4F for UL versions)					
Temperature limits	1T40 °C / 34T104 °F					
Water pressure limits (MPa)	0.3 to 0.8					
Total hardness (ppm CaCO ₃)	0 to 25					
Conductivity limits (µS/cm)	0 to 50 µS/cm (stainless steel pump) – 30 to 50 µS/cm (brass pump)					
Water outlet						
Connection	M16.5m DIN 2353 (G3/8" F) (NPT3/8F for UL versions)					M22x1.5 DIN 2353 (G3/8" F) (NPT3/8F for UL versions)
Water drain						
Connection (Ø mm)	Stainless steel pipe, OD 10 mm/ 0.4 inch					
Network						
Network connection	RS485; Modbus® (others upon request)					
Control						
Control	external signal, temperature or humidity control; additional temperature or humidity limit probe					
Type of input signals	0 to 1 V, 0 to 10 V, 2 to 10 V, 0 to 20 mA, 4 to 20 mA, NTC					
Certification						
Hygiene certification for generic air-conditioning applications	VDI 6022, page 1 (04/06), VDI 3803 (10/02), ONORM H 6021 (09/03), SWKI VA104-01 (04/06), DIN EN 13779 (09/07)					
Hygiene certification for hospital applications	DIN 1946, part 4 (01/94), ONORM H 6020 (02/07)*, SWKI 99-3 (03/04)					
Certification	CE and ETL998 (pumping unit); ETL508A (zone controllers) seismic certification: compliant with the requirements of Italian decree of 14 January 2008					

Models of blowers for rooms

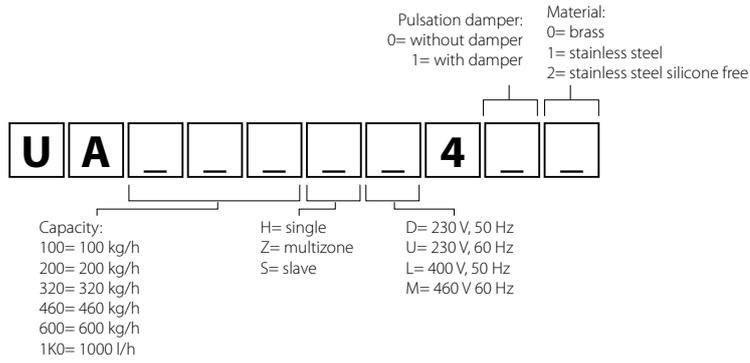
Features	DL*
Water inlet	M12 x 1 male
Water outlets	M12 x 1 male or TNF 6x8 for DLxxSDxxxx and DLxxMDxxxx
Outlet fan power	230 Vac, 50 Hz
Capacity (kg/h)	5, 11, 12, 16, 22, 32
Air flow-rate	700 m ³ /h model with 4 nozzles, 1500 m ³ /h model with 8 nozzles
Dimensions	850 model with 4 nozzles, 1500 model with 8 nozzles, 200x200 mm
Material	stainless steel
Maximum distribution line length (m)	50 m (contact CAREL for longer lines)

Dimensions in mm (in) and weights in kg (lb)



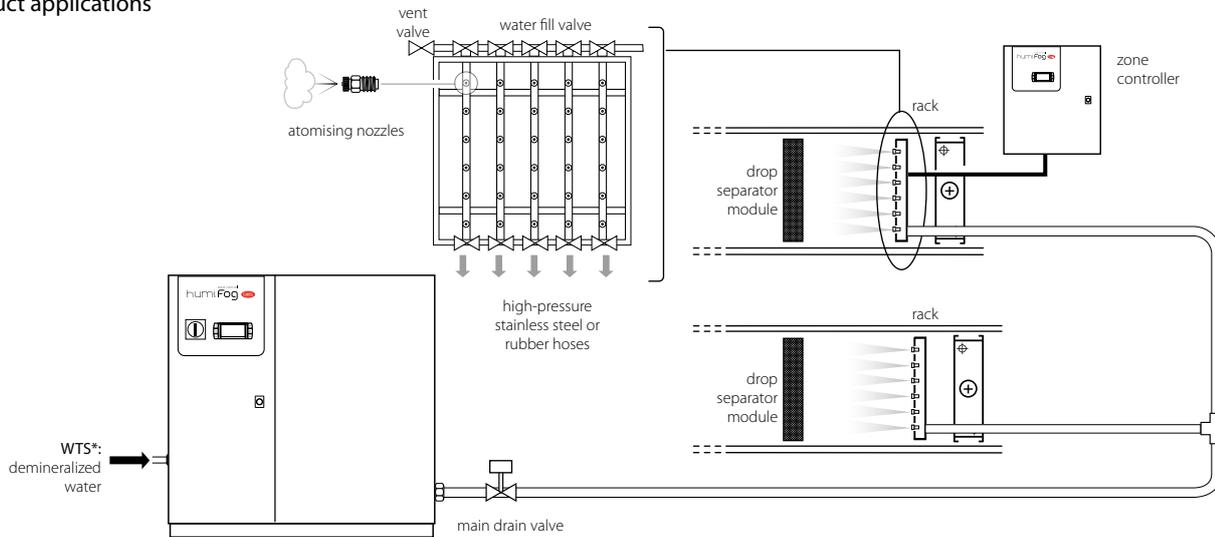
Model	AxBxC	weight	LxWxH	weight
UA (master)	1030x370x860 (40.6x14.6x33.9)	85 to 105 (187.4 to 231.5)	1100x455x1020 (43.3x17.9x40.2)	100 to 125 (220.5 to 275.6)
UA (slave)	500x150x580 (19.7x5.9x22.8)	19,5 (43)	605x255x770 (23.9x10x30.3)	21 (46.3)

Unit code

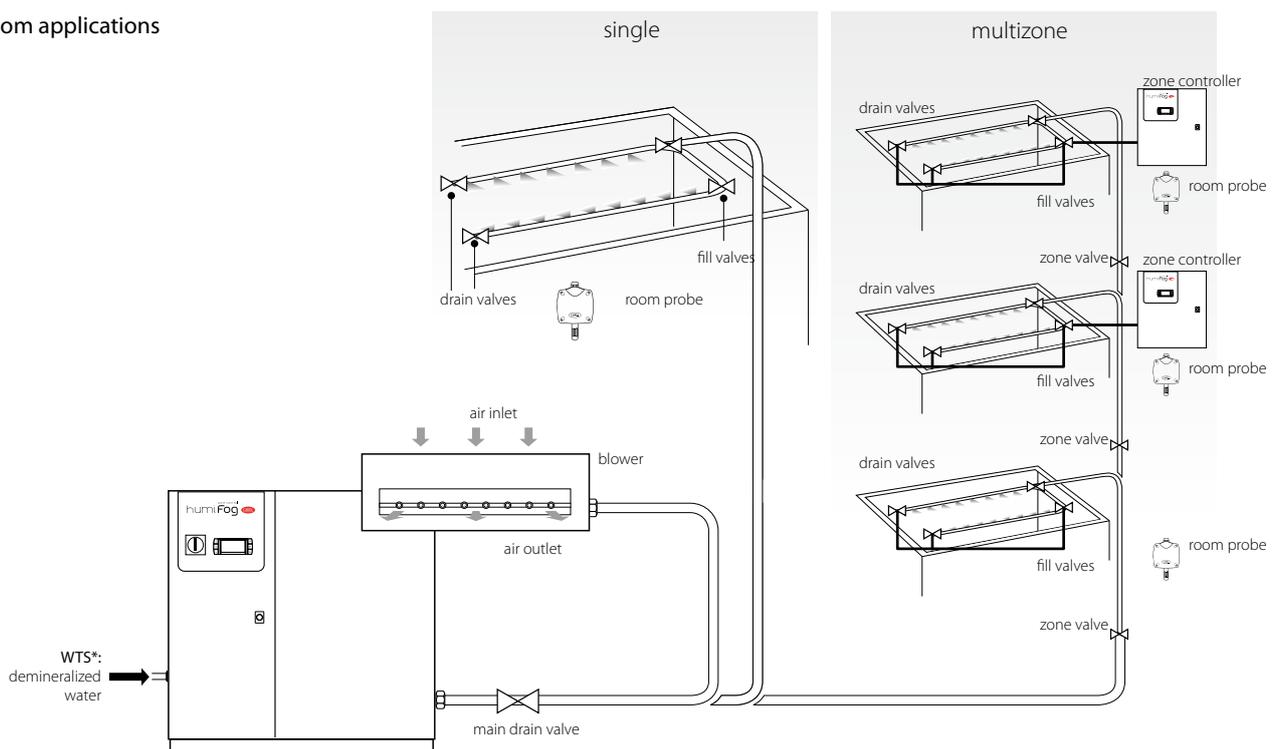


OVERVIEW DRAWING humiFog

duct applications



room applications





Compressed air and water atomisers

Compressed air humidifiers are the ideal humidification solution whenever a compressed air supply is available, as is the case in many industrial applications, even if humidification systems are often fitted with a dedicated air compressor.

The humidifier essentially consists of a cabinet fitted with electronic controller that, using two independent connection pipe networks, supplies the spray nozzles with compressed air and water at the ideal pressure for instant operating conditions. The units can be installed inside an AHU or directly in the room where humidity needs to be controlled.

The greatest advantage of these atomisers is the minute dimensions of the droplets produced and their thorough mixing in the compressed air that, due to its speed, distributes the aerosol in the room and consequently allows quick absorption. These units can therefore be readily used for direct cooling in rooms, and are ideal for the textile industry, wood and paper processing, and storerooms, where there is almost always a supply of compressed air.

mc multizone features an electronic controller that manages the supply of water and compressed air to the nozzles. Water atomisation is managed by an external control signal or, in the case of stand-alone control, so as to maintain the humidity/temperature set point.

The unit also manages a series of automatic cycles, such as nozzle cleaning and washing.

The system has the ability to control humidity independently in multiple zones (rooms, AHUs, cold rooms) using a master-slave layout. The layout has one master and multiple slaves (up to 5) connected in a pLAN. The master is fitted with a display for accessing the readings, viewing the status and messages on the master and slaves. The slaves have their own internal controller and can be set to continue operating even if connection to the master is interrupted.

The master/slave configuration can be used for:

- **high capacity:** applications in rooms or ducts where more than 230 kg/h of humidification is required, and thus more than one mc cabinet. The control signals (probes, external signals, limit probe) are connected to the master only. The master and the slaves generate a humidification/cooling capacity that is proportional to demand and their capacity. This allows systems to be developed with a capacity up to 1,380 kg/h;
- **multizone applications:** applications in multiple zones, rooms or ducts, each with its own humidity/temperature set point. All the parameters, status

information and messages for all the cabinets can be viewed and edited from the user interface on the master.

Automatic nozzle self-cleaning system

Each cabinet, master and slave, periodically activates a cycle for drying and cleaning the atomising nozzles. A special cleaning piston inside the nozzle is periodically pressed, by a spring, into the opening of the nozzle, removing any mineral salts and considerably reducing the need for cleaning.





mc multizone

MC*

Guaranteed hygiene

mc multizone ensures a very high level of hygiene, through:

- automatic emptying of the water line whenever the unit stops;
- automatic periodical washing of the water line during inactivity.

This prevents the nozzles from spraying stagnant water. In addition, an effective UV sanitising lamp (optional) can also be installed upstream of mc multizone; this shines UV light ON the flow of supply water, helping eliminate any biological contaminants such as bacteria, viruses, mould, spores and yeast that may be in the water.

Water quality for mc multizone systems

The constructional and functional features of the mc multizone allow the use of untreated drinking water. Nonetheless, the quantity and quality of dissolved minerals affect the frequency of routine maintenance operations (periodical cleaning of the nozzles) and the quantity of mineral dust deposited by the droplets of water after these have completely evaporated. For best operation, demineralised supply water by reverse osmosis should be used. This is also specified by the main reference standards, such as UNI 8884, VDI6022 and VDI3803.

Compressor

mc multizone requires compressed air, provided by an external compressor, not supplied by CAREL. The volume of air at standard atmospheric pressure required to atomise one litre of water is 1.27 Nm³/h, compressed to a pressure between 4 and 10 bars.

Accessories

Nozzles and assembly kits

(MCA* and MCK1AW0000)

AlSi316 stainless steel nozzles are available with different capacities, however all with the same outside dimensions.

Model	Capacity
A	2.7 l/h
B	4.0 l/h
C	5.4 l/h
D	6.8 l/h
E	10 l/h

Compressed air consumption: each 1 kg/h of atomised water requires 1.27 Nm³/h of compressed air.

Dripping is avoided thanks to the closing mechanism in periods of inactivity. The nozzle assembly kit includes the components required for assembly of a nozzle between a manifold in the water line and a manifold in the compressed air line, and is suitable for all types of mc nozzles.



Pressure sensor at the end of the line (for modulating cabinets)

(MCKPT*)

This is installed at the end of the compressed air line that supplies the nozzles. In this way, the controller can regulate air pressure to the optimum value (2.1 bars) at the nozzle that is furthest away, making up for pressure drop. This enormously simplifies setup of the installation, which will work perfectly right from the very first time.



Drain valve at the end of the line

(MCKDVWL*)

This is installed at the end of the water line that supplies the nozzles. In this way, mc multizone can empty the line when the unit is off and run the automatic periodical wash cycles. These procedures ensure a high level of hygiene by avoiding stagnated water in the line.



Pressure gauge at the end of the line (for ON/OFF cabinets)

(MCKM*)

This has the same purpose as the pressure sensor at the end of the line, described above. In this case, the pressure generated by the cabinet can be adjusted manually so as to reach a pressure of 2.1 bars on the gauge at the end of the line.

A pressure gauge is also available for displaying water pressure at the end of the line.



UV lamp disinfection system and filters

(MCKSUV0000, MCKFIL* and MCC*)

For optimum operation and to ensure maximum hygiene, a UV sanitising lamp and water filter are installed upstream of the cabinet. For the compressed air line, CAREL also provides a filter to trap any solid particles and an oil filter to remove any oil.

Compressed air filter

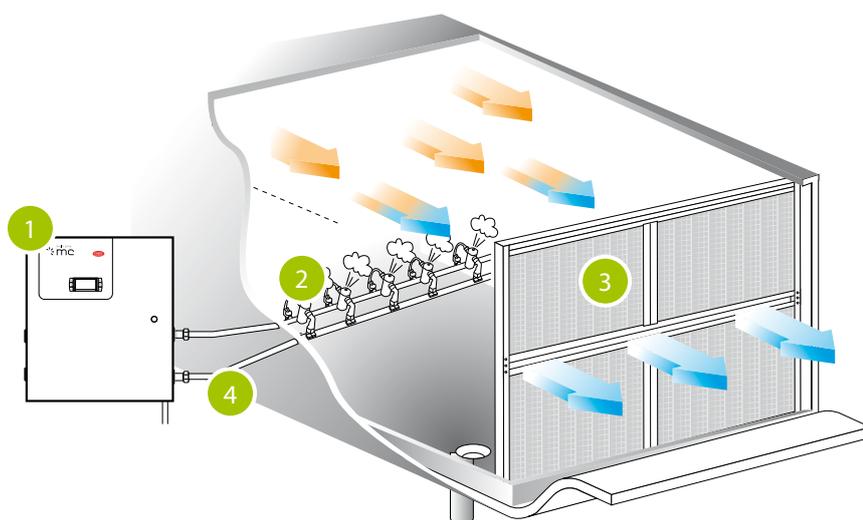
(MCFILAIR01)

Installed before the mc multizone cabinet, this protects the nozzles against being clogged by particles contained in the compressed air line.

Compressed air oil mist eliminator

(MCFILOIL01)

The eliminator is needed to trap any oil leaks from the compressor.

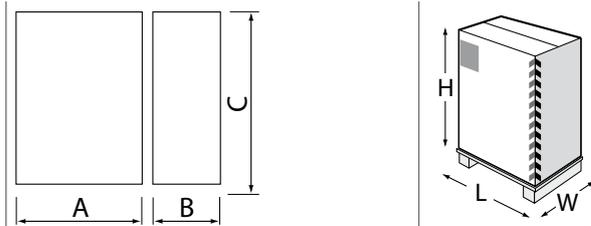


- 1 Cabinet: available in various models, according to capacity, type of control (ON/OFF or modulating), type of supply water, master/slave and power supply.
- 2 Nozzles: as well as the special atomising nozzles, assembly kits are also available for installing each nozzle.
- 3 Mist eliminator: with fibreglass or AISI304 filtering mesh (the same used for humiFog) for duct installation only.
- 4 Manifolds: stainless steel manifolds are available for installation in the ducts where the atomising nozzles are installed. Manifolds and lines for installations in rooms are not supplied.

Features	MC060*	MC230*
Maximum humidification capacity (kg/h)	60	230
Power supply	230 Vac single-phase, 50/60 Hz / 110 Vac single-phase 60 Hz, 37...48 W	
Operating conditions	1T40 °C, 0 to 80% RH non-condensing	
Storage conditions	-1T50 °C, 0 to 80% RH non-condensing	
Degree of protection	IP40	
Water fill		
Connection	1/2" G	1/2" G
Temperature limits (°C)	1T50 °C	
Water pressure limits (MPa - bar)	0.3 to 0.7 - 3 to 7	
Instant flow-rate (l/h)	60	230
Total hardness (ppm CaCO ₃) *	0 to 400	
Conductivity limits (µS/cm) *	0 to 1250	
Water drain		
Connection	TCF 8/10 or TCF 6/8 normal water model, TCF 8/10 demineralised water model	
Water outlet		
Connection	1/2" G	
Water pressure (MPa - bar)	0.035 + 0.01Δh - 0.35 + 0.1 Δh (Δh: height difference in metres between cabinet and nozzles)	
Air line		
Connection	1/2" G	
Temperature limits (°C)	1T50 °C	
Water pressure limits (MPa - bar)	0.5 to 0.7 - 5 to 7	
Outlet	1/2" G	
Air pressure (MPa - bar)	0.12 to 0.21 - 1.2 to 2.1 (intermediate pressure values available only on modulating versions)	
Nozzles		
Material	stainless steel (AISI 316)	
Nozzle capacity at 2.1 bars (kg/h)	2.7 - 4.0 - 5.4 - 6.8 - 10	
Network		
Network connection	Modbus®, LON, TCP/IP, SNMP	

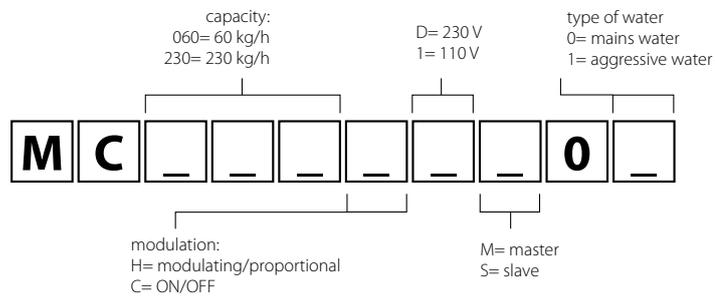
(*) The mc system can operate on untreated drinking water. Nonetheless, the quantity and the quality of dissolved minerals affect the frequency of routine maintenance operations (periodical cleaning of the nozzles) and the quantity of mineral dust deposited by the droplets of water after these have completely evaporated. For best operation, demineralised supply water by reverse osmosis should be used. Softened water, on the other hand, should not be used as it does not reduce the concentration of mineral salts. In any case, observe the provisions of the UNI8884 standard "Characteristics and treatment of the water in cooling and humidification circuits", according to which the main water characteristics are conductivity < 100 µS/cm and total hardness < 5 °fH (50 ppm CaCO₃). Similar recommendations are also provided by VDI6022 and VDI3803.

Dimensions in mm (in) and weights in kg (lb)

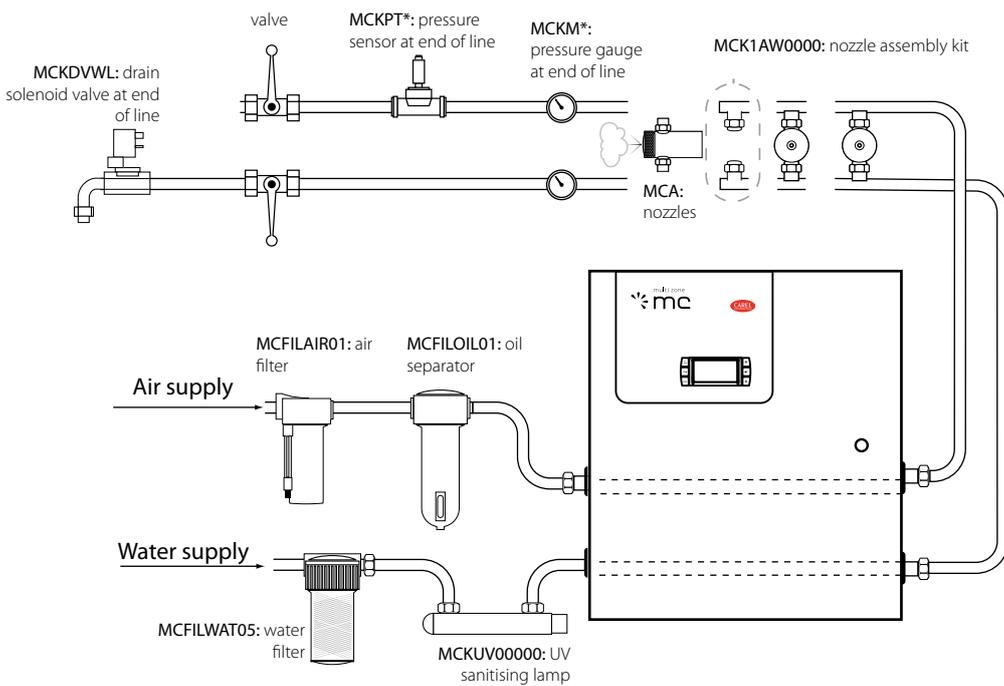


Model	AxBxC	weight	LxWxH	weight
MC*	515x165x580 (20.3x6.5x22.8)	19.5 (43)	605x255x770 (23.8x10x30.3)	21 (46.3)

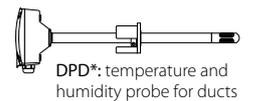
Unit code



OVERVIEW DRAWING mc multizone



Probes





Ultrasonic humidifiers

Ultrasonic humidifiers comprise a small water storage tank and piezoelectric transducers installed at the bottom of the tank.

The surface of the transducer vibrates at very high speed (1.65 million times a second), a speed that does not allow the water to move due to its inertial mass (the water cannot respond to the extremely fast movements of the transducer).

During the negative amplitude of the transducer cycle, a void is created that is not filled by the water, being unable to follow the extremely movements of the transducer. The cavity thus created leads to the production of bubbles that are pushed to the edge of the water column during the positive amplitude of the cycle, thus colliding. During this process, very fine particles of water are atomised.

Ultrasound technology applied to air humidification is an efficient and versatile solution:

- efficient, as ultrasonic humidifiers guarantee considerable energy savings (>90%) when compared to ordinary steam generators;
- versatile, thanks to the size of the droplets produced (diameter of 0.001 mm). This fundamental characteristic guarantees very fast absorption of the atomised water in the surrounding environment, avoiding possible condensation.

humiSonic is the CAREL ultrasonic humidifier. It has been designed to control and maintain the required humidity level in the specific environment. The features of humiSonic make it suitable for many different types of applications:

- residential comfort, for direct humidification applications in rooms or installation in ducts or on fan coils;
- datacenters, thanks to the very fine droplets generated, the humidifier is suitable for cooling and humidifying the surrounding environment;
- cleanrooms, to ensure constant humidity during production processes;
- museums, to preserve works of art, maintaining the right humidity and temperature;
- cold stores and climate rooms, for storing food;
- display cabinets, to preserve the freshness of fruit, vegetables and fresh food for sale;
- food processing, installed on appliances such as dough retarders;
- tobacco and wine industries, for product storage.

Benefits

- significant energy savings;
- easy installation and maintenance;
- guaranteed hygiene;
- precise control of room humidity;
- connection to external controllers;
- communication via Modbus and CAREL protocols.





humiSonic

UU*

humiSonic, installed on fan coils, is the ideal solution for coupling accurate control of ambient humidity with common temperature control (guaranteed by the fan coils).

At the same time, the humidifier is suitable for installation on showcases and display cabinets, to preserve the freshness of food, and on dough retarders, in production processes that require the right humidity and temperature.

Energy saving

Ultrasound humidification is adiabatic, requires very low power consumption compared to steam solutions (40 W to atomise 0.5 kg/h of water). This important feature makes humiSonic compact an "Energy Saving" solution in line with modern energy saving expectations.

Easy installation and maintenance

humiSonic, thanks to its compact design, can be easily installed on humidity and temperature control appliances and the latest-generation fan coils, and at the same time can be retrofitted on existing units. The maintenance of humiSonic consists only in periodic replacement of the transducers and, thanks to the ergonomic design, this does not have to be performed by trained staff.

Hygiene

This is one of the main strong points of humiSonic and is guaranteed by three important characteristics:

- the washing cycles are performed periodically (even when humiSonic is in standby), preventing the build-up of dirt inside the tank;
- the drain valve ensures the humidifier empties completely once the humidification cycle has ended, also in the event of a power failure.
- the tank (made from plastic) also features silver ions, which are able to prevent proliferation of bacteria.

Complete solution

As humiSonic is fitted with an integrated control board, no external electric control board is required. The humidifier receives the power supply from the transducer (supplied complete with cable kit) while as a control signal it can be connected to a voltage-free contact (ON/OFF), can be managed by the dedicated micro probe (available as an accessory) or can be controlled via serial network with Modbus® or CAREL communication protocol.

By installing an optional card, humiSonic can be managed with an external signal (e.g. 0 to 10 V, 4 to 20 mA...) or with other active probe models.

Supply water

humiSonic works operates on demineralised or mains water. If using mains water, maintenance intervals for cleaning or replacing the transducers will be shorter, the higher the mineral salt content of the supply water.

Accessories



Air filter

UUKFL* + UUKCY*

To ensure the inside of the tank remains clean, especially in dusty environments, an air filter can be installed on the fan inlet, which can be easily removed for cleaning with water.



Dedicated humidity probe

HYHU000000

humiSonic compares the value of the humidity present in the environment (measured via probe), against the set point and consequently modulates the production of mist in order to maintain the ambient conditions. The small size of the probe (Ø= 20 mm L= 71 mm) simplifies installation inside the fan coil or in other small spaces.



Flow sensor

UUKTA000000

The flow sensor manages the important remote ON/OFF function, and must be connected to the neutral wire on the power supply to the fan on the fan coil or in the AHU or display cabinet. By measuring the flow of current, the flow sensor (TAM) will enable or disable atomised water production. This guarantees that, regardless of ambient conditions, the humidifier will only operate when the fan is on.



Temperature/humidity probe

DPW*

Via the auxiliary card (UUKAX00000, optional but always recommended), humiSonic can read an active room temperature/humidity probe, ideal for installations in places such as museums, libraries and offices, where design also plays an important role.



Display and optional card

UUKDI00000, UUKAX00000

With the optional card, humiSonic can:

- be connected to the display; in this way, access is available to the list of parameters in order to optimise the configuration of humiSonic and adapt it to particular application requirements.
- receive a signal from an external controller (0 to 10 V, 2 to 10 V, 0 to 20 mA, 4 to 20 mA) or from an active probe;



Distribution system

UUKDP*

The distribution systems offered as an accessory allow easy and safe installation.

The kits are made up of a part in flexible plastic measuring 700 mm in length (to be connected to the humiSonic manifold) and a part in stainless steel to be installed in the room, available in lengths: 250, 530, 600 and 800 mm.

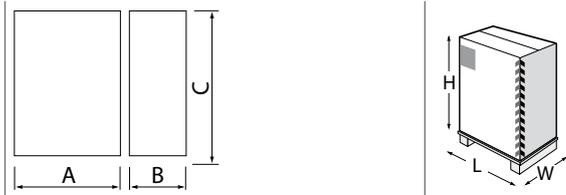
humiSonic table

Features	UU01F*0	UU01F*A0
Mist production	0.5 kg/h - 1.1 lb/h	1.0 kg/h - 2.2 lb/h
Mist outlet	Ø= 40 mm	
Supply water inlet	G 1/8" F	
Supply water temperature	from 1 to 40 °C - from 33.8 to 104 °F	
Supply water pressure	from 0.1 to 6 bars - from 14.5 to 87 psi	
Fill flow rate	1 l/min	
Supply water	The use of demineralised water is recommended (humiSonic will still work correctly on mains water, nonetheless routine maintenance will be required more frequently).	
Drain water outlet	Ø= 10 mm	
Drain flow rate (max.)	1 l/min	
Power	230 V, 40 W; 115 V, 40 W	230 V, 100 W; 115 V, 70 W
Power supply voltage	230 V, 50 Hz or 115 V, 60 Hz	
Current draw	0.5 A, 0.4 A	1 A; 0,8 A
Power cable section	1.5 mm ²	
Control signals		
ON/OFF enabling	●	●
HYHU000000 humidity probe (to be installed in the fan coil intake line)	□	□
UUKTA000000 flow sensor to be connected to the neutral wire of the fan coil power supply.	□	□
RS485 Serial (CAREL or Modbus® protocol).	●	●
Signal from active probe	with auxiliary card UUKAX only	
External control signals (0 to 10 V, 4 to 20 mA)		

● standard

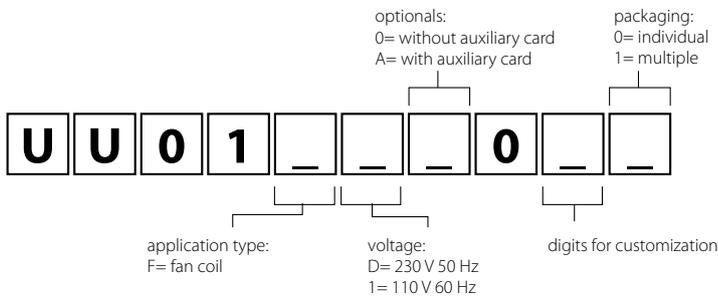
□ optional

Dimensions in mm (in) and weights in kg (lb)



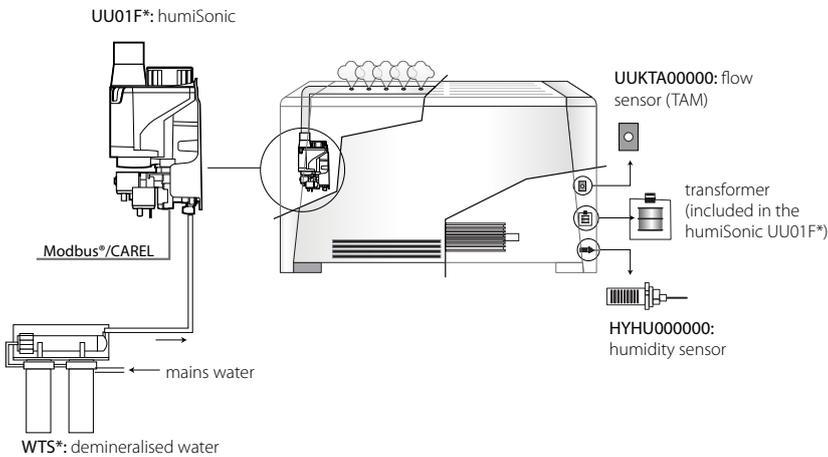
Mod.	AxBxC	weight	LxWxH	weight
UU01F*	125x121x221 (4.92x4.76x8.70)	2,8 (6.17)	395x155x225 (15.6x6.1x8.9)	3,9 (8.6)
UU01G*	125x183x216 (4.92x7.2x8.5)	4,4 (9.7)	395x155x225 (15.6x6.1x8.9)	5,5 (12.3)

Unit code

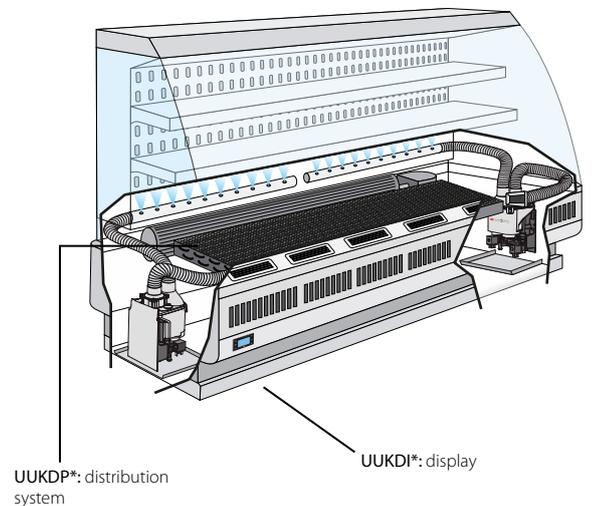


OVERVIEW DRAWING humiSonic

fan coil installation



display cabinet installation





humiSonic direct

UU*

humiSonic direct, installed directly in the room, can precisely control air relative humidity.

Complete and compact solution

In room humidity control applications, it is crucial for the humidifier to have compact dimensions. The solution in fact needs to adapt to an existing layout, while allowing flexibility for future changes in position. humiSonic is a stand-alone compact solution that comprises both the control panel/power supply and the probe for reading air humidity.

Energy saving

Very low energy consumption (less than 80 W per litre of atomised water) makes humiSonic the ideal solution for datacentres and all humidity control applications where energy saving is crucial. In datacenters in particular, humiSonic can be installed in the hot aisle and, integrating with the close control unit thanks to Modbus communication, can precisely control air humidity.

Mission Critical DNA

When supplying humiSonic with desalinated water, the interval for replacing the piezoelectric transducers is 10,000 hours! In addition, if used with a highly accurate probe (not supplied), humiSonic direct can obtain precision of $\pm 1\%$ r.H..

Accessories



Dedicated humidity probe

HYHU000000

humiSonic compares the humidity value in the room (measured by the probe) against the set point, and modulates atomised water production accordingly, so as to keep ambient conditions under control. The compact dimensions of the probe ($\varnothing = 20$ mm L = 71 mm) simplify its installation on the fan coil or in other small spaces.



Flood detector

FLOE*

The flood detecting device is able to sense the presence of water in an environment. It is generally used to protect against flooding in datacenters, offices, laboratories and other special environments.



Display and optional card

UUKDI00000, UUKAX00000

With the optional card, humiSonic can:

- be connected to the display; in this way, access is available to the list of parameters in order to optimise the configuration of humiSonic and adapt it to particular application requirements.
- receive a signal from an external controller (0 to 10 V, 2 to 10 V, 0 to 20 mA, 4 to 20 mA) or from an active probe;



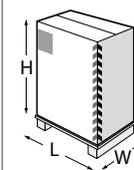
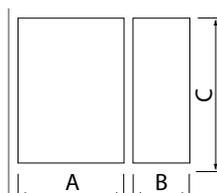
WTS compact

ROC*

The new CAREL reverse osmosis system has been designed for treating humidifier feedwater.

Supplied with drinking water, the unit produces demineralised water whose physical/chemical, flow-rate and pressure characteristics are ideal for providing humidifier feedwater.

Dimensions in mm (in) and weights in kg (lb)



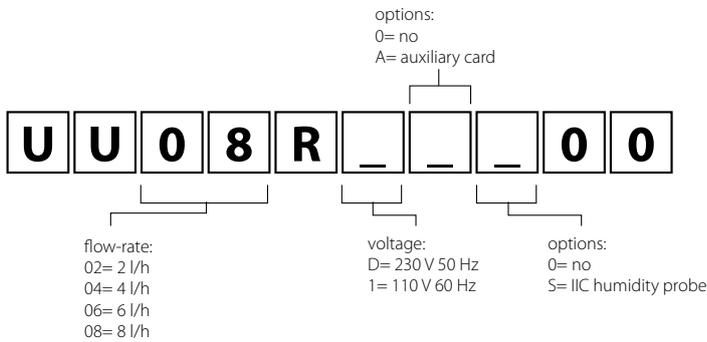
Mod.	AxBxC	weight	LxWxH	weight
UU02R*	275x274x317 (10.8x10.79x12.48)	9,5 (20,9)	635x410x410 (25x16.14x16.14)	11 (24.2)
UU04R*	400x274x317 (15.7x10.79x12.48)	12,5 (27,6)	760x410x410 (29.92x16.14x16.14)	14 (30.9)
UU06R*	525x274x317 (20.7x10.79x12.48)	15,5 (34,2)	885x410x410 (34.84x16.14x16.14)	17 (27.5)
UU08R*	650x274x317 (25.6x10.79x12.48)	18,5 (40,8)	1010x410x410 (39.76x16.14x16.14)	21 (46.3)

humiSonic direct table

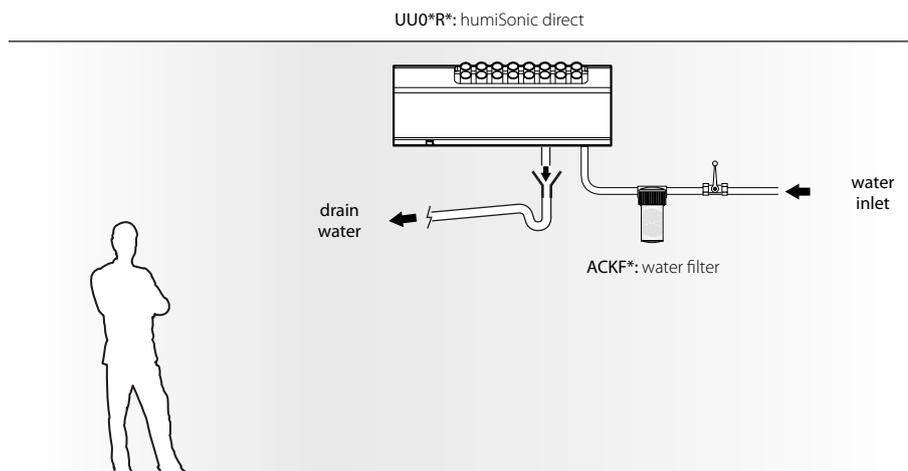
Features	UU002R*	UU004R*	UU06R*	UU008R*
Atomised water production	2 kg/h - 4.4 lb/h	4 kg/h - 8.8 lb/h	6 kg/h - 13.2 lb/h	8 kg/h - 17.6 lb/h
Atomised water outlet	Ø= 40 mm			
Feedwater inlet	G 1/8" F			
Feedwater temperature	1 to 40 °C - 33.8 to 104 °F			
Feedwater pressure	0.1 to 6 bars - 14.5 to 87 psi			
Feedwater flow-rate	1.9 l/h			
Feedwater	0 to 20 µS/cm			
Drain water outlet	Ø= 1/8"			
Max. drain flow-rate	1.9 l/min			
Power	180 W	330 W	480 W	690 W
Power supply	230 V, 50 Hz; 110 V, 60 Hz			
Electric current	0,8 A	1,5 A	2,1 A	3,0 A
Power cable size	0,823 mm ²			
Control signals				
Enable ON/OFF	●	●	●	●
HYHU000000 humidity probe	□	□	□	□
RS485 serial (CAREL or Modbus® protocol)	●	●	●	●
Signal from active probe or external control signals (0 to 10 V, 4 to 20 mA)	only with UUKAX auxiliary card			

- standard
- optional

Unit code



OVERVIEW DRAWING humiSonic





humiSonic ventilation

UU*

The humiSonic version for air handling units provides adiabatic humidification even in compact-sized ducts.

Installed directly in the air stream, humiSonic atomises water into very fine droplets (1 µm), which are instantly absorbed.

Hygiene

This new generation of ultrasonic humidifiers incorporates all of Carel's experience in ensuring maximum hygiene: all components in contact with the demineralised water are made from stainless steel, and the main body is designed to prevent stagnation of water at the end of the humidification cycle. Moreover, the electronic controller manages periodical washing cycles in the event of system inactivity.

High efficiency

humiSonic, with power consumption of less than 80 W for each litre of atomised water, is the optimum choice for applications where energy saving is a priority.

In addition, thanks to the small droplet size, around 1 µm, the atomised water is completely absorbed by the air stream in just 50-60 cm.

Easy installation and maintenance

humiSonic for air handling units comprises two elements: the main body (containing the piezoelectric transducers) and the electrical power supply and control panel. The main body can be easily positioned inside the air handling unit, while the electrical panel can be installed outside of the humidification compartment.



Electrical panel

UQ*

The ultrasonic humidifiers installed inside air handling units are powered and controlled by an electrical panel, complete with display.

Accessories



Airflow switch

DCFL*

The flow switch signals when there is no or excessively low air flow in the duct, stopping the humidification cycle.



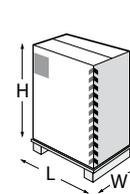
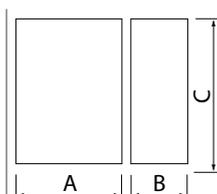
WTS compact

ROC*

The new CAREL reverse osmosis system has been designed for treating humidifier feedwater.

Supplied with drinking water, the unit produces demineralised water whose physical/chemical, flow-rate and pressure characteristics are ideal for providing humidifier feedwater.

Dimensions in mm (in) and weights in kg (lb)



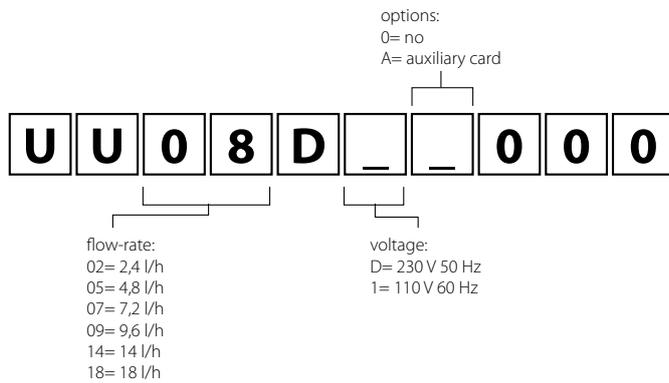
Mod.	AxBxC	weight	LxWxH	weight
UU02D*	275x256x309 (10.8x10.1x12.2)	4,9 (10.8)	510x410x410 (20.07x16.14x16.14)	5,9 (13)
UU05D*	400x256x309 (15.7x10.1x12.2)	6,4 (14.1)	640x410x410 (25.20x16.14x16.14)	7,4 (16.3)
UU07D*	525x256x309 (20.7x10.1x12.2)	8 (17.6)	760x410x410 (29.92x16.14x16.14)	9,5 (20.9)
UU09D*	650x256x309 (25.6x10.1x12.2)	9,5 (20.9)	890x410x410 (35.04x16.14x16.14)	11 (24.2)
UU14D*	900x256x309 (35.4x10.1x12.2)	12,7 (28)	1150x410x410 (45.27x16.14x16.14)	14,7 (32.4)
UU15D*	1150x256x309 (45.3x10.1x12.2)	15,8 (34.8)	1350x410x410 (53.15x16.14x16.14)	17,8 (39.2)

humiSonic ventilation table

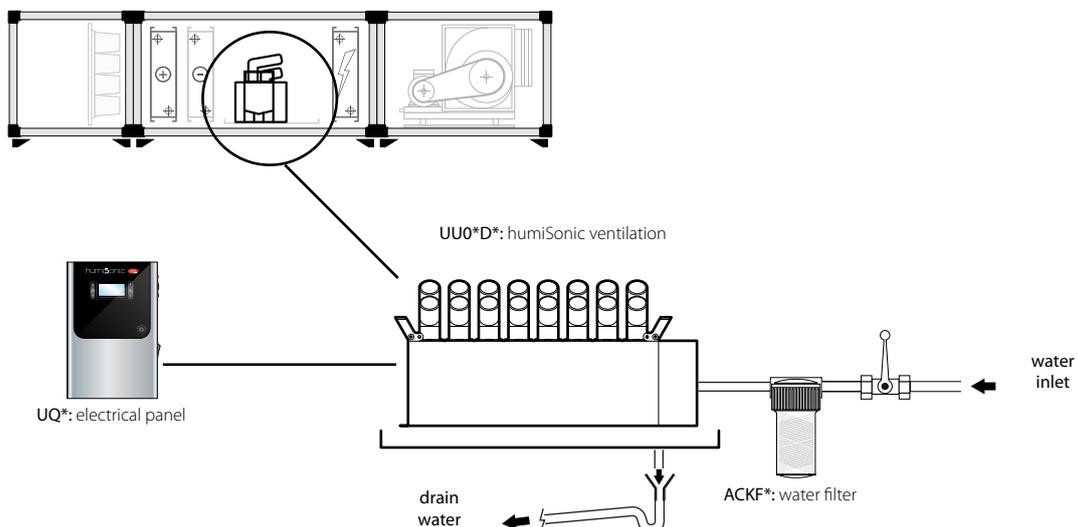
Features	UU02D*	UU05D*	UU07D*	UU09D*	UU14D*	UU18D*
Atomised water production - kg/h (lb/h)	2.4 (5.3)	4.8 (10.5)	7.2 (16)	9.6 (21)	14 (31)	18 (39.6)
Atomised water outlet	Ø= 40 mm					
Feedwater inlet	G 1/8" F					
Feedwater temperature	1 to 40 °C - 33.8 to 104 °F					
Feedwater pressure	0.1 to 6 bars - 14.5 to 87 psi					
Feedwater flow-rate	1.9 l/min					
Feedwater	0 to 20 µS/cm					
Drain water outlet	Ø= 1/8"					
Max. drain flow-rate	1.9 l/min					
Power	210 W	350 W	500 W	650 W	950 W	1150 W
Power supply	230 V, 50 Hz; 110 V, 60 Hz					
Electric current	0,7 A	1,3 A	2,0 A	2,6 A	4,0 A	4,7 A
Power cable size	0,823 mm ²					
Control signals						
Enable ON/OFF	●	●	●	●	●	●
RS485 serial (CAREL or Modbus® protocol)	●	●	●	●	●	●
Signal from active probe	0 to 1 V, 0 to 5 V					
External control signals						

● standard

Unit code



OVERVIEW DRAWING humiSonic





Centrifugal humidifiers

humiDisk is a small yet sturdy humidifier that uses a spinning disk to atomise water and transform it into millions of very small droplets that, blown by a built-in fan, are introduced into the environment, where they evaporate, humidifying and cooling the air.

Very low power consumption

humiDisk is a simple, economic and easy to maintain humidification system, with an energy consumption of just 220 W for 6.5 kg/h of capacity (31 W for the 1.0 kg/h model).

Guaranteed hygiene

The water tank inside the humiDisk contains just 0.055 litres of water, which is atomised, at maximum capacity, in just 30s for the 6.5 kg/h model and 3 minutes for the 1 kg/h model. The water in the tank is therefore changed very rapidly, meaning the humidifier substantially works with non-stagnant running water, so as to guarantee the best hygiene conditions.

Adjustable capacity (humiDisk₆₅ only)

Operation of humiDisk₆₅ controlled by an electronic board fitted with a trimmer for setting humidifier capacity, from 1.1 to 6.5 kg/h, making it suitable for all applications.

Automatic washing cycles (humiDisk₆₅ only)

The board, as well as managing normal unit operation, also performs a tank washing cycle when starting the unit, and an emptying cycle when humidification is no longer required. This avoids having stagnant water inside the unit.

Important: to ensure a higher level of hygiene, when using the CAREL electrical control panels, the humidifier also washes the water tank at the start of each humidification cycle.

Water used

humiDisk can operate on both mains water or treated water. The quantity and quality of the minerals dissolved in the water affect the frequency of the routine maintenance operations and the amount of dust generated. For best operation, use demineralised water (do not use softened water, as this does not reduce the content of minerals dissolved in the water).

In any case, observe the requirements of UNI8884 standard "Characteristics and treatment of the water in cooling and humidification circuits", according to which the main characteristics of the water are conductivity < 100 $\mu\text{S}/\text{cm}$ and total hardness < 5 °fH (50 ppm CaCO_3). Similar requirements are also specified in standards VDI6022, VDI3803.

Benefits

- Simplicity:
 - requires just the 230 Vac power supply and the mains water and drain lines;
 - operation is ON/OFF;
- hygienically safe:
 - very small water tank, just 55 ml;
 - washing procedure at unit start;
 - emptying at the end of the humidification cycle;
 - washing procedure at the beginning of every cycle (with CAREL control panel only);
- modularity: 1 or 2 humiDisk₆₅ units can be controlled in parallel using the special control panel, or up to 10 humiDisk10 units using the CAREL humidistat





humiDisk₁₀ & humiDisk₆₅

UC*

Applications

- cold rooms, storage facilities and ripening rooms for products, such as fruit and vegetables, where low humidity level causes weight loss and product spoilage;
- printing facilities, where the correct level of humidity must be maintained to avoid variation in paper size and consequent misprints; the correct humidity value reduces the probability of electrostatic discharges and adhesion of the sheets of paper;
- textile industries, where maintenance of the required humidity according to the production process and the type of material used is fundamental.

Assembly and accessories

humiDisk₆₅ is complete with accessories for wall and ceiling mounting, as well as the water fill and drain hoses.

humiDisk₁₀ is available in two versions:

- with accessories for ceiling installation only;
- also complete with wall-mounting bracket and water fill and drain hoses.

Accessories



Ultracella
(WB000*)

The CAREL platform can connect more probes and loads than other standard solutions, managing these with optimised and advanced control algorithms, for total cold room control. With UltraCella, humidity control can also be optimised, for even better food storage inside the cold room. HACCP compliant.



Electrical panels with electronic humidity controller
(UCQ065D*00)

CAREL supplies electrical panels fitted with electronic humidity controller. By connecting a humidity probe to the controller, this can activate one or two humiDisk₆₅ units, in parallel, so as to maintain the humidity level to the set value. The humidity measured by the probe can be read on the display of the controller. The humidity probe is not included in the electrical panel.



UV lamp disinfection system
(MCKSUV0000)

To guarantee maximum hygiene, a UV sanitising lamp can be installed upstream of the humidifier. The lamp shines UV light on the flow of supply water, helping to eliminate any biological contaminants that may be present, such as bacteria, viruses, mould, spores and yeast.

Frost protection device (humiDisk₆₅ only)
(UCKH70W000)

humiDisk₆₅ can be supplied with an optional frost protection device: an electric immersion heater, controlled by the electronic board and a temperature sensor that is activated when the temperature inside the unit approaches 0 °C. The appliance can operate at temperatures down to around 1 °C without the frost protection device, and down to -2 °C with the device (optional). This is especially useful for applications in fruit and vegetable cold stores.



Humidistat
(UCHUMM0000)

This simple and low-cost mechanical humidistat can be connected directly to one or more humiDisk units (up to a maximum of 10 units in parallel, for humiDisk₁₀ or one humiDisk₆₅). Used to set the desired humidity by simply turning the knob.

humiDisk table

Features	humiDisk ₁₀	humiDisk ₆₅
Capacity	1 kg/h at 230 V 50 Hz 1.2 kg/h at 110 V 60 Hz	6.5 kg/h, adjustable from 0.85 to 6.5 kg/h
Power supply	230 V, 50 Hz - 110 V, 60 Hz	230 V, 50 Hz - 110 V, 60 Hz
Power consumption	31 W	230 W - (290 W with frost protection device)
Air flow-rate	80 m ³ /h (47 CFM)	280 m ³ /h (165 CFM)
Water content	0.055 litres	0.055 litres
Operating conditions	1T35 °C (34T95°F)	1T35 °C (34T95°F) WITHOUT frost protection device
	0 to 100% RH non-condensing	-2T35 °C WITH frost protection device (not available for American version) 0 to 100% RH non-condensing
Frost protection heater	no	yes (European version only)
Degree of protection	IPX4	IPX4
Electronic board for capacity control		●
Electrical panel with electronic humidistat		□
Mechanical humidistat	□	□
Installation accessories	accessories for ceiling-hung installation INCLUDED. Accessories for wall mounting and hoses NOT INCLUDED, available as options.	accessories for ceiling-hung AND wall-mounted installation and fill and drain hoses included.
Certification	CE and ETL	CE and ETL
Fill connections	Ø10 mm (OD)	3/4 G
Drain connection	Ø10 mm (OD)	3/4 G
Water		
Supply water pressure	100 to 1000 kPa	100 to 1000 kPa
Water temperature limits	1T50 °C (33.8T122 °F)	1T50 °C (33.8T122 °F)
Water total hardness limits (*) (**)	max 30 °fH (max. 300 ppm CaCO ₃)	max 30 °fH (max. 300 ppm CaCO ₃)
Water conductivity limits (**)	100 to 1200 µS/cm	100 to 1200 µS/cm

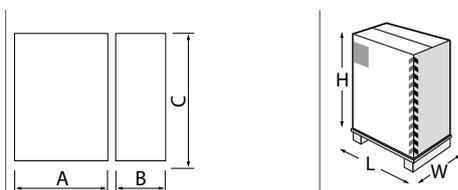
(*) not less than 200% Cl- in mg/l

(**) The quantity and quality of the minerals dissolved in the water affect the frequency of the routine maintenance operations and the amount of dust generated. For best operation, use demineralised water (do not use softened water, as this does not reduce the content of minerals dissolved in the water). Observe the requirements of UNI8884 standard "Characteristics and treatment of the water in cooling and humidification circuits", according to which the main characteristics of the water are conductivity < 100 µS/cm and total hardness < 5 °fH (50 ppm CaCO₃).

● standard

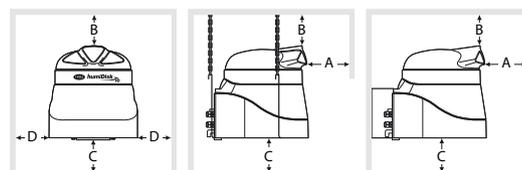
□ optional

Dimensions in mm (in) and weights in kg (lb)



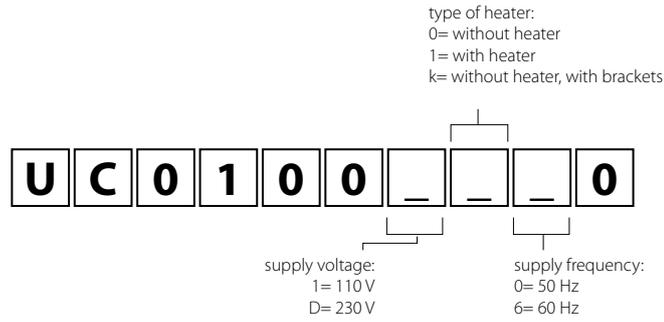
Model	AxBxC	weight	LxWxH	weight
UC010	302x390x312 (11.89x15.35x12.28)	4.3 (9.48)	400x400x350 (15.75x15.75x13.78)	5 (11.02)
UC065	505x610x565 (19.88x24.01x22.24)	17.6 (38.80)	640x600x665 (25.20x23.62x26.18)	20 (22.24)

Positioning

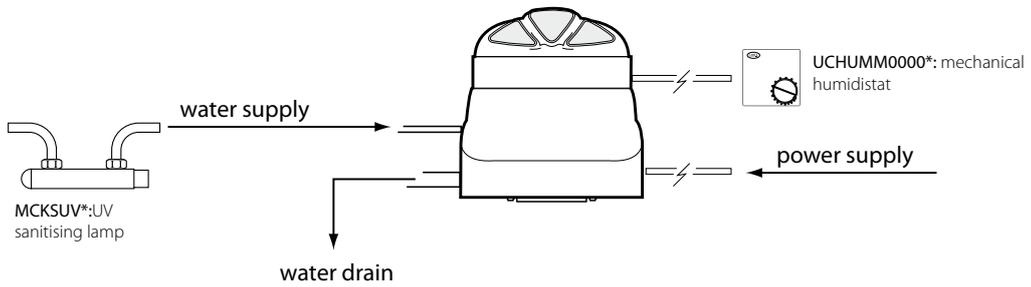


humidifier	distance (m)			
	A	B	C	D
UC010	≥2	≥0,5	≥1,5	≥0,5
UC065	≥3	≥1	≥1,5	≥0,5

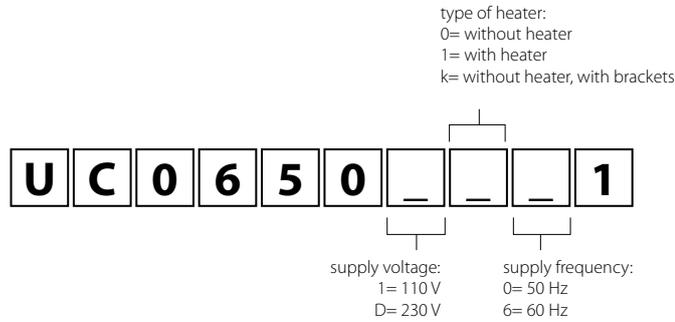
Unit code



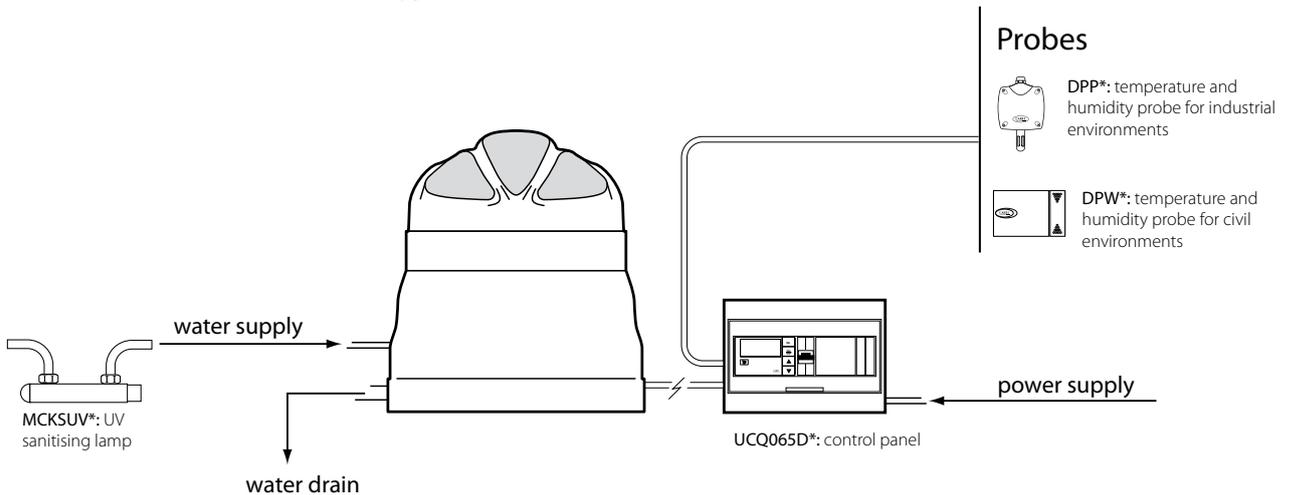
OVERVIEW DRAWING humiDisk₁₀



Unit code



OVERVIEW DRAWING humiDisk₆₅



Evaporative cooling





Atomisers - evaporative cooling

“Evaporative Cooling” is the process in which water cools the air through evaporation. For this to happen spontaneously, without the contribution of external energy, the water must be atomised in the air as very fine water droplets which, having a lower surface tension than the surrounding air, evaporate into the air.

Why does the air cool down?

No contribution of external energy is necessary, however, owing to its nature, the water evaporation process requires a certain amount of energy. This energy is removed from the air itself which, in order to absorb the water must release sensible heat, thus lowering its own temperature. Every kilogram of water that evaporates absorbs 0.69 kW of heat from the air. This is how the dual humidification and cooling effect of the air is obtained through the Evaporative Cooling process, which in many air handling applications represent two desired effects.

Energy Saving

The rapid development of evaporative cooling in HVAC applications is surely due to its very low energy impact. If we compare the cost for energy regarding Evaporative Cooling with that of other types of air transformations (e.g. humidification with steam emission or air cooling via chiller), it can be seen that the energy saving is considerable. The only energy required is for water pressurisation,

which is sent to the atomiser nozzles by a pump. Consumption is about 4 to 8 W for every l/h of atomised water.

Atomisers

CAREL supplies a complete range of products that make use of the principles of evaporative cooling and all its advantages. The standard composition of these products is:

- cabinet, containing the pump for pressurising the water, an inverter and an electronic controller for modulating the production of atomised water instant by instant;
- atomiser nozzles, able to atomise the water into very fine water droplets (in the order of a few hundredths of a millimetre), extending the heat exchange surfaces.
- distribution system, composed of stainless steel manifolds, atomiser nozzles and drain valves, in order to guarantee emptying.

Advantages

- energy saving: the same system combines adiabatic humidification and evaporative cooling, providing a global energy saving solution;
- pressure loss management: evaporative cooling guarantees real energy savings, assuring a very low pressure drop at the fans (30 Pa);

- controlled atomisation: in order to completely exploit the potential of evaporative cooling and without waste, it is necessary to have very accurate control of the amount of water atomised, instant by instant. By combining the action of the inverter and the modulation circuits, Optimist can precisely follow temperature and humidity demand;
- hygiene: thanks to the materials used, the design of the distribution systems without stagnation points and the automatic washing systems managed by the electronic controller, CAREL provides hygienically safe solutions for adiabatic humidification and evaporative cooling in AHUs.





optiMist

EC**

optiMist is an evaporative humidifier and cooler that atomises water into very small droplets which, by evaporating spontaneously, extract heat from the humidified and cooled air. It uses an impeller pump to pressurise the water, atomising it successively through special nozzles.

The sophisticated control system combines the action of an inverter, which controls speed and therefore pump displacement, with that of 2 solenoid valves that activate only the nozzles necessary. This allows the system to always work at the best pressure for atomising the water, within a wide flow rate range.

The cooling effect of the air is due to the spontaneous evaporation of the water droplets: the change of state from liquid to vapour takes place at the expense of the energy in the air, which cools down as a consequence.

optiMist is a complete system, which includes humidification and evaporative cooling in a single solution, and can be used to handle air in an AHU (air handling unit), and to humidify the flow air (direct evaporative cooling) and also for indirect cooling of fresh air, for example with a cross-flow heat recovery unit, so as to increase energy efficiency of the AHU.

System components

- pumping station that pressurises the water (4 to 15 bars): this also contains the electronic controller that completely manages the pumping station, controlling the temperature/humidity in each optiMist section. As it is fitted with an inverter and pressure probe, it can control the flow rate produced moment by moment, thus guaranteeing maximum accuracy and minimum energy and water consumption;
- distribution system: this is made up of stainless steel piping, fittings for

compression joints, atomiser nozzles and drain valves (autonomous mechanical valves or solenoid valves managed by the controller). optiMist can be combined with a distribution system featuring a double modulation circuit, so as to shift the focus between precision temperature or humidity control, or alternatively, combined with two distribution systems, it represents an integrated solution for also managing evaporative cooling (with a single pumping unit, without the need to add electrical panels);

- droplet separator: necessary to prevent condensation in the AHU outside the sections dedicated to humidification or evaporative cooling. The drainage structure simplifies droplet separator maintenance; as the filter modules can be removed from the front, without needing to dismantle the structure.

Hygiene

All CAREL atomisers are designed following the VDI6022 standard guidelines. In particular, for the products that make use of evaporative cooling, the sophisticated electronic system that governs the distribution line drain solenoid valves prevents stagnating water from stopping in the piping; a main danger for the proliferation of bacteria.

Automatic washing is also managed by the distribution lines at the time interval set by the user.

All CAREL atomisers can be used (as further hygienic safety and to reduce maintenance) with dematerialised water. The installation of the optional UV lamp guarantees further cleaning and disinfection of the water entering the atomiser.

Supply water

Following the evaporation process, the mineral salts dissolved in the supply water are in part destined to deposit on the surface of the droplet separator.

The nature and quantity of the mineral salts contained in the water determine the frequency of routine maintenance operations necessary to remove said deposits from inside the AHU.

In order to maintain the hygiene of the installation and to reduce system management costs, CAREL recommends to supply optiMist with demineralised water via reverse osmosis, as envisioned in the main standards such as UNI 8884, which require:

- conductivity <100 $\mu\text{S}/\text{cm}$;
- total hardness <5 $^\circ\text{fH}$ (50 ppm CaCO_3);
- $6.5 < \text{pH} < 8.5$;
- chlorides content <20 mg/l;
- silica content <5 mg/l;

If demineralised water is not available, softened water can be used. In this case, in order to limit aggressiveness, it is recommended to guarantee minimum hardness not lower than 3 $^\circ\text{fH}$. CAREL recommends the use of mains water only if this has hardness lower than 16 $^\circ\text{fH}$ or conductivity lower than 400 $\mu\text{S}/\text{cm}$. The use of mains water will lead to routine maintenance operations (cleaning or replacement of the nozzles and the droplet separator), whose frequency depends on the chemical composition of the water itself.

Accessories and options



Drain valves

(ECKD*)

This is installed in the distribution system drain circuit in order to allow complete emptying. Thanks to these valves, periodic washing cycles can be planned automatically. These are very important for guaranteeing system hygiene. Based on the needs of the application, ECKDSV0000 solenoid valves can be used, controlled electrically by the optiMist cabinet or ECKDMV0000 mechanical valves, which open and close depending on working pressure.



Teflon liquide

(5024612AXX)

Teflon liquide pour raccords hydrauliques haute pression, boîte de 100 ml. On l'utilise pour sceller des buses et tous les raccords des racks et des distributeurs de ventilation pré-assemblés par CAREL.



Drop separator for AHU/certified duct

(UAKDS*, ECDS*)

The droplet separator has the purpose of capturing the droplets of water that have not completely evaporated to prevent them passing beyond the evaporative humidification/cooling section. It is supplied in easy-to-assemble modular panels to cover the cross-section of the AHU.

The pressure drop of the droplet separator is very low, only 30 Pa with air speed of 3.0 m/s. The support structure of the droplet separator is always in stainless steel and guarantees quick and efficient draining of the water. The droplet separator can be supplied with glass fibre or stainless steel modules according to application requirements.



Flexible hose

(ACKT*)

AISI304 stainless steel flexible corrugated hoses for connection of the pumping station to the distribution system. Hoses available up to 10 m long.



Differential pressure switch

DCPD0*0*00

Device for controlling the differential pressure of the air for the droplet separator. The differential pressure switch allows continuous monitoring of the pressure drop on the fans in order to guarantee global energy saving within the AHU.



Active temperature and humidity probes

(DPD*)

Connectivity is guaranteed by the on-board pCO controller, reading up to 4 active duct probes (2 probes for DEC/IEC + 2 limit probes).

optiMist table

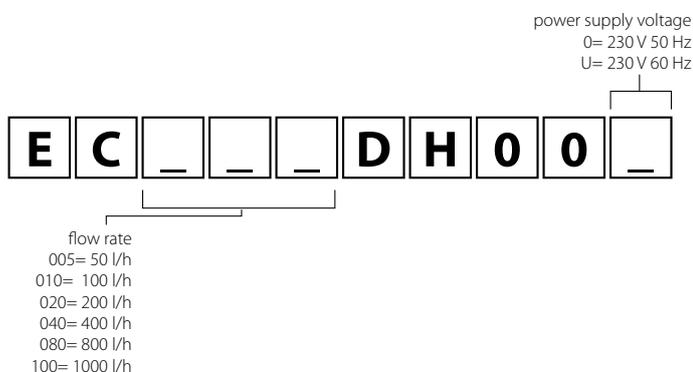
Features	EC005*	EC010*	EC020*	EC040*	EC080*	EC100*
General						
Power supply	EC*0= 230 V, 1 phase, 50 Hz EC*U= 230 V, 1 phase, 60 Hz					
Power consumption	0.375 kW				0.75 kW	
Current	1.6 A	1.6 A	1.7 A	1.7 A	3.0 A	3.2 A
Operating conditions	5 to 40 °C (34 to 104 °F) <80% R.H. non condensing					
Water supply						
maximum flow rate	50	100	200	400	800	1000
pressure	0.2 to 0.7 mPa					
connection:	EC*0= G3/4" f EC*U= NPT 3/4" f					
Water drain						
connection	stainless steel coupling G3/4f ID, OD ~35 mm/ 1.18 inch.					

Dimensions in mm (in) and weights in kg (lb)

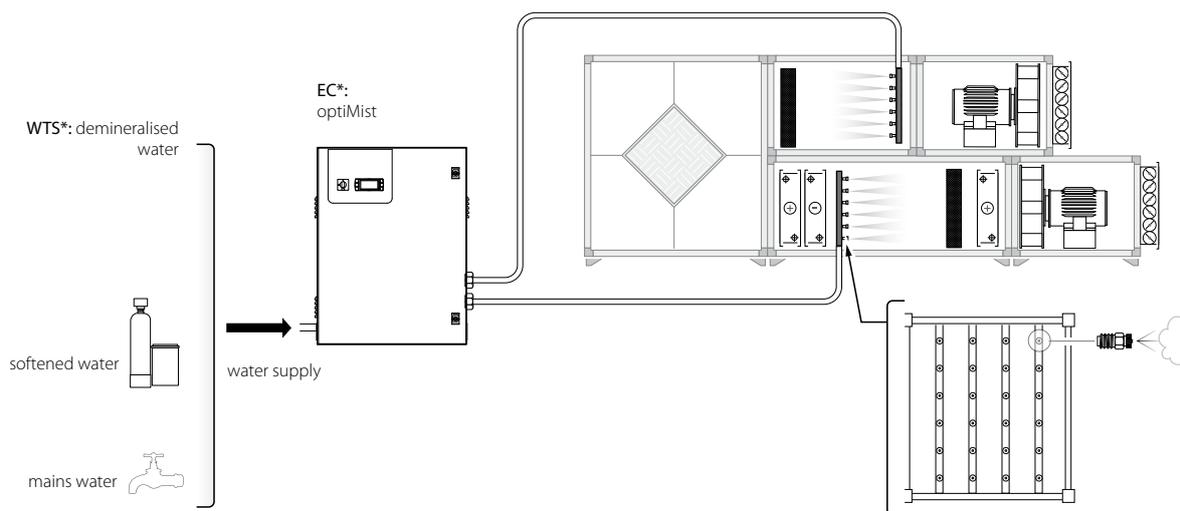


Model	AxBxC	weight	LxWxH	weight
EC005*, EC010*	630x300x800 (24.8x11.82x31.5)	53 (117)	720x410x1020 (28.36x16.14x40.16)	56 (124)
EC020*, EC040*	630x300x800 (24.8x11.82x31.5)	55 (121)	720x410x1020 (28.36x16.14x40.16)	58 (128)
EC080*, EC100*	630x300x800 (24.8x11.82x31.5)	59 (130)	720x410x1020 (28.36x16.14x40.16)	62 (137)

Unit code



OVERVIEW DRAWING optimist





ChillBooster

AC100D*, AC050D*, AC010D*

ChillBooster is made up of a pumping station and a water distribution and atomisation system:

- an electrical panel for ON/OFF control of capacity;
- a pump power supply solenoid valve;
- inlet water pressure switch;
- an impeller pump with incorporated pressure adjustment valve calibrated at 10 bars;
- outlet pressure gauge;
- high temperature protection heating valve;
- drain solenoid valve for unit shutdown;
- modular stainless steel manifolds with 20 mm diameter;
- atomiser nozzles;
- distribution system drain solenoid valves, at line end;
- corrugated steel flexible connection hoses;
- metal compression fittings;
- UV system for cleaning and disinfecting water inside the cabinet (optional).

The pumping station is available in two versions: stainless steel version for demineralised water (recommended), or version for normal water with brass pump.

Supply and top-up water

ChillBooster can operate with untreated drinking water and with demineralised water. If using mains water, following evaporation, the minerals dissolved in the feedwater will be carried by the air stream in the form of very fine dust, and will partly precipitate on the surface of the heat exchanger fins or in the duct. The problem is minimised with the use of demineralised water via reverse osmosis.

Applied to chiller/drycoolers, to limit the formation of deposits on the surface of the coils. Whenever untreated water is used it is recommended to limit the use of ChillBooster only to when necessary and indicatively not over 200 h per year.

ChillBooster for chillers or drycoolers

Chillbooster cools the air before it is used by the unit for cooling the fluid in the coil. Atomisation takes place against the flow so that the droplets follow the longest route possible, in a way to have sufficient time to evaporate. The cooled air is extracted by the fans and therefore the heat exchange of the coil increases considerably! Part of the droplets will wet the coil fins: this water will tend to evaporate thus absorbing heat and contributing to the increase in capacity. Part of the water will fall onto the fins and must be drained.

ChillBooster allows liquid coolers and condensers to deliver rated capacity even in periods with high temperatures, which often coincide with maximum loads, without oversizing the systems.

pRack

pRack manages Chillbooster for air condensers, maximising performance during high summer temperatures and minimising energy consumption.



Components



Valves at the end of the line

Available in two versions:

- M1/2" GAS brass drain valve for emptying the water when the system is inactive;
- solenoid valve powered by the cabinet.



Manifold

AISI304 stainless steel, Ø20 mm manifolds, with threaded holes for nozzles, available with 7 holes (1052 mm), 13 holes (1964 mm) or 19 holes (2876 m).



Quick couplings

Compression fittings for unthreaded Ø20 mm pipes in brass or stainless steel.



Flexible hose

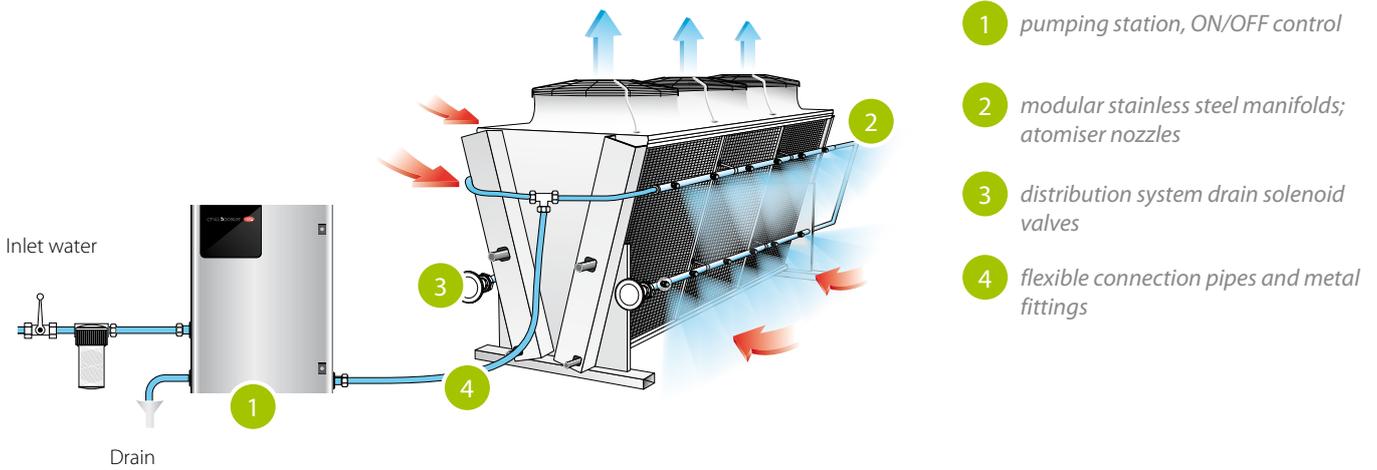
AISI304 stainless steel corrugated flexible hoses.



Nozzles

Nozzles with capacity of 5, 7.5 or 15 kg/h at 10 bars.

Layout example for chiller or drycooler



ChillBooster table

Features	AC010****	AC050D****	AC100D****
Flow rate (kg/h)	100	500	1000
Power consumption (kW)	0,4	0,5	0,6
Temperature	5T40 °C (40-104 °F)		
Heat valve discharge connection	pipe OD 10, ID 5		
Certification	CE		
UV lamp duration (optional)	4000 h		
Protection rating	IP55		
Water supply			
Connection	1/2" G female		
Pressure (min.-max.)	3-8 bars, 0.3-0.8 Mpa, 40-115 Psi		
Water drain			
Connection	1/2" G female		
Electrical features	230 V, 50/60 Hz (depending on the model)		
Output			
Connection	1/2" G female		
Supply water*			
Conductivity	<100 µS/cm		
Total hardness	<5 °fH (50 ppm CaCO3)		

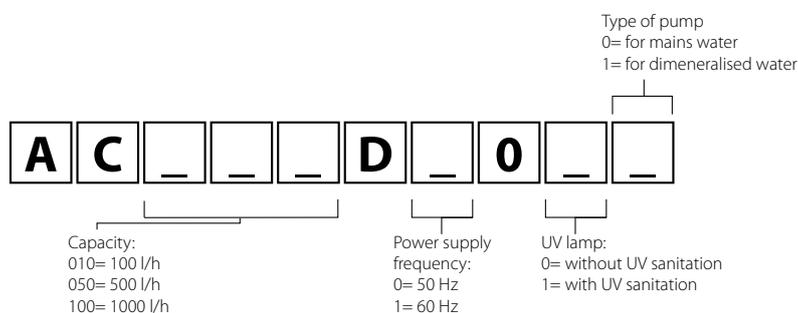
* see "Supply and top-up water"

Dimensions in mm (in) and weights in kg (lb)

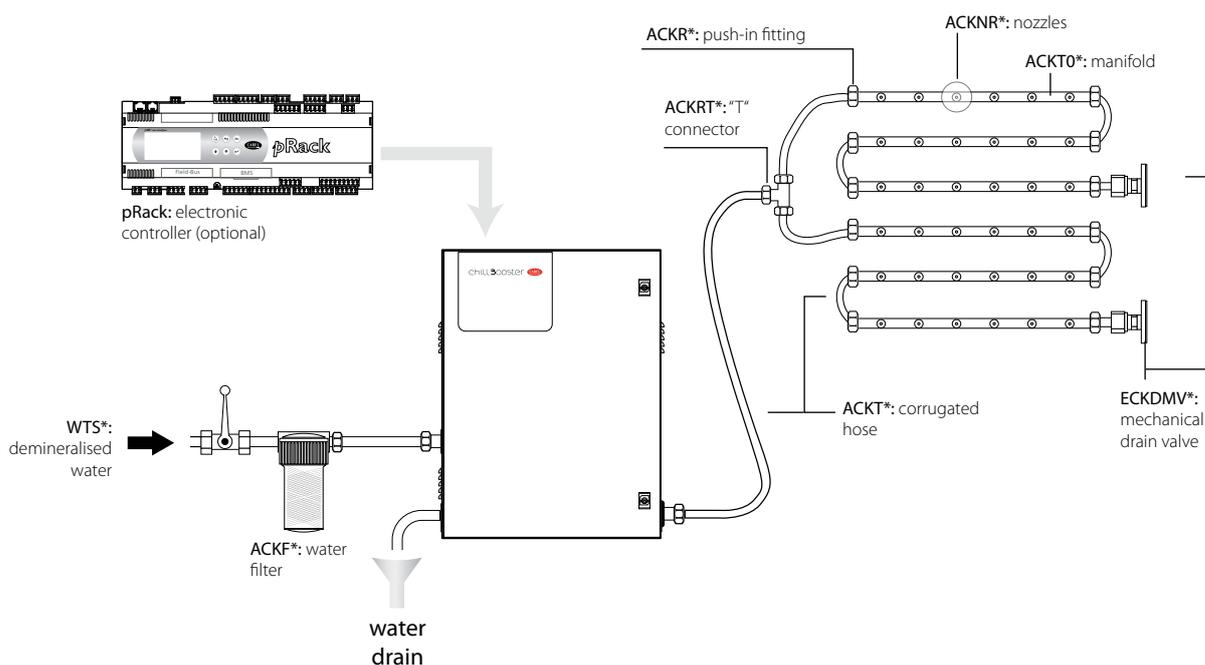


Model	AxBxC	weights	LxWxH	weights
AC*****0**	630x300x800 (24.8x11.82x31.50)	49 (108)	720x410x1020 (28.5x16x40)	52 (115)
AC*****01*	630x300x800 (24.8x11.82x31.50)	53 (115)	720x410x1020 (28.5x16x40)	56 (125)

Unit code



OVERVIEW DRAWING ChillBooster



Water treatment systems





Reverse osmosis water treatment systems (WTS)

The CAREL proposal of complete solutions marks a new step forwards. The new range of reverse osmosis water treatment systems (WTS) is a new and improved product, specifically regarding:

- design;
- rationalised system layout
- flow switches in each circuit
- recirculation setting
- sizing over long-term operation
- dedicated membrane for steel pump and brass pump
- NSF descaler (WTS large only).

What is reverse osmosis?

This is a technique in which the water being purified is pumped at high pressure and forced through a semi-permeable membrane with pores smaller than 0.001 μm in diameter: the majority of the dissolved ions are filtered by the membrane, thus producing relatively pure water. The removal of minerals, measured as a percentage of the original mineral content, may vary from 95% to 99% and even higher. Automatic operation and reduced operating costs make the use of this technique quite extensive, bringing evident advantages.

Why use demineralised water?

In electric heater steam humidifiers, this treatment minimises the buildup of mineral salts and fouling in the boilers, thus extending working life: maintenance

is reduced and there is no more need to shut the unit down for periodical cleaning.

In adiabatic humidifiers, demineralised water prevents the nozzles from being blocked by dirt, the accumulation of mineral salts in air handling units and the dust of mineral salts from being introduced into the humidified environment.

Maintenance costs are reduced and the ventilation systems are more hygienic, as desalinated water contains no bacteria or contaminants.

In the specific case of ultrasonic humidifiers, the elasticity of the transducers will thus not be affected by fouling: CAREL humiSonic components, if used with demineralised water, are guaranteed for a minimum of 10,000 hours' uninterrupted operation!

Limits on maximum conductivity and water hardness are also specified by standards, such as UNI8884, VDI6022, VDI3803 and L8.

Comparison against water softening

Reverse osmosis is a treatment that produces pure water, while water softening is a completely different procedure, which simply replaces the salts that cause fouling, such as calcium and magnesium, with sodium. Reverse osmosis is therefore the best solution for almost every type of application.

In addition, the use of softened water in isothermal humidifiers causes foaming - meaning entrainment of droplets of water - and premature corrosion of the heating elements, thus increasing maintenance costs. In this case too, softening is not recommended.

Benefits

- easy start-up: WTS is pre-calibrated for simple and fast start-up. The automatic "flushing" procedure reduces maintenance;
- integration: the new WTS system guarantees perfect operation with CAREL humidifiers;
- maximum hygiene: WTS provides desalinated water containing no bacteria or contaminants, with the additional safety of the ultraviolet disinfection system.





WTS compact

ROC*

The new CAREL reverse osmosis system, in the Compact version, has been designed for treating the water used to supply humiSonic, freshSonic and heaterSteam humidifiers.

Operating on mains drinking water, the unit generates demineralised water with physical-chemical, flow-rate and pressure characteristics suitable for supplying humidifiers.

The strengths of this product are:

- reliability; unlike many of the systems available on the market, it is fitted with an AC rather than DC pump. This solution avoids overheating, while continuously responding to demand. Safety is guaranteed by pressure switches on the permeate line, and fill solenoid valves that stop the unit in the event of anomalies. All managed by an electronic controller;
- quality and usability: all WTS compact units are calibrated and tested in the factory. The storage tank and all the water connections are already included in the kit;
- simple maintenance: the only routine maintenance operation required is simple replacement of the filters.

System composition

- micrometre safety pre-filtering (removes impurities from the water);
- activates carbon dechlorination system (reduces water hardness and protects the membrane);
- electrical control panel and rotary vane pump;
- TFC reverse osmosis membrane;
- UV disinfection system (optional).

How it works

When powered on, WTS compact produces desalinated water, filling the expansion vessel supplied and keeping pressure in the circuit at around 3 to 3.5 bars. The demand for water from the humidifier is fulfilled by the water contained in the vessel, while the consequent pressure drop in the circuit, measured by a pressure switch, activates a new desalinated water production cycle.

Available in different sizes

WTS compact is available in five sizes, ranging from 12 to 60 l/h. For higher flow-rates, the Large version is required. It can also be supplied in the version without pump, if feedwater pressure is greater than 4 bars.

Certification

WTS compact complies with the following directives:

- Machinery Directive 2006/42/EC;
- Low Voltage Directive 2006/95/EC;
- Electromagnetic Compatibility directive (EMC) 2004/108/EC.

Controller

(ROKL00EP00)



WTS compact comes with an electronic controller that manages all the functions and guarantees intrinsic system safety.

Accessories



Expansion vessel

(ROK00KTVE)

The expansion vessel is fitted with an elastic membrane that keeps the water at a pressure of up to 3-4 bars. Ideal for simple and effective installation.

As well as the first vessel supplied as standard with WTS compact, others can be added in series to increase storage capacity.



UV lamp disinfection system

(MCKSUV0000)

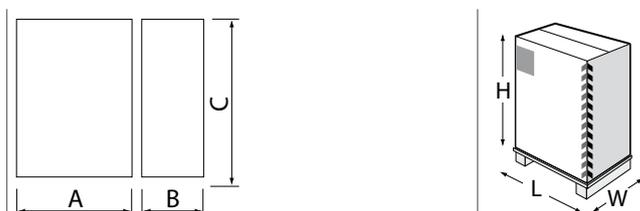
To guarantee maximum hygiene, a UV sanitising lamp CAN BE installed upstream of the humidifier. The lamp shines UV light on the flow of supply water, helping to eliminate any biological contaminants that may be present, such as bacteria, viruses, mould, spores and yeast. Maximum flow-rate 240 l/h.

Feedwater requirements

Conductivity	< 1000 µs/cm
Hardness	≤ 30°f
Turbidity	1 NTU max
SDI (Silt Density Index)	≤ 3
Free chlorine at inlet	≤ 0.2 mg/l
TDS (Total Dissolved Solid)	≤ 750 ppm
Bacterial load	absent

WTS compact specifications

Model	ROC0120000	ROC0200000	ROC025500N	ROC040500N	ROC0605000
Feedwater pressure	3.5 to 8 bars	3.5 to 8 bars	1.5 to 4 bars	1.5 to 4 bars	1.5 to 4 bars
Feedwater temperature	5 to 30 °C	5 to 30°C	5 to 30 °C	5 to 30 °C	5 to 30 °C
Minimum feedwater flow-rate	100 l/h	100 l/h	150 l/h	150 l/h	200 l/h
Room temperature	5 to 40°C	5 to 40 °C			
Operating pressure	≤ 8 bars				
Permeate ± 10% (T=16°C – TDS 250 ppm)	12 l/h	20 l/h	25 l/h	40 l/h	60 l/h
Connections					
Total installed power	-	-	245 W	245 W	245 W
Single-phase power supply	-	-	230 V/50 Hz	230 V/50 Hz	230 V/50 Hz
Power supply connections	G ½"F				
Permeate connection	Ø 10 mm				
Concentrate drain connection	Ø 8 mm				

Dimensions in mm (in) and weights in kg (lbs)

Model	AxBxCxD	weight	LxWxH	weight
ROC0120000	370x120x420 (14.6x4.7x16.5)	7 (15.4)	440x570x330 (17.3x22.4x13)	8 (17.6)
ROC0200000	370x120x470 (14.6x4.7x18.5)	8 (17.6)	440x570x330 (17.3x22.4x13)	9 (19.8)
ROC0255000	420x200x580 (16.5x7.9x22.9)	20 (44.1)	450x590x510 (17.7x23.2x20.1)	21 (46.3)
ROC0405000	420x200x580 (16.5x7.9x22.9)	21 (46.3)	450x590x510 (17.7x23.2x20.1)	22 (48.5)
ROC0605000	600x270x650 (23.6x10.6x25.6)	22 (48.5)	650x700x510 (25.6x27.6x20.08)	23 (50.7)

Unit code

Capacity:
 012= 12 l/h
 020= 20 l/h
 025= 25 l/h
 040= 40 l/h
 060= 60 l/h

power supply
 5= 50 Hz
 6= 60 Hz
 0= without pump

0= first version
 N= new version



capacity 1200 l/h



capacity 320 l/h

WTS large

ROL*

Completing the range of WTS products, CAREL offers the WTS Large, with a capacity from 100 to 1200 l/h.

WTS Large is suitable for higher capacity steam humidifiers, such as gaSteam and heaterSteam, and for the adiabatic humidifier range.

The new WTS large has been designed and developed based on market and user feedback.

New features

- design: without bulky cabinets, the unit has been made suitable for complete integration into industrial environments, as well as to assist access for any type of work on the unit;
- rationalised system layout: all the system components are easily and immediately identifiable directly on the printed diagram in the user manual;
- flow switches on each circuit: together with the valves, these ensure a very fast calibration time;
- recirculation setting: keeping a high recovery value avoids excess water consumption;
- long-term operation: rated data guaranteed for at least two years' operation;
- dedicated membrane for steel pump and brass pump: conductivity limits respected without diluting with mains water, avoiding contamination of the permeate;
- NSF descaler: together with the standard descaler, an NSF version is also available for applications that require food safety certification.

Descaler and metering pump assembly

The reverse osmosis system frame houses the descaler tank, metered into the water (1:40) to prevent scale build-up on the membrane. The metering pump delivers the right quantity based on the flow-rate of treated water. The dosage is settable using a knob on the metering pump control panel.

Maintenance

Routine maintenance involves:

- replacement of the CBC activated carbon cartridge (every 4 months or every 2 months if the amount of free chlorine in the water supply exceeds 0.1 ppm);
- replacement of the micron filter (around every 4 months or when the pressure read by the pressure gauge downstream of the filters is lower than 1 bar);
- periodically filling the descaler tank; this is also signalled directly by the electronic controller via a warning message;
- replacement of the membranes need to be replaced at the end of their working life, in other words, when they no longer guarantee the required flow-rate or conductivity;
- replacement of the UV lamp at the end of its working life, generally once a year, or after around 10,000 operating hours.

Accessories



Expansion vessel

(AUC*)

The expansion vessel is fitted with an elastic membrane that keeps the water at a pressure of up to 3-4 bars. Ideal for simple and effective installation.



Storage vessel with pump

(RT300M2000)

Able to pressurise water to a height of up to 30 m. Ideal for applications with complex layouts that require high performance.



Antiscalant descaler liquid

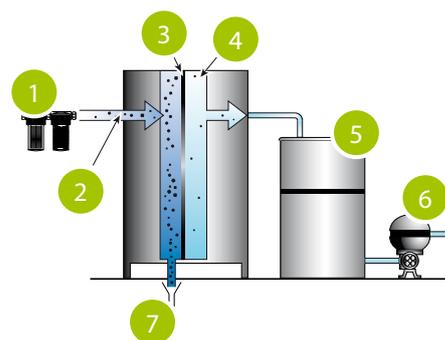
(ROKLO0AS00)

25 kg pack of descaler liquid to prevent build-up of calcium and magnesium on the membrane. Available in two versions: classic or NSF certified, to ensure greater safety in hygiene/food applications.

Feedwater requirements

Feedwater pressure	1.5 - 4 bars
Operating pressure	≤ 12 bars
Permeate outlet pressure	≤ 3 bar
Feedwater temperature	5 - 35 °C
Conductivity	< 1000 µs/cm
Turbidity	< 1 NTU
Iron	< 0.15 ppm
SDI (Silt Density Index)	< 3
Free chlorine	< 0.2 ppm
TDS (Total Dissolved Solid)	< 750 ppm
Water hardness TH	< 500 ppm CaCO ₃ eq (<50°F) (< 28°dH)
SiO ₂	< 15 ppm
TOC (Total Organic Carbon)	< 3 mg/l
CODE (Chemical Oxygen Demand)	< 10 mg/l

Installation example

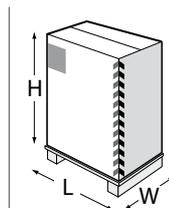
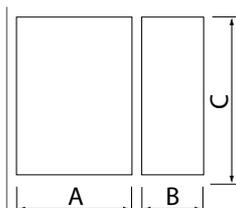


- 1 pre-treatment (microfiltration and activated carbon filters)
- 2 mains water inlet (water + mineral salts)
- 3 membrane
- 4 demineralised water
- 5 storage tank
- 6 generic points of use
- 7 drain water (concentrated mineral salts)

WTS large specifications

Features	ROL100*U0*	ROL320*U0*	ROL460*U0*	ROL600*U0*	ROL1K0*U0*	ROL1K2*U0*
Demineralised water production (l/h)	160	320	460	600	1000	1200
Drain (l/h)	70	150	460	600	470	570
Recirculation (l/h)	70	150	460	650	450	450
Installed power (W)	600		1600			
Power supply	230 V, 50 Hz single-phase or 230 V, 60 Hz single-phase					
Water connections						
Inlet	3/4" G F		1" G F			
Outlet	1/2" G F		3/4" G F			

Dimensions in mm (in) and weights in kg (lb)



Model	AxBxCxD	weight	LxWxH	weight
ROL100*U0*	850x500x1650 (33.5x19.7x64)	160 (352)	1260x670x1900 (49.6x26.4x74.8)	180 (396)
ROL320*U0*	850x500x1650 (33.5x19.7x64)	160 (352)	1260x670x1900 (49.6x26.4x74.8)	180 (396)
ROL460*U0*	1080x695x1545 (42.5x27.4x60.8)	200 (440)	1300x760x1800 (51.2x29.9x70.9)	220 (485)
ROL600*U0*	1080x695x1545 (42.5x27.4x60.8)	200 (440)	1300x760x1800 (51.2x29.9x70.9)	220 (485)
ROL1K0*U0*	1100x700x1600 (43.3x27.6x63)	200 (440)	1300x760x1800 (51.2x29.9x70.9)	220 (485)

Unit code

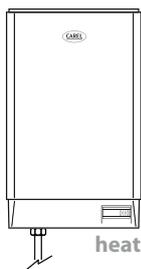


Capacity:
 100= 160 l/h
 320= 320 l/h
 460= 460 l/h
 600= 600 l/h
 1K0= 1000 l/h
 1K2= 1200 l/h

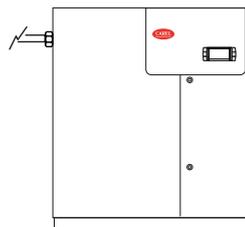
power supply
 5= 50 Hz
 6= 60 Hz

0= very high filtration
 B= high filtration

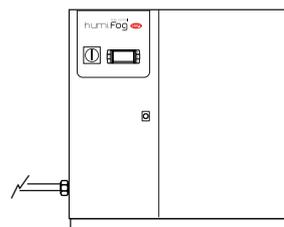
OVERVIEW DRAWING WTS



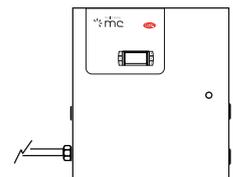
heaterSteam



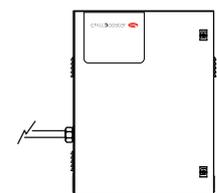
gaSteam



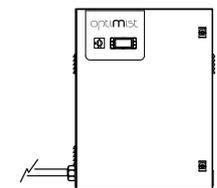
humiFog



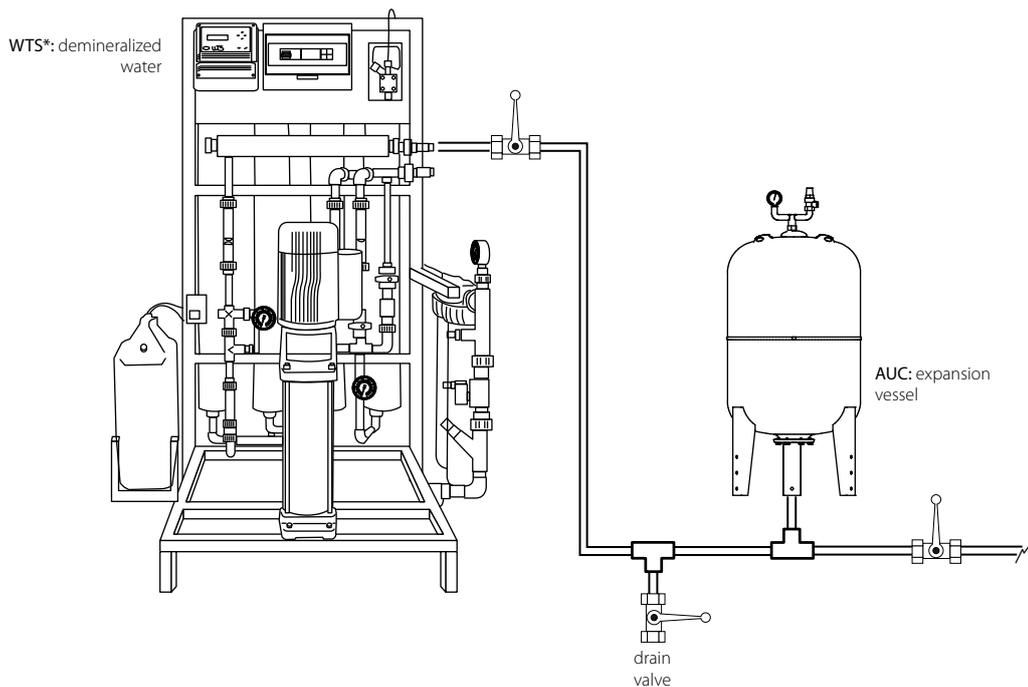
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chillbooster



optiMist



Sensors and protection devices





Sensors and protection devices

CAREL offers increasingly advanced and complete global solutions.

For this reason, CAREL has designed an entire range of probes that respond to the needs of HVAC/R installers and manufacturers, as well as for the control of CAREL's own line of humidifiers.

The range envisions temperature and humidity sensors with different uses, housed in sockets, ducted, residential or industrial environment, pressure transducers, smoke, fire and flood detectors, air quality probes, gas leak detectors for refrigerant units, guaranteeing performance and compatibility with all CAREL controllers.

The range has been enhanced with the most innovative technological solutions, offering new international standards at increasingly competitive prices.

Advantages

CAREL probes, as well as being characterised by the acknowledged performance that sets them apart, are very versatile and can satisfy various market requirements.

In fact, all the probes have been especially designed to be compatible not only with all CAREL controllers, but also with the most commonly used standards worldwide.

The temperature and humidity probes, offering a great choice between active and passive technology, are available in different operating ranges.

The pressure transducers are available in a ratiometric version, 0 to 5 V and 4 to 20 mA, also in a sealed version (to be installed without capillary directly onto the piping) offering improved performance in terms of precision.

The air quality sensors offer a new and important accessory to installers and manufacturers of AHUs, absolutely in line with CAREL quality.

The smoke/fire and flood detectors are small devices with auto-calibration function, thus adapting to different environmental conditions without losing activation accuracy.

For the detection of CFCs, HFCs and CO₂ gas refrigerants, CAREL offers a range of sensors designed to satisfy requirements in the industrial refrigeration and air-conditioning for supermarkets, shopping centres, and other public places.





Temperature, humidity and temperature/humidity probes.

DPW*: for installation in the room
DPD*: for installation in the duct

This probes are particularly suitable for civil and commercial environments where particular attention is paid to design. They are used in heating and air conditioning systems that use ducts. The range also envisions models with RS485 connection with CAREL and Modbus® protocol.

Technical specifications

Power supply: 12/24 Vac -10/15%
9 to 30 Vdc ±10%

Operating conditions:

- DPW*: -10T60 °C, <100% R.H. non cond.;
- DPD*: -10T60 °C, -20T70, <100% R.H. non cond.

Protection rating:

- DPW*: IP30;
- DPD*: IP55, IP40 sensor.

Assembly:

- DPW*: wall-mounted;
- DPD*: duct;

Number of I/Os:

- **analogue outputs:** -0.5 to 1 V, 0 to 1 V, 0 to 10 V, 4 to 20 mA

Serial Ports: RS485 (specific model)

Dimensions:

- DPW*: 127x80x30 mm;
- DPD*: 98x105x336 mm.

Connections: screw terminal board for cables up to 1.5 mm²



Active temperature/humidity probes

DPP*: for industrial environment

Specifically designed to measure high levels of humidity with great accuracy. The range also envisions models with RS485 connection with CAREL and Modbus® protocol.

Technical specifications

Power supply: 12/24 Vac -10/15%,
9 to 30 Vdc ±10%

Operating conditions: -10T60 °C, -20T70,
<100% R.H. non cond.

Protection rating:

- IP55 (container);
- IP54 (sensor).

Assembly: wall-mounted

Number of I/Os:

- **analogue outputs:** -0.5 to 1 V, 0 to 1 V, 0 to 10 V, 4 to 20 mA

Serial Ports: RS485 (specific model)

Dimensions: 98x170x44

Connections: screw terminal board for cables up to 1.5 mm²



Active immersion temperature probes

ASIT*: immersion

The ASIT* immersion probes are used in cases where it is necessary to measure the temperature inside cooling and heating circuits. They are particularly adaptable where the sensitive element must be in direct contact with the fluid being controlled.

Technical specifications

Power supply: 12/24 Vac -10/15%,
9...30 Vdc ±10%

Operating conditions: -10T70 °C, <100%
R.H. non cond.

Protection rating:

- IP55 (container);
- IP67 (sensor).

Assembly: direct or with housing

Number of I/Os:

- **analogue outputs:** -0.5 to 1 V, 4 to 20 mA

Dimensions: 94x102x176

Connections: screw terminal board for cables up to 1.5 mm²



Active universal temperature probes

ASET*: universal

The universal temperature probes are used for many applications; in particular the ASET03* version has an electronic amplifier, protected by a container with IP55 protection rating, which allows remote control up to 200 m with 4 to 20 mA output.

Technical specifications

Power supply: 12/24 Vac -10/15%,
9...30 Vdc $\pm 10\%$

Operating conditions: -30T90 °C or 30T150 °C, <100% R.H. non cond.

Protection rating:

- IP55 (container);
- IP67 (sensor).

Assembly: directly in socket

Number of I/Os:

- **analogue outputs:** -0.5 to 1 V, 4 to 20 mA

Dimensions: 94x102x176

Connections: screw terminal board for cables up to 1.5 mm²



Outdoor probes

DPU*: outdoor

CAREL outdoor electronic sensors are used with heat pump controllers to offset the water temperature set point based on the outside temperature and to manage climate zones, and with air handling units to measure the outside temperature. Built to withstand the most extreme climatic conditions, these are available in two versions:

- temperature sensor: -50 to 90 °C,
- temperature and humidity sensor: -35 to 80 °C.

Technical specifications

Power supply: 24 Vac $\pm 20\%$ or 15 to 36 Vdc ($\pm 10\%$)

Operating conditions:

- temperature version: -50T90 °C;
- temp. & humidity version: -35T80 °C

Protection rating: IP55 (EN60529)

Assembly: wall-mounted

Number of I/Os:

- **analogue outputs:** 4 to 20 mA

Dimensions:

- temperature ver.: 72x64x39.5 mm;
- temp. & humidity ver.: 108x70x73.5 mm

Connections: two-pin screw terminal for cables from 0.14 to 1.5 mm²



VOC, CO₂, CO₂+VOC air quality probes

DPWQ*: for installation in the room

DPPQ*: for installation in the duct

These analyse the quality of the air and are ideal for air ventilation and handling systems in domestic and commercial areas.

Main functions:

- measurement of air quality;
- quantitative analysis of contamination by parts of polluting gases;
- setting of a sensitivity threshold depending on that envisioned;
- for the ventilation of rooms only when necessary, contributing to a large energy saving.

Technical specifications

Power supply: 24 Vac/dc $\pm 10\%$, 50/60 Hz

Operating conditions: 0T50 °C, 10/90% R.H. non cond.

Protection rating:

- IP55 (container);
- IP67 (sensor)

Assembly:

- DPWQ: wall-mounted;
- DPPQ: duct

Number of I/Os:

- **analogue outputs:** 0 to 10 V, 4 to 20 mA

Dimensions:

- DPWQ*: 95x97x30 mm; 79x81x26 mm;
- DPPQ*: 108x70x262.5 mm; 64x72x228.4 mm.

Connections: screw terminal board for cables up to 1.5 mm²



Refrigerant gas leak detector

DPWL*

The refrigerant gas detection sensor is a device that indicates leaks of the most common gases (R22, R134a, R290, R404a, R407c, R407F, R410a, R507a, CO₂ and NH₃). It can be used in stand-alone applications, integrated with Carel controllers or with third party devices. It envisions connection with the CAREL controller via the analogue, digital output or via RS485 Modbus® serial connection. When a leak above a certain concentration is detected, the sensor informs the controller of the alarm and locally activates an audible and visual signal and a relay (SPDT) at the same time. It offers the advantage of intervening immediately on gas leaks, thus preventing unit standstill and guaranteeing the safety of persons in the vicinity. Its installation ensures compliance with the European F-GAS and EN378 and ASHRAE 15 standards.

Technical specifications

Power supply: 12 to 24 Vac/Vdc ±20% 50/60 Hz

Operating conditions:

- semicond. ver. -20T50°C;
- infrared ver. -40T50°C 80% R.H. non condensing.

Protection rating:

- semicond. ver. IP41;
- infrared ver. IP66.

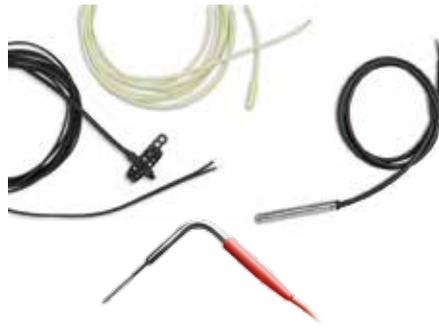
Assembly: wall-mounted

Number of I/Os:

- **analogue outputs:** configurable 0 to 5 V, 1 to 5 V, 0 to 10 V, 2 to 10 V, 4 to 20 mA;
- **digital outputs:** 1 amp at 24 Vac/Vdc.

Serial Ports: RS485 Modbus®

Connections: disconnectable clamps, 0.5 mm² cable cross-section



Temperature probes with NTC thermistor

NTC*HP*, NTC*WP*, NTC*WH*, NTC*WF*, NTC*HF and NTC*HT, NTCINF*, NTC*PS*

CAREL offers a range of sensors with different features for the various controllers, suitable for different applications mainly in the HVAC/R market sector.

The accuracy obtained thanks to the technical solutions used in developing the sensor, the reliability as a result of the tests to which they are subjected, mean that CAREL NTC probes are reliable transducers for measuring temperature at a low cost.

Probes for socket assembly are available in strips for installation on piping for pass-through with or without pre-heater, to measure the core temperature of the product, and a sensor for estimating product temperature.

Technical specifications

Operating conditions: -50T105 °C

Protection rating: IP67 and IP68

Assembly: depending on the model

Dimensions: depending on the model



Immersion probes

TSN* and TSC*= NTC version

TST* and TSM*= Pt1000 version

TSOPZ= accessories (connectors, fittings, housing...)

CAREL offers a range of TS* series immersion probes in NTC and Pt1000 models, suitable exclusively for hydronic applications.

Quick installation, fast response of the sensor an excellent price/performance ratio are features on which this product range is based.

Connectors are available with cables, fittings and the socket as accessories.

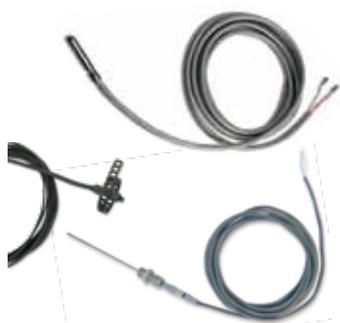
Technical specifications

Operating conditions: -40T90 °C, -40T120 °C

Assembly: on piping

Dimensions:

- TSN* and TSC*: 1/8" GAS x 5 mm
- TST* and TSM: M14 x23 mm with 2 m cable



Temperature probes with PTC, Pt100, Pt1000 sensor

PTC*

The PTC temperature probes represent a possible solution for both cooling and heating applications, used to measure temperature within the operating range, -50T100 °C and 0T150 °C.

PT100*

The PT100 probes represent the ideal solution for all applications in which it is necessary to measure temperatures within the range from -50 to 400 °C (depending on the models).

PT1*HP*, PT1*WP*, PT1*WF*, PT1*HF*, PT1*HT*; PT1*PS; TSQ*

The Pt1000 probes (PT1* and TSQ*) are suitable for all those applications in which it is necessary to measure temperatures in a range from -50 to 250 °C (TSQ*) and from -50 to 105 °C (PT1*), maintaining accuracy also over long distances..

Probes for socket assembly are available in strips for installation on piping for pass-through with or without pre-heater, to measure the core temperature of the product, and a sensor for estimating product temperature.

Technical specifications

Operating conditions: -50T105 °C, -50T250 °C, -50T350 °C

Protection rating: IP65 and IP67

Dimensions: depending on the model



Pressure transducers 4 to 20 mA series C and D

SPKT*C*, SPK1*, SPK2*, SPK3*, SPKT*D*

The pressure transducers supply an analogue current signal (4 to 20 mA). They are used particularly in refrigeration and air conditioning to measure pressure in cooling circuits, but their high performance allows their use in almost all other applications. Compatible with all types of refrigerant. They are available with male and female connection for the C series and only female for the D series.

Technical specifications

Power supply: 8 to 28 Vdc ±20%

Operating conditions:

- -25T80 °C (male);
- -40T135 °C (female).

Protection rating: IP65 (IP67 with built-in connector)

Number of I/Os:

- **analogue outputs:** 4 to 20 mA

Dimensions: depending on the model

Connections: Packard



Ratiometric pressure transducers 0 to 5 V series S

SPKT*S*

The Carel 5 V ratiometric pressure transducers (Sealing) have been developed to be used in commercial refrigeration and air conditioning applications. They are completely hermetic and can be installed directly in contact with the piping, in conditions with the refrigerant fluid lower than the dew point (it is not necessary to use the capillary positioned between piping and sensor). Available with female connection only

Technical specifications

Power supply: 5 Vdc

Operating conditions: -40T125 °C

Protection rating: IP67

Number of I/Os:

- **analogue outputs:** 0.5 to 4.5 V

Dimensions: Ø21x51 mm

Connections: Packard



Ratiometric pressure transducers 0 to 5 V series P

SPKT*P*

These pressure transducers supply a 0 to 5 V ratiometric signal (automotive standard). They can be used in air conditioning and refrigeration systems, with exception to those containing ammonia. The exceptional stability of the output signal and higher degree of EMC/EMI immunity make this an excellent transducer to meet the most severe industrial requirements. Available with female fitting.

Technical specifications

- Power supply:** 4.5 to 5.5 Vdc
- Operating conditions:** -40T135 °C
- Protection rating:** IP65
- Number of I/Os:**
 - **analogue outputs:** 0.5 to 4.5 V
- Dimensions:** 20x51.6 mm
- Connections:** Packard



Differential pressure transducers

SPKD*

The differential pressure transducers use a ceramic sensor that supplies a voltage or current signal that is calibrated and compensated by temperature. They are particularly suitable for measuring low pressure values in air conditioning systems, laboratories and clean rooms (non-corrosive air and gas)

- The main features are:
- compact construction;
 - easy and simple installation;
 - model can be configured for 4 different pressure ranges.

Technical specifications

- Power supply:** 15 to 36 Vdc
- Operating conditions:** 0T50 °C
- Protection rating:** IP65
- Assembly:** panel
- Number of I/Os:**
 - **analogue outputs:** 4 to 20 mA
- Dimensions:** 70x108x73.5 mm
- Connections:** screw terminal board for cables up to 1.5 mm²



Differential pressure switch

DCPD0*0*00

Device used to control the differential pressure of the air for filters, fans, air ducts, air-conditioning and ventilation units. The pressure switch is particularly suitable for control and safety in air-conditioning systems for indicating fan shutdown and clogging of the filters. It is applied in environments with non-aggressive and non-flammable air and gases, also in the version with assembly kit.



Anti-freeze thermostat

DCTF000320

This manages heat exchanger (evaporation coils) and electric heater protection for air conditioning and refrigeration systems. It can be used in all applications where it is necessary to control the temperature in a certain point of the system in order to prevent it dropping below a pre-established safety value. Moreover, the thermostat offers self-protection if the sensitive element should breakdown.



Airflow switch

DCFL000100

Flow switch for controlling air or non-aggressive gas flow inside the distribution ducts for air conditioning and air handling units. It signals the lack of or excessive decrease in flow rate in the duct, thus activating the switch.



Flood detector

FLOE*

The flood sensor device can detect the presence of water in an environment. It is usually used for the protection against the flooding of datacentres, offices, laboratories, special rooms. It is made up of a detector (normally positioned on the electric control board) and a sensor (positioned on the point to be controlled).

When the water comes into contact with the sensor, the detector immediately signals an alarm, switching over relay status.



Smoke and fire detector

SFF*

The smoke and heat detectors are electronic devices that can quickly detect dangerous and sudden temperature changes or the increase in fumes. Their peculiarity lies in the self-calibration, i.e. the possibility to maintain the guarantee of activation over time, adapting perfectly to the different environmental conditions, without losing sensitivity.



Combined light and movement sensors

DPWAE08000, DPWAI08000

The DPWA series light and occupancy sensors for indoor and outdoor use are devices that measure brightness and detect occupancy in order to identify ambient environmental conditions.

They are installed where movement needs to be measured in order to control the functions of the environment, for example, detecting movement so as to lower the ambient temperature when the spaces are not occupied.

The light sensor measures brightness, and is used to control luminaires, lighting systems, blinds and awnings, etc., as well as to monitor light conditions in workplaces, glasshouses, stores, workshops, corridors, outside areas, industrial environments, offices homes and businesses, ensuring constant control of the lighting system based on natural light, while the photocell or twilight sensor function and awning control prevents needless heating of the controlled spaces.

Active temperature and humidity probes

Models	temper. range	temper. range	output
Active probes for rooms, power supply 9 to 30 Vdc/12 to 24 Vac			
DPWT010000	-10T60 °C		selectable 0 to 1 V/-0.5 to 1 Vdc/4 to 20 mA
DPWT011000	-10T60 °C		NTC 10 K at 25 °C
DPWC111000	-10T60 °C	10 to 90% R.H.	• NTC 10 K at 25 °C (temperature) • selectable 0 to 1 V/-0.5 to 1 Vdc/4 to 20 mA (humidity)
DPWC110000	-10T60 °C	10 to 90% R.H.	selectable 0 to 1 V/-0.5 to 1 Vdc/4 to 20 mA
DPWC115000	-10T60 °C	10 to 90% R.H.	• NTC 10 K at 25 °C (temperature) • 0 to 10 Vdc (humidity)
DPWC112000	-10T60 °C	10 to 90% R.H.	0 to 10 Vdc
DPWC114000	-10T60 °C	10 to 90% R.H.	opto-isolated RS485 serial
DPWT014000	-10T60 °C		opto-isolated RS485 serial
Active probes for industrial environments, power supply 9 to 30 Vdc/12 to 24 Vac			
DPPT010000	-20T70 °C		selectable 0 to 1 V/-0.5 to 1 Vdc/4 to 20 mA
DPPT011000	-20T70 °C		NTC 10 K at 25 °C
DPPC111000	-10T60 °C	10 to 90% R.H.	• NTC 10 K at 25 °C (temperature) • selectable 0 to 1 V/-0.5 to 1 Vdc/4 to 20 mA (humidity)
DPPC110000	-10T60 °C	10 to 90% R.H.	selectable 0 to 1 V/-0.5 to 1 Vdc/4 to 20 mA
DPPC210000	-20T70 °C	0 to 100% R.H.	selectable 0 to 1 V/-0.5 to 1 Vdc/4 to 20 mA
DPPC112000	-10T60 °C	10 to 90% R.H.	0 to 10 Vdc
DPPC212000	-20T70 °C	0 to 100% R.H.	0 to 10 Vdc
DPPT014000	-10T60 °C	10 to 90% R.H.	opto-isolated RS485 serial
DPPC114000	-10T60 °C	10 to 90% R.H.	opto-isolated RS485 serial
DPPC214000	-20T70 °C	0 to 100% R.H.	opto-isolated RS485 serial
Active probes for ducts, power supply 9 to 30 Vdc/12 to 24 Vac			
DPDT010000	-20T70 °C		selectable 0 to 1 V/-0.5 to 1 Vdc/4 to 20 mA
DPDT011000	-20T70 °C		NTC 10 K at 25 °C
DPDC111000	-10T60 °C	10 to 90% R.H.	• NTC 10 K at 25 °C (temperature) • selectable 0 to 1 V/-0.5 to 1 Vdc/4 to 20 mA (humidity)
DPDC110000	-10T60 °C	10 to 90% R.H.	selectable 0 to 1 V/-0.5 to 1 Vdc/4 to 20 mA
DPDC210000	-20T70 °C	0 to 100% R.H.	selectable 0 to 1 V/-0.5 to 1 Vdc/4 to 20 mA
DPDC112000	-10T60 °C	10 to 90% R.H.	0 to 10 Vdc
DPDC212000	-20T70 °C	0 to 100% R.H.	0 to 10 Vdc
DPDT014000	-20T70 °C		opto-isolated RS485 serial
DPDC114000	-10T60 °C	10 to 90% R.H.	opto-isolated RS485 serial
DPDC214000	-20T70 °C	0 to 100% R.H.	opto-isolated RS485 serial
DPUT011000	-50T90 °C		NTC 10 K at 25 °C
DPUC110000	-35T80 °C	0 to 90% R.H.	NTC 10 K at 25 °C and 4 to 20 mA umidity
Compact probe			
DPRC11A000	-10T60 °C	10 to 90% RH	0.5 - 4.5 output, 5 V power supply, 1 mm cable
DPRC13A000	-10T60 °C	10 to 90% RH	0.5 - 4.5 output, 5 V power supply, 3 mm cable

Container protection rating:	IP55 for DPD, DPP IP30 for DPW	for duct and technical environment) (wall-mounted)
Sensitive element protection rating	IP30 IP40 IP54	for DPW for DPD for DPP
Time constant, temperature	in still air in ventilated air (3 m/s)	300 s 60 s
Time constant, humidity	in still air in ventilated air (3 m/s)	60 s 20 s

Models	temperature range	output
Active probes for immersion and power supply environment 9 to 30 Vdc/12 to 24 Vac		
ASIT030000	-30T90 °C	selectable -0.5 to 1 Vdc/4 to 20 mA
Active probes for universal power supply use 9 to 30 Vdc/12 to 24 Vac		
ASET030000	-30T90 °C	selectable -0.5 to 1 Vdc/4 to 20 mA
ASET030001	-30T90 °C	selectable -0.5 to 1 Vdc/4 to 20 mA
ASET030002	-30T150 °C	selectable -0.5 to 1 Vdc/4 to 20 mA

Passive temperature probes

Models	range	accuracy	constants (time) in fluid	IP
NTC*				
NTCI*HP**	-50T105 °C	25 °C: ±1%	25 s	IP67
NTCI*WF**	-50T105 °C	25 °C: ±1%	10 s	IP67
NTCI*WH**	-50T105 °C	25 °C: ±1%	30 s	IP68 permanent
NT*WG**	-50T105 °C	25 °C: ±1%	20 s	IP67
NT*HT**	0T150 °C	±0.5 °C; -10T50 °C - 25 °C: ±1.0 °C; -50T85 °C ±1.6 °C; +85T120 °C - ±2.1 °C; +120T150 °C	30 s	IP55
NT*HF**	-50T90 °C	±0.5...25 °C; ±1.0 °C from -50T90 °C	50 s	IP55
NT*WH*	-50T105 °C	25 °C; ±1%	30 s	IP68 permanent
NT**WS*	-40T105 °C	25 °C; ±1%	50 s	IP67
NTC*PS*	-50T105 °C	25 °C: ±1%	50 m	IP67
NTCINF	-50T110 °C	25 °C: ±1%	45 s	IP67
TSN*	-40T120 °C	25 °C: ±1%	30 s	IP68
TSC*	-40T90 °C	25 °C: ±1%	45 s	IP68
PT100*				
PT100000A1	-50T250 °C	IEC 751 class B	20 s	IP65
PT100000A2	-50T400 °C	IEC 751 class B	20 s	IP65
PT1000				
PT1*HP*	-50T105 °C	IEC 751 class B	10 s	IP67
PT1*WF*	-50T105 °C	IEC 751 class B	15 s	IP67
PT1*WP*	-50T105 °C	IEC 751 class B	25 s	IP68 limited
PT1*HF*	-50T105 °C	IEC 751 class B	15 s	IP67
PT1*HT*	-50T250 °C	IEC 751 class B	20 s	IP67
PT1*PS*	-50T105 °C	IEC 751 class B	50 m	IP67
TSQ15MAB00	-50T250 °C	IEC 751 class B	10 s	IP65
TST*	-40T120 °C	IEC 751 class B	10 s	IP68
TSM*	-40T90 °C	IEC 751 class B	10 s	IP68
PTC				
PTC0*0000	0T150 °C	±2 °C; 0T50 °C - ±3 °C; -50T90 °C - ±4 °C; 90T120 °C	15 s	IP65
PTC0*W*	-50T100 °C	±2 °C; 0T50 °C - ±3 °C; -50T90 °C - ±4 °C; 90T120 °C	15 s	IP67
PTC03000*1	-50T120 °C	±2 °C; 0T50 °C - ±3 °C; -50T90 °C - ±4 °C; 90T120 °C	15 s	IP67

Air quality probes

Models	type	output
For rooms, 24 Vac/15 to 36 Vdc		
DPWQ306000	V.O.C.	0 to 10 Vdc or 4 to 20 mA
DPWQ402000	CO2	0 to 10 Vdc
DPWQ502000	V.O.C. and CO2	0 to 10 Vdc
For ducts, 24 Vac/15 to 36 Vdc		
DPDQ306000	V.O.C.	0 to 10 Vdc or 4 to 20 mA
DPDQ402000	CO2	0 to 10 Vdc
DPDQ502000	V.O.C. and CO2	0 to 10 Vdc

Pressure transducers

Models	power supply:	operating temperature	range	accuracy	output signal	constants (time)	IP
SPKT00-P0: 0 to 5 V ratiometric - female series P							
53	4.5 to 5.5 Vdc	-40T135 °C	4.2 relative bar	±1,2%	0.5 to 4.5 V	10 ms	IP65 ¹
13	4.5 to 5.5 Vdc	-40T135 °C	9.3 relative bar	±1,2%	0.5 to 4.5 V	10 ms	IP65 ¹
33	4.5 to 5.5 Vdc	-40T135 °C	34.5 relative bar	±1,2%	0.5 to 4.5 V	10 ms	IP65 ¹
43	4.5 to 5.5 Vdc	-40T135 °C	17.3 relative bar	±1,2%	0.5 to 4.5 V	10 ms	IP65 ¹
B6	4.5 to 5.5 Vdc	-40T135 °C	45.0 relative bar	±1,2%	0.5 to 4.5 V	10 ms	IP65 ¹
F3	0.5 to 5.5 Vdc	-40T135 °C	20 relative bar	±1,2%	0.5 to 4.5 V	10 ms	IP65 ¹
E3	0.5 to 5.5 Vdc	-40T135 °C	12.8 relative bar	±1,2%	0.5 to 4.5 V	10 ms	IP65 ¹
SPK*: 4 to 20 mA - male series C							
*1000000	8 to 28 Vdc	-25T80 °C	-0.5 to 7 bar	±1% fs	4 to 20 mA	-	IP67
*240000	8 to 28 Vdc	-25T80 °C	-1 to 24 bar	±1% fs	4 to 20 mA	-	IP67
*2500000	8 to 28 Vdc	-25T80 °C	0 to 25 bar	±1% fs	4 to 20 mA	-	IP67
*3000000	8 to 28 Vdc	-25T80 °C	0 to 30 bar	±1% fs	4 to 20 mA	-	IP67
SPK*C*: 4 to 20 mA - female series C							
*T0021C0	8 to 28 Vdc	-40T135 °C	-0.5 to 7 bar	±1% fs; 0T50 °C	4 to 20 mA	<10 ms	IP65 ¹
*T0011C0	8 to 28 Vdc	-40T135 °C	0 to 10 bar	±1% fs; 0T50 °C	4 to 20 mA	<10 ms	IP65 ¹
*T0031C0	8 to 28 Vdc	-40T135 °C	0 to 30 bar	±1% fs; 0T50 °C	4 to 20 mA	<10 ms	IP65 ¹
*T0041C0	8 to 28 Vdc	-40T135 °C	0 to 18.2 bar	±1% fs; 0T50 °C	4 to 20 mA	<10 ms	IP65 ¹
*T00B1C0	8 to 28 Vdc	-40T135 °C	0 to 44.8 bar	±1% fs; 0T50 °C	4 to 20 mA	<10 ms	IP65 ¹
*T00G1C0	8 to 28 Vdc	-40T135 °C	0 to 60 bar	±1% fs; 0T50 °C	4 to 20 mA	<10 ms	IP65 ¹
*T00D8C0	8 to 28 Vdc	-40T100 °C	0 to 150 bar	±1% fs; 0T50 °C	4 to 20 mA	<10 ms	IP65 ¹
*T00M8C0	8 to 28 Vdc	-40T100 °C	0 to 120 bar	±1% fs; 0T50 °C	4 to 20 mA	<10 ms	IP65 ¹
SPK*: 4 to 20 mA - female series D							
*T0021D0	8 to 28 Vdc	-40T135 °C	-0.5 to 7 bar	±1% fs; 0T40 °C	4 to 20 mA	<10 ms	IP65
*T0011D0	8 to 28 Vdc	-40T135 °C	0 to 10 bar	±1% fs; 0T40 °C	4 to 20 mA	<10 ms	IP65
*T0041D0	8 to 28 Vdc	-40T135 °C	0 to 18.2 bar	±1% fs; 0T40 °C	4 to 20 mA	<10 ms	IP65
*T0031D0	8 to 28 Vdc	-40T135 °C	0 to 30 bar	±1% fs; 0T40 °C	4 to 20 mA	<10 ms	IP65
*T00B1D0	8 to 28 Vdc	-40T135 °C	0 to 44.8 bar	±1% fs; 0T40 °C	4 to 20 mA	<10 ms	IP65
*T00G1D0	8 to 28 Vdc	-40T135 °C	0 to 60 bar	±1% fs; 0T40 °C	4 to 20 mA	<10 ms	IP65
SPK*: 0 to 5 V - female series S							
*T0051S0	0.5 to 4.5 Vdc	-40T125 °C	-1 to 4.2 bar	±1% fs; 0T50 °C	0.5 to 4.5 V	<10 ms	IP67
*T0011S0	0.5 to 4.5 Vdc	-40T125 °C	-1 to 9.3 bar	±1% fs; 0T50 °C	0.5 to 4.5 V	<10 ms	IP67
*T00E1S0	0.5 to 4.5 Vdc	-40T125 °C	-1 to 12.8 bar	±1% fs; 0T50 °C	0.5 to 4.5 V	<10 ms	IP67
*T0041S0	0.5 to 4.5 Vdc	-40T125 °C	0 to 17.3 bar	±1% fs; 0T50 °C	0.5 to 4.5 V	<10 ms	IP67
*T00F1S0	0.5 to 4.5 Vdc	-40T125 °C	0 to 20.7 bar	±1% fs; 0T50 °C	0.5 to 4.5 V	<10 ms	IP67
*T0031S0	0.5 to 4.5 Vdc	-40T125 °C	0 to 34.5 bar	±1% fs; 0T50 °C	0.5 to 4.5 V	<10 ms	IP67
*T00B1S0	0.5 to 4.5 Vdc	-40T125 °C	0 to 45 bar	±1% fs; 0T50 °C	0.5 to 4.5 V	<10 ms	IP67
*T00G1S0	0.5 to 4.5 Vdc	-40T125 °C	0 to 60 bar	±1% fs; 0T50 °C	0.5 to 4.5 V	<10 ms	IP67
*T00L1S0	0.5 to 4.5 Vdc	-40T125 °C	0 to 90 bar	±1% fs; 0T50 °C	0.5 to 4.5 V	<10 ms	IP67
SPK*D0*: 4 to 20 mA - male series D							
*10000D0	8 to 28 Vac	-25T80 °C	-0.5 to 7 bar	±1% fs	4 to 20 mA	-	IP67
*24000D0	8 to 28 Vac	-25T80 °C	-1 to 24 bar	±1% fs	4 to 20 mA	-	IP67
*30000D0	8 to 28 Vac	-25T80 °C	0 to 30 bar	±1% fs	4 to 20 mA	-	IP67

¹ with built-in IP67 connector

Differential air pressure transducers

Models	power supply:	input current	differential pressure range	differential pressure accuracy full scale	output signal	filtered signal	IP
SPKD00C5N0	15 to 30 Vdc	≥20 mA	-50 to 50 Pa -100 to 100 Pa 0 to 50 Pa 0 to 100 Pa	±3%	4 to 20 mA	selectable 1 or 10 s	IP65
SPKTD00U5N0	15 to 30 Vdc	≥20 mA	0 to 1000 Pa 0 to 2000 Pa 0 to 3000 Pa 0 to 5000 Pa	±3%	4 to 20 mA	selectable 1 or 10 s	IP65

Pressure switches and flow switches

Operating conditions	sensor	range	accuracy	maximum current	output signal	contacts	IP
DCPD0*0100: pressure switch for duct							
-25/85 °C max 50 mbar	silicone membrane	0.5 to 5 mbar	0.2 ± 15% mbar	1.5 (A) 25 Vac 0.1 A 24 Vac	NO...NC voltage-free contact	AgCdO contacts watertight switch	IP54
DCPD0*1100: pressure switch for duct							
-20/85 °C max 50 mbar	silicone membrane	0.2 to 2 mbar	0.2 ± 15% mbar	1.5 (A) 25 Vac 0.1 A 24 Vac	NO...NC voltage-free contact	AgCdO contacts watertight switch	IP54
DCFL000100: flow switches							
-40/85 °C	silicone membrane	2.5 to 9.2 m/s (start) 1 to 8 m/s (stop)		15 (8) A 24/250 Vac	NO...NC voltage-free contact	watertight switch	IP65

*: "1" with assembly kit



Wireless devices for monitoring temperature, humidity, light and energy

The CAREL rTM monitoring system, is used to monitor temperature, humidity, light intensity and pulse counters from energy meter modules, in combination with CAREL supervisory systems or programmable controllers with special software.

Benefits

Ideal for retrofits on existing systems, being easy to install:

- no electrical connections required;
- flexible layout in the event of structural modifications;
- simple installation and maintenance;
- existing controllers do not need to be replaced, as the system is completely independent and can be integrated into any installation;
- simplifies monitoring of the installation (including over remote connections). In the event of alarms, operating status can be notified via SMS, email, FAX;
- supervisory systems can be used to process and send customised reports and data log files;

Composition

- Battery or mains powered sensors for measuring the temperature of cabinets and cold rooms (°C). Available in versions with built-in sensors (BP) and external sensors (EP);
- Battery powered sensors for measuring temperature, humidity, light intensity in

rooms, type SA (°C - RH%) or SI (°C - r.H.% - Lux).

- Pulse counter from energy meter modules for monitoring electricity, water and gas consumption, battery powered (CI) or mains powered (RC).
- RA (Router-Actuator) I/O module, to measure the status of the inputs and activate general loads. Can be configured as a thermostat with direct/reverse logic.
- RB (Router-Bridge) to connect instruments locally over Modbus® RS485 that are not accessible to cabled lines.

The devices use a 2.4 GHz wireless connection (16 channels, 2405 to 2480 MHz) with ZigBee communication protocol and MESH networks with up to 7 hops, automatic adaptation of communication between devices, optimising wireless communication routes when the devices are not directly reachable from the Access Point, so as to guarantee continuous communication. Battery or mains powered sensors. The battery powered sensors require no electrical connection and typical battery life is 5/8 years; mains powered devices require no routine maintenance. All wireless sensors send the data measured to the Access Point via radio; this acquires information from the sensors and then forwards it to the CAREL supervisory system or controller, over the Modbus® RTU RS485 serial network.

The system can be easily extended and modified following installation. Handheld configuration devices are available for simple configuration and installation.

To increase wireless coverage, Routers are available that extend the area of transmission. These devices are available as Router only, RO, or combined with other functions:

- EP1 Router-Sensor (same functions as the EP sensor);
- RB Router-Bridge type (to extend the RS485 wired network);
- RA Router-Actuator, to manage I/Os via a remote connection or used as a local thermostat monitored via the wireless network.





BP - temperature sensor

WS01U01M0*

Sensor suitable for installation in refrigeration cabinets. The local button disables the high temperature signal alarm when the cabinet is off or being cleaned. The sensor is ready to be installed directly inside the cabinet with its own fastening bracket. The rear wall has metal shielding that, combined with thermal insulation inside the shell, offers better heat insulation, eliminating the influence of the surface of the refrigerated cabinet.

Functions implemented

- instant temperature;
- product simulation temperature;
- monitoring of temperature thresholds for high temperature (HACCP) or low temperature alarm signals (to prevent products from freezing);
- disable high temperature alarm from local "Clean" button;
- battery level control in mV and residual charge in mAh;
- wireless signal level control.

Technical specifications

Power supply: 3.6 V lithium battery 2500 mAh, "AA" size

Operating conditions: -40T50 °C 80% r.H. non-condensing

Degree of protection: IP65

Assembly: wall-mounted on bracket

Dimensions: 83.9x71.6x34 mm



EP - temperature sensor

WS01W02M00

The EP sensor (External Probe) is used inside cabinets or cold rooms to monitor temperature in combination with supervisory systems. It transmits temperature data measured by the two NTC probes, and the status of two digital inputs, configurable as "door status" and "defrost status" or for generic use.

Functions implemented

- instant temperature read by the two sensors;
- monitoring of temperature thresholds for high temperature (HACCP) or low temperature alarm signals;
- battery level control in mV;
- wireless signal level control;

Technical specifications

Power supply: 3.6 V lithium battery 2500 mAh, "AA" size

Operating conditions: 0T50°C 80% r.H. non-condensing

Degree of protection: IP55

Assembly: wall-mounted

Number of I/Os:

- **analogue inputs:** 2 NTC 10 K at 25°C
- **digital inputs:** 2 (voltage-free contact)

Dimensions: 94x102x40 mm

Connections: plug-in terminals, wire size 0.5 mm²



SA - room temperature and humidity sensor

WS01G01M00

The SA wireless room sensor is battery-powered and is installed inside rooms to monitor temperature and humidity.

Functions implemented

- instant temperature;
- instant humidity;
- monitoring of temperature and humidity thresholds;
- battery level control in mV;
- wireless signal level control.

Technical specifications

Power supply: 3.6 V lithium battery 2500 mAh, "AA" size

Operating conditions: -10T60°C 80% r.H. non-condensing

Degree of protection: IP30

Assembly: wall-mounted

Dimensions: 127x80x30 mm



SI - temperature, humidity and light sensor

WS01F01M00

The SI wireless industrial sensor is battery-powered and is installed inside rooms to monitor temperature, humidity and light intensity.

Functions implemented

- instant temperature;
- instant humidity;
- instant light intensity;
- monitoring of temperature, humidity and light intensity thresholds;
- battery level control in mV;
- wireless signal level control.

Technical specifications

Power supply: 3.6 V lithium battery 2500 mAh, "AA" size

Operating conditions: -20T70°C 80% r.H. non-condensing

Degree of protection: IP55 case, IP40 sensor cap

Assembly: wall-mounted

Dimensions: 94x153x40 mm



CI - pulse counter

WS01E02M00

The CI battery-powered wireless pulse counter is a device used together with energy meters to measure electricity, gas, or water consumption, without the need to install electrical cables.

It can manage two energy meters using two digital inputs, and is ready for connection of two external NTC temperature probes. Closing of the contacts on the digital inputs activates two separate pulse counters.

The number of pulses is converted to an energy value (KW, m³) by the CAREL supervisor or controller with special software, so as to total and monitor energy utility consumption. It can manage up to two energy meters configured to send pulse signals.

Functions implemented

- two separate pulse counters;
- battery level control in mV;
- wireless signal level control;
- instant temperature read by two NTC probes;
- temperature difference between NTC probes.

Technical specifications

Power supply: 3.6 V lithium battery 2500 mAh, "AA" size

Operating conditions: 0T50°C 80% r.H. non-condensing

Degree of protection: IP55

Assembly: wall-mounted

Number of I/Os:

- **analogue inputs:** 2 NTC 10 K at 25°C;
- **digital inputs:** 2 (voltage-free contact)

Dimensions: 94x108x40 mm

Connections: plug-in terminals, wire size 0.5 mm²



Access Point

WS01AB2M20

This device acquires data via the wireless signals sent by the sensors or Routers over the ZigBee™ network, and then forwards these over a Modbus® RTU RS485 serial line. A CAREL supervisor (PlantVisorPRO or PlantWatchPRO) or controller can be used to manage the rTM system variables. Up to 30 sensors can be bound to each Access Point, and a maximum of 60 when adding one or more Routers. Up to 7 Access Points can be connected to the same Modbus RS485 serial network, for a total of 111 sensors on each serial line.

Technical specifications

Power supply: 12/24 Vac/Vdc ±10%;

Operating conditions: 0T50°C 80% r.H. non-condensing

Degree of protection: IP55

Assembly: wall-mounted

Serial ports: RS485 Modbus®

Dimensions: 94x300x40 mm

Connections: plug-in terminals, wire size 0.5 mm²



RO - router

WS01RC1M20

This device is used when the distance between sensor and Access Point exceeds 30 m, or alternatively the number of network nodes (sensors) exceeds a total of 30. A maximum of 60 Routers can be installed in the wireless network, 48 of which can be accessed by the supervisor. The Access Point automatically assigns the serial address in the order in which these are "bound" (from 200 to 247).

Technical specifications

Power supply: 230 Vac -20/+10 %;

Operating conditions: 0T50 °C 80% r.H. non-condensing

Degree of protection: IP55

Assembly: wall-mounted

Dimensions: 98x300x44 mm

Connections: plug-in terminals, wire size 0.5 mm²



RB - router bridge

WS01RB2M20

This device is used to connect Modbus® RS485 instruments via radio when these are not accessible using cabled lines, using a wireless connection to send data from the instruments to the supervisor.

The instruments are connected locally on the serial line, which acquires data and forwards them to the Access Point.

The Access Point is physically connected to the supervisor, and the instruments connected locally to the Router-Bridge devices are logically assigned to the main network (where the Access Point is physically connected).

This is an excellent solution for all refrigeration and air-conditioning applications and others with similar needs.

The device is a solution for binding all wired devices that require wireless communicate.

It also includes the Router function.

Technical specifications

Power supply: 12/24 Vac/Vdc ±10%;

Operating conditions: 0T50 °C 80% r.H. non-condensing

Degree of protection: IP55

Assembly: wall-mounted

Serial ports: RS485 Modbus®

Dimensions: 94x300x40 mm

Connections: plug-in terminals, wire size 0.5 mm²



EP1 - router sensor

WS01VB2M10

This integrates the same functions as the EP battery-powered sensor and the RO Router, and features two network addresses (one for the sensor and one for the router).

Functions implemented

- instant temperature read by the two sensors;
- monitoring of temperature thresholds for high temperature (HACCP) or low temperature alarm signals;
- wireless signal level control;

Technical specifications

Power supply: 12/24 Vac/Vdc ±10%;

Operating conditions: 0T50 °C 80% r.H. non-condensing

Degree of protection: IP55

Assembly: wall-mounted

Number of I/Os:

- **analogue inputs:** 2 NTC 10 K at 25°C;
- **digital inputs:** 2 (voltage-free contact)

Dimensions: 94x300x40 mm

Connections: plug-in terminals, wire size 0.5 mm²



RC - router/pulse counter

WS01N02M20

This integrates the same functions as the CI pulse counter and the RO Router, and features two network addresses (one for the pulse counter and one for the router).

Functions implemented

- management of two separate pulse counters;
- wireless signal level control;
- instant temperature measurement by two NTC probes;
- temperature difference between NTC probes.

Technical specifications

Power supply: 12/24 Vac/Vdc $\pm 10\%$;

Operating conditions: 0T50 °C 80% r.H. non-condensing

Degree of protection: IP55

Assembly: wall-mounted

Number of I/Os:

- **analogue inputs:** 2 NTC 10 K at 25°C;
- **digital inputs:** 2 (voltage-free contact)

Dimensions: 94x300x40 mm

Connections: plug-in terminals, wire size 0.5 mm²



RA - router actuator

WS01H02M20

This module can be configured as a wireless I/O actuator for managing loads and reading generic inputs. It can be configured as a thermostat with heat-cool operating logic. When used as an I/O module, the outputs are managed directly by Modbus variables (via CAREL supervisor or controller with special software). When used as a thermostat, it sends the I/O status to the supervisor for monitoring. It also integrates the Router function and features two network addresses (one for the I/O module - thermostat and one for the router).

Configured as an I/O module it manages:

- 2 digital inputs;
- 2 digital outputs, 1 A/24 Vac;
- 1 analogue inputs (NTC 10 K at 25°C)

Functions implemented

- management of remote loads, reading analogue and digital inputs;
- activation of digital outputs from digital input;
- thermostat management (heat – cool);
- wireless signal level control;

Technical specifications

Power supply: 12/24 Vac/Vdc $\pm 10\%$;

Operating conditions: 0T50 °C 80% r.H. non-condensing

Degree of protection: IP55

Assembly: wall-mounted

Number of I/Os:

- **analogue inputs:** 1 NTC 10 K at 25°C
- **digital inputs:** 2 (voltage-free contact)
- **digital outputs:** 2 (1 A, 24 Vac)

Dimensions: 118x300x40 mm

Connections: plug-in terminals, wire size 0.5 mm²



Handheld configuration device

WS01L01M00

The rTM handheld is a useful device for installation, commissioning and service of CAREL ZigBee™ wireless networks for the rTM system.

Functions implemented

- reading of wireless channels occupied, performed before wireless system installation (in the field);
- measurement of wireless signal intensity from Access Point or Router;
- simplified opening and closing of the wireless network during commissioning;
- reset default parameters on Access Point and Router;
- assign serial address (ID) to the BP Sensor.

Technical specifications

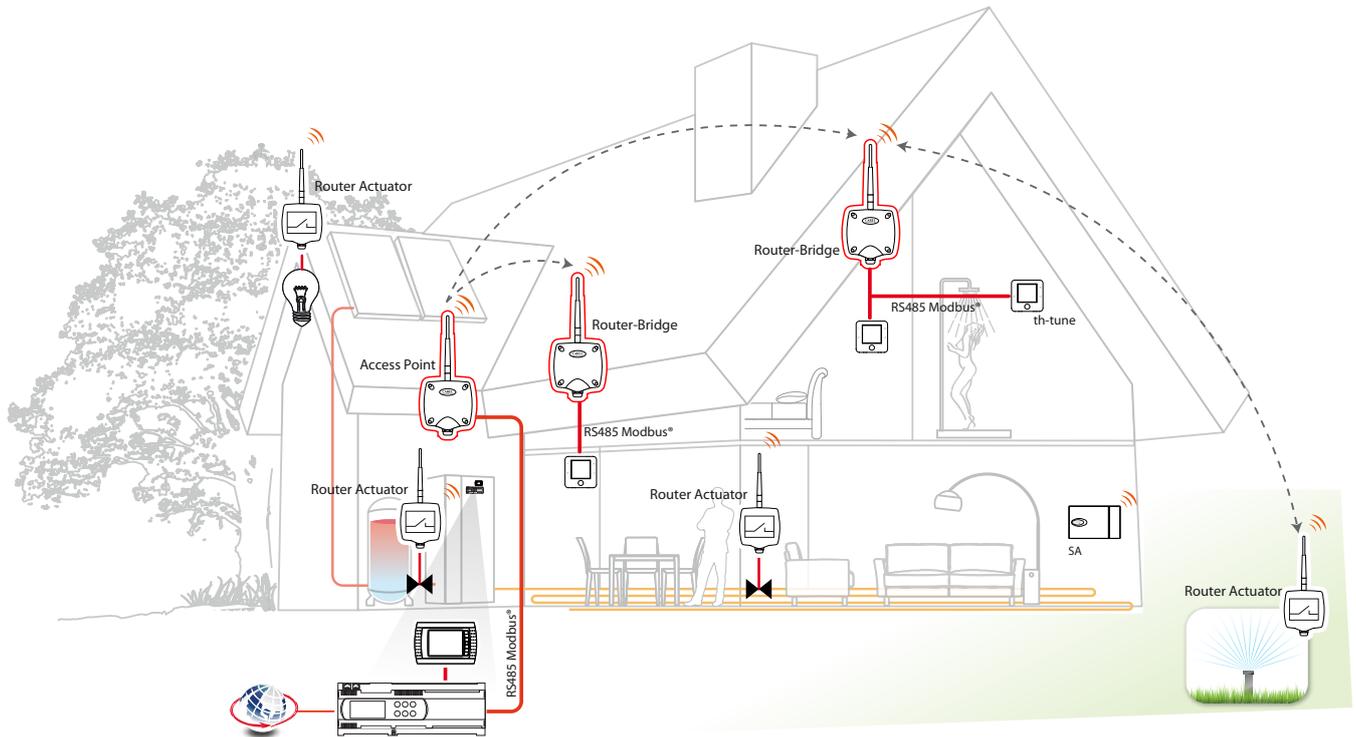
Power supply: 1.5V "AAA" size batteries

Operating conditions: 0T50 °C 80% r.H. non-condensing

Degree of protection: IP40

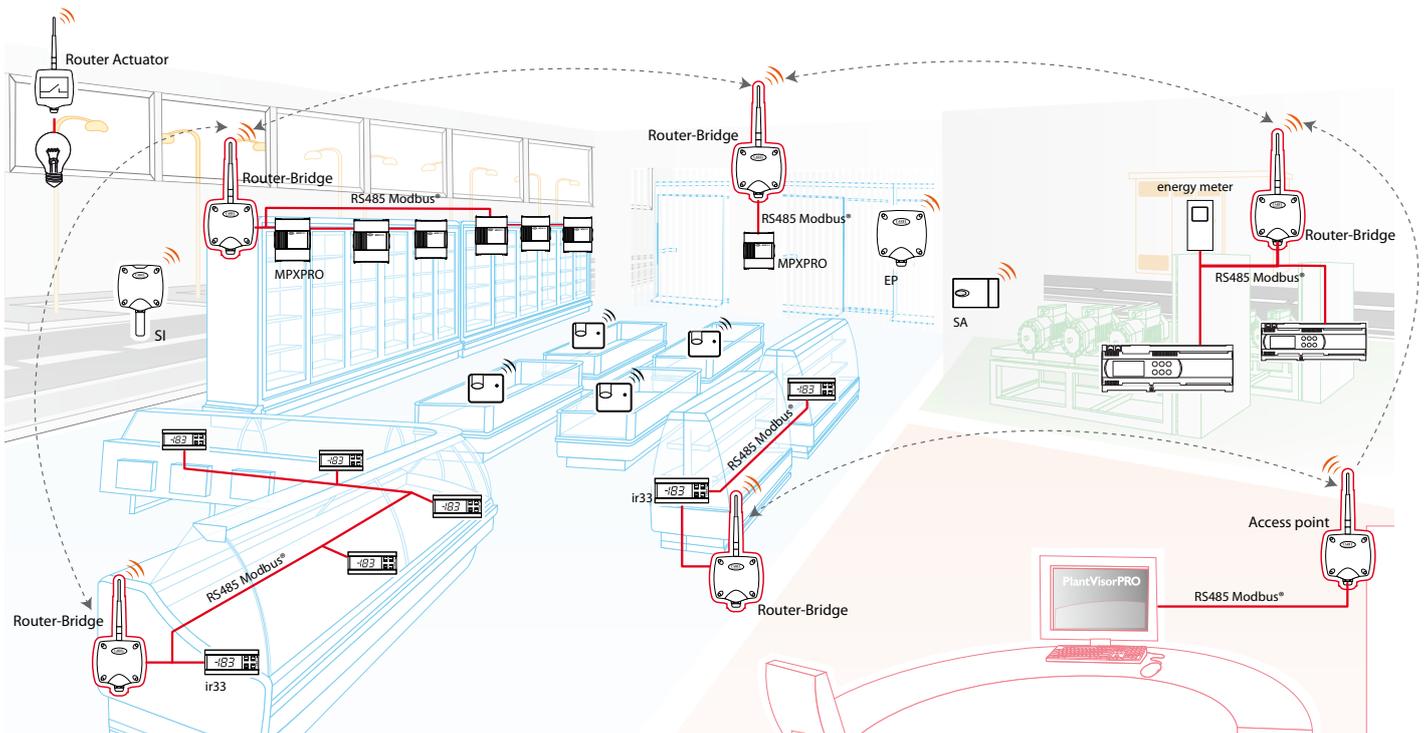
Dimensions: 72,5x167,5x28 mm

Air-conditioning application example



solution to be implemented in the application program

Retail application example



solution to be evaluated according to the number of devices installed



Remote management and communication solutions



System monitoring and supervision solutions

The use of a global monitoring and supervision system is always more essential, due to the necessity to manage alarms quicker and more efficiently and to optimise the routine and special maintenance of systems.

In addition, standards in force and the trend towards energy saving make these systems a key to success and differentiation.

CAREL fulfils these needs by offering field devices fitted with RS485 and/or Ethernet interface for connection to local and centralised supervisor systems.

Depending on the various types of system and requirements, CAREL offers:

- PlantWatchPRO: compact embedded solution for small refrigeration and air conditioning systems up to a maximum of 50 devices.
- boss: embedded solution for medium and large systems up to a maximum of 300 devices.
- RemotePRO: software solution for centralised server in order to manage the system installed quicker and in an optimised manner.

Advantages

The CAREL supervision systems use modern WEB technology, making remote access always much quicker and more secure at the same time.

The data is memorised inside a database, thus guaranteeing integrity and reliability of the information.

The embedded plug&play solution and the software made to measure for the user, greatly reduce installation and configuration times in the system.

The user-friendliness, the complete control of the systems, the sophisticated configuration for the notification of alarms and the tools for analysis are all features that make CAREL supervision a winning solution.

Certification

EN12830

boss and PlantWatchPRO are compliant, as required by EC regulation 37/2005 of 12 January 2005, with standard EN 12380 on temperature recorders for the transport, storage and distribution of refrigerated, frozen and deep-frozen food and ice cream.

Underwriters Laboratories®

boss and PlantWatchPRO are compliant with UL standards for product certification on the North American market.





boss

BMHST*

boss is the new CAREL local supervisor for medium-sized / large systems.

The extensive configurability, the possibility to customise maps, the introduction of new protocols, in particular BACnet™, and the possibility of communicating with devices via Ethernet mean boss is also suitable for HVAC applications.

boss can also be used together with other BMS systems in large buildings that manage functions that are not the main features of boss (alarm management, fire safety,...); in these cases, boss can be used specifically for the HVAC part, providing specific data that creates added value for the end customer, and then sharing with the main BMS only the information needed to understand system status.

For the first time ever on a CAREL supervisor, boss introduces the BACnet™ protocol, the leading protocol in HVAC supervision applications. This new feature significantly increases the possibility to integrate third party devices. The BACnet™

Master protocol is available in both MS/TP (RS485) and TCP/IP modes, and together with the Modbus® RS485 and Modbus® TCP/IP protocols, these too available on boss, offers the possibility to interact with the widest range of devices in the HVAC/R sector.

The built-in Wi-Fi is used to create a private network and allow the supervisor to be accessed from the user's mobile device, without requiring other network infrastructure.



PlantWatchPRO

PWPRO*

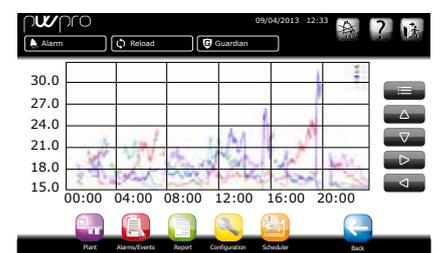
PlantWatchPRO now comes with a new design that offers the best response to the needs of applications in medium-small installations. Its hardware performance, together with a new 65,000-colour display, ensures users a new and powerful tool for system monitoring and management. Both compact and versatile, this new version helps installers, maintenance personnel and facility managers control and optimise refrigeration and air-conditioning systems.



Login page



Main page



Graph



remotePRO

RVSTD*

The remote supervisory system allows one single interface to be used to analyse and compare the data acquired from the local supervisors on each system.

Whatever your application, CAREL remote is a secure and reliable tool for controlling sites in different locations.

All local supervisors offered by CAREL can be connected to the remote supervisor: PlantVisorPRO, PlantWatchPRO, pCOWEB; via LAN connection or modem.

Maintenance

Centralised control of all systems to reduce site running costs and guarantee the safety and security demanded by the customer. Centralised alarm notification and comparative analysis between systems.



tERA

tERA is new CAREL cloud server platform for centralised site monitoring and management.

Connectivity to the system is simple and immediate, using wireless transmission: the system can collect all the data from the site via GPRS, using a channel that is independent of site infrastructure. Users can, at any time and wherever they are, access all site information using any device available: desktop PC, tablet or smartphone.

Reports, graphs and alarms provide a rapid overview of unit status, allowing users to make the necessary changes to improve operation, either over the same remote connection, or planning specific service on site.



Terminals

PGDT*, PGD1*, AT*

CAREL offers a vast range of terminals that respond precisely to customer needs:

- pGD Touch is the new range of touchscreen displays that make navigating the screens simple and intuitive for the user;
- pGD1, the basic model in the pCO sistema family of "terminals", designed with a graphic LCD to offer versatility and customisation, while ensuring a high aesthetic standard;
- th-Tune, the room terminal that allows users to control room temperature and humidity in residential or light commercial environments.



Energy meters

MT*

These are instruments used to measure the main electrical parameters and consumption of connected loads. They record consumption data and allow complete and detailed analysis, meaning the operator can:

- identify when and where consumption takes place;
- identify incorrect behaviour and use;
- diagnose faults and abnormal consumption;
- assess the effects of energy saving actions to be adopted.

Record the main values:

- active power;
- reactive power;
- current measurement;
- phase sequence;
- $\cos \varphi$;
- frequency.

Closed and openable current transformers are available for the three-phase version. The openable version offers the advantage of allowing installation without needing to disconnect the power supply, avoiding system shutdown.

