



climate
humidity control



cleanrooms
humidity and AHU control
solutions

Energy control for air handling units in cleanrooms

Relative humidity is one of the fundamental ambient parameters used to define the normal operating conditions of a cleanroom, and often the limits in tolerance are very restricted (in some applications, even just 1%).

- precise humidification, maximising energy saving and hygiene
- integrated AHU control solutions
- simple and fast access to all the information on the AHU using tERA

Precise humidity control

Precise control of relative humidity is required influences the main factors that affect the performance of cleanrooms:

- risk of electrostatic discharges;
- proliferation of biological contaminants;
- speed of chemical reactions;
- swings in the properties of photoresist;
- increase in capillary forces;
- personal comfort.

CAREL: specialists in humidification control

For more than thirty years CAREL has been designing and manufacturing electronic control systems for air-conditioning and humidification applications.

This specialisation, together with the extensive experience acquired, makes CAREL the ideal partner for high-tech and industries and laboratories, where reliability and precision humidity control are essential.

The integrated solution

Air handling unit applications feature a very wide variety of system types, with differing degrees of specificity. For cleanrooms too, CAREL can supply solutions for all installations, whatever their complexity: modular programmable controllers, humidifiers and a wide range of accessories to meet the increasing need for integration, up to complete system supervision solutions to ensure reliability, precision and maximum energy saving. The system approach is combined with hardware architecture and software flexibility, starting from the standard AHU application that is completely customisable using 1 tool.



Electrostatic charges

To limit electrostatic discharges that are harmful to electronic components, relative humidity should be kept above 30%.



Bacteria & biological contaminants

Controlling and keeping relative humidity between 40% and 60% minimises the proliferation of bacteria and other biological contaminants (viruses, fungi, mould, mites).



Chemical reactions

Close humidity control means greater control over processes. The speed of many chemical reactions, including the corrosion processes, depends on the relative humidity.

Example system diagram

CAREL can supply the most suitable type of humidifier for the installation, together with a complete control system to optimise energy costs.



pCO5plus

pGD touch



Temperature and humidity probes



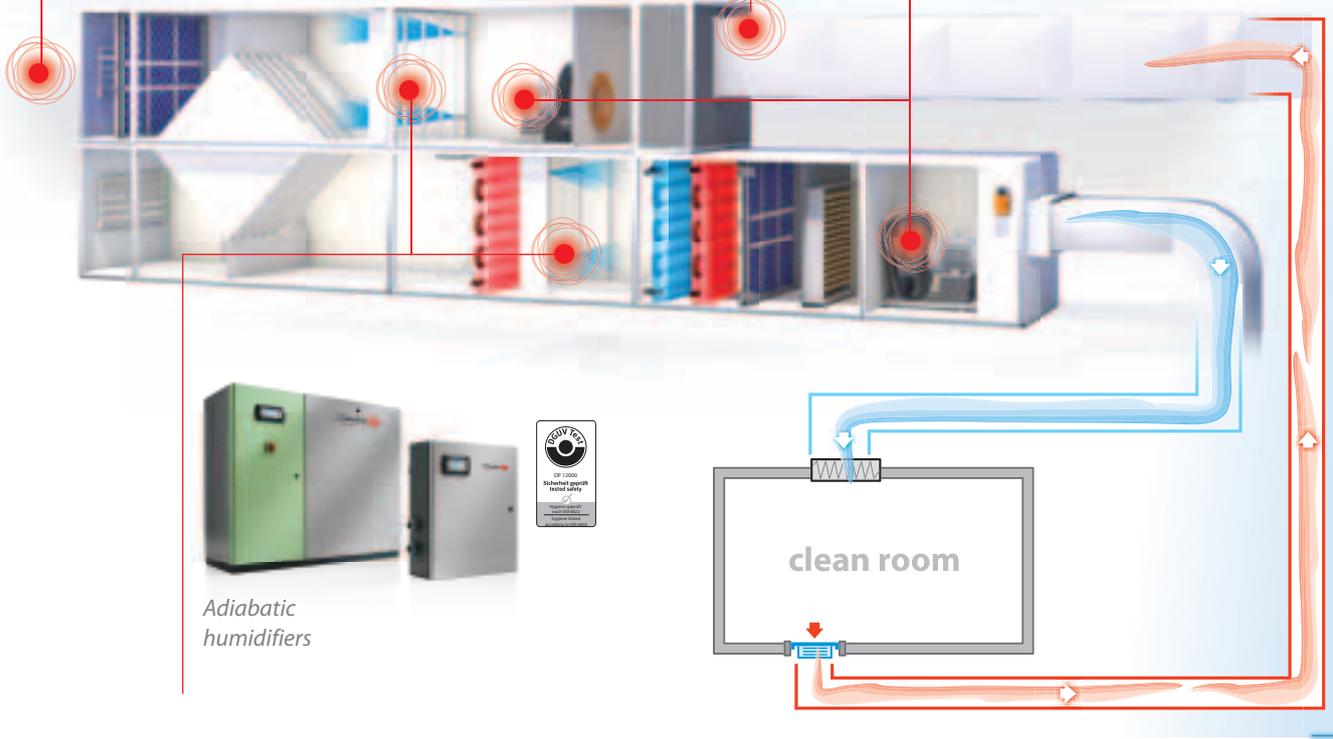
Air quality sensors



Inverters



Electrical panels



Semiconductors

Extremely precise control limits are required when processing semiconductors, for example, the viscosity of photoresist is very sensitive to relative humidity.



Capillary forces

Capillary forces can affect the precision and speed of processes. In particular, when relative humidity is high, these forces increase the adhesion of water particles to surfaces.



Personal comfort

Relative humidity between 40% and 60% represents the personal comfort zone. Higher humidity causes a feeling of discomfort, while lower humidity causes inflammation of the mucous and chapped skin.

Typical applications

The constant increase in the technological level of production processes has led to the increasing use of rooms with a controlled level of contamination. CAREL humidification systems are

successfully used in applications for:

- semiconductors and microelectronics;
- pharmaceuticals and pharmaceutical biotechnologies;
- cosmetics;
- medicine;
- hospitals and operating theatres;
- research laboratories;

- aerospace technology;
- micro- and nano-technologies;
- agro-food industry;
- automobile industry.

Steam humidifiers

CAREL offers a range of steam humidifiers with different capacities: heaters, immersed electrodes or gas-fired boilers, complete with all the accessories needed for AHU applications. In particular, the heaterSteam electric heater model ensures precision of $\pm 1\%$ RH, a value often required for cleanrooms.

Adiabatic humidifiers

These humidifiers exploit the properties of atomised water to offer significant advantages in terms of precision and efficiency in managing temperature and humidity. Precise and continuous modulation of humidification capacity and very low energy consumption make humiFog the ideal solution for precision applications such as cleanrooms.

Evaporative cooling

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

Our solutions

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.

humiSteam



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

ultimateSAM



Pressurised steam distributor (0.1 to 4 bars); capacity: 0.1 to 1100 kg/h.

humiFog multizone



High pressure water spray humidifier; capacity: 100 to 5000 kg/h.

humiSonic



Ultrasonic humidifiers for small cleanrooms; capacity: 0.5 kg/h.

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