

success story



Humidity control and energy saving for a sustainable hospital

where

- Ospedale Alto Vicentino**
- hospital;
 - Santorso (VI)- Italy.

what

- humiFog multizone installation**
- 60 humiFog in air handling units

why

- energy saving;
- energy cost reduction;
- maximum hygiene, VDI6022 certified;
- easy installation and maintenance;
- simple and intuitive user interface;
- reliability.

Thiene-Schio Hospital

At the cutting-edge in terms of services and green building

The hospital, opened on 20 February 2012, was built to combine the existing Thiene and Schio hospitals into one single complex.

Located in Santorso (between Thiene and Schio), occupying 69,000 sq.m. on a total area of 86,000 sq.m., the complex has 280 spacious rooms, all with at most two beds, and an area for families to ensure maximum patient comfort.

The main characteristic however is service quality, meaning the care paid to patients and their families, the focus of all the hospital's activities. The complex is therefore modern and functional, no longer being structured around wards and departments, but rather patient care, unifying common activities and resources as much as possible.

This patient-focused approach also extends to the construction of the operating rooms, as well as the ancillary structures, such as the restaurant and nursery for children.

The building was constructed applying "green" principles, such as district heating, with a waste-to-energy plant supplying hot water at 120°C. This also provides air-conditioning in winter and cooling in summer, using an absorber. Electricity is partly provided by a photovoltaic installation, rainwater is collected and used to water the lawns, and the natural gas used to supply the combined heat and power plant is considered under Italian law as being equivalent to a renewable energy source .

The choice of the CAREL humiFog for optimum air humidification fits into this innovative vision of energy-saving building, as humiFog consumes just 4 W of power for each litre/hour of atomised water, less than 1% of the power consumption of any steam humidifier. Indeed, considerable energy savings are possible using the adiabatic process, humidifying the air while consuming just the small amount of energy needed to bring the water to a pressure of 70 bars, meaning significant cost as well as energy savings. Further savings are also guaranteed by using humiFog multizone to humidify different rooms, connecting several distribution systems to one single pumping unit.



Low-power humidification

Comfort conditions inside a hospital are fundamental. One important aspect in this sense is air quality, which ensures comfort for the people who occupy a building.

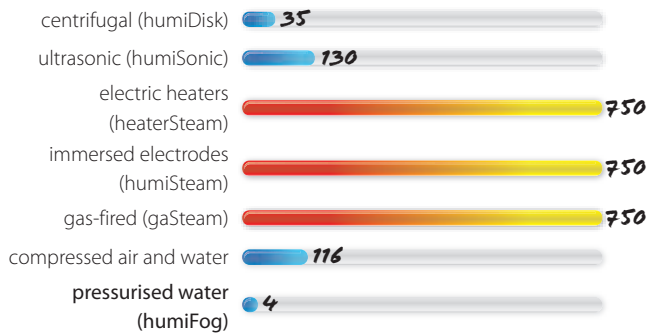
HumiFog guarantees optimum air humidity parameters with a lower energy cost than any other technology.

Humidity needs to be kept between 40% and 60%, as lower values, for example during the winter as a result of indoor heating, cause problems with the respiratory system, eyes, skin, nose and mouth. Excessively dry air also assists the generation of electrostatic discharges, which are very harmful to both people and electronic equipment.

Air that is too humid, on the other hand, favours proliferation of bacteria and viruses, a dangerous situation in places occupied by people who are already in poor health.

HumiFog ensures the humidity and hygiene conditions needed for personal comfort and health, using demineralised water, automated washing cycles, a draining system and stainless steel. All of this is guaranteed by VDI6022 certification, the international benchmark in the sector.

Humidifier power consumption



Comparison between various types of humidifiers, estimate of the power (W) needed to generate 1 kg/h of steam or atomise 1 l/h of water

Energy saving with adiabatic humidification

The philosophy of sustainable building and reductions in energy consumption that underlies the construction of the new Ospedale dell'Alto Vicentino is also the reason why humiFog was chosen for air humidity control.

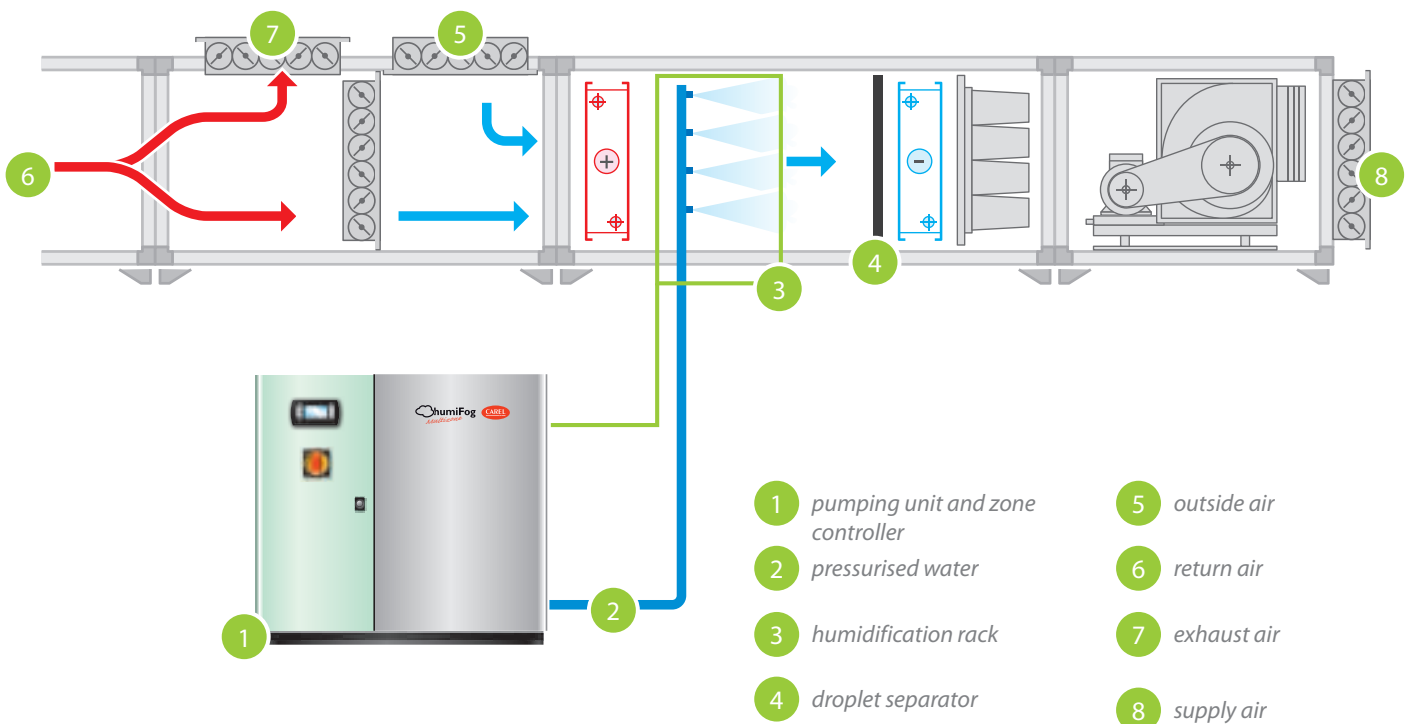
The adiabatic process in fact ensures the desired air humidity level with very low energy consumption, as the only energy consumed is that required by the pump to pressurise the water. This water, subsequently atomised into very fine droplets in the air, changes state (from liquid to vapour) by removing energy in the form of sensible heat from the air.

This solution can be made even more sustainable using humiFog multizone, with one master pumping unit delivering pressurised water to the various slave cabinets, these in turn humidifying based solely on the needs in the room where they are installed.

HumiFog can adapt to different hospital rooms and the specific needs of each, ensuring precise and hygienic humidification, as well as extremely low power consumption

Design climate conditions

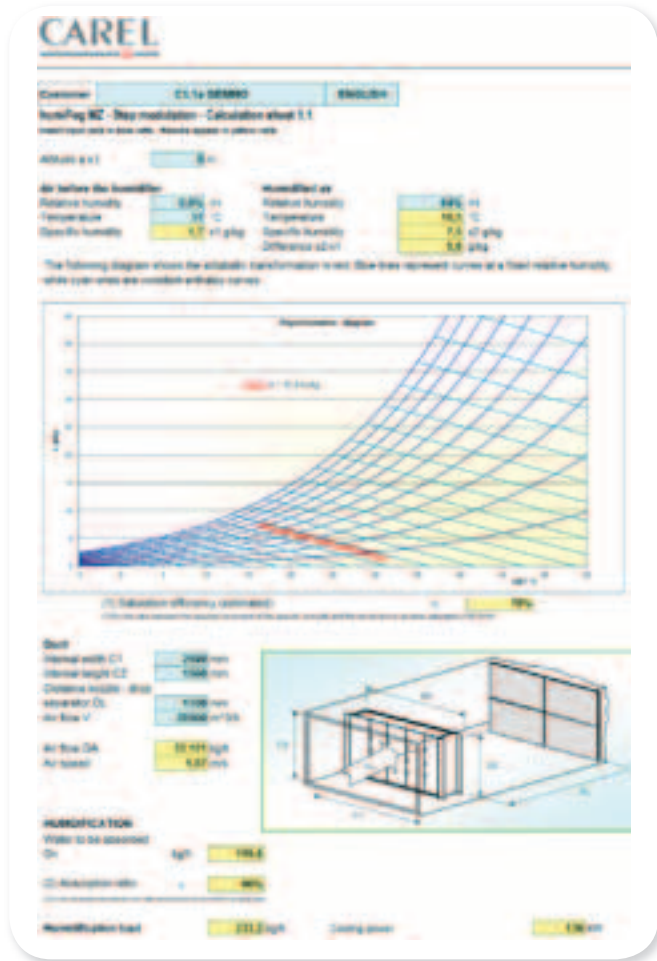
| Environment | Temp. | RH | AH | ΔX AH |
|------------------------------|-------|-----|-----------|---------------|
| Outside air | -6 °C | 74% | 1.7 g/kg | |
| Set point 1: offices | 20 °C | 45% | 6.6 g/kg | 4.9 g/kg |
| Set point 2: multizone | 22 °C | 45% | 7.5 g/kg | 5.8 g/kg |
| Set point 3: operating rooms | 24 °C | 45% | 8.5 g/kg | 6.8g/kg |
| Set point 4: newborn care | 26 °C | 45% | 13.9 g/kg | 12.2 g/kg |



Simple design tool

The HumiFog sizing tool, available to designers, uses the design specifications (temperature and relative humidity before and after the humidifier, and air flow-rate) to automatically calculate the features of the complete humidification system, sizing it to measure based on the dimensions of the air handling unit:

- Size of the rack and number of atomisers;
- Power and water consumption;
- Saturation efficiency (up to 95%);
- Humidification load;
- Cooling capacity.



humiFog tool



rack with nozzles and stainless steel droplet separator



reverse osmosis demineraliser

A powerful and complete solution

Carel provides all the components, tested and ready for assembly. The racks are supplied to measure according to the size of the ducts, while the valves ensure precise humidity control. Certified materials and the use of demineralised water guarantee product hygiene.

The system supplied comprises:

- pumping unit with continuous flow-rate modulation controlled by inverter;
- rack with nozzles and valves, pre-assembled and tested;
- stainless steel droplet separators for hygiene-certified installations;
- electronic controller with intuitive user interface;
- water treatment system (reverse osmosis).

Products installed:

- 44 humiFog units from 100 kg/h to 460 kg/h;
- 16 humiFog multizone units, 8 masters and 8 slaves

| Flow-rate | Individual zones | multizone masters | multizone slaves |
|------------------|------------------|-------------------|------------------|
| humiFog 100 kg/h | 19 | | |
| humiFog 200 kg/h | 17 | | |
| humiFog 320 kg/h | 6 | 4 | |
| humiFog 460 kg/h | 2 | 1 | |
| humiFog 600 kg/h | | 3 | |
| humiFog slave | | | 8 |
| total | 44 | 8 | 8 |



certification



details of the droplet separator



installation



Conclusions

HumiFog, the CAREL air humidity control solution, drastically reduces energy consumption by exploiting the adiabatic process in which atomised water absorbs the energy it needs to evaporate from the air.

The multizone application optimises installation, allowing multiple zones (maximum 6) to be served, at the same time and independently, by a single pumping unit.

This extreme reduction in power consumption makes humiFog the ideal solution for buildings designed to meet the needs of energy saving and a reduction in running costs.

VDI6022 hygiene certification, moreover, means the units are compliant for hospital applications.

The project was designed and developed through the partnership between CAREL, Agenzia Bissaro, a CAREL systems integrator, and Gemmo Holding Spa, responsible for the installation.

The range of specific expertise of the three partners involved allowed a complete and integrated solution to be supplied, meeting all the customer's requirements.



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