

## DOUBLE INTELLIGENCE

Two adiabatic humidification  
principles intelligently combined  
Condair **DL**



Humidification and evaporative cooling

 **condair**



## Energy-efficient low-pressure system

The low-pressure operation leads to significant energy savings due to the lower compression work. By combining the Condair DL humidifier and the reverse osmosis Condair AT2, even a booster pump on the humidification system becomes superfluous



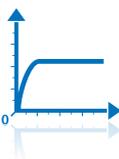
## Aerosol-free air

Using the ceramic evaporator unit, the humidifying water is completely separated from the air flow and effectively evaporated.



## Effective degermination

The HygienePlus® concept includes a series of measures for effective germ neutralization. The key element here is the silver ionization ensuring reliable hygiene and safety.



## Precise control

The unique combination of the spray circuit drive and continuous water quantity control allows precise control accuracy.

**Condair RSF fine filter**

The fine filter prevents suspended particles from penetrating following components.

**Condair RT pipe disconnecter**

A pipe disconnecter ensures to meet the requirements for drinking-water installations.

**Condair Soft softener**

Optimal water treatment first of all requires the softening of the humidifying water. The Condair Soft softener performs this task reliably.

**Condair AT reverse osmosis**

A reverse osmosis system supplies mineral-free humidifying water. The Condair AT reverse osmosis system was developed for the technological requirements of humidifying water.

**Condair DL control unit**

The control unit is the heart of the Condair DL hybrid humidifier. The integral control and regulating operations take place there.

**Condair DL HygienePlus®**

The HygienePlus® silver ionization and the optional sterile filter are used as hygiene precautions and ensure permanent hygiene safety

**Condair DL atomizer unit**

The optimal layout of the atomizing nozzles ensures uniform humidity distribution. Electrical current consumption is low because of the low-pressure operation.

**Condair DL evaporator unit**

The ceramic evaporator unit increases the efficiency in water consumption and allows the economic use of the high-grade humidifying water. The separating efficiency of the ceramic ensures hygienic operation



# Condair DL

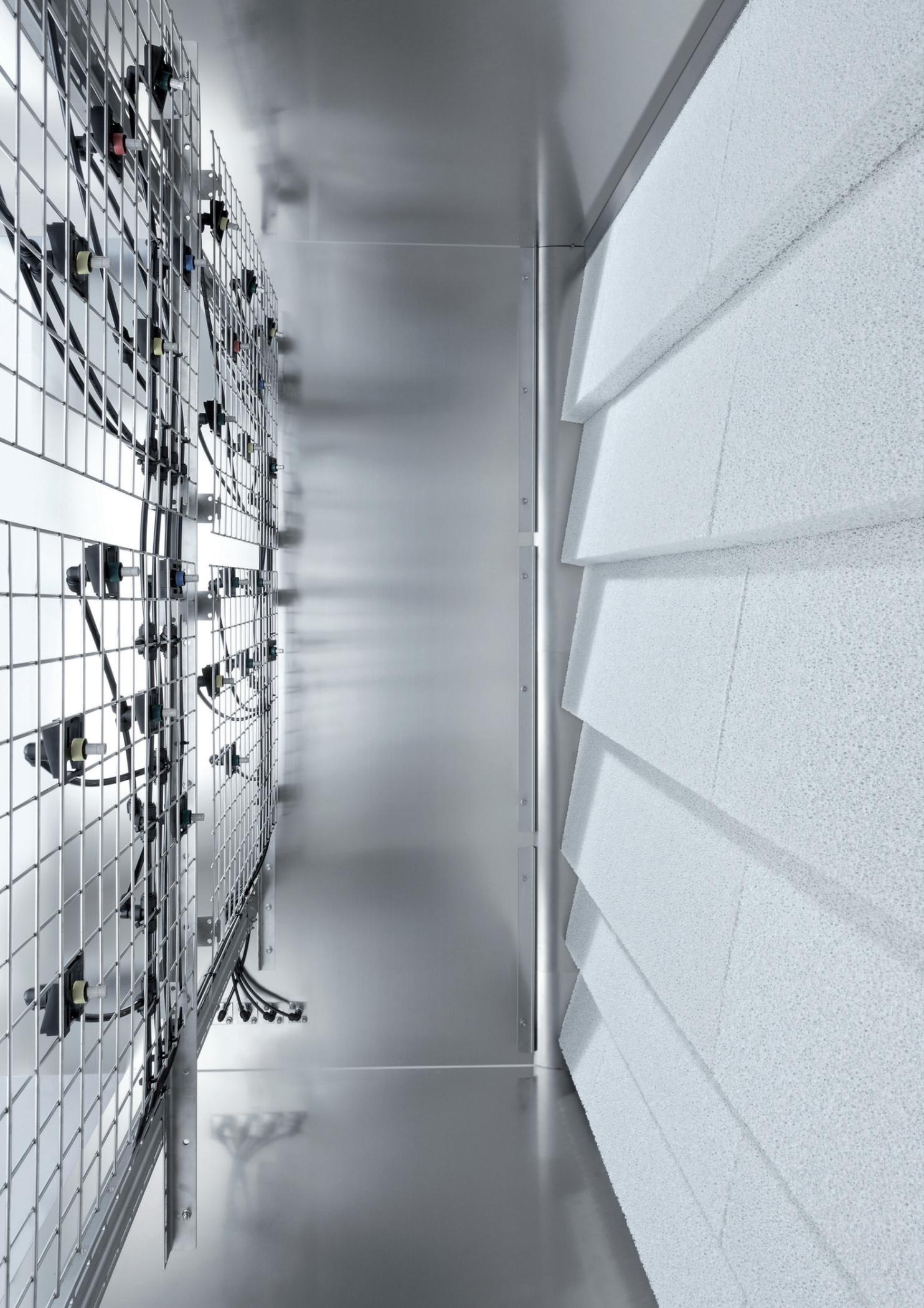
## Hybrid Humidifier

The Condair DL is the advanced version of the Condair DUAL2, the most successful adiabatic humidification system. Its hygienic quality has proven itself in operation and has been demonstrated and given awards by independent organizations with public responsibility. The Condair DL

was developed with regard to the highest possible hygiene safety. Detailed structural solutions have a preventive effect, guarding against uncontrolled germ growth inside the humidifier.

The HygienePlus® system ensures sustainably healthy air and a hygienic environ-

ment. An adequate relative humidity is of great importance for the environment. Optimal air parameters for well-being and health protection are between 21°C to 22°C, and with relative humidity between 40% and 60%. A suitable air humidity leads to the best production results and highest quality in the industrial sector.



## Two adiabatic principles intelligently combined!

The Condair DL hybrid humidifier is based exclusively on the advantages of the two humidification principles of atomization and evaporation. This results in the sustainable resolution of key problems which can emerge when these technologies are used individually. The humidification system is therefore the first choice in terms of hygiene, energy efficiency and cost-effectiveness.

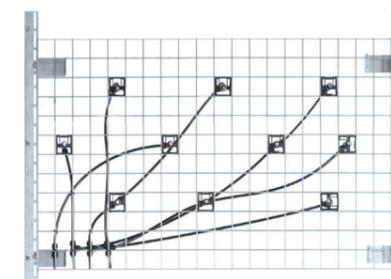
### Atomize

The humidifying water is atomized by molecular atomizing nozzles at low pressure. The atomizing nozzles have an adjustable spray output and are optimally distributed over the entire cross-section of the device. A high evaporation efficiency and a uniform humidity distribution are achieved by this layout.

### Evaporate

The evaporator unit made of premium ceramic is placed at the end of the humidification distance. It captures the humidifying water and ensures the best possible reevaporation. The ceramics thus allow the most effective utilization of the highgrade humidifying water. At the same time, they prevent water accumulation in downstream components.

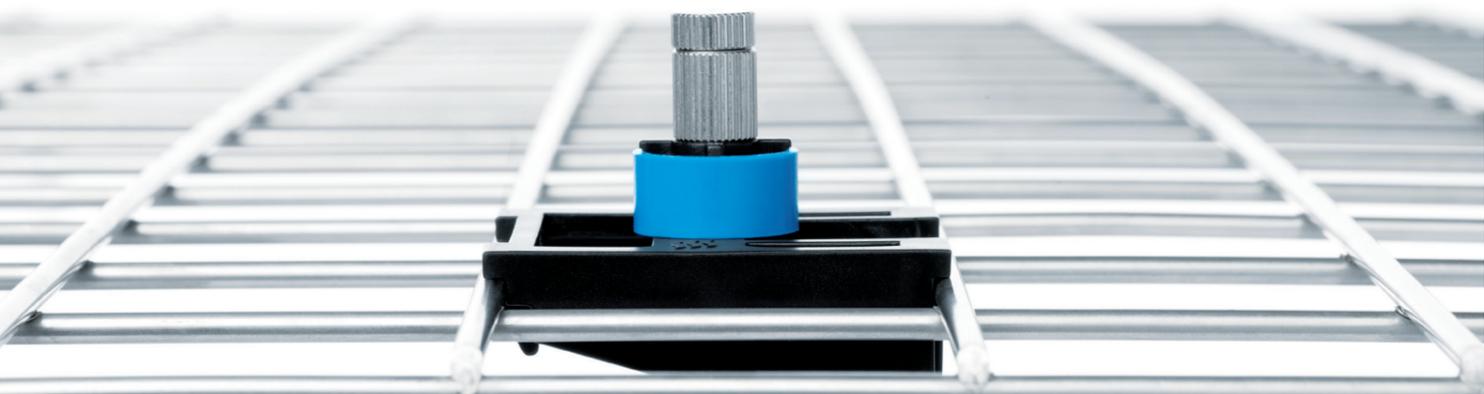
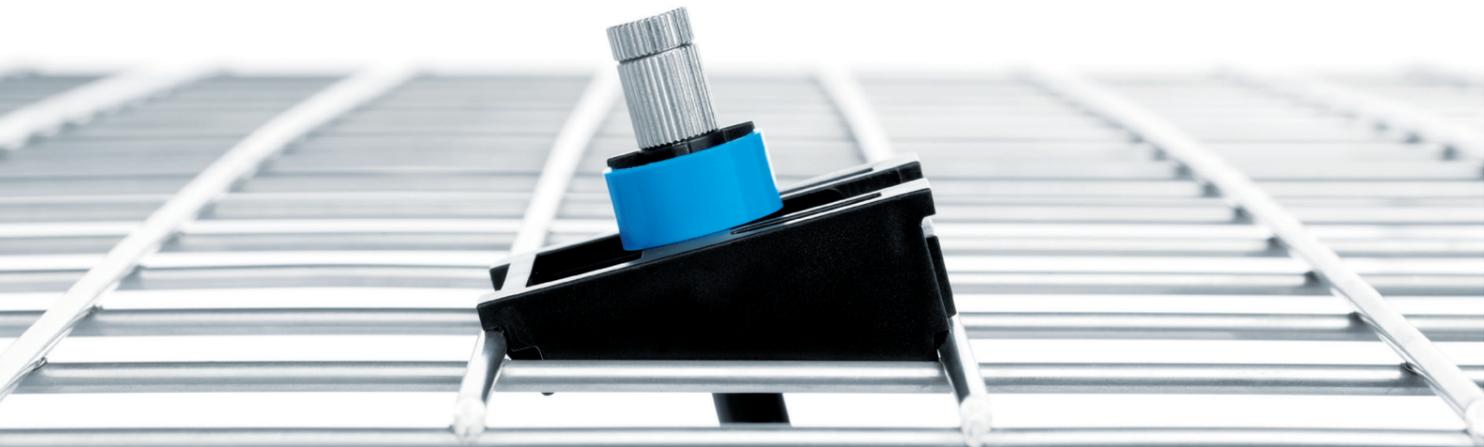
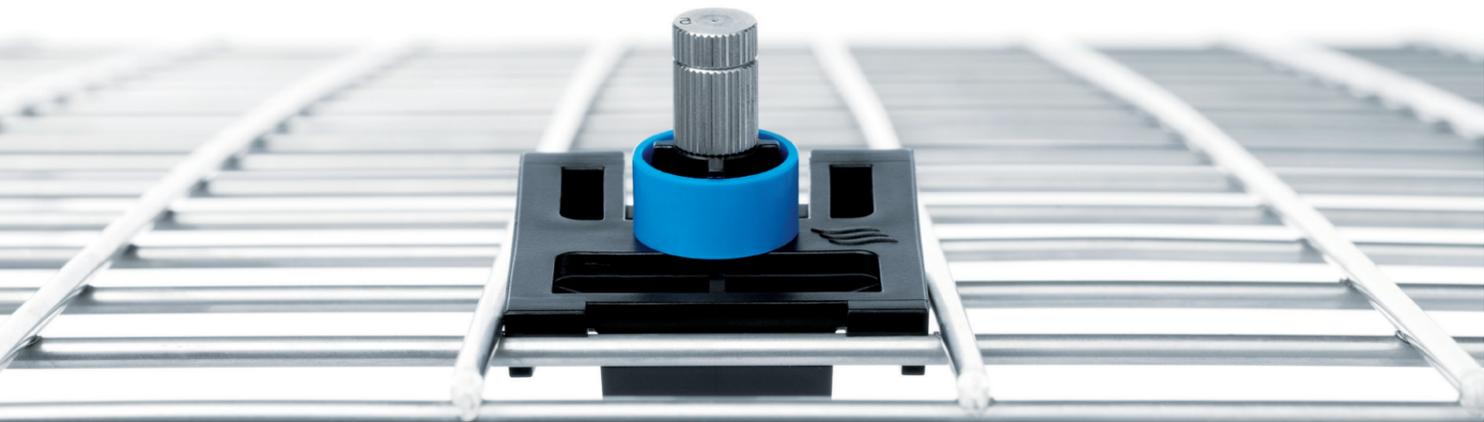
Behind the Condair DL humidifier, there is aerosol-free and hygienically humidified breathable air.



Atomize  
Low-pressure molecular atomizer nozzles



+ Evaporate  
Evaporation ceramics

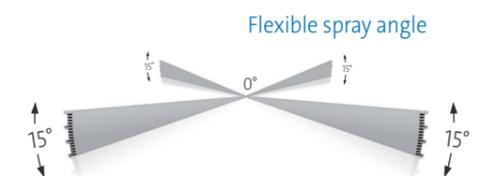


## Adjustable molecular atomizer nozzles

The low-pressure mode of operation leads to significant energy savings due to the lower compression work. The low-pressure molecular nozzles work in a pressure range of 2 to 10 bar(g) and are totally wear-free.

The nozzle itself is located on a flexible mounting clip which can be adjusted into a straight line or at an inclination angle of 15°.

By that, the spray cone of the nozzles can be directed so that the humidifying water meets the evaporation ceramics completely, even in the critical edge areas.





## Full-surface evaporation of water

The bigger the wet ceramic surface, the higher the efficiency in water utilization. The humidifying water therefore evaporates over the entire crosssection of the air flow.

This makes the highgrade ceramic surface available for complete water absorption on the upstream side.

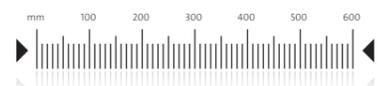


## Extremely short installation length

Low-pressure systems generally get by with a significantly lower construction depth than what is necessary in high-pressure humidifiers. Because of the full-surface layout of the evaporation ceramics and the spray cone of the molecular atomizer nozzles, the overall construction depth of the Condair DL can be reduced to up to 600 mm.

Thanks to the compact design, the humidification chamber can also be shortened and remarkable material savings can be obtained.

Overall length can be reduced up to 600 mm!



## Intuitive Touch Controller

### Optimal process transparency

With the Condair touch controller you have all devices and Process data at a glance. Functional data can be called up in real time and via a detailed data history. Via the IoT (Internet of Things) connection, data can be transferred to Can be stored in the Condair Cloud, viewed and analyzed online.

### Perfect connection to the building management system

The DL hybrid humidifier supports a variety as standard common network protocols of building technology.

The connection to Modbus RTU or Modbus TCP as well as BACnet IP or BACnet MS/TP is easily made directly via the interfaces attached to the controller.

The DL has a BTL (BACnet Testing Laboratories) certified BACnet technology. This certification is carried out by an accredited BTL test laboratory and is considered a worldwide test standard in the BACnet communication: The optional gateway board can also be used to connect to a Lonworks Network.

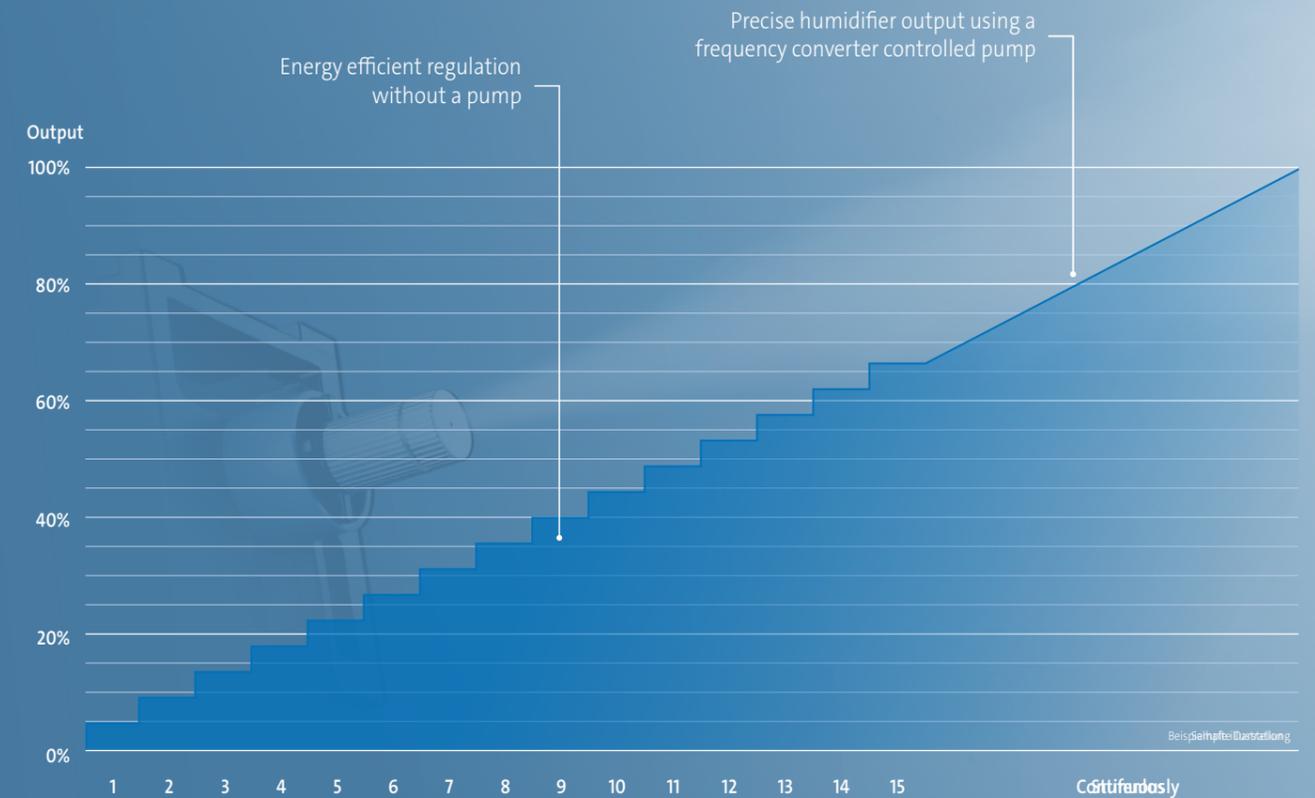
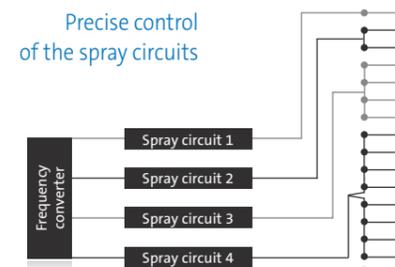


## Control at highest precision

The unique combination of the spray circuit drive and continuous water quantity control allows precise control accuracy. The system first runs through the 15 output levels of the spray circuits in line. Only afterwards, the frequency controlled humidification pump is activated and the humidification output continuously rises until the required humidity setpoint is reached.

In conjunction with the evaporation effect of the ceramic elements the highest possible control accuracy is reached at each operating point and this takes place over the entire output range of 0% - 100%.

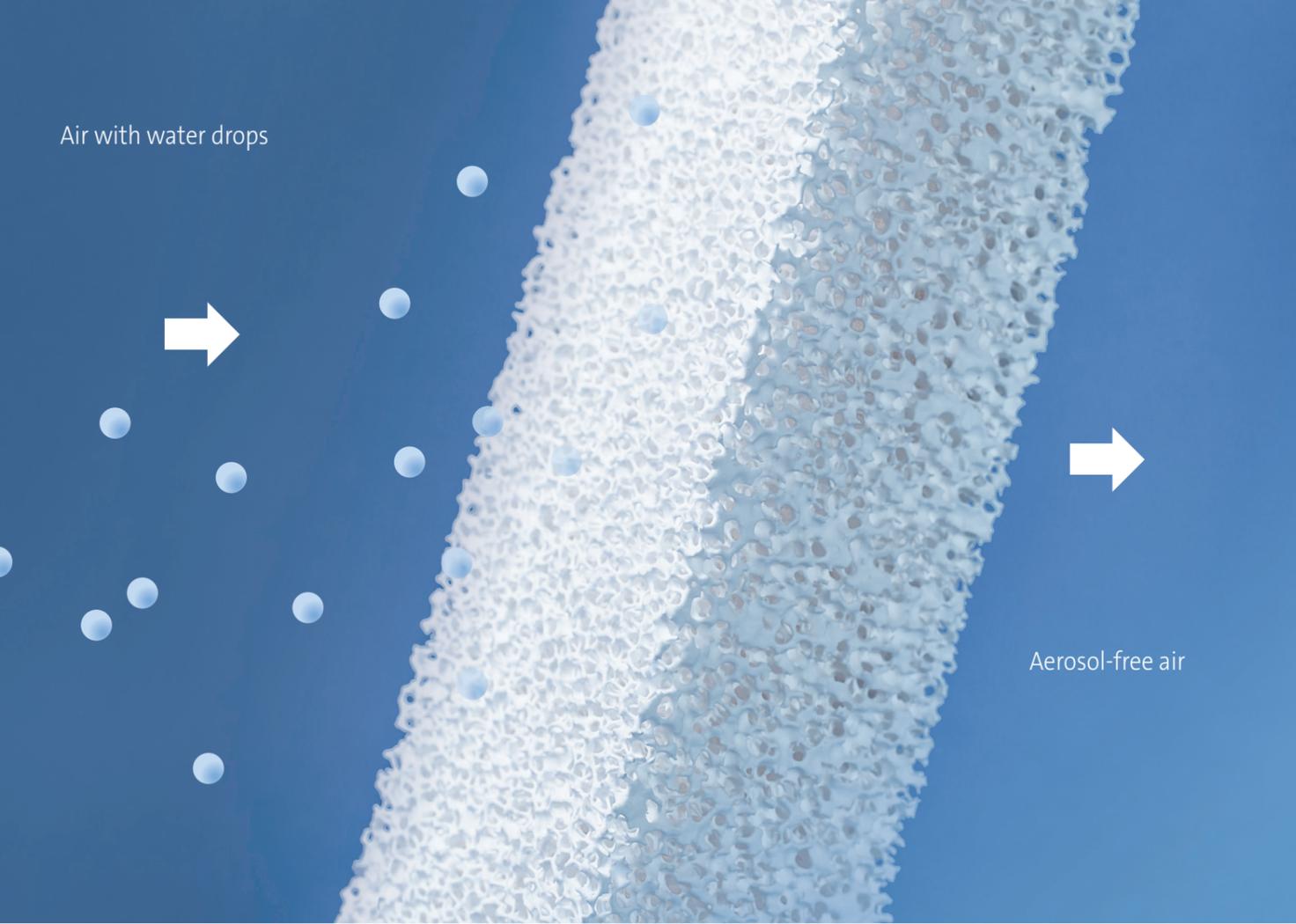
This operating mode is energy-efficient, saves humidifying water and also meets the high requirements for humidification accuracy.



Beispielhafte Darstellung

Condair

Air with water drops



Aerosol-free air

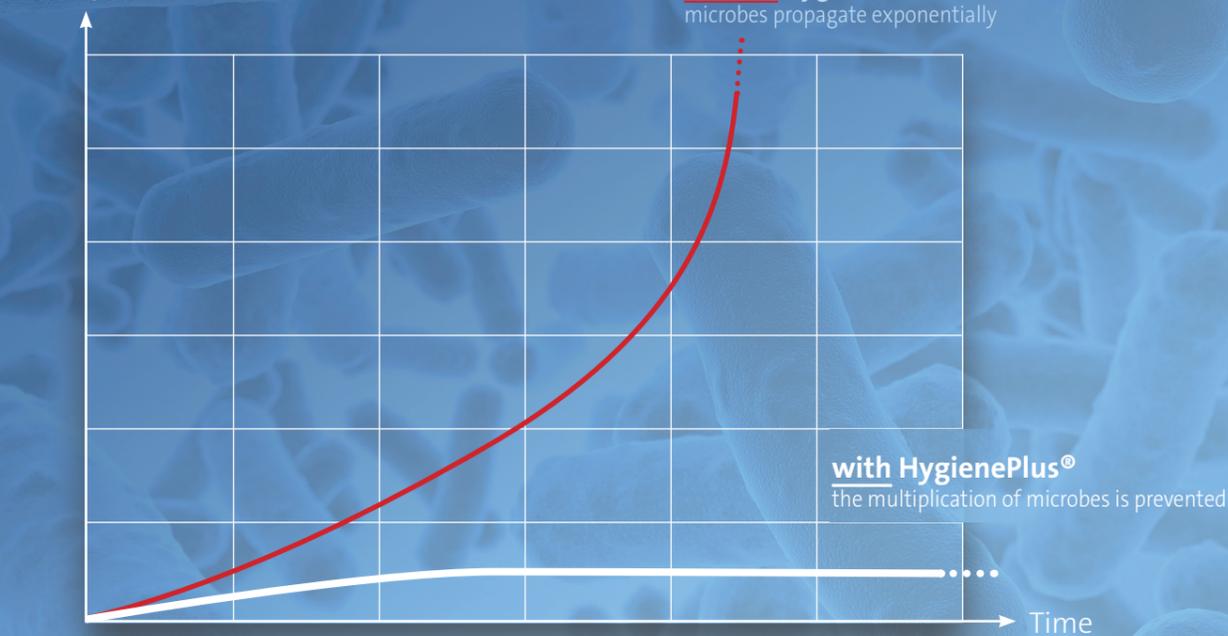
## Absolutely free of aerosols

No water aerosols should enter the air duct system during hygienic humidification. The aerosols could get deposited there and form hazardous wet areas.

Water aerosols in microbially contaminated humidifying water or existing biofilms can become germ carriers and contaminate breathable air.

Here too, the Condair DL offers a sustainable solution with the ceramic evaporator unit which separates and effectively evaporates the humidifying water completely from the air flow.

N° of germs



## Hygiene precautions

Basically, air conditioners and humidification devices are not sterile areas. Even when humidifying water of drinking-water quality is used, it will never be completely free of germs.

Therefore, microbes can always settle and form hazardous biofilms in humidifiers and in wet areas of air conditioners.

Suitable hygiene precautions are therefore essential to prevent the growth and multiplication of pathogens in adiabatic humidifiers.

The germ diagram points out the rapid multiplication of microorganisms when no appropriate steps are taken to contain them.



## The HygienePlus® concept



### The most pure humidifying water

Clean treated humidifying water is the basis for hygienic humidification. Only mineral-free fresh water with drinking water quality is used in the Condair DL. The humidifying water has the highest hygiene quality thanks to the germ neutralization system.

### Independent flushing of the water supply pipe

Stagnant water in water pipes generally represents a hygiene risk. For this reason, the water-bearing pipe systems of the Condair DL humidifier are emptied completely after a system stoppage of 12 h. In addition, every power-up cycle of the humidifier triggers an automatic flushing of the on-site water supply pipes.

### Intrinsic safety through automatic conductance monitoring

Limescale in adiabatic humidifiers offers ideal refuge areas for undesirable microorganisms. They are protected there and cannot be eliminated through conventional hygiene measures. Mineral-free humidifying water must therefore always be used for adiabatic humidification. Automatic conductance monitoring is part of the Condair DL hybrid humidifier and protects the system from undesirable entry of minerals even when on-site operating conditions are not ideal.

### Preventive germ neutralization

The HygienePlus® concept is based on the silver ionization of the humidifying water. Silver ions are dosed into the application efficiently, precisely and easily. Microorganisms are prevented from multiplying and propagating.

### Sterile filter

A sterile filter in the water system with automatic self-monitoring provides for additional hygiene safety. In case of microbially contaminated humidifying water or water-borne biofilms, the sterile filter safely prevents them from entering the pipe system.

### Effective germ neutralization

The germ diagram points out the rapid multiplication of microorganisms when no appropriate steps are taken to contain them. The HygienePlus® concept bases on the natural effect of silver ions for germ neutralization and prevention. The electronic controller with automatic capacity monitoring ensures the exact dosage with constant disinfection action. The silver ions ensure hygienic conditions wetted components of the humidification system.

### Optional H<sub>2</sub>O<sub>2</sub> disinfection

Upon request it is possible to carry out preventive germ neutralization through the optionally available H<sub>2</sub>O<sub>2</sub> disinfection. The quantity, time and duration of the disinfection cycles can easily be adjusted through the Condair DL controller.

### Interval flushing of supply water

Stagnant water in water pipes always poses the risk of microbial contamination. The Condair DL controller therefore allows the automatic flushing of the on-site water supply pipes during downtimes when no humidification is carried out. The humidifying water in these pipes is thus regularly replaced. The duration and intervals of this automatic flushing can be individually set by the user according to what is required.

### Optional compressed air flushing of the humidification system

The water-conducting pipes of the humidification system can be flushed with compressed air and dried upon request. This is done either automatically after specific downtimes or individually initiated by the user. Users are also free to choose the time and duration of the compressed air flushing.

Effective germ neutralization  
with silver ions



# Humidification without pump

## Humidification without proprietary pump energy

The Condair DL hybrid humidifier and the Condair AT2 reverse osmosis ideally complement each other. The principle of low-pressure atomization and continuous water quantity control produce a unique combination.

Omission of the booster pump in the humidifier reduces its current consumption to almost zero.

Because of the continuously adjustable control of the water supply, the correct water quantity is always provided at the precisely appropriate supply pressure. This means 100% savings not only for the pump and pump energy of the humidifier. Electrical energy is optimally utilized over the entire output range through frequency control during water treatment.

This translates to enormous savings in energy consumption for water treatment.

## Savings in humidifying water

Continuous control of the water quantity leads to a significant increase in the efficiency of water utilization of the Condair DL.

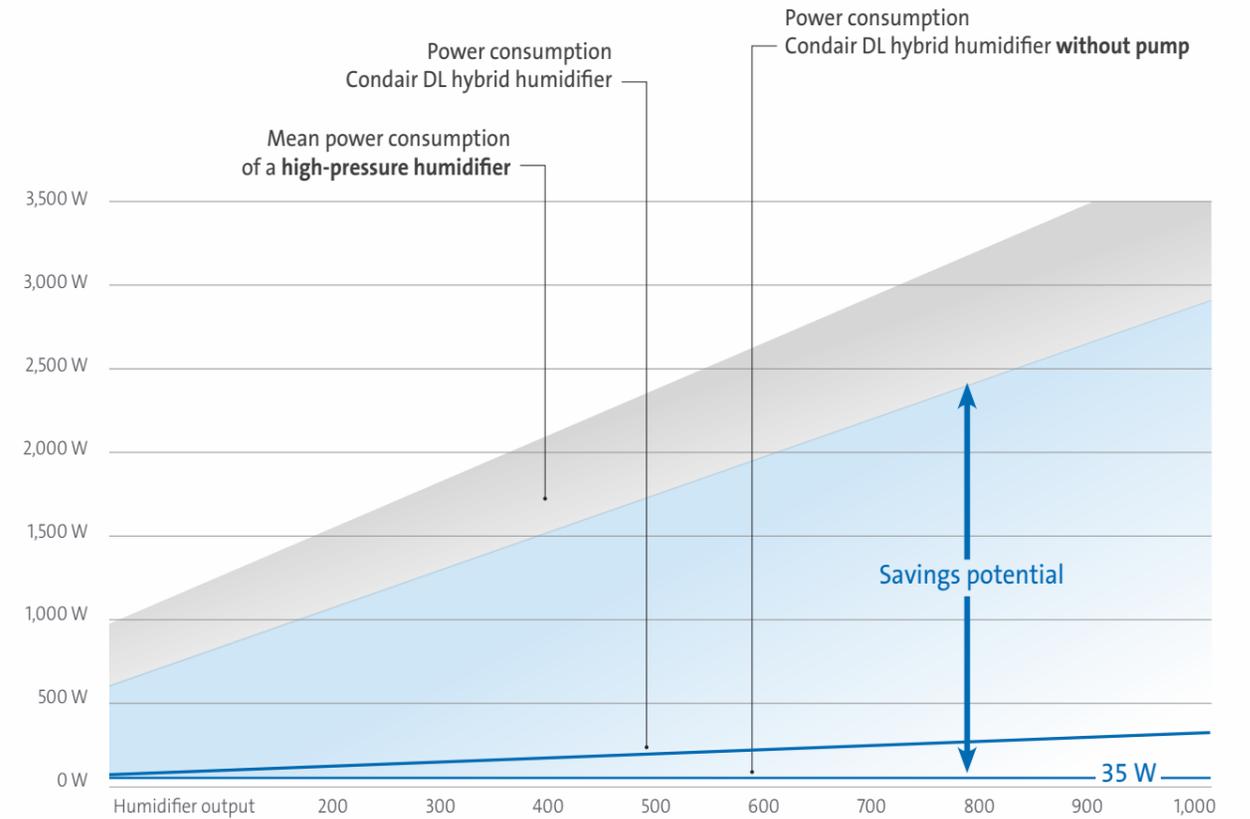
Because only exactly the water quantity actually needed is produced and atomized, flush water losses are minimal over the entire output range during humidification and even during reverse osmosis. The result is an overall system that works very efficiently and that is second to none.

## Precision in humidity control

If highest accuracy in humidity control counts, the continuously adjustable control of the water supply is the first choice. Therefore, the water quantity is always adjusted directly to the actual demand. Continuous humidity control is thereby carried out over the entire operating range of the Condair DL hybrid humidifier.



Condair AT2 reverse osmosis with frequency-converting pump



By combining the AT2 and DL a booster pump becomes superfluous! Current consumption is reduced to almost zero!

