# HUMICON
# Desiccant Dehumidification

## A Solution for Ventilation & Air-Purification

Excellent Product

New Excellent Technology

New Excellent Product

Green Certification

Excellent Performance Certification

www.hu-master.com

Humaster

한국과학기술연구원
Korea Institute of Science and Technology
창업기업

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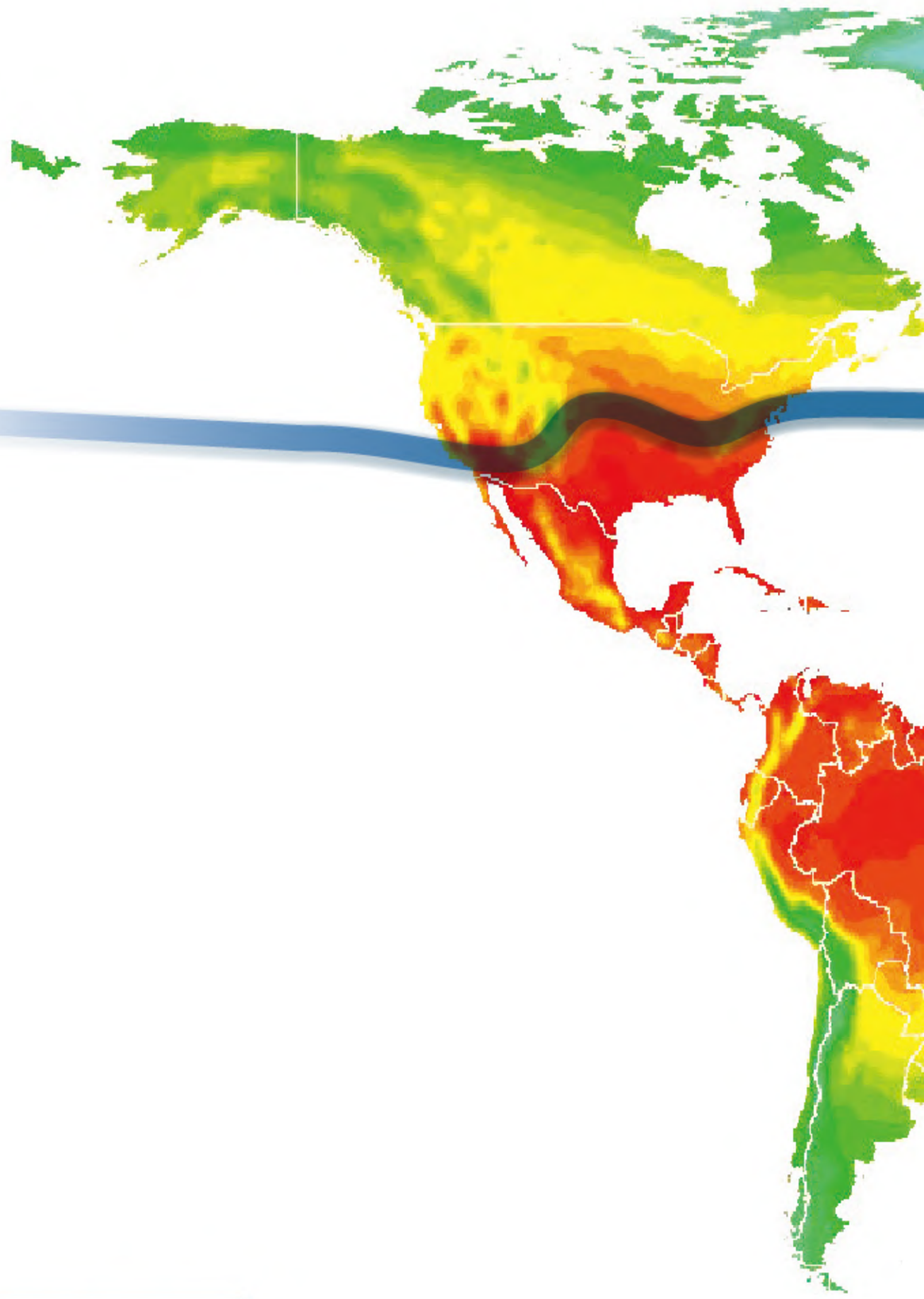


# Comfort or Discomfort, Why?

## Humidity is the most significant factor for fresh and comfortable air

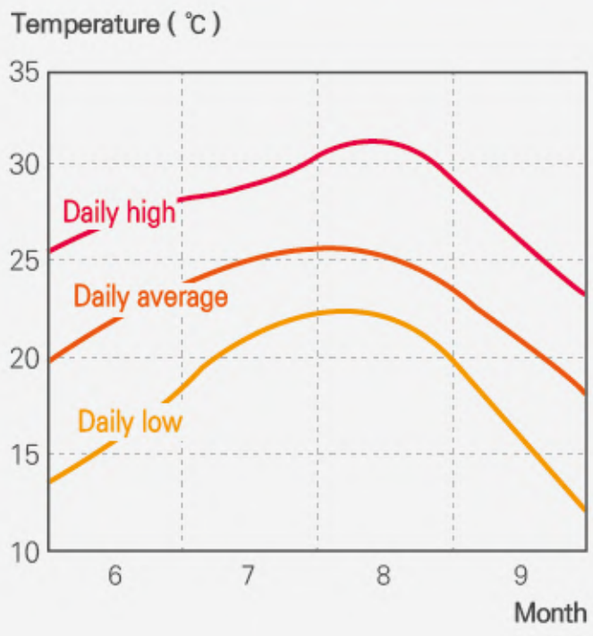
Humidity levels below 30% or above 80% indicate a hazardous environment. 40-70% is generally considered comfortable. In fact, the humidity that provides comfort varies with temperature, with the appropriate humidity being around 70% at 15°C, 60% at 18-20°C, 50% at 21-23°C, and 40% at 24°C or higher.

[Source] Hidak

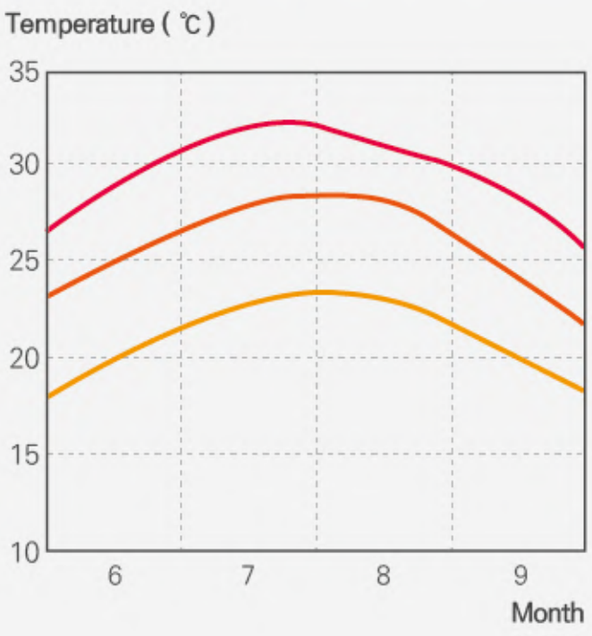
## **Temperature**? No, IT IS THE **HUMIDITY.**

What is the difference between Athens, Greece and Seoul,
which are at similar latitudes and have similar summer temperatures?
It's because of the 30% difference in humidity.
The Mediterranean is known as "heaven on Earth" for two reasons: it is warm and humid.
To make Korea's summers as pleasant as those of the Mediterranean,
we must focus on humidity rather than temperature.

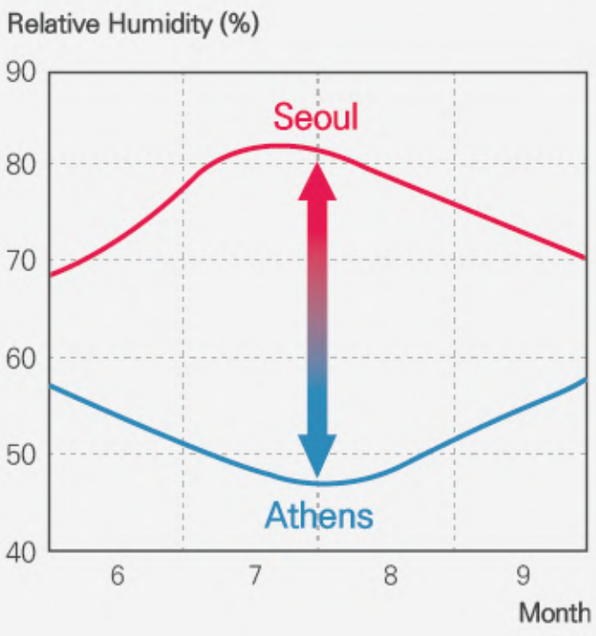
Seoul temperature in summer



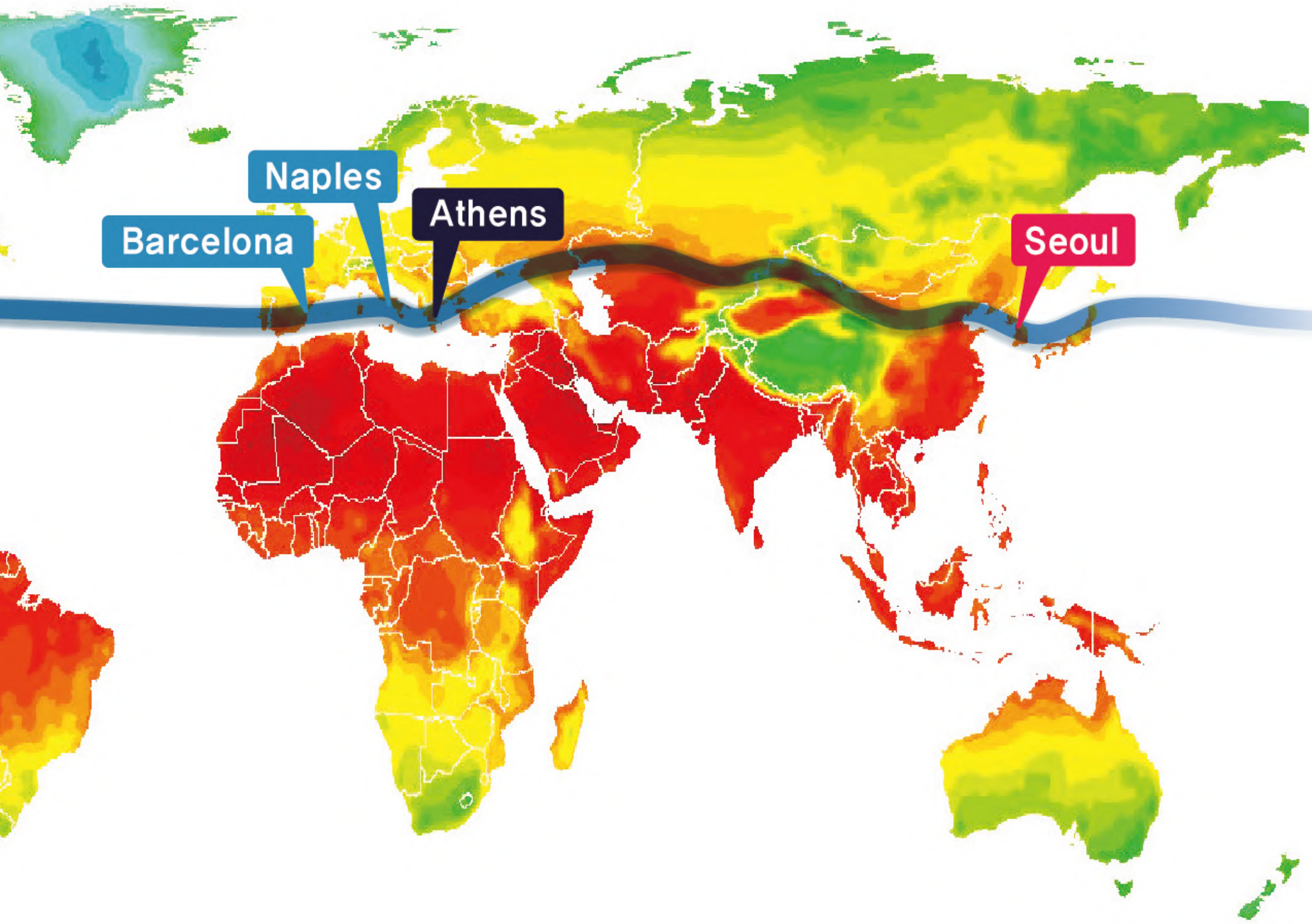

Athens temperature in summer




Humidity difference between Seoul and Athens



World map for average temperature in summer (June, July and August)




## Humidex

Humidity is the primary indicator of your comfortable feeling. As stated in below index, blue color represents the pleasant weather condition, while the red color represents the extremely unpleasant. With the high humidity, even in the low temperature, you can see that the discomfort index rises. On the other side, with the low humidity, even in the high temperature, it indicates the comfortable condition. Therefore, you can keep a comfortable temperature at 28℃ or higher by lowering the humidity of the indoor air to 30-40%.

| Temperature(°C) \ Humidity(%) | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
|---|---|---|---|---|---|---|---|---|
| 36℃ | 40 | 44 | 47 | 50 | 54 | 57 | 60 | 63 |
| 35℃ | 39 | 42 | 45 | 48 | 51 | 54 | 58 | 61 |
| 34℃ | 37 | 40 | 43 | 46 | 49 | 52 | 55 | 58 |
| 33℃ | 36 | 39 | 41 | 44 | 47 | 50 | 53 | 55 |
| 32℃ | 34 | 37 | 40 | 42 | 45 | 48 | 50 | 53 |
| 31℃ | 33 | 35 | 38 | 40 | 43 | 45 | 48 | 50 |
| 30℃ | 32 | 34 | 36 | 39 | 41 | 43 | 46 | 48 |
| 29℃ | 30 | 32 | 35 | 37 | 39 | 41 | 43 | 46 |
| 28℃ | 29 | 31 | 33 | 35 | 37 | 39 | 41 | 43 |
| 27℃ | 27 | 29 | 31 | 33 | 35 | 37 | 39 | 41 |
| 26℃ | 26 | 28 | 30 | 32 | 34 | 35 | 37 | 39 |
| 25℃ | 25 | 27 | 28 | 30 | 32 | 34 | 35 | 37 |
| 24℃ | 24 | 25 | 27 | 28 | 30 | 32 | 33 | 35 |

Risk of death

Serious risk:
stop all physical activities

Discomfort:
Restrict physical activities

No discomfort

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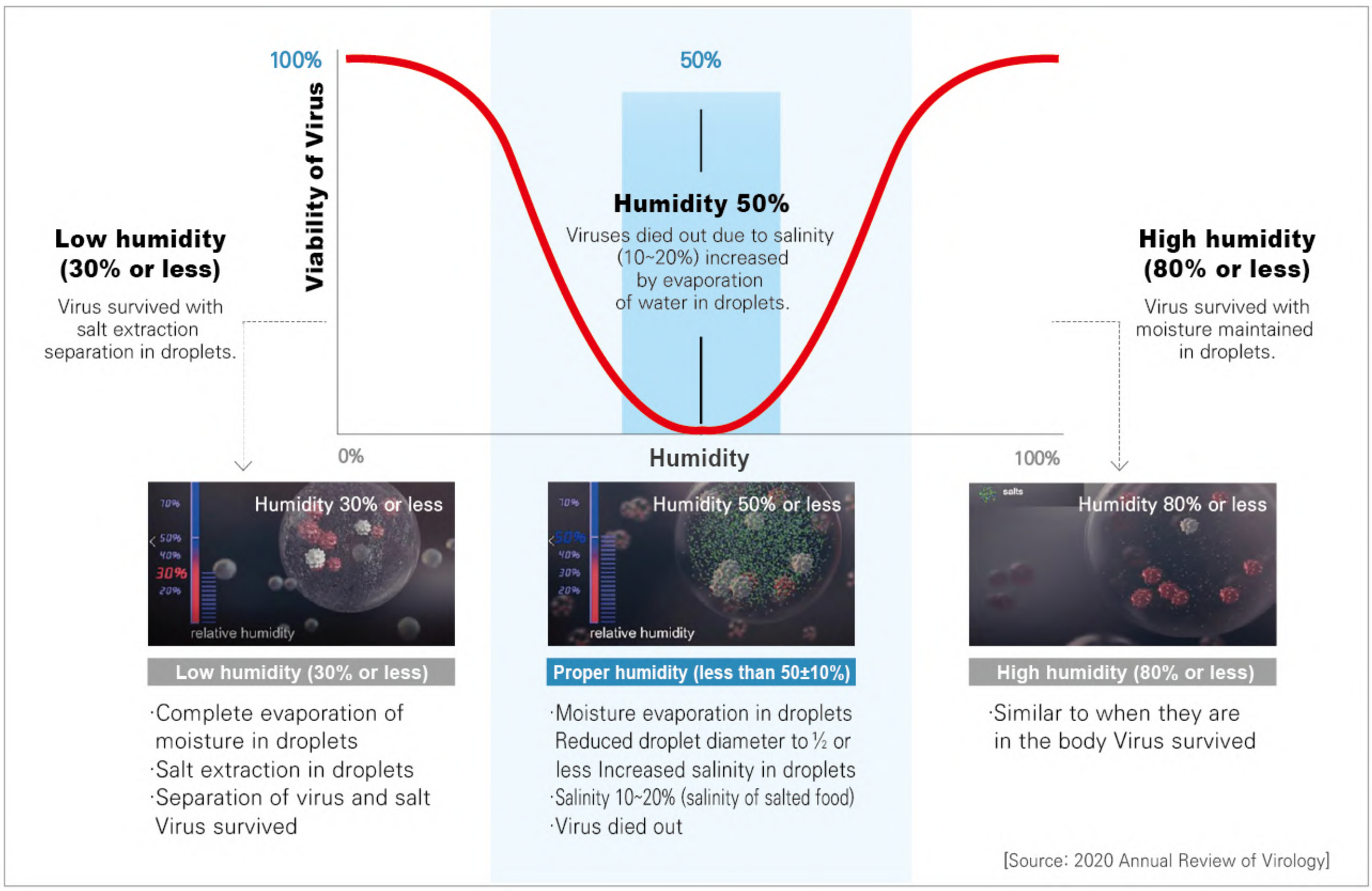
# A solution to prevent the spread of virus and control humidity

## Virus is heavily affected by Humidity.

Relative humidity affects significantly on the airborne spread of the COVID-19 virus through aerosol particles.

[Source] Leibniz Tropospheric Laboratory (TROPOS), Germany · CSIR National Institute of Physics, New Delhi, India, International Journal 'Aerosol and Air Quality Research'




## Officially Certified Technology

- Maximum moisture absorption performance : 241% (5 times higher than silica gel) – the world's best Desiccant material
- Reduction of VOCs : ammonia 99.8%, trimethylamine 99.6%, acetic acid 94.0%
- Antibacterial test : Escherichia coli 99.9%, Staphylococcus aureus 99.9%
- Antifungal test : mixed strain 0 grade (no mycelial growth)
- Air Purifying test : Reduction of Particles 99.4%
- Ozone reduction test : ozone generation 0.0027ppm (5.4% level compared to the standard value of 0.05ppm)
- Airborne virus reduction rate 98.7%
- Airborne bacteria reduction rate 99.9%

# HUMICON

Self-Development & Patented material(SDP)

Super Desiccant Polymer
(HuSorb)

Super Desiccant Polymer

Desiccant dehumidification

Desiccant cooling

Ventilation

Air purification

## Desiccant Air Conditioning

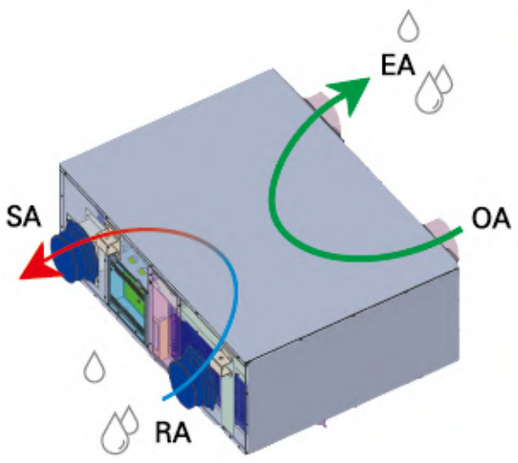
### Desiccant Dehumidification / Cooling

- Desiccant Dehumidification without temperature change
- Desiccant Cooling by reducing "Feel-Like" temperature by humidity control
- Inhouse-Invented Desiccant Polymer material
- Minimized viability of remaining viruses by maintaining proper humidity
- Most desirable atmosphere under proper temperature and humidity
- Solution for prevention: Dew condensation, mold, and mildew

### Air-Purification / ERV

- Fine dust reduction 99.4%
- Airborne bacteria reduction 99.9%
- Airborne virus reduction 98.7%
- Highest grade in antifungal and antibacterial test
- Reduction of Ozone
- Excellence in reduction of VOCs

### Desiccant Dehumidification

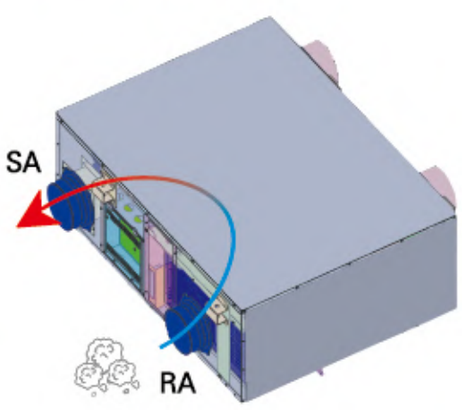



**Desiccant dehumidification**

It draws in humid air from the room, adsorbs the moisture to the filter, and then discharges it to the outside. At this time, it has the effect of lowering the perceived temperature without increasing the temperature.

### Air-Purification

▶ It draws in the impure air inside and purifies the indoor air with a filter.

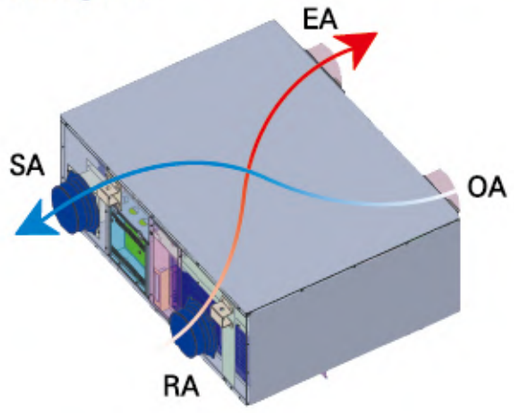



**Premium air cleaning function**

Humicon perfectly removes even a small amount of ozone that can be generated from the dust collection filter applied to the air purifier.

### ERV(Energy Recovery Ventilation)

▶ It discharges the indoor air to the outside, and purifies the outside air with a filter before drawing in it.




**Premium ventilation function**

When ventilating, it blocks the inflow of moisture contained in the outside air, so you can ventilate with more pleasant air.

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# Performance comparison between HUMICON and conventional products

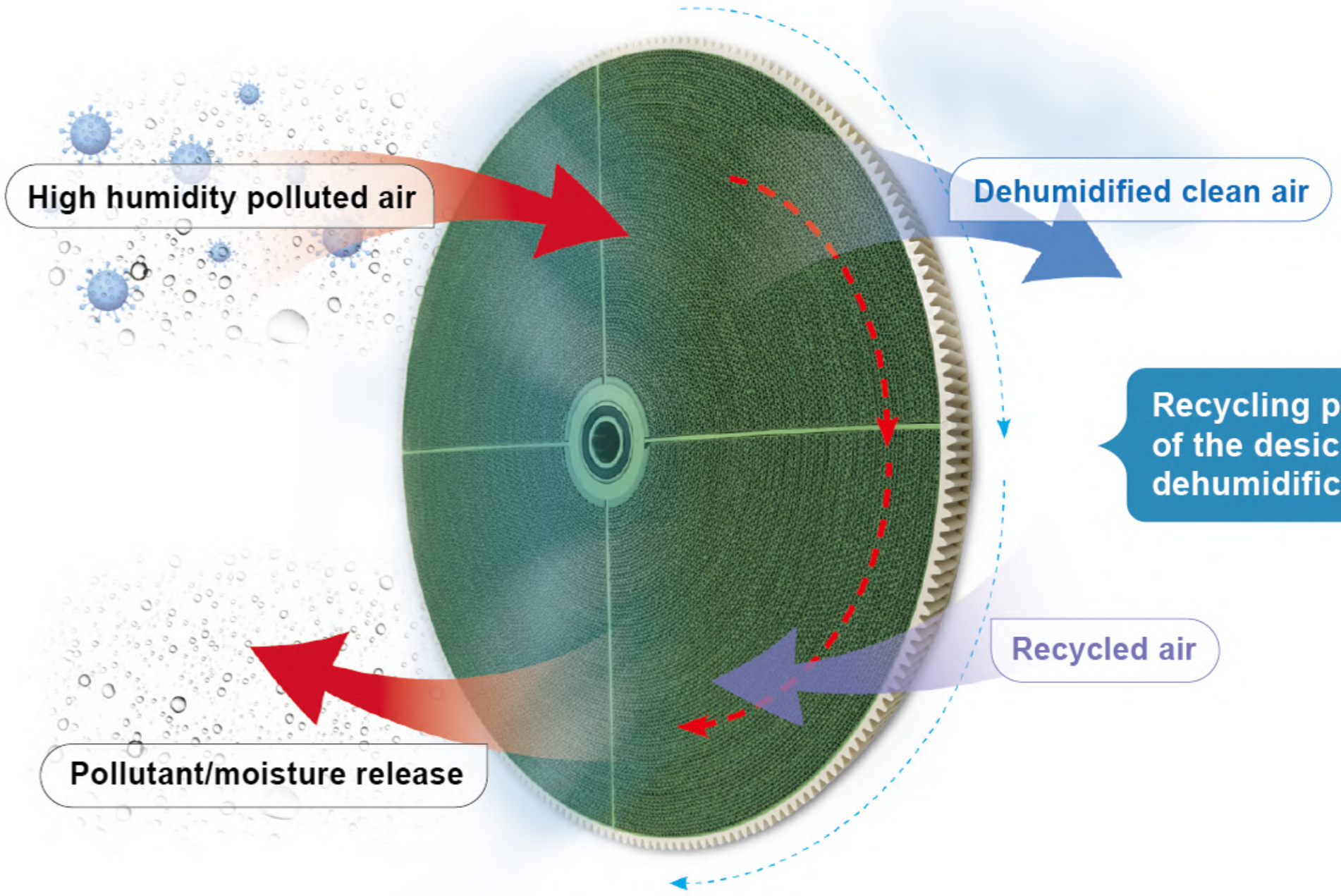
HUMICON has an outstanding advantage in the function compared with dehumidifiers, air purifiers, and clean ventilation products.
In particular, mold prevention of the inside of the device and the diffuser and excellent energy efficiency have been proven in certified tests.

| Classification | | Existing products | HUMICON |
|---|---|---|---|
| Dehumidification | Dehumidification efficiency (L/kWh) | 2~2.5 | 3.5 or higher |
| | Discharge temperature | 40~50℃ (heater discharge temperature) | Room temperature (no temperature rise) |
| | Water bottle management | Needed | Not-Needed |
| | Dehumidifying filter management | Non-renewable, replacement required | Self-renewing, no replacement required |
| | Room temp. increase | Y | N |
| | Airborne bacteria reduction | X | O (99.9%) |
| | Airborne virus reduction | X | O (98.7%) |
| | Air purifying function | △ | O |
| | Ventilation function | X | O |
| | Deodorization function | △ | O |
| Airpurification | Fine dust removal | O | O |
| | Removal of ultra-fine dust | O | O |
| | Clean filter mgmt. | Replacement needed | Recycling after cleaning the main filter |
| | Ventilation function | X | O |
| | Antibacterial, antifungalmgmt. | O | O (99.9%) |
| | Ozone Suppression of Electrostatic Dust Collection Filter | X | O (ppm 0.0027) |
| Ventilation | Total heat exchange efficiency (cooling) | 45%~55% | 65~70% |
| | Total heat exchange efficiency (heating) | 65~70% | 70~72% |
| | Moisture Exchange Efficiency | 20% | 70% |
| | Device condensation | Y | N |
| | Anti-condensation heater heat loss | 80% | 0% (anti-condensation heater not required) |
| | Duct (air passage) condensation | Y | N |

- HUMICON can dehumidify below 35% even at 26 ℃.
- Compared to electric dehumidifiers with the same cooling capacity, it has more than 140% dehumidification performance.
- When circulating indoor air and supplying outside air, antibacterial, antifungal, and deodorizing are possible through the built-in polymer dehumidifying agent.

# Desiccant dehumidification Filter

The desiccant filter is a recycling filter not a replacement filter, which is comprised of eco-friendly materials that are safe to human. It is a new technology developed by the Korea Institute of Science and Technology (KIST) and patented in the US and Korea.




## Excellent desiccant dehumidification filter

※ 122 related patent applications, 83 registrations, 8 technology transfers (32 implementation patents)

2022 Selected as an excellent government procurement product/ selected as a baby unicorn company

2021 Won New Product Certification (NEP) certification from the Ministry of Trade, Industry and Energy

2020 Won Excellent Performance Certification from the Ministry of SMEs and Startups

Selected as a priority purchase product for excellent inventions recommended by the Korean Intellectual Property Office of the Korea Invention Promotion Association

2018 Selected as 'Top 10 Mechanical Technologies of the Year' on Machinery Day

Received a commendation from the Minister of Land, Infrastructure and Transport on the Day of Mechanical Equipment

2017 Won Green Technology Certification from the Ministry of Environment for Polymer Moisture Absorption and Desorption Material Technology.

New Excellent Technology (NET) from the Ministry of Trade, Industry and Energy

2015 International Institute of Refrigeration,

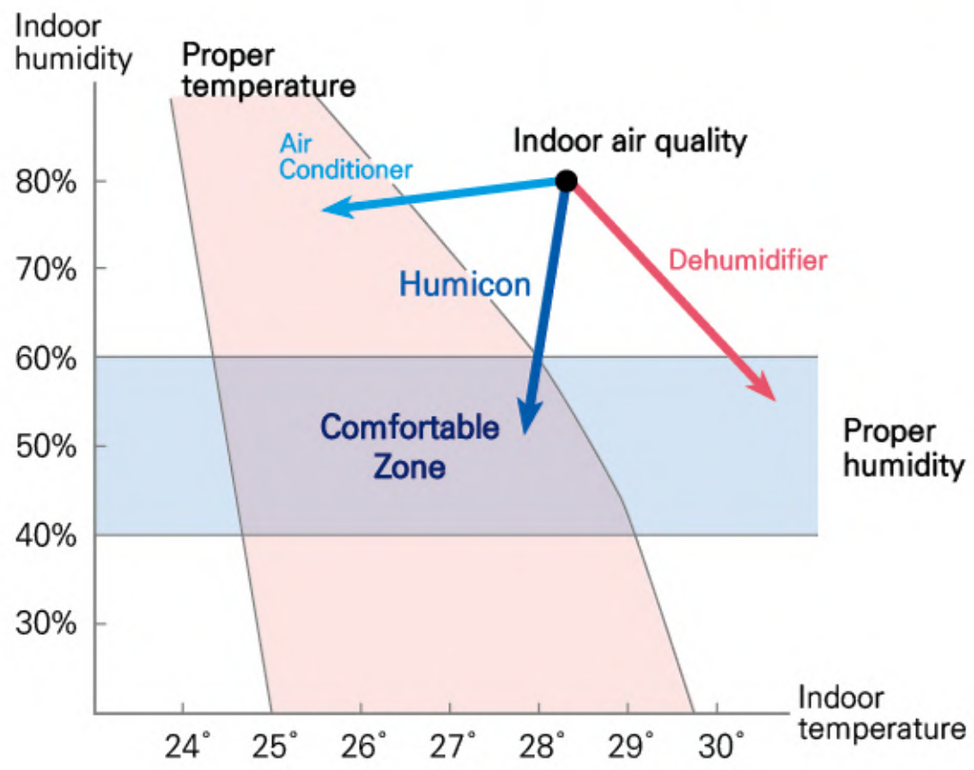
2014 Won the Patent Technology Award from the Korean Intellectual Property Office for the Polymer Moisture Absorption and Desorption Material

2012 Received Presidential Commendation for Invention Merit on the 47th Invention Day

2010 Polymer Moisture Absorption and Desorption Material patented in Korea and the US

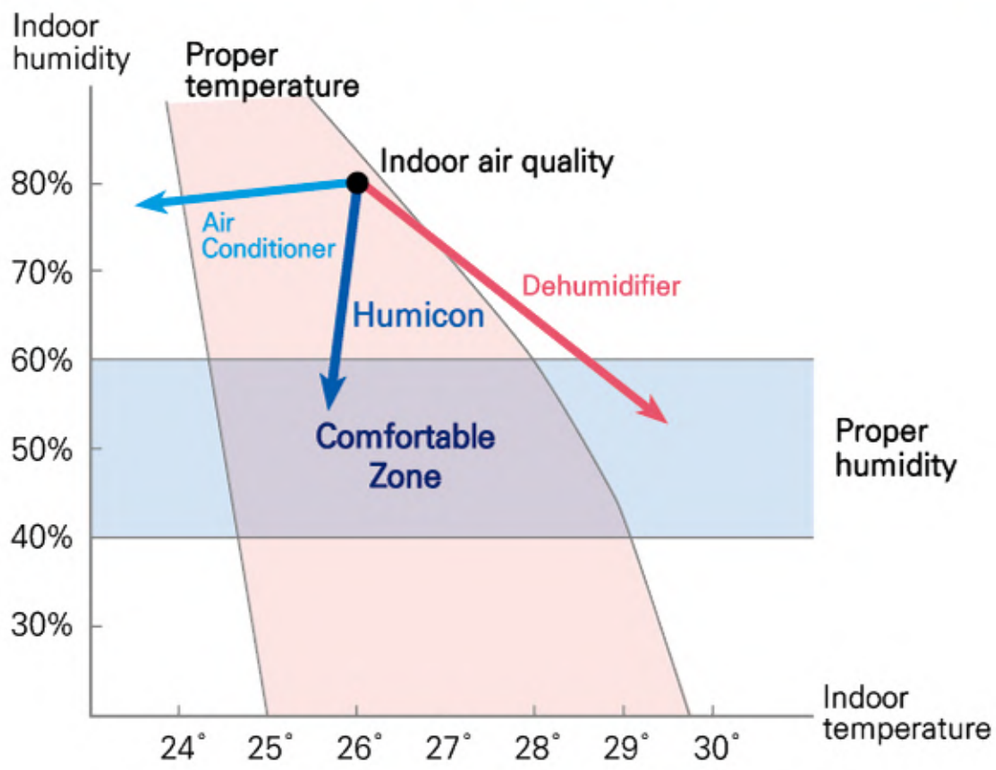
# Desiccant dehumidification vs Air conditioner dehumidification

## Hot weather, high humidity




| AIR CONDITIONER | HUMICON |
|---|---|
| To dehumidify, air conditioner lowers the temperature. Although the temperature has dropped, the indoor humidity has increased, making it difficult to feel comfortable. | Humicon only removes moisture without changing the temperature. Therefore, it can quickly lower the indoor humidity and make you feel comfortable. |

## Not hot, high humidity




| AIR CONDITIONER | HUMICON |
|---|---|
| To dehumidify the indoor air, the air conditioner must lower the temperature below the proper temperature. However, the excessively low temperature makes you feel cold. | Humicon maintains proper humidity even without lowering the temperature, so it reduces the perceived temperature and solves the issue of air conditioner sickness. |

## Dehumidification method by device

| | HUMICON | AIR CONDITIONER | DEHUMIDIFIER |
|---|---|---|---|
| Principle of operation | Humidity based | Temperature based | Temperature based |
| Temperature | Slightly decreased | Decreased | Increased |
| Humidity | Decreased | Slightly decreased | Decreased |
| How to get rid of moisture | Discharged to the outside | Discharged to the outside | Internal storage(Bucket) |

### ▸ HUMICON's dehumification principle

HUMICON captivates moisture from the air and adsorbs it to the desiccant filter regardless of temperature. The moisture that has been absorbed is slightly heated and discharged to the outside. You can quickly achieve the proper humidity and get a cooling effect that reduces the perceived temperature by controlling only the humidity.

### ▸ Air conditioner's dehumidification principle

The principle of air conditioner dehumidification is to remove moisture by causing condensation by cooling air as it passes through a cold cooling plate. However, once the air conditioner reaches the specified temperature (e.g. 26°C), the humidity cannot be lowered any further. The only way to reduce humidity is to reduce the temperature.

# HUMICON, Desiccant dehumidification & clean ventilation solution used all year around

Manage indoor air pleasantly and comfortably throughout the four seasons!

Reduce the use of air conditioners and employ desiccant cooling to resolve the air-conditioning problem brought on by the significant temperature difference between inside and outside.

Create a conducive environment for good sleep during the rainy season and hot summer nights.

When humidity falls by 5%, the perceived temperature falls by 1°C. Create a breath of fresh air by using desiccant dehumidification.

Solve condensation problems caused by differences in indoor and outdoor humidity by managing proper humidity.

With a 98.7% reduction in airborne viruses, you can create an environment where viruses cannot live indoors.

If you're worried about heat loss when ventilating in the cold winter, Humicon is the best solution.

Must maintain proper humidity to reduce house dust, mites and mold, which are the causes of allergies and rhinitis.

Due to a lack of ventilation, odor accumulates throughout the house. Utilize Humicon's powerful deodorization function to solve the problem.

When you are afraid to ventilate due to external fine dust, you can now ventilate without concern.

## Intuitive room control UX

### Easy to check your indoor air quality.

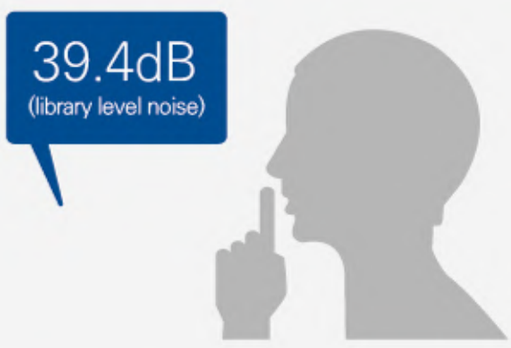
The HUMICON controller is designed so that users of all ages can easily recognize and control real-time air quality.

## More efficiency, less electricity

### 40% savings on annual expense

Because an air conditioner and a dehumidifier must be used in tandem to achieve the desired temperature and humidity, electricity bills are high. With Humicon, you can save money on your electricity bill.

## HUMICON without noise




### Dehumidification and ventilation without noise

When measuring the noise of the HCR-350E Model, it is very quiet at 39.4dB. Less than 40dB means quiet residential or library level noise.

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# Why you need HUMICON in your house

| | |
|---|---|
| Point 1 | With ceiling-type installation, make not only the air in the house, but also the space in the house pleasant. |
| Point 2 | No ducts and diffusers where mold lives! Stay healthy with dehumidifying and anti-fungal performance. |
| Point 3 | Stop placing dehumidifiers and air purifiers in each room. |
| Point 4 | Stop worrying about the cold wind from the air conditioner. Keep all rooms comfortable with proper humidity endured by desiccant cooling . |
| Point 5 | Integrated operation of air conditioner, dehumidifier, air purifier, and ventilation system into one, even reducing electricity bills. |

## Convenient SMART Funtion

- HUMICON is a TOTAL SOLUTION that can comprehensively provide desiccant dehumidification, air purification, and ventilation functions along with humidity control.
- HUMICON can measure air conditions such as indoor humidity, temperature, carbon dioxide, fine dust, and ultrafine dust in detail, and prioritize them to control the indoor air in the desired direction.
- HUMICON maintains the best indoor air quality by automatically diagnosing the current condition and operating without the user having to manually set it.

## Product information

Choose the proper HUMICON model that is best suited to the indoor space.
With HUMICON, you can create a pleasant and healthy indoor environment.

| Model name | Use Area (㎡) | Air volume (CMH) | | | Total heat exchange efficiency (%) | | Dehumidification amount | Dehumidification efficiency | Power(W) | | Power source | External dimensions (mm) | | | W.T | Filter method |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | High | Med. | Low | Cooling | Heating | (L/day) | (L/kWh) | Dehumidification | Ventilation | | W | L | H | (kg) | |
| HCR-250E | 60 | 300 | 250 | 200 | 70 | 73 | 42 | 3.3 | 530 | 100 | 1/220/60 | 750 | 900 | 300 | 60 | Filtered |
| HCR-350E | 100 | 400 | 350 | 300 | 71 | 72 | 64 | 3.5 | 752 | 120 | 1/220/60 | 750 | 1000 | 350 | 70 | Electronic |
| HCR-500E | 160 | 600 | 500 | 400 | 66 | 71 | 87 | 3.6 | 1024 | 200 | 1/220/60 | 900 | 1170 | 430 | 90 | Electronic |
| HCR-800E | 260 | 900 | 800 | 600 | 65 | 71 | 127 | 3.4 | 1553 | 288 | 1/220/60 | 1040 | 1380 | 500 | 120 | Electronic |
| HCR-1200E | 380 | 1400 | 1200 | 900 | 65 | 72 | 194 | 3.5 | 2290 | 441 | 1/220/60 | 1043 | 1433 | 550 | 140 | Filtered |

## Keep the same temperature, and let HUMICON control the proper humidity with the most efficient Desiccant Dehumidification & Clean Ventilation Solution.

To reduce the survival rate of airborne viruses by maintaining proper humidity as well as ventilation

| Restaurant, Cafe

| Study Room, Study Cafe

| Fitness centers, indoor sports facilities

Seasons sensitive to temperature changes,
Health management by proper humidity management without temperature change

| Day Care Center, Kindergarten, School

| Postpartum care centers, hospitals

| Nursing facilities, day and night care centers

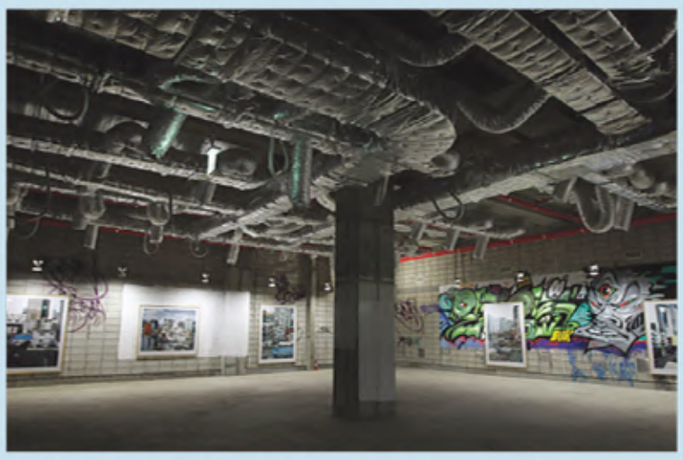
If it needs to preserve moisture-sensitive products,

| Museums, performances and exhibition facilities

| Archives, server rooms

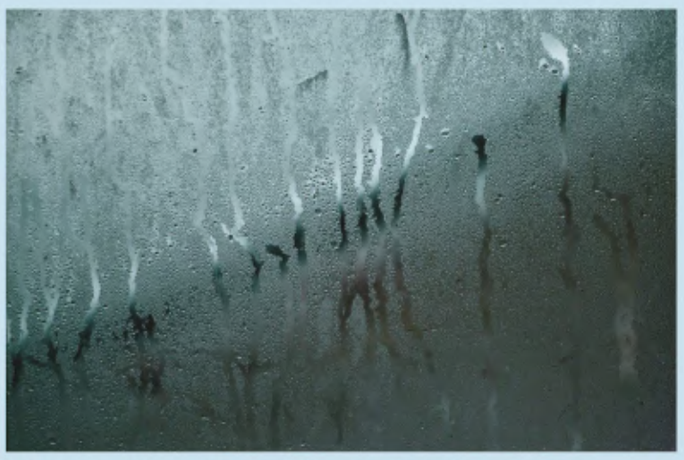
| Product warehouses, distribution warehouses

If you worry about the absence of an appropriate humidity control solution,



| Underground space humidity control

| Alternatives for the air conditioner less-use campaign in public institutions



| Prevention of condensation in winter

By the ‘Desiccant Dehumidification’,
getting rid of the humidity
without temperature change

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Creating fresh and comfort
indoor Air quality by
Desiccant Dehumidification

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Innovative Desiccant Humidity
control as well as ERV
(Energy Recovery Ventilation)

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Complete removal contaminants and
fine dust. Excellent air purification
with patented material

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