



■ ■ ■ ■ ■ UV-C made in Germany

UV-C Disinfection in HVAC systems

Heating, ventilation and air conditioning

Risks through pandemics

Numbers of infections and deaths

COVID-19

- > 660.000 victims through the 2019-nCoV
- > 16.500.000 infected by the corona virus

SARS

- > 1.000 victims in Asia through SARS
- > 8.000 infected

Ebola

- > 11.000 victims through Ebola
- > 21.000 infected

MERS

- > 500 victims through MERS
- > 1.500 infected





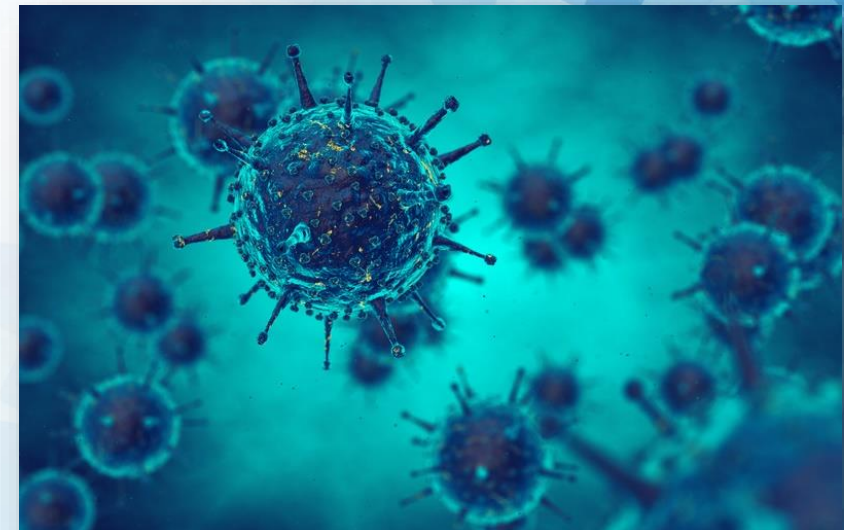
Risks with HVAC systems



Airborne transmission diseases

High risks of infection

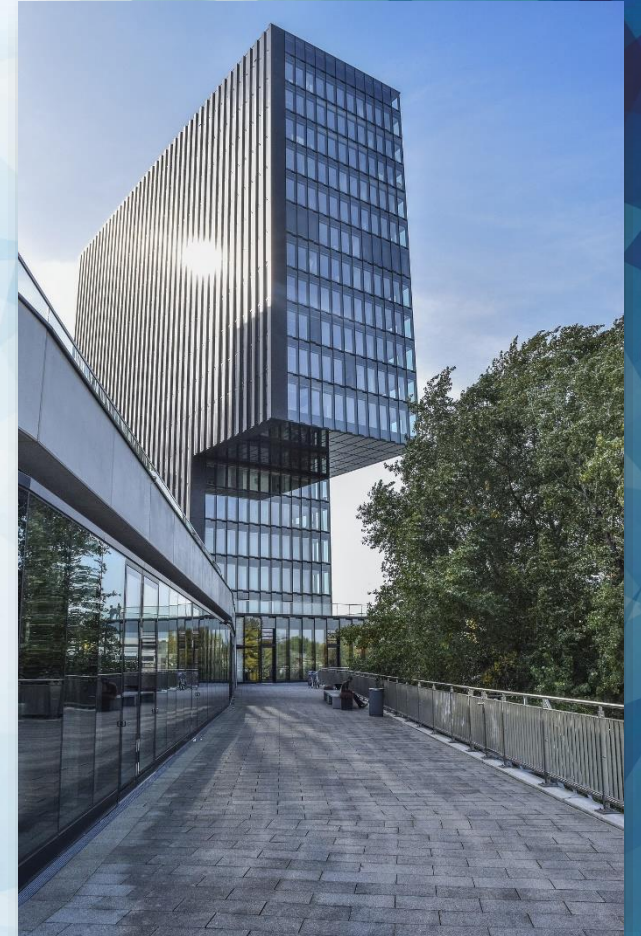
- Diseases with airborne transmission:
 - *The common flue*
 - *Influenza*
 - *Chickenpox*
 - *Mumps*
 - *Measles*
 - *Tuberculosis*
- The coronavirus which causes COVID-19 has been considered to be transmitted via larger respiratory droplets from coughing, sneezing and talking
- However, there are some cases where the transmission of the coronavirus was airborne
- Smaller droplets of virus particles are not settling down, they hang in the air and can be breathed in by people



Heating, ventilation, and air conditioning (HVAC)

Risks through HVAC systems

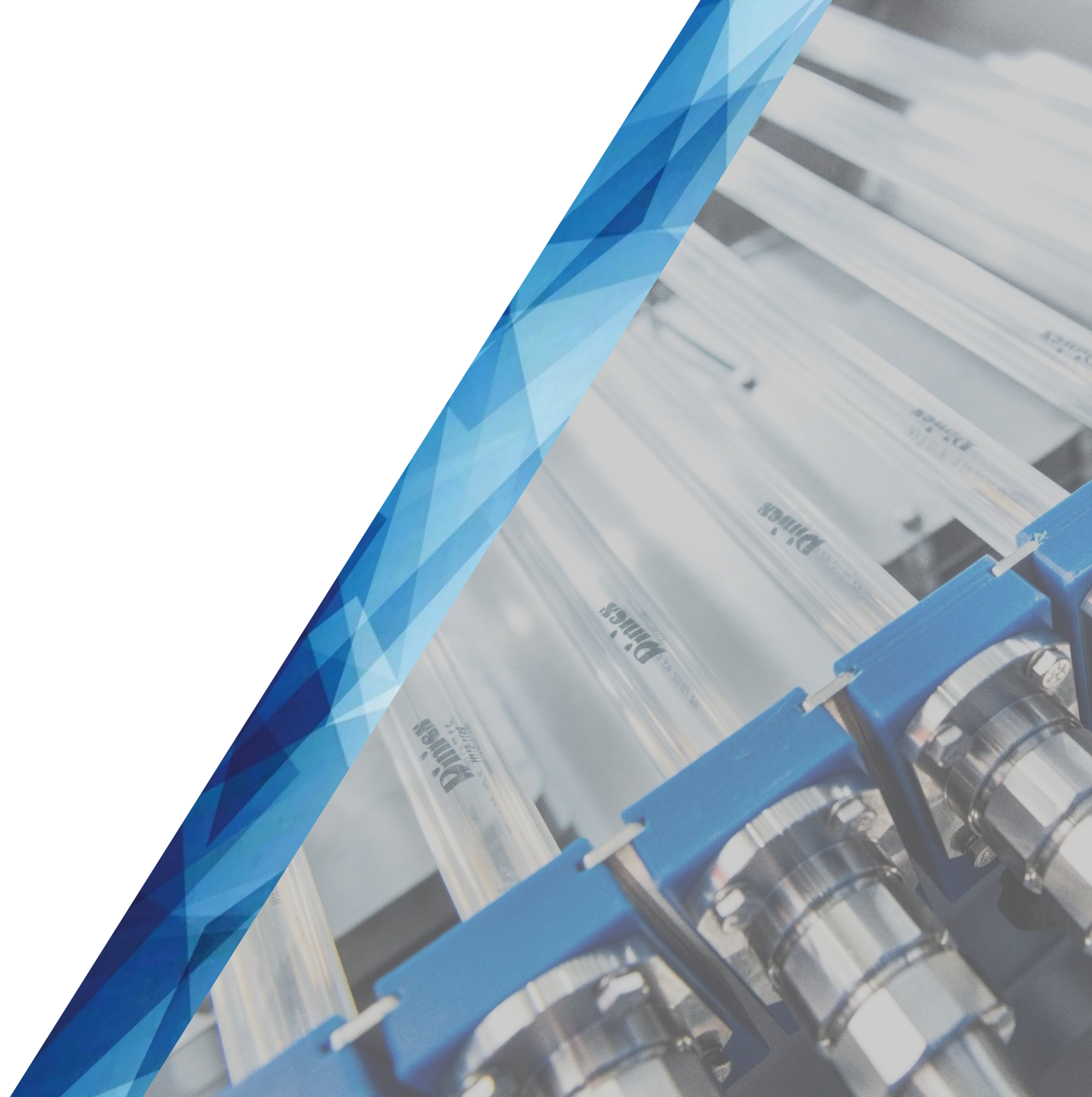
- The goal of HVAC systems is to provide acceptable and healthy indoor air quality
- However, they pose large microbial contamination risks and can spread viruses and bacteria everywhere
- That is why a high-quality HVAC system needs something to disinfect the air properly
- Property owners and building managers need to find a solution
- UV-C light can be used as a disinfection method inside the HVAC systems to clean the air and control fungal growth in places that are difficult to access





UV-C light

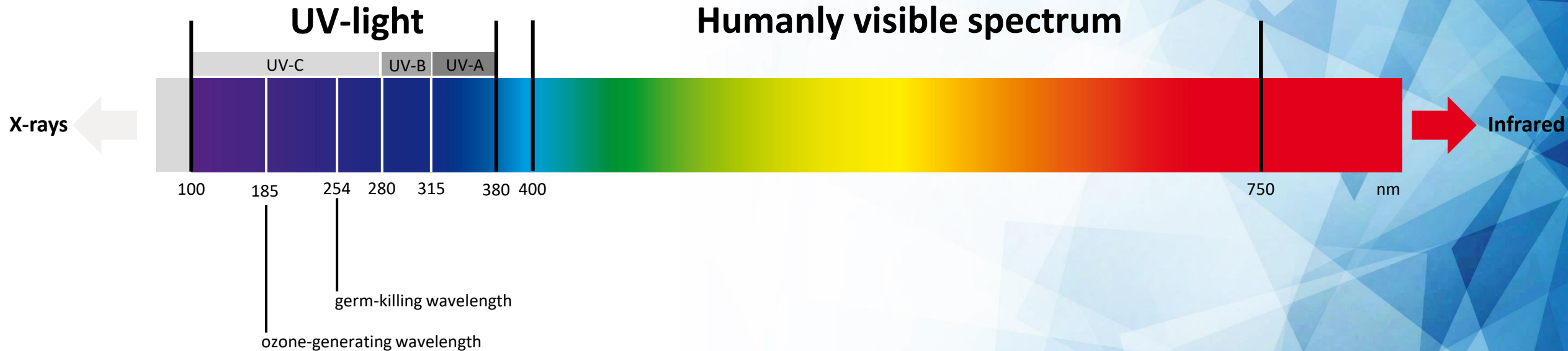
More Information



What is UV?

How does it work?

UV light is invisible to the human eye, but it can be used to eliminate microorganisms.



4 Factors for UV disinfection

What is important?



1.



2.



3.



4.

-
1. Microorganisms
 2. Distance
 3. UVC power
 4. Time

Important radiation doses

Lethal doses to kill microorganisms

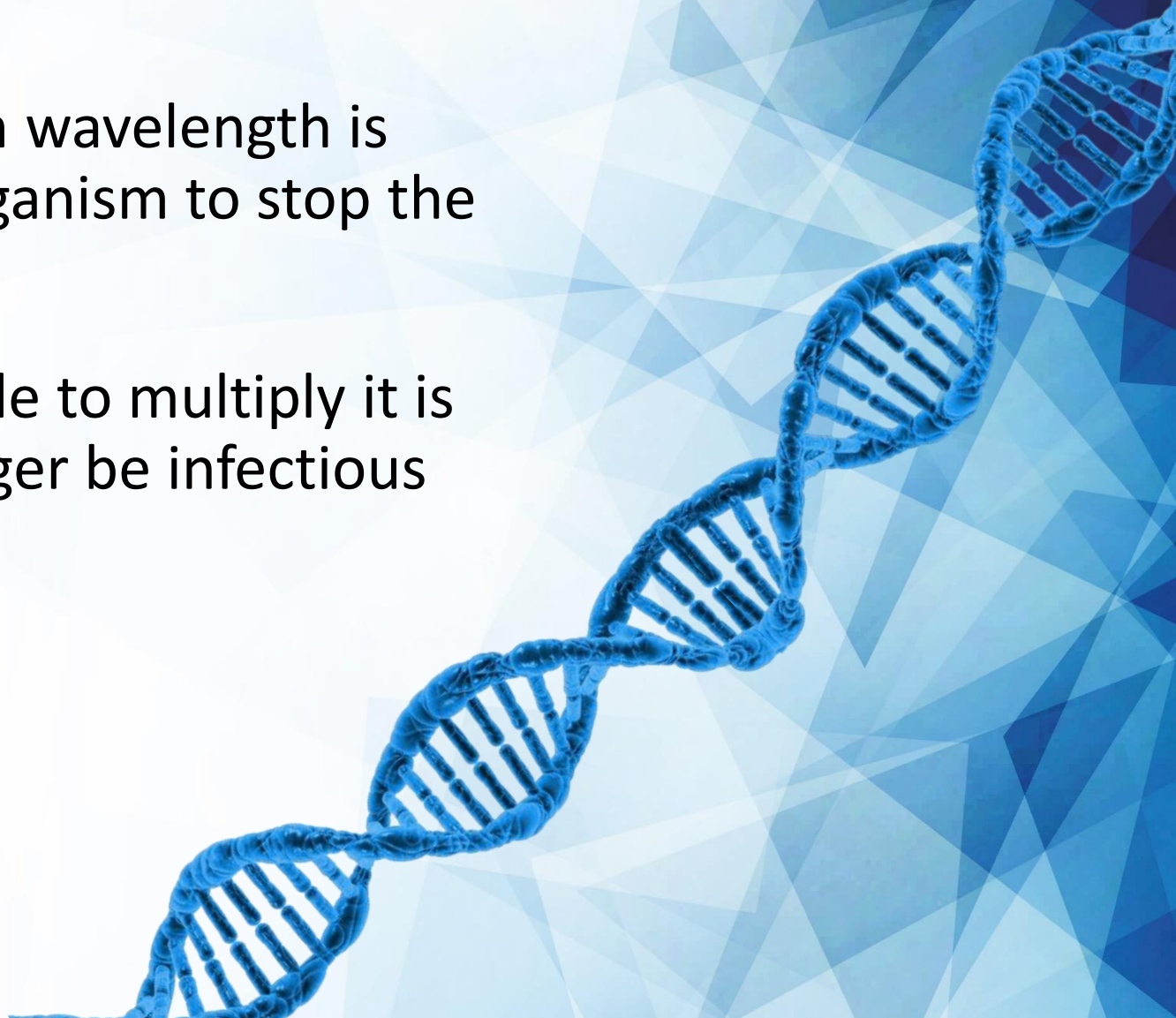


Microorganism	Distance	Radiation dose*	Time
Bacteria			
Escherichia coli	5 cm	9 mWs/cm ²	0,74 sec
Legionella pneumophila	5 cm	2,8 mWs/cm ²	0,23 sec
Mycobacterium tuberculosis	5 cm	30 mWs/cm ²	2,46 sec
Viruses			
Influenza virus	5 cm	10,2 mWs/cm ²	0,84 sec
SARS-CoV-2	5 cm	16,4 mWs/cm ²	1,23 sec
Mold spores			
Aspergillus niger	5 cm	396 mWs/cm ²	32,46 sec

*radiation dose necessary for 90% disinfection / log 1

UV-C disinfection

What is happening?

- The UV-C irradiation with 254nm wavelength is modifying the DNA of a microorganism to stop the reproduction
 - When a virus or bacteria is unable to multiply it is considered dead and can no longer be infectious
 - Very short deactivation time
 - Resistance is impossible
- 

Use of our UV light products is safe for humans

No direct exposure to the UVC rays

- Direct contact with UV rays is dangerous for humans
- However, our products can be used safely with NO risk of harm
- The UV light is part of an enclosed system and the disinfection takes place inside the robust casing
- As a result, our products can be used in rooms while people are there
- Our products comply with high quality standards and they have passed several safety tests



UV-C light

Summary



Disinfection up to 99.9%

Chemical free

Very effective and quick disinfection method

Low maintenance and inexpensive

Elimination of all microorganisms

UV-C light against Covid-19

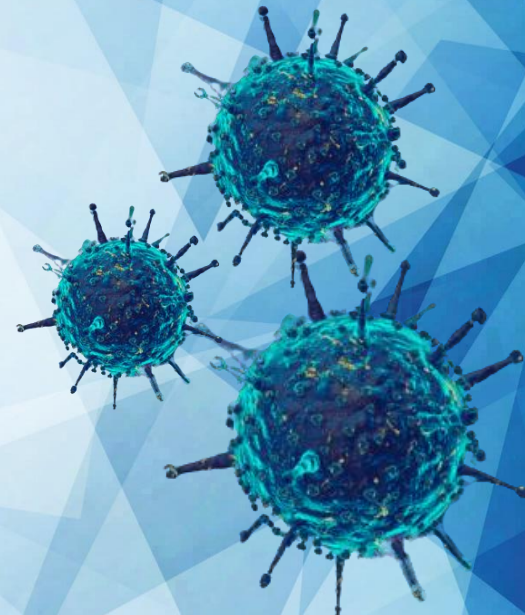
Studies

Stability of SARS Coronavirus in Human Specimens and Environment and Its Sensitivity to Heating and UV-C Irradiation

→ Study can be found here [Link](#)

Inactivation of severe acute respiratory syndrome coronavirus in platelet concentrates by ultraviolet C light and in plasma by methylene blue plus visible light

→ Study can be found here [Link](#)





UV-C Solutions

For HVAC systems



In-duct UV disinfection



In-duct UV disinfection

HVAC disinfection module

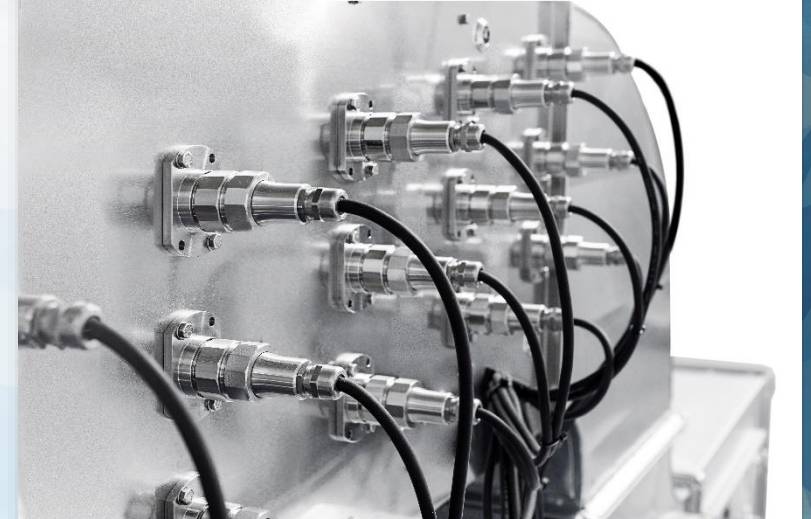
- The duct disinfection module is just placed inside the duct line
- It is a plug-and-play module available in different configurations
- The UV-C lamps are equally spread in the duct module to get the best disinfection result of the passing air
- According to HACCP & VDI 6022



Easy lamp replacement

In-duct UV disinfection

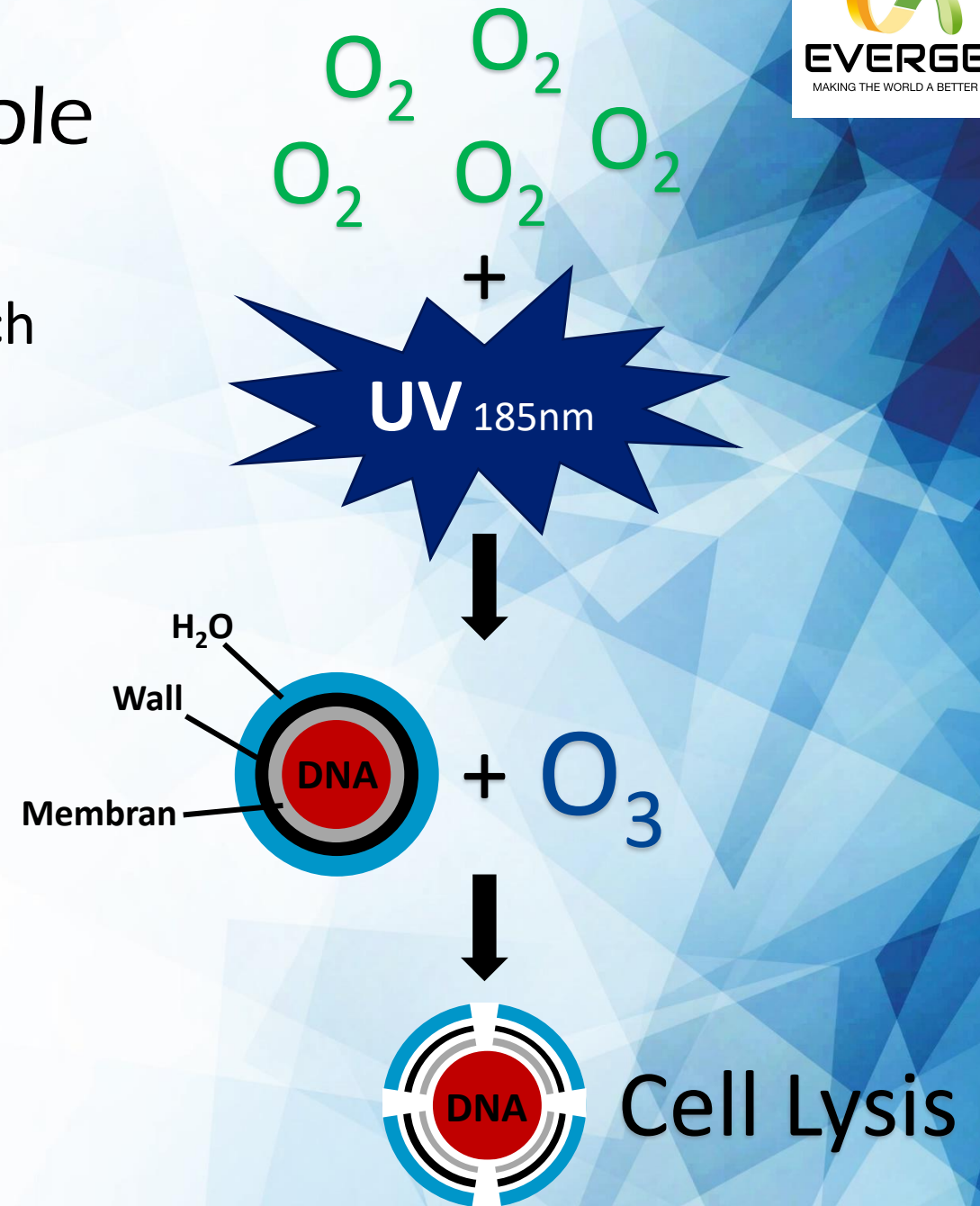
- The lamps can be easily changed from the outside
- No additional service door is necessary
- It is not necessary to switch off the system



Optional ozone lamps possible

In-duct UV disinfection

- Optional ozone lamps can be added which create ozone out of the oxygen in the air
- The result is a self-cleaning duct system and fresh air in the rooms
- O₃ is a very powerful oxidizing agent which eliminates odors, bacteria, spores, viruses and much more
- Only oxygen, water, carbon dioxide, nitrogen and other non-hazardous substances remain as residues.



Two possible options

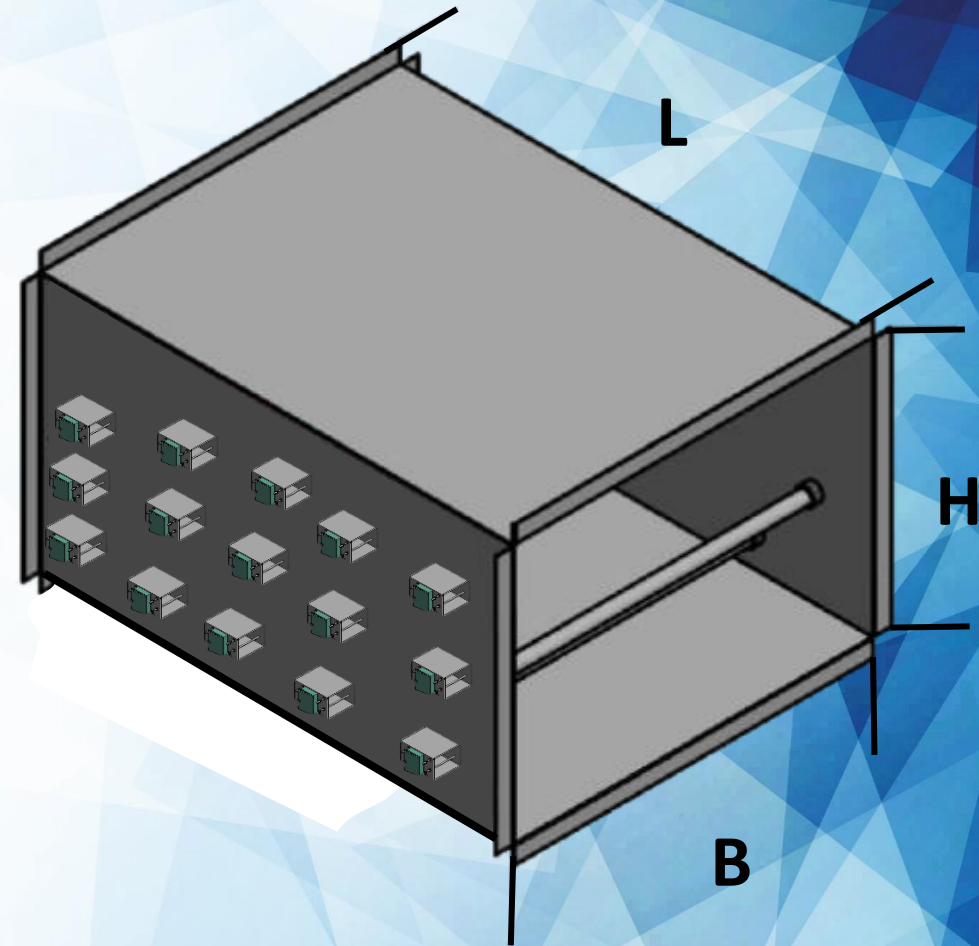
Specifications

1. For existing systems

- *you provide the dimensions*
- *you make a hole according to our plans into your existing in-duct system*
- *we deliver only the drawer frame with the UV lamps*

2. For new system

- *you provide the dimensions*
- *we deliver the complete in-duct system with in-duct part, drawer frame and UV lamps*



What we need from you

In-duct UV disinfection

- Air volume of the air-con system
 - *Max. air flow in m^3/h*
- Dimension of the duct
 - *Width (B), height (H) and length (L) of duct in mm*
- Duct design
 - *Only drawer frame for UV lamps (no duct part) or complete in-duct system?*
- UV disinfection
 - *UV disinfection only with UV or including ozone for smell reduction?*
- Additional Features
 - *Air flow measurement? Remote maintenance?*



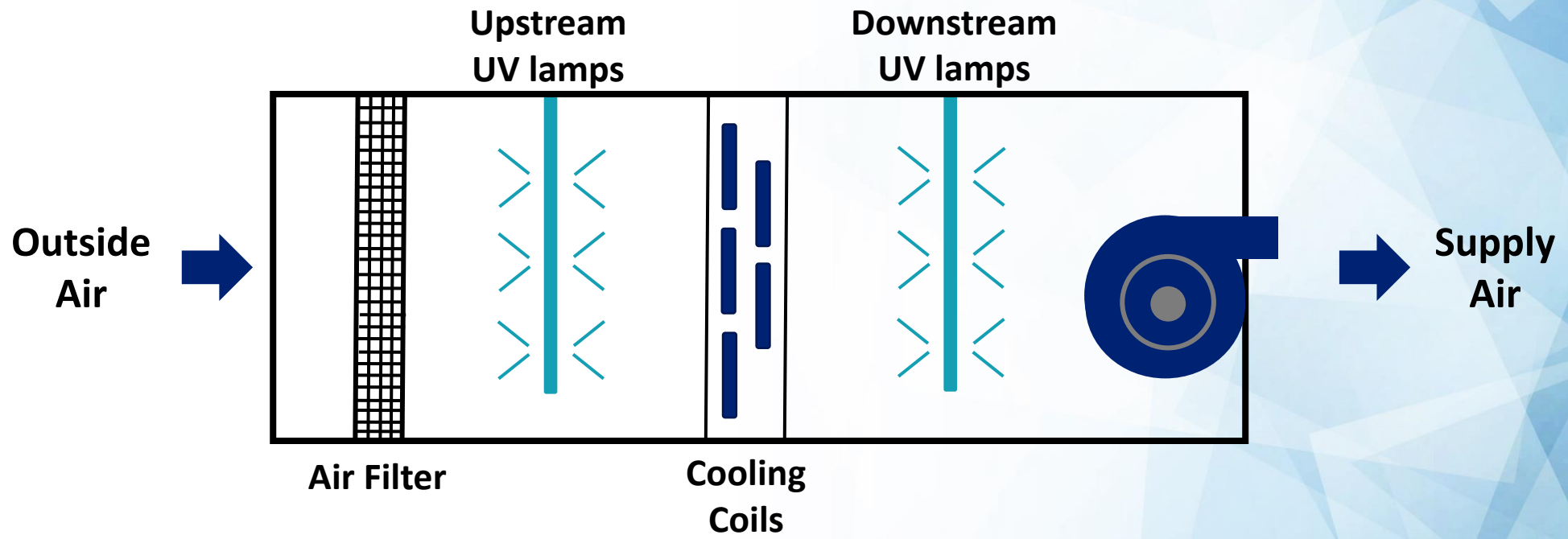
UV disinfection in air handling unit



UV disinfection for air handling unit

Graphic

The UVC disinfection lamps can be placed on both sides of the cooling coils: downstream and/or upstream in a distance of 250mm from the cooling coils.



What we need from you

UV disinfection for air handling unit

- Cooling coil size
 - *in mm*
- Air volume of the air-con system
 - *Max. air flow in m³/h*



UV disinfection of air washer



Risks with air handling units

UV disinfection system for air washer

- Air washers in central air conditioners are critical spots for the air quality
- If the air washers are not properly maintained, the conditions for the growth of microorganisms is ideal
- The air washer can become a breeding ground for germs
- The bacteria and viruses can then spread to every room through the air ducts



UV disinfection system for air washer

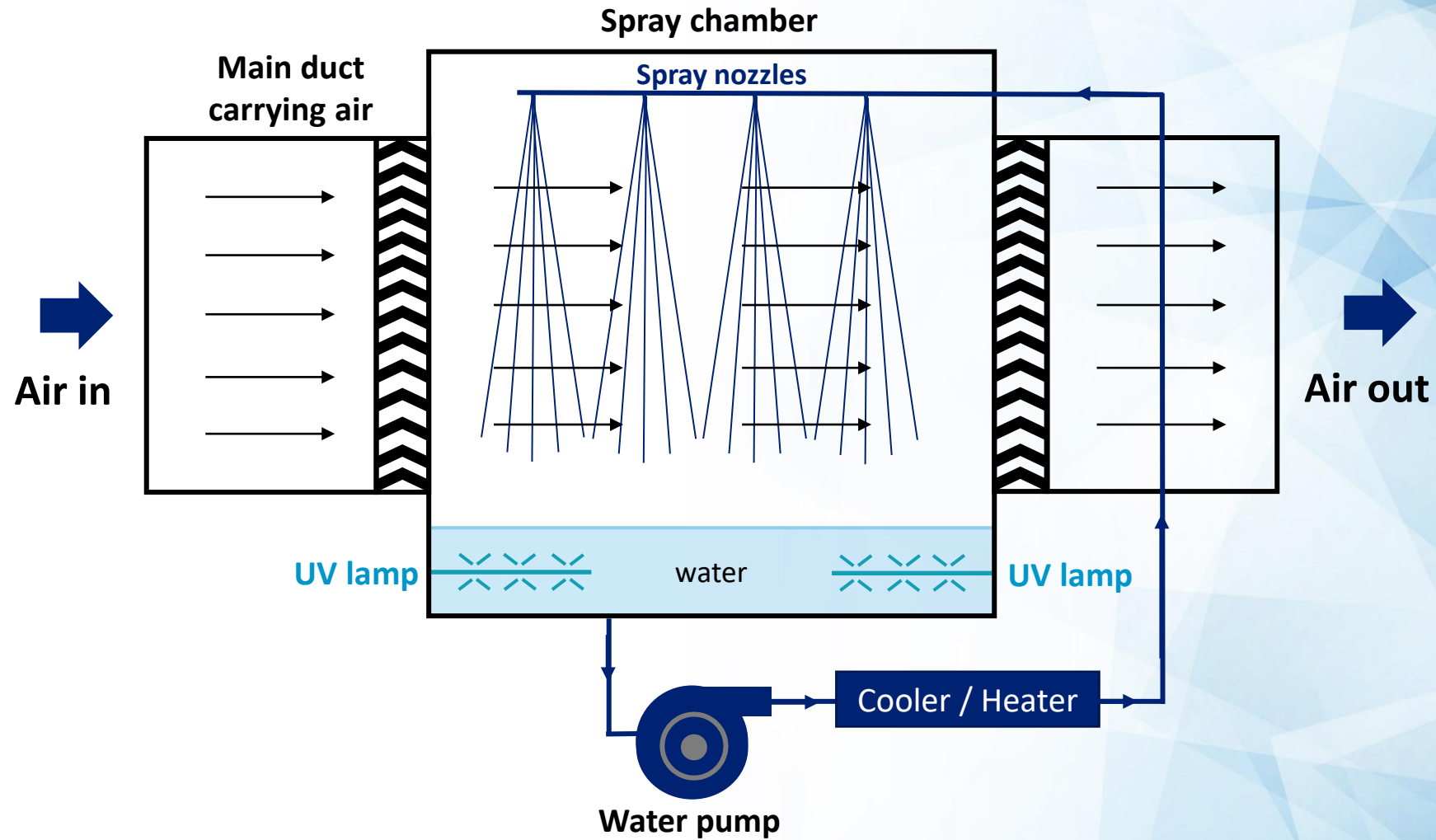
HVAC disinfection module

- ESS immersion lamps are mounted in the water basin of air washers.
- The UV-C light kills the germs in the water immediately.



Graphic

UV disinfection system for air washer



UV-C immersion lamp

UV disinfection system for air washer

Basin size	Lamp power	ES Model
100l	30W	ES40-357
500l	40W	ES48-436
1000l	90W	ES90-846
2000l	120W	ES119-1149
5000l	260W	2 x ES119-1149



UVCO Control System



UVCO Control System

LEM disinfection module

- Multiple UVC lamps can be monitored and controlled with the UVCO control system
- With the integrated PLC control system various parameters such as UV intensity, air flow and operating times can be measured and monitored easily
- Previously defined deviations can be transmitted acoustically, visually, via SMS, email, etc.

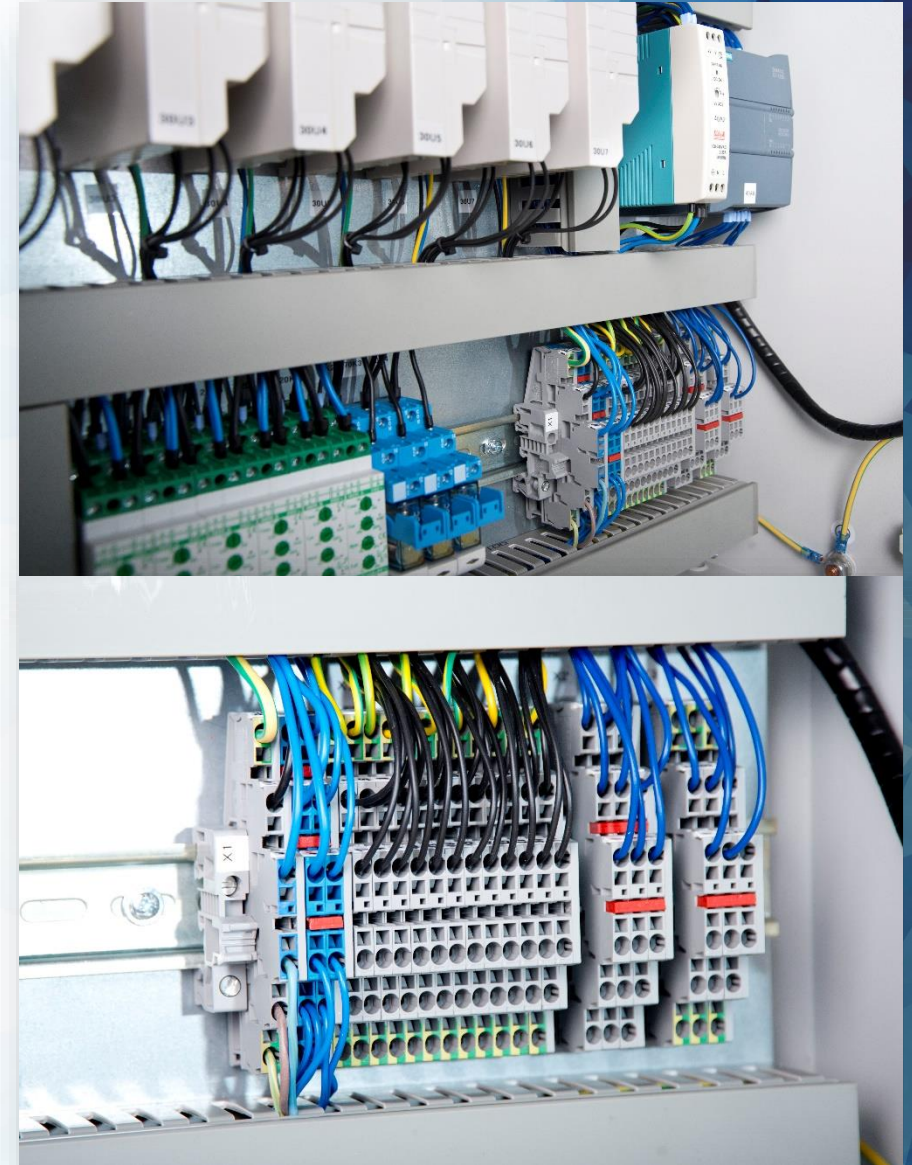


UVCO Control System

LEM disinfection module

With the UVCO controlling unit we are able to:

- Monitor the lamps
- Control the life time of the lamps
- Give alarms (visual & acoustic)
- Measure UV power (optional)
- Measure air flow (optional)



Thank you for your attention



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