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PURION UV plants for disinfection

Value added of an integration into kitchen equipment

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The company PURION® GmbH develops and manufactures UV systems for the disinfection of water, air and surfaces

Summary: Company data

General Data

- Founding of the Company: 2006
- Certified according DIN EN ISO 9001 : 2008
- All systems are developed and produced at the location of the company PURION® in Germany.
- Projects in Germany, Austria, Spain, Switzerland, Portugal, Denmark, Thailand, Brazil, Haiti,...

Products

- Disinfection plants for water, air und surface disinfection based on UV-technology
- Actually as radiation source low pressure mercury lamps are mainly used

Research

- Research on future UV-technologies in cooperation with German universities
- Member of the “Advanced UV for life” group: joint development of UVC-LED “point of use” systems within the program “twenty20 – Partnership for innovation” (funded by German Federal Ministry of Education and Research)

PURION products are Made In Germany – for more information visit our website: www.purion.eu

Water

- Drinking water
- **Kitchen equipment**
- Aquariums, Pools
- Fish ponds
- Water of air conditioning
- Disinfection of permeate

Air

- Breweries
- Dairies
- Bakery
- **Kitchen equipment**
- Packaging industry
- Breeding farms

Surfaces

Configuration Options

I. Operating Time Counter (OTC)

Observation of the life time of the UV lamps.

II. Operating Power Detection (OPD)

Observation of the uvc-irradiance of the UV lamps.

PURION has many years of experience in the field of technical implementation - PURION UV plants have been already widely integrated into kitchen equipment

Selected References PURION UV-plants

References	Issues
BLANCO BOMBARDIER the evolution of mobility HAMANN AG HITACHI Inspire the Next hansgrohe	▪ UV - equipment for kitchens on trains to disinfect water ▪ UV - equipment for hotel projects to disinfect air in storage rooms, cooling chambers and areas of food production ▪ UV - equipment for kitchens on boards of yachts and lager vessels

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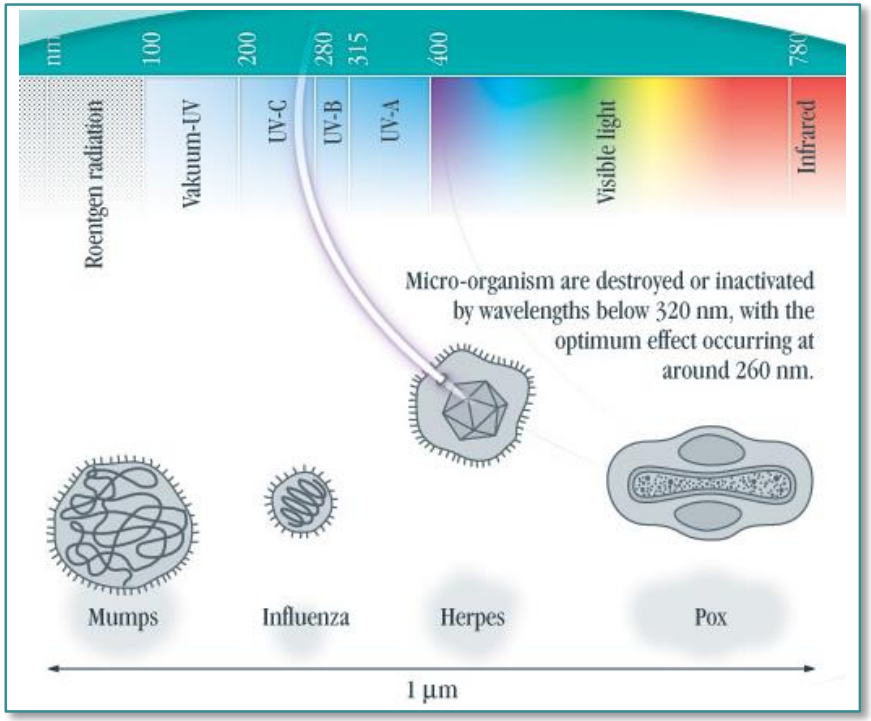
UV-C radiation is an effective method to disinfect water without toxic impact - Microorganism are destroyed or inactivated by wavelength below 280 nm (UVC)

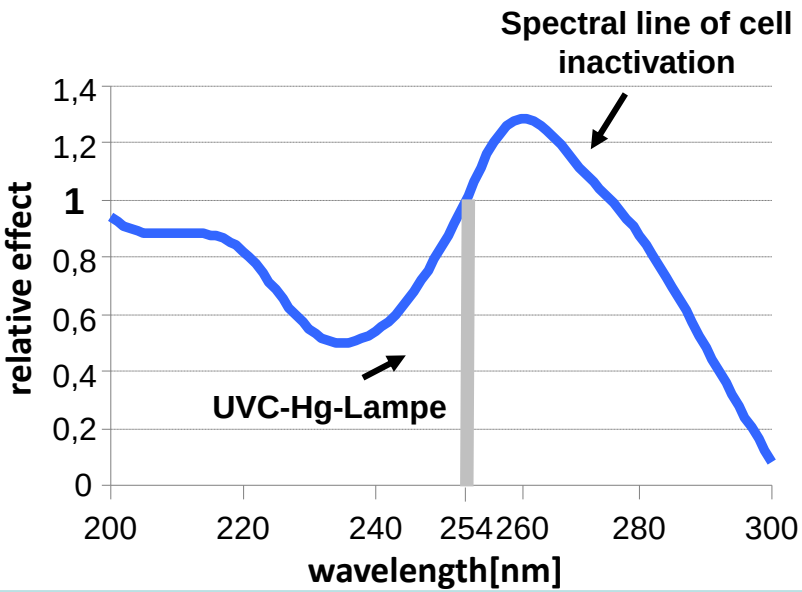
Fundamentals of UV-based disinfection

Characterization of UV-C radiation

- Part of electro-magnetic radiation bounded by: the lower wavelength extreme of the visible spectrum and the upper end of the X-ray radiation band
- Spectral range: 100 - 400 nm (invisible to human eyes)
  → UVC: ~180nm – 280nm (short wave radiation)



Disinfection effect of the UV radiation



- The absorption spectrum of the DNA is characterized by a maximum at a wavelength at 260 nm
- UV lamps with wavelength between 240-290 nm can be used for „inactivation“ of bacteria's
- The PURION UV lamps emits a wavelength of 254 nm and are therefore optimal for disinfection purposes

Via adjustment of the UV dose the required level of disinfection can be ensured

Basis for designing UV-plants

UV radiation dose – key parameter for the disinfection performance of an UV-plant

- → dose (J/m²) = radiation power (W/m²) * dwell time (sec)
- → for many bacteria's the radiation dose for a level of disinfection (inactivation – IA) of 90% or 99% is known

bacteria	Lethal dose with a degree of efficiency of 90%	Lethal dose with a degree of efficiency of 99%
Bakterium coli	7 J/m² for 90% IA	14 J/m² for 99% IA
Influenza	31 J/m² for 90% IA	62 J/m² for 99% IA
Poliovirus	30 J/m² for 90% IA	60 J/m² for 99% IA
Eberthella typhosa	22 J/m² for 90% IA	45 J/m² for 99% IA

Between the dose and the level of disinfection exists an exponantial relation

For disinfection of air via active turnover of air (intake of air actively) PURION has developed the product family AIRPURION active

UV based disinfection of air: AIRPURION active

AIRPURION active

- The device consists of a matt anodized and completely closed aluminum frame.
- Wiring system and the electronic cut-in unit are integrated into the frame.
- Lamp failure or cable breaking are being internally controlled and duly signaled.

- during operation of the plant staff can stay in the room
- example application: disinfection of air in the food production industry

Recommendations for installation

- installation should be at the ceiling
- the intake port should be directed towards doors or other potential sources of microbial contamination

  → additional convection via heating systems, air conditioning systems etc. can increase the turnover of air
- to avoid two way influence of several AIRPURION active devices the plants should not be installed in a row but in parallel

- specification of the UV plants and the optimal location for installation to be derived from the room volume and the room geometry

The different models are characterized by different turnover of the ambient air, different UVC-intensity and therefore different UV disinfection performance

Comparison: AIRPURION active models

AIRPURION® 48 active	
disinfection grade of 80%	approximately 100 m³ of ambient air in permanent operation: approximately 300 m³ of ambient air
disinfection grade of 88%	approximately 45 m³ of ambient air
turnover of the ambient air	24 m³/h
housing dimensions (length x width x height in mm)	1000 x 105 x 105
weight	6 Kg
life time of lamps	10.000 h
number of lamps	1
maximum temperature.	40°C
electrical connection (optionally)	110-240 V 50/60 Hz
total power	48 W
over current protection	10 A

AIRPURION® 90 active	
disinfection grade of 80%	approximately 100 m³ of ambient air in permanent operation: approximately 550 m³ of ambient air
disinfection grade of 88%	Approximately 75 m³ of ambient air
turnover of the ambient air	36 m³/h
housing dimensions (length x width x height in mm)	1000 x 105 x 105
weight	6 Kg
life time of lamps	10.000 h
number of lamps	1
maximum temperature.	40°C
electrical connection (optionally)	110-240 V 50/60 Hz
total power	90 W
over current protection	10 A

The AIRPURION active plants are designed to meet the required minimum dose of UV intensity for a 99% disinfection of the actively intaken AIR

Comparison: required lethal dose and performance of the AIRPURION active

Bacteria's (selection)	Lethal dose with a degree of efficiency of 99%	AIRPURION 48 active guaranteed minimum dose	AIRPURION 90 active guaranteed minimum dose
Bakterium coli	14 J/m² for 99% IA	69 J/m²	65 J/m²
Influenza	62 J/m² for 99% IA		
Poliovirus	60 J/m² for 99% IA		
Eberthella typhosa	45 J/m² for 99% IA		

- The guaranteed minimum of the AIRPURION 48 active and the AIRPURION 90 active exceeds the lethal dose for the bacteria's
- Disinfection performance of 99% of the intaken air is ensured

Disinfection performance of the AIRPURION active plants has been confirmed by reputable german research institutions

AIRPURION active: confirmation of disinfection performance

GMBU

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Confirmation of technical design and performance of the UV plant AIRPURION active 48

1. Technical system:

The AIRPURION 48 active consists of a closed cabinet made from aluminium. The ambient air is taken in the housing actively via ventilator. Inside the housing the air is routed closed to the UV lamp. The maximum distance between the UV lamp und the air to be disinfected is 30 mm. After disinfection the air is leaving the housing. The cabling and the electronic ballast are integrated inside of the housing.

UVC High Output Lampe	total power: UVC power: life time:	48 W ca. 18 W 10.000h
ventilator	turnover of the ambient air: 24 m³/h	
electrical connection	110-240 V 50/60 Hz	
housing's type of protection	IP 54	

Table 1: technical data AIRPURION 48 active

inflow of air — AIRPURION 48 active — outflow of air

Illustration: schematic design AIRPURION 48 active

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	guaranteed minimum dose AIRPURION 90 active
	65 J/m²

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Confirmation of technical design and performance of the UV plant AIRPURION active 90

1. Technical system:

The AIRPURION 90 active consists of a closed cabinet made from aluminium. The ambient air is taken in the housing actively via ventilator. Inside the housing the air is routed closed to the UV lamp. The maximum distance between the uv lamp und the air to be disinfected is 30 mm. After disinfection the air is leaving the housing. The cabling and the electronic ballast are integrated inside of the housing.

UVC High Output Lampe	total power: UVC power: life time:	90 W ca. 32 W 10.000h
ventilator	turnover of the ambient air: 36 m³/h	
electrical connection	110-240 V 50/60 Hz	
housing's type of protection	IP 54	

Table 1: technical data AIRPURION 90 active

inflow of air — AIRPURION 90 active — outflow of air

Illustration: schematic design AIRPURION 90 active

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	guaranteed minimum dose AIRPURION 90 active
	65 J/m²

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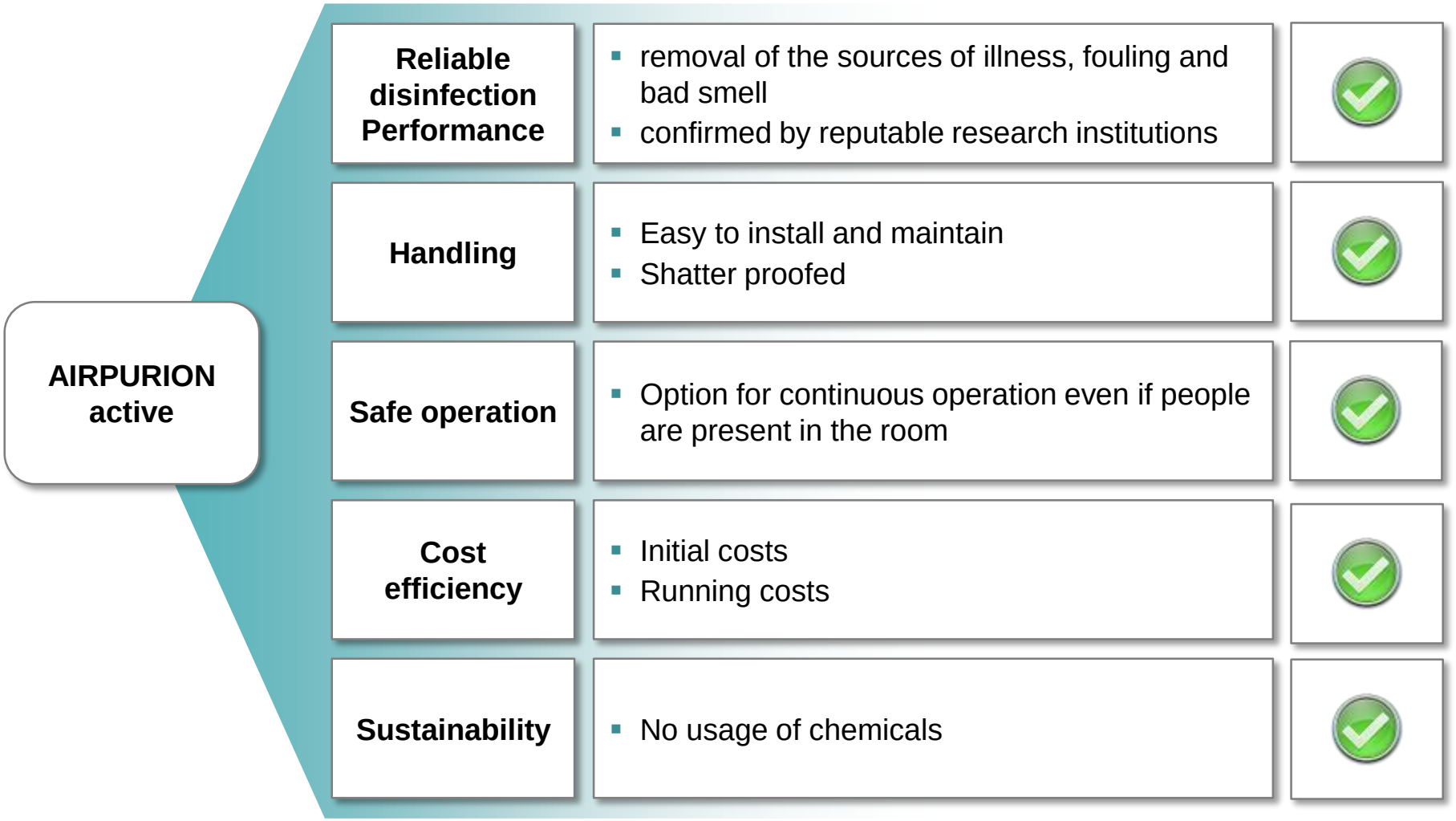
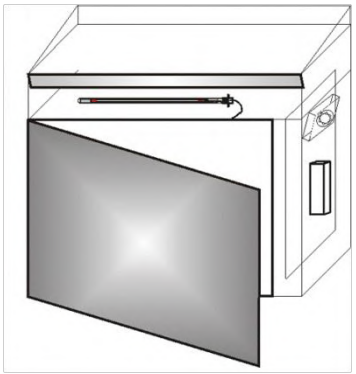
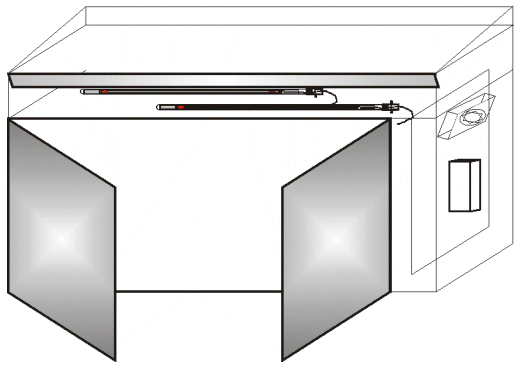
Integration of AIRPURION active UV plants into the kitchen equipment implies various important advantages

Summary: advantages of AIRPURION active



Outlook: currently PURION is in the last lap of the development of PURION UV Cabinets to disinfect knifes etc.

PURION UV Cabinet active

PURION UV Cabinet active	PURION UV Cabinet MAX active
1 x UV lamp 17W	2 x UV lamp 17W
Monitoring of the life time of the UV lamp	Monitoring of the life time of the UV lamp
Internal dimension: 500 x 600 x 150 (width x height x depth)	Internal dimension: 1000 x 600 x 150 (width x height x depth)
turnover of the cabinet air: 24 m³/h	turnover of the cabinet air: 24 m³/h
Capacity: approx.18 knifes	Capacity: approx.32 knifes
	

Value added compared to existing solutions

- Active turnover of the air inside the cabinet
- Monitoring of the life time of the UV lamp
- Safety mechanism: UV lamp switches off automatically when the doors is opened
- Splinter protection

Available from Q2 2016

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