DynaM'eau

UV & Ozone Water Disinfection

UVOX-Redox

– a trendsetting and chemical free way of water purification

The UVOX-Redox technology combines the oxidizing effect of ozone with the disinfecting effect ultraviolet light and initiates meanwhile a highly effective advanced oxidation process (AOP) in one single system.

The UVOX-Redox 2000 water purification system offers:

- triple water treatment as result of the irradiation by one type of lamp
- UV-Disinfection up to 99,9% killing-off of all pathogens
- ozone oxidation of many persistent substances
- advanced oxidation process (AOP) reducing e.g. THM, Chloramine and TOC's
- increase of the oxygen content
- savings on chemicals, water and energy
- economical- and ecological water purification
- limited maintenance without endangering water quality

The UVOX-Redox measurement and control system delivers:

- permanent UV monitoring by means of UV-Detector
- DVGW/ÖNORM certified UV-Measurement
- controlling of the ozone output by means of Redox potential
- booster venturi injectionsystem
- system-check by means of internal and external temperature measurements
- (semi-)automatic cleaning of the quarz sleeves
- turn-key systems for many applications

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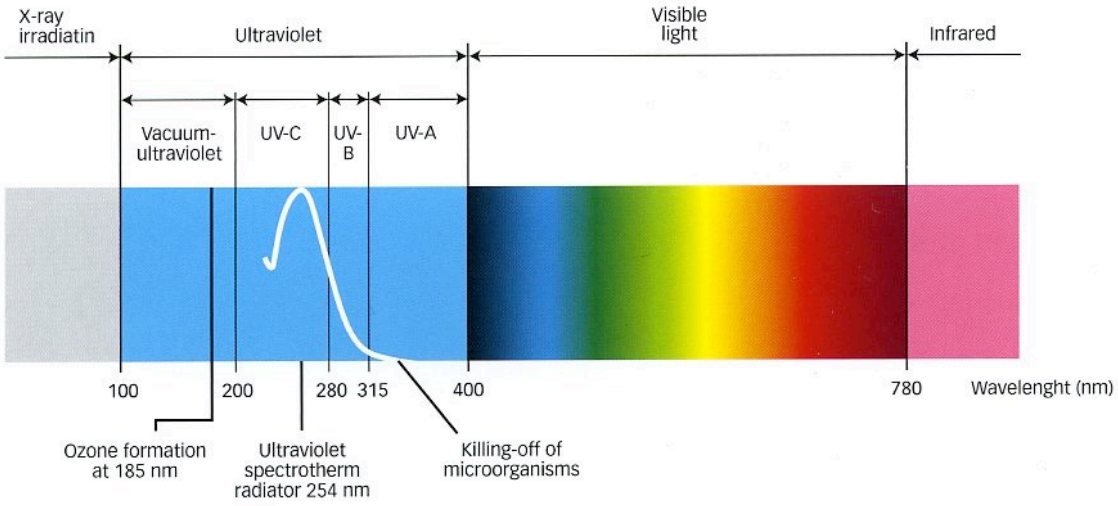
The sun as a role model

The sun radiates light in different wave lengths nanometer (nm) to the earth. Some light is visible (colour spectrum) and some is not. For the preparation of water, however, only ultraviolet light with a wavelength of 185 to 315 nm is of importance.

The ultraviolet rays of the sun kill off dangerous microorganisms within seconds, thus preventing further spreading. The primary damage to the microorganisms during ultraviolet irradiation is based on a photosensitive alternation of the nucleic acids, which prevents cell division. A very effective disinfection is accomplished through this. The most efficient disinfection is achieved by ultraviolet rays with a wavelength of 254 nm.

Ozone (O_3) is formed as a result of the UV-irradiation of oxygen (O_2) with 185 nm. It breaks down easily upon formation of oxygen and is thus deemed to be a good disinfectant and oxidant of many water dissolved persistent substances.



The UVOX process

The UVOX process was invented by Mr. ing J.J. Berson as a further development of the ultraviolet technology. By means of an ultraviolet lamp produced especially for Wapure:

Air is irradiated with ultraviolet light with a wavelength of 185 nm.

- **Ozone is built out of oxygen**
  The oxygen in the air is converted into ozone by means of this ultraviolet irradiation. Ozone leads to oxidation of the pathogenic germs in the water (bacteria, viruses and algae) and parasitic dissolved matter.

This air mixture is injected into the water cycle by means of a venturi injection system.

- **The Advanced Oxidation Process (AOP)**
  The ozone in the water is converted into OH^- radicals, whereby the relative oxidation potential is increased from 1.52 (value of ozone) to 2.05 (value of OH^- radicals). The remaining ozone content is destroyed.

  OH^- radicals have the greatest oxidation power and can reduce a variety of very persistent substances (such as: nitrite, cyanide, plant protectants, pesticides, chlorinated hydrocarbons, hydrosulphides, other odours, humic substances, pharmaceutical products).

- **UV-Disinfection**
  Very efficient killing-off (up to 99.9%) of the germs and pathogens takes place by means of ultraviolet light irradiation (254 nm).

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Measuring and controlling UV and ozone – safe and efficient

Wapure International stands for 35 years of experience in research and development of water purification systems with ultraviolet irradiation, ozone oxidation and advanced oxidation. The main objective of Wapure is to push ahead with environmentally friendly, safe and healthy water purification equipment and making this technology available for smaller budgets. Wapure International attaches particular importance to the quality and performance assurance of its systems. The UVOX-Redox measurement and control systems therefore have absolute priority.

UV-Disinfection: the minimum UV-Dosage in order to guarantee a 99,9% killing rate of all pathogens.

A prerequisite for every UVOX-Redox System is a defined irradiation dose of at least 25 mJ/cm² at the end of lamp life, which is calculated as a function of:

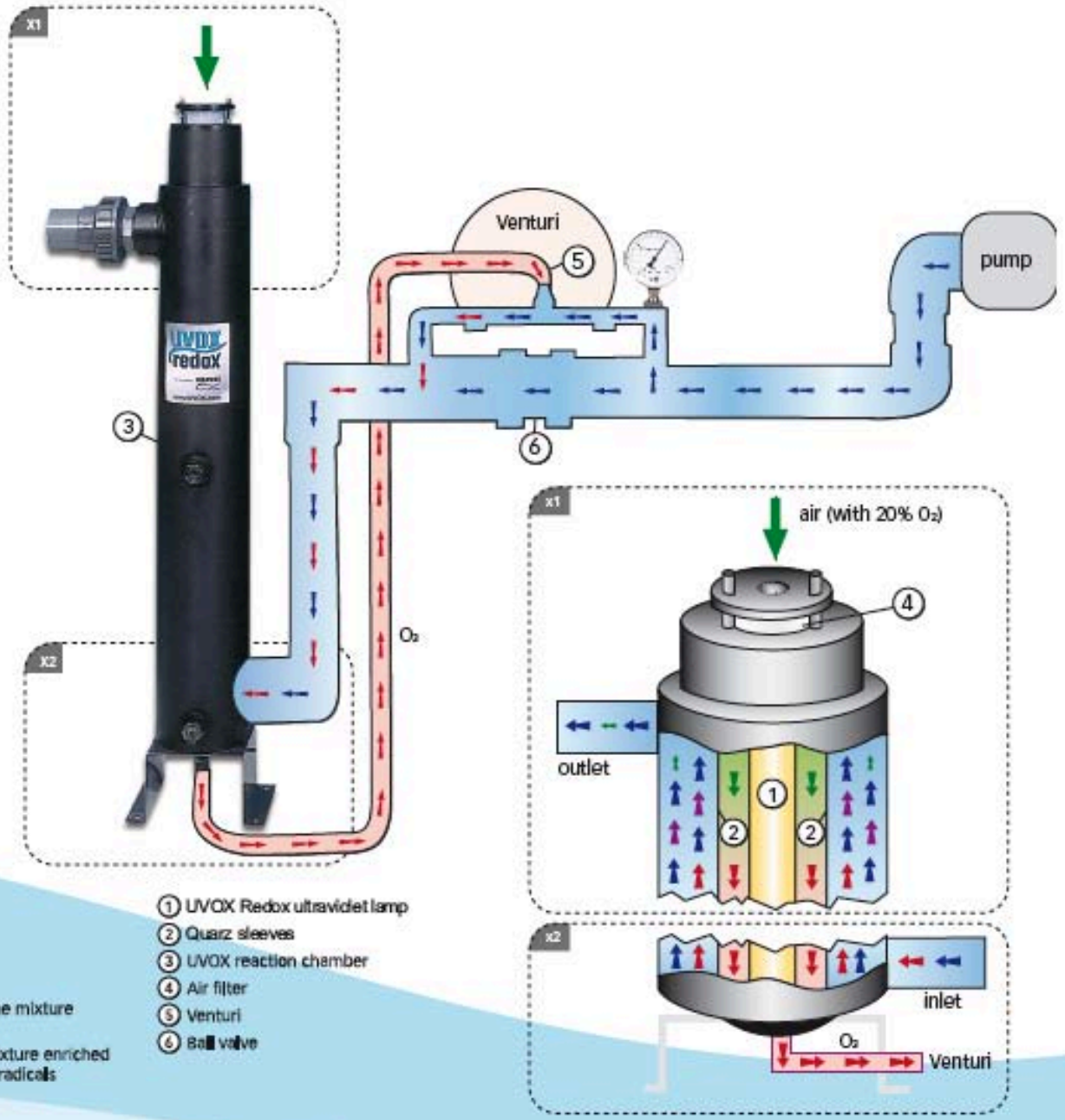
- Lamp output in UV light (254 and 185 nm)
- the layer density
- the clouding of the water
- the dwell time of the cells in the ultraviolet light, which results again from the flow rate.

This minimum ultraviolet irradiation dosage leads to a killing-off rate of 99,9% of all pathogens, like bacteria, viruses and algae, when passing through the UVOX System once.

The optimal dosage of ozone and the advanced oxidation process (AOP):

The needed amount of ozone depends on various factors and therefore differs to a large extent. A redox measurement gives insight in the actual oxidation power of ozone (and therefore its concentration) at time of measurement. The concentration of ozone is determined by the increase in redox potential as result of the injection of the ozone. In case there is sufficient dissolved ozone left in the water, when passing through the UVOX reaction chamber, the Advanced Oxidation Process (AOP) will automatically be accomplished in order to reduce various persistent compounds.

In order to measure the effectiveness of the Advanced Oxidation Process, a two point redox measurement will be made in order to adjust the sucking in performance of the UVOX injection system.



UVOX-Redox UV-Compact

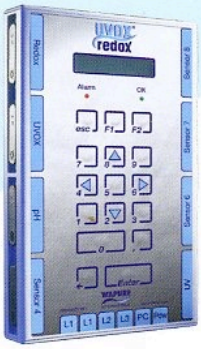
The UVOX-Redox UV-Compact measurement and control system guarantees an optimal monitoring and an efficient operation of the UVOX-System.

UVOX-Redox UV-Compact measures the UV-Intensity and therefore guarantees the minimum killing rate of all pathogens in the water, such as bacteria, viruses and algae.

Functions:

- controlling the UV- intensity in %
- controlling the temperature of ballast and lamp
- monitoring the water and system temperature.
- lamp life and system life counting
- integration of the electronic ballast

UVOX-Redox Pilot



Especially for private pools, natural ponds, (koi) ponds, fishhatcheries and zoos, the UVOX-Redox pilot takes over the complete monitoring and controlling of the water quality and therefore guarantees pure and crystal clear water.

Beside measuring and controlling of water parameters, such as p.H., Redox and temperature, it also can automatically operate the backflush of the filter. The UVOX-Redox Pilot is even able to forward alarm function to your mobile phone.

experience in ultraviolet technology
More than 30 years

Details

The minimum UV intensity (254 nm):

UV-Intensity	Killing Rate in %	
	E.Coli	Algae
50,00 mJ/cm²	99,99 %	99,00 %
25,00 mJ/cm²	99,90 %	90,00 %
12,50 mJ/cm²	99,00 %	45,00 %
6,45 mJ/cm²	90,00 %	22,50 %
3,12 mJ/cm²	45,00 %	11,00 %
1,50 mJ/cm²	22,50 %	5,50 %

Quality assurance and service

Wapure International attaches particular importance to the quality assurance of its services. Rely on more than 30 years of experience in ultraviolet disinfection and oxidation. The UVOX systems are produced in Germany in compliance with **DIN** and **ISO 9001**.

The UVOX systems have been tested by a leading and independent international test institute for water purification (KIWA in the Netherlands).

The application areas and minimum UV-dosage:

Class	Application	minimum UV-dosage in mJ/cm²
A	Drinking Water	25,00 mJ/cm²
B	Process Water	12,50 mJ/cm²
C	Swimming Pools	12,50 mJ/cm²
D	Natural Pools, Swimming Ponds (without Algae)	25,00 mJ/cm²
E	Ponds, Fishhatcheries, Aquariums, Zoos	12,50 mJ/cm²

Maximum flow rates for the applications:

UV-Transmission T=10 > 90%		maximum flow rates in m³ in different classes:				
UVOX-System	lamp-type	A	B	C	D	E
UVOX-200	Wapure 20 H 100 W	—	4,30	12,00	6,00	12,00
UVOX-250	Wapure 20 H 100 W	—	4,80	14,00	8,00	14,00
UVOX-300	Term. Spectr. 120 W	6,40	12,80	35,00	18,00	35,00
UVOX-350	Term. Spectr. 120 W	7,20	14,40	40,00	20,00	40,00
UVOX-400	Amg. T. Spectr. 180 W	12,80	25,40	70,00	35,00	70,00
UVOX-450	Amg. T. Spectr. 180 W	14,40	28,80	28,80	14,40	28,80
UVOX-2000	4x Amg. T. Spectr. 180 W = 720 W	50,00	100,00	100,00	50,00	100,00

Areas of application

With our trendsetting **UVOX system Wapure International** is able to combine three technologies (ultraviolet disinfection, ozone oxidation and advanced oxidation) in one single device, thus guaranteeing ecological and economical water treatment. An **UVOX Redox** measurement and control module will safeguard the water quality. In order to guaranty an environmentally friendly, healthy and non-residual water treatment, we developed turn-key **UVOX Redox** systems for following applications:

A: Drinking water

A 99,9% guaranteed killing rate of all pathogens

UVOX Redox systems treat drinking water according to the DVGW/Önorm standards for many applications such as private households, hotels, small flat-sharing communities, hospitals, ships, trains and wells.

The **UVOX** system combined with the **UV-Compact** guarantees a 99,9 % killing rate of all bacteria, viruses and algae and other hazardous pathogens.

The **UVOX** process is efficient in deactivating dangerous legionella, which are frequently found in warm water circuits. Furthermore the oxidation of various dissolved organic matter will considerably improve the taste, smell and color of the water. Also harmful compounds like pesticides and TOC`s are being reduced as result of the advanced oxidation process (AOP).

B: Process- and waste water

UV-Disinfection, Ozone Oxidation and Advanced Oxidation

The production of qualitative high grade foodstuffs, drinks, cosmetics and pharmaceutical products requires flawless micro biological quality of the applied water.

The **UVOX Redox** process is extremely suitable to improve the quality of natural water and avoiding it from sprouting during storage and processing. The microorganisms commonly found in waste water, such as species of E.coli, Salmonella, Shigella, Vibrio, Cryptosporidium, Giardia, Enterovirus, Hepatitis are effectively destroyed by the triple disinfection process of the **UVOX-Redox** system.

The effectiveness of disinfection relates directly to the concentrations of suspended and colloidal solids in the water.

Furthermore, many persistent toxic water dissolved compounds can be reduced by means of the advanced oxidation process (AOP). Some examples are: TOC/DOC reduction, dechloramination, nitrification and denitrification, reduction of pesticides and biocides, medicine, hormones and micro-pollutants. No noxious by-products are formed due to the **UVOX process** and the p.H. value remains unchanged.

C: Public and private swimming pools

A swimming pool without the negative side effects of chlorine

For the disinfection of public pools, a minimum dosage of 0.3 to 0.5 mg of free chlorine per liter is required in many countries for disinfecting purpose. Chlorine reacts with compounds in the pool water to give rise to unwanted by-products.

In the water chlorine reacts very rapidly to combined chlorine and THM, which strongly irritate eyes, hair, skin, nose and throat and the bronchial tubes. Its odour is similar to that of chlorine. High concentrations of combined chlorine (mono-, di- and trichloramines) and THM often lead to water quality problems and high maintenance costs.

The **UVOX Redox** System enables an efficient dechloramination (the process of reducing the combined Chlorine) by means of the Advanced Oxidation Process (AOP).

By taking over the disinfection, an economical and ecological water purification is guarantied. Furthermore, the removal of the activated carbon leads to further cost reductions, as the use of water, chemicals and energy is drastically reduced.

D: Natural pools and swimming ponds

Algae free even without the use of chemicals

Due to the **UVOX Redox** technology natural pools and ponds can be kept algae free even without the use of chlorine or any other residual disinfectant.

The **UVOX Redox** technology combines several components into to a comprehensive turn-key water purification system. The centrepiece is the **UVOX Redox** water treatment system, which combines the disinfecting effect of UV-C light with the oxidizing effect of ozone in one single system.

The **UVOX Redox** system disinfects up to 99,9 % of all bacteria, germs and algae and oxidizes many hazardous compounds such as: Urea, Ammonium, Nitrites, pesticides, cosmetics and unpleasant odour or taste by means of the advanced oxidation process (AOP).

Enjoy the **UVOX Redox** water quality for a natural wellness experience.

E: (koi carp) ponds, aquariums and zoos

A natural and healthy habitat for fish, plants and animals

The UVOX systems also provide an optimal solution for intensive animal husbandry in tanks and aquariums. The **UVOX Redox** System combines the disinfecting effect of UV-light on pathogens with the oxidizing effect of ozone and OH^- radicals on organic toxic compounds.

Ultraviolet light is a natural disinfection agent against all fish, seal and penguin pathogenic germs such as VHS, IPN, IPA, UDN, PKD, furunculosis and vibrio. The Advanced Oxidation Process (AOP) leads to an efficient reduction of toxic compounds such as Ammoniak, Ammonium, Nitrite, Medicine and Pesticides. By increasing the oxygen content a natural water without noxious by-products is achieved.

The **UVOX Redox** reaction chamber is made of polyethylene. Polyethylene is particularly suitable for the water purification of fresh water and sea water and other highly corrosive media.

UVOX® redox

made in germany

Designer and Manufacturer

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