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UV Units for  
wastewater





## Contents

- 3 UV preserves scarce water resources
- 5 Berson Openline systems
- 7 The Berson InLine® system:
  - Properties and key benefits
  - Key components

# The best in UV for over 40 years

- The most copied design in UV
- All major validations
- Tailor-made solutions



## Berson: the pioneers and innovators in UV disinfection and advanced oxidation

### Introducing Berson

Founded in 1972 by Hans Berson, the company has over 40 years' experience in UV technology. Berson was a pioneer in the introduction of UV for drinking water in Western Europe in the early 1980s and since then has expanded the application of UV technology globally. The Berson InLine UV design, introduced in 1995, has become the standard for medium pressure UV applications for drinking water worldwide. The company is based in Nuenen, in the Eindhoven Region in the Netherlands (number 1 Smart Community in 2011). Berson was acquired by British multinational Halma p.l.c. in 1988 and, together with sister companies Hanovia in the UK and Aquionics in the USA, is the global leader in UV for water treatment.

### UV Applications

Berson offers a wide range of UV systems for drinking water, wastewater and water reuse validated by DVGW, USEPA and NWRI. These validations ensure end-users and authorities can be confident that the performance of the UV system is appropriate for the application. Berson also offers systems for treating injection water in oil and gas field recovery. Berson's water applications range from disinfection to advanced oxidation for the removal of organic (micro) contaminants.

### Innovation

With a strong focus on innovation through cooperation with internationally renowned institutes such as Imperial College London, UNESCO-IHE, KWR and Wetsus, as well as key suppliers, Berson continues to improve the disinfection performance, system efficiency and maintenance friendliness of its systems. This ensures customers have effective systems with a low total cost of ownership. The company is dedicated to ensuring safe drinking water, safe bathing water and water security all over the globe. Its systems can be installed centrally at a treatment works, locally for satellite disinfection in the distribution network, or at the point-of-entry, providing bacterial reliability right to the consumer's tap.

### Global Network

A global sales and service network, trained by Berson, ensures customers worldwide with the right products and outstanding service, ensuring the long-lasting performance of their UV systems.

### Quality

Quality is one of Berson's main drivers. The company holds both ISO 9001:2000 and 14001:2004 and continues to improve its processes to meet customers' needs.

## Key components

### Electronic Lamp Drivers

Highly efficient stepless power control (30-100%), reducing energy costs and lamp aging. Maintain disinfection performance under variable conditions (flow, quality). CE and UL approved.

### Conventional Ballasts

A solution trusted for over 30 years. Operates in the most challenging environments.

### Medium-Pressure Lamps

High output medium pressure lamps allow compact reactor design as fewer lamps are needed to achieve the required dose. This minimises maintenance costs and downtime for replacing lamps and sleeves.

### Quartz Sleeves

Long life quartz sleeves selected for high transmittance. Doped sleeves available to avoid nitrite formation.

### Control Panel

ECTronic  $\Omega$ , UVTronic or PLC monitor and control all UV functions and dosing. Can be set up to trigger valves and to communicate with a customer's SCADA systems (Ethernet, MODBUS). Allows multi-stream control.

### UV Intensity Sensor

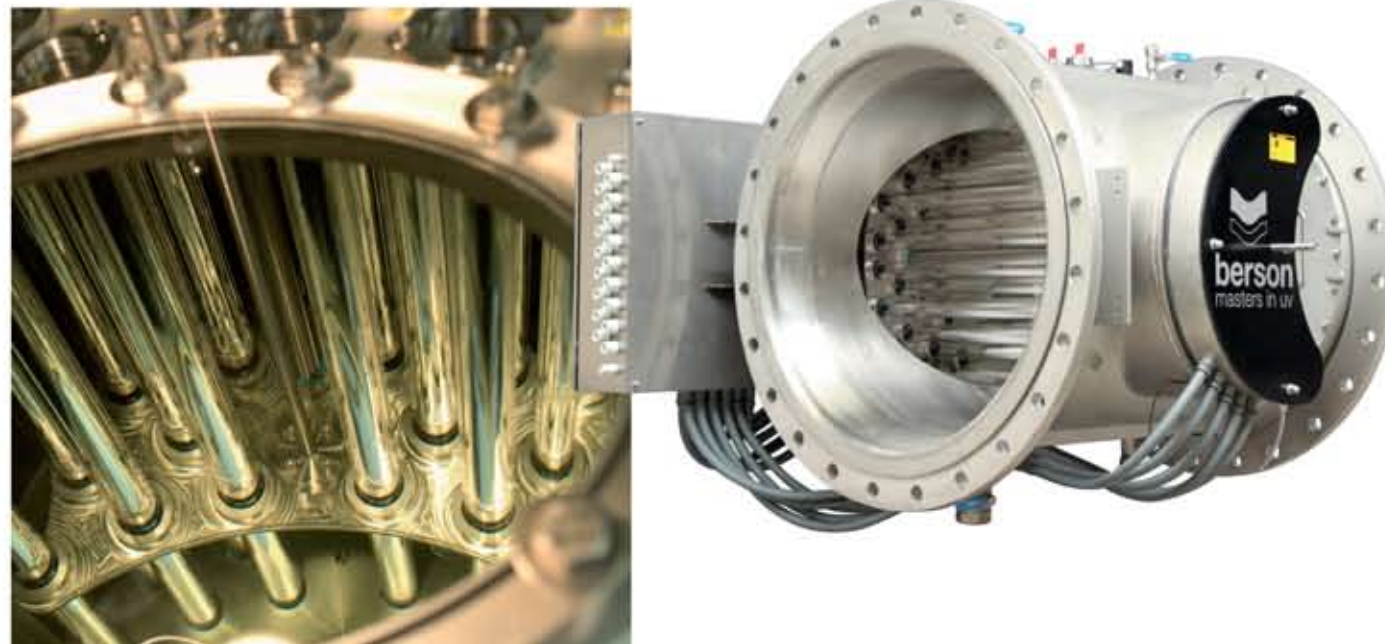
Either field-calibrated relative sensors or controlled absolute sensors monitor UV output to ensure the required UV dose is met. One sensor can monitor a group of lamps or, if required, one sensor per lamp can be used.

### InLine® Reactor

Hydraulically optimised to achieve uniform and optimal UV dose distribution. Validated performance (USEPA, DVGW). Extremely small operational footprint. Allows both horizontal and vertical flow. Easy access for maintenance. Standard stainless steel 316L and chlorine resistant alternatives available. Pressure rated up to 16 bar (230 psi).

### UltraWipe® Sleeve Cleaning

A combination of automatic mechanical wiping and chemical cleaning eliminates sleeve fouling and scaling. The sensors are wiped simultaneously. A range of chemicals can be applied to offer enhanced cleaning and to meet local drinking water legislation.







# Berson Openline systems

- Proven
- Innovative
- Reliable

The OpenLine systems for channel mounted UV systems can be the right solution in many cases. If an existing channel is available, UV can be easily fitted and made operational for final disinfection.

### Horizontal and Vertical Design

Berson can supply conventional horizontal Open Channel UV lay-outs or vertical Open Channel UV lay outs. Vertical systems have an advantage over horizontal as the lamps are less exposed and exchange can be done without disassembly of underwater seals. Horizontal systems can be installed in relatively shallow channels.

### Modular Design

An advantage of Open Channel systems is the possibility to add banks of UV racks in case the water quality worsens or the design flow increases. With modular design flexibility for the future is guaranteed.

### Variable Ballast Configuration

The electronic lamp drivers are mounted in heavy duty electrical cabinets protecting them from the harsh outside environment. If need be, ballasts can be exchanged rapidly as they are easy accessible. Electronic lamp drivers are variable and ensure efficient use of power under all operating conditions.

### UV Sensor & Control System

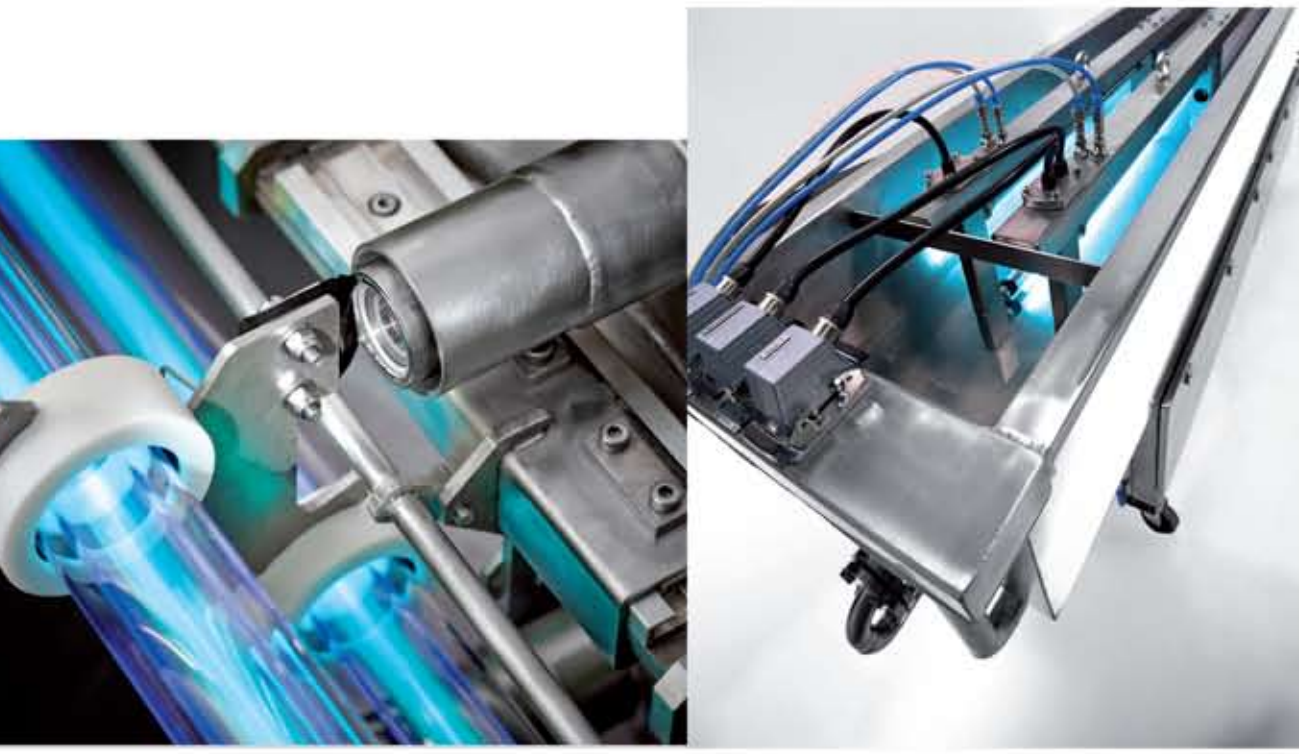
All Open Channel systems are monitored by calibrated UV intensity sensors and controlled by industrial PLC controllers ensuring a safe performance under all operating conditions. A touch screen interface is available for easy operation and maintenance

### Cleaning System

The wiping system is operated pneumatically, cleaning the sleeves with dedicated wiper rings removing deposits. In most cases automatic mechanical wiping is sufficient. Additionally, a chemical cleaning system can be provided in cases where algae, hardness, iron or manganese contents are high.

### Mechanical & Electrical Design

All under water structures are made out of stainless steel 316, above water components of stainless steel 304. All racks, connectors and components are made for easy operation and maintenance.



New pathogens are discovered all the time, resulting in increased risks;

*"Although a significant proportion of this immense burden of disease is caused by 'classical' water-related pathogens, such as typhoid and cholera, newly-recognised pathogens and new strains of established pathogens are being discovered that present important additional challenges to both the water and public health sectors. Between 1972 and 1999, 35 new agents of disease were discovered and many more have re-emerged after long periods of inactivity, or are expanding into areas where they have not previously been reported. Amongst this group are pathogens that may be transmitted by water."*

Source:  
Emerging Issues in Water and Infectious Disease-World Health Organisation

### UV in Waste-Water Treatment and Re-Use Plants

UV light inactivates microorganisms (bacteria and viruses) by altering their DNA, preventing replication or infection. All conventional disinfection methods (chlorine, ozone) produce disinfection by-products, increasing the risk of carcinogenic effects for human and wild-life. UV is an elegant proven solution over the last few decades in most developed regions in the world to reduce environmental risks. In terms of power consumption; the newest lamp and lamp driver techniques ensure reducing the carbon-footprints to minimal acceptable levels.



### UV Reactor Designs

UV reactors are available in many varieties to suit the exact application. The pipe mounted closed vessel solutions are maintenance friendly. Amalgam lamp systems have the advantage of lower power consumption; medium pressure lamps have the advantage of being extremely flexible in operating range and a very low footprint being able to put the system 'inline'. An existing water plant with a concrete channel available can best be equipped with an Open Channel UV solution. Berson can offer the best solution for each application.

### Implementation Advice

In waste water or re-use applications it is very important to make the right choices where, how and what to install in terms of the UV solution. Not only the quality of water to be treated, but also the used pre-process, the geographical location and other factors can alter the decision what is the best solution. Berson attempts to be involved at an as early stage as possible with dedicated specialists to ensure making each installation a success. Berson's involvement does not stop at delivery; we will keep track of correct operation after training the staff of the plant.



# Berson InLine® system

## UV Preserves Scarce Water Resources

- Effective, reliable and efficient
- No disinfection by-products
- Used worldwide

### Properties and key benefits

#### Compact and Flexible Design Reduces Capital Costs

The Berson InLine® has an extremely small footprint, requiring very little extra floor space in a treatment building. UV units can be mounted horizontally and vertically in virtually any existing installation without many changes to piping. This reduces investment costs in both new and retrofit installations.

#### Ease of Maintenance

All wet parts are easily accessible and regular service can be performed by general maintenance staff trained by Berson's commissioning engineers. Berson also offers commissioning and maintenance service worldwide supported locally by trained service partners.

#### Cyclops® Design Reduces Operational Footprint

Installed in places with very limited access or when frequent cleaning of the quartz sleeves is necessary, the Cyclops® allows single-sided access with a slide-opening hatch. Maintenance and cleaning can be carried out in a fraction of the time normally required.

#### UltraWipe® for Clean Sleeves

The general wiping system keeps sleeves clean resulting in a higher UV dose. In case of excessive hardness or iron content in the water, sleeve fouling may still occur. The UltraWipe® offers automatic periodic chemical cleaning, using only chemicals that are effective and safe for drinking water applications.



#### Validated Performance

Berson's UV systems are validated to the most stringent third party approvals, including DVGW, USEPA, JWRC, NWRI and NSF. In the case of the most internationally accepted regulations – DVGW and USEPA – our systems are validated under challenging hydraulic conditions (after a 90° pipe bend). Validations are regularly upgraded to allow the application of the newest lamp and ballast technology.

#### Customised Solutions

Berson has a flexible approach towards adapting standard systems to meet our customers' special needs. UV reactors can be designed to fit any piping size and controls can be adapted to be integrated with all commonly applied process control environments.

#### Range of Control Options

Our ECTronicΩ and UVTronic+ offer a combination of local control interfaced with a central (SCADA) system through Modbus RTU, Ethernet IP or analogue communication. PLC-based control (all major platforms) is also available. Both UVTronic+ and PLC control allow multi-stream operation, saving on investment and operating costs.

#### Need for Disinfection of Waste Water

With increasing water scarcity and global urbanisation, the need for centralised waste water treatment is growing. The effluent standards applied vary greatly, depending on whether the effluent is discharged on surface water or the waste water is re-used in agriculture, district cooling or other useful applications. Regardless of the treatment and final destination of the effluent, UV is the final barrier in the treatment scheme, providing disinfection to a level that ensures safe discharge or re-use of the effluent.

#### Recreational Water

In natural waters recreational activities are very common, especially in summer. In the early eighties, the European Bathing Water Directive gave strict regulations on the (microbiological) quality of recreational natural water and fish/shell fish hatcheries. In 2006 this directive was renewed and adopted by the 27 European Member States. Each season the water quality is tested and graded. From 2015 all Member States should meet the standards of the new Bathing Water Directive. UV is the best solution to reduce the levels of intestinal enterococci and escherichia coli (guidance parameters in the Directive), since UV does not cause disinfection by-products that impair marine life. As the tourism industry in some areas strongly depends on the availability of safe recreational natural waters, programs have been put in place to implement waste water disinfection. In a growing number of cases, UV is even applied to disinfect the storm water drainage, providing safe beaches and happy tourists year round.

#### Protecting Water Resources

In many cases, effluent is discharged to natural waters that are applied as source for drinking water. Despite strong measures in the drinking water treatment plant, the presence of substantial amounts of pathogens in the water source is an additional risk. In 1993, a cryptosporidium outbreak occurred in Milwaukee USA, resulting in more than 100 people dying and 400,000 people ill. This was caused by the fact that the drinking water plant was downstream of an effluent discharge and did not have sufficient protection against cryptosporidium. UV provides excellent disinfection without by-products, therefore has become the technology of choice for waste water disinfection across the globe. The natural waters in which effluent is discharged are related, in many more ways to our food chain than drinking water. Water from rivers and lakes is used for instance in: agricultural crop irrigation, intake by livestock, and many food processing industries.

#### Emerging Pathogens – Multi-Resistant Bacteria

Partially due to human activities, the world around us evolves constantly. This certainly applies to micro-organisms that adapt to new situations constantly. As we are fighting one class of pathogens, the next is waiting for an opportunity to emerge. The wide spread application of antibiotic's leads to strains of multi-resistant pathogens that once they cause an infection are very difficult to fight.

