

Chemical-free water treatment

UV-technology – Highly-efficient systems
for disinfection and oxidation



UV light for disinfection and oxidation

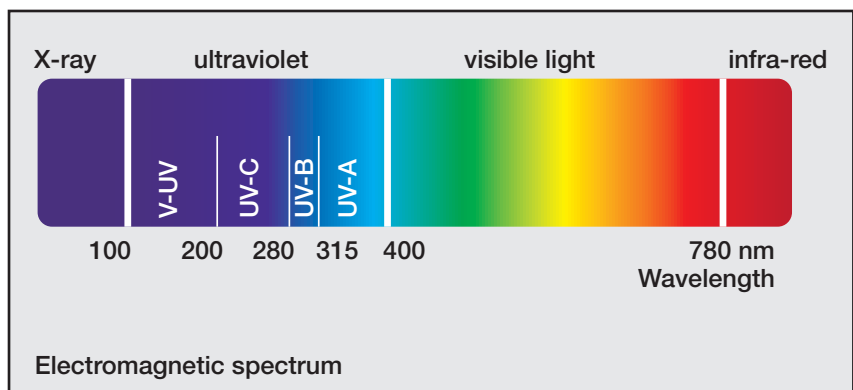


Chemical-free, powerful action with saving effect

High-energy ultraviolet light at wavelengths between 240 and 290 nm has been successfully used for the disinfection of water for decades. The UV radiation kills pathogenic micro-organisms safely, effectively and without the use of chemicals. Even stubborn parasites, such as cryptosporidia or giardia, are rendered harmless. The high level of user-friendliness and extremely low maintenance are additional advantages of this technique. This makes UV disinfection highly economical – no wonder then, that it is ever more frequently to be found in modern water treatment systems.

Advantages of UV disinfection

- Safe and fast disinfection
- Economical method due to low level of investment and minimal operating costs
- Chemical-free disinfection
- Extremely durable UV lamps
- No development of resistance
- Environmentally-friendly "green technology"
- Disinfectant effect independent of pH
- Simple system technology with minimal personnel and maintenance requirements
- No water impairment due to the formation of odorous substances or by-products of disinfection





Effect and function of UV radiation

Action of UV light

UV-C light directly affects the genetic information (DNA) of micro-organisms. The DNA of viruses, bacteria, parasites, yeasts and fungi absorb the UV radiation and is immediately destroyed.

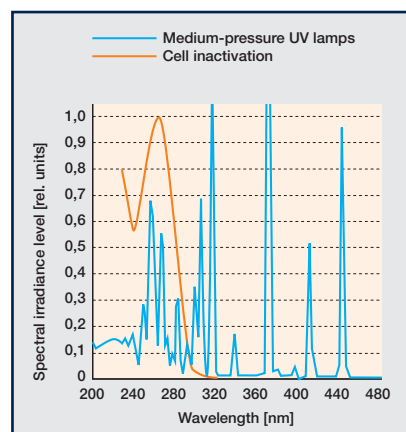
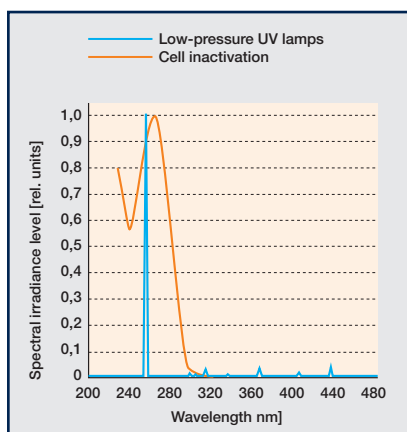
Low-pressure UV lamps

Low-pressure UV lamps have a strongly pronounced emission peak at a wavelength of 254 nm (monochromatic emission spectrum). This type of lamp is extremely efficient because micro-organisms absorb UV radiation at almost precisely this wavelength. ProMaqua uses extremely durable high-performance amalgam lamps for this purpose. A unique coating combined with reliable ballast technology ensures virtually consistent disinfection performance throughout the entire operational lifetime of the lamp. Thanks to their high performance and operational durability (up to 14,000 hours),

these low-pressure systems offer significant savings potential in terms of investment and operating costs. The low number of lamps, low energy requirements and long servicing intervals mean the system is easy on your pocket.

UV medium-pressure lamps

These lamps emit polychromatic radiation in a broad spectral range. In addition to UV disinfection, they are therefore also suitable especially for UV oxidation as well as for other photo-chemical processes. The systems are designed to be extremely compact. Large flow rates of up to 800 m³/h can be easily managed with just a single lamp.



UV systems

Extensive range for all applications

UV systems Dulcodes D and K

Dulcodes D thin-layer systems fulfil all requirements for safe disinfection of low-transmission media. Pretreated waste water, potable water containing humic substances, process water for domestic use through to syrup solutions can all be disinfected with this product range. Depending on the flow, these systems can also be combined in a modular manner.

The UV resistant HDPE synthetic radiation chambers used in the Dulcodes K systems even make it possible to treat saline solutions. The Dulcodes K range has no contact surfaces for corrosion to set in, regardless of whether they are used for disinfection of brackish water, sea water or the elimination of undesired by-products in thermal spa water.



UV systems Dulcodes W and R

Our proven systems for the disinfection of potable water and process water. They are also ideal for the treatment of production water in the food and cosmetics industries and for the elimination of chloramines in smaller swimming pools. The wiper mechanism on the Dulcodes R offers convenient cleaning options with water that has a tendency to form films.



Dulcodes controls

Optimally designed UV lamps for all power classes up to 10 kW enable maximum performance with small system dimensions. A combination of electronic ballasts and the Dulcodes convenient control system ensure reliable, economical and easily controllable operation. The freely-configurable control system display clearly indicates all relevant operating parameters. The time curve of the UV intensity is indicated on the control's display.

Continuous monitoring

Reliable and continuous monitoring of the UV intensity is a prerequisite for safe operation of any UV treatment system. Depending on the system type, special high-quality UV sensors with long-term stability are used. The UV intensity is indicated on the control's display. Continuous monitoring of the programmable limit values serves to offer the greatest possible safety.

UV systems Dulcodes Z

Certified UV systems Dulcodes Z (DVGW, OVGW, EPA UVDGM) deliver biosimetrically proven disinfection performance. The high output and service life of the newest Opti Flux generation of lamps ensure that they are particularly cost-effective to operate.

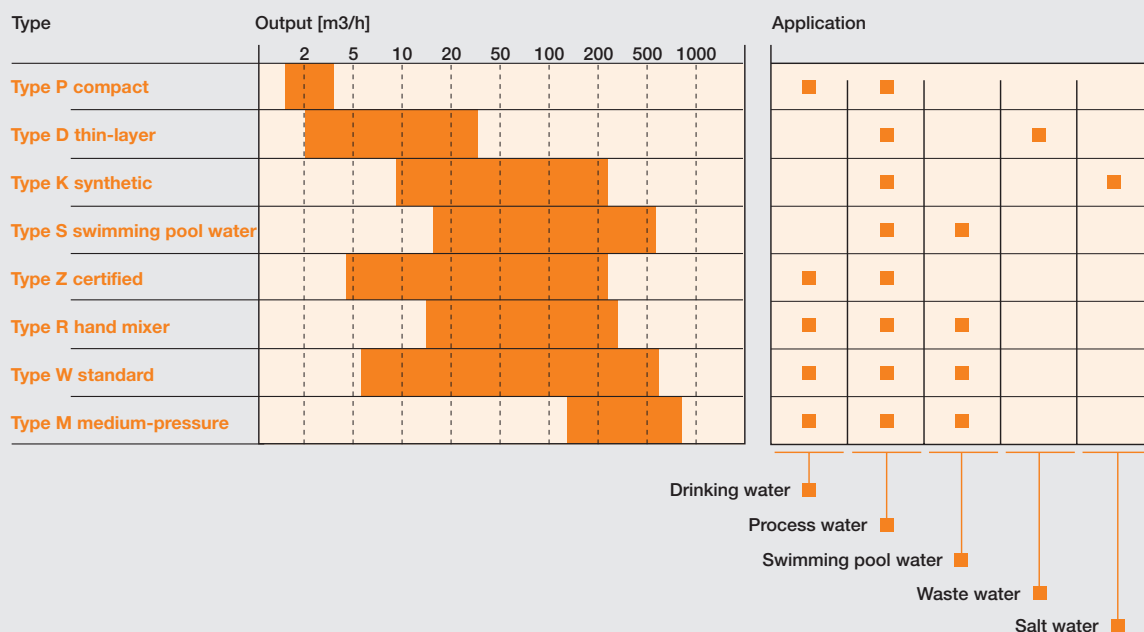


UV systems Dulcodes S and A

The system for efficient treatment of larger volumes of water. Our medium-pressure Powerline lamps offer an optimised broad-band spectrum to reliably eliminate chloramines in swimming pool water or chlorine, chlorine dioxide and ozone in production water. An integrated cleaning mechanism serves to prevent deposits coating the lamp protection tube.



Performance overview of UV systems



Dulcodes D and K

UV systems

Dulcodes D thin-layer systems fulfil all requirements for safe disinfection of low-transmission media. Pretreated waste water, potable water containing humic substances, process water for domestic use through to syrup solutions can all be disinfected with this product range. Depending on the flow, Dulcodes D systems can also be expanded in a modular manner.

- Safe disinfection even under deviating water qualities in low transmission range
- Simple and individual adaptation to operating conditions thanks to freely-programmable control system

Dulcodes K systems, with their UV-resistant PE-HD radiation chamber, are used to treat water containing saline. The Dulcodes K product range has no contact surfaces for corrosion to set in, regardless of whether they are used for disinfection of seawater or the elimination of combined chlorine in swimming pool water.

- Corrosion-proof design can be used for saline water
- Low maintenance costs due to powerful amalgam lamps with extremely long operational lifetime



Dulcodes type K

	Max. flow*) [m³/h]	Lamp power [W]	Connector nom. diameter
1 x 130 K	8.7	1 x 130	DN 50
1 x 290 K	27	1 x 290	DN 80
2 x 290 K	93	2 x 290	DN 125
3 x 290 K	192	3 x 290	DN 200
4 x 290 K	250	4 x 290	DN 200

*) 98 %/cm transmission, 400 J/m² irradiation intensity

Dulcodes type D

	Max. flow*) [m³/h]	Lamp power [W]	Connector nom. diameter
1 x 45 D	2.0	1 x 45	G 1"
1 x 130 D	4.6	1 x 130	G 1"
1 x 230 D	8.2	1 x 230	DN 65
2 x 230 D	16	2 x 230	DN 65
3 x 230 D	25	3 x 230	DN 65
4 x 230 D	33	4 x 230	DN 65

*) 80 %/cm transmission, 400 J/m² irradiation intensity

Dulcodes R and W

UV systems

Dulcodes R for potable water and process water qualities which tend to form coatings on the lamp protection tubes.

- Cleaning possible without interrupting operation
- More performance with fewer, more powerful lamps

Dulcodes W equipped with efficient, high-performance, low-pressure High Flux lamps means this range of systems ensures safe disinfection results for flow rates up to 600 m³/h. It is a versatile system that can be used in different applications – even for hot water disinfection.

- Low maintenance costs due to powerful amalgam lamps with extremely long operational lifetime
- Suitable for hot water disinfection; stable performance even under deviating temperatures, thanks to special UV lamps



Dulcodes type R

	Max. flow*) [m³/h]	Lamp power [W]	Connector nom. diameter
1 x 300 R	30	1 x 300	DN 80
2 x 300 R	95	2 x 300	DN 150
3 x 300 R	179	3 x 300	DN 200
4 x 300 R	274	4 x 300	DN 250

Dulcodes type W

	Max. flow*) [m³/h]	Lamp power [W]	Connector nom. diameter
1 x 75 W	5.7	75	G 1 1/4"
1 x 80 W	5.4	80	G 1 1/4"
1 x 130 W	8.7	130	G 2"
1 x 230 W	20	230	DN 65
2 x 230 W	64	2 x 230	DN 125
3 x 230 W	117	3 x 230	DN 150
4 x 230 W	184	4 x 230	DN 200
5 x 230 W	228	5 x 230	DN 250
6 x 230 W	273	6 x 230	DN 250
7 x 230 W	369	7 x 230	DN 250
8 x 230 W	418	8 x 230	DN 250
9 x 230 W	467	9 x 230	DN 250
10 x 230 W	514	10 x 230	DN 250
11 x 230 W	561	11 x 230	DN 250
12 x 230 W	600	12 x 230	DN 250

*) 98 %/cm transmission, 400 J/m² irradiation intensity

Dulcodes Z

UV systems

Dulcodes Z systems are certified according to the internationally recognised guidelines set out in DVGW (W294), OVGW (M 5873-1) and EPA (UVDGM2006) and therefore correspond to the highest standards in drinking water disinfection. The DVGW-compliant UV-C sensor is used to monitor lamp ageing, the degree of soiling in the lamp protection tubes and changes in the water quality. The system is equipped with a freely-programmable control system with comprehensive control, alarm and monitoring functions as well as a graphical display to keep track of the sensor signals as trend displays.

- Biodosimetrically proven safety
- Broad range of applications and permissible flows thanks to certified characteristic curves
- Fulfills stringent statutory regulations for disinfection effectiveness in many countries
- Low cost of investment due to fewer lamps with higher lamp outputs of up to 300 W
- Low operating costs due to almost constant lamp output throughout the entire operational lifetime of 14,000 hours



Dulcodes type Z

	Max. flow*) [m³/h]	Lamp power [W]	Connector nom. diameter
1 x 75 Z	4.5	1 x 75	G 1 1/4"
1 x 200 Z	10	1 x 200	DN 50
1 x 300 Z	20	1 x 300	DN 80
2 x 300 Z	60	2 x 300	DN 100
3 x 300 Z	110	3 x 300	DN 150
4 x 300 Z	165	4 x 300	DN 150
5 x 300 Z	230	5 x 300	DN 200
7 x 300 Z	230**)	7 x 300	DN 200

*) 98 %/cm transmission, 400 J/m² irradiation intensity

**) 94 %/cm transmission, 400 J/m² irradiation intensity

Dulcodes A and S

UV systems

Dulcodes S systems are ideal for the photochemical degradation of combined chlorine (chloramines) in the treatment of swimming pool water. The in-line mounting enables quick installation in any fitting position: rapid retrofitting with minimal work, directly into a plastic pipeline without any stain-less steel connection pieces required.

- Minimum space requirements due to extremely compact in-line design
- Unbeatably maintenance-friendly due to single-end lamp connection
- Quick payback due to operating cost savings in fresh water, chemicals and heating

Dulcodes A systems for the disinfection of potable water, elimination of chlorine, chlorine dioxide and ozone, or for the breaking down of combined chlorine in swimming pool water. The Powerline medium-pressure lamps safely inactivate pathogenic organisms. In particular, chlorine-resistant germs, such as cryptosporidia or giardia, are reliably eliminated.

- Simple installation, thanks to the compact inline system, ensures minimum installation costs and fast retrofitting
- Maximum flexibility when installing, thanks to free choice of fitting position and direct installation in plastic pipes, as no UV radiation escapes from the reactor



- External power control via 0/4 - 20 mA standard signal for optimum adaptation of the system to changing operating conditions, such as flow fluctuations
- Certified systems: NSF 50, CSA 22, UL 508, comprehensively biosidometrically validated to EPA UVDGM 2006

Dulcodes type A

	Max. flow [m³/h]	Lamp power [W]	Connector nom. diameter
1 x 1 A	66**/76*	1.0	DN 100
1 x 2 A	116**/133*	2.0	DN 150
1 x 3 A	232**/266*	3.0	DN 200
2 x 2 A	309**/362*	4.0	DN 200
2 x 3 A	464**/493*	6.0	DN 250
3 x 3 A	696**/739*	9.0	DN 300

Dulcodes type S

	Max. flow**) [m³/h]	Lamp power [W]	Connection nominal width is selectable
1 x 0.65 S	20	0.65	DN 65/80
1 x 1 S	58	1.0	DN 100/125
1 x 2 S	102	2.0	DN 125/150
1 x 3 S	205	3.0	DN 200/250
2 x 2 S	278	4.0	DN 200/250
2 x 3 S	379	6.0	DN 250
3 x 3 S	569	9.0	DN 250/300

*) 98 %/cm transmission, 400 J/m² irradiation intensity

**) 98 %/cm transmission, 600 J/m² irradiation intensity

Applications & industries



Applications for UV systems

With every new project, our engineers draw on experience that we have accumulated over many decades in the following applications:

Food and beverage industry

- Disinfection of industrial and process water
- Disinfection of water in fish and seafood farms
- Degradation of oxidants such as chlorine, chlorine dioxide and ozone

Industry

- Disinfection of industrial and process water
- Disinfection of process water in the pharmaceutical and cosmetics industries
- Disinfection of ultra-pure water for laboratories and the semiconductor industry
- Disinfection of permeate in reverse osmosis systems
- Disinfection of process water in air-conditioning systems
- Degradation of ozone in process water

Municipal drinking water and waste water companies

- Disinfection of potable water
- Disinfection of waste water in municipal waste water treatment plants

Hotels, hospitals, care homes, sports centres etc.

- Swimming pool water
- Disinfection of potable water

Market gardening

- Disinfection of irrigation water in plant cultivation

Public swimming pools

- Disinfection and degradation of combined chlorine in swimming pool water

Other

- Water for artificial snow-making machines
- Degradation of TOC
- AOP processes

Efficient UV systems with certified performance



"Maximum safety for precious potable water"

The administration union for municipal water supply in Höchenschwanderberg supplies the connected households with the finest potable water available. The 7-lamp UV system Dulcodes Z from ProMaqua ensures the water remains germ-free.

The administration union for municipal water supply in Höchenschwanderberg supplies over 20 villages and hamlets from six municipalities with additional water from an underground reservoir in the Alb tal to the south of St. Blasien (Baden-Württemberg / Germany). Its waterworks uses a UV system Dulcodes Z from ProMaqua to guarantee optimum drinking water quality at all times. The DVGW certified UV system (in accordance with DVGW test specification W 294) guarantees efficient, chemical-free disinfection of the potable water without impairment to the odour or flavour, whilst maintaining the terms of the statutory regulations.

Andreas Denz, Waterworks Supervisor at the Administration Union for Municipal Water Supply in Höchenschwanderberg granted us an interview regarding the Dulcodes Z.

Mr Denz, what do you use the UV system from ProMaqua for?

A. Denz: "We use the Dulcodes Z as a safety precaution. The purpose of this is to ensure a high level of potable water quality even under unfavourable conditions. In doing so, there is no need to add chlorine."

Where is the UV system positioned within the process and what level of output is demanded of it?

A. Denz: "It is positioned downstream of the filters and hardeners and has to cope with a flow rate of about 200 cubic metres per hour."

What has been your experience with the system and what advantages does it offer?

A. Denz: "The Dulcodes Z is one of the most reliable systems we have in operation. We can certainly confirm the high quality of the ProMaqua UV system. It is characterised by its extremely low maintenance requirements and low operating costs. The system guarantees safe and reliable water disinfection as well as an odour-free and tasteless water quality."

Contact worldwide



Experts in Chemical Feed and Water Treatment

ProMaqua, a brand of the ProMinent Group of companies, is at home in over 100 countries across the globe. We supply products, systems and service solutions with the same standards all

over the world: quality and reliability. All our experience and expertise in water treatment and chemical feeding is at your disposal – any time, anywhere.

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