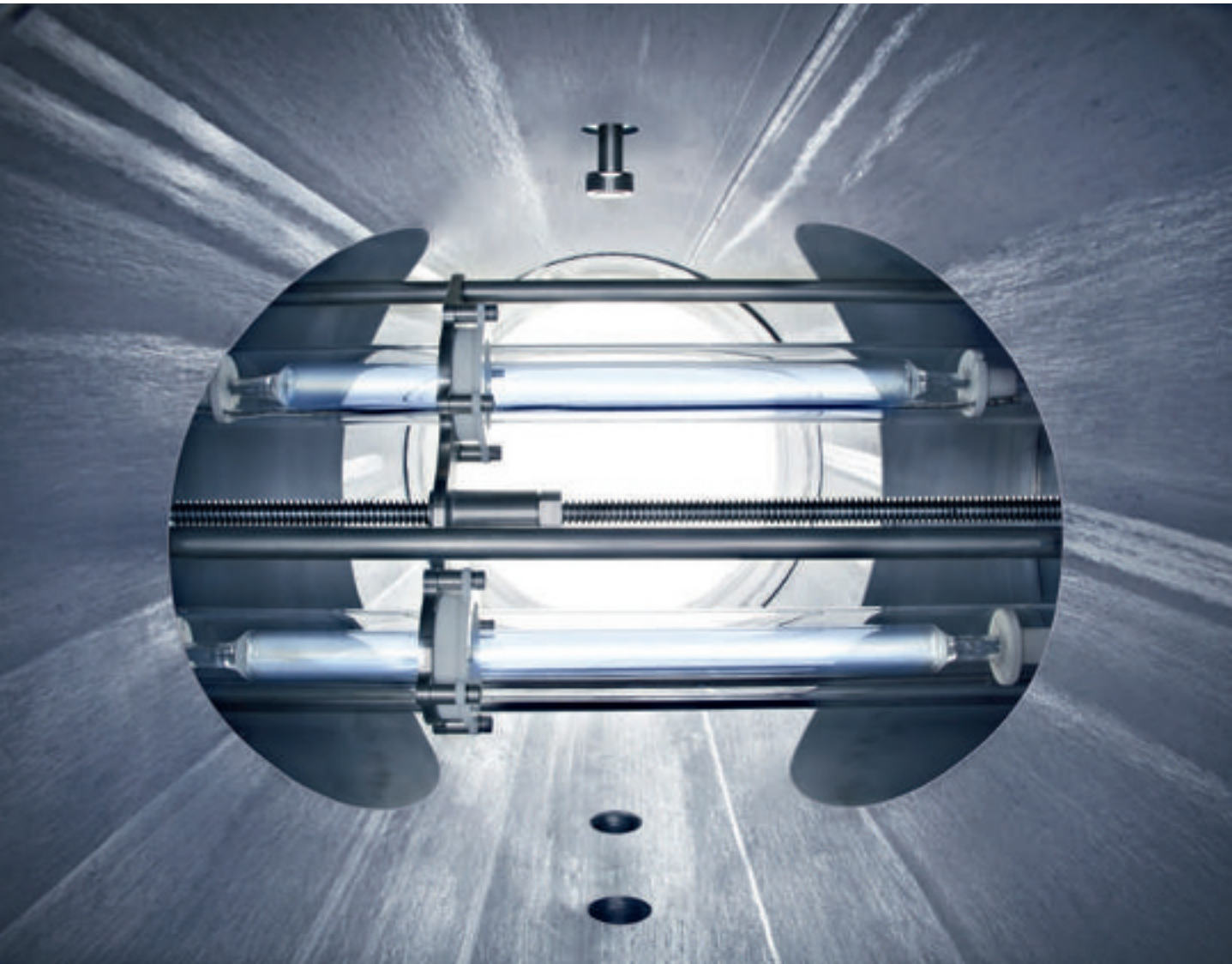


# Chemical-free water treatment

UV-technology – highly efficient systems  
for disinfection and oxidation



# UV-light for disinfection and oxidation

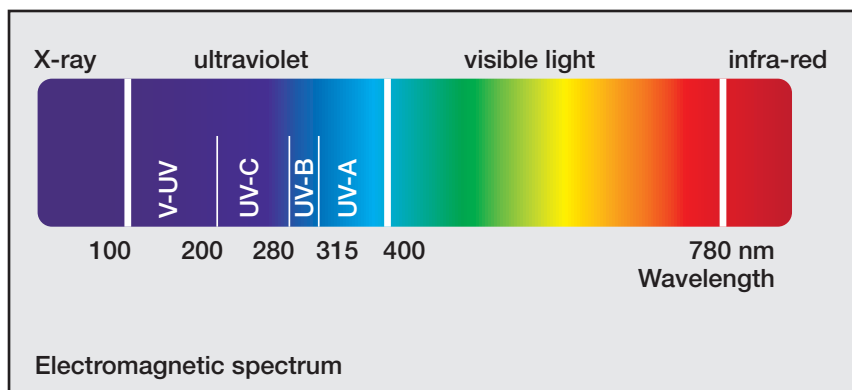


## Chemical-free, powerful impact with savings effect

High-energy ultraviolet light at wavelengths between 240 and 290 nm has been successfully used for the disinfection of water for decades. The UV-light kills pathogenic micro-organisms safely, effectively and without the use of chemicals. Even stubborn and chlorine resistant 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, 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
- Micro organisms do not get resistant against UV-light
- Environmentally-friendly „green technology“
- Disinfection power independent of pH value
- Simple system technology with minimal personnel and maintenance requirements
- No water impairment due to the formation of odorous substances or disinfection by-products





## Action 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).

This type of lamp is extremely efficient because micro-organisms absorb UV radiation at almost precisely this wavelength. ProMaqua uses high-performance amalgam lamps with extremely extensive lifetime.

A unique coating in combination with reliable ballast technology guarantees virtually uniform disinfection performance throughout the entire extensive lifetime of the lamp. Thanks to their high performance and operational durability (up to 14,000 hours), these low-pres-

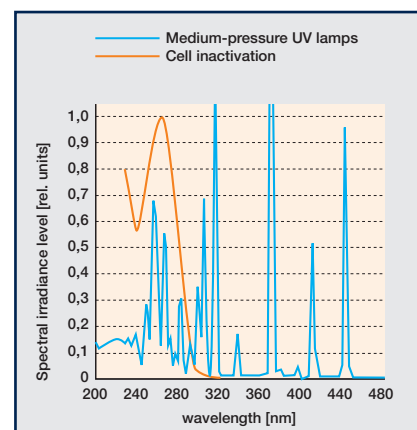
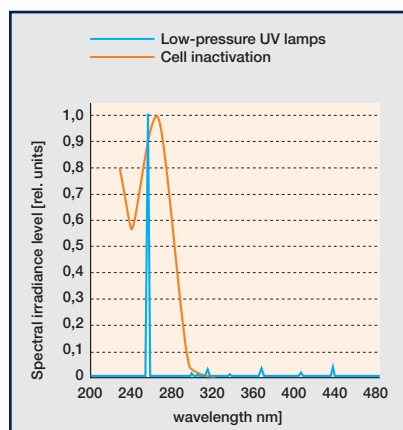
sure systems offer significant savings potential in terms of investment and operating costs.

The low number of lamps, low energy requirements and long servicing intervals mean the system saves you money.

### Medium-pressure UV-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 photochemical processes. The systems are designed to be extremely compact. Large flow rates of up to 800 m<sup>3</sup>/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 liquids. Pretreated waste water, drinking water containing humic substances, process water for domestic use through to syrup solutions can all be disinfected with this product range. Depending on flow, these systems can also be expanded in accordance with your requirements. 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, seawater or the elimination of undesired by-products in thermal spa water.



### UV systems Dulcodes W, R and P

Our proven systems for the disinfection of drinking water and water for domestic use. Also optimal for the treatment of process water in the food and cosmetic industries and for the elimination of chloramines in smaller swimming pools. The Dulcodes R integrated wiper mechanism offers a convenient cleaning option for water that tends to form a coating.



## Dulcodes control systems

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 UV intensity trend over time is logged by the controller.

## 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, specific high-quality UV sensors with long-term stability are used. The UV intensity is indicated on the controller display. Continuous monitoring of the programmable limit values serves to offer the greatest possible safety.

### UV systems Dulcodes Z

DVGW-certified UV systems Dulcodes Z deliver biosimetrically proven disinfection performance. The high output and extensive lifetime of the newest Opti Flux generation of lamps ensure that they are particularly cost-effective to operate.

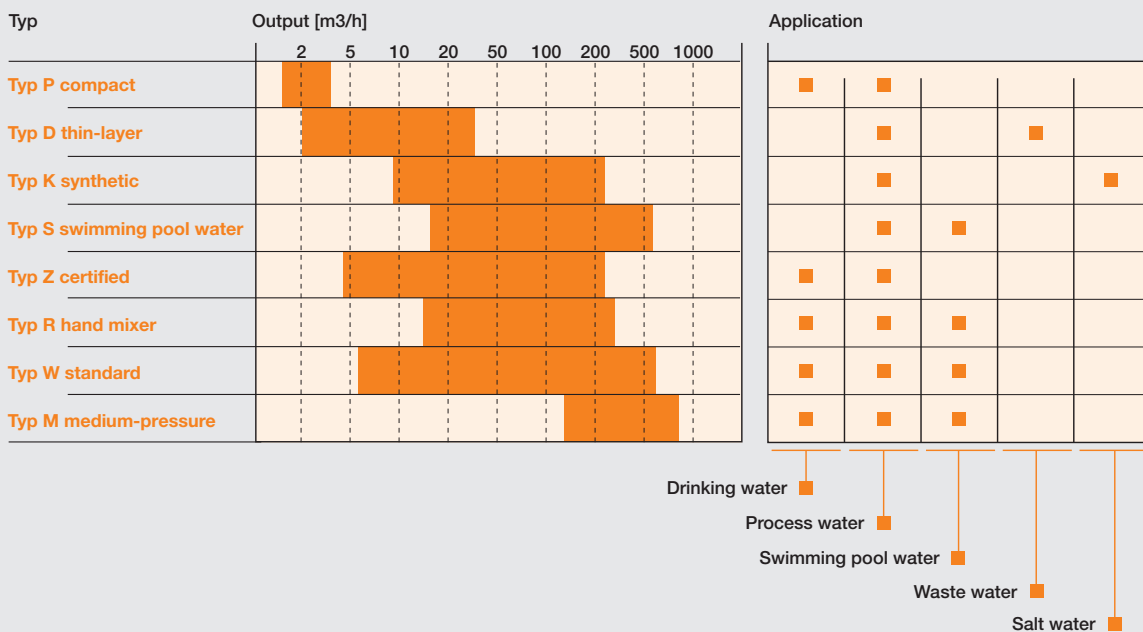


### UV systems Dulcodes M and S

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, ozone and chlorine dioxide in production water. An integrated cleaning mechanism serves to prevent fouling of 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 liquids. Pretreated waste water, drinking water containing humic substances, process water for domestic use through to syrup solutions can all be disinfected with this product range. Depending on flow, Dulcodes D systems can also be expanded in a modular manner.

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

The UV resistant HDPE radiation chamber used in the **Dulcodes K** systems enables the treatment of saline solutions. The Dulcodes K 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 extensive lifetime



**Dulcodes Typ K**

	max. flow*) [m³/h]	lamp output [W]	Connection size
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 150
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 Typ D**

	max. flow*) [m³/h]	lamp output [W]	Connection size
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 P, R and W



## UV systems

**Dulcodes P** systems are compact UV systems which use low-pressure lamps designed for smaller water flow rates up to 3.8 m<sup>3</sup>/h.

- Graphical display for indicating monitored parameters
- Radiation chambers made from high-grade stainless steel 1.4404

**Dulcodes R** for drinking 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 m<sup>3</sup>/h. Highly versatile system can be used in a wide range of applications.

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

Dulcodes Typ P

	max. flow*) [m <sup>3</sup> /h]	lamp output [W]	Connection size
16 P	1,5	16	G ¾"
45 P	3,8	45	G 1¼"

Dulcodes Typ R

	max. flow*) [m <sup>3</sup> /h]	lamp output [W]	Connection size
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 Typ W

	max. flow*) [m <sup>3</sup> /h]	lamp output [W]	Connection size
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/m<sup>2</sup> irradiation intensity

# Dulcodes Z

## UV systems



**Dulcodes Z** systems are certified according to the internationally recognised guidelines set out in DVGW (W294-2) and ÖVGW (M 5873-1) and therefore correspond to the highest standards in drinking water disinfection. The calibratable UV-C sensor serves to monitor lamp ageing, the degree of soiling in the lamp protection tubes and changes to the water quality. The system is equipped with a freely configurable control system with comprehensive control, alarm and monitoring functions as well as a large graphical display to keep track of the sensor signals.

- Biosimetrically proven safety
- Broad range of applications and permissible flows thanks to certified characteristic curves
- Fulfills stringent statutory regulations for disinfection effectiveness in many countries (DVGW and ÖVGW)
- 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 lifetime of 14,000 hours

Dulcodes Typ Z

	max. flow*) [m³/h]	lamp output [W]	Connection size
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, 600 J/m² irradiation intensity

\*\*\*) 84 %/cm transmission, 600 J/m² irradiation intensity

# Dulcodes M 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 systems enable quick installation in any fitting position: rapid retrofitting with minimal work, directly into a plastic pipeline without any stainless 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 savings in fresh water, chemicals and heating costs

**Dulcodes M** systems with Powerline medium-pressure lamps are suitable for the disinfection of larger volumes of water as well as the photooxidative degradation of chloramines, chlorine, chlorine dioxide and ozone.

- Efficient treatment of larger volumes of water with a single powerful medium-pressure Powerline lamp
- Lifetime 10,000 h

Dulcodes Typ M

	max. flow*) [m³/h]	lamp output [W]	Connection size
1 x 2 ML	88	2	DN 100
1 x 3 ML	158	3	DN 150
1 x 4 ML	229	4	DN 200
1 x 6 ML	406	6	DN 250
1 x 8 ML	541	8	DN 250
1 x 10 ML	600	10	DN 250
1 x 10 ML	800	10	DN 300

Dulcodes Typ S

	max. flow**) [m³/h]	lamp output [W]	Connection size 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

For every new project, our engineers draw on the experience that we have continually 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 farming
- 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 cosmetic industry
- Disinfection of ultra-pure water for laboratories and the semiconductor industry
- Disinfection of permeate in reverse osmosis plants
- Disinfection of process water in airconditioning systems
- Degradation of chlorine, chlorine-dioxide and ozone in process water

### Municipal drinking water and waste water companies

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

### Hotels, hospitals, care homes, sports centres, etc.

- Swimming pool water
- Disinfection of drinking water

### Horticulture

- 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 drinking water“

The municipal water supply in Höchenschwanderberg supplies the connected households with the finest drinking water available. The 7-lamp UV systems Dulcodes Z from ProMaqua ensures the water remains germ-free

The municipal water supply in Höchenschwanderberg supplies over 20 villages and hamlets from six municipalities with additional water from an underground reservoir in Alltal to the south of St. Blasien (Baden-Württemberg / Germany). Its water works use a UV systems Dulcodes Z from ProMaqua in order to guarantee optimal drinking water quality at all times. The DVGW certified UV systems (in accordance with DVGW test specification W 294) guarantees efficient, chemical-free disinfection of the drinking water without impairment to the odour or flavour, whilst maintaining the terms of the statutory regulations. A. Denz, water works supervisor for municipal water supply in Höchenschwanderberg granted us an interview regarding Dulcodes Z.

Mr Denz, what do you use the UV systems 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 drinking water quality even under unfavourable conditions.“ In doing so, there is no need to add chlorine.“

Where is the UV systems 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 systems. 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 waterquality.“

## Contact worldwide

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### Experts in Chem-Feed and Water Treatment

As a member of the ProMinent Group, ProMaqua is at home in 100 countries across the globe. This guarantees worldwide availability of our products and short distances to the customer.

We offer identically high quality standards for our products and services worldwide. Exactly where you need us. Experience, knowledge and expertise in water treatment and metering technology.

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