

Water treatment and water disinfection

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Heidelberg, January 2016

## Water Treatment and Water Disinfection



### A clear case of disinfection

Hygienically pure water is one of the greatest challenges of our time. With ProMaqua® products and systems - combined with our many years of practical experience - we have developed application-based solutions for a range of different industries. They are characterised by their outstanding handling of natural resources, minimal operating costs and maximum efficiency.

Chapter 1 offers **UV systems** for the gentle and chemical-free disinfection of water. They are ideal for applications associated with the treatment of potable water or swimming pool water, as well as in the beverage industry.

Refer to Chapter 2 for the effective removal of undesirable organic and inorganic substances or for efficient disinfection in the treatment of cooling and process water. The chapter focuses on **ozone systems** with the most diverse capacity ranges. Choose from this diverse product range for a trouble-free outcome - advice included!

Avoid undesired by-products that occur with standard disinfection with chlorine. To this end, refer to chapter 3 for economically and ecologically sensitive alternative disinfection methods with **chlorine dioxide**.

Chapter 4 describes **electrolysis systems**, precisely the right alternative for ultra-environmentally-friendly applications, for example instead of chlorine gas.

The **storage tanks** from chapter 5 are indispensable. They comply with internationally applicable manufacturing approvals and are suitable for installation outdoors and indoors.

The **metering systems Ultromat**® are persuasive with their ease of assembly and operation. They meet the ultimate requirements in terms of the separation of colloidal solids from liquids. They can be found in Chapter 6.

When it comes to the reliable removal of particles and salts, we recommend systems with **membrane filter technology** described in Chapter 7.

### We're happy to help

The selection of a product depends on a number of different factors.

Our team would be happy to be of assistance should you have any questions about water treatment and water disinfection. Give us a call! We look forward to hearing from you.

Monday to Friday 8:00 – 16:30

#### ProMinent Sales

0049 6221 842 – 0  
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#### Technical Consulting

0049 6221 842 – 1850  
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**Note:** We can also support you by phone in selecting the right products and, in many cases, optimising entire applications. With more complex requirements, our consultants will then hand the task over to a field sales colleague, who will then clarify your requirements in person on site.

### After-sales Service

Our service technicians are on hand to help you. Whether for the initial installation or for maintenance and repair work. We're happy to help!

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## UV Systems Dulcodes LP

Flow up to 523 m<sup>3</sup>/h

A world first – the Dulcodes LP: precise lamp dimming in seconds – even with rapidly changing flows and temperature conditions

Our patented Vario-Flux high-output lamps with active temperature management are used in the Dulcodes LP. Thanks to the unique combination of electronic ballast technology and the Vario-Flux lamps, they can be dimmed quickly and precisely over a broad range of up to 50% of the nominal power.

Efficiency even increases in "Dimmed Mode", which has a particularly positive effect when the actual flow is below the maximum possible flow of the system. Seasonal fluctuations of water temperature no longer play a role and are simply compensated for.

Vario-Flux lamps stand out on account of their high UV output and minimal ageing behaviour.

The flow in the Dulcodes LP has been optimised in a reactor based on intensive computer simulation. At the same time the pressure loss is kept minimal. The resulting uniform UV dose without over- or under-dosing a partial volumetric flow leads to minimal use of energy, a minimal lamp count and significantly reduced life cycle costs.

For more information see page → 1-7

## External Storage Module CDVc/CDKc

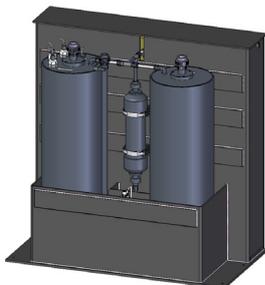
Useful capacity 150 l

The external storage module features a volume compensation bag so that no external bleed line or neutralisation of the chlorine dioxide gas volume is needed.

The maximum permissible concentration of the ClO<sub>2</sub> solution is 2,000 mg/l.

The storage module can be connected on a project basis to the chlorine dioxide systems BelloZon<sup>®</sup> CDVc and CDKc. Make sure that the defined safety equipment (secure bypass) is also installed. Please contact our Sales Department with any project enquiries.

For more information see page → 3-21



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# Contents

<b>Water treatment and water disinfection</b>		<b>page</b>
<b>1</b>	<b>UV Systems Dulcodes</b>	<b>1-1</b>
1.1	General Notes on UV Treatment	1-1
1.1.1	Applications of Dulcodes UV Systems	1-1
1.1.2	Description of Dulcodes UV Systems	1-2
1.2	Performance Overview of Dulcodes UV Systems	1-4
1.2.1	Notes on Planning and Designing an UV System	1-5
1.3	Questionnaire for Designing an UV System	1-6
1.4	UV System Dulcodes LP Stainless Steel	1-7
1.5	UV System Dulcodes LP-PE Plastic	1-9
1.6	UV System Dulcodes Z	1-11
1.7	UV System Dulcodes MP	1-13
1.8	UV System Dulcodes A	1-15
1.9	Accessories for Dulcodes UV Systems	1-17
<b>2</b>	<b>Ozone Systems OZONFILT®</b>	<b>2-1</b>
2.1	Ozone In Water Treatment	2-1
2.2	Performance Overview of Ozone Systems	2-2
2.3	Questionnaire on the Design of an Ozone System	2-3
2.4	Ozone System OZONFILT® OZVa	2-4
2.4.1	OZONFILT® OZVa 1-4 Ozone Production Systems (Operating Gas - Air)	2-5
2.4.2	OZONFILT® OZVa 5-7 Ozone Production Systems (Operating Gas - Oxygen)	2-7
2.4.3	Ordering Information for OZONFILT® OZVa Systems	2-9
2.4.4	System Solution OZONFILT® Compact OMVa	2-11
2.5	Ozone System OZONFILT® OZMa	2-13
2.5.1	Ozone Generation Systems OZONFILT® OZMa 1-6 A (Operating Gas - Air)	2-15
2.5.2	Ozone Generation Systems OZONFILT® OZMa 1-6 O (Operating Gas - Oxygen)	2-18
2.5.3	Ordering Information for OZONFILT® OZMa Systems	2-21
2.6	Accessories and Spare Parts for Ozone Systems	2-22
2.6.1	Compressors for OZONFILT® OZVa 1-4	2-22
2.6.2	Oxygen Generator for OZONFILT® OZVa 5-7	2-23
2.6.3	Static Helical Mixer Made of PVC or Stainless Steel	2-24
2.6.4	Accessories for OZONFILT® OZMa	2-25
2.6.5	Bleed Valves	2-25
2.6.6	Residual Ozone Gas Destructor	2-25
2.6.7	Room Air Monitoring	2-26
2.6.8	Cooling Water Heat Exchanger	2-27
2.6.9	Personal Protection Needs	2-28
2.6.10	Overvoltage Protection	2-28
2.6.11	Replacement Plug-in Insert After Tripping	2-28
<b>3</b>	<b>Bello Zon® Chlorine Dioxide Systems</b>	<b>3-1</b>
3.1	Chlorine Dioxide in Water Treatment	3-1
3.1.1	Chlorine Dioxide Applications	3-1
3.1.2	Bello Zon® System Technology	3-2
3.2	Performance Overview of Chlorine Dioxide Systems	3-3
3.3	Questionnaire on the Design of a Chlorine Dioxide System	3-4
3.4	Chlorine Dioxide System Bello Zon® CDLb	3-5
3.4.1	Identity code ordering system for chlorine dioxide systems Bello Zon® CDLb	3-6
3.4.2	Accessories and Maintenance Sets for Chlorine Dioxide Systems Bello Zon® CDLb	3-7
3.5	Chlorine Dioxide System Bello Zon® CDLb with Multiple Points of Injection	3-10
3.6	Chlorine Dioxide System Bello Zon® CDEa	3-11
3.7	Chlorine Dioxide System Bello Zon® CDVc	3-13
3.7.1	Identity Code Ordering System for CDVc Systems	3-15
3.7.2	Maintenance Sets for Bello Zon® CDV Chlorine Dioxide Systems	3-16

## Water treatment and water disinfection

page

3.8	Chlorine Dioxide System Bello Zon <sup>®</sup> CDKc	3-17
3.8.1	Identity Code Ordering System for CDKc Systems	3-19
3.8.2	Maintenance Kits for Bello Zon <sup>®</sup> Type CDK Chlorine Dioxide Systems	3-20
3.9	Storage Tank Accessories	3-21
3.10	Bypass Line Accessories	3-22
3.11	Chemical Supply Accessories	3-25
3.12	Safety Accessories and Analysis	3-27
<b>4</b>	<b>Electrolysis Systems CHLORINSITU<sup>®</sup> and DULCO<sup>®</sup>Lyse</b>	<b>4-1</b>
4.1	Electrolysis Systems CHLORINSITU <sup>®</sup>	4-1
4.2	Performance Overview	4-2
4.3	Questionnaire on the Design of an Electrolysis System	4-3
4.4	Electrolysis System CHLORINSITU <sup>®</sup> II	4-4
4.5	Electrolysis System CHLORINSITU <sup>®</sup> III	4-6
4.6	Electrolysis Systems CHLORINSITU <sup>®</sup> III Compact and IV Compact	4-8
4.6.1	Electrolysis System CHLORINSITU <sup>®</sup> III Compact	4-8
4.6.2	Electrolysis System CHLORINSITU <sup>®</sup> IV Compact	4-10
4.7	Electrolysis System CHLORINSITU <sup>®</sup> V	4-12
4.8	Electrolysis System CHLORINSITU <sup>®</sup> V Plus	4-14
4.9	Questionnaire on the Design of an ECA Water System	4-16
4.10	Electrolysis System Dulco <sup>®</sup> Lyse	4-17
4.11	Accessories	4-18
<b>5</b>	<b>Storage Tanks</b>	<b>5-1</b>
5.1	PE/PP Storage Tank and Equipment Construction	5-1
5.2	PE Storage Tank With General WHG Approval	5-1
5.2.1	Our standard equipped storage tanks and collecting pans with approval marks	5-3
5.2.2	Accessories Meeting The Requirements Of WHG § 19 and VAWS (Directive On Systems For Storage And Handling Of Water-Endangering Substances)	5-4
5.2.3	Other Accessories	5-6
5.3	PP/PE Storage Tanks, Custom-built	5-7
<b>6</b>	<b>Polymer Batching and Metering Systems Ultromat<sup>®</sup></b>	<b>6-1</b>
6.1	Metering Systems for Metering Powdered and Liquid Polymer Solutions Ultromat <sup>®</sup>	6-1
6.1.1	Application examples for complete polymer dissolving systems	6-1
6.2	Performance Overview of Polymer Batching and Metering Systems Ultromat <sup>®</sup>	6-2
6.3	Questionnaire for the Design of Polymer Matching and Metering Systems Ultromat <sup>®</sup>	6-3
6.4	Metering System Ultromat <sup>®</sup> ULFa	6-4
6.5	Metering System Ultromat <sup>®</sup> ULPa	6-7
6.5.1	Identity Code Ordering System for Oscillating Systems Ultromat <sup>®</sup> ULPa	6-9
6.6	Metering System Ultromat <sup>®</sup> ULDa	6-10
6.6.1	Identity Code Ordering System for Double-deck System Ultromat <sup>®</sup> ULDa	6-12
6.7	Metering System Ultromat <sup>®</sup> ATR	6-13
6.8	Metering System POLYMORE	6-15
6.9	Metering System PolyRex	6-16
6.10	Metering System Ultromat <sup>®</sup> MT for Batch Operation	6-17
6.11	Ultromat <sup>®</sup> Accessories	6-18
<b>7</b>	<b>Membrane Technology and Membrane Filtration</b>	<b>7-1</b>
7.1	Overview of Membrane Technology	7-1
7.2	Performance Overview of Ultrafiltration	7-2
7.3	Nanofiltration System Dulcosmose <sup>®</sup> NF	7-4
7.4	Performance Overview of Reverse Osmosis	7-6
7.5	Questionnaire	7-8
7.5.1	Questionnaire on the Design of a UF System	7-8
7.5.2	Questionnaire on the Design of an RO System	7-9

# Contents

<b>Water treatment and water disinfection</b>		<b>page</b>
7.6	Ultrafiltration System Dulcoclean <sup>®</sup> UF	7-10
7.6.1	Ultrafiltration Systems Dulcoclean <sup>®</sup> UF	7-10
7.7	Reverse Osmosis System Dulcosmose <sup>®</sup>	7-11
7.7.1	Reverse Osmosis System Dulcosmose <sup>®</sup> ecoPRO	7-11
7.7.2	Reverse Osmosis System Dulcosmose <sup>®</sup> TW	7-14
7.7.3	Reverse Osmosis System Dulcosmose <sup>®</sup> BW	7-16
7.7.4	Reverse Osmosis System Dulcosmose <sup>®</sup> SW	7-18
<b>8</b>	<b>Gravity Filter INTERFILT<sup>®</sup> SK</b>	<b>8-1</b>
8.1	Sand Filter INTERFILT <sup>®</sup> SK	8-1



# 1 UV Systems Dulcodes

## 1.1 General Notes on UV Treatment

Disinfection is a key stage in modern water treatment. UV disinfection is used to an ever increasing extent, as a safe, chemical-free and reliable disinfection process. Extensive research projects and numerous trouble-free operational systems prove the safety and reliability of UV disinfection.

With UV disinfection, the water to be disinfected is irradiated with ultraviolet light, which involves a purely physical, chemical-free process for water disinfection.

UV-C radiation in particular, with a wavelength ranging from 240 to 280 nm, attacks the vital DNA of the bacteria directly. The radiation initiates a photochemical reaction and destroys the genetic information contained in the DNA. The germ loses its reproduction capability and is destroyed. Even parasites, like Cryptosporidia or Giardia, which are extremely resistant to chemical disinfectants, are efficiently reduced.

Photochemical reactions are triggered in other applications too. The undesirable use of combined chlorine in swimming pool water is reduced by UV radiation, as a result of which enormous fresh water savings are achieved. Oxidants, such as ozone, chlorine or chlorine dioxide, are reliably reduced in the production water used in the food and beverage industry, avoiding the need for costly activated charcoal filters.

UV disinfection has many advantages:

- Immediate and safe destruction of germs without the addition of chemicals
- Photochemical reduction of undesirable substances
- No THM or AOX formation, no formation of other undesirable substances
- No impairment of the odour or taste of the water
- No storage and handling of chemicals required
- Effect is independent of pH
- No reaction vessel or reaction tank required
- Minimal space requirement
- Low investment and operating costs with excellent reliability and efficiency

### 1.1.1 Applications of Dulcodes UV Systems

A large number of our UV disinfection systems have been supplied worldwide, for the most diverse of applications:

- **Private water suppliers and municipal water works**  
for the disinfection of potable water
- **Food and beverage industry**  
to destroy the germs and bacteria in the water needed for food and beverage production and for the disinfection of process water  
to reduce chlorine dioxide in the production water
- **Pharmaceutical and cosmetics industry**  
to meet the high microbiological requirements of the production water  
to destroy residual ozone in the production water without the use of active carbon filters
- **Reverse osmosis systems**  
for permeate disinfection
- **Horticulture**  
for the disinfection of irrigation water
- **Spa pools and swimming pools**  
for the disinfection of the pool water  
for chloramine reduction in the pool water

# 1 UV Systems Dulcodes

## 1.1.2

### Description of Dulcodes UV Systems

**Dulcodes UV disinfection systems essentially consist of:**

- High-quality reactor made of stainless steel (DIN 1.4404) or UV-resistant plastic
- Lamp protection tubes made of high-quality quartz, easily removable for cleaning purposes
- Lamps with an exceptionally high UV output in the 254 nm range
- Highly selective UV sensors with good long-term and temperature stability
- UV system controllers and modern electronic ballasts fitted in a control cabinet

**The special features of our Dulcodes UV disinfection systems are:**

- Uniform UV dose distribution thanks to optimised flow characteristic in the reactor guarantees maximum flow output with a minimum lamp count and minimum pressure loss
- Reduced life cycle costs due to the long life time of high-output lamps with low energy consumption and high UV output
- Unique active temperature management of Vario-flux low-pressure technology adapts the lamp output in seconds and provides optimum disinfection even with rapidly changing flows and temperature conditions
- Efficient and chemical-free cleaning of the lamp protection tubes with manual or automatic wiper system without interruption to operation
- Continuous monitoring of the reactor temperature by temperature sensor Pt 1000
- Electronic ballasts for the soft start and operation and monitoring of individual lamps
- Dulcodes LP control cabinet with efficient recirculation cooling ensures the long life of electronic components and protects against corrosion in aggressive ambient conditions
- Various options for simple integration of the unit in higher-level control systems thanks to many analogue and digital interfaces
- User-friendly and intuitive control for the display of operating statuses and adjustment of operating parameters
- Comprehensive biosimetric validation in line with EPA-UVDGM or DVGW and ÖVGW certification for selected product ranges confirm disinfection efficiency

### Dulcodes UV Lamps

**Low-pressure lamp Opti-Flux**

Doped, high-performance low-pressure amalgam lamp with a life expectancy of approx. 14,000 operating hours. The operating temperature of the lamp is 100 – 130 °C so that it can even be used in water temperatures of up to approximately 70 °C. The output is independent of the water temperature and is approximately 300 W per metre arc length.

**Low-pressure Vario-Flux lamp**

Newly developed patented high-performance amalgam lamp with a guaranteed life time of 14,000 operating hours (pro rata). The lamps stand out on account of their high UV output and minimal ageing behaviour. Thanks to the unique combination of electronic ballast technology and the Vario-Flux lamps, they can be dimmed quickly and precisely down to 50% of the nominal power. Seasonal fluctuations of water temperature no longer play a role and are simply compensated by the active temperature management of the lamp. Efficiency increases even in dimmed mode. This has a particularly positive effect when the actual flow is below the maximum possible flow of the system. The special technology also enables vertical and horizontal installation.

**Medium-pressure Powerline lamp**

Medium-pressure mercury lamp with a life expectancy of approx. 8,000 to 10,000 operating hours, depending on lamp size. The high output of these lamps permits the treatment of very large flows. Thanks to their broad range spectrum, these lamps are particularly suitable for photochemical processes. The operating temperature of the lamp is 650 – 850 °C. The water temperature is therefore monitored and the system switches off when a limit temperature is exceeded.

# 1 UV Systems Dulcodes

## Dulcodes UV Controllers

### Compact controller

Compact unit for the control of all functions of the UV system. The control can be selected for single lamp systems of the Dulcodes LP product range. The display alternately shows the current UV-intensity, the operating hours and the number of lamp activations. The compact controller informs the operator if values fall below freely programmable safety and warning thresholds. Different functions, such as start rinsing, interval rinsing, stagnation rinsing and post-burning time can be freely set on demand.

The control has the following inputs and outputs:

- Connection for both a rinsing and shut-off valve (230 V)
- Potential-free contact output for the end of lamp life, power failure and warning
- Potential-free changeover output for operating and collective failure messages
- Potential-free contact input for temperature or flow control and pause
- 4-20 mA analogue output for sensor signal

### Deluxe control UVCb

The Deluxe controller consists of a control PCB and a HMI which is integrated in the door of the control cabinet. The control of the UV systems is user-friendly and intuitive. All operating statuses are shown on the display and all operating and fault messages are shown in plain text. The operating status (Operation/Warning/Fault) of the system can be seen from afar by means of LEDs.

The Deluxe control UVCb is connected to the ballasts via a bus system so that each individual lamp can be precisely monitored. Different cable lengths are detected automatically and the operating parameters adapted accordingly. The controller, the electronic ballasts and the lamps are perfectly matched to each other. This enables the system to adapt the UVC-output of the low pressure and medium pressure lamp to variable water quality or flow rates via an external 0/4-20 mA signal.

Different auxiliary functions, such as the automatic rinsing of the system over a freely programmable rinsing time, the control of a shut-off valve and a circulating pump are integrated as standard. The controller is managing as well the automatic wiper system. During the wiping cycle, the position is multiple controlled for absolute operational safety of the wiper system: by monitoring the end position and by continuous data exchange between the wiper motor and the controller.

The UVC sensor signal can be monitored online via an analogue output 0/4-20 mA. Any violation of the warning threshold, minimum radiation intensity and faults are reported via contact outputs. The reactor temperature is monitored by a temperature sensor to avoid overheating.

Potential-free inputs make it possible to hook up the UV-system to a higher order control: The "Pause" input can be used to regularly start/stop the system, with the "External fault" input leading to the system being shut down in the event of a fault with an external peripheral component connected. If the application requires different UV doses, a contact input can quickly adapt the UV dose to the changing requirement.

The Deluxe control UVCb features data logger. All events are saved on an SD card and can simply be read off on a PC. The UV sensor signal and other measuring parameters, connected to the control via external 0/4-20 mA signals, are stored on the SD card at set time intervals.

The control has the following inputs and outputs:

- 3 voltage outputs for rinsing and shut-off valve and pump (230 V or 24 V)
- 3 potential-free outputs for warning, collective malfunction and operating messages
- 4 potential-free inputs for pause, external fault, activate emergency mode, setpoint 1/2 switchover
- Input for temperature sensor Pt 100 or Pt 1000
- 1 analogue output 0/4-20 mA for sensor signal
- 2 analogue inputs 0/4-20 mA for flow and turbidity or combined chlorine with limit value function
- CAN-bus interface for the integration of higher-level controls

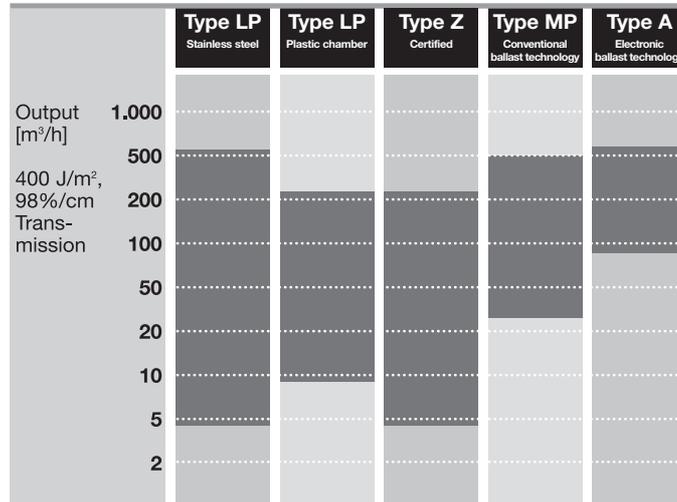
### Deluxe control Dulcodes A

A Siemens S7- 1200 control with a KP 300 Basic operating unit is used for operation and control of Dulcodes A systems. The functionality corresponds to that of the Deluxe control UVCb.

# 1 UV Systems Dulcodes

## 1.2 Performance Overview of Dulcodes UV Systems

ProMinent offers a wide range of UV systems for the most diverse applications. The following overview shows the capacity and main applications of our standard systems:



### Application

Drinking water	■		■		■
Industrial water	■	■	■	■	■
Swimming pool water	■	■		■	■
Salt water		■			

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Type LP: Low-pressure systems

Type MP: Medium-pressure systems

ProMinent provides all the advice needed for the safe operation of a Dulcodes UV system:

- Evaluation of the situation on site by trained, expert field sales staff.
- We can measure all key water parameters required for optimum system design in our water laboratory.
- Project planning of the system.
- Commissioning and system maintenance by our trained service technicians.

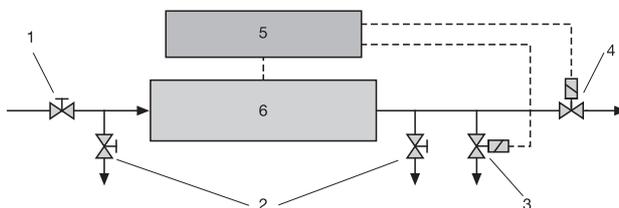
# 1 UV Systems Dulcodes

## 1.2.1

### Notes on Planning and Designing an UV System

- The system should always be designed for the maximum water flow.
- The system should always be designed for the worst anticipated UV transmission.
- Fireproof sampling cocks for microbiological tests should be provided upstream and downstream of UV disinfection systems.
- A manual shut-off valve should be provided before the UV system to isolate the system for maintenance work.
- With potable water disinfection and similar applications, an electrically-controlled shut-off valve should be provided downstream of the UV disinfection system, which also closes automatically on mains failure (solenoid valve, automatic closing flap valve or similar).
- With service water disinfection, it is normally sufficient to provide a manual valve to isolate the system for maintenance work, instead of the electrically-controlled valve.
- With potable water disinfection and similar applications, a flushing valve should be provided downstream of the UV disinfection.
- It should be ensured that there is sufficient space available for removing the lamp protection tube and lamp replacement.
- Modern electronic ballasts only allow a limited cable length between ballast and lamp, so that the control box with the ballasts should be positioned close to the lamp. On the other hand, the controller can be fitted in a control area, for example. **However, the maximum cable lengths we have specified should not be exceeded in this case.**

- 1 Shut-off valve
- 2 Sampling cock
- 3 Flushing valve
- 4 Shut-off valve
- 5 Controller/ballast
- 6 Radiation chamber



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Typical installation diagram of a UV disinfection system

The following details are required for design of a UV system:

- Application of the system
- Maximum water flow
- Minimum UV transmission of the water

The UV transmission should be determined by means of a laboratory measurement of the absorption at 254 nm.

A full water analysis gives important conclusions on the operating conditions of the system. The following questionnaire provides our project engineers with the information needed to design an appropriate system.

# 1 UV Systems Dulcodes

## 1.3 Questionnaire for Designing an UV System

**Application of the UV system:**

- for disinfection of
  - drinking water
  - production water in the food industry, cosmetics or pharmaceuticals
  - utility water
  - wastewater
  - salt water or brackish water
  - \_\_\_\_\_
- for photochemical reduction of
  - \_\_\_\_ ppm ozone
  - \_\_\_\_ ppm chlorine dioxide
  - \_\_\_\_ ppm chlorine
  - \_\_\_\_ ppm chloramine

**Water data:**

Maximum water flow \_\_\_\_\_ m<sup>3</sup>/h      Maximum water pressure \_\_\_\_\_ bar

Minimum UV transmission at 254 nm \_\_\_\_\_ %/1 cm      \_\_\_\_\_ %/10 cm      \_\_\_\_\_ SAC 254 nm

Turbidity \_\_\_\_\_ FNU      \_\_\_\_\_ NTU

Suspended particles content \_\_\_\_\_ mg/l

Water quality       constant       fluctuating

Total hardness \_\_\_\_\_ mmol/l      \_\_\_\_\_ °dH

Carbonate hardness \_\_\_\_\_ mmol/l      \_\_\_\_\_ °dH

Chloride \_\_\_\_\_ mg/l

Manganese \_\_\_\_\_ mg/l

Iron \_\_\_\_\_ mg/l

Water temperature \_\_\_\_\_ °C

**Other requirements:**

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# 1 UV Systems Dulcodes

## 1.4 UV System Dulcodes LP Stainless Steel



**A world first – the Dulcodes LP: precise lamp dimming in seconds – even with rapidly changing flows and temperature conditions**

**Flow up to 523 m<sup>3</sup>/h**

The unique UV systems Dulcodes LP are synonymous with pioneering water treatment – efficient and free of chemicals. Maximum flow rates with minimum lamp count and minimum energy consumption leads to lower life cycle costs. The active temperature management of the patented high-performance lamps ensures fast and precise lamp dimming. This ensures at all times automatic adaptation to varying flows and temperature conditions.

Our patented Vario-Flux high-output lamps with active temperature management are used in the Dulcodes LP. Thanks to the unique combination of electronic ballast technology and the Vario-Flux lamps, they can be dimmed quickly and precisely over a broad range of up to 50% of the nominal power.

Efficiency even increases in "Dimmed Mode", which has a particularly positive effect when the actual flow is below the maximum possible flow of the system. Seasonal fluctuations of water temperature no longer play a role and are simply compensated for.

Vario-Flux lamps stand out on account of their high UV output and minimal ageing behaviour.

The flow in the Dulcodes LP has been optimised in a reactor based on intensive computer simulation. At the same time the pressure loss is kept minimal. The resulting uniform UV dose without over- or under-dosing a partial volumetric flow leads to minimal use of energy, a minimal lamp count and significantly reduced life cycle costs.

### Your benefits

- UV system Dulcodes LP for a broad field of application for the efficient, safe and chemical-free water disinfection
- Unique active temperature management adapts the lamp output in seconds and provides for optimum disinfection even with rapidly changing flows and temperature conditions
- Uniform UV dose distribution thanks to optimised flow characteristics in the reactor guarantees maximum flow output with a minimum lamp count and minimum pressure loss
- Reduced life cycle costs due to the long life of Vario-Flux high-output lamps with low energy consumption and high UV output
- High flexibility thanks to vertical or horizontal installation
- User-friendly and intuitive control for the display of operating statuses and adjustment of operating parameters
- Control cabinet with efficient recirculation cooling ensures the long life of electronic components and protects against corrosion in aggressive ambient conditions



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### Technical details

- Hydraulically optimised reactor made of high-grade stainless steel 1.4404/AISI316L by means of computer simulation
- High-performance amalgam lamp "Vario-Flux" with an output of 80, 230 or 350 watts
- Guaranteed lamp life of 14,000 operating hours (pro rata)
- Electronic ballasts for the soft start, operation and individual monitoring and control of the lamps with active temperature management
- Long-term stable UVC sensor for continuous monitoring of the system
- Efficient and chemical-free cleaning of the lamp protection tube with automatic wiper system without interruption to operation, optionally available for selected system sizes
- Continuous monitoring of the reactor temperature by temperature sensor Pt 1000
- Single lamp system: equipped with either a Compact control or Deluxe control UVCb
- Various options for simple integration of the plant in higher-level control systems thanks to many analogue and digital in- and outputs

### Field of application

- Potable water treatment
- Food and beverage production
- Swimming pool water

# 1 UV Systems Dulcodes

## Technical Data

Type	Max. flow	Lamp power	Connected load	Reactor length	Minimum clearance for service	Ø	Connector nominal diameter
	m <sup>3</sup> /h	W	W	mm	mm	mm	
Dulcodes 1x80LP	8.8	80	100	742	973	140	RP 1 1/2"
Dulcodes 1x230LP	35.0	230	260	1,151	1,064	140	DN 80
Dulcodes 1x350LP	53.0	350	380	1,640	1,465	168	DN 100
Dulcodes 2x350LP	123.0	2x350	730	1,640	1,465	256	DN 150
Dulcodes 3x230LP	155.0	3x230	720	1,304	1,156	168	DN 150
Dulcodes 3x350LP	232.0	3x350	1,080	1,885	1,565	324	DN 200
Dulcodes 4x350LP	317.0	4x350	1,430	1,885	1,565	356	DN 200
Dulcodes 6x350LP	523.0	6x350	2,130	1,885	1,565	406	DN 250

\* 98%/cm transmission; 400 J/m<sup>2</sup> radiation intensity

<b>Lamp type</b>	High-Flux low pressure lamp (see p. → 1-2)
<b>Controller type</b>	Deluxe controller, alternatively compact controller (see p. → 1-3)
<b>Permissible operating pressure</b>	10 bar
<b>Permissible ambient temperature</b>	5–40 °C
<b>Permissible water temperature</b>	5-70 °C

## Spare Parts For Dulcodes LP UV Systems

	Order no.
UV lamp Vario Flux 80 W	1061751
UV lamp Vario Flux 230 W	1061752
UV lamp Vario Flux 350 W	1061418
Lamp protection tube for Dulcodes 1x80LP	1059182
Lamp protection tube for Dulcodes 1x230LP	1058838
Lamp protection tube for Dulcodes 1x350 and 2x350LP	1049344
Lamp protection tube for Dulcodes 3 – 6x350LP	1049350
O-ring lamp protection tube/lamp cover for 1x80LP	1004920
O-ring lamp protection tube/lamp cover for 1x230 to 6x350LP	1023569
UVC-U sensor P/D/W/R 1.4539 from Sep. 2006	1028115
O-ring for UVC sensor	1002175
Screwed plug G 1/2" for Dulcodes 2 – 6x350LP	1005818
Screwed plug G 1/4" for Dulcodes 1x80 to 1x350LP	1002752
O-ring for G 1/4" screwed plug for Dulcodes 1x80 to 1x350LP	1001356
O-ring for G 1/2" screwed plug for Dulcodes 2 – 6x350LP	1002279

# 1 UV Systems Dulcodes

## 1.5 UV System Dulcodes LP-PE Plastic

**Chemical-free and reliable disinfection of water containing salt, such as sea water or thermal water.**

**Flow up to 250 m<sup>3</sup>/h**



Disinfection of saline sea water or thermal water without corrosion problems with the UV system Dulcodes LP-PE Plastic. The UV system consists of a reactor and a UV sensor made of highly UV-resistant plastic.

The UV system Dulcodes LP-PE is absolutely corrosion-free. This is ensured by the UV-stabilised, highly compressed HD-PE reactor and a special sensor made of plastic. The reactor is temperature-resistant through a special welding process and optimised to a pressure rating of more than 4 bar. The 130 or 290 W low-pressure lamps are powered by electronic ballasts and operated gently.

### Your benefits

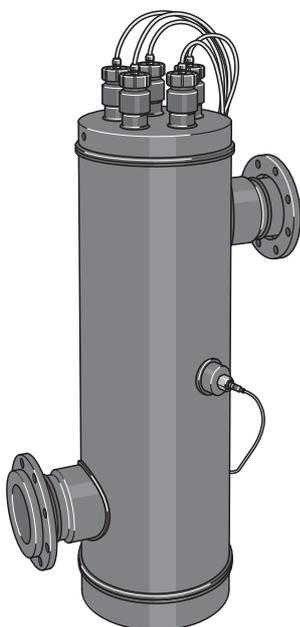
- Reactor made of UV-stabilised high-density HD-PE, absolutely corrosion-free and temperature stable.
- Long-term salt water-resistant UVC sensor for monitoring the disinfection capacity, contamination of the lamp protection tubes, lamp ageing and water transmission.
- Highly efficient Opti Flux 290 W lamps provide maximum disinfection and flow rate with a minimum number of lamps.
- Ballasts with BUS interface for the gentle ignition and operation of the lamps
- The replacement of lamps is reduced to the absolute minimum.
- Low maintenance costs and low follow-on costs, as there are fewer, high-performance lamps featuring amalgam technology with an excellent service life of up to 14,000 hours.

### Technical details

- Reactor made of UV-stabilised high-density HD-PE
- High-performance and highly efficient High-Flux (130 W) or Opti-Flux (290 W) low pressure amalgam lamps, largely temperature-independent
- Guaranteed (pro rata) lamp service life: High-Flux lamp: 10,000 h; Opti-Flux lamp: 14,000 h
- Long-term stable UVC sensor made of PTFE for continuous monitoring of the system, factory-calibrated in accordance with the DVGW standard.
- Control cabinet made of coated steel
- Single lamp system: equipped with either a Compact control or Deluxe control UVCb
- Various options for simple integration of the plant in higher-level control systems thanks to many analogue and digital interfaces and connectors

### Field of application

- Process water
- Swimming pool water
- Salt water



pk\_7\_047

# 1 UV Systems Dulcodes

## Technical Data

Type	Max. flow	Lamp power	Connected load	Reactor length	Minimum clearance for service	Ø	Connector nominal diameter
	m <sup>3</sup> /h	W	W	mm	mm	mm	
1x130LP-PE	8.7*	1x130	150	1,371	1,400	125	DN 50
1x290LP-PE	26.6*	1x290	310	1,530	1,710	138	DN 80
2x290LP-PE	93.5*	2x290	600	1,535	1,710	188	DN 125
3x290LP-PE	192.7*	3x290	910	1,535	1,710	268	DN 200
4x290LP-PE	250.0*	4x290	1,200	1,535	1,710	268	DN 200

\* 98 %/cm transmission; 400 J/m<sup>2</sup> UV dose

<b>Lamp type</b>	High-Flux low-pressure lamp 130 W Opti Flux low-pressure UV lamp, 290 W (see page → 1-2)
<b>Controller type</b>	De luxe controller, optional compact controller (see p. → 1-3)
<b>Permissible operating pressure</b>	4 bar
<b>Permissible ambient temperature</b>	5–40 °C
<b>Permissible water temperature</b>	5–30 °C

## Spare Parts for Dulcodes LP-PE UV Systems

	Order no.
High-Flux UV lamp 130 W	1002486
Opti Flux UV lamp 290 W	1040082
Lamp protection tube for Dulcodes 130 LP-PE	1006385
Lamp protection tube for Dulcodes 290 LP-PE	1002471
O-ring lamp protection tube/lamp cover	1006332
UVC sensor K, red brass for systems supplied up to Nov. 2011	1006329
UVC-Sensor K, PTFE for systems supplied since Dec. 2011	1035201
O-ring for UVC sensor	1002175
O-ring for UVC sensor K, PTFE	1041049
Replacement filter mats for control cabinet ventilation (2 off required per control cabinet)	1004212

# 1 UV Systems Dulcodes

## 1.6 UV System Dulcodes Z



### Chemical-free disinfection of potable water – naturally DVGW-certified

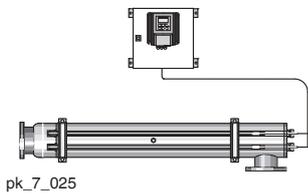
Flow up to 230 m<sup>3</sup>/h

UV system Dulcodes Z for potable water treatment. Chemical-free disinfection, which conforms to all internationally established DVGW, ÖVGW and UVDGM standards. High-performance and energy-efficient high-output lamps.

UV system Dulcodes Z is equipped with energy-efficient Opti-Flux high performance lamps, incorporated in optimised reactors. The effectiveness of the disinfection necessary for certification was proved in comprehensive biosimetric measurements. Dulcodes Z thus facilitates maximum possible disinfection and flow performance with a minimum number of lamps. The long-term stable, DVGW-compliant UVC sensor, in conjunction with the central control, ensures optimum continuous operating reliability in potable water treatment.

### Your benefits

- DVGW and ÖVGW-certified, EPA and UVDGM-compliant
- Flexible use over a wide transmission and flow range by extended DVGW characteristic line certification.
- Minimum use of resources at maximum flow, thanks to uniform irradiation and homogeneous UV dosage with optimised flow guidance.
- DVGW-compliant, long-term stable UVC sensor for monitoring the disinfection capacity, contamination of the lamp protection tubes, lamp ageing and water transmission.
- Increased output with fewer lamps.
- Energy-efficient high-performance Opti-Flux 300 W lamps permit greater flow per lamp.
- Operating costs reduced by longer maintenance cycles: guaranteed (pro rata) 14,000 operating hours.
- Electronic ballasts for the gentle ignition and operation of the lamps.



### Technical details

- Hydraulically optimised reactor made of high-grade stainless steel 1.4404/AISI316L
- High-performance, energy-efficient Opti-Flux (300 W) low pressure amalgam lamp, largely temperature-independent
- 14,000 lamp service life guaranteed (pro rata)
- Long-term stable DVGW UVC sensor for continuous system monitoring, factory-calibrated and verifiable on site by means of reference radiometer which conforms to the DVGW/ÖVGW specification
- Control cabinet made of coated steel
- Electronic ballasts with BUS interface for the gentle ignition, operation and individual monitoring of the lamps
- Deluxe control, freely programmable with large graphic display to show all important operating parameters, such as timing of the UV sensor signal (trend line), control type, operating status.
- Interfaces and connectors for:
  - Stopcock and flushing valve
  - Control of the feed pump
  - Warning and alarm relay for UV intensity
  - Collective malfunction alert relay
  - Pause contact
  - Relay for monitoring reactor temperature
  - Input for external fault
  - Standard signal output 4-20 mA of UV sensor signal

### Field of application

- Potable water
- Process water
- Food & beverage industry

# 1 UV Systems Dulcodes

## Technical Data

Type	Max. flow m <sup>3</sup> /h	Lamp power W	Connected load W	Reactor length mm	Minimum clearance for service mm	Ø mm	Empty weight/ Operating weight kg	Connector nominal diameter
75Z***	4.5*	1x75	90	1,115	1,035	140	12/27	G 1 1/4"
200Z	10.0*	1x200	220	1,040	910	140	16/30	DN 50
300Z	20.0*	1x300	320	1,540	1,420	140	25/47	DN 80
2x300Z	60.0*	2x300	650	1,590	1,420	219	39/97	DN 100
3x300Z	110.0*	3x300	1,000	1,625	1,420	219	39/97	DN 150
4x300Z	165.0*	4x300	1,300	1,630	1,420	273	56/143	DN 150
5x300Z	230.0*	5x300	1,600	1,630	1,420	273	56/144	DN 200
7x300Z	230.0**	7x300	2,200	1,630	1,420	324	73/201	DN 200

\* 98%/cm transmission; 400 J/m<sup>2</sup> UV dose

\*\* 94%/cm transmission; 400 J/m<sup>2</sup> UV dose

### Lamp type

Standard low pressure lamp with Type 75 Z  
Opti-Flux low pressure lamp with Types 200 Z to 7x300 Z  
(see p. → 1-2)

### Controller type

Deluxe controller  
UVC sensor signal in W/m<sup>2</sup> which can be calibrated with the help of a reference radiometer (see p. → 1-3, Reference Radiometer RRM see p. → 1-17)

### Permissible operating pressure

10 bar

### Permissible ambient temperature

5–40 °C

### Permissible water temperature

5 - 70 °C    \*\*\*5 - 30 °C

## Spare Parts for Dulcodes Z UV Systems

	Order no.
Opti-Flux UV lamp 75 W	1020911
Opti-Flux UV lamp 200 W	1021008
Opti-Flux UV lamp 300 W	1020929
Lamp protection tube for Dulcodes 75 W and 75 Z	1020845
Lamp protection tube for Dulcodes 200 Z	1021010
Lamp protection tube for Dulcodes 1-7x300 Z, Dulcodes R	1020846
O-ring lamp protection tube/lamp cover	1023569
UVC sensor Z 1.4404 DVGW	1022347
Sensor window G 1x20 for Dulcodes 75, 200, 2x300Z	1021113
Sensor window G 1x30 for Dulcodes 300, 3x300Z	1022377
Sensor window G 1x47.5 for Dulcodes 4-7x300Z	1023884
O-ring for sensor window	1023570
Lamp cable, 3.5 m long	1017867
Lamp cable, 7.5 m long	1024826
Sensor connection cable, 5 m long for systems supplied since September 2006	1021041
Extension for sensor cable, 5 m long	1024825
Screwed plug G 1/4"	1002752
O-ring for G 1/4" screwed plug	741256
Replacement filter mats for control cabinet ventilation (2 off required per control cabinet)	1004212

# 1 UV Systems Dulcodes

## 1.7 UV System Dulcodes MP



**Effective solution for the treatment of bathing water – designed for the degradation of combined chlorine.**

**Flow up to 569 m<sup>3</sup>/h**

The UV system Dulcodes MP for water treatment and disinfection in swimming pools. Combined chlorine is broken down and the typical swimming pool odour is eliminated: no more irritation for eyes, nose and skin. A manual stage switch permits adaptation to the required capacity requirement.

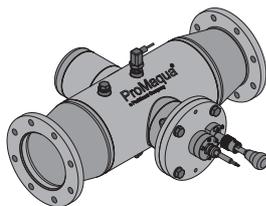
The UV system Dulcodes MP is fitted with output-optimised medium-pressure lamps. They guarantee the efficient photochemical breakdown of combined chlorine in swimming pool water. The system is insensitive to the most adverse conditions in warm, humid plant rooms enriched by aggressive chemicals. The robust and conventional ballast technology remains completely unaffected by this.

Efficient cleaning of the lamp protection tubes during operation is possible with ease. The lamp protection tubes can either be cleaned by a manual wiper or by the optionally extendible motor-driven automatic wiper.

The Dulcodes MP is a compact inline system. Thanks to its flexible flange options, the system can be used with ease for different nominal widths of circulation rate. The UV reactor is designed in such a way that no UV radiation can escape from the reactor. This means that the system can be installed directly in a plastic pipe. The free choice of the fitting position simplifies installation and retrofitting in the extreme.

### Your benefits

- Simple installation, thanks to the compact inline system, ensures minimum installation costs and fast retrofitting.
- Maximum flexibility when installing, thanks to free choice of the fitting position and direct installation in plastic pipes, as no UV radiation escapes from the reactor.
- Automatic switching on and off based on the chloramine value, for example used in conjunction with the DULCOMARIN® II.
- Unbeatably simple and quick maintenance: all maintenance work can be carried out quickly and conveniently from one side.
- Manual power control for optimum adaptation of the system to the respective capacity requirement (not for Dulcodes 1 x 0.65MP and 1MP).
- Manual or automatic wiper system for the efficient removal of deposits on the lamp protection tube. The wiper system can be easily retrofitted.



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### Technical details

- NSF 50-certified and specifically recommended for use in swimming pools.
- Optimised use of energy, thanks to large radiation chamber and uniform irradiation of the entire water flow due to optimised system hydraulics
- Radiation chambers made of high-grade stainless steel 1.4404/AISI316L
- Powerline medium-pressure lamps with high connecting power of up to 3 kW
- Guaranteed (pro rata) lamp service life of 8,000 hours
- Long-term stable UVC sensor for monitoring the lamp output, dirt on the lamp protection tube and changes in water quality
- Integral temperature switch to monitor the water temperature in the radiation chamber
- Manual or automatic motor-driven wiper for the efficient removal of deposits on the lamp protection tube
- Control cabinet made of coated steel
- Deluxe control with various options for simple integration of the plant in higher-level control systems, thanks to many analogue and digital in- and outputs

### Field of application

- Process water
- Swimming pool water

# 1 UV Systems Dulcodes

## Technical Data

Type	Max. flow m <sup>3</sup> /h	Lamp power W	Connected load kW	Reactor length mm	Minimum clearance for service mm	Empty weight/ Operating weight kg	DIN connector
1x0,65MP	20.0*	650	0.75	500	335	21/31	DN 65/80
1x1MP	58.0*	1.000	1.10	700	400	31/47	DN 100/125
1x2MP	102.0*	2.000	2.10	700	500	38/65	DN 125/150
1x3MP	205.0*	3.000	3.20	800	600	52/118	DN 200/250
2x2MP	278.0*	4.000	4.20	900	1,000	78/166	DN 200/250
2x3MP	379.0*	6.000	6.20	900	1,000	78/166	DN 200/250
3x3MP	569.0*	9.000	9.20	900	1,000	78/166	DN 250/300

\* 98 %/cm transmission; 600 J/m<sup>2</sup> UV dose for the breaking down of combined chlorine

<b>Lamp type</b>	Powerline S medium-pressure lamp (see p. → 1-2)
<b>Controller type</b>	Deluxe control (see p. → 1-3)
<b>Permissible operating pressure</b>	6 bar
<b>Permissible ambient temperature</b>	5–40 °C
<b>Permissible water temperature</b>	5–40 °C

## Spare Parts for Dulcodes MP UV Systems

	Order no.
Powerline UV lamp 1 kW	1035179
Powerline UV lamp 2 kW	1035057
UV lamp Powerline 3 kW	1035180
Lamp protection tube for Dulcodes 1 A and 0.6 MP	1035218
Lamp protection tube for Dulcodes 1 MP	1035166
Lamp protection tube for Dulcodes 2 MP	1035041
Lamp protection tube for Dulcodes 1 x 3 MP, 2 x 2 MP, 2 x 3 MP, 3 x 3 MP	1035193
Wiper element (2 required per UV lamp)	1027879
Spare parts kit UV MP 1 – 3 kW motor wiper	1037735
Spare parts kit UV MP 2x2 kW and 2x3 kW motor wiper	1044862
Spare parts kit UV MP 3x3 kW motor wiper	1044863
O-ring lamp protection tube/lamp cover	790410
UVC-U sensor M 1.4539	1034147
O-ring for UVC sensor	1002175
Sensor connection cable, 5 m long for systems supplied since September 2006	1021041
Replacement filter mats for control cabinet ventilation (2 off required per control cabinet)	1004212

# 1 UV Systems Dulcodes

## 1.8 UV System Dulcodes A



**Perfect for the treatment of higher flows.**

**Flow up to 739 m<sup>3</sup>/h**

The UV system Dulcodes A helps to ensure water quality. The UV system works energy-efficiently and cleanly based on continuously variable medium pressure lamps and can therefore automatically compensate for variations in the water quality or level of contamination.

The UV system Dulcodes A has a compact design. Output-optimised medium pressure lamps ensure effective disinfection of potable water and the photochemical breakdown of oxidants and/or combined chlorine.

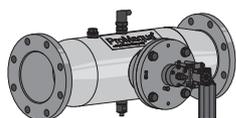
The system is fitted with electronic ballasts, which continuously adjust the lamp output, either via an external signal, such as the flow rate, or by specification of a setpoint.

A long-term stable UVC sensor ensures that the system operates safely and reliably. The motor-driven automatic wiper efficiently cleans the lamp protection tubes and minimises maintenance work with types of water that have a tendency to form films. After comprehensive certification and biosimetric validation, the systems comply with strict internationally recognised NSF, UL, CSA and USEPA standards.

### Your benefits

- Simple installation, thanks to the compact inline system, ensures minimal installation work and fast retrofitting
- Maximum flexibility when installing, thanks to the 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
- Automatic adjustment of the lamp output to a defined UV-C sensor signal with power increase to a raised, adjustable sensor signal via a digital input saves energy and extends the lamp service life.
- Unbeatable simple and quick maintenance: All maintenance work can be carried out quickly and conveniently from one side.
- Certified systems: NSF 50, CSA 22, UL508, comprehensively biosimetrically validated to UVDGM 2006

**NSF 50**  
**UVDGM 2006**  
**UL-CSA**



P\_PMA\_DS\_0018\_SW1a

### Technical details

- Optimised use of energy, thanks to large radiation chamber and uniform irradiation of the entire water flow due to optimised system hydraulics.
- Radiation chambers made of high-grade stainless steel 1.4404/AISI316L
- Powerline A medium-pressure lamps with high power input of up to 3 kW
- Guaranteed (pro rata) lamp service life of 8,000 hours
- Long-term stable UVC sensor for monitoring the lamp output, lamp protection tube fouling and changes in water quality
- Integral temperature sensor for monitoring the water temperature in the radiation chamber
- Automatic motor-driven wiper for efficient removal of deposits on the lamp protection tube
- Double, independent and automatic monitoring of the wiper function by revolution counter and limit switch
- Control cabinet made of coated steel
- Freely programmable control (Deluxe control Dulcodes A) with backlit display during normal operation (green), warning (yellow) and fault (red)
- Large graphic display to show all important operating parameters, such as the UV sensor signal, lamp power consumption, control type and operating status
- Interfaces and connectors for:
  - Stopcock and flushing valve
  - Control of the feed pump
  - Operating signal relay
  - Warning and alarm relay for UV intensity
  - Collective malfunction alert relay
  - Pause contact
  - Relay for monitoring reactor temperature
  - Temperature monitoring and fault indicating relay for control cabinet temperature
  - Input for external fault
  - Digital input for switch-over to second power stage
  - 4-20 mA standard signal input for flow-dependent lamp control or control dependent on measured value
  - Standard signal output 4-20 mA of UV sensor signal

# 1 UV Systems Dulcodes

## Field of application

- Potable water
- Process water
- Swimming pool water

## Technical Data

Type	Max. flow m <sup>3</sup> /h	Lamp power W	Connected load kW	Reactor length mm	Minimum clearance for service mm	Min. distance from wall mm	Empty weight/ Operating weight kg	Connector width DIN/ ANSI
1 x 1A	66.0* / 76.0**	1.000	1.10	700	400	300	31/47	DN 100/4"
1 x 2A	116.0* / 133.0**	2.000	2.10	700	500	300	38/65	DN 150/6"
1 x 3A	232.0* / 266.0**	3.000	3.20	800	600	300	52/118	DN 200/8"
2 x 2A	309.0* / 362.0**	4.000	4.20	900	1,000	300	78/166	DN 200/8"
2 x 3A	464.0* / 493.0**	6.000	6.20	900	1,000	300	78/166	DN 250/10"
3 x 3A	696.0* / 739.0**	9.000	9.20	900	1,000	300	78/166	DN 300/12"

\* 98 %/cm transmission; 600 J/m<sup>2</sup> UV dose for the breaking down of combined chlorine

\*\* 98 %/cm transmission; 400 J/m<sup>2</sup> UV dose for disinfection applications

<b>Lamp type</b>	Powerline A medium-pressure lamp (see page → 1-2)
<b>Permissible operating pressure</b>	10 bar (for systems 1 x 1A - 1 x 3A) 7 bar (for systems 2 x 2A - 3 x 3A)
<b>Permissible ambient temperature</b>	5–40 °C
<b>Permissible water temperature</b>	5–40 °C

## Spare Parts for Dulcodes A UV Systems

	Order no.
Powerline UV lamp 1 kW	1035179
Powerline UV lamp 2 kW	1041450
Powerline UV lamp 3 kW	1041451
Lamp protection tube for Dulcodes 1 A and 0.6 MP	1035218
Lamp protection tube for Dulcodes 2 A	1041723
Lamp protection tube for Dulcodes 3 A	1041485
Wiper element (2 required per UV lamp)	1027879
Spare parts set for UV A 1-3 kW motor wiper	1042860
Spare parts kit UV MP 2x2 kW and 2x3 kW motor wiper	1044862
Spare parts kit UV MP 3x3 kW motor wiper	1044863
O-ring lamp protection tube/lamp cover	1023569
UVC-U sensor M -1, 4-20 mA	1041449
O-ring for UVC sensor	1002175
Replacement filter mats for control cabinet ventilation (2 off required per control cabinet)	1004212

# 1 UV Systems Dulcodes

## 1.9 Accessories for Dulcodes UV Systems

### Transmission Photometer UVT P200

Photometer for measuring 254 nm UV transmission.

Supplied in stable, compact, water-tight plastic box including 10 mm quartz cuvette. Storage of the in-situ calibration means that a calibration using deionised water prior to every calibration is not necessary.

#### Technical Data

<b>Dimensions L x W x H (mm)</b>	230 x 190 x 95
<b>Weight</b>	1.8 kg
<b>Voltage supply</b>	100 - 240 V AC 50/60 Hz, 12 V DC auto-adapter
<b>UV-C lamp</b>	Mercury medium pressure lamp
<b>Measuring resolution</b>	Transmission in 0.1%
<b>Measuring accuracy</b>	Transmission in $\pm 0.5\%$
<b>Measuring range</b>	5 – 100%/cm

	<b>Order no.</b>
<b>Transmission Photometer UVT P200</b>	1045245

### Reference Radiometer RRM

Reference radiometer for checking and recalibrating DVGW-certified Dulcodes Z UV systems. The portable instrument complies with DVGW technical standard W 294/Part 3/2003 and is fitted with an insertion sensor inserted directly into the radiation chamber of the Dulcodes Z UV system in place of the sensor to be calibrated, so that the radiation intensity can be measured without interrupting operation. Suitable UV protective glasses should be worn as UV radiation escapes from the radiation chamber during this procedure.

#### Technical Data

<b>Measuring range</b>	20/200/2,000/20,000 W/m <sup>2</sup> (switchable)
<b>Display</b>	3-digit
<b>Voltage supply</b>	Battery, 9 V Type 6F22 or equivalent
<b>Wavelength range</b>	220 ... 290 nm, spectral adjustment in accordance with W 294
<b>Angular field of view</b>	40° in accordance with W 294, Item 7.2

	<b>Order no.</b>
<b>Reference radiometer RRM</b>	1025094

### UV Protective Glasses

Protective glasses to protect against UV radiation that can be harmful to the eyes when working on open UV systems.

	<b>Order no.</b>
<b>UV protective glasses</b>	1025243

### Protective Gloves

Protective gloves made of white cotton to avoid fingerprints on UV lamps and lamp sleeves. 1 pair universal size.

	<b>Order no.</b>
<b>Protective gloves</b>	1032815

# 1 UV Systems Dulcodes

## Sampling Cock

Fireproof sampling cock made of stainless steel.

	<b>Order no.</b>
<b>Sampling cock</b>	On request

## Cleaning System

Cleaning system for flushing the radiation chamber with a cleaning solution to remove deposits on the lamp tubes and internal surfaces of the UV system. Consists of chemical tanks, booster and metering pumps, valves and complete automatic or manual controller. Design and technical equipment are matched to the particular UV system and its application.

	<b>Order no.</b>
<b>Cleaning system</b>	On request

## Clip-on Thermostat

A thermostat is fitted to the outside of the radiation chamber. The thermostat monitors the water temperature of the water and can be connected to the control. The flushing valve opens when the pre-set limit temperature is exceeded. IP30 degree of protection. Switching on temperature range 0-90° C.

	<b>Order no.</b>
<b>Clip-on thermostat</b>	1043944
<b>Universal mounting tape suitable for all sizes</b>	1044851

## Fittings

Fittings provided for quick and easy wall mounting of the UV radiation chamber. Fitting parts comprise 2 screw-in pipe clips in high alloy steel (V2A), 2 base plates with M12 nut, 2 set screws and 4 M12 hexagon nuts.

Two-part clip with increased material cross-section to ensure high bearing strength and breaking resistance. A soundproofing layer ensures marked resistance in the sound level.

	<b>For type</b>	<b>Order no.</b>
<b>Fittings A2</b>	1x45D, 1x130D, 4x230D	1039826
	16P, 45P, 1x80W, 1x130W, 1x0,65S	1039827
	1x75W, 1x230W, 1x75Z, 1x200Z, 1x300Z, 1x300R	1039828
	2x230W, 2x300Z, 3x300Z, 2x300R, 1x2S	1039829
	3x230W, 4x300Z, 5x300Z, 3x300R	1039830

## Overvoltage Protection

Overvoltage protection for Dulcodes UV systems operated at 230 V 50-60 Hz.

The external overvoltage protection is intended for operations when the device's internal protection is not sufficient for surge voltages of 1 kV between the conductors and 2 kV to earth. An overvoltage trip can be fitted as a low protection surge arrester to significantly increase the stability of the Dulcodes systems to protect them when the supply mains is prone to disturbance energy.

It can only be determined by thorough investigation of the voltage behaviour on site whether the low protection surge arrester requires further measures, such as medium and main protection.

	<b>Order no.</b>
<b>Fine protection PT 2-DE IS 230 IAC</b>	733010

## Replacement Plug-in Insert After Tripping

	<b>Order no.</b>
<b>Replacement plug-in insert PT 2-DE / S 230 / AC - ST</b>	733011

## 2 Ozone Systems OZONFILT®

### 2.1 Ozone In Water Treatment

As the most powerful oxidant that can be used in water treatment, ozone permits a broad spectrum of possible applications:

#### Outstanding disinfection action against

- Bacteria and viruses
- Fungi and parasites

#### Oxidation of undesirable inorganic substances in the water

- Iron and manganese
- Arsenic
- Nitrite and sulphide

#### Oxidation of undesirable organic substances in the water

- Strong-smelling and strong-tasting compounds
- Humic substances and other compounds which affect the colour of the water
- Cyclic hydrocarbons
- Trihalomethanes, chloramines and other chlorine compounds

#### Micro-flocculating action

- After oxidation with ozone, substances and colloids dissolved in the water become insoluble and can be filtered

Significantly less environmentally harmful by-products result from the generation and use of ozone than other comparable oxidants and disinfectants. As a highly reactive gas, ozone is generated on site from oxygen, and introduced to the water directly, without interim storage. Because of its high reactivity, ozone decomposes into oxygen again in the water, with a half-life of several minutes. Therefore all components of an ozone handling system have to be perfectly coordinated to each other and the planned application, to achieve an optimum relationship between ozone generation and its effect.

With every new project, our engineers draw on experience that we have accumulated since 1971 in the following applications:

#### Potable water supply

- Oxidation of iron, manganese or arsenic
- Refinement and improvement of taste
- Disinfection

#### Food and beverage industry

- Disinfection of table water
- Disinfection of rinsers in the beverage industry
- Disinfection of process water

#### Swimming pools

- Reduction of chloramines and trihalomethanes, avoiding typical swimming pool odours
- Crystal clear water, thanks to micro-flocculating action
- Reliable microbiological barriers in therapy pools
- Reduction of investment and operating costs by the possibility of reducing the circulating power and throttling the fresh water inlet

#### Industry

- Cooling water treatment
- Combating legionella in cooling water circuits
- Disinfection of process water
- Removal of odorous substances in air scrubbers

#### Municipal waste water treatment

- Breakdown of trace substances
- Reduction of clarifier sludge
- COD reduction/breakdown
- Removal of colouring

## 2 Ozone Systems OZONFILT<sup>®</sup>

### 2.2 Performance Overview of Ozone Systems

ProMaqua<sup>®</sup> ozone systems operate based on the proven principle of silent electrical discharge. Ozone is produced from oxygen between two electrodes separated by an insulating dielectric by applying a high voltage of several thousands of volts. Depending on the system type, either dried ambient air or concentrated oxygen is used as the source of oxygen. ProMaqua<sup>®</sup> ozone systems are optimised to ensure maximum return and operating safety. They conform to the German DIN 19627 standard for ozone generation systems and are characterised by low energy and cooling water consumption.

#### Medium-frequency pressure systems

With the OZONFILT<sup>®</sup> OZVa and OZMa product range, the air or oxygen operating gas is fed to the ozone generator under pressure. Ozone is generated using medium-frequency high voltages.

The use of an integrated pressure swing dryer and a dielectric with optimum thermal conductivity makes the system extremely compact.

Operating under pressure means that the ozone generated can be introduced directly into water systems with back pressures of up to 2 bar. Additional booster pumps and injectors can therefore be dispensed with in many applications.

ProMaqua offers a wide range of ozone systems for the most diverse applications. The overview below shows the capacity ranges of our type series:

Output [g ozone/h]	OZVa 1-4	OZVa 5-7	OZMa 1-6 A	OZMa 1-6 O
1.000				
500				
200				
100				
50				
20				
10				
5				
2				
Operating gas	Air	Oxygen	Air	Oxygen
Ozone concentration	20 g/Nm <sup>3</sup>	100 g/Nm <sup>3</sup>	20 g/Nm <sup>3</sup>	100 g/Nm <sup>3</sup>

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#### Larger systems available on request

ProMaqua provides all the advice needed for the safe operation of an ozone plant:

- Evaluation of the situation on site by trained, expert field sales staff.
- In our water laboratory, we can measure all the key water parameters required for optimum plant design.
- Planning of the plant.
- Commissioning and plant service by our trained service technicians.



## 2 Ozone Systems OZONFILT®

### 2.4 Ozone System OZONFILT® OZVa

**Generate ozone from compressed air or oxygen. Environmentally-friendly and cost-effective.**

**Ozone capacity 5 – 90 g ozone/h**



The OZONFILT® OZVa is high-performance and compact. For efficient ozone generation in the medium output range of up to 90 g/h from compressed air or oxygen.

Ozone systems OZONFILT® OZVa are pressurised systems in which the operating gas – air or oxygen – is fed into the ozone generator under pressure.

**Air is used as the operating gas in the ozone system OZONFILT® OZVa type 1 to 4**

The ozone is generated from the oxygen in the ambient air and simultaneously metered. The integrated air treatment unit is designed as a pressure swing dryer, ensuring that ozone can be generated operationally safely and reliably even with a high level of ambient air humidity with ozone concentrations of up to 20 g/Nm<sup>3</sup>. Using the suitable mixing equipment, ozone concentrations of between 3 and 12 ppm can be achieved in the water to be treated, depending on the temperature.

**Oxygen is used as the operating gas in the ozone system OZONFILT® OZVa type 5 to 7**

Oxygen operation permits ozone generation with ozone concentrations of up to 150 g/Nm<sup>3</sup>. Depending on the system type, ozone is produced in 1-3 generators from oxygen provided from special oxygen generators or bottles. Using the suitable mixing equipment, ozone concentrations of up to 90 ppm can be achieved in the water to be treated, depending on the temperature.

#### Your benefits

- Simple operation
- Ozone generation independent of pressure and mains voltage
- Direct injection without injector system at up to 2 bar back pressure
- Maximum efficiency with minimal consumption of energy and cooling water
- Complete protection of electrical components (high-voltage transformer and power stage) thanks to PCC technology (primary current-controlled)
- Low maintenance and operating costs
- Infinitely precise output control of between 3% and 100% of the nominal power with display of the ozone volume in "grammes/hour"

#### Technical details

- Compact mounting in painted steel cabinet or optionally in a stainless steel cabinet
- Wall cabinet for OZVa 1, 2 and 5; free-standing cabinet for OZVa 3, 4, 6 and 7
- Special dielectric with outstanding cooling performance: in spite of the low cooling water consumption, heat is quickly and efficiently discharged before the ozone produced can decompose due to excessive heat
- Different designs up to complete equipment including integral mixing unit
- Excellent efficiency: Over 90% of the ozone is dissolved in the water, thanks to the special construction of the mixing unit
- Pause input for external switching on/off
- Analogue input 4-20 mA for power control depending on the measured value combined with external measuring and control technology
- Digital inputs for connection of a gas detector or external fault alarm
- Digital alarm signal output
- Air conditioning: With ambient temperature above 40 °C, the system can be equipped with an integral air conditioner. Max. ambient temperature with air conditioning: 50 °C

#### Field of application

- **Potable water supply:** Oxidation of iron, manganese and arsenic, refinement and taste enhancement and disinfection
- **Waste water treatment:** Degradation/reduction of COD and microcontaminants, reduction of sewage sludge
- **Food and beverage industry:** Oxidation of iron and manganese, disinfection of potable water and rinser water
- **Public swimming pools:** Degradation of disinfection by-products, reliable microbiological barrier and production of crystal-clear water thanks to its microfloculating effect
- **Industry:** Legionella prevention and disinfection of cooling water

## 2 Ozone Systems OZONFILT®

### 2.4.1

### OZONFILT® OZVa 1-4 Ozone Generation Systems (Process Gas - Air)

Under nominal conditions, the series OZVa 1 – 4 produces up to 40 g/h of ozone from oxygen in the ambient air at a concentration of 20 g/Nm<sup>3</sup>. Using the designated mixing devices, ozone concentrations of between 3 and 12 ppm can be achieved in the water to be treated, depending on the temperature (theoretical value at 30 and/or 0 °C).

Types OZVa 1 and 2 are installed in a control cabinet for wall mounting; types OZVa 3 and 4 are installed in a free-standing cabinet.

Provide an adequate supply of compressed air and a mixing unit designed for the operating conditions for operation of the ozone system.

#### Mixing equipment

OZVa 1 can be ordered in the following designs:

- Transparent mixing system with flow control mounted on the side of the system (see Fig. pk\_7\_001\_1\_V2)
- PVC static helical mixer mounted directly below the system, with 4 helical blades (pressure drop approx. 0.4 bar at maximum throughput) (see Fig. pk\_7\_042\_V2)
- Without mixing system for connection of 12/9 mm stainless steel pipes or 12/9 mm PTFE pipes

OZVa 2 can be ordered in the following designs:

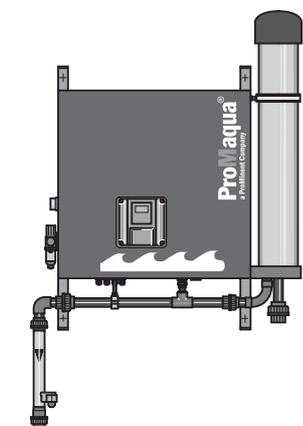
- PVC static helical mixer mounted directly below the system, with 4 helical blades (pressure drop approx. 0.4 bar at maximum throughput) (see Fig. pk\_7\_042\_V2)
- Without mixing system for connection of 12/10 mm stainless steel pipes or 12/9 mm PTFE pipes

OZVa 3 and 4 are delivered, in principle, as designs without mixing system; order a suitable mixing system separately (see Fig. pk\_07\_043\_V2).

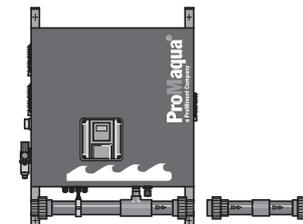
Static Helical Mixer Made of PVC or Stainless Steel see p. → 2-24

#### Notes

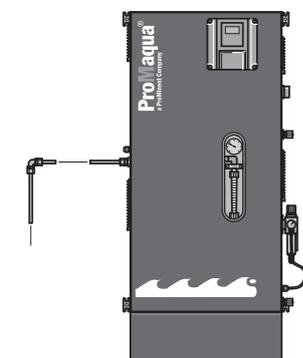
- The length of ozone gas-transporting pipes and the number of joints should be kept to a minimum. All rooms with a removable joint are to be monitored with a gas detector according to applicable German accident prevention regulations. All OZONFILT® systems are equipped for fitting a gas detector, such as a GMA 36 Ozon (see accessories).
- The ozone generator must be interlocked with the water flow into the metering point on all installations.
- A non-return valve should be installed upstream of the OVZa to prevent any return of ozonised water into the ozone-transporting pipe.



pk\_7\_001\_1\_V2  
OZONFILT® OZVa 1; capacity: 5 g/h



pk\_7\_042\_V2  
OZONFILT® OZVa 2; capacity: 15 g/h



pk\_7\_043\_V2  
OZONFILT® OZVa 3; capacity: 35 g/h

## 2 Ozone Systems OZONFILT®

### Technical Data

#### OZONFILT® OZVa 1-4 ozone production systems (operating gas - air)

##### Ambient parameters

Max. 85% air humidity of the ambient air, non-condensing, non-corrosive, dust-free, max. ambient temperature: 40 °C (with integrated air conditioning system: 50 °C)

		OZVa 1	OZVa 2	OZVa 3	OZVa 4
Number of generator modules		1	1	2	2
Ozone capacity, measured in accordance with DIN with air at 20 °C, cooling water at 15 °C	g/h	5	15	35	40
Air consumption (only ozone generation)	Nm <sup>3</sup> /h	0.25	0.75	1.75	2
Ozone concentration in the gas phase referenced to nominal conditions	g/Nm <sup>3</sup> *	20	20	20	20
Specific energy requirement at nominal capacity	Wh/g	30	30	21	20
Power factor at full capacity	cos φ	0.70	0.98	0.98	0.98
Ozone connection		G 1/4" internal	G 1/4" internal	G 1/4" internal	G 1/4" internal

\* For air at 20 °C, cooling water at 15 °C

\*\* Nm<sup>3</sup> = m<sup>3</sup> under standard conditions (p = 1.013x10<sup>5</sup> Pa, T = 273 K)

##### Electrical Connection

		OZVa 1	OZVa 2	OZVa 3	OZVa 4
Connected load	V/Hz/A	230/50;60/2	230/50;60/6	230/50;60/6	230/50;60/6
Enclosure rating		IP 54	IP 54	IP 54	IP 54
Degree of protection with integrated air conditioning unit (indoor/outdoor)		IP 54 / IP 34			

##### Overall Dimensions (Without Mixer)

		OZVa 1	OZVa 2	OZVa 3	OZVa 4
Width	mm	840	840	710	710
Height	mm	840	805	1,400	1,400
Depth	mm	310	310	310	310

##### Weight

		OZVa 1	OZVa 2	OZVa 3	OZVa 4
Weight	kg	70	75	121	121

##### Ozone Mixing

		OZVa 1	OZVa 2	OZVa 3	OZVa 4
Max. raw water temperature	°C	35	35	35	35
Permissible pressure at ozone outlet	bar	0.8–2.0	0.8–2.0	0.8–2.0	0.8–1.5

##### Air Supply

		OZVa 1	OZVa 2	OZVa 3	OZVa 4
Required air volume	Nl/min	6.2	17	38	42

##### Air quality

oil and dust-free, non-corrosive, constant priming pressure of 6 – 10 bar, max. temperature 40 °C

##### Cooling Water

		OZVa 1	OZVa 2	OZVa 3	OZVa 4
Cooling water requirement	l/h	10–60	20–60	50–100	70–100
Cooling water inlet pressure	bar	1–5	1–5	1–5	1–5
Cooling water inlet, PE pressure hose	mm	6 x 4	6 x 4	6 x 4	6 x 4
Cooling water outlet, open discharge	mm	6 x 4	6 x 4	6 x 4	6 x 4
Cooling water temperature at ambient temp. max. 35 °C	°C	<30	<30	<30	<30
Cooling water temperature at ambient temp. 35–40 °C	°C	<25	<25	<25	<25

##### Cooling water quality

No tendency to form lime scale, no corrosive components, removable substances: < 0.1 ml/l, iron: < 0.2 mg/l, manganese: < 0.05 mg/l, conductivity: > 100 µS/cm, chloride: < 250 mg/l

## 2 Ozone Systems OZONFILT®

### 2.4.2

#### OZONFILT® OZVa 5-7 Ozone Production Systems (Operating Gas - Oxygen)

The product range OZONFILT® OZVa 5 – 7 is a new development based on proven PSG technology, which produces ozone concentrations of up to 150 g/Nm<sup>3</sup> using oxygen as the operating gas. Using the designated mixing units, ozone concentrations of up to 90 ppm can be achieved (theoretical value at 0 °C) in the water to be treated.

Depending on the system type, ozone is produced in 1 – 3 generators from oxygen, provided from special oxygen generators or bottles. The nominal capacity of the individual generators is 30 g/h at 100 g/Nm<sup>3</sup>.

Type 5 is installed in a wall-mounted cabinet, types 6 and 7 are installed in a free-standing cabinet. In all three systems, ozone is transported to the mixing unit through a separate 12/10 mm stainless steel pipe or 12/9 mm PTFE pipe.

##### Mixing equipment

We recommend using stainless steel mixing systems because of the high ozone concentrations. Mixing systems made of PVC can have a reduced service life, depending on the operating conditions.

##### Important note

- Keep the length of pipes for conveying ozone and the number of joints to a minimum. Monitor all adjoining rooms with a gas detector, in line with the applicable German accident prevention regulations. All OZONFILT® systems are equipped for the fitting of a gas detector, such as type GMA 36 Ozone.
- Depending on the operating and installation conditions, it might also be necessary to monitor the room air for excessive oxygen content. The gas detector GMA 36 Oxygen can be used for this purpose.
- It is necessary for the ozone generation system to be interlocked with the water flow to the ozone metering on all installations.
- Install a non-return valve upstream of the OZVa to prevent any backflow of ozonised water into the pipe transporting the ozone.
- Ensure that all accessories that transport gas are resistant to ozone and oxygen (e.g. grease-free).
- Only use catalytic residual ozone destructors because of the high ozone concentrations. Activated charcoal based residual ozone destructors ignite spontaneously if subjected to increased ozone concentrations.

Room Air Monitoring see p. → 2-26

## 2 Ozone Systems OZONFILT®

### Technical Data

#### OZONFILT® OZVa 5-7 ozone production systems (Operating Gas - Oxygen)

##### Ambient parameters

Max. 85% air humidity of the ambient air, non-condensing, non-corrosive, dust-free, max. ambient temperature: 40 °C (with integrated air conditioning system: 50 °C)

		OZVa 5	OZVa 6	OZVa 7
Number of generator modules		1	2	3
Nominal ozone capacity at 100 g/Nm <sup>3</sup> ** and cooling water at 15 °C	g/h	30	60	90
Ozone capacity at 150 g/Nm <sup>3</sup> *	g/h	17.5	35.0	52.0
Ozone capacity at 80 g/Nm <sup>3</sup>	g/h	35	70	105
Specific energy requirement at nominal capacity	Wh/g	10	10	10
Power factor at full capacity	cos φ	0.98	0.98	0.98
Ozone connection		G 1/4" internal	G 1/4" internal	G 1/4" internal

##### Electrical Connection

		OZVa 5	OZVa 6	OZVa 7
Connected load	V/Hz/A	230/50;60/3	230/50;60/6	230/50;60/10
Enclosure rating		IP 54	IP 54	IP 54
Degree of protection with integrated air conditioning unit (indoor/outdoor)		IP 54 / IP 34	IP 54 / IP 34	IP 54 / IP 34

##### Overall Dimensions (Without Mixer)

		OZVa 5	OZVa 6	OZVa 7
Width	mm	865	705	705
Height	mm	804	1,400	1,400
Depth	mm	310	345	345

##### Weight

		OZVa 5	OZVa 6	OZVa 7
Weight	kg	75	109	114

##### Ozone Mixing

		OZVa 5	OZVa 6	OZVa 7
Max. raw water temperature	°C	35	35	35
Permissible pressure at ozone outlet	bar	0.8–2.0	0.8–2.0	0.8–2.0

##### Specification of Operating Gas: Oxygen

		OZVa 5	OZVa 6	OZVa 7
Gas volume at nominal capacity 100 g/Nm <sup>3</sup>	NI/h	300	600	900
Gas volume at capacity 150 g/Nm <sup>3</sup>	NI/h	117*	234*	347*
Gas volume at capacity 80 g/Nm <sup>3</sup>	NI/h	438	875	1,313
Concentration min.	vol%	90	90	90
Dew point max.	°C	-50	-50	-50
Pressure	bar	3 – 6	3 – 6	3 – 6
Max. particles	µm	5	5	5
Max. hydrocarbons	ppm	20	20	20
Max. temperature	°C	30	30	30

##### Cooling Water

		OZVa 5	OZVa 6	OZVa 7
Cooling water requirement	l/h	30	70	100
Cooling water inlet pressure	bar	1–5	1–5	1–5
Cooling water inlet, PE pressure hose	mm	6 x 4	6 x 4	6 x 4
Cooling water outlet, open discharge	mm	6 x 4	6 x 4	6 x 4
Cooling water temperature at ambient temp. max. 35 °C	°C	<30	<30	<30
Cooling water temperature at ambient temp. 35–40 °C	°C	<25	<25	<25

##### Cooling water quality

No tendency to form lime scale, no corrosive components, removable substances: < 0.1 ml/l, iron: < 0.2 mg/l, manganese: < 0.05 mg/l, conductivity: > 100 µS/cm, chloride: < 250 mg/l

\* Capacity 150 g/Nm<sup>3</sup> must be factory set as a special version

\*\* Nm<sup>3</sup> = m<sup>3</sup> under standard conditions (p = 1.013x10<sup>5</sup> Pa, T = 273 K)

## 2 Ozone Systems OZONFILT®

### 2.4.3

### Ordering Information for OZONFILT® OZVa Systems

#### OZONFILT® OZVa 1 Capacity 5 g/h

Type	Control cabinet surface	Order no.
Without mixing system	Grey powder-coated	1004239
Without mixing system	Stainless steel	1026124
With transparent mixing system with flow monitor 0.5–3 m³/h	Grey powder-coated	1026118
With transparent mixing system with flow monitor 0.5–3 m³/h	Stainless steel	1026125
With transparent mixing system with flow monitor, 3-5 m³/h	Grey powder-coated	1004235
With transparent mixing system with flow monitor, 3-5 m³/h	Stainless steel	1026126
With PVC static mixer, DN 40, 5–10 m³/h	Grey powder-coated	1026120
With PVC static mixer, DN 40, 5–10 m³/h	Stainless steel	1026127
With PVC static mixer, DN 50, 10–15 m³/h	Grey powder-coated	1026121
With PVC static mixer, DN 50, 10–15 m³/h	Stainless steel	1026128
With PVC static mixer, DN 32, 0.5–2.8 m³/h	Grey powder-coated	1026122
With PVC static mixer, DN 32, 0.5–2.8 m³/h	Stainless steel	1026129
With PVC static mixer, DN 32, 2.8–5 m³/h	Grey powder-coated	1026123
With PVC static mixer, DN 32, 2.8–5 m³/h	Stainless steel	1026130

#### OZONFILT® OZVa 2 Capacity 15 g/h

Type	Control cabinet surface	Order no.
Without mixing system	Grey powder-coated	1005129
Without mixing system	Stainless steel	1026133
With PVC static mixer, DN 40, 5–10 m³/h	Grey powder-coated	1005127
With PVC static mixer, DN 40, 5–10 m³/h	Stainless steel	1026134
With PVC static mixer, DN 50, 10–15 m³/h	Grey powder-coated	1005806
With PVC static mixer, DN 50, 10–15 m³/h	Stainless steel	1026135
With PVC static mixer, DN 32, 0.5–2.8 m³/h	Grey powder-coated	1026132
With PVC static mixer, DN 32, 0.5–2.8 m³/h	Stainless steel	1026144
With PVC static mixer, DN 32, 2.8–5 m³/h	Grey powder-coated	1005125
With PVC static mixer, DN 32, 2.8–5 m³/h	Stainless steel	1026145

#### OZONFILT® OZVa 3 Capacity 35 g/h

Type	Control cabinet surface	Order no.
Without mixing system	Grey powder-coated	1009083
Without mixing system	Stainless steel	1026146

#### OZONFILT® OZVa 4 Capacity 40 g/h

Type	Control cabinet surface	Order no.
Without mixing system	Grey powder-coated	1009105
Without mixing system	Stainless steel	1026147
without mixing system with air conditioning unit	Stainless steel	1049716

## 2 Ozone Systems OZONFILT<sup>®</sup>

### OZONFILT<sup>®</sup> OZVa 5 Capacity 30 g/h Operating Gas Oxygen

Type	Control cabinet surface	Order no.
Without mixing system	Grey powder-coated	1026148
Without mixing system	Stainless steel	1026149
without mixing system with air conditioning unit	Stainless steel	1049717

### OZONFILT<sup>®</sup> OZVa 6 Capacity 60 g/h Operating Gas Oxygen

Type	Control cabinet surface	Order no.
Without mixing system	Grey powder-coated	1023452
Without mixing system	Stainless steel	1026150
without mixing system with air conditioning unit	Stainless steel	1049718

### OZONFILT<sup>®</sup> OZVa 7 Capacity 90 g/h Operating Gas Oxygen

Type	Control cabinet surface	Order no.
Without mixing system	Grey powder-coated	1026151
Without mixing system	Stainless steel	1026152

2

## 2 Ozone Systems OZONFILT®

### 2.4.4

### System Solution OZONFILT® Compact OMVa

Individually adaptable thanks to modular construction

Ozone capacity 5 – 70 g ozone/h



The OZONFILT® Compact OMVa is a complete, ready-to-use ozone system solution for the generation and metering of ozone. The components are perfectly coordinated to each other.

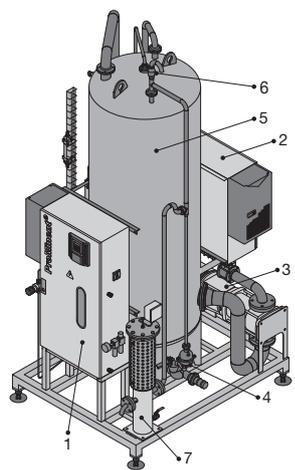
The ozone system OZONFILT® Compact OMVa has a modular construction mounted on a stainless steel frame. It can therefore be simply adapted to and integrated in the respective application.

A sufficient quantity and constant concentration of ozonised water is produced in the system's reaction tank. From there it is pumped to where it is needed. The required ozone concentration can be adjusted and is continuously controlled and held constant by a measuring and control circuit. Depending on the application, the ozonised water is pumped by system pressure or with one or more discharge pumps to where it is needed.

With the removal and replenishment of water in the storage tank, the air, which contains ozone, is discharged out via the water phase and via a residual ozone gas destructor. Ensure that no ozone escapes into the ambient air in normal operation.

#### Your benefits

- Excellent process reliability through the use of a pre-assembled, complete ozone treatment stage with perfectly coordinated components.
- Well-thought-out installation on a stainless steel frame for plug-and-play connection
- Modular construction which can still be customised
- Compression-proof ozone generator built in compliance with DIN 19627
- Destruction of residual ozone gas for the removal of traces of ozone gas
- Room air monitoring for traces of ozone gas via a gas detector with a sensor with long-term stability
- Metering ozone, depending on the measured values, ensures a constant ozone concentration in the reaction tank
- A central electric control ensures metering of ozone depending on the measured values and the control of all connected peripheral components.
- Clear and simple operation, as well as signal exchange with higher-order control systems



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- 1 Ozone generation
- 2 Central control unit
- 3 Discharge system
- 4 Water separator
- 5 Reaction tank
- 6 Bleed valve
- 7 Residual ozone gas destructor

#### Technical details

##### Modules:

- Central control unit
- Ozone generation
- Reaction tank
- Discharge system
- Ozone mixing unit
- Residual ozone gas destruction
- Room air monitoring

##### Available options:

- 1 or 2 discharge pumps for pumping of ozonised water to where it is used
- Cooling water chiller for supply of chilled water to the ozone system
- Air conditioning unit for air conditioning of the ozone system and central control cabinet
- Storage tank cleaning with built-in atomizer including valve combination

##### Ozone generation module, built in accordance with DIN 19627:

The ozone is produced with an OZONFILT® OZVa or OZMa in a pressure-resistant ozone generator using an electronically produced and regulated medium frequency.

##### Central control unit module

A central control unit manages the entire process and ensures ozone metering dependent on the measured value. A panel visualises the entire process, thereby simplifying operation. A high-quality control for industrial applications (Siemens S7-300 with TP 177 B) permits varied signal exchange with higher-level management systems.

##### Discharge system module

As soon as the ozone concentration setpoint has been reached, the ozonised water is pumped on-demand to where it is needed. This is done by the pump or a discharge system with one or more discharge pumps.

## 2 Ozone Systems OZONFILT<sup>®</sup>

### Ozone mixing module:

This module comprises an ozone metering point and a downstream mixing section made of stainless steel, with a series of static mixing elements for intensive mixing of the ozone/air mix with the water to be treated. The lines carrying the ozone, and the pipework from the raw water connection to the inlet to the reaction tank are made throughout in stainless steel and have been factory-pressure tested.

An injector for sucking out the ozone is not needed with back pressures of up to 1.8 bar because the ozone is generated at positive pressure.

### Reaction tank module:

The stainless steel reaction tank incorporates all the necessary fittings for water distribution and an automatic bleed valve. The ozone generation module, residual ozone gas destructor module and room air monitoring module are mounted on this storage tank.

### Residual ozone gas destruction module:

The residual ozone gas destruction module has an integrated water separator to remove any traces of ozone gas in the exhaust air coming from the reaction tank.

### Room air monitoring module:

The room air is monitored for traces of ozone gas using a calibrated gas detector with a long-term stable electrochemical sensor.

If the alarm threshold is exceeded, ozone generation is stopped and an alarm signalled. A buzzer is activated at the same time.

### Field of application

- **Food and beverage industry:** Oxidation of iron and manganese, disinfection of potable water and rinsing water
- **Swimming pools:** Degradation of disinfection by-products, reliable microbiological barrier and production of crystal-clear water thanks to its microfloculating effect

### Technical Data

Type		OMVa 5 – 200	OMVa 15 – 500	OMVa 35-1,000	OMVa 40-1,000	OMVa 70-2,000
Type: ozone generation system		OZVa 1	OZVa 2	OZVa 3	OZVa 4	OZMa 1A
Ozone output at 20 g/Nm <sup>3</sup>	g/h	5	15	35	40	70
Cooling water volume (15 °C)	l/h	10–60	20–60	50–100	70–100	90
Nominal flow rate	m <sup>3</sup> /h	1.5 – 5	5 – 15	15 – 30	30 – 45	45 – 60
Enclosure rating		IP 54	IP 54	IP 54	IP 54	IP 54
Connected load	V/Hz/A	230/50;60	230/50;60	230/50;60	230/50;60	230/50;60

## 2 Ozone Systems OZONFILT®

### 2.5 Ozone System OZONFILT® OZMa



**Powerful and yet environmentally-friendly. Disinfect and oxidise ecologically and economically.**

**Ozone capacity 70 – 735 g ozone/h**

OZONFILT® OZMa represents maximum operational safety with minimal operating costs. The ozone generator is maintenance-free and generates up to 735 g/h of ozone from compressed air or oxygen.

The ozone systems OZONFILT® OZMa have been designed as pressurised systems, in which the operating gas – air or oxygen – is fed into the ozone generator under pressure.

**Air is used as the operating gas in the ozone system Ozonfilt® OZMaA types 1 to 6**

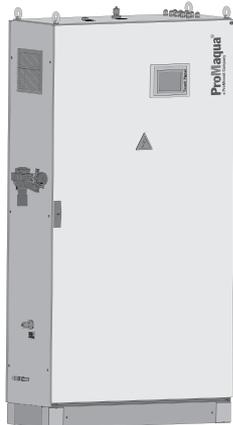
The ozone is generated from the oxygen in the ambient air and simultaneously metered. A demand-led, self-optimising pressure swing dryer reduces the consumption of compressed air to a minimum. Ozone can therefore be generated operationally safely and reliably even with a high level of ambient air humidity with ozone concentrations of up to 20 g/Nm<sup>3</sup>. Ozone concentrations of between 3 and 12 ppm can be achieved in the water to be treated with suitable mixing units, depending on the temperature.

**Oxygen is used as the operating gas in the ozone system Ozonfilt® OZMaO type 1 to 6**

Operation with oxygen permits ozone generation with ozone concentrations of up to 150 g/Nm<sup>3</sup>. Depending on the system type, ozone is produced in 1-3 generators from oxygen provided from special oxygen generators or bottles. Using the suitable mixing equipment, ozone concentrations of up to 90 ppm can be achieved in the water to be treated, depending on the temperature.

#### Your benefits

- Economical: maintenance-free generator concept with virtually unlimited service life
- Up to 30% energy savings for air treatment, thanks to demand-led and self-optimising air drying compared with conventional air treatment.
- Automatic control of the operating gas depending on the ozone output, therefore reduced consumption of operating gas produced with intensive use of energy.
- High ozone concentration ensures optimum ozone solubility in water
- Direct injection without injector system at up to 2 bar back pressure
- Automatic ozone generation, virtually independent of fluctuations in main voltage and pressure
- Simple, safe and reliable operation and process visualisation thanks to large, colour and clear 7" touch panel
- Infinite adjustment and precise output control of between 3% and 100% of the nominal power with display of the ozone volume in "grammes/hour"



P\_PMA\_OF\_0010\_SW

#### Technical details

- Compact mounting, ready-to-use in a painted steel cabinet or optionally in a stainless steel cabinet
- With integrated filter package for the removal of dust and small amounts of residual oil in the compressed air
- Special dielectric with excellent cooling: In spite of the low cooling water consumption, heat is quickly and efficiently discharged before the ozone produced can decompose due to excessive heat.
- PLC with integrated ozone measurement and PID control
- 7" touch panel with data logger and screen recorder
- Multiple communication interfaces (e.g. LAN, PROFIBUS® DP)
- Excellent efficiency: Over 90% of the ozone is dissolved in the water, thanks to the special construction of the mixing unit.
- Integration of a dew point sensor to monitor the quality of compressed air
- Integration of an air conditioning unit to adjust the temperature of the ozone system
- Pause input for external switching on/off
- Contact input for locking the system, for example in the absence of flow
- Digital input for connection of a gas detector
- Digital input for control of two power stages
- 0/4-20 mA input for external output control depending on the flow or measured value with a PIC controller
- Second freely configurable 0/ 4-20 mA input
- Contact output for operating status
- Contact output for collective malfunction alert
- Contact output for limit value transgression, ozone concentration in the water too low
- One freely configurable 0/ 4-20 mA output

## 2 Ozone Systems OZONFILT<sup>®</sup>

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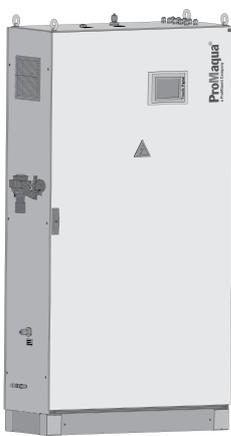
### Field of application

- **Potable water supply:** Oxidation of iron, manganese and arsenic, refinement and taste enhancement and disinfection
- **Waste water treatment:** Degradation/reduction of COD and microcontaminants, reduction of sewage sludge
- **Food and beverage industry:** Oxidation of iron and manganese, disinfection of potable water and rinsing water
- **Swimming pools:** Degradation of disinfection by-products, reliable microbiological barrier and production of crystal-clear water thanks to its microfloculating effect
- **Industry:** Legionella prevention and disinfection of cooling water

## 2 Ozone Systems OZONFILT®

### 2.5.1

### Ozone Generation Systems OZONFILT® OZMa 1-6 A (Operating Gas - Air)



P\_PMA\_OF\_0010\_SW

Under nominal conditions, the OZMa 1-6 A range produces up to 420 g/h of ozone from compressed air at a concentration of 20 g/Nm<sup>3</sup>. Using the designated mixing devices, ozone concentrations of between 3 and 12 ppm can be achieved in the water to be treated, depending on the temperature (theoretical value at 30 or 0 °C).

Different feature options can be achieved by combining different Identity code characteristics.

The plants are pre-mounted ready for connection in a painted steel cabinet (optional stainless steel control cabinet) and need only be connected to a single-phase voltage supply, compressed air, cooling water/waste water and ozone metering point on the customer's site.

An adequate compressed air supply and a mixing device designed for the operating conditions should be integrated for operation of the ozone plant.

Ordering Information for OZONFILT® OZMa Systems see p. → 2-21, Static Helical Mixer Made of PVC or Stainless Steel see p. → 2-24

#### Mixing equipment

All OZMa systems are delivered, in principle, without a mixing unit and a suitable mixing system has to be ordered separately. When selecting a suitable mixing system, please note that the mixing of ozone is more efficient the higher the water flow in the mixing system. Accordingly design the mixing system so that the flow of the water to be treated is at the upper range of the flow specification.

Static Helical Mixer Made of PVC or Stainless Steel see p. → 2-24

#### Notes on installation

Keep the length of ozone gas transporting pipes and the number of joints to a minimum. All rooms with a removable joint should be monitored with a gas detector in line with the applicable German accident prevention regulations. All OZONFILT® systems are equipped for fitting a gas detector such as GMA 36 Ozon.

Ozonisation adds a large amount of gas to the water of which only a small percentage can dissolve. Adequate bleeding should therefore be integrated. Because the gases discharged in this way have a considerable residual ozone concentration, appropriate residual ozone destructors should be installed.

The ozone generator should be interlocked with the water flow into the metering point for all installations.

A non-return valve should be installed between OZMa and the ozone metering point to prevent any return of ozonised water into the ozone-transporting pipe.

Room Air Monitoring see p. → 2-26, Residual Ozone Gas Destructor see p. → 2-25

## 2 Ozone Systems OZONFILT®

### Technical Data

#### Ozone Generation Systems OZONFILT® OZMa 1-3 A (Process Gas - Air)

##### Ambient parameters

Max. 85% air humidity of the ambient air, non-condensing, non-corrosive, dust-free, max. ambient temperature: 40 °C (with integrated air conditioning system: 50 °C)

		OZMa 1A	OZMa 2A	OZMa 3A
Number of generator modules		1	1	1
Ozone capacity, measured in accordance with DIN with air at 20 °C, cooling water at 15 °C	g/h	70	105	140
Air consumption (only ozone generation)	Nm <sup>3</sup> /h	3.50	5.25	7.00
Ozone concentration in the gas phase referenced to nominal conditions	g/Nm <sup>3</sup> *	20	20	20
Specific energy requirement at nominal capacity	Wh/g	16.5	16.5	16.5
Power factor at full capacity	cos φ	0.95	0.95	0.95
Ozone connection		Rp 3/8"	Rp 3/8"	Rp 3/8"

\* Nm<sup>3</sup>= m<sup>3</sup> at standard conditions (P = 1.013x10<sup>5</sup>Pa, T = 273 K)

##### Electrical Connection

		OZMa 1A	OZMa 2A	OZMa 3A
Connected load	V/Hz/A	230/50;60/10	230/50;60/16	230/50;60/16
Enclosure rating		IP 54	IP 54	IP 54
Degree of protection with integrated air conditioning unit (indoor/outdoor)		IP 54 / IP 34	IP 54 / IP 34	IP 54 / IP 34

##### Overall Dimensions (Without Mixer)

		OZMa 1A	OZMa 2A	OZMa 3A
Width	mm	1,114	1,114	1,114
Height	mm	1,961	1,961	1,961
Depth	mm	405	405	405

##### Weight

		OZMa 1A	OZMa 2A	OZMa 3A
Weight	kg	270	280	300

##### Ozone Mixing

		OZMa 1A	OZMa 2A	OZMa 3A
Max. raw water temperature	°C	35	35	35
Permissible pressure at ozone outlet	bar	0.8–2.0	0.8–2.0	0.8–2.0

##### Air Supply

		OZMa 1A	OZMa 2A	OZMa 3A
Required air volume	Nl/min	73	110	147

##### Air quality

oil and dust-free, non-corrosive, constant priming pressure of 4.5 – 10 bar, max. temperature 40 °C

##### Cooling Water

		OZMa 1A	OZMa 2A	OZMa 3A
Cooling water consumption (15 °C)	l/h	90	135	180
Cooling water consumption (30 °C)	l/h	125	190	250
Cooling water inlet pressure	bar	2–5	2–5	2–5
Cooling water inlet, PE pressure hose	mm	8 x 5	8 x 5	12 x 9
Cooling water outlet, open discharge	mm	8 x 5	8 x 5	12 x 9

##### Cooling water quality

No tendency to form lime scale, no corrosive components, removable substances: < 0.1 ml/l , iron: < 0.2 mg/l, manganese: < 0.05 mg/l, conductivity: > 100 µS/cm, chloride: < 250 mg/l

## 2 Ozone Systems OZONFILT®

### Ozone Generation Systems OZONFILT® OZMa 4-6 A (Operating Gas - Air)

#### Ambient parameters

Max. 85% air humidity of the ambient air, non-condensing, non-corrosive, dust-free, max. ambient temperature: 40 °C (with integrated air conditioning system: 50 °C)

		OZMa 4A	OZMa 5A	OZMa 6A
<b>Number of generator modules</b>		2	2	3
<b>Ozone capacity, measured in accordance with DIN with air at 20 °C, cooling water at 15 °C</b>	g/h	210	280	420
<b>Air consumption (only ozone generation)</b>	Nm <sup>3</sup> /h	10.50	14.00	21.00
<b>Ozone concentration in the gas phase referenced to nominal conditions</b>	g/Nm <sup>3</sup> *	20	20	20
<b>Specific energy requirement at nominal capacity</b>	Wh/g	16.5	16.5	16.5
<b>Power factor at full capacity</b>	cos φ	0.95	0.95	0.95
<b>Ozone connection</b>		Rp 3/8"	Rp 3/8"	Rp 3/8"

\* Nm<sup>3</sup>= m<sup>3</sup> at standard conditions (P = 1.013x10<sup>5</sup>Pa, T = 273 K)

#### Electrical Connection

		OZMa 4A	OZMa 5A	OZMa 6A
<b>Connected load</b>	V/Hz/A	400/50;60/16	400/50;60/16	400/50;60/16
<b>Enclosure rating</b>		IP 54	IP 54	IP 54
<b>Degree of protection with integrated air conditioning unit (indoor/outdoor)</b>		IP 54 / IP 34	IP 54 / IP 34	IP 54 / IP 34

#### Overall Dimensions (Without Mixer)

		OZMa 4A	OZMa 5A	OZMa 6A
<b>Width</b>	mm	1,320	1,320	1,606
<b>Height</b>	mm	1,961	1,961	1,961
<b>Depth</b>	mm	605	605	605

#### Weight

		OZMa 4A	OZMa 5A	OZMa 6A
<b>Weight</b>	kg	420	445	580

#### Ozone Mixing

		OZMa 4A	OZMa 5A	OZMa 6A
<b>Max. raw water temperature</b>	°C	35	35	35
<b>Permissible pressure at ozone outlet</b>	bar	0.8–2.0	0.8–2.0	0.8–2.0

#### Air Supply

		OZMa 4A	OZMa 5A	OZMa 6A
<b>Required air volume</b>	l/min	220	293	440

**Air quality** oil and dust-free, non-corrosive, constant priming pressure of 4.5 – 10 bar, max. temperature 40 ° C

#### Cooling Water

		OZMa 4A	OZMa 5A	OZMa 6A
<b>Cooling water consumption (15 °C)</b>	l/h	270	360	540
<b>Cooling water consumption (30 °C)</b>	l/h	300	400	600
<b>Cooling water inlet pressure</b>	bar	2–5	2–5	2–5
<b>Cooling water inlet, PE pressure hose</b>	mm	12 x 9	12 x 9	12 x 9
<b>Cooling water outlet, open discharge</b>	mm	12 x 9	12 x 9	12 x 9

**Cooling water quality** No tendency to form lime scale, no corrosive components, removable substances: < 0.1 ml/l, iron: < 0.2 mg/l, manganese: < 0.05 mg/l, conductivity: > 100 µS/cm, chloride: < 250 mg/l

## 2 Ozone Systems OZONFILT®

### 2.5.2

### Ozone Generation Systems OZONFILT® OZMa 1-6 O (Operating Gas - Oxygen)

Under nominal conditions, the OZMa 1-6 O range produces up to 735 g/h of ozone from oxygen at a concentration of up to 150 g/Nm<sup>3</sup>. Using the designated mixing devices, ozone concentrations in the water to be treated of up to 90 ppm can be achieved (theoretical value at 0 °C). Ozone concentration in g/Nm<sup>3</sup> and system feed rate in g/h can be varied depending on the operating conditions and can thus be individually matched to the application conditions. Examples for various combinations are listed in the technical data table.

Different feature options can be achieved by combining different Identity code characteristics.

The systems are pre-mounted ready for connection in a painted steel cabinet (optional stainless steel control cabinet) and should only be connected to a single-phase voltage supply, oxygen, cooling water/waste water and ozone metering point on the customer's site.

Ordering Information for OZONFILT® OZMa Systems see p. → 2-21

#### Mixing equipment

All OZMa systems are delivered, in principle, without a mixing unit and a suitable mixing system has to be ordered separately. When selecting a suitable mixing system, please note that the mixing of ozone is more efficient the higher the water flow in the mixing system. Accordingly design the mixing system so that the flow of the water to be treated is at the upper range of the flow specification.

We recommend using stainless steel mixing systems because of the high ozone concentrations. Mixing systems made of PVC can have a reduced service life, depending on the operating conditions.

Static Helical Mixer Made of PVC or Stainless Steel see p. → 2-24

#### Notes on installation

Keep the length of ozone gas transporting pipes and the number of joints to a minimum. All rooms with a removable joint should be monitored with a gas detector in line with the applicable German accident prevention regulations. All OZONFILT® systems are equipped for fitting a gas detector such as GMA 36 Ozon.

Depending on the operating and installation conditions, it might be necessary to also monitor the room air for excessive oxygen content. The gas detector GMA 36 Oxygen can be used for this purpose.

All gas-transporting accessories should be resistant to ozone and oxygen (e. g. fat-free).

Ozonisation adds a large amount of gas to the water of which only a small percentage can dissolve. Adequate bleeding should therefore be integrated. Because the gases discharged this way have a considerable residual ozone concentration, appropriate residual ozone destructors should be installed. Because of the high ozone concentrations, only catalytic residual ozone destructors can be used. Activated charcoal-based residual ozone destructors ignite spontaneously if subjected to increased ozone concentrations.

The ozone generator must be interlocked with the water flow into the metering point for all installation.

A non-return valve should be installed between OZMa and ozone metering point to prevent any return of ozonised water into the ozone-transporting pipe.

Room Air Monitoring see p. → 2-26, Residual Ozone Gas Destructor see p. → 2-25

## 2 Ozone Systems OZONFILT®

### Technical Data

#### Ozone Generation Systems OZONFILT® OZMa 1-3 O (Operating Gas - Oxygen)

##### Ambient parameters

Max. 85% air humidity of the ambient air, non-condensing, non-corrosive, dust-free, max. ambient temperature: 40 °C (with integrated air conditioning system: 50 °C)

		OZMa 1 O	OZMa 2 O	OZMa 3 O
Number of generator modules		1	1	1
Nominal ozone capacity at 100 g/Nm <sup>3</sup> ** and cooling water at 15 °C	g/h	105	158	210
Ozone capacity at 150 g/Nm <sup>3</sup> *	g/h	60	90	120
Ozone capacity at 80 g/Nm <sup>3</sup>	g/h	123	184	245
Specific energy requirement at nominal capacity	Wh/g	9	9	9
Power factor at full capacity	cos φ	0.95	0.95	0.95
Ozone connection		Rp 3/8"	Rp 3/8"	Rp 3/8"

##### Electrical Connection

		OZMa 1 O	OZMa 2 O	OZMa 3 O
Connected load	V/Hz/A	230/50;60/10	230/50;60/16	230/50;60/16
Enclosure rating		IP 54	IP 54	IP 54
Degree of protection with integrated air conditioning unit (indoor/outdoor)		IP 54 / IP 34	IP 54 / IP 34	IP 54 / IP 34

##### Overall Dimensions

		OZMa 1 O	OZMa 2 O	OZMa 3 O
Width	mm	1,114	1,114	1,114
Height	mm	1,961	1,961	1,961
Depth	mm	400	400	400

##### Weight

		OZMa 1 O	OZMa 2 O	OZMa 3 O
Weight	kg	220	230	250

##### Ozone Mixing

		OZMa 1 O	OZMa 2 O	OZMa 3 O
Max. raw water temperature	°C	35	35	35
Permissible pressure at ozone outlet	bar	0.8–2.0	0.8–2.0	0.8–2.0

##### Specification of Operating Gas: Oxygen

		OZMa 1 O	OZMa 2 O	OZMa 3 O
Gas volume at nominal capacity 100 g/Nm <sup>3</sup>	NI/h	1,050	1,580	2,100
Gas volume at capacity 150 g/Nm <sup>3</sup>	NI/h	400*	600*	800*
Gas volume at capacity 80 g/Nm <sup>3</sup>	NI/h	1,540	2,300	3,100
Concentration min.	vol%	90	90	90
Dew point max.	°C	-50	-50	-50
Pressure	bar	3 – 6	3 – 6	3 – 6
Max. particles	µm	5	5	5
Max. hydrocarbons	ppm	20	20	20
Max. temperature	°C	30	30	30

##### Cooling Water

		OZMa 1 O	OZMa 2 O	OZMa 3 O
Cooling water consumption (15 °C)	l/h	70	105	140
Cooling water consumption (30 °C)	l/h	115	175	400
Cooling water inlet pressure	bar	1–5	1–5	1–5
Cooling water inlet, PE pressure hose	mm	12 x 9	12 x 9	12 x 9
Cooling water outlet, open discharge	mm	12 x 9	12 x 9	12 x 9

##### Cooling water quality

No tendency to form lime scale, no corrosive components, removable substances: < 0.1 ml/l, iron: < 0.2 mg/l, manganese: < 0.05 mg/l, conductivity: > 100 µS/cm, chloride: < 250 mg/l

\* Output 150 g/Nm<sup>3</sup> as special version must be factory-set

\*\* Nm<sup>3</sup> = m<sup>3</sup> at standard conditions (P = 1.013x10<sup>5</sup>Pa, T = 273 K)

## 2 Ozone Systems OZONFILT®

### Ozone Generation Systems OZONFILT® OZMa 4-6 O (Operating Gas - Oxygen)

#### Ambient parameters

Max. 85% air humidity of the ambient air, non-condensing, non-corrosive, dust-free, max. ambient temperature: 40 °C (with integrated air conditioning system: 50 °C)

		OZMa 4 O	OZMa 5 O	OZMa 6 O
<b>Number of generator modules</b>		2	2	3
<b>Nominal ozone capacity at 100 g/Nm<sup>3</sup> ** and cooling water at 15 °C</b>	g/h	320	420	630
<b>Ozone capacity at 150 g/Nm<sup>3</sup> *</b>	g/h	180	240	360
<b>Ozone capacity at 80 g/Nm<sup>3</sup></b>	g/h	370	490	735
<b>Specific energy requirement at nominal capacity</b>	Wh/g	9	9	9
<b>Power factor at full capacity</b>	cos φ	0.95	0.95	0.95
<b>Ozone connection</b>		Rp 3/8"	Rp 3/8"	Rp 3/8"

#### Electrical Connection

		OZMa 4 O	OZMa 5 O	OZMa 6 O
<b>Connected load</b>	V/Hz/A	400/50;60/16	400/50;60/16	400/50;60/16
<b>Enclosure rating</b>		IP 54	IP 54	IP 54
<b>Degree of protection with integrated air conditioning unit (indoor/outdoor)</b>		IP 54 / IP 34	IP 54 / IP 34	IP 54 / IP 34

#### Overall Dimensions

		OZMa 4 O	OZMa 5 O	OZMa 6 O
<b>Width</b>	mm	1,320	1,320	1,606
<b>Height</b>	mm	1,961	1,961	1,961
<b>Depth</b>	mm	605	605	605

#### Weight

		OZMa 4 O	OZMa 5 O	OZMa 6 O
<b>Weight</b>	kg	420	445	580

#### Ozone Mixing

		OZMa 4 O	OZMa 5 O	OZMa 6 O
<b>Max. raw water temperature</b>	°C	35	35	35
<b>Permissible pressure at ozone outlet</b>	bar	0.8–2.0	0.8–2.0	0.8–2.0

#### Specification of Operating Gas: Oxygen

		OZMa 4 O	OZMa 5 O	OZMa 6 O
<b>Gas volume at nominal capacity 100 g/Nm<sup>3</sup></b>	NI/h	3,200	4,200	6,300
<b>Gas volume at capacity 150 g/Nm<sup>3</sup></b>	NI/h	1,200*	1,600*	2,400*
<b>Gas volume at capacity 80 g/Nm<sup>3</sup></b>	NI/h	4,630	6,130	9,190
<b>Concentration min.</b>	vol%	90	90	90
<b>Dew point max.</b>	°C	-50	-50	-50
<b>Pressure</b>	bar	3 – 6	3 – 6	3 – 6
<b>Max. particles</b>	µm	5	5	5
<b>Max. hydrocarbons</b>	ppm	20	20	20
<b>Max. temperature</b>	°C	30	30	30

#### Cooling Water

		OZMa 4 O	OZMa 5 O	OZMa 6 O
<b>Cooling water consumption (15 °C)</b>	l/h	200	280	420
<b>Cooling water consumption (30 °C)</b>	l/h	300	400	600
<b>Cooling water inlet pressure</b>	bar	1–5	1–5	1–5
<b>Cooling water inlet, PE pressure hose</b>	mm	12 x 9	12 x 9	12 x 9
<b>Cooling water outlet, open discharge</b>	mm	12 x 9	12 x 9	12 x 9

#### Cooling water quality

No tendency to form lime scale, no corrosive components, removable substances: < 0.1 ml/l, iron: < 0.2 mg/l, manganese: < 0.05 mg/l, conductivity: > 100 µS/cm, chloride: < 250 mg/l

\* Output 150 g/Nm<sup>3</sup> as special version must be factory-set

\*\* Nm<sup>3</sup> = m<sup>3</sup> at standard conditions (P = 1.013x10<sup>5</sup> Pa, T = 273 K)

## 2 Ozone Systems OZONFILT®

### 2.5.3 Ordering Information for OZONFILT® OZMa Systems

OZMa	Type ozone generator
<b>Air operation / Oxygen operation</b>	
	<b>g/h                      g/h</b>
01	70                      105
02	105                    158
03	140                    210
04	210                    320
05	280                    420
06	420                    630
<b>Operating gas</b>	
A	Operating gas - air
O	Operating gas - oxygen
<b>Type</b>	
P	ProMaqua
S	Special version
C	ProMaqua with air-conditioning
<b>Mechanical design</b>	
0	Standard (packaging for transport by HGV)
1	Standard (packaging for sea/air freight)
2	In stainless steel cabinet (packaging for transport by HGV)
3	In stainless steel cabinet (packaging for sea/air freight)
M	Modified
<b>Operating voltage</b>	
A	Single-phase 230 V ±10%, 50/60 Hz (only types 01-03)
S	Three-phase 230/400 V ±10%, 50/60 Hz (only types 04-06)
<b>Gas treatment</b>	
0	Gas treatment not integrated (design operating gas - oxygen)
1	Gas treatment integrated without filter package (design operating gas - air)
2	Gas treatment integrated with filter package (design operating gas - air)
3	Gas treatment not integrated (oxygen operating gas version), including gas control valve
4	Gas treatment integrated without filter package (air operating gas version), including gas control valve
5	Gas treatment integrated with filter package (air operating gas version), including gas control valve
<b>Preset language</b>	
DE	german
EN	english
FR	french
IT	italian
ES	spanish
<b>Control</b>	
0	Basic version with digital input to control two power stages
1	External power control via 0/4-20 mA input, data logger
2	External power control, ozone measurement and visualisation via screen recorder, 2 freely configurable 0/4-20 mA inputs, 1 freely configurable 0/4-20 mA output
3	As 2 with additionally integrated PID controller for control of the ozone concentration independent of measured value and flow
<b>Communication interfaces</b>	
0	None
4	PROFIBUS® DP interface
<b>Additional options</b>	
0	None
1	Dew point sensor
<b>Approvals</b>	
01	CE-mark
<b>Hardware</b>	
0	Standard
<b>Software</b>	
0	Standard

**Explanation on the Identity code:**

Mechanical design: In design 0 and 1, the plant is installed in a standard control cabinet made of powder-coated steel.

Gas treatment: Without filter package for oil-free generated or de-oiled compressed air.  
With filter package for compressed air with residual oil content.

## 2 Ozone Systems OZONFILT<sup>®</sup>

### 2.6 Accessories and Spare Parts for Ozone Systems

#### 2.6.1 Compressors for OZONFILT<sup>®</sup> OZVa 1-4

##### Atlas Copco LFX compressors

The outstanding feature of this range of compressors is their outstanding value for money. They are equipped with active start unloading and automatic condensate discharge by solenoid valve. The compressors are not suitable for continuous operation and should only be used in less harsh operating conditions.

##### Technical Data

Type		LFX 0.7	LFX 1.5
Free air delivery rate at 7 bar	l/min	61	124
Power consumption at 7 bar	W	530	970
Number of cylinders		1	1
Sound pressure level	dB(A)	62	64
Air receiver capacity	l	20	20
Weight	kg	44	48
Suitable for OZVa Type		1 + 2	3 + 4

Type	Type	Order no.
LFX 0.7	230 V/50 Hz	1004458
LFX 0.7	230 V/60 Hz	1010719
LFX 1.5	230 V/50 Hz	1006343
LFX 1.5	230 V/60 Hz	1009638

##### Air filter kit

	Order no.
Air filter kit for Atlas Copco LFX compressors	1005789

##### Dürr ABK compressors

The outstanding feature of this continuously rated range of compressors is their extremely robust construction, making them ideally suitable for industrial use. They are equipped with active start unloading, automatic condensate discharge by solenoid valve and an hours-run meter. PTFE coated special aluminium pistons lead to the long service life and reliability of these compressor units.

##### Technical Data

Type		TA-080	HA-234
Free air delivery rate at 7 bar	l/min	62	152
Supply max.	VAC	230	230
Supply frequency	Hz	50/60	50
Power consumption at 7 bar	W	800	1,900
Number of cylinders		1	3
Sound pressure level	dB(A)	68	78
Air receiver capacity	l	25	55
Weight	kg	49	70
Suitable for OZVa Type		1 + 2	3 + 4

Type	Order no.
TA-080	1025398
HA-234	1025399

## 2 Ozone Systems OZONFILT®

### Air filter kit

	Order no.
<b>Air filter kit for Dürr ABK compressors*</b>	1025400

\* 1 filter kit is required per cylinder.

Compressors with refrigeration drying for operation in conditions of high humidity, and high-capacity screw compressors for connection to several ozone plants are available on request.

### 2.6.2

## Oxygen Generator for OZONFILT® OZVa 5-7

### OXYMAT 020 eco

This compact oxygen generator works on the principle of pressure swing filtration of the ambient air through a molecular sieve. Oxygen is generated with a purity of up to 95% and a dew point of – 70 °C when supplied with suitably dried compressed air. The system generates a pressure of 4 bar at the oxygen outlet and can be connected directly to the OZVa 5-7.

### Technical Data

(At 90% oxygen yield):

Type	OXYMAT 020 eco
<b>Capacity</b>	1.6 Nm <sup>3</sup> /h
<b>Air requirement (min. 6 bar)</b>	0.31 Nm <sup>3</sup> /min
<b>Power consumption incl. compressor</b>	2.5 kW
<b>Specific energy requirement</b>	1.4 kWh/Nm <sup>3</sup>

### Example of an installation

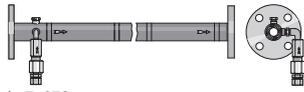
Quantity		Order no.
1	Kaesar SX 3 screw compressor (oil injection), Motor 2,2 kW, integrated cyclone air filter	on request
3	Connecting set, hose with double-sided quick coupling 1/2" – 3/4" external thread, length 1.2 m	1025388
2	Pressure tank O <sub>2</sub> for Oxyamat O 020 eco, 90 l, 11 bar, PED with revision opening	1044986
1	Refrigeration dryer ACT 5, 33 Nm <sup>3</sup> /h, 1/230 – 240 V	on request
1	Filter set 006, for LE 2-10 and GX 2-10 FF	1025387
1	Hexagonal reducer R 3/4 -Rp 1/2 1.4571	1003366
1	OXYMAT 020 eco, 110-240 V / 50-60 Hz	1044799
1	Connecting set with connections for 6x4 mm PTFE hose, between OXYMAT and OZVa	1025395

### Accessories

	Order no.
<b>PTFE hose 6x4 mm, admissible operating pressure 15 bar, sold in metres</b>	037426
<b>Service kit for Atlas Copco LE 2-10, (recommended after 8000 running hours)</b>	1025390
<b>Service kit for Atlas Copco GX 2-10 FF, (recommended after 8000 running hours)</b>	1025391
<b>Service kit 006</b>	1025392
<b>Service kit for screw compressor SX3</b>	on request
<b>Service kit for OXYMAT 020 eco</b>	on request

## 2 Ozone Systems OZONFILT®

### 2.6.3 Static Helical Mixer Made of PVC or Stainless Steel



pk\_7\_072  
Static Helical Mixer

Designed for intensive mixing of gas with liquid flows. 4 helical blades ensure optimum mixing of the ozone with minimal pressure drop (0.1 bar per blade at maximum flow). The specified flow range of the static helical mixer should be complied with for optimum mixing results.

Version with loose flanges to DIN 2501 and integrated injection point made from stainless steel with couplings for 12 mm diam. stainless steel tube, or 12/9 mm PTFE hose, using stainless steel support inserts. In addition, the injection point is fitted with a non-return valve to protect the ozone plant from reverse flowing water. The mixers are manufactured as grease-free, so they are also suitable for Types OZVa 5-7. The stainless steel version has a G 1/4" pressure gauge tapping at the ozone mixing point.

Flow m <sup>3</sup> /h	Material	Overall length mm	Connector	Order no.
5 – 10	PVC-U	718	DN 40	1024324
10 – 15	PVC-U	718	DN 50	1024325
15 – 25	PVC-U	718	DN 65	1024326
25 – 35	PVC-U	1,100	DN 80	1024327
35 – 50	PVC-U	1,100	DN 100	1024328
50 – 90	PVC-U	1,300	DN 125	1034641
95 – 160	PVC-U	1,700	DN 150	1034640
5 – 10	1.4404	718	DN 40	1022503
10 – 15	1.4404	718	DN 50	1022514
15 – 25	1.4404	718	DN 65	1022515
25 – 35	1.4404	1,100	DN 80	1022516
35 – 50	1.4404	1,100	DN 100	1024154

Other sizes on request

#### Connecting parts for the gas pipeline

	Order no.
<b>Stainless steel pipe 12/10 mm, Sold in metres</b>	015743
<b>Stainless steel pipe 12/10 mm, grease-less, 1.4 m</b>	1022463
<b>PTFE hose 12/9 mm, grease-less, sold in metres</b>	037428
<b>Stainless steel support inserts, 2 No. for 12/9 mm PTFE hose, grease-less</b>	1025397
<b>Stainless steel coupling 12 mm - R 1/4, grease-less</b>	1025755
<b>Stainless steel fitting 12 mm - R 3/8, grease-less</b>	1034642
<b>3/8" Doppelnippel</b>	1005825
<b>Stainless steel 90° elbow D 12 - D 12, grease-less</b>	1022462
<b>Stainless steel pressure relief valve, Adjustable pressure range 0.07 – 2 bar, Connection size: 1/4" NPT, 2 additional inputs for connecting 2 pressure gauges.</b>	1029032
<b>Stainless steel back pressure valve for OZMa 1 – 3 A and OZMa 4 – 6 O, adjustable pressure range 0.5 – 10 bar, connector G 3/4" external thread, grease-free</b>	1039408
<b>Spare parts kit for back pressure valve order no. 1039408</b>	1039410
<b>Stainless steel back pressure valve for OZMa 4 – 6 A, adjustable pressure range 0.5 – 10 bar, connector G 1 1/4" external thread, grease-free</b>	1039409
<b>Spare parts kit for back pressure valve order no. 1039409</b>	1039411

## 2 Ozone Systems OZONFILT®

### 2.6.4 Accessories for OZONFILT® OZMa

The remote control module for OZMa systems enables bidirectional communication with the system control. Communication takes place optionally via a LAN, MPI or USB communication interface.

	Order no.
Remote control module for OZMa systems	On request

### 2.6.5 Bleed Valves

Suitable for types	Connector	Pressure bar	Order no.
OZVa 1 – 7	R 3/4" internal x R 1/2" external	0 – 6.0	302525
OZMa 1 – 30/OZMa 1A	R 1" internal x R 1/2" external	0 – 2.0	302526
OZMa 2-4A / OZMa 4-6O	R 1" internal x R 3/4" external	0 – 2.0	303845

Bleed valves made of stainless steel 1.4571 in ozone-resistant version for mounting on reaction tanks.

### 2.6.6 Residual Ozone Gas Destructor

Residual ozone gas destruction is used to remove traces of ozone gas from the exhaust air coming from the reaction tank. Because the exhaust air from the reaction tank still contains water, the pipework should be suitably routed so as to ensure that the water is drained off at the inlet side.

A suitable drainage connection should be provided here too as the exhaust air after the residual ozone gas destructor is still up to 100% saturated with water vapour, and because small temperature fluctuations, even on the outlet side, can lead to flowback of condensate.

The exhaust air from any downstream filter plant that may be fitted can also be routed via this ozone gas destruction unit.

#### PVC version

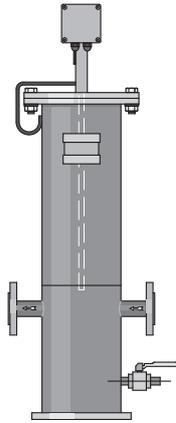
Residual ozone destructor based on activated charcoal granules in a PVC housing.

	Type	Ozone quantity g/h	Order no.
Residual ozone destructor 3 L	10	10	879022
Residual ozone destructor 14 L	40	40	1004267
Residual ozone destructor 30 L	100	100	879019
Residual ozone destructor 60 L	200	200	879018

#### Note:

The stated ozone quantities refer to quantities added to the raw water. The residual ozone destructor is designed for the normal residual ozone concentration found in swimming pool applications. It should only be used in plants with air as operating gas and a maximum added quantity of 1.5 g of ozone/m<sup>3</sup> treated water.

## 2 Ozone Systems OZONFILT®



pk\_7\_073  
Residual ozone destructor

### Stainless steel version

Residual ozone destructor based on a maintenance-free MnO catalytic converter with integrated heating, 230 V, 50-60 Hz. Connections Rp 1/2" or flanges to DIN 2642, PN10. Types 18 to 110 m<sup>3</sup>/h also fitted with Rp 1/2" ball valve as condensate drain.

Max. gas flow m <sup>3</sup> /h	Heating power W	Dimensions H x W x D mm	Connector	Order no.
1.5	100	700 x 110 x 180	Rp 1/2"	1018440
8.0	100	735 x 110 x 235	Rp 1/2"	1018406
18.0	140	1,154 x 275 x 240	DN 25	1019155
28.0	140	1,154 x 300 x 259	DN 25	1021037
40.0	500	1,156 x 330 x 264	DN 25	1026335
73.0	500	1,158 x 400 x 320	DN 32	1019971
110.0	500	1,160 x 450 x 375	DN 40	1027238

#### Note:

The catalytic residual ozone destructor should only be used in chlorine-free gas flows. The PVC version should therefore be used for swimming pool applications.

### 2.6.7

## Room Air Monitoring

### Gas warning device GMA 36 – ozone and oxygen

Calibratable gas warning device with digital display of the detected gas concentration. 2 relay outputs for issue of infringements of warning and alarm thresholds, to switch external alarm sounder and for interlocking with the ozone system. The warning message relay is self-resetting, the alarm relay is a latching type and should be acknowledged at the device. 1 self-resetting relay for connection to an alarm horn is switched in the event of fault conditions and when the alarm limit is exceeded.

The ozone sensor responds to all strongly oxidising gases, hence it responds to chlorine gas or chlorine dioxide too.

The GMA 36 oxygen warning device is intended for installations where an unacceptably high oxygen enrichment of the ambient air is possible.



pk\_7\_004\_1  
Gas warning devices GMA 36

### Technical Data

Type	Ozone
Warning at approx.	ppm/vol% 0.3
Alarm at approx.	ppm/vol% 0.5
Permissible ambient temperature	°C -15...45
Protection class housing	IP 54
Dimensions (without PGs, without sensor) H x W x D	mm 247 x 135 x 95
Supply	V/Hz 85 – 264/50 – 60
Power consumption	W 5
Warm-up phase max.	s 150
"Warning" relay contact, self-resetting	V/A 230/1
"Alarm" relay contact, latching	V/A 230/1
"Horn" relay contact, latching, can be acknowledged	V/A 230/1
Sensor measuring principle	electrochemical
Sensor service life (depending on environmental cond.)	years 2–3

Type	Order no.
Gas warning device GMA 36	Ozone 1023155

### Spare Parts

Order no.	
Replacement sensor For chlorine, chlorine dioxide, ozone	1023314
Replacement sensor for oxygen	1023851
Replacement sensor For gas warning devices in the Life CGM range	1003009

## 2 Ozone Systems OZONFILT®

### Mounting kit

	Order no.
Mounting kit for direct mounting of the CGM 1060 and GMA 36 ozone warning devices on the housing of the OZVa plants	1004248
Support bracket for mounting kit for all types of OZVa except OZVa 1/2 with transparent mixing system	1005854

### Warning light and horn

Combined horn and red warning lamp. IP 33 enclosure made of impact-resistant ABS. Dome made of clear polycarbonate. Connected load: 230 V AC, 50 mA. Supplied complete with B 15 d / 7 watt bulb.

	Order no.
Warning light and horn	1010508

### Gas tracing pump

Hand operated, non-continuously working test tube pump for fast and accurate measurement of ozone gas. Complete with 10 no. ozone gas test tubes 0.05-5 ppm in carrying case.

	Order no.
Gas tracing pump	1025533

### Potassium iodide starch paper

Roll with 4.8 m test strip for leak detection on pipelines carrying ozone gas.

	Order no.
Potassium iodide starch paper	1025575

## 2.6.8

### Cooling Water Heat Exchanger

A heat exchanger can be used as an alternative to the use of fresh water as cooling water. The cooling water is fed through the heat exchanger and ozone system in a circuit. The cooling water heat exchanger discharges the heat to the surroundings.

#### Technical Data

- Single circuit system with tank open to the atmosphere
- Air-cooled refrigeration unit
- Integral evaporator
- Plastic tank with water level display and level switch with alarm contact
- Microprocessor-controlled temperature controller with digital display
- Integral pump
- Manometer
- Powder-coated exterior housing

Order no.		1043847	1043848	1043849	1043850
Refrigerant	CFC-free	R404a	R404a	R134a	R134a
Useful cooling output at 20 °C	kW	2.5	3.6	4.9	6.0
Working range	°C	+10/+25	+10/+25	+5/+25	+5/+25
Pump	Type	P16-YA62D	P16-YA62D	P3-BR11B	P3-BR11B
Pump output	l/min	5.0	5.0	16.7	18.3
Pump pressure	bar	3.0	3.0	2.2	2.1
Contents	l	13	13	30	30
Water connectors	Inch	< 1/2 " internal thread >		< G 3/4 " internal thread >	
Power consumption	kW	1.6	2.2	2.2	1.8
Mains connection	V/Hz	230/50 – 60	230/50 – 60	400/50	400/50
Degree of protection	IP	21	21	21	21
Weight	kg	35	47	123	125
Outside dimensions (WxDxH)	mm	480x745x445	480x745x445	580x650x920	580x650x920

## 2 Ozone Systems OZONFILT®

	Suitable for type	Order no.
Cooling water heat exchanger	OZVa 1 – 7, OZMa 1 – 2 A, OZMa 1 – 2 O	1043847
	OZMa 3 A, OZMa 3 O, OZMa 4 O	1043848
	OZMa 4 A, OZMa 5 A, OZMa 5 O	1043849
	OZMa 6 A, OZMa 6 O	1043850

### 2.6.9

#### Personal Protection Accessories

##### Gas mask

Ozone-resistant, full-face respiratory protective mask with panoramic window shield to EN 136 Class 3. Medium size with EN 148-1 threaded pipe connection. Complete with combination filter NO-P3 and carrying case.

	Order no.
Gas mask	1025574

##### Warning label

Warning label in accordance with the "Guidelines for the use of ozone for water treatment" ZH 1/474, issued by the central office of the industrial safety associations. Version supplied as a combined adhesive label with markings as follows: warning sign, ozone plant room indication and prohibited activity signs.

	Order no.
Warning label	740921

##### Emergency stop switch

For installation near the door of the ozone plant room. IP 65 PVC enclosure.

	Order no.
Emergency stop switch	700560

### 2.6.10

#### Overvoltage Protection

Overvoltage protection for OZONFILT® systems operated at 230 V 50-60 Hz.

The external overvoltage protection is intended for the operating case where the device internal protection is insufficient for surge voltages of 1 kV between the conductors and of 2 kV to earth. To protect the system when the supply mains is prone to power transients an overvoltage trip can be fitted as a low protection surge arrester to significantly increase the stability of the ozone systems.

Whether the low protection surge arrester requires further measures such as medium and main protection can only be determined by thorough investigation of the voltage behaviour on site.

	Order no.
Fine protection PT 2-DE IS 230 IAC	733010

### 2.6.11

#### Replacement Plug-in Insert After Tripping

	Order no.
Replacement plug-in insert PT 2-DE / S 230 / AC - ST	733011

# 3 Bello Zon® Chlorine Dioxide Systems

## 3.1 Chlorine Dioxide in Water Treatment

Chlorine dioxide is an exceptionally reactive gas, which is not stored due to its instability but rather must only be manufactured to meet requirements at its place of use in special systems.

Chlorine dioxide has a number of advantages over chlorine, which is predominantly used in the disinfection of water. Thus for instance, the disinfection effect does not reduce with increasing pH-value, as is the case with chlorine, rather it increases slightly. Chlorine dioxide remains stable in pipework systems over long periods of time and provides microbiological protection of the water for many hours and up to several days. Ammonia or ammonium, which cause considerable chlorine loss, do not react with chlorine dioxide so that the metered chlorine dioxide remains fully available for disinfection purposes. Chlorophenols, strongly smelling compounds, which result from the chlorination of water etc., are not formed with chlorine dioxide. Trihalogenmethanes (THMs), a substance class, which, like their main representative, chloroform, is suspected of being carcinogens, result from the reaction of chlorine with dissolved matter naturally found in water (humic acids, fulvic acids, etc.). If chlorine dioxide is used as an alternative disinfectant these substances are not produced.

### Advantages of chlorine dioxide:

- Disinfectant effect regardless of the pH value.
- Excellent depositing effect, thanks to long-term stability in the pipework.
- Degradation of biofilms in pipework and tanks, thus reliable protection of entire water systems against legionella attack.
- No reaction with ammonia or ammonium.
- No formation of chlorophenols and other strongly smelling compounds that can be produced during water chlorination.
- No formation of trihalomethanes (THM) or other chlorinated hydrocarbons, no increase in AOX values.

### 3.1.1 Chlorine Dioxide Applications

With every new project, our engineers draw on experience that we have accumulated since 1976 in the following applications:

#### Municipal potable water and waste water companies

- Disinfection of potable water
- Disinfection of waste water

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

- Combating legionella in cold and hot water systems
- Water disinfection in the cooling towers of air conditioning systems
- Disinfection of swimming pool filters

#### Food and beverage industry

- Disinfection of product and raw water
- Bottle cleaning, rinsers and pasteurisers
- Cold-sterile bottling systems
- Disinfectant in CIP systems
- Water vapour treatment (condensation) in the milk industry
- Water treatment for fruit, vegetable, seafood, fish and poultry processing

#### Market gardening

- Disinfection of irrigation water in plant cultivation

#### Industry

- Cooling water treatment
- Combating legionella in cooling water circuits
- Disinfection of process water
- Removal of odorous substances in air scrubbers
- Slime control in the paper industry

## 3 Bello Zon<sup>®</sup> Chlorine Dioxide Systems

### 3.1.2

#### Bello Zon<sup>®</sup> System Technology

Bello Zon<sup>®</sup> chlorine dioxide generation and metering systems use the chlorite/acid process. These systems generate a chlorine-free chlorine dioxide solution through the reaction of sodium chlorite solution with hydrochloric acid.

Decades of experience with Bello Zon<sup>®</sup> chlorine dioxide systems have shown that using the selected process parameters can achieve an excellent output of up to 99% (relative to the stoichiometric ratio).

In most applications, metering is proportional to the flow, i.e. the flow depends on the signal from an inductive or contact flow meter or is performed in parallel to a feed pump.

In circulation systems, such as bottle washing machines, cooling circuits, etc., where a chlorine dioxide loss need only be made good, the addition can also be controlled based on a measurement of chlorine dioxide.

#### Features

- Precise and reproducible chlorine dioxide production, thanks to the use of calibratable metering pumps for the starting chemicals.
- Convenient easy operation, thanks to microprocessor control with display of all relevant operating parameters and error messages in plain text.
- Display of the current production quantity as well as the flow rate of the connected flow meters with CDV and CDK.
- Integrated measurement of ClO<sub>2</sub> and chlorite plus control of ClO<sub>2</sub> with CDV and CDK.
- Highest safety level provided as standard, thanks to construction and operation in accordance with DVGW specifications W 224 and W 624.

#### Bello Zon<sup>®</sup> CDL

**Compact dimensions and maximum cost-effectiveness - chlorine dioxide system for one or more points of injection.**

**0 – 120 g/h capacity with storage of up to 60 g of chlorine dioxide for peak metering. Max. flow rate at 0.2 ppm ClO<sub>2</sub> metering capacity of 600 m<sup>3</sup>/h**

#### Bello Zon<sup>®</sup> CDE

**Bello Zon<sup>®</sup> CDEa is winning over customers, thanks to its ultra-simple operation and clearly laid out construction.**

**5-140 g/h chlorine dioxide. Max. flow at 0.2 ppm ClO<sub>2</sub> metering is 700 m<sup>3</sup>/h**

#### Bello Zon<sup>®</sup> CDV

**Bello Zon<sup>®</sup> CDVc is the convenient system for the treatment of average to large volumes of water.**

**1 – 2,000 g/h chlorine dioxide. Max. flow at 0.2 ppm ClO<sub>2</sub> metering is 10,000 m<sup>3</sup>/h**

#### Bello Zon<sup>®</sup> CDK

**Bello Zon<sup>®</sup> CDKc is a deluxe system, persuading customers with its safe handling of chemicals.**

**8 – 12,000 g/h chlorine dioxide. Max. flow rate at 0.2 ppm ClO<sub>2</sub> metering is 60,000 m<sup>3</sup>/h**

**ProMinent provides all the advice needed for the safe operation of a chlorine dioxide system:**

- Evaluation of the situation on site by trained, expert field sales staff.
- Interpretation of water analysis.
- Project planning of the system.
- Commissioning and system maintenance by our trained service technicians.

# 3 Bello Zon® Chlorine Dioxide Systems

## 3.2 Performance Overview of Chlorine Dioxide Systems

Type [g/h]	CDLb	CDEa	CDVc	CDKc
15.000				
10.000				8 – 12.000
5.000				
1.000			1 – 2.000	
500				
100	0 – 120	5 – 140		
50				
10				
5				

### Manufacturing method

	Chlorite-Acid (depleted) 7,5 % NaClO <sub>2</sub> + 9 % HCl	Chlorite-Acid (depleted) 7,5 % NaClO <sub>2</sub> + 9 % HCl	Chlorite-Acid (depleted) 7,5 % NaClO <sub>2</sub> + 9 % HCl	Chlorite-Acid (concentrated) 24,5 % NaClO <sub>2</sub> + 25-36 % HCl
--	--	--	--	---

### Application

Legionella combating	■			
Food and beverages industry	■	■	■	
Municipal drinking and waste water treatment	■	■	■	■
Industry (cooling tower, waste/ process water, etc.)	■	■	■	■

P\_PMA\_BEZ\_0161\_SW

Chlorine dioxide is establishing itself more and more as a universal disinfectant in applications such as the disinfection of drinking water and industrial water, washing food or in the treatment of cooling water and waste water. Its effect independent of the pH value of the water ensures systems remain free of biofilms.

- Efficient disinfection in connection with excellent eco-compatibility
- Safe and reliable plant technology
- Worldwide availability of know-how and service

# 3 Bello Zon<sup>®</sup> Chlorine Dioxide Systems

## 3.3 Questionnaire on the Design of a Chlorine Dioxide System

**Use of the chlorine dioxide plant:**

- |  |  |
|--|--|
| <input type="checkbox"/> for disinfection of | <input type="checkbox"/> Drinking water                          |
|  | <input type="checkbox"/> Industrial water                        |
|  | <input type="checkbox"/> Process water in the food industry      |
|  | <input type="checkbox"/> Waste water                             |
|  | <input type="checkbox"/> Cooling water                           |
|  | <input type="checkbox"/> _____                                   |
| <input type="checkbox"/> for oxidation of    | <input type="checkbox"/> Iron, manganese, nitrite, sulphide etc. |
|  | <input type="checkbox"/> Swimming pool water                     |
|  | <input type="checkbox"/> Odour                                   |
|  | <input type="checkbox"/> _____                                   |
| <input type="checkbox"/> _____               |  |

**Water values:**

- |   |  |
|---|--|
| Max. water flow rate _____ m <sup>3</sup> /h      | Maximum water pressure _____ bar   |
| Water flow rate <input type="checkbox"/> constant | <input type="checkbox"/> fluctuating from _____ m <sup>3</sup> /h to _____ m <sup>3</sup> /h |
| pH value _____                                    | Iron (Fe <sup>2+</sup> ) _____ mg/l  |
| Temperature _____ °C                              | Manganese (Mn <sup>2+</sup> ) _____ mg/l   |
| Solid fraction _____ mg/l                         | Nitrite (NO <sub>2</sub> <sup>-</sup> ) _____ mg/l   |
| Alkalinity K <sub>S4,3</sub> _____ mmol/l         | Sulphide (S <sup>2-</sup> ) _____ mg/l   |
|   | TOC (total organic carbon) _____ mg/l  |

**Response time to application:**

\_\_\_\_\_ m<sup>3</sup> volume reaction tank or \_\_\_\_\_ minutes residence time in entire system.

**Type of metering:**

- constant
- flow-proportional
- depending on measured value

**Desired amount of metering:** \_\_\_\_\_ mg/l

**Desired concentration after chlorine dioxide metering:** \_\_\_\_\_ mg/l

**Other requirements:**

\_\_\_\_\_

\_\_\_\_\_

3

# 3 Bello Zon® Chlorine Dioxide Systems

## 3.4 Chlorine Dioxide System Bello Zon® CDLb

**Compact dimensions and maximum cost-effectiveness - chlorine dioxide system for one or more points of injection.**

**0 – 120 g/h capacity with storage of up to 60 g of chlorine dioxide for peak metering. Max. flow rate at 0.2 ppm ClO<sub>2</sub> metering capacity of 600 m<sup>3</sup>/h**

Chlorine dioxide system for production of a chlorine-free chlorine dioxide solution, especially suitable for multiple points of injection. Bello Zon® CDLb produces ClO<sub>2</sub> discontinuously using the acid/chlorite process with diluted chemicals.



In batch production a chlorine-free chlorine dioxide solution is generated from a sodium chlorite solution and hydrochloric acid. This is an extremely safe, managed process.

The concentration of the chlorine dioxide solution remains constant even during storage. This means that the chlorine dioxide can be buffered in an integrated or external storage module at a concentration of 1,000 or 2,000 mg/l.

Because the chlorine dioxide is buffered in this module, the system can be designed in line with average rather than peak consumption. This drastically reduces investment costs in comparison with conventional systems.

The ProMinent® product range includes a wide range of metering pumps and control versions from which to choose when operating several injection points using chlorine dioxide from a storage module.

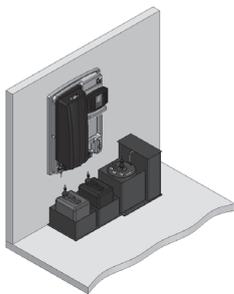
No chlorine dioxide can escape from the system due to the closed gas transport system, thereby guaranteeing economical, environmentally friendly operation with minimal use of chemicals. In addition, the chlorine dioxide solution generated with maximum output offers excellent long-term stability with minimal consumption of starting chemicals.

Integration of the system into your process is simple and reliable with the wide range of accessory modules. Please ask our sales representatives for information about our modular systems specifically designed for CDLb.

The chlorine dioxide system Bello Zon® CDLb meets the high standards stipulated in data sheets W 224 and W 624 published by the German Association for Gas and Water (DVGW).



P\_PMA\_BEZ\_0077\_SW



P\_PMA\_BEZ\_0122\_SW

### Your benefits

- Reduced costs thanks to minimal use of chemicals
- Cost-effective way to provide several points of injection
- Quick ramp-up time after downtime thanks to long-term stability of chlorine dioxide solution
- Maximum output due to closed gas transport system
- Outstanding operating safety and reliability, thanks to intrinsically safe process control
- Ultra-simple process integration

### Technical details

<b>Voltage supply</b>	100 – 230 V, 50/60 Hz (16 A)
<b>Inputs</b>	2 freely configurable digital inputs for the functions Pause, High metering, Intermittent metering or Manual metering, as well as an external collective malfunction signal 4 digital inputs for monitoring (warning / empty message) the chemical supply 1 digital input for contact water meter 0.25-20 Hz 1 frequency input for water meter 10-10,000 Hz
<b>Outputs</b>	1 operating signal relay 1 alarm signal relay 1 warning signal relay 1 voltage output +5 V as supply voltage for a water meter with Hall sensor
<b>Operating fluids</b>	Sodium chlorite 7.5%, purity according to EN 938 Hydrochloric acid 9% purity according to EN 939 Potable water
<b>Enclosure rating</b>	IP 65

### Field of application

- Disinfection in the food and beverage industry. Especially for bottle rinsers, CIP (cleaning in place), bottle washing machines and fruit / vegetable washing
- Legionella control and prevention, e.g. in hotels or hospitals
- Market gardening: Germ-free irrigation water and sprinkler irrigation water
- Treatment of cooling water and potable water
- Filter disinfection, e.g. in swimming pools

### 3 Bello Zon® Chlorine Dioxide Systems

#### Technical Data

Type	Generation capacity g/h	Operating temp. °C	Solution concentration mg/l	Capacity l/h	Dimensions (approx.) H x W x D (mm) mm	Weight kg
CDLb 06	6*	10-40	1000	8	1,236 x 878 x 306	41
CDLb 12	12*	10-40	2000	8	1,236 x 878 x 306	42
CDLb 22	22*	10-40	2000	13	1,236 x 878 x 306	46
CDLb 55	55* 1)	10-40	2000	30	1,550 x 800 x 345	73
CDLb 120	120** 1)	10-40	2000	**	1,300 x 880 x 425	55

\* Option: Integrated receiver tank and integrated metering pump with suitable capacity up to 7 bar back pressure.

\*\* With external receiver module and separate metering pump

1) Without cover

#### Interfaces

Type CDLb		6 g/h	12 g/h	22 g/h	55 g/h	120 g/h
Water inlet	ProMinent/Neutral	12-9	12-9	12-9	12-9	Di20/DN15
	Swiss	Di20/DN15	Di20/DN15	Di20/DN15	Di20/DN15	Di20/DN15
Connector dimensions of metering pump for acid and chlorite		6x4	6x4	6x4	6x4	6x4
ClO <sub>2</sub> outlet	With internal storage/pump/multifunctional valve	6-4	6-4	12-9	12-9	
	With internal storage tank/pump	6-4	6-4	12-9	12-9	
	With internal storage tank, without pump	6-4	6-4	8-5	12-9	
	With external storage tank, without pump (reactor outlet)	12-9	12-9	12-9	12-9	Di25/DN20
External storage tank (suction lance connector)		Di25/DN20	Di25/DN20	Di25/DN20	Di25/DN20	Di25/DN20

#### 3.4.1 Identity code ordering system for chlorine dioxide systems Bello Zon® CDLb

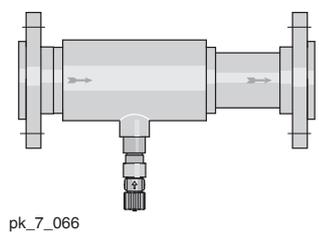
CDLb	ClO <sub>2</sub> production capacity
02	CDLb 06 = 6 g/h
04	CDLb 12 = 12 g/h
06	CDLb 22 = 22 g/h
08	CDLb 55 = 55 g/h, cover not included, see Accessories
10	CDLb 120 = 120 g/h, cover not included, see Accessories
<b>Equipment</b>	
0	With receiver tank, pump and multifunctional valve (not with CDLb 120) *
1	With receiver tank and pump (not with CDLb 120) *
2	With receiver tank, without pump (not for CDLb 120)
3	With 30 l receiver module, without pump
<b>Design</b>	
P	ProMinent
S	Swiss, DN 15 water connection, rigid piping
N	Neutral
<b>Operating voltage</b>	
0	230 V, 50/60 Hz
1	115 V, 50/60 Hz
<b>Suction lance, suction assembly</b>	
0	None
1	With suction lance
2	With suction lance and collecting pan
3	With suction lance, collecting pan, angle valve and PE hose 12x9 (10 m)
<b>Pre-set language</b>	
DE	german
EN	english
ES	spanish
FR	french
IT	italian
PL	polish
CZ	czech

\* ClO<sub>2</sub> discharge pumps are not equipped with a fault indicating relay. It is available as an accessory.

# 3 Bello Zon® Chlorine Dioxide Systems

## 3.4.2 Accessories and Maintenance Sets for Chlorine Dioxide Systems Bello Zon® CDLb

### Point of injection



Corrosion-resistant point of injection made of PVC-U or PVC-C for warm water applications with integrated mixer elements and maintenance-free PVDF metering valve.

	Material	Installation length mm	Order no.
<b>CDL DN 50 point of injection</b>	PVC-U	450	1027611
<b>CDL DN 65 point of injection</b>	PVC-U	400	1026490
<b>CDL DN 80 point of injection</b>	PVC-U	400	1027612
<b>CDL DN 100 point of injection</b>	PVC-U	470	1034693
<b>CDL DN 125 point of injection</b>	PVC-U	550	1047692
<b>CDL DN 150 point of injection</b>	PVC-U	680	1047693
<b>CDL DN 65 point of injection</b>	PVC-C	400	1029326
<b>CDL DN 80 point of injection</b>	PVC-C	400	1029327

### Temperature/pressure resistance – metering station CDL

Water temperature (°C)	Maximum permissible operating pressure (bar)	
	PVC-U	PVC-C
40	12	12
50	7	9.5
60	4.5	7.5
70	–	5
80	–	3

### Back pressure valve and angle valve

Back pressure valve type MFV with wall bracket and 6 x 4 mm hose connection is ideal for fitting in the chlorine dioxide metering line. Angle valve for the transition from the customer's pipeline to the 12x9 hose connector on the CDLb.

	Order no.
<b>MFV pressure relief valve with wall mounting bracket</b>	1027652
<b>Angle valve (support insert 12/9 stainless steel) DN15 G 1/2" brass</b>	1046350

### Fault indicating relay for the ClO<sub>2</sub> pump

Fault indicating relay retrofit kit for the ClO<sub>2</sub> discharge pump

	Order no.
<b>Relay 3-pin</b>	1029309

### Hood for CDLb

	Order no.
<b>Hood for CDLb 55 PE black</b>	1045889
<b>Hood for CDLb 120 PE black</b>	1045890

### Safety collecting pan for chemical containers

Collecting pan with two separate compartments - 1 No. 25 l Bello Zon® acid and 1 No. 10 l Bello Zon® chlorite chemical container.

Dimensions (HxWxD): 290 x 700 x 350 mm

	Order no.
<b>Safety collecting pan CDLa</b>	1026744

## 3 Bello Zon® Chlorine Dioxide Systems

### Safety collecting pan for chemical tanks (CDLb)

Collecting pan for a 25 l Bello Zon® acid or Bello Zon® chlorite chemical canister.

Dimensions (HxWxD): 266 x 400 x 500 mm

	Order no.
Safety collecting pan CDLb	791726

### Service kits for CDLa

The kits contain all parts subject to wear and tear that need to be replaced at regular service intervals. The 1-year kit should be used every year and the 3-year kit in addition every 3 years.

	Order no.
1-year service kit for pressure relief valve	1029442

### For CDLa with ClO<sub>2</sub> pump

	Type	Order no.
1-yearly maintenance set	CDL 5	1027263
3-yearly maintenance set, 230 V	CDL 5	1049659
1-yearly maintenance set	CDL 10	1031549
3-yearly maintenance set, 230 V	CDL 10	1049665
3-yearly maintenance set, 100 V	CDLa 5	1049655
3-yearly maintenance set, 115 V	CDLa 5	1049657
3-yearly maintenance set, 100 V	CDLa 10	1049661
3-yearly maintenance set, 115 V	CDLa 10	1049663

### For CDLa without ClO<sub>2</sub> pump

	Type	Order no.
1-yearly maintenance set	CDL5	1042829
3-yearly maintenance set, 230 V	CDL5	1049660
1-yearly maintenance set	CDL10	1042830
3-yearly maintenance set, 230 V	CDL10	1049666
3-yearly maintenance set, 100 V	CDLa 5	1049656
3-yearly maintenance set, 115 V	CDLa 5	1049658
3-yearly maintenance set, 100 V	CDLa 10	1049662
3-yearly maintenance set, 115 V	CDLa 10	1049664

### Maintenance sets for Bello Zon® CDLb

#### For CDLb with receiver tank, pump and multifunctional valve

	Type	Order no.
Annual maintenance set	CDLb 06, CDLb 12	1044484
Annual maintenance set	CDLb 22	1044501
Annual maintenance set	CDLb 55	1044509
3-yearly maintenance set, 230 V	CDLb 06, CDLb 12	1044494
3-yearly maintenance set, 230 V	CDLb 22	1044502
3-yearly maintenance set, 230 V	CDLb 55	1044510
3-yearly maintenance set, 115 V	CDLb 06, CDLb 12	1045212
3-yearly maintenance set, 115 V	CDLb 22	1045216
3-yearly maintenance set, 115 V	CDLb 55	1045220

### 3 Bello Zon® Chlorine Dioxide Systems

#### For CDLb with receiver tank and pump

	Type	Order no.
Annual maintenance set	CDLb 06, CDLb 12	1044495
Annual maintenance set	CDLb 22	1044503
Annual maintenance set	CDLb 55	1044511
3-yearly maintenance set, 230 V	CDLb 06, CDLb 12	1044496
3-yearly maintenance set, 230 V	CDLb 22	1044504
3-yearly maintenance set, 230 V	CDLb 55	1044512
3-yearly maintenance set, 115 V	CDLb 06, CDLb 12	1045213
3-yearly maintenance set, 115 V	CDLb 22	1045217
3-yearly maintenance set, 115 V	CDLb 55	1045221

#### For CDLb with receiver tank without pump

	Type	Order no.
Annual maintenance set	CDLb 06, CDLb 12	1044497
Annual maintenance set	CDLb 22	1044505
Annual maintenance set	CDLb 55	1044513
3-yearly maintenance set, 230 V	CDLb 06, CDLb 12	1044498
3-yearly maintenance set, 230 V	CDLb 22	1044506
3-yearly maintenance set, 230 V	CDLb 55	1044514
3-yearly maintenance set, 115 V	CDLb 06, CDLb 12	1045214
3-yearly maintenance set, 115 V	CDLb 22	1045218
3-yearly maintenance set, 115 V	CDLb 55	1045222

#### For CDLb with 30 l receiver module without pump

	Type	Order no.
Annual maintenance set	CDLb 06, CDLb 12	1044499
Annual maintenance set	CDLb 22	1044507
Annual maintenance set	CDLb 55	1044515
Annual maintenance set	CDLb 120	1044517
3-yearly maintenance set, 230 V	CDLb 06, CDLb 12	1044500
3-yearly maintenance set, 230 V	CDLb 22	1044508
3-yearly maintenance set, 230 V	CDLb 55	1044516
3-yearly maintenance set, 230 V	CDLb 120	1044519
3-yearly maintenance set, 115 V	CDLb 06, CDLb 12	1045215
3-yearly maintenance set, 115 V	CDLb 22	1045219
3-yearly maintenance set, 115 V	CDLb 55	1045223
3-yearly maintenance set, 115 V	CDLb 120	1044519

## 3 Bello Zon® Chlorine Dioxide Systems

### 3.5 Chlorine Dioxide System Bello Zon® CDLb with Multiple Points of Injection

The modular customised solution for several ClO<sub>2</sub> points of injection with only one generation system.

0 – 120 g/h capacity with storage of up to 60 g of chlorine dioxide for peak metering. Max. flow rate at 0.2 ppm ClO<sub>2</sub> metering capacity of 600 m<sup>3</sup>/h, up to 6 points of injection possible as standard

Flexible solutions for the production and metering of ClO<sub>2</sub> adapted to our customer's tasks, requirements and anticipated pricing. Made-to-measure systems constructed from modules designed to work together.



The Bello Zon® chlorine dioxide systems for multiple metering are divided into three different concepts designed to respond to specific customer requirements. These concepts are used where several injection points need to be supplied with ClO<sub>2</sub> from a single ClO<sub>2</sub> system. Up to 6 points of injection can be selected as standard depending on the chosen concept.

#### Concept 1 (assembly kit of loose components)

This concept consists of a CDLb system and all components that are needed for metering. They are provided as a kit for assembly on site.

#### Concept 2 (assembly kit of metering components ready mounted on panel)

This concept consists of two main components, the CDLb system and a metering panel, on which all the metering components are mechanically and, optionally, electrically mounted.

#### Concept 3 (plug and play on stainless steel frame)

This concept consists of a stainless steel frame, on which the Bello Zon® CDLb system and the metering components are mechanically and electrically mounted in full. There is a stainless steel control cabinet with a main switch that contains the central power supply and control system for all electrical components.

#### Your benefits

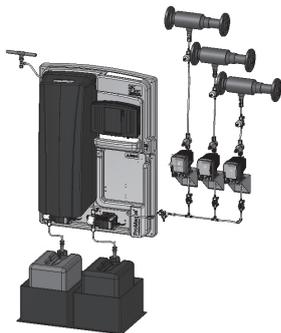
- Very easy way to provide several points of injection according to requirements
- Cost-effective way to provide several points of injection
- Outstanding operating safety and reliability, thanks to intrinsically safe process control
- Ultra-simple process integration

#### Technical details

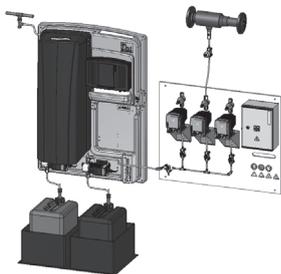
- External storage module
- Internal storage tank (only with the "Modular, loose components" and "Modular, metering components pre-assembled on a panel" concepts)
- Terminal box with optional main switch (only with the "Modular, metering components pre-assembled on a panel" concept)
- Stainless steel cabinet with main switch and emergency relay (only with the "Plug and Play on stainless steel frame" concept)

#### Field of application

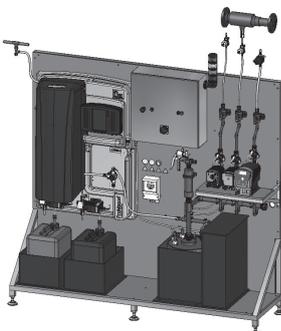
- All applications which require more than one point of injection
- Disinfection in the food and beverage industry. Especially with bottle rinsers, CIP (cleaning in place), bottle washing machine and in fruit / vegetable washing
- Legionella control and prevention, e.g. in hotels or hospitals (cold and hot water metering)
- Market gardening: germ-free irrigation and sprinkler irrigation water
- Treatment of cooling water and potable water
- Filter disinfection, e.g. in swimming pools



P\_PMA\_BEZ\_0022\_SW1  
Concept 1



P\_PMA\_BEZ\_0021\_SW1  
Concept 2



P\_PMA\_BEZ\_0020\_SW1  
Concept 3

# 3 Bello Zon® Chlorine Dioxide Systems

## 3.6 Chlorine Dioxide System Bello Zon® CDEa



**Bello Zon® CDEa is winning over customers, thanks to its ultra-simple operation and clearly laid out construction.**

**5-140 g/h chlorine dioxide. Max. flow at 0.2 ppm ClO<sub>2</sub> metering is 700 m<sup>3</sup>/h**

Chlorine dioxide system, which continuously produces ClO<sub>2</sub> according to the acid/chlorite method with diluted chemicals. Extremely simple operation, clear construction, analogue control, manual control or via contacts.

A ready-to-use chlorine dioxide system for the continuous production and metering of chlorine dioxide with diluted chemicals. The emphasis is on ultra-simple operation and clearly laid out system design with standard components.

The stroke lengths of the metering pumps are continuously monitored. This rules out inadmissible operating statuses arising from incorrect pump stroke length adjustments.

The system is extremely easy to operate and, alongside a central Start-Stop key, also has colour-differentiated LEDs to display all the operating statuses.

The system can be controlled in an analogue or manual manner or via contacts

### Your benefits

- Minimal training required thanks to extremely simple operation
- Minimal investment costs
- Short lead times
- Excellent operating safety
- Simple process integration

### Technical details

#### Power supply

- 100-230 V, 50/60 Hz

#### Inputs

- 1 digital input for the Pause function
- 1 digital input for contact water meter 0.25-20 Hz
- 1 analogue input 0/4-20mA

#### Outputs

- 1 alarm signal relay
- 1 warning signal relay

#### Operating substances

- Sodium chlorite 7.5%, purity according to EN 938
- Hydrochloric acid 9% purity according to EN 939
- Particle-free water

#### Degree of protection

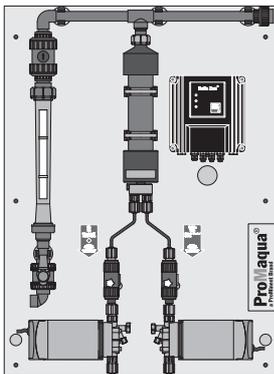
- IP 54

#### Bypass pipework

- DN 20

#### Field of application

- Municipal potable water and waste water treatment
- Industrial process and cooling water
- Disinfection in the food and beverage industry



P\_PMA\_BEZ\_0126\_SW1

### 3 Bello Zon<sup>®</sup> Chlorine Dioxide Systems

#### Technical Data

Type	Chlorine dioxide capacity*		Max. operating pressure **	Operating temp. °C	Connector size, chlorite and acid metering pumps	Dimensions H x W x D mm	Dimensions of the bypass connector DN	Weight kg
	min.-max./hour g/h	min./day g/d						
CDEa 45	5-45	16	7 / 8 **	15-40	6x4	958 x 700 x 195	20	21
CDEa 80	8-80	30	7 / 8 **	15-40	6x4	958 x 700 x 195	20	22
CDEa 140	14-140	50	7 / 8 **	15-40	8x5	1,200 x 700 x 195	20	24

\* The metering figures relate to 5 bar back pressure and an ambient temperature of 20 °C. The minimum capacity/per hour is based on the fact that when the system is operating at below 10 % of the nominal capacity, continuous metering is no longer possible, due to the then low pumping frequency of the metering pumps. Where systems are operating continuously, change the reactor content at least 2 x daily. Do not operate at below the specific minimal output/day.

\*\* 8 bar at maximum 35 °C ambient temperature

Subject to technical and design changes

Type	Order no.
CDEa 45	1047456
CDEa 80	1047457
CDEa 140	1047458

#### Scope of supply:

Bello Zon<sup>®</sup> CDEa systems are supplied connection-ready on a wall panel. Connection to the site bypass line is via DN 20 PVC threaded connectors with straight solvent unions. Order suction lances for the chemical pumps, safety collecting pans for the chemical drums and other accessories, like flushing equipment with a vacuum relief valve separately.

# 3 Bello Zon® Chlorine Dioxide Systems

## 3.7 Chlorine Dioxide System Bello Zon® CDVc



**Bello Zon® CDVc is the convenient system for the treatment of average to large volumes of water. 1 – 2,000 g/h chlorine dioxide. Max. flow at 0.2 ppm ClO<sub>2</sub> metering is 10,000 m<sup>3</sup>/h**

Chlorine dioxide system for monitoring and metering chlorine dioxide and diluted chemicals. Maximum output and safety due to special reactor concept. Bello Zon® CDVc can be easily and safely integrated into any water treatment process.

Continuous water treatment using the chlorine dioxide system Bello Zon® CDVc can be simply and safely integrated into any process. The special reactor concept generates chlorine dioxide safely and simply with maximum output.

Food-compatible PVDF is used instead of PVC generally used in the industry. This results in improved operating safety and reliability and improved purity of the chlorine dioxide generated. The central system controller manages the precise production of the chlorine dioxide. All parameters relevant for water treatment are recorded and logged.

The stroke lengths of ProMinent® metering pumps are monitored online. This rules out hazardous operating statuses arising from incorrect pump stroke length adjustments.

The precise production of chlorine dioxide is managed by the central system control. Chlorine dioxide, chlorite, pH or redox potential sensors DULCOTEST® are directly connected to the two mA inputs. The chlorine dioxide in the treated water, as well as its main by-product chlorite, is thus monitored and documented online. The chlorine dioxide concentrations in the water can be adjusted automatically depending on the measurement by the integrated PID controller.

The integrated data logger documents all status messages and measured values, which the screen writer then visualises on the clear colour display.

The systems meet all the requirements of the DVGW specifications W 224 and W 624 with regard to construction and operation and are designed for operation with diluted chemicals Bello Zon® chlorite (7.5% NaClO<sub>2</sub>) and acid (9% HCl).

### Your benefits

- Efficient operation, thanks to production, metering and monitoring of ClO<sub>2</sub> with just one system
- Maximum operating safety and purity of the ClO<sub>2</sub> produced through the use of PVDF reactors and stroke length-monitored pumps
- No need for external control due to integrated measuring and control technology
- Perfect quality management, thanks to integrated storage of all operating parameters and measured values
- Automatic monitoring of operating parameters and maintenance intervals
- Simple and safe operation, thanks to clear navigation in plain text

### Technical details

#### Power supply

- 100-230 V, 50/60 Hz

#### Inputs

- 2 freely configurable analogue inputs (0/4-20 mA)
- 7 digital inputs for monitoring
- 1 digital input for contact water meter 0.25-20 Hz
- 1 frequency input for water meter 10-10,000 Hz

#### Outputs

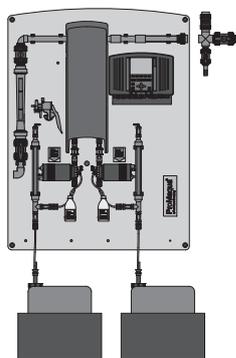
- 1 operating signal relay
- 1 alarm signal relay 1 warning signal relay
- Mains output for controlling the bypass pump
- 1 freely configurable analogue output (0/4-20 mA)
- 1 voltage output +5 V as supply voltage for water meter with Hall sensor

#### Operating substances

- Sodium chlorite 7.5%, purity according to EN 938
- Hydrochloric acid 9% purity according to EN 939
- Particle-free water

#### Degree of protection

- IP 65



P\_PMA\_BEZ\_0009\_SW  
CDVc 20-120 (figure shows optional configuration)

# 3 Bello Zon® Chlorine Dioxide Systems

## Field of application

- Municipal potable water and waste water treatment
- Industrial process and cooling water
- Disinfection in the food and beverage industry, above all with inlet water treatment.
- Market gardening: Germ-free irrigation water and sprinkler irrigation water

## Technical Data

Type	Chlorine dioxide dosing capacity*		Max. operating pressure**	Operating temp.	Dimensions*** H x W x D (mm)	Weight*** kg	Power consumption (max.) ****	
	min.-max./hour g/h	min./day g/d					230 V A	115 V A
CDVc 20	1–20	6.4	8	10–40	1,344 x 1,002 x 200	26	2.7	0.9
CDVc 45	2–45	16.0	8	10–40	1,344 x 1,002 x 200	27	2.7	0.9
CDVc 120	6–120	40.0	8	10–40	1,344 x 1,002 x 200	28	2.7	0.9
CDVc 240	12–240	80.0	8	10–40	1,342 x 1,000 x 248	45	2.7	1.2
CDVc 600	30–600	140.0	8	15–40	1,711 x 1,200 x 273	75	2.8	1.4
CDVc 2000	100–2,000	468.0	5	15–40	1,900 x 1,400 x 370	120	4.1	3.2

\* The metering figures relate to 5 bar back pressure and an ambient temperature of 20 °C. The minimum capacity/per hour is based on the fact that when the system is operating at below 5% of the nominal power, continuous metering is no longer possible because of the correspondingly low pumping frequency of the metering pumps. When systems are not operating continuously, the reactor contents should be changed at least twice daily. The system should not, therefore, be operated below the stated minimum capacity/day.

\*\* At 35 °C ambient temperature

\*\*\* Without bypass pump, flushing valve and water supply line

\*\*\*\* 230 V values with bypass pump, 115 V values without bypass pump

## Interfaces

Type	Chlorine dioxide dosing capacity*		Hose connection dimensions of metering pumps	Dimensions of the bypass connector  DN
	min.-max./hour g/h	min./day g/d		
CDVc 20	1–20	6.4	6x4	25
CDVc 45	2–45	16.0	6x4	25
CDVc 120	6–120	40.0	6x4	25
CDVc 240	12–240	80.0	8x5	25
CDVc 600	30–600	140.0	8x5	25
CDVc 2000	100–2,000	468.0	DN 10	40

# 3 Bello Zon® Chlorine Dioxide Systems

## 3.7.1 Identity Code Ordering System for CDVc Systems

<b>CDVc</b>	<b>System type, metering output ClO<sub>2</sub></b>
02	CDVc 20= 20 g/h
04	CDVc 45= 45 g/h
06	CDVc 120= 120 g/h
08	CDVc 240= 240 g/h
10	CDVc 600= 600 g/h
14	CDVc 2000= 2,000 g/h
	<b>Type</b>
P	ProMaqua
	<b>Power supply</b>
U	100-230 V ± 10%, 50/60 Hz
A	230 V ± 10%, 50/60 Hz
B	100-115 V ± 10%, 50/60 Hz (not available for version with „bypass“ 04)
	<b>Bypass version</b>
02	PVC-U bypass with float flow meter and pump, <b>unit l/h</b>
04	Bypass PVC-U with float flow meter and bypass pump (not CDVc 2000), only selectable with operating voltage A and 50 Hz mains frequency, <b>unit l/h</b>
08	PVC-U bypass with float flow meter, <b>unit gpm</b>
	<b>Calibration device</b>
0	Without calibration device, but with measuring cylinder
1	With calibration device
	<b>Suction lance, suction fitting, chemicals</b>
0	none
1	Suction lance for 5-60 l container (only CDV 20-600)
2	Suction lance for 200 l container (only CDV 20-600)
3	Flexible suction fitting up to 5 m with two-phase level switch (only CDV 20-600 g/h)
4	Suction lance for 25 l tank with 2 drip pans 40 l without leakage sensor (only CDV 20-600 g/h)
	<b>Mechanical design</b>
0	Standard
	<b>Preset language</b>
DE	german
EN	english
FR	french
IT	italian
ES	spanish
	<b>Control</b>
0	Basic version *)
1	With measuring and control properties (only in connection with version inputs and outputs 1 or 3)
2	With measuring and control properties, data logger and screen recorder (only in connection with version inputs and outputs 1 or 3)
	<b>Extended inputs and outputs</b>
0	none
1	2 analogue inputs, freely configurable for controller output and flow rate
2	1 analogue output, freely configurable
3	2 analogue inputs and 1 analogue output, freely configurable
	<b>Communication interfaces</b>
0	Standard
	<b>Approvals</b>
01	CE-mark
	<b>Temperature monitoring</b>
0	without temperature monitoring
	<b>Hardware</b>
0	Standard
	<b>Software</b>
0	Standard

\* 4 contact inputs for leakage, external fault, high dosage and pause plus 3 contact outputs for operating, warning and alarm messages.  
1 digital and 1 frequency input for connection of flow meters.

## 3 Bello Zon<sup>®</sup> Chlorine Dioxide Systems

### 3.7.2

#### Maintenance Sets for Bello Zon<sup>®</sup> CDV Chlorine Dioxide Systems

The maintenance kits contain all of the wear parts that may need to be replaced during regular system maintenance.

##### Maintenance sets for CDVc systems

	<b>Order no.</b>
Maintenance set, complete CDVc 20	1034758
Maintenance set, complete CDVc 45	1034759
Maintenance set, complete CDVc 120	1034760
Maintenance set, complete CDVc 240	1034761
Maintenance set, complete CDVc 600	1034762
Maintenance kit, complete CDVc 2000 up to delivery date 03/2011	1034763
Maintenance kit, complete CDVc 2000 from delivery date 04/2011	1048801

##### Maintenance sets for CDVb systems

	<b>Order no.</b>
Maintenance set, complete CDVb 15	1022252
Maintenance set, complete CDVb 35	1022253
Maintenance set, complete CDVb 60	1022264
Maintenance set, complete CDVb 120	1022265
Maintenance set, complete CDVb 220	1024614

##### Maintenance sets for CDVa systems

	<b>Order no.</b>
Maintenance set, complete 230 V CDVa 35	791842
Maintenance set, complete 230 V CDVa 60	791913
Maintenance set, complete 230 V CDVa 120	791915
Maintenance set, complete 230 V CDVa 220	740824
Maintenance set, complete 230 V CDVa 400	740765
Maintenance set, complete 230 V CDVa 600	740826
Maintenance set, complete 230 V CDVa 2000	1005333
Maintenance set, complete 115 V CDVa 35	791860
Maintenance set, complete 115 V CDVa 60	791914
Maintenance set, complete 115 V CDVa 120	791916
Maintenance set, complete 115 V CDVa 220	740825
Maintenance set, complete 115 V CDVa 400	740819
Maintenance set, complete 115 V CDVa 600	740827
Maintenance set, complete 115 V CDVa 2000	1005344

Additional spare parts are listed in the operation instructions for the systems.

## 3 Bello Zon® Chlorine Dioxide Systems

### 3.8 Chlorine Dioxide System Bello Zon® CDKc



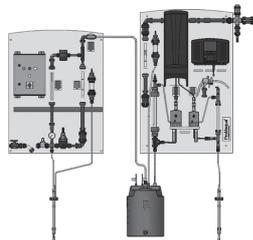
**Bello Zon® CDKc is a deluxe system, persuading customers with its safe handling of chemicals. 8 – 12,000 g/h chlorine dioxide. Max. flow rate at 0.2 ppm ClO<sub>2</sub> metering is 60,000 m<sup>3</sup>/h**

Chlorine dioxide system for continuous production, metering and monitoring of chlorine dioxide with concentrated chemicals. Bello Zon® CDKc is a ready-to-use convenient system with integrated intrinsically safe pre-dilution station.

This chlorine dioxide system includes an intrinsically safe pre-dilution station for concentrated hydrochloric acid. The consumption of hydrochloric acid can therefore be adapted on site to the individual operating conditions. Savings of up to a quarter of the hydrochloric acid volume are possible. The special reactor concept generates chlorine dioxide safely and simply with maximum output. Food-compatible PVDF is used instead of PVC generally used in the industry. This results in improved operating safety and reliability and improved purity of the chlorine dioxide generated. The central system controller manages the precise production of the chlorine dioxide. All parameters relevant for water treatment are recorded and logged. The stroke lengths of ProMinent® metering pumps are monitored online. This rules out hazardous operating statuses owing to incorrect operation with regard to pump stroke length adjustment. The precise production of chlorine dioxide is managed by the central system control. Chlorine dioxide, chlorite, pH or redox potential sensors DULCOTEST® are directly connected to the two mA inputs. The chlorine dioxide in the treated water, as well as its main by-product chlorite, is thus monitored and documented online. The chlorine dioxide concentrations in the water can be adjusted automatically depending on the measurement using the integrated PID controller. The integrated data logger documents all status messages and measured values, which the screen writer then visualises on the clear colour display. The systems meet all the requirements of DVGW data sheets W 224 and W 624, with regard to construction and operation, and are intended for operation with concentrated chemicals (24.5% NaClO<sub>2</sub>) and acid (25-36% HCl).

#### Your benefits

- Cost saving through minimal acid consumption
- Cost-effective operation by the use of inexpensive concentrated output chemicals
- Efficient operation, thanks to production, metering and monitoring of ClO<sub>2</sub> with just one system
- Maximum operating safety and purity of the ClO<sub>2</sub> produced through the use of PVDF reactors
- Integrated measuring and control technology
- Perfect quality management, thanks to integrated storage of all operating parameters and measured values



P\_PMA\_BEZ\_0096\_SW  
CDKc 420 (figure shows optional configuration) <sup>1)</sup>

#### Technical details

##### Power supply

- 100-230 V, 50/60 Hz

##### Inputs

- 2 freely configurable analogue inputs (0/4-20 mA)
- 7 digital inputs for monitoring
- 1 digital input for contact water meter 0.25-20 Hz
- 1 frequency input for water meter 10-10,000 Hz

##### Outputs

- 1 operating signal relay
- 1 alarm signal relay
- 1 warning signal relay
- Mains output for control of the bypass pump
- 1 freely configurable analogue output (0/4-20 mA)
- 1 +5 V voltage output as supply voltage for water meter with Hall sensor

##### Operating substances

- 24.5 % sodium chlorite, purity as per EN 938
- Hydrochloric acid 25 – 36% purity according to EN 939
- Particle-free water

##### Degree of protection

- IP 65

##### Field of application

- Municipal potable water and waste water treatment
- Industrial process and cooling water

### 3 Bello Zon<sup>®</sup> Chlorine Dioxide Systems

#### Technical Data

Type <sup>1)</sup>	Chlorine dioxide dosing capacity* <sup>1)</sup>		Max. operating pressure**	Operating temp.	Connection dimensions of chlorite and acid metering pumps	Dimensions of the bypass connector
	min.-max./hour g/h	min./day g/d				
			bar	°C		DN
CDKc 150	8-150	56	8	10-40	6x4	25
CDKc 400	20-400	140	8	10-40	8x5	25
CDKc 900	45-900	300	8	10-40	8x5	32
CDKc 2000	100-2,000	700	5	10-40	8x5	40
CDKc 2800	140-2,800	700	5	15-40	8x5	40
CDKc 7300	365-7,300	1,750	3	15-40	DN 10	40
CDKc 12000	600-12,000	1,750	2	18-40	DN 10	40

Type <sup>1)</sup>	Dimensions*** H x W x D (mm)	Weight*** kg	Power consumption (max.) ****		Power uptake W
			230 V A	115 V A	
	mm	kg			
CDKc 150	1,380 x 880 x 320	55	0.7	1.2	130
CDKc 400	1,650 x 880 x 445	80	0.9	1.2	180
CDKc 900	1,920 x 920 x 510	95	1.4	2.5	250
CDKc 2000	1,880 x 1,320 x 570	160	2.2	3.5	410
CDKc 2800	1,880 x 1,320 x 570	160	2.2	3.5	410
CDKc 7300	2,250 x 1,850 x 460	175	5.5	6.4	640
CDKc 12000	2,250 x 1,850 x 460	180	5.5	6.4	640

\* The metering figures relate to 5 or 2 bar back pressure and an ambient temperature of 20 °C. The minimum capacity/per hour is based on the fact that when the system is operating at below 5% of the nominal power, continuous metering is no longer possible, due to the correspondingly low pumping frequency of the metering pumps. When systems are not operating continuously, the reactor contents must be changed at least twice daily. The system should not, therefore, be operated below the stated minimum capacity/day.

\*\* At 35 °C ambient temperature

\*\*\* Without bypass pump, flushing valve and water supply line

\*\*\*\* 230 V figure with bypass pump (CDKc 150-900), 115 V figures without bypass pump

<sup>1)</sup> **Subject to technical and design changes.**

Dimensions of the pre-dilution unit (H x W x D) for CDKc 150 - 12,000: 1,200 x 900 x 300 mm

# 3 Bello Zon® Chlorine Dioxide Systems

## 3.8.1 Identity Code Ordering System for CDKc Systems

<b>CDKc</b>	<b>Capacity of ClO<sub>2</sub> including HCl pre-dilution and flushing assembly</b>
20	CDKc 150 = 150 g/h
21	CDKc 400 = 400 g/h
22	CDKc 900 = 900 g/h
23	CDKc 2,000 = 2,000 g/h
24	CDKc 2,800 = 2,800 g/h
25	CDKc 7,300 = 7,300 g/h
26	CDKc 12,000 = 12,000 g/h
	<b>Version</b>
P	ProMaqua
	<b>Operating voltage</b>
A	230 V ±10%, 50/60 Hz (for version with bypass 04)
B	100 – 115 V ±10%, 50/60 Hz (not available for version with bypass 04)
	<b>Bypass version, bypass monitoring</b>
02	Bypass PVC-U with float flow meter
04	Bypass PVC-U with float flow meter and pump (VA) only with 230 V operating voltage (only with CDKc 150-900 g/h)
	<b>Calibrating device</b>
1	with calibrating device
	<b>Suction lance, suction fitting for chemicals</b>
0	none
2	Suction lance for 200 l container, not available for CDKc 7300 and CDKc 12000
3	Flexible suction assembly 5 m, not available for CDKc 7300 and CDKc 12000
	<b>Mechanical design</b>
0	Standard
	<b>Preset language</b>
DE	german
EN	english
FR	french
IT	italian
ES	spanish
	<b>Control</b>
0	Basic version *)
1	With measuring and control properties (only in connection with version inputs and outputs 1 or 3)
2	With measuring and control properties, data logger and screen recorder (only in connection with version inputs and outputs 1 or 3)
	<b>Extended inputs and outputs</b>
0	none
1	2 analogue inputs, freely configurable for controller output and flow rate
2	1 analogue output, freely configurable
3	2 analogue inputs and 1 analogue output, freely configurable
	<b>Communication interfaces</b>
0	Standard
	<b>Approvals</b>
01	CE mark
	<b>Temperature monitoring</b>
0	without temperature monitoring
	<b>Hardware</b>
0	Standard
	<b>Software</b>
0	Standard

\* 4 contact inputs for leakage, external fault, high dosage and pause plus 3 contact outputs for operating, warning and alarm messages.  
1 digital and 1 frequency input for connection of flow meters.

## 3 Bello Zon® Chlorine Dioxide Systems

### 3.8.2 Maintenance Kits for Bello Zon® Type CDK Chlorine Dioxide Systems

The spare parts kits include all wearing parts that need replacing in the course of regular maintenance.

	Order no.
Maintenance kit, complete 230 V CDKa 150	740740
Maintenance kit, complete 230 V CDKa 420	740743
Maintenance kit, complete 230 V CDKa 750	1000172
Maintenance kit, complete 230 V CDKa 1500	1000856
Maintenance kit, complete 230 V CDKa 6000	1004814
Maintenance kit, complete 230 V CDKa 10000	1006647
Maintenance kit, complete 115 V CDKa 150	740741
Maintenance kit, complete 115 V CDKa 420	740744
Maintenance kit, complete 115 V CDKa 750	1000173
Maintenance kit, complete 115 V CDKa 1500	1000855
Maintenance kit, complete 115 V CDKa 6000	1004815
Maintenance kit, complete CDKc 150 (type 20)	1043841
Maintenance kit, complete CDKc 170 (type 02)	1036454
Maintenance kit, complete CDKc 400 (type 21)	1043842
Maintenance kit, complete CDKc 420 (type 04)	1036455
Maintenance kit, complete CDKc 900 (type 22)	1043843
Maintenance kit, complete CDKc 900 (type 06)	1036456
Maintenance kit, complete CDKc 2000 (type 23)	1043864
Maintenance kit, complete CDKc 2100 (type 08)	1036457
Maintenance kit, complete CDKc 2800 (type 24)	1043865
Maintenance kit, complete CDKc 3000 (type 10)	1036458
Maintenance kit, complete CDKc 7500 (type 25)	1043866
Maintenance kit, complete CDKc 7500 (type 12)	1036459
Maintenance kit, complete CDKc 12000 (type 26)	1043867
Maintenance kit, complete CDKc 12000 (type 14)	1040079

Additional spare parts are listed in the operating instructions for the systems.

# 3 Bello Zon® Chlorine Dioxide Systems

## 3.9 Storage Tank Accessories

### External Storage Module CDVc/CDKc

The large chlorine dioxide storage module with integrated volume compensation bag

**Useful capacity 150 l**

The external storage module features a volume compensation bag so that no external bleed line or neutralisation of the chlorine dioxide gas volume is needed.

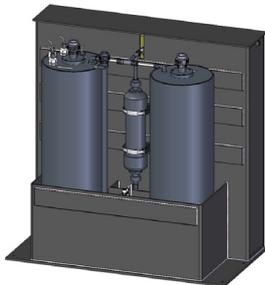
The maximum permissible concentration of the ClO<sub>2</sub> solution is 2,000 mg/l.

#### Your benefits

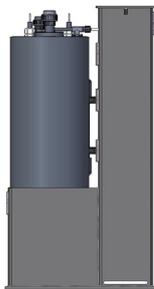
The storage module can be connected on a project basis to the chlorine dioxide systems BelloZon® CDVc and CDKc. Make sure that the defined safety equipment (secure bypass) is also installed. Please contact our Sales Department with any project enquiries.

#### Field of application

The external storage module can be used in applications where more than one point of injection is needed and where a capacity of more than 120 g ClO<sub>2</sub> per hour is needed.



04\_VM\_150L



06\_VM\_150L

	Dimensions L x W x H (mm)	Connectors		Order no.
		Extraction	Filling	
<b>Storage module 150 l for BelloZon®</b>	1,300 x 685 x 1,290	2 x DN 32	1 x DN 25	1060153

## 3 Bello Zon<sup>®</sup> Chlorine Dioxide Systems

### 3.10 Bypass Line Accessories

#### Premixers Made of PVC

CDVb 15-120 premixers are fully integrated in the plant, provided they are ordered with the Identity Code. The premixer on the CDVb 220 can also be ordered by Identity Code but is supplied loose with the plant. On all other plants, the premixer can be ordered partly by Identity Code or partly as a separate order. The standard delivery package of the premixer includes all PVC couplings, screw hose clips and other fixing materials. On the CDVa 2000 and CDKa 1500–10000, the pre-mixer is in two parts.

Plant	Volume l	Length mm	Connection nominal diameter	Order no.
CDVb 220, CDKa 150	1.5	594	DN 25	740649
CDVa 400, CDKa 420	4.5	756	DN 25	740650
CDVa 600, CDKa 750	7.0	1,306	DN 32	740832
CDVa 2000, CDKa 1500	13.4	2x1,316	DN 40	1001000
CDKa 6000/10000	13.4	2x1,330	DN 50	1003121

#### Bypass Pump

Booster pumps made of cast iron (GG) or stainless steel (SS) for operation in the bypass line. Electrical version 220-230 V, 50 Hz, with integrated overload protection.

The required bypass flow should be considered when selecting a suitable bypass pump. The following flow data is recommended for the different plants:

Plant type	Bypass line	Diameter (mm)	Flow rate (m <sup>3</sup> /h)
CDV 15 – 600	DN 25	32	0.5 - 2
CDV 2,000	DN 40	50	2 - 10
CDKa 150 – 420	DN 25	32	0.5 - 2
CDKa 750	DN 32	40	1 - 3.5
CDKa 1,500	DN 40	50	1.5 - 10
CDKa 6,000 – 10,000	DN 50	63	6 - 10
CDKc 150 - 900	DN 25	32	0.5 - 2
CDKc 2,000 - 2,800	DN 40	50	2 - 10
CDKc 7,300	DN 40	50	6 - 10
CDKc 12,000	DN 40	50	10 - 15

PVC should be used as the material for the bypass. The thickness should at least correspond to the pressure range PN 10, or even better PN 16 (bar).

#### Technical Data

Type	Material	Connection suction/ discharge side inch	Pump capacity at 2 bar m <sup>3</sup> /h	Nominal rating W	Nominal current A	Order no.
ZHM 3	SS	RP 1"/1"	1.2	500	2.3	1051081

**Caution: Do not allow pump to come into contact with ClO<sub>2</sub>!**

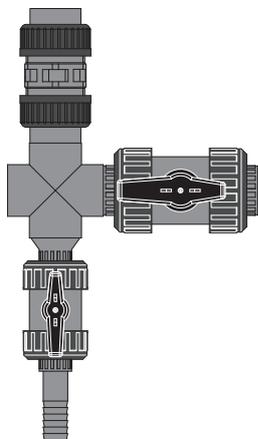
#### Accessories

	Order no.
Bracket for bypass pump	791474
Angle-seat valve PVC DN 25 for throttling the bypass pump	1001877

### 3 Bello Zon® Chlorine Dioxide Systems

#### Flushing Assembly

Install a flushing valve downstream of the chlorine dioxide system so that the reactor and pre-mixer can be flushed through, either for maintenance purposes or after a long system shut-down. The complete flushing equipment kit comprises a DN 20 or DN 25 PVC stopcock and a DN 15 PVC flushing valve with a hose nozzle and a DN 25 vacuum relief valve. It is already included as standard in the scope of supply of all new systems.

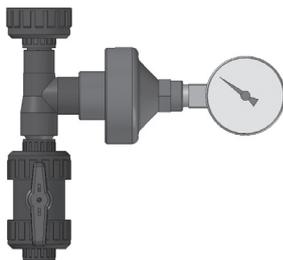


P\_PMA\_AC\_0257\_SW  
Flushing assembly

	Order no.
<b>Flushing equipment PVC-U, EPDM, DN 20 for CDE</b>	1047718
<b>Flushing equipment PVC-U, EPDM, DN 25 for CDV, CDK</b>	1033405

#### Bypass Pressure Gauge CDVc/CDKc

The fitting is used during commissioning to adjust the water pressure in the bypass. It is connected to the flushing valve on the flushing assembly for this purpose. The pressure measurement bypass consists of a PVC stopcock DN 15 and a diaphragm seal with manometer.



P\_PMA\_AC\_0258\_SW1

	Order no.
<b>Bypass pressure measurement DN 20 for CDEa, CDVc, CDKc</b>	1050092

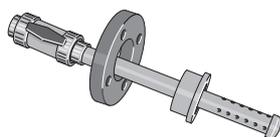
#### Ball-check Valve

A back pressure-resistant ball-check valve should be fitted on installations with long bypass lines, especially if the pipe slopes downwards and the point of injection is below the Bello Zon® system, as well as on installations with fluctuating back pressure.

Type	Nominal diameter	Connector	Material	Order no.
<b>DHV-U</b>	DN 20	G 1 1/4"	PCB	1037775
<b>DHV-U</b>	DN 25	G 1 1/2"	PCB	1037774
<b>DHV 712-R</b>	DN 40	G 2 1/4"	PCB	1000052

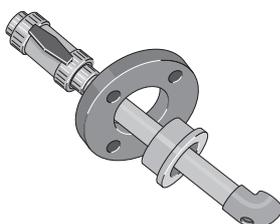
#### PVC-U Chlorine Dioxide Point of Injection

Use an immersion pipe for homogeneous distribution of the chlorine dioxide enriched bypass water in the main water supply pipe, to optimise the mixing and distribution of the chlorine dioxide. Shorten the immersion pipe on site to the required length. The scope of delivery includes a ball valve DN 25 as a shut-off valve for this purpose. The immersion pipe is installed using a DN 50 DIN flange supplied by others.



pk\_7\_011\_2  
Injection pipe from DN 100

	Order no.
<b>Injection pipe for pipe diameters up to DN 80</b>	1018754
<b>Injection pipe for pipe diameters from DN 100</b>	1018753



pk\_7\_012\_2  
Injection pipe to DN 80

## 3 Bello Zon® Chlorine Dioxide Systems

### Contact Water Meter

For direct connection to Bello Zon® systems.

Nominal diameter	Rated flow	Max. flow rate	Pulse rate	Order no.
	m <sup>3</sup> /h	m <sup>3</sup> /h	l	
DN 40	10	20	0.3	1041357
DN 50	15	30	1	1041358
DN 80	40	110	1	1041359

### Inductive Magnetic Flow Meters

The flow meter with transducer MAG 5100 W is especially suitable for water flow measurement in the fields of ground water, potable water, waste water and sludge.

	Connector nominal diameter	Order no.
Inductive magnetic flow meter	DN 50	1034685
	DN 65	1034686
	DN 80	1034687
	DN 100	1034688

# 3 Bello Zon® Chlorine Dioxide Systems

## 3.11 Chemical Supply Accessories

### Suction Lances and Accessories

Suction lances have a rigid construction that can be precisely adapted to the chemical tank. Suction assemblies consist of flexible suction lines.

All suction lances and suction assemblies are made of PVC with FKM seals and are fitted with a foot valve and two-stage level switch including cable and round plug. Select relevant components from the ProMinent motor driven metering pump accessories range for system types not listed here.

	Suitable for system types	Order no.
Suction lance for connection to 5-60 litre non-reusable tank with 2 m long suction hose (6/4 mm)	CDVc 20-120, CDEa 45-80, CDLb	802077
Suction lance for connection to 5-60 litre non-reusable tank with 2 m long suction hose (8/5 mm)	CDVc 240-600, CDEa 140	802078
Suction lance for connection to 200 litre drums with 3 m long suction hose (6/4 mm)	CDVc 20-120, CDEa 45-80, CDLb	802079
Suction lance for connection to 200 litre drums with 3 m long suction hose (8/5 mm)	CDVc 240-600, CDEa 140	802080
Flexible suction fitting with D55 screw cap and 5 m suction hose (6/4mm)	CDVc 20-120, CDEa 45-80, CDLb	1034602
Flexible suction fitting with D55 screw cap and 5 m suction hose (8/5 mm)	CDVc 240-600, CDEa 140	1034644
Suction lance DN 25 PP for connection to 200 litre drums, excluding cable	CDVc 2000	1039397
Suction lance DN 25 PP for connection to 1,000 litre IBC container, excluding cable	CDVc 2000	1039399
Gas-tight suction lance for 200 litre drums with bleed valve, connection for 6/4 and 8/5 mm suction lines and connector for 6/4 mm return line	CDKc 150-2800	1036371
Gas-tight suction lance for 60-litre canister with bleed valve, connector for 6/4 and 8/5 mm suction line and connector for 6/4 mm return line	CDKc 150-2800	1030891
Flexible suction assembly with 5 m suction hose (6/4 mm) and gas-tight D55 screw cap with opening for a return line	CDKc 150-2800	1036174
Flexible suction assembly with 5 m suction hose (8/5 mm) and gas-tight D55 screw cap with opening for a return line	CDKc 150-2800	1036175

### Safety Collecting Pans for Chemical Tanks

Usable capacity l	Type	Order no.
40	without leakage monitor	791726
40	With leakage monitor	791728
70	without leakage monitor	740309
70	With leakage monitor	740308
140	Without leakage monitor	740723
140	With leakage monitor	1003190

Scope of delivery:

- Without leakage monitor: one pan
- With leakage monitor: two pans + level switch + electronics card for Bello Zon® control (CDVa, CDVb, CDKa)

### 3 Bello Zon® Chlorine Dioxide Systems



pk\_1\_126

#### Extension cable, 3-core

For 2-stage level switches, with round plug and round plug coupling.

	Cable length m	Fig.	Order no.
Extension cable, 3-core	3	pk_1_126	1005559

#### Calibration Free-standing Cylinder for Bello Zon® CDEa

	Order no.
Measuring cylinder, tall, 500 ml PP	790661

#### Leakage Monitor for CDVc and CDKc Systems

Name of the item	Order no.
Level switch with litz wire 5 m	1003191

Consisting of 1 level switch to be fitted in the 40, 70 or 140 l safety drip pans without leakage monitor and connected to the control of the Bello Zon® CDVc and CDKc.

#### Drip Pan with Grating to Install Two 200 l Barrels

Material	Weight kg	External dimension WxDxH mm	Effective area WxD mm	Collecting volume l
Polyethylene	ca. 22	1,230 x 820 x 435	1,160 x 750	220

Meets the requirements of the German Water Resources Act (WHG) and possesses a general building supervision approval from DIBt, Berlin.

Name of the item	Order no.
Drip pan with grating	1027211

#### Bello Zon® Acid

Component 1 for Bello Zon® chlorine dioxide production system.

Name of the item	Order no.
Bello Zon® Acid 25 l	1027594
Bello Zon® Acid 200 l	950131

#### Bello Zon® Chlorite

Component 2 for Bello Zon® chlorine dioxide production system.

Name of the item	Order no.
Bello Zon® Chlorite 10 l	1026422
Bello Zon® Chlorite 25 l	1027595
Bello Zon® Chlorite 200 l	950136

3

# 3 Bello Zon® Chlorine Dioxide Systems

## 3.12 Safety Accessories and Analysis

### Gas Warning Device GMA 36 – chlorine dioxide

The gas warning device GMA 36 for chlorine dioxide is designed as a compact measuring and switching unit for monitoring the surrounding air for dangerous concentrations of chlorine dioxide.



pk\_7\_004\_1  
Gas warning devices GMA 36

#### Technical Data

<b>Type</b>	Chlorine dioxide
<b>Warning at approx.</b>	0.1 ppm/vol%
<b>Alarm at approx.</b>	0.3 ppm/vol%
<b>Permissible ambient temperature</b>	-15...45°C
<b>Protection class housing</b>	IP 54
<b>Dimensions (without PGs, without sensor) H x W x D</b>	247 x 135 x 95 mm
<b>Supply</b>	85 – 264 / 50 – 60 V/Hz
<b>Power consumption</b>	5 W
<b>Warm-up phase max.</b>	150 s
<b>"Warning" relay contact, self-resetting</b>	230 / 1 V/A
<b>"Alarm" relay contact, latching</b>	230 / 1 V/A
<b>"Horn" relay contact, latching, can be acknowledged</b>	230 / 1 V/A
<b>Sensor measuring principle</b>	Electrochemical
<b>Sensor service life (depending on environmental cond.)</b>	2–3 years

**Note:** The sensor responds to all oxidising gases

	<b>Order no.</b>
<b>Gas warning device GMA 36 – chlorine dioxide</b>	1023156

#### Spare Parts

	<b>Order no.</b>
<b>Replacement sensor</b> For chlorine, chlorine dioxide, ozone	1023314
<b>Replacement sensor</b> For gas warning devices in the Life CGM range	1003009

#### Warning Label for Chlorine Dioxide System

Soft PVC film, yellow/black, 300 x 200 mm, self-adhesive.

<b>Text</b>	<b>Language</b>	<b>Order no.</b>
<b>"Behälter und Geräte nicht wechselweise benutzen"</b>	German	607320
<b>"Never mix up chemical containers"</b>	English	607318
<b>"Non usare serbatoi e apparecchi alternativamente"</b>	Italian	791886

#### Warning Label for Chlorine Dioxide Room

PVC film yellow/black, 200 x 80 mm

<b>Text</b>	<b>Language</b>	<b>Order no.</b>
<b>"Zutritt nur für unterwiesene Personen"</b>	German	607322
<b>"Entry for authorised persons only"</b>	English	607319
<b>"Vietato l'accesso ai non addetti ai lavori"</b>	Italian	791885

### 3 Bello Zon® Chlorine Dioxide Systems

#### Acid Fume Separator

Acid vapour separator, filled with acid-binding granules for the absorption of hydrochloric acid vapours.

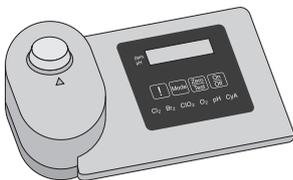
	Order no.
Acid vapour separator CDKa 0.7 l	1009987
Acid vapour separator CDKc 0.13 l	1034692
Spare back of binder 0.15 l CDKc	1035854
Spare back of binder 0.7 l CDKa	1010500

#### Photometers DT1, DT2 and DT4

- Portable, compact photometer
- Simple operation with text support
- Safe, simple measurement of chlorine, chlorine dioxide, fluoride, chlorite, H<sub>2</sub>O<sub>2</sub>, bromine, ozone, pH and cyanuric acid
- Calibratable

#### Technical Data

<b>Measuring ranges of the DT1B</b>	0.05 ... 6.0 mg/l free chlorine (DPD1) +total chlorine (DPD1+3) 5 ... 200 mg/l free chlorine (high range) 0.1 ... 13.0 mg/l bromine (DPD1) 0.05 ... 11 mg/l chlorine dioxide (DPD1) 0.03 ... 4.0 mg/l ozone (DPD4) 6.5 ... 8.4 pH (phenol red) 1 ... 80 mg/l cyanuric acid
<b>Measuring ranges of the DT2C</b>	0.05 ... 2.0 mg/l fluoride 0.05 ... 6.0 mg/l free chlorine and total chlorine 0.05 ... 11.0 mg/l chlorine dioxide
<b>DT4 ranges</b>	0.03 ... 2.5 mg/l chlorite 0.05 ... 11 mg/l chlorine dioxide 0.05 ... 6 mg/l chlorine
<b>Measuring tolerance</b>	Dependent upon measured value and measuring method
<b>Battery</b>	4 AA/LR6 batteries
<b>Permissible ambient temperature</b>	5...40 °C
<b>Relative humidity</b>	30 ... 90% (non-condensing)
<b>Material</b>	Housing material: ABS Keypad: Polycarbonate
<b>Dimensions L x W x H (mm)</b>	190 x 110 x 55
<b>Weight</b>	0.4 kg



P\_DT\_0074\_SW  
Photometer

		Order no.
<b>Photometer DT1B</b>	Complete with carrying case	1039315
<b>Photometer DT2C</b>	Complete with carrying case	1039316
<b>Photometer DT4B</b>	Complete with carrying case	1039318

The standard delivery package for the photometers includes accessories, cuvettes and reagents

#### Messkoffer für Chlordioxid-Zehrungsversuche

The case contains the equipment needed for a ClO<sub>2</sub> depletion test. A photometer and the starting chemicals are also needed.

**Important: Only allow trained personnel to use the case!**

	Order no.
<b>Measuring case</b>	1042890

### 3 Bello Zon® Chlorine Dioxide Systems

#### Consumables for Analysis

	<b>Order no.</b>
DPD 1 buffer, 15 ml	1002857
DPD 1 reagent, 15 ml	1002858
DPD 3 solution, 15 ml	1002859
Phenol red tablets R 175 (100 in each)	305532
Cyanuric acid tablets (100 in each)	1039744
SPADNS reagent, 250 ml for fluoride detection	1010381
Calibration standard fluoride 1 mg/l, for calibration of the photometer during fluoride determination	1010382
3 spare cells: round cells with covers for DPD phenol red and cyanuric acid detection (DT1 and DT2B)	1007566
3 spare cells for fluoride detection (DT2A and B)	1010396
DPD reagent set, 15 ml each: 3 x DPD 1 buffer, 1 x DPD 1 reagent, 2 x DPD 3 solution	1007567
Chlorine dioxide tablets no. 1	1039732
Chlorine dioxide tablets no. 2	1039733
Chlorine HR tablets (100 off)	Tabletten_Chlor
ACIDIFYING tablets (100 no.)	Tabletten_AC

DPD reagents for measurement of excess chlorine, ozone or chlorine dioxide in the water, in conjunction with a Lovibond comparator.

	<b>Amount</b>	<b>Order no.</b>
DPD tablets no. 1	100	501319
DPD tablets no. 2	100	501320
DPD tablets no. 3	100	501321
DPD tablets no. 4	100	501322



## 4 Electrolysis Systems CHLORINSITU® and DULCO® Lyse

### 4.1

#### Electrolysis Systems CHLORINSITU®

Chlorine and sodium hydroxide are produced in-situ in electrolysis by passing an electric current through salt water.

In **open or tubular cell electrolysis** (type CHLORINSITU® II), the electrochemical reaction takes place in a flow chamber, so that the freshly produced active chlorine immediately reacts with the sodium hydroxide to form sodium hypochlorite. A saturated brine is used as a salt solution, which is produced in a separate salt dissolving tank from salt of a defined quality. The advantage of tubular cell electrolysis lies in the simple construction of the equipment, its ease of maintenance and low investment compared with **diaphragm electrolysis systems**. The disadvantage is the relatively poor output (50%) of brine, higher entrainment of chloride into the water to be treated, higher power consumption and relatively low chlorine concentrations (5 g/l FAC) in the end product.

In **diaphragm electrolysis**, the electrochemical reaction takes place in two electrode chambers separated by a diaphragm, so that the formation of the freshly produced active chlorine and sodium hydroxide is physically separated. Systems of type CHLORINSITU® III and CHLORINSITU® III Compact bring the reaction mixtures of both electrode chambers together again after the electrochemical reaction to produce a stock solution of sodium hypochlorite (25 g/l FAC), which can be stored temporarily and metered as needed.

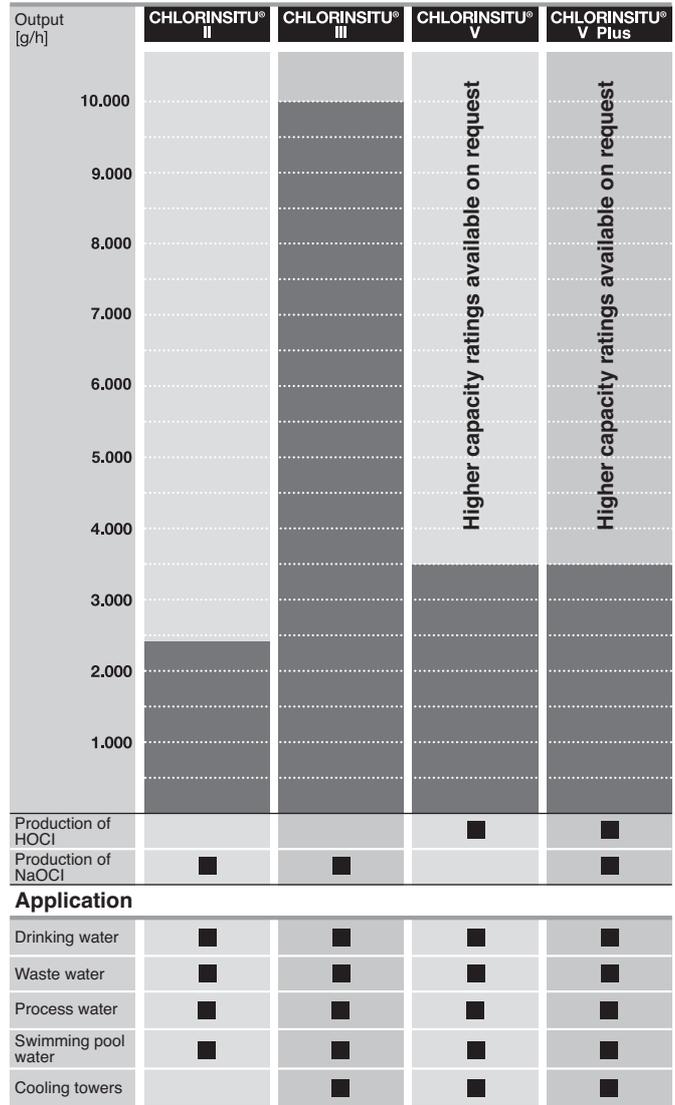
With systems of type CHLORINSITU® IV Compact and CHLORINSITU®, the highly pure active chlorine is fed into the water to be treated through an injector and under constant vacuum, where it dissolves as hypochlorous acid. In systems of type CHLORINSITU® V plus, any excess active chlorine gas produced is combined with the sodium hydroxide, as in the CHLORINSITU® III system, to form sodium hypochlorite and is then stored temporarily. The systems therefore only need to be designed for average chlorine demand, as peaks of capacity can be compensated for from the sodium hypochlorite temporary storage tank. In all systems of types CHLORINSITU® IV Compact, CHLORINSITU® V and CHLORINSITU® V Plus, the sodium hydroxide produced during electrolysis is stored temporarily and metered in, as required, to correct the pH value.

The advantage of diaphragm systems lies in their excellent efficiency (85% brine output) and minimal entrainment of chloride compared with open tubular cell systems. With systems of type CHLORINSITU® V and CHLORINSITU® V Plus, the entrainment of chloride and chlorate from the electrolysis cell into the water to be treated can be avoided completely. In diaphragm cell electrolysis system for producing sodium hypochlorite, the higher output results in solutions with a significantly higher chlorine content than is the case with tubular cell electrolysis.

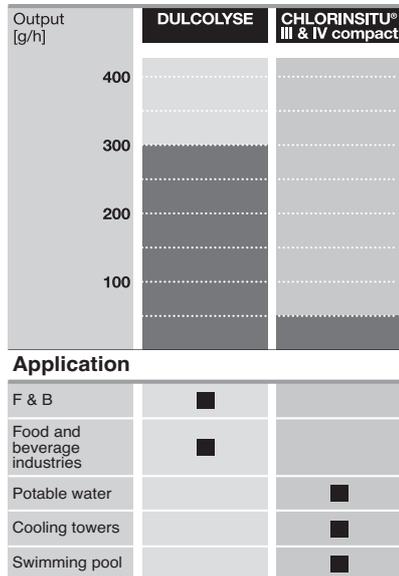
- Disinfection from natural sodium chloride
- No handling of hazardous chemicals
- Economical method thanks to low salt and energy consumption
- Ultra-pure active chlorine thanks to production in-situ and short temporary storage periods
- The fresh active chlorine is generated under a constant vacuum, absolutely reliably and with maximum operating safety, thanks to the units being designed as vacuum systems
- Chlorine generation and pH correction with one system (CHLORINSITU® IV Compact, CHLORINSITU® V and CHLORINSITU® V Plus)
- The extremely pure active chlorine is produced to meet demand and is available at atmospheric pressure
- Improved working conditions for operating personnel
- No risk of confusing dangerous chemical tanks

# 4 Electrolysis Systems CHLORINSITU<sup>®</sup> and DULCO<sup>®</sup>Lyse

## 4.2 Performance Overview



P\_PMA\_EL\_0008\_SW



P\_PMA\_EL\_0035\_SW

**Note: larger systems available on request**

# 4 Electrolysis Systems CHLORINSITU® and DULCO®Lyse

## 4.3 Questionnaire on the Design of an Electrolysis System

**Use of the electrolysis plant:**

- for disinfection of
  - Drinking water
  - Industrial water
  - Cooling water
  - Swimming pool water
  - \_\_\_\_\_

**Water values:**

- |                                 |                                   |   |  |
|---------------------------------|-----------------------------------|---|--|
| Max. water flow rate            | _____ m <sup>3</sup> /h           | Maximum water pressure                    | _____ bar  |
| Water flow rate                 | <input type="checkbox"/> constant | <input type="checkbox"/> fluctuating from | _____ m <sup>3</sup> /h to _____ m <sup>3</sup> /h |
| pH value                        | _____                             | Iron (Fe <sup>2+</sup> )                  | _____ mg/l   |
| Temperature                     | _____ °C                          | Manganese (Mn <sup>2+</sup> )             | _____ mg/l   |
| Solid fraction                  | _____ mg/l                        | Nitrite (NO <sub>2</sub> <sup>-</sup> )   | _____ mg/l   |
| Acid capacity K <sub>S4,3</sub> | _____ mmol/l                      | Sulphide (S <sup>2-</sup> )               | _____ mg/l   |
| Total hardness                  | _____ mmol/l                      | TOC (total organic carbon)                | _____ mg/l   |
| Total hardness                  | _____ °dH                         | Ammonia                                   | _____ mg/l   |

**Response time to application:**

\_\_\_\_\_ m<sup>3</sup> volume reaction tank or \_\_\_\_\_ minutes residence time in entire system.

**Type of metering:**

- constant
- flow-proportional
- depending on measured value

**Desired dosing rate:** \_\_\_\_\_ mg/l

**Disinfection method used up to now:**

\_\_\_\_\_

Consumption of disinfectant up to now: \_\_\_\_\_ kg/week

**Other requirements:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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# 4 Electrolysis Systems CHLORINSITU® and DULCO®Lyse

## 4.4 Electrolysis System CHLORINSITU® II

### Output of 50 – 2,400 g sodium hypochlorite per hour



Electrolysis system CHLORINSITU® II: Robust, safe and economical system for areas where carry-over of sodium chloride into the water being treated is not a problem.

Electrolysis systems of the type CHLORINSITU® II generate sodium hypochlorite with a concentration of 5 g/l. A saturated solution of sodium chloride is produced in a salt dissolving tank, included in the scope of delivery for this purpose, which, after appropriate dilution, is electrolysed in an open tubular cell. The resulting solution is collected in a storage tank and, from there, metered according to requirements using separate metering pumps. Due to its moderate pH value of 8.5 – 9, it affects the pH of the treated water significantly less than if conventional sodium hypochlorite with a pH of 12 – 13.5 were used. Much less acid is used to adjust the pH value, enabling savings of up to 80%. The hydrogen always produced during electrolysis is diluted with fresh air through an ATEX 95-approved fan and discharged safely. Both the salt-dissolving and diluting water comes from a softener unit integrated in the system, preventing the formation of lime deposits and ensuring the long service life of the electrolytic cell. There is therefore no need for acid purification. Electrolysis systems of type CHLORINSITU® II are especially suitable for applications where a robust and clearly laid out technology is required and where the entrainment of residual sodium chloride into the water being treated is not a problem.

### Your benefits

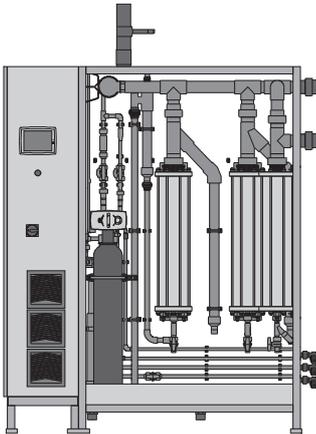
- Robust, simple technology
- Safe system control with remote diagnosis by Remote Control Engineer
- Cost-effective operation thanks to the use of sodium chloride as an inexpensive raw material and lower chemical consumption for pH adjustment
- Compact, space-saving design
- Improved working conditions for operating personnel
- No risk of confusing dangerous chemical tanks

### Technical details

- Modern PLC with large illuminated display
- Integrated Remote Control Engineer for remote diagnosis and troubleshooting

### Field of application

- Potable water
- Waste water
- Process water
- Swimming pool water



P\_PMA\_EL\_0003\_SW

4

# 4 Electrolysis Systems CHLORINSITU® and DULCO®Lyse

## Technical Data

Power supply 1 x 230 V (50 – 150 g/h) (VAC/1P/N/PE/50 Hz)

Power supply 3 x 400 V (> 200 g/h) (VAC/3P/N/PE/50 Hz)

Type/output	Fuse	Power uptake	Max. salt consumption	Max. consumption of process water	Product outlet H	Dimensions L x W x H (mm)	Brine tank	Recommended capacity storage tank
g/h	A	kW	kg/d	l/h	mm		l	l
50	16	0.78	4	10	1,188	1,050 x 600 x 1,550	130	300
100	16	1.15	8	20	1,589	1,250 x 600 x 2,000	130	500
150	16	1.53	12	30	1,589	1,250 x 600 x 2,000	200	700
200	3 x 16	1.90	16	40	1,589	1,250 x 600 x 2,000	200	1,000
300	3 x 16	2.65	24	60	1,589	1,250 x 600 x 2,000	200	1,500
400	3 x 16	3.40	32	80	1,589	1,250 x 600 x 2,000	200	2,000
500	3 x 20	4.15	40	100	1,589	1,250 x 600 x 2,000	380	2,500
600	3 x 25	4.90	48	120	1,589	1,250 x 600 x 2,000	380	3,000
800	3 x 35	6.40	65	160	1,589	1,250 x 600 x 2,000	380	3,500
1,000	3 x 35	7.90	80	200	1,589	1,250 x 600 x 2,000	520	4,500
1,200	3 x 50	9.40	95	240	1,589	1,250 x 600 x 2,000	520	5,500
1,400	3 x 50	10.90	110	280	1,589	1,250 x 600 x 2,000	520	6,000
1,600	3 x 63	12.40	130	320	1,589	1,250 x 600 x 2,000	760	7,000
1,800	3 x 63	13.90	155	360	1,589	1,650 x 600 x 2,000	760	8,000
2,000	3 x 63	15.40	175	400	1,589	1,650 x 600 x 2,000	760	9,000
2,200	3 x 80	16.90	190	440	1,589	1,650 x 600 x 2,000	760	10,000
2,400	3 x 80	18.40	210	480	1,589	1,650 x 600 x 2,000	760	11,000

### Scope of delivery:

Electrolysis systems of type Chlorinsitu® II are mounted ready-wired with a PLC on a powder-coated stainless steel frame in the control cabinet. They include a Remote Control Engineer for remote diagnosis and troubleshooting, integrated water softener system, open tubular cells, ATEX 95-compliant bleed system and separate salt dissolving tanks and level monitoring unit. The system also includes liquid level sensors for monitoring the storage tank to be set up on site for sodium-calcium hypochlorite. A duplex water softener is fitted as standard for systems producing more than 1,800 g/h. Automatic monitoring of water hardness downstream of the softening system can be offered as an option.

### Note:

Electrolysis systems of type CHLORINSITU® II, III, V and V Plus are offered and planned to meet customer specifications. This is true both for the system documentation and the subsequent supply of spare parts and maintenance.

## 4 Electrolysis Systems CHLORINSITU® and DULCO®Lyse

### 4.5 Electrolysis System CHLORINSITU® III



#### Output of 100 – 10,000 g sodium hypochlorite per hour

Need sodium hypochlorite that is high-purity or low-chloride and low-chlorate? The electrolysis system CHLORINSITU® III is the solution. Can be used for potable water, waste water, process water, swimming pool water and in cooling towers.

Electrolysis systems of type CHLORINSITU® III generate sodium hypochlorite with a higher concentration of approximately 25 g/l with minimal entrainment of sodium chloride (85% output) from the diaphragm cell into the finished product. A saturated solution of sodium chloride is produced in a salt dissolving tank, included in the scope of delivery, and this solution is then electrolysed in a diaphragm cell. Sodium hydroxide and hydrogen are produced in the cathode chamber while ultra-pure active chlorine and a diluted residual brine are produced in the anode chamber, separated by the diaphragm from the cathode chamber. The resulting active chlorine is bound to the sodium hydroxide through an injector under a constant vacuum and is collected as sodium hypochlorite in a storage tank. The vacuum is kept constant by a frequency-controlled circulation pump. This creates less mechanical stress on the diaphragm in the electrolysis cell and in other parts of the system. The complete sodium hypochlorite solution can be metered, as required, by separate metering pumps. Due to its moderate pH value of 9.5 – 10, it affects the pH of the treated water significantly less than if conventional sodium-calcium hypochlorite with a pH of 12 – 13.5 were used. Much less acid is used to adjust the pH value, enabling savings of up to 70%. The hydrogen always produced during electrolysis is diluted with fresh air through an ATEX 95-approved fan and discharged safely. The salt-dissolving water comes from a softener integrated in the system, thereby preventing the formation of lime deposits and ensuring the long service life of the diaphragm cell. The efficiency of the electrolysis is constantly monitored by various flow meters, the addition of water depending on the sodium hydroxide production and a dynamic level control in the storage tanks.

#### Your benefits

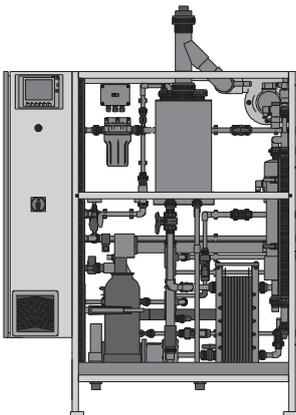
- Sodium hypochlorite solution low in chloride and chlorate with a high chlorine concentration (25 g/l FAC)
- Minimal acid consumption for pH correction, making savings of up to 70 % possible
- Safe system control with remote diagnosis by Remote Control Engineer
- Excellent service life of the diaphragm cells, thanks to constant vacuum
- A frequency-controlled circulation pump maintains the vacuum constant in the enclosed anode area
- Maximum operating safety due to their design as negative pressure systems
- Dynamic level control in the storage tank ensures optimised chlorine production
- Active process control of production by largely internal measuring and control technology
- Cost-effective operation thanks to the use of sodium chloride as an inexpensive raw material and lower chemical consumption for pH adjustment
- Robust, simple technology
- Compact, space-saving design

#### Technical details

- Modern PLC with large illuminated display
- Integrated Remote Control Engineer for remote diagnosis and troubleshooting
- Storage tank for multiple points of injection

#### Field of application

- Potable water
- Waste water
- Process water
- Swimming pool water
- Cooling tower



P\_PMA\_EL\_0004\_SW

# 4 Electrolysis Systems CHLORINSITU® and DULCO®Lyse

## Technical Data

Power supply 3 x 400 V (VAC/3P/N/PE/50 Hz)

Type/ output	Fuse	Power uptake	Max. salt consumption	Max. consumption of process water	Max. consumption of cooling water	Dimensions L x W x H (mm)	Brine tank	Recommended capacity storage tank
g/h	A	kW	kg/d	l/h	l/h		l	l
100	3 x 16	1.10	5	4	80	1,250 x 600 x 1,550	130	200
200	3 x 16	1.50	10	8	80	1,250 x 600 x 1,550	130	300
300	3 x 16	1.90	15	12	100	1,250 x 600 x 1,550	200	400
400	3 x 16	2.30	20	16	100	1,250 x 600 x 1,550	200	500
500	3 x 16	2.70	25	20	125	1,250 x 600 x 1,550	200	600
600	3 x 20	3.10	30	24	125	1,650 x 600 x 2,000	380	700
750	3 x 25	3.70	35	30	150	1,650 x 600 x 2,000	380	800
1,000	3 x 25	4.70	50	40	150	1,650 x 600 x 2,000	380	1,200
1,250	3 x 35	5.70	60	50	150	1,650 x 600 x 2,000	380	1,500
1,500	3 x 35	6.70	70	60	180	1,650 x 600 x 2,000	380	1,700
1,750	3 x 35	7.70	80	70	180	1,650 x 600 x 2,000	380	2,000
2,000	3 x 50	8.70	100	80	200	1,750 x 1,200 x 2,000	520	2,200
2,500	3 x 63	10.70	125	100	250	1,750 x 1,200 x 2,000	520	3,000
3,000	3 x 63	12.70	150	120	300	1,750 x 1,200 x 2,000	520	3,300
3,500	3 x 80	14.70	175	140	350	1,750 x 1,200 x 2,000	520	4,000
5,000	3 x 90	20.70	250	200	500	3,100 x 1,800 x 2,070	1,180	5,800
7,000	3 x 100	29.40	350	280	700	3,100 x 1,800 x 2,070	1,180	6,000
8,500	3 x 130	35.70	425	340	850	4,300 x 1,800 x 2,070	1,180	7,500
10,000	3 x 160	40.70	500	400	1,000	4,300 x 1,800 x 2,070	1,180	11,000

### Scope of delivery:

Electrolysis systems of type Chlorinsitu® III are mounted ready-wired with a PLC on a powder-coated stainless steel frame in the control cabinet. They include a Remote Control Engineer for remote diagnosis and troubleshooting, integrated water softener system, diaphragm electrolysis cells, ATEX 95-compliant bleed system and separate salt dissolving tanks and level monitoring unit. Dynamic level control to monitor the storage tank to be provided on site for sodium hypochlorite. A chlorine gas warning unit and automatic monitoring of water hardness downstream of the softening system come as standard with systems producing more than 600 g/h.

### Note:

Electrolysis systems of type CHLORINSITU® II, III, V and V Plus are offered and planned to meet customer specifications. This is true both for the system documentation and the subsequent supply of spare parts and maintenance.

# 4 Electrolysis Systems CHLORINSITU® and DULCO®Lyse

## 4.6 Electrolysis Systems CHLORINSITU® III Compact and IV Compact

### 4.6.1 Electrolysis System CHLORINSITU® III Compact



**Output of 25 – 50 g sodium hypochlorite per hour**

Generation of sodium hypochlorite in smaller amounts for smaller swimming pools: Electrolysis system CHLORINSITU® III Compact.

Electrolysis systems of type CHLORINSITU® III Compact produce a disinfectant based on active chlorine. A saturated solution of sodium chloride is produced in a salt dissolving tank, included in the scope of delivery, and this solution is then electrolysed in a diaphragm cell. Sodium hydroxide and hydrogen are produced in the cathode chamber while ultra-pure active chlorine and a diluted residual brine are produced in the anode chamber, separated by the diaphragm from the cathode chamber. The active chlorine produced reacts in the reactor with the sodium hydroxide to form sodium hypochlorite with a concentration of approx. 25 g/l FAC. The hydrogen generated is discharged to the fresh air through a bleed line. The salt-dissolving water comes from a softener integrated in the system, thereby preventing the formation of lime deposits and ensuring the long service life of the electrolytic cell. Electrolysis systems of type CHLORINSITU® III Compact are especially suitable for use with smaller swimming pools in residential properties and hotels (indoor pools with a total circulation capacity of up to 40 m<sup>3</sup>/hour, chlorinated in accordance with the DIN standard).

**Your benefits**

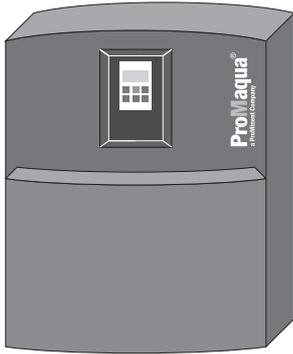
- Sodium hypochlorite solution low in chloride and chlorate with a high chlorine concentration (25 g/l FAC)
- Minimal acid consumption for pH correction, making savings of up to 70 % possible
- Cost-effective operation thanks to the use of sodium chloride as an inexpensive raw material and minimal chemical consumption for pH adjustment
- Robust, simple technology
- Compact space-saving design, ready mounted on a wall panel

**Technical details**

- The integrated microprocessor controller digitally indicates the current output and monitors all key functions.
- All operating and error messages are shown in plain text on the clear display.
- The output can be controlled manually, automatically (controller option) or externally.
- Optional integrated chlorine and pH control

**Field of application**

- Swimming pool
- Potable water
- Cooling tower



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**Technical Data**

Power supply 1 x 230 Volt (VAC/1P/N/PE/50 Hz)

Type/ output	Power uptake	Max. salt consumption	Max. consumption of process water	Dimensions L x W x H (mm)	Brine tank
g/h	kW	g/h	l/h		l
25	0.11	65	1.5	590 x 355 x 650	130
50	0.22	130	3	590 x 355 x 650	130

## 4 Electrolysis Systems CHLORINSITU® and DULCO® Lyse

### Scope of delivery:

Electrolysis systems of type CHLORINSITU® III Compact are ready mounted and wired for use on a wall panel. Chlorine electrolysis system with integrated microprocessor control and softener system. They include a diaphragm electrolysis cell, separate salt dissolving tank with level monitor and a level control for a storage tank (tank not included with the scope of delivery). A storage tank is also required as well as a metering pump for each point of injection (pump not included in the scope of delivery). Only a chlorine and pH control can be integrated as an option. The measuring and control technology then has to be offered separately for several pools.

	Order no.
CHLORINSITU® III Compact 25	1041399
CHLORINSITU® III Compact 50	1041401
CHLORINSITU® III Compact 25 with integrated chlorine and pH controller	1041400
CHLORINSITU® III Compact 50 with integrated chlorine and pH controller	1041402

### Spare parts and maintenance kits

**Important note:** Both the sensors and the metering pump(s) have to be maintained on systems with pH and/or chlorine control.

	Type	Order no.
Annual maintenance set	CHLORINSITU® III Compact 25	1041407
Annual maintenance set	CHLORINSITU® III Compact 50	1041409
3-yearly maintenance set	CHLORINSITU® III Compact 25	1041408
3-yearly maintenance set	CHLORINSITU® III Compact 50	1041410
Membrane cell	CHLORINSITU® III Compact 25	1041419
Membrane cell	CHLORINSITU® III Compact 50	1041420
Spare parts kit	CHLORINSITU® III Compact 25/50	1045233

# 4 Electrolysis Systems CHLORINSITU® and DULCO®Lyse

## 4.6.2

### Electrolysis System CHLORINSITU® IV Compact

Output of 25 – 50 g ultra-pure active chlorine per hour



Generate ultra-pure chlorine gas using the vacuum method with electrolysis system CHLORINSITU® IV Compact. Cost-effective, robust and compact.

Electrolysis systems of type CHLORINSITU® IV Compact generate ultra-pure active chlorine in a vacuum process. A saturated solution of sodium chloride is produced in a salt dissolving tank, included in the scope of delivery, and this solution is then electrolysed in a diaphragm cell. Sodium hydroxide and hydrogen are produced in the cathode chamber while ultra-pure active chlorine and dilute residual brine are produced in the anode chamber, separated by the diaphragm from the cathode chamber. The resulting active chlorine is suctioned off through an injector integrated in the system and dissolved as hypochlorous acid in the water being treated. The hydrogen generated is discharged to the fresh air through a bleed line. The sodium hydroxide is disposed of or optionally used by a metering pump integrated in the system to correct the pH of the water being treated. The salt dissolving water comes from a softener integrated in the system, thereby preventing the formation of lime deposits and ensuring the long service life of the electrolytic cell. Electrolysis systems of type CHLORINSITU® IV Compact are especially suitable for use with smaller swimming pools in residential properties and hotels (indoor pools with a total circulation capacity of up to 25 m<sup>3</sup>/hour, chlorinated in accordance with the DIN standard).

#### Your benefits

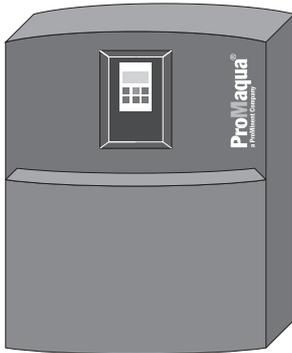
- Chlorination and pH value adjustment in a single system
- Production and metering of ultra-pure hypochlorous acid
- Cost-effective operation thanks to the use of sodium chloride as an inexpensive raw material and no consumption of chemicals for pH correction
- Safe vacuum system technology
- Robust, simple technology
- Compact space-saving design, ready mounted on a wall panel

#### Technical details

- The integrated microprocessor controller digitally indicates the current output and monitors all key functions.
- All operating and error messages are shown in plain text on the clear display.
- The output can be controlled manually, automatically (controller option) or externally.
- Optional integrated chlorine and pH control

#### Field of application

- Swimming pool
- Potable water
- Cooling tower



P\_PMA\_EL\_0007\_SW

#### Technical Data

Power supply 1 x 230 Volt (VAC/1P/N/PE/50 Hz)

Type/ output g/h	Power uptake kW	Max. salt consumption g/h	Max. consumption of process water l/h	Dimensions L x W x H (mm)	Brine tank l
25	0.11	65	1.5	590 x 355 x 650	130
50	0.22	130	3	590 x 355 x 650	130

# 4 Electrolysis Systems CHLORINSITU® and DULCO®Lyse

## Scope of delivery:

Electrolysis systems of type CHLORINSITU® IV Compact are ready mounted and wired for use on a wall panel. Chlorine electrolysis system with integrated microprocessor control and water softening system, diaphragm electrolysis cell with negative pressure monitoring, separate salt dissolving tanks with level control, integrated injector and integral feeder assembly for sodium hydroxide (optional). A booster pump is also needed (not included in the scope of delivery) for the single possible point of injection. A chlorine and pH control can be integrated as an option. Several pools cannot be fed from one Chlorinsitu® IV Compact system.

	<b>Order no.</b>
<b>CHLORINSITU® IV Compact 25</b>	1036461
<b>CHLORINSITU® IV compact 25 with pH correction</b>	1036462
<b>CHLORINSITU® IV Compact 25 with integrated chlorine and pH controller</b>	1041405
<b>CHLORINSITU® IV Compact 25 with integral pH and chlorine controller and pH correction</b>	1041403
<b>CHLORINSITU® IV Compact 50</b>	1036463
<b>CHLORINSITU® IV Compact 50 with pH correction</b>	1036464
<b>CHLORINSITU® IV Compact 50 with integrated chlorine and pH controller</b>	1041406
<b>CHLORINSITU® IV Compact 50 with integral pH and chlorine controller and pH correction</b>	1041404

## Spare parts and maintenance kits

**Important note:** Both the sensors and the metering pump(s) have to be maintained on systems with pH and/or chlorine control.

	<b>Type</b>	<b>Order no.</b>
<b>Annual maintenance set</b>	CHLORINSITU® IV Compact 25	1041415
<b>Annual maintenance set</b>	CHLORINSITU® IV Compact 25 with pH correction	1043267
<b>Annual maintenance set</b>	CHLORINSITU® IV Compact 50	1041417
<b>Annual maintenance set</b>	CHLORINSITU® IV Compact 50 with pH correction	1043269
<b>3-yearly maintenance set</b>	CHLORINSITU® IV Compact 25	1041416
<b>3-yearly maintenance set</b>	CHLORINSITU® IV Compact 25 with pH correction	1043268
<b>3-yearly maintenance set</b>	CHLORINSITU® IV Compact 50	1041418
<b>3-yearly maintenance set</b>	CHLORINSITU® IV Compact 50 with pH correction	1043270
<b>Membrane cell</b>	CHLORINSITU® IV Compact 25	1041419
<b>Membrane cell</b>	CHLORINSITU® IV Compact 50	1041420
<b>Spare parts set</b>	CHLORINSITU® IV Compact 25/50	1045232

## 4 Electrolysis Systems CHLORINSITU<sup>®</sup> and DULCO<sup>®</sup>Lyse

### 4.7

#### Electrolysis System CHLORINSITU<sup>®</sup> V

##### Output of 100 – 3,500 g ultra-pure active chlorine per hour



Generate ultra-pure active chlorine using the vacuum method with electrolysis system CHLORINSITU<sup>®</sup> V. Suited to applications for metering hypochlorous acid and simultaneously correcting the pH value.

Electrolysis systems of type CHLORINSITU<sup>®</sup> V generate ultra-pure active chlorine in a vacuum process. A saturated solution of sodium chloride is produced in a salt dissolving tank, included in the scope of delivery, and this solution is then electrolysed in a diaphragm cell. Chloride-free sodium hydroxide and hydrogen are produced in the cathode chamber, while ultra-pure chlorine gas and dilute residual brine are produced in the anode chamber, separated by the diaphragm from the cathode chamber. The active chlorine produced is suctioned off through an injector (contained in the scope of delivery) and fully dissolved as hypochlorous acid in the water being treated (through a bypass). The superchlorinated water is then distributed throughout the various pools via one or more proportionately controllable motor driven ball valves. The vacuum is kept stable by a single frequency-controlled booster pump. This permits significant savings in terms of energy. The chloride-free sodium hydroxide is stored temporarily and can be used for pH value correction. A standard diaphragm metering pump is first used to correct the base pH (pH 6.8 – 7) of the superchlorinated water. The fine correction of the pH value is provided via additional alkali metering pumps for each circuit or point of injection. These are connected directly to the system's control through an external pH value controller. The hydrogen produced is diluted with fresh air through an ATEX 95-approved fan and discharged safely. The diluted residual brine is fully discarded. To this end, the diluted brine is strongly diluted with softened water, neutralised by the addition of sodium hydroxide and disposed of in the sewer. All residual chloride and chlorate are thus disposed of and are not mixed with the process water. Electrolysis systems of type CHLORINSITU<sup>®</sup> V can thus be compared with pure chlorine gas in terms of their oxidation strength and chloride / chlorate content in the process water. The salt-dissolving water comes from a softener integrated in the system, thereby preventing the formation of lime deposits and ensuring the long service life of the diaphragm cell. The efficiency of electrolysis is constantly monitored by various flow meters, the addition of water depending on the sodium hydroxide production and the base pH correction.

##### Your benefits

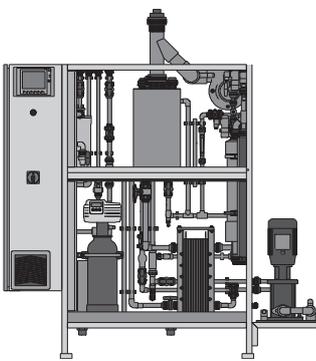
- Chlorination and pH adjustment with a single system
- Exceedingly low chloride and chlorate content
- Production and metering of ultra-pure hypochlorous acid without temporary storage
- Safe system control with remote diagnosis by Remote Control Engineer
- Excellent service life of the diaphragm cells, thanks to constant vacuum
- A frequency-controlled circulation pump maintains the vacuum constant in the enclosed anode area
- Maximum operating safety due to their design as negative pressure systems
- Active process control of production by largely internal measuring and control technology
- Cost-effective operation thanks to the use of sodium chloride as an inexpensive raw material and no consumption of chemicals for pH correction
- Complete disposal of the diluted brine, nothing is fed back into the process water being treated
- Comparable with pure chlorine gas in terms of oxidation strength and chloride / chlorate content in the process water
- Robust technology
- Compact, space-saving design

##### Technical details

- Modern PLC with large illuminated display
- Integrated Remote Control Engineer for remote diagnosis and troubleshooting
- Chlorine metering and pH value correction controlled via contact inputs
- Analogue input (optional)
- MOD bus or PROFIBUS<sup>®</sup> (optional)
- Several points of injection (optional)
- Multiple booster pumps (optional) can be used for different water qualities (e.g. brine and freshwater pools)

##### Field of application

- Potable water
- Waste water
- Process water
- Swimming pool water
- Cooling tower



P\_PMA\_EL\_0013\_SW

# 4 Electrolysis Systems CHLORINSITU® and DULCO®Lyse

## Technical Data

Power supply 3 x 400 V (VAC/3P/N/PE/50 Hz)

Type/ output	Fuse	Power uptake	Max. salt consumption	Max. consumption of process water	(External) consumption of cooling water	Dimensions L x W x H (mm)	Brine tank
g/h	A	kW	kg/d	l/h	l/h		l
100	3 x 16	1.10	5	60	–	1,655 x 600 x 1,550	130
200	3 x 16	1.50	10	60	–	1,655 x 600 x 1,550	130
300	3 x 16	1.90	15	60	–	1,655 x 600 x 1,550	200
400	3 x 16	2.30	20	60	–	1,655 x 600 x 1,550	200
500	3 x 16	2.70	25	60	–	1,655 x 600 x 1,550	200
600	3 x 20	3.10	30	90	–	1,950 x 600 x 2,000	380
750	3 x 25	3.70	35	90	–	1,950 x 600 x 2,000	380
1,000	3 x 25	4.70	50	90	–	1,950 x 600 x 2,000	380
1,250	3 x 35	5.70	60	90	–	1,950 x 600 x 2,000	380
1,500	3 x 35	6.70	70	90	–	1,950 x 600 x 2,000	380
1,750	3 x 35	7.70	80	90	–	1,950 x 600 x 2,000	380
2,000	3 x 50	8.70	100	175	200	1,750 x 1,200 x 2,000	520
2,500	3 x 63	10.70	150	175	250	1,750 x 1,200 x 2,000	520
3,000	3 x 63	12.70	175	175	300	1,750 x 1,200 x 2,000	520
3,500	3 x 80	14.70	175	175	350	1,750 x 1,200 x 2,000	520

Capacities > 3,500 g/h upon request

### Scope of delivery:

Electrolysis systems of type Chlorinsitu® V are ready mounted, wired for use, on a powder coated stainless steel frame with a Programmable Logic Controller (PLC) in the control cabinet, Remote Control Engineer for remote diagnosis and troubleshooting, integral water softening unit, diaphragm electrolysis cells, ATEX-95-compliant bleed system and separate salt dissolving tank with level monitoring. The scope of delivery also includes a frequency-controlled central injector system matched to the system to meter active chlorine and sodium hydroxide for pH correction and a single booster pump. A chlorine gas warning unit and automatic monitoring of water hardness downstream of the softening system come as standard with systems producing more than 600 g/h.

### Note:

Electrolysis systems of type CHLORINSITU® II, III, V and V Plus are offered and planned to meet customer specifications. This is true both for the system documentation and the subsequent supply of spare parts and maintenance.

## 4 Electrolysis Systems CHLORINSITU® and DULCO®Lyse

4.8

### Electrolysis System CHLORINSITU® V Plus

**Capacity 100 – 3,500 g of ultra-pure active chlorine per hour**



Generation of active chlorine in combination with a sodium hypochlorite solution using the vacuum process with the electrolysis system CHLORINSITU® V Plus. Chlorination and pH value adjustment from a single system.

Electrolysis systems of type CHLORINSITU® V Plus generate ultra-pure active chlorine combined with a sodium hypochlorite solution in a vacuum process. A saturated solution of sodium chloride is produced in a salt dissolving tank, included in the scope of delivery, and this solution is then electrolysed in a diaphragm cell. Chloride-free sodium hydroxide and hydrogen are produced in the cathode chamber, while ultra-pure active chlorine and diluted residual brine are produced in the anode chamber, separated by the diaphragm from the cathode chamber. The resulting ultra-pure active chlorine is further processed in two ways. Firstly, it is suctioned off through an injector (included in the scope of delivery) and fully dissolved as hypochlorous acid in the water being treated (through a bypass). The superchlorinated water is then distributed throughout the various pools via one or more proportionately controllable motor driven ball valves. The vacuum is kept stable by a single frequency-controlled booster pump. This permits significant savings in terms of energy. If the complete production output is not needed, excess active chlorine can also be combined with the sodium hydroxide produced and then temporarily stored as sodium hypochlorite. Consequently, the system does not have to be dimensioned according to the maximum active chlorine demand but can be aligned to the average daily demand. Peaks in demand are met by the additional metering of sodium hypochlorite from the temporary storage, which, as with hypochlorous acid, is fed through a central injector system.

The chloride-free sodium hydroxide is stored temporarily and can be used for pH value correction. First the base pH (pH 6.8 – 7) of the superchlorinated water is corrected by a standard diaphragm metering pump or through the addition of sodium hypochlorite. Fine correction of the pH value is achieved by additional alkali metering pumps for each circuit or point of injection. These are connected directly to the system's control through an external pH value controller. The hydrogen produced is diluted with fresh air through an ATEX 95-approved fan and discharged safely. The diluted residual brine is fully discarded. To this end, the diluted brine is strongly diluted with softened water, neutralised by the addition of sodium hydroxide and disposed of in the sewer. Any residual chloride and chlorate are thus disposed of and are not mixed with the process water. Electrolysis systems of type Chlorinsitu® V Plus can thus be compared with pure chlorine gas in terms of their oxidation strength and chloride / chlorate content in the process water. The salt-dissolving water comes from a softener integrated in the system, thereby preventing the formation of lime deposits and ensuring the long service life of the diaphragm cell. The efficiency of the electrolysis is constantly monitored by various flow meters, the addition of water depending on the sodium hydroxide production and the base pH correction.

#### Your benefits

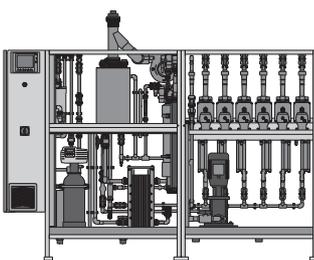
- Chlorination and pH adjustment with a single system
- Exceedingly low chloride and chlorate content
- Reservoir of sodium hypochlorite solution to cover peak demand
- Production and metering of ultra-pure hypochlorous acid combined with sodium hypochlorite production
- Excellent service life of the diaphragm cells, thanks to constant vacuum
- Maximum operating safety due to their design as negative pressure systems
- Active process control of production by largely internal measuring and control technology
- Cost-effective operation thanks to the use of sodium chloride as an inexpensive raw material and low consumption of chemicals for pH correction
- Robust technology
- Compact, space-saving design

#### Technical details

- Modern PLC with large illuminated display
- Integrated Remote Control Engineer for remote diagnosis and troubleshooting
- Chlorine metering and pH value correction controlled via contact inputs
- Simultaneous production and metering of ultra-pure hypochlorous acid and sodium-calcium hypochlorite (optional)
- Analogue input (optional)
- MOD bus or PROFIBUS® (optional)
- Several points of injection (optional)
- Multiple booster pumps (optional) can be used for different water qualities (e.g. brine and freshwater pools)

#### Field of application

- Potable water
- Waste water
- Process water
- Swimming pool water
- Cooling tower



P\_PMA\_EL\_0012\_SW

4

# 4 Electrolysis Systems CHLORINSITU® and DULCO®Lyse

## Technical Data

Power supply 3 x 400 V (VAC/3P/N/PE/50 Hz)

Type/ output	Fuse	Power uptake	Max. salt consumption	Max. consumption of process water*	(External) consumption of cooling water	Dimensions L x W x H (mm)	Brine tank	Recommended capacity storage tank
g/h	A	kW	kg/d	l/h	l/h		l	l
100	3 x 16	1.10	5	60	–	1,655 x 600 x 1,550	130	50
200	3 x 16	1.50	10	60	–	1,655 x 600 x 1,550	130	100
300	3 x 16	1.90	15	60	–	1,655 x 600 x 1,550	200	150
400	3 x 16	2.30	20	60	–	1,655 x 600 x 1,550	200	200
500	3 x 16	2.70	25	60	–	1,655 x 600 x 2,000	200	250
600	3 x 20	3.10	30	90	–	1,950 x 600 x 2,000	380	300
750	3 x 25	3.70	40	90	–	1,950 x 600 x 2,000	380	400
1,000	3 x 25	4.70	55	90	–	1,950 x 600 x 2,000	380	500
1,250	3 x 35	5.70	60	90	–	1,950 x 600 x 2,000	380	600
1,500	3 x 35	6.70	75	90	–	1,950 x 600 x 2,000	380	750
1,750	3 x 35	7.70	85	90	–	1,950 x 600 x 2,000	380	850
2,000	3 x 50	8.70	100	175	200	1,750 x 1,200 x 2,000	520	1,000
2,500	3 x 63	10.70	125	175	250	1,750 x 1,200 x 2,000	520	1,250
3,000	3 x 63	12.70	150	175	300	1,750 x 1,200 x 2,000	520	1,500
3,500	3 x 80	14.70	175	175	350	1,750 x 1,200 x 2,000	520	1,750

\* The consumption of process water depends on the ratio of chlorine gas to stock production. The value is given here for a ratio of 70% : 30 %.

Capacities > 3,500 g/h upon request

### Scope of delivery:

Electrolysis systems of type Chlorinsitu® V Plus are ready mounted, wired for use, on a powder-coated stainless steel frame with a PLC Programmable Logic Controller in the control cabinet, Remote Control Engineer for remote diagnosis and troubleshooting, integral water softening unit, diaphragm electrolysis cells, ATEX-95-compliant bleed system and separate salt dissolving tank with level monitoring. The scope of delivery also includes a frequency-controlled central injector system matched to the system to meter active chlorine and sodium hydroxide for pH correction and a single booster pump. A level control to monitor the storage tank to be provided on site for sodium hypochlorite. A chlorine gas warning unit and automatic monitoring of water hardness downstream of the softening system come as standard with systems producing more than 600 g/h.

### Note:

Electrolysis systems of type CHLORINSITU® II, III, V and V Plus are offered and planned to meet customer specifications. This is true both for the system documentation and the subsequent supply of spare parts and maintenance.

# 4 Electrolysis Systems CHLORINSITU<sup>®</sup> and DULCO<sup>®</sup>Lyse

## 4.9 Questionnaire on the Design of an ECA Water System

### Application

- Bottler flushing
- CIP
- Other \_\_\_\_\_

### Applicational details

Number of bottlers: \_\_\_\_\_

Flushing duration: \_\_\_\_\_

Required volume to be added to bottler: \_\_\_\_\_ Recommendation with material SS 316 L 2-4 ppm

Number of CIP points of injection: \_\_\_\_\_

Duration of CIP: \_\_\_\_\_

Required volume to be added for CIP: \_\_\_\_\_ Recommendation 10-15 ppm

### Water data:

Max. volume of water to be treated \_\_\_\_\_ m<sup>3</sup>/h      maximum water pressure \_\_\_\_\_ bar

Water flow       constant       fluctuating from \_\_\_\_\_ m<sup>3</sup>/h to \_\_\_\_\_ m<sup>3</sup>/h

pH value \_\_\_\_\_      (iron (Fe<sup>2+</sup>) \_\_\_\_\_ mg/l)

Temperature \_\_\_\_\_ °C      (manganese (Mn<sup>2+</sup>) \_\_\_\_\_ mg/l)

Proportion of solids \_\_\_\_\_ mg/l      (nitrite (NO<sub>2</sub><sup>-</sup>) \_\_\_\_\_ mg/l)

Acid capacity K<sub>S4,3</sub> \_\_\_\_\_ mmol/l      (sulphide (S<sup>2-</sup>) \_\_\_\_\_ mg/l)

Total hardness \_\_\_\_\_ mmol/l      (TOC (total organic carbon) \_\_\_\_\_ mg/l)

Total hardness \_\_\_\_\_ °dH      (ammonium \_\_\_\_\_ mg/l)

### Reaction time to application:

\_\_\_\_\_ m<sup>3</sup> volume of reaction tank or \_\_\_\_\_ minutes dwell time in the total system.

### Disinfection method used to date:

\_\_\_\_\_

Disinfectant consumed to date: \_\_\_\_\_ kg/week

### Other requirements:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

P\_PMA\_ECA\_0001\_SW

# 4 Electrolysis Systems CHLORINSITU® and DULCO®Lyse

## 4.10

### Electrolysis System Dulco®Lyse

#### Output of 100 – 300 g ultra-pure hypochlorous acid per hour

Efficient production of DulcoLyt 400 (ECA water) with an exceptionally low chloride and chlorate content. Maximum protection against corrosion and very good cost efficiency because of low chloride.



Electrolysis systems of the type DULCO®Lyse generate ultra-pure hypochlorous acid in a vacuum process. A saturated solution of sodium chloride is produced in a salt dissolving tank, included in the scope of delivery, and this solution is then electrolysed in a diaphragm cell. Chloride-free sodium hydroxide and hydrogen are produced in the cathode chamber, while ultra-pure chlorine gas and dilute residual brine are produced in the anode chamber, separated by the diaphragm from the anode chamber. The active chlorine produced is immediately separated from the residual brine and dissolved as hypochlorous acid. The sodium hydroxide is temporarily stored and added to hypochlorous acid through a metering pump. The result is a neutral, highly effective and extremely low-chloride and low-chlorate disinfection solution, temporarily stored in the product tank until metered through separate metering stations. The hydrogen produced is diluted with fresh air through an ATEX-approved fan and discharged safely. The diluted residual brine is fully discarded. To do so, the diluted brine is strongly diluted with softened water, neutralised by the addition of sodium hydroxide and disposed of in the sewer. Any residual chloride and chlorate is thus disposed of and is not mixed with the process water. DULCO®Lyse systems can thus be compared with pure chlorine gas in terms of their oxidation strength and chloride and chlorate content in the process water. The salt dissolving water comes from a softening system integrated in the DULCO®Lyse system, thereby preventing the formation of lime deposits and ensuring the long service life of the electrolytic cell.

#### Your benefits

- Extremely low chloride and chlorate content for maximum protection and corrosion-free system technology
- Environmentally friendly, highly effective disinfection
- Long-term freedom from germs, without any transport, storage or handling of concentrated chemicals
- Handling of chemicals is reduced (only sodium chloride is required)
- Compact, space-saving design
- Cost-effective operation, thanks to use of inexpensive sodium chloride as a raw material

#### Technical details

- Modern PLC with large illuminated display
- Integrated Remote Control Engineer for remote diagnosis and troubleshooting
- Supplied ready for connection in stainless steel housing
- Integrated softening system
- ATEX-certified bleeding system
- Integrated salt tank with level monitoring

#### Field of application

- Food industry
- Beverage industry

#### Technical Data

Power supply: 1 x 230 V (VAC/1P/N/PE/50 Hz)

Dimensions (H x W x D): 2,100 x 1,200 x 600 mm

	Type/ output g/h	Dulcolyt production at 400 ppm l/h	Power uptake kW	Salt solution tank volume l	Order no.
<b>DULCO®Lyse 100</b>	100	250	1.10	130	1041424
<b>DULCO®Lyse 200</b>	200	500	1.50	130	1043987
<b>DULCO®Lyse 300</b>	300	750	1.90	200	1043988

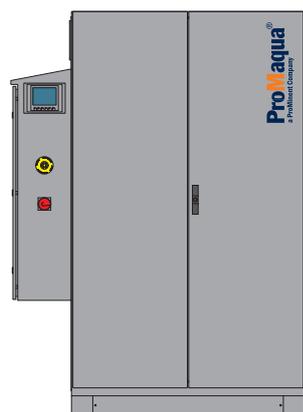
#### Scope of delivery:

DULCO®Lyse electrolysis systems are assembled ready-wired in a stainless steel housing

- PLC (Programmable Logic Controller) in the attached control cabinet
- Integrated softening system
- Electrolysis cell(s)
- ATEX-certified bleeding system
- Integrated salt dissolving tank with level monitoring

#### Spare parts and maintenance kits

	Type	Order no.
<b>Annual maintenance kit</b>	DULCO®Lyse 100 – 300	1041427
<b>3-yearly maintenance kit</b>	DULCO®Lyse 100 – 300	1041430
<b>Spare parts kit</b>	DULCO®Lyse 100 – 300	1044366



Dulcolyse\_100-300gram\_SW1

## 4 Electrolysis Systems CHLORINSITU<sup>®</sup> and DULCO<sup>®</sup>Lyse

### 4.11

#### Accessories

##### Water hardness measuring kit

For manual determination of the overall hardness

	Order no.
Water hardness measuring kit for overall hardness	505505

# 5 Storage Tanks

## 5.1 PE/PP Storage Tanks



**Safe and reliable handling of chemicals.**  
**Useful capacity 500 l–50,000 l, indoor and outdoor installation**

Our plastic storage tanks guarantee compliance with statutory specifications taking into account country-specific approvals, which regulate the production and operation of systems for storage and metering of environmentally-hazardous substances.

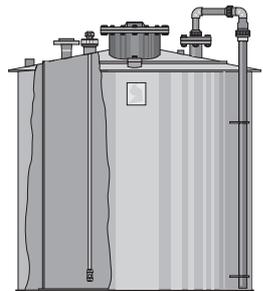
Constructional design and production are in compliance with the construction and test guidelines as laid down by the German Institute for Building Technology (DIBT).

- Predominantly PE-HD and PP plate material is used, the suitable material being selected following checking of the chemical resistance and process-specific requirements.

**Field of application**

Suitable for the storage of chemicals. Applications include: Potable water and process water treatment, process technology, waste water technology, electroplating, swimming pool technology and exhaust air treatment.

## 5.2 PE Storage Tank With General WHG Approval



pk\_3\_014

**The storage of chemicals hazardous for water (Water Hazard Class (WGK) 0-3) is subject to strict, regulatory requirements.**

We supply storage tanks that comply with WHG §19 I, suitable for installation indoors and outdoors, up to a storage volume of 50 m<sup>3</sup>. The storage tanks are available with monitoring accessories, filling level devices, filling equipment, heating equipment, suction and dosing assemblies.

**PE-HD Storage Tanks**

- Approval mark Z-40.21-229 in compliance with the WHG § 19 (Water Resource Management Act)
- Design and manufacture carried out in accordance with the construction and test principles of the DIBT (German Institute of Building Technology)
- For pressure-free operation up to a max. working temperature of 30 °C
- Material: polyethylene PE-HD
- For indoor or outdoor installation
- For chemicals in accordance with the DIBT media list

Usable volume 95% fill level l	Internal diameter mm	External diameter mm	Height of cylindrical section mm	Overall height mm	Weight empty kg
500	800	860	1,050	1,300	50
750	1,000	1,060	1,050	1,300	60
1,000	1,000	1,060	1,350	1,600	70
1,250	1,200	1,260	1,150	1,400	80
1,500	1,200	1,260	1,400	1,650	90
2,000	1,400	1,480	1,400	1,650	100
2,500	1,400	1,480	1,700	1,950	130
3,000	1,600	1,680	1,550	1,800	170
3,500	1,700	1,780	1,550	1,800	190
4,000	1,700	1,780	1,850	2,100	220
5,000	1,900	1,980	1,850	2,100	280
6,000	2,000	2,080	1,950	2,250	350
7,000	2,150	2,250	1,950	2,250	400
8,000	2,150	2,250	2,250	2,550	500
10,000	2,150	2,250	2,900	3,200	600
12,000	2,150	2,250	3,400	3,700	700

Other sizes available on request.

## 5 Storage Tanks

### PE-HD Collecting Pans

Usable volume 95% fill level l	Internal diameter mm	External diameter mm	Height of cylindrical section mm	Overall height mm	Weight empty kg
500	1,050	1,150	1,030	1,050	40
750	1,250	1,350	1,030	1,050	45
1,000	1,250	1,350	1,280	1,300	50
1,250	1,450	1,550	1,080	1,100	55
1,500	1,450	1,550	1,330	1,350	60
2,000	1,650	1,750	1,280	1,300	70
2,500	1,650	1,750	1,600	1,620	90
3,000	1,850	1,950	1,470	1,500	105
3,500	1,950	2,050	1,470	1,500	120
4,000	1,950	2,050	1,750	1,780	140
5,000	2,150	2,250	1,750	1,780	160
6,000	2,250	2,350	1,900	1,950	200
7,000	2,390	2,490	1,910	1,960	220
8,000	2,390	2,490	2,200	2,250	270
10,000	2,390	2,490	2,750	2,800	350
12,000	2,390	2,490	3,300	3,350	450

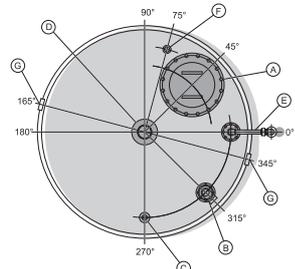
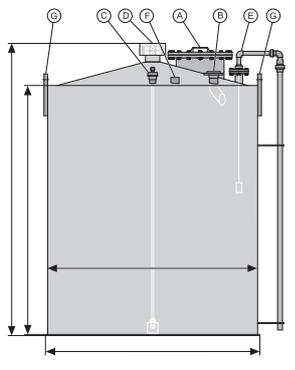
Other sizes available on request.

# 5 Storage Tanks

## 5.2.1

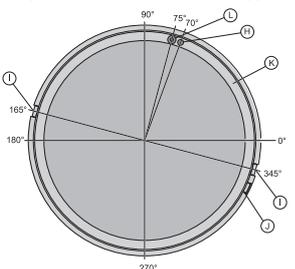
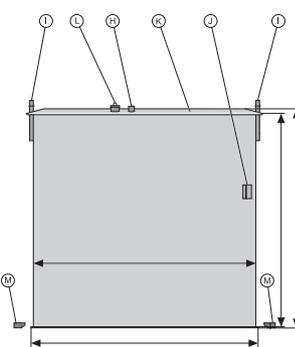
### Our standard equipped storage tanks and collecting pans with approval marks

For indoor or outdoor installation; other internal fittings/accessories on request.



pk\_3\_046

Item	Quantity	Name	500 l - 1,250 l	1,500 l - 2,000 l	2,500 l - 3,500 l	4,000 l - 12,000 l
A	1	Handhole/manhole, bolted 1.4301	DN 250	DN 250	DN 500	DN 500
B	1	Filling connection with 45° inlet elbow	DN 32	DN 50	DN 50	DN 50
C	1	Sampling pipe PVC/EPDM	DN 15	DN 15	DN 15	DN 20
D	1	Vent pipe with dome	DN 80	DN 100	DN 100	DN 100
E	1	Rope-operated level indicator	DN 80/40	DN 80/40	DN 80/40	DN 80/40
F	1	Screwed socket for overflow protection	Rp 2"	Rp 2"	Rp 2"	Rp 2"
G	2	Crane lifting eye	-	yes	yes	yes



pk\_3\_047

#### Collecting Pans for outdoor installation

Item	Quantity	Name	500 l - 1,250 l	1,500 l - 12,000 l
H	1	Leakage sensor support	Rp 2"	Rp 2"
I	2	Crane lifting eye	-	yes
J	1	Name plate	yes	yes
K	1	Rain collar	yes	yes
L	1	Inspection port	yes	yes
M	1	Floor claw set	yes	yes

#### Collecting Pans for indoor installation

Item	Quantity	Name	500 l - 1,250 l	1,500 l - 12,000 l
H	1	Leakage sensor support	Rp 2"	Rp 2"
I	2	Crane lifting eye	-	yes
J	1	Name plate	yes	yes

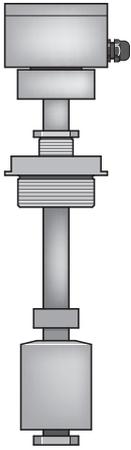
# 5 Storage Tanks

## 5.2.2

### Accessories Meeting The Requirements Of WHG § 19 and VAWS (Directive On Systems For Storage And Handling Of Water-Endangering Substances)

#### Overfill protection with approval mark

T200 level gauge with float as max. level limit switch, without downstream transmitter, see below. Length 500 mm.



pk\_3\_037

	Order no.
Overfill protection with approval mark	1009334

#### Leakage sensor with approval mark

T200 leakage detection system consisting of level detector with float, without downstream transmitter, see below. Length 3,000 mm.

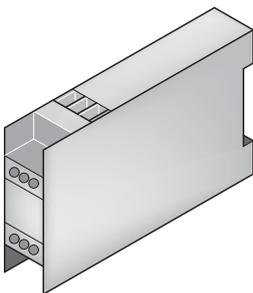


pk\_3\_038

	Order no.
Leakage sensor with approval mark	1009340

#### Transmitter with approval mark

For installation in control cabinets by others, suitable for leakage and overfill protection.



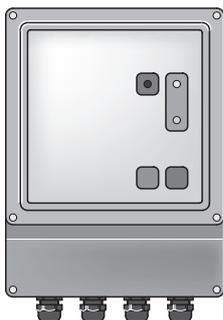
pk\_3\_040

	Order no.
Transmitter with approval mark	1009348

#### Alarm indicator unit

For overfill protection and leakage sensor with approval mark incl. beacon light, signal horn and two transmitters.

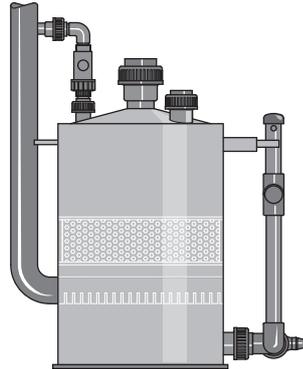
Price on request.



pk\_3\_039

# 5 Storage Tanks

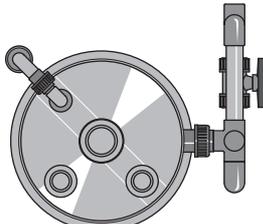
## Absorption vessel



For ventilation of closed storage tanks.

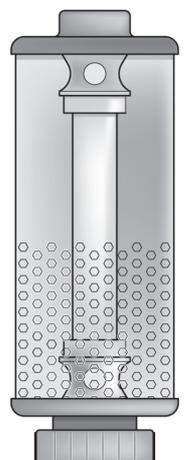
Material: polyethylene PE-HD complete with connections, PVC/EPDM ball valve and fixed pipework to storage tank; sizes and prices according to tank volume and stored medium.

Price on request.



pk\_3\_041

## Acid vapour separator



Size and combining agent according to tank volume and stored medium.

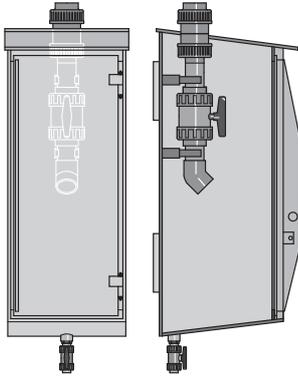
Price on request.

pk\_3\_042

# 5 Storage Tanks

## 5.2.3

### Other Accessories



pk\_3\_043

#### Chemical filling station

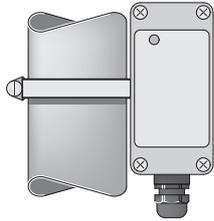
Suitable for third-party wall mounting.

Material: polyethylene PE-HD.

Size: approx. 420x420x1000 mm (LxWxH), complete with DN 50 PVC/EPDM ball valve, threaded connector and drip tray with ball valve DN 25

PVC/EPDM connection: Rp 2" (parallel female thread)

Other built-in components such as tank waggon couplings, automatic valves, heater, etc. are possible; prices on request.

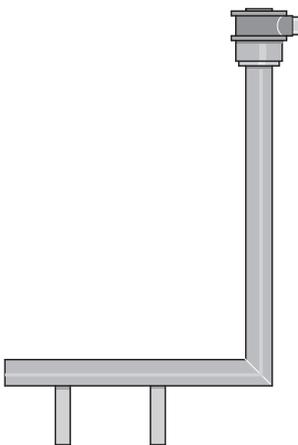


pk\_3\_044

#### Bistable changeover contact

With approval mark for fitting on rope-operated level indicator.

	<b>Order no.</b>
<b>Bistable changeover contact</b>	1009349



pk\_3\_045

#### Storage tank heater

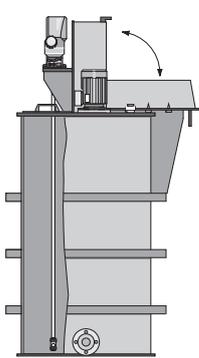
With temperature and level control for run-dry protection; on request, according to stored medium and tank volume.

Optional in addition to insulation of the storage tank.

Price on request.

# 5 Storage Tanks

## 5.3 PP/PE Storage Tanks, Custom-built



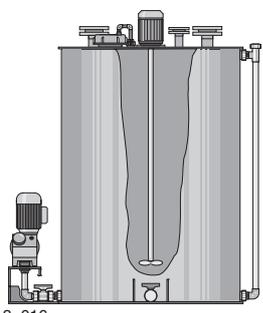
pk\_3\_015

System and process-technology requirements and specifications, and often special requirements demand specially tailored and custom-manufactured PP-PE storage tanks produced using special plate welding machines and bending machines.

Selection of a suitable plate material after checking its chemical resistance.

Additional inserts and attachments, like connecting nozzles, flanges, stirrers, salt dissolving baskets, bag dump equipment, absorption tanks, slanted and cone bottom, optimise and extend their functionality, permitting targeted adaptation of technical problems. A versatile programme of transducers and sensors can also be integrated.

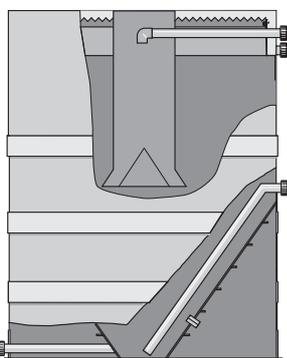
We supply storage tanks up to a storage volume of 50 m<sup>3</sup>.



pk\_3\_016

### Round Tanks

- Material: polyethylene PE-HD or polypropylene PP
- Bottom design: flat bottom, cone bottom, slanted bottom
- Roof design: flat roof, tapered roof or open, suitable for pressure-free operation at working temperatures of up to 80 °C
- Standard equipment: 2 crane lifting eyes on round tanks with usable volumes above 2000 litres
- Prices on request according to application

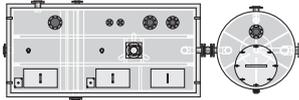
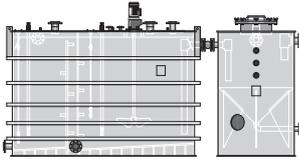


pk\_3\_017

Usable volume 95% fill level	Internal diameter	External diameter	Height of cylindrical section	Overall height
l	mm	mm	mm	mm
500	800	860	1,050	1,070
750	1,000	1,060	1,050	1,070
1,000	1,000	1,060	1,350	1,370
1,250	1,200	1,260	1,150	1,170
1,500	1,200	1,260	1,400	1,425
2,000	1,400	1,480	1,400	1,425
2,500	1,400	1,480	1,700	1,730
3,000	1,600	1,680	1,550	1,580
3,500	1,700	1,780	1,550	1,580
4,000	1,700	1,780	1,850	1,880
5,000	1,900	1,980	1,850	1,880
6,000	2,000	2,080	1,950	1,980
7,000	2,150	2,250	1,950	1,990
8,000	2,150	2,250	2,250	2,290
10,000	2,150	2,250	2,900	2,950
12,000	2,150	2,250	3,400	3,450

Other sizes available on request.

## 5 Storage Tanks



pk\_3\_048

### Rectangular Tanks

- Material: polyethylene PE-HD or polypropylene PP
- Bottom design: flat bottom or slanted bottom, flat-mounted to foundation
- Roof design: flat roof or open, suitable for pressure-free operation at working temperatures of up to 80 °C
- Surrounding steel frame reinforcement, PE or PP coated
- Standard equipment: 4 crane lifting eyes on rectangular tanks with usable volumes above 2,000 litres.
- Prices on request according to application

Usable volume 95% fill level	Internal dimensions	External dimensions
	(L x W x H)	(L x W x H)
I	mm	mm
<b>500</b>	950 x 750 x 750	1,100 x 900 x 770
<b>750</b>	1,000 x 1,000 x 800	1,150 x 1,150 x 820
<b>1,000</b>	1,000 x 1,000 x 1,060	1,150 x 1,150 x 1,080
<b>1,250</b>	1,250 x 1,000 x 1,060	1,400 x 1,150 x 1,080
<b>1,500</b>	1,500 x 1,000 x 1,060	1,750 x 1,250 x 1,090
<b>2,000</b>	1,500 x 1,250 x 1,130	1,750 x 1,500 x 1,160
<b>2,500</b>	1,750 x 1,250 x 1,210	2,000 x 1,500 x 1,240
<b>3,000</b>	1,750 x 1,250 x 1,450	2,000 x 1,500 x 1,480
<b>3,500</b>	1,750 x 1,500 x 1,410	2,000 x 1,750 x 1,440
<b>4,000</b>	2,000 x 1,500 x 1,410	2,250 x 1,750 x 1,440
<b>5,000</b>	2,500 x 1,500 x 1,410	2,750 x 1,750 x 1,440
<b>6,000</b>	2,500 x 1,750 x 1,450	2,750 x 2,000 x 1,480
<b>7,000</b>	2,500 x 1,750 x 1,700	2,750 x 2,000 x 1,730
<b>8,000</b>	2,500 x 2,000 x 1,700	2,750 x 2,250 x 1,730
<b>10,000</b>	3,000 x 2,000 x 1,760	3,350 x 2,350 x 1,800
<b>12,000</b>	3,500 x 2,000 x 1,810	3,850 x 2,350 x 1,850
<b>15,000</b>	4,000 x 2,000 x 2,000	4,350 x 2,350 x 2,050

Other sizes available on request.

# 6 Polymer Batching and Metering Systems Ultromat®

## 6.1 Metering Systems for Metering Powdered and Liquid Polymer Solutions Ultromat®

Ultromat® systems have been designed specifically for the production of ordinary or standard solutions of synthetic polyelectrolytes and have proved themselves many times over. The use of polyelectrolytes as flocculation aids have a very wide range of applications. They can be used in all applications where colloidal solids need to be economically separated from liquids.

Preferred fields of application include:

- Potable water treatment
- Waste water treatment
- Sludge de-watering
- Treatment of process water and circulation water
- Paper production
- Chemical industry, power plants etc.

3 different automatic system concepts are available:

- Continuous flow system (identity code ULFa)
- Oscillating system (identity code ULPa)
- Double-decker system (identity code ULDa)

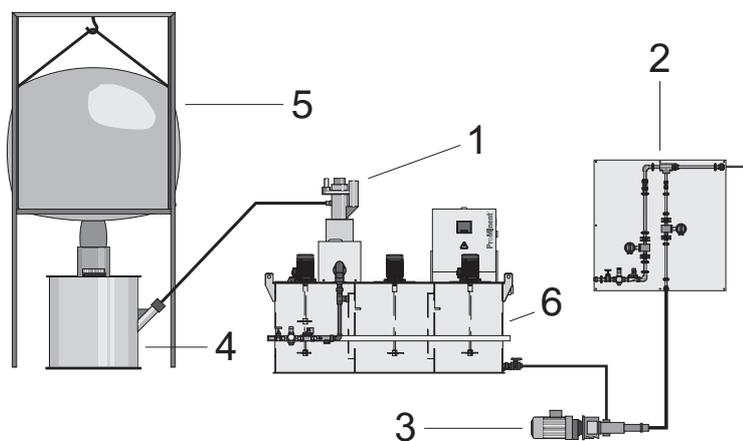
The systems differ primarily due to the construction of the storage tank. The storage tank in the continuous flow system is sub-divided into 3 chambers, largely preventing the mixing of fresh and matured polymer. The oscillating and double-decker systems consist of two completely separated storage tanks, preventing the mixing of fresh and matured polymer.

Powder feeder units and liquid concentrate pumps can be freely selected by means of the identity code. Powdered or liquid polymers can therefore be prepared depending on the application.

Ultromat® unit types ULFa, ULPa and ULDa are equipped with a PLC compact controller and touch screen. Optionally the PLC compact controller can be fitted with a PROFIBUS® or PROFINET module. Input of the solvent concentration, as well as calibration of the powder feeder unit and liquid concentrate pump is user-managed. Alarm messages and warnings are shown on the display. The feed of dilution water is continuously detected by a flow meter and shown on the display. The control calculates the polymer requirement based on the set solvent concentration and proportionately controls the powder metering unit or concentrate pump so that the concentration of polymer solution is always kept constant even if there are fluctuations in the water supply.



### 6.1.1 Application examples for complete polymer preparation systems



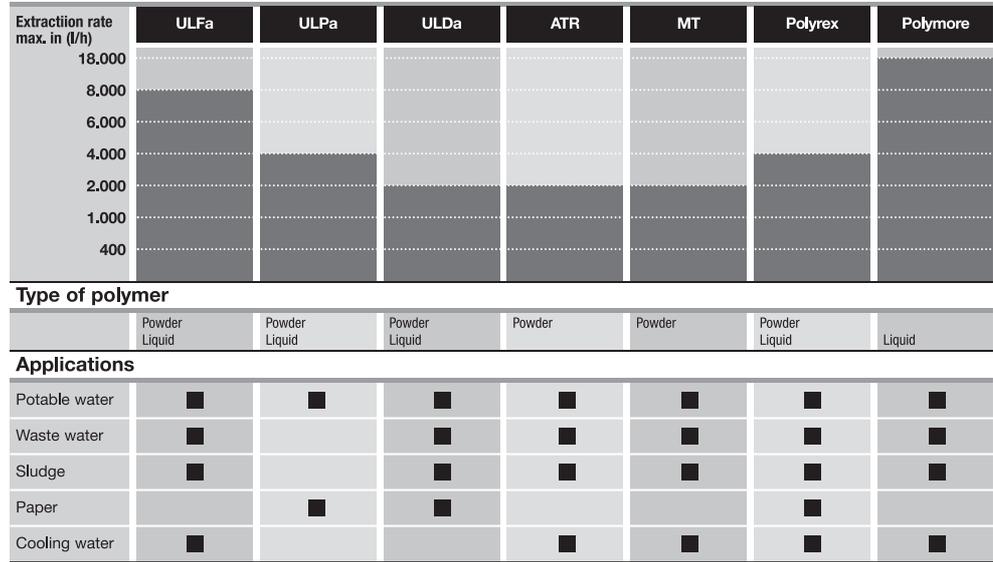
- 1 Powder conveyor unit
- 2 Re-dilution
- 3 Transfer pump
- 4 Powder storage tank
- 5 Big-Bag
- 6 Ultromat® unit

AP\_0002\_SW

# 6 Polymer Batching and Metering Systems Ultramat®

## 6.2 Performance Overview of Polymer Batching and Metering Systems Ultramat®

ProMinent offers a wide range of Ultramat for the most diverse batching and metering applications. The following overview shows the capacity ranges of our type series:



P\_UL\_0033\_C\_EN

ProMinent provides all the advice needed for the efficient operation of a polymer batching and metering system Ultramat:

- Evaluation of the situation on site by trained, expert field sales staff.
- Project planning of the system.
- Commissioning and system maintenance by our trained service technicians.

# 6 Polymer Batching and Metering Systems Ultromat<sup>®</sup>

## 6.3 Questionnaire for the Design of Polymer Matching and Metering Systems Ultromat<sup>®</sup>

For the treatment of

- Potable water
- Waste water
- Sludge
- Paper
- Cooling water
- \_\_\_\_\_

Polymer available as

- Powdered polymer
- Liquid polymer
- Required maturing time: \_\_\_\_\_

Required quantities

- Concentration of batched solution: \_\_\_\_\_
- Max. metering quantity (volume of polymer): \_\_\_\_\_
- Required maturing time: \_\_\_\_\_

Quality of dilution water

- Potable water
- Process water

Mains voltage supply

- 400 VAC/50/60 Hz
- 440 VAC/60 Hz
- 460 VAC/60 Hz
- Other: \_\_\_\_\_

Other requirements

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

PRO01\_0285\_Fragebogen

# 6 Polymer Batching and Metering Systems Ultromat®

## 6.4 Metering System Ultromat® ULFa



**Practical when production of polymer solutions is integrated directly in the workflow.**

**Extraction rates of up to 8,000 l/h**

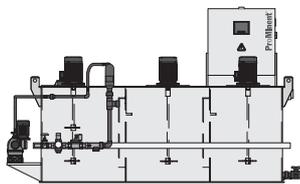
Polymer batching station Ultromat® ULFa (continuous flow system): This metering system can be used to batch flocculation aids for the preparation of a ready-to-use polymer solution. The system was designed for the fully automatic batching of polymer solutions.

These systems can be used to process both liquid and powdered polymers. The storage tank, which is subdivided into three chambers, largely prevents the carry-over of freshly batched polymer.

Ultromat® ULFa systems are equipped with a PLC Programmable Logic Controller S7-1200 and touch panel.

### Your benefits

- Processing of liquid polymer (0.05 - 1.0%) and powdered polymer (0.05 - 0.5%)
- Minimal carry-over of product and thus higher-quality results
- Extraction of the polymer solution and drainage of the chambers through the front of the storage tank
- Operator-controlled input of solvent concentration and calibration of powder metering unit and liquid concentrate pump
- Version with terminal box available on request
- Gentle mixing of the polymer solution (electric stirrer)



P\_UL\_0024\_SW1

Ultromat® ULFa for liquid polymers

### Technical details

Siemens S7-1200 compact control system and KTP 400 touch panel

- Optionally fitted with PROFIBUS® and DP/DP coupler
- Optionally fitted with Profinet and PN/PN coupler

### Field of application

Many different uses, for example in water treatment, waste water treatment or in paper production.

### The following types of polymer can be processed:

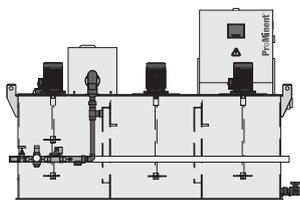
- Liquid polymers (0.05 – 1.0%)
- Powdered polymers (0.05 – 0.5%)

### Selectable components:

- Tank size / extraction rate
- Construction (normal or mirror image)
- Electrical connection
- Control S7 – 1200 (with and without PROFIBUS®/PROFINET)
- Powder feeder unit
- Vibrator for powder feeder unit (promotes the movement of polymer)
- FG205 powder conveyor/add-on hopper (for filling and feeding the powder feeder unit)
- Liquid concentrate pump
- Monitor for liquid concentrate pump (float switch / flow monitor)
- Flush valve (Y-flush inlet or wetting cone)
- Stirrer for 3rd chamber
- Language (pre-set language for the control panel)

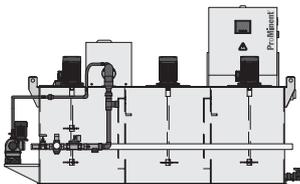
### The standard scope of delivery includes among other things:

- Pressure sensor for measuring the liquid level
- Pause function / operating message
- Monitoring of the re-dilution unit
- Lifting lugs for transport
- Socket for FG205 unit (only when powder feeder unit is selected)



P\_UL\_0022\_SW1

Ultromat® ULFa for powder polymers



P\_UL\_0023\_SW1

Ultromat® ULFa for powder and liquid polymers

# 6 Polymer Batching and Metering Systems Ultramat®

## Technical Data

<b>Discharge volume</b>	l/h	<b>400</b>	<b>1,000</b>	<b>2,000</b>	<b>4,000</b>	<b>6,000</b>	<b>8,000</b>
<b>Tank volume</b>	l	400	1,000	2,000	4,000	6,000	8,000
<b>Diluent water max.</b>	l/h	1,500	1,500	3,000	6,000	9,000	12,000
<b>Water pressure</b>	bar	3 – 5	3 – 5	3 – 5	3 – 5	3 – 5	3 – 5
<b>Powdered polymer</b>	kg/h	0.5–11	0.5–11	0.8–18	3.6–55	3.6–55	4.8–110
<b>Length</b>	mm	1,999	2,643	3,292	3,301	4,120	4,605
<b>Width</b>	mm	918	1,002	1,186	1,456	1,651	1,910
<b>Height</b>	mm	1,390	1,740	1,890	2,182	2,182	2,290
<b>Water connection</b>	"	1	1	1	1 1/2	1 1/2	2
<b>Discharge nozzle DN</b>	mm	25	25	32	40	40	50
<b>Concentrate feed DN</b>	mm	15	15	15	20	20	20
<b>Voltage/Frequency</b>	VAC/Hz	400/50	400/50	400/50	400/50	400/50	400/50
<b>Power uptake</b>	kW	1.5	2.6	3.2	5.0	5.0	9.5

# 6 Polymer Batching and Metering Systems Ultramat®

## Identity Code Ordering System for Continuous Flow Systems Ultramat® ULFa

ULFa	Type / Tank size / Discharge volume
0400	Continuous flow system / 400 l / 400 l/h
1000	Continuous flow system / 1000 l / 1000 l/h
2000	Continuous flow system / 2000 l / 2000 l/h
4000	Continuous flow system / 4000 l / 4000 l/h
6000	Continuous flow system / 6000 l / 6000 l/h
8000	Continuous flow system / 8000 l / 8000 l/h
<b>Design</b>	
N	standard
S	mirror-imaged
<b>Electrical connection</b>	
A	400 VAC, 50/60 Hz (3ph, N, PE)
B	440 VAC, 60 Hz (3 ph, N, PE)
C	460 VAC, 60 Hz (3 ph, N, PE)
<b>Control</b>	
0	PLC S7-1200
1	PLC S7-1200 with PROFIBUS® (DP/DP coupler)
2	PLC Programmable Logic Controller S7-1200 with PROFINET (PN/PN coupler)
<b>Options</b>	
0	none
1	Discharge pipework, PVC (400, 1000)
2	Discharge pipework, PVC (2000)
3	Discharge pipework, PVC (4000, 6000)
4	Discharge pipework, PVC (8000)
<b>Powder feeder</b>	
P0	none
P1	Powder feeder (0400, 1000)
P2	Powder feeder (2000)
P3	Powder feeder (4000, 6000)
P4	Powder feeder (8000)
<b>Vibrator for powder feeder</b>	
0	none
1	with vibrator for powder feeder
<b>Powder conveyor FG 205, add-on hopper</b>	
0	none
1	with add-on hopper 50 l (0400, 1000, 2000)
2	with add-on hopper 75 l (4000, 6000)
3	with add-on hopper 100 l (8000)
4	with add-on hopper 50 l + powder conveyor unit FG205 (0400, 1000, 2000)
5	with add-on hopper 75 l + powder conveyor unit FG205 (4000, 6000)
6	with add-on hopper 100 l + powder conveyor unit FG205 (8000)
7	with adapter cover + powder conveyor unit FG205
<b>Liquid concentrate pump</b>	
L0	none
L1	with Sigma
L2	with Spectra
L3	prepared for Sigma
L4	prepared for Spectra
<b>Monitoring for liquid concentrate pump</b>	
0	none
1	with float switch for concentrate tank
2	with flow monitor (only Spectra)
3	with float switch and flow monitor (only Spectra)
<b>Water pipework with wetting fitting</b>	
1	Y-wetting fitting, PVC (0400, 1000, 2000)
2	Y-wetting fitting, PVC (4000, 6000)
3	Y-wetting fitting, PVC (8000)
4	Wetting cone, PVC (0400, 1000, 2000)
5	Wetting cone, PVC (4000, 6000)
6	Wetting cone, PVC (8000)
7	Wetting cone, PP (0400, 1000, 2000)
8	Wetting cone, PP (4000, 6000)
9	Wetting cone, PP (8000)
<b>Stirrer for 3<sup>rd</sup> chamber</b>	
0	none
1	Stirrer for storage tank 400, 0.18 kW, 400 VAC
2	Stirrer for storage tank 1000, 0.55 kW, 400 VAC
3	Stirrer for storage tank 2000, 0.75 kW, 400 VAC
4	Stirrer for storage tank 4000/6000, 1.1 kW, 400 VAC
5	Stirrer for storage tank 8000, 2.2 kW, 400 VAC
A	Stirrer for storage tank 400, 0.21 kW, 460 VAC
B	Stirrer for storage tank 1000, 0.65 kW, 460 VAC
C	Stirrer for storage tank 2000, 0.9 kW, 460 VAC
D	Stirrer for storage tank 4000/6000, 1.3 kW, 460 VAC
E	Stirrer for storage tank 8000, 2.6 kW, 460 VAC
<b>Language</b>	
BG	bulgarian
CN	chinese
CZ	czech
DA	danish
DE	german
EL	greek
EN	english
ES	spanish
ET	estonian
FI	finnish
FR	french
HR	croatian
HU	hungarian
IT	italian
LT	lithuanian
LV	latvian
MS	malay
NL	dutch
NO	norwegian
PL	polish
PT	portuguese
RO	romanian
RU	russian
SK	slovakian
SL	slovenian
SV	swedish
TR	turkish

# 6 Polymer Batching and Metering Systems Ultromat®

## 6.5 Metering System Ultromat® ULPa



**A good solution when preparing polymer solutions as flocculation aids.**

**Extraction rates from 400 to 4,000 l/h**

The metering system Ultromat® ULPa (oscillating system) is ideal for batching flocculation aids for the preparation of a ready-to-use polymer solution.

Ultromat® ULPa units consist of two separate chambers, which can be successively filled with polymer solution, eliminating the risk of product carry-over. Both liquid and powdered polymers can be processed depending on the product range.

**Your benefits**

- Processing of liquid polymer (0.05-1.0%) and powdered polymer (0.05-0.5%).
- No mixing of fresh and matured polymer.
- Operator-controlled input of the solvent concentration and the calibration of powder metering unit and liquid concentrate pump.
- Gentle mixing of the polymer solution (electric stirrer).
- Version with terminal box available on request.

**Technical details**

Siemens S7-1200 compact control system and KTP 400 touch panel.

- Optionally fitted with PROFIBUS® and (DP/DP coupler)
- Optionally fitted with Profinet and PN/PN coupler

**Field of application**

Many different uses, for example in water treatment, waste water treatment or in paper production.

**The following types of polymer can be processed:**

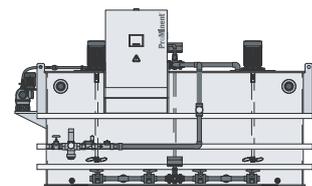
- Liquid polymers (0.05 – 1.0%)
- Powdered polymers (0.05 – 0.5%)

**Selectable components:**

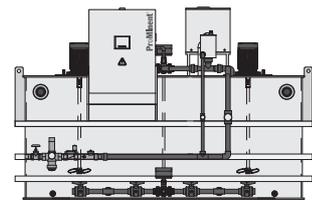
- Tank size / extraction rate
- Construction (normal or mirror image)
- Electrical connection
- Control S7 – 1200 (with and without PROFIBUS®/PROFINET)
- Powder feeder unit
- Vibrator for powder feeder unit (promotes the movement of polymer)
- FG205 powder conveyor/add-on hopper (for filling and feeding the powder feeder unit)
- Liquid concentrate pump
- Monitor for liquid concentrate pump (float switch / flow monitor)
- Flush valve
- Language (pre-set language for the control panel)

**The standard scope of delivery includes among other things:**

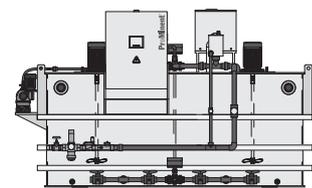
- Pressure sensor for measuring the liquid level
- Pause function / operating message
- Monitoring of the re-dilution unit
- Lifting lugs for transport
- Socket for FG205 (only when powder feeder unit is selected)



P\_UL\_0026\_SW1  
Ultromat® ULPa for liquid polymers



P\_UL\_0027\_SW1  
Ultromat® ULPa for powder polymers



P\_UL\_0028\_SW1  
Ultromat® ULPa for powder and liquid polymers

## 6 Polymer Batching and Metering Systems Ultramat<sup>®</sup>

### Technical Data

Discharge volume	l/h	400	1,000	2,000	4,000
Tank volume	l	2 x 400	2 x 1,000	2 x 2,000	2 x 4,000
Diluent water max.	l/h	1,600	4,000	8,000	14,000
Water pressure	bar	3 – 5	3 – 5	3 – 5	3 – 5
Powdered polymer	kg/h	0.5–11	0.8–18	3.6–55	4.8–110
Length	mm	2,040	2,840	3,340	4,540
Width	mm	1,253	1,733	1,918	2,583
Height	mm	1,635	1,739	2,178	2,384
Water connection	"	1	1 1/4	1 1/2	2
Discharge nozzle DN	mm	25	32	40	50
Concentrate feed DN	mm	15	15	20	20
Voltage/Frequency	VAC/Hz	400/50	400/50	400/50	400/50
Power uptake	kW	2.5	3.2	5.5	7.0

# 6 Polymer Batching and Metering Systems Ultromat®

## 6.5.1 Identity Code Ordering System for Oscillating Systems Ultromat® ULPa

ULPa	Type / Tank size / Discharge volume
0400	Oscillating system / 2x400 l / 400 l/h
1000	Oscillating system / 2x1,000 l / 1,000 l/h
2000	Oscillating system / 2x2,000 l / 2,000 l/h
4000	Oscillating system / 2x4,000 l / 4,000 l/h
<b>Construction</b>	
N	standard
S	mirror-imaged
<b>Electrical connection</b>	
A	400 VAC, 50/60 Hz (3ph, N, PE)
<b>Control</b>	
0	PLC S7-1200
1	PLC S7-1200 with PROFIBUS® (DP/DP coupler)
2	PLC Programmable Logic Controller S7-1200 with PROFINET (PN/PN coupler)
<b>Options</b>	
0	none
<b>Powder feeder</b>	
P0	none
P1	Powder feeder (0400)
P2	Powder feeder (1000)
P3	Powder feeder (2000)
P4	Powder feeder (4000)
<b>Vibrator for powder feeder</b>	
0	none
1	with vibrator for powder feeder
<b>Powder conveyor FG205, add-on hopper</b>	
0	none
1	with add-on hopper 50 l (0400, 1000)
2	with add-on hopper 75 l (2000)
3	with add-on hopper 100 l (4000)
4	with add-on hopper 50 l + powder conveyor unit FG205 (0400, 1000)
5	with add-on hopper 75 l + powder conveyor unit (2000)
6	with add-on hopper 100 l + powder conveyor unit (4000)
7	with adapter cover + powder conveyor unit
<b>Liquid concentrate pump</b>	
L0	none
L1	with Sigma
L2	with Spectra
L3	prepared for Sigma
L4	prepared for Spectra
<b>Monitor for liquid concentrate pump</b>	
0	none
1	with float switch for concentrate tank
2	with flow monitor (only Spectra)
3	with float switch and flow monitor (only Spectra)
<b>Water pipework with wetting fitting</b>	
0	without wetting cone (liquid version)
1	Wetting cone, PVC (0400)
2	Wetting cone, PVC (1000, 2000)
3	Wetting cone, PVC (4000)
4	Wetting cone, PP (0400)
5	Wetting cone, PP (1000, 2000)
6	Wetting cone, PP (4000)
<b>Language</b>	
BG	bulgarian
CN	chinese
CZ	czech
DA	danish
DE	german
EL	greek
EN	english
ES	spanish
ET	estonian
FI	finnish
FR	french
HR	croatian
HU	hungarian
IT	italian
LT	lithuanian
LV	latvian
MS	malay
NL	dutch
NO	norwegian
PL	polish
PT	portuguese
RO	romanian
RU	russian
SK	slovakian
SL	slovenian
SV	swedish
TR	turkish

# 6 Polymer Batching and Metering Systems Ultramat®

## 6.6 Metering System Ultramat® ULDa

**A good solution when preparing polymer solutions as flocculation aids.**

**Extraction rates of up to 2,000 l/h**

The ProMinent metering system Ultramat® ULDa is an automatic polyelectrolyte preparation system. It is useful wherever polymers need to be automatically prepared as polymer solutions to act as flocculation aids.



Ultramat® ULDa double-decker systems are used to process liquid and powdered polymers. The system consists of two separate PP storage tanks, stacked above each other, preventing product carry-over. The polymer solution is batched in the upper storage tank and can be transferred to the lower storage tank once the maturing time has elapsed.

### Your benefits

- Processing of liquid polymer (0.05-1.0%) and powdered polymer (0.05-0.5%).
- No mixing of fresh and matured polymer.
- Wide range of versions for specific applications.
- Operator-controlled input of the solvent concentration and calibration of powder metering unit and liquid concentrate pump.
- Water fitting with flow meter and fitting set for the dilution water.
- Gentle mixing of the polymer solution (electric stirrer).
- Version with terminal box available on request.

### Technical details

- Siemens S7-1200 compact control system and KTP 400 touch panel.
- PLC Programmable Logic Controller optionally fitted with PROFIBUS® and DP/DP coupler.

### Field of application

Many different uses, for example in water treatment, waste water treatment or in paper production.

### The following types of polymer can be processed:

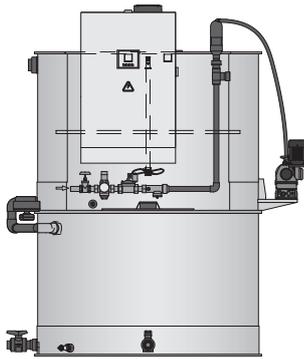
- Liquid polymers (0.05 – 1.0%)
- Powdered polymers (0.05 – 0.5%)

### Selectable components:

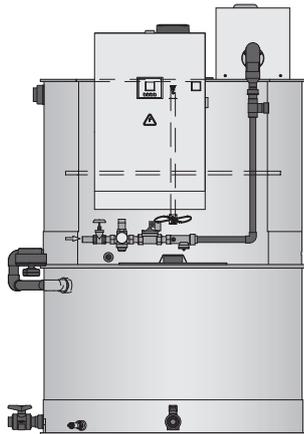
- Tank size / extraction rate
- Construction (normal or mirror image)
- Electrical connection
- Control S7 – 1200 (with and without PROFIBUS®/PROFINET)
- Powder feeder unit
- Vibrator for powder feeder unit (promotes the movement of polymer)
- FG205 powder conveyor/add-on hopper (for filling and feeding the powder feeder unit)
- Liquid concentrate pump
- Monitor for liquid concentrate pump (float switch / flow monitor)
- Flush valve (Y-flush inlet or wetting cone)
- Language (pre-set language for the control panel)

### The standard scope of delivery includes among other things:

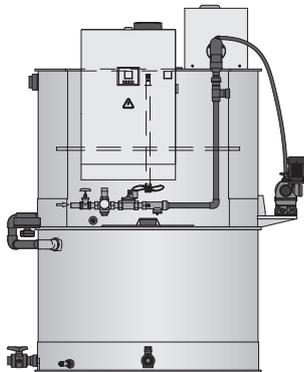
- Pressure sensor for measuring the liquid level
- Pause function / operating message
- Monitoring of the re-dilution unit
- Lifting lugs
- Socket for FG205 unit when the powder feeder unit is selected



P\_UL\_0029\_SW1  
Ultramat® ULDa for liquid polymers



P\_UL\_0030\_SW1  
Ultramat® ULDa for powder polymers



P\_UL\_0031\_SW1  
Ultramat® ULDa for powder and liquid polymers

# 6 Polymer Batching and Metering Systems Ultromat®

## Technical Data

Discharge volume	l/h	400	1,000	2,000
Tank volume	l	2 x 400	2 x 1,000	2 x 2,000
Diluent water max.	l/h	1,600	4,000	8,000
Water pressure	bar	3 – 5	3 – 5	3 – 5
Powdered polymer	kg/h	0.5–11	0.8–18	3.6–55
Length	mm	1,638	1,902	2,288
Width	mm	1,351	1,615	2,005
Height	mm	2,030	2,514	3,149
Water connection	"	1	1 1/4	1 1/2
Discharge nozzle DN	mm	25	32	40
Concentrate feed DN	mm	15	15	20
Voltage/Frequency	VAC/Hz	400/50	400/50	400/50
Power uptake	kW	1.5	2.6	3.2

# 6 Polymer Batching and Metering Systems Ultromat®

## 6.6.1 Identity Code Ordering System for Double-deck System Ultromat® ULDa

ULDa	Type / Tank size / Discharge volume
0400	Double-deck system / 2x400 l / 400 l/h
1000	Double-deck system / 2x1,000 l / 1,000 l/h
2000	Double-deck system / 2x2,000 l / 2,000 l/h
<b>Construction</b>	
N	standard
S	mirror-imaged
<b>Electrical connection</b>	
A	400 VAC, 50/60 Hz (3ph, N, PE)
<b>Control</b>	
0	PLC S7-1200
1	PLC S7-1200 with PROFIBUS® (DP/DP coupler)
2	PLC Programmable Logic Controller S7-1200 with PROFINET (PN/PN coupler)
<b>Options</b>	
0	none
<b>Powder feeder</b>	
P0	none
P1	Powder feeder (0400)
P2	Powder feeder (1000)
P3	Powder feeder (2000)
<b>Vibrator for powder feeder</b>	
0	none
1	with vibrator for powder feeder
<b>Powder conveyor FG205, add-on hopper</b>	
0	none
1	with add-on hopper 50 l
2	with add-on hopper 75 l
3	with add-on hopper 100 l
4	with add-on hopper 50 l + powder conveyor unit
5	with add-on hopper 75 l + powder conveyor unit
6	with add-on hopper 100 l + powder conveyor unit
7	with adapter cover + powder conveyor unit
<b>Liquid concentrate pump</b>	
L0	none
L1	with Sigma
L2	with Spectra
L3	prepared for Sigma
L4	prepared for Spectra
<b>Monitor for liquid concentrate pump</b>	
0	none
1	with float switch for concentrate tank
2	with flow monitor (only Spectra)
3	with float switch and flow monitor (only Spectra)
<b>Water pipework with wetting fitting</b>	
1	Y-wetting fitting, PVC (0400)
2	Y-wetting fitting, PVC (1000)
3	Y-wetting fitting, PVC (2000)
4	Wetting cone, PVC (0400)
5	Wetting cone, PVC (1000)
6	Wetting cone, PVC (2000)
7	Wetting cone, PP (0400)
8	Wetting cone, PP (1000)
9	Wetting cone, PP (2000)
<b>Language</b>	
BG	bulgarian
CN	chinese
CZ	czech
DA	danish
DE	german
EL	greek
EN	english
ES	spanish
ET	estonian
FI	finnish
FR	french
HR	croatian
HU	hungarian
IT	italian
LT	lithuanian
LV	latvian
MS	malay
NL	dutch
NO	norwegian
PL	polish
PT	portuguese
RO	romanian
RU	russian
SK	slovakian
SL	slovenian
SV	swedish
TR	turkish

# 6 Polymer Batching and Metering Systems Ultromat®

## 6.7 Metering System Ultromat® ATR

**The complete solution: Produces polymer solutions. Automated and reliable.**

**Extraction rates of up to 2,000 l/h**

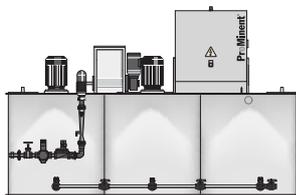


The metering system Ultromat® ATR (continuous flow system with round tank) is used for processing powdered polymers into ready-to-use polymer solutions.

Ready-mounted, automatic triple chamber batching systems for powdered flocculants to prepare a 0.05 to 0.5% polymer solution. The Ultromat® consists of 3 individual cylindrical PP storage tanks that serve as batching, maturing and storage tanks. The cylindrical storage tanks are hydraulically coupled via overflow channels. The storage tanks are extremely stable and do not require any additional reinforcement. The shipping weight of the Ultromat® ATR metering system is thus considerably reduced.

### Your benefits

- Ready-for-use assembled systems
- Three individual cylindrical PP cylindrical tanks serve as batching, maturing and storage tanks
- Cylindrical storage tanks are hydraulically coupled via overflow channels
- Powder feeder with drive motor, metering pipe heating and powder funnel with seal tight lid
- Flushing system for flushing and wetting of the powder
- Gentle mixing of the polymer solution with two electric stirrers



P\_UL\_0020\_SW

### Technical details

Control cabinet for automatic control of the entire system Reliable and precise: Siemens LOGO control

### Field of application

Many different uses, for example in water treatment, waste water treatment or in paper production.

### The Ultromat® basically consists of the following components:

- Ultromat storage tanks made of 3 individual cylindrical PP storage tanks that serve as batching, maturing and storage tanks.
- Powder feeder with drive motor, metering pipe heater and powder funnel with seal tight lid
- Flushing system for flushing and wetting the powder with flush valve, flow meter and fitting set for the dilution water.
- Two slow-running electric stirrers
- Control cabinet for the automatic control of the entire system

### Ultromat® ATR

	Process solution l/h	Order no.
Ultromat® ATR 400	400	1033810
Ultromat® ATR 1000	1,000	1033811
Ultromat® ATR 2000	2,000	1033812

### Options

	Order no.
3 <sup>rd</sup> stirrer for 0.18 kW for ATR 400	1033794
3 <sup>rd</sup> stirrer for 0.55 kW for ATR 1000	1033795
3 <sup>rd</sup> stirrer for 0.75 kW for ATR 2000	1033803
Overflow sensor for Ultromat® tank	1021604
Vibrator for powder feeder	1033808

## 6 Polymer Batching and Metering Systems Ultramat<sup>®</sup>

### Technical Data

<b>Discharge volume</b>	<b>l/h</b>	<b>400</b>	<b>1,000</b>	<b>2,000</b>
<b>Tank volume</b>	<b>l</b>	<b>400</b>	<b>1,000</b>	<b>2,000</b>
<b>Diluent water max.</b>	<b>l/h</b>	<b>1,500</b>	<b>1,500</b>	<b>3,000</b>
<b>Water pressure</b>	<b>bar</b>	<b>3 – 5</b>	<b>3 – 5</b>	<b>3 – 5</b>
<b>Powdered polymer</b>	<b>kg/h</b>	<b>0.8–18</b>	<b>0.8–18</b>	<b>0.8–18</b>
<b>Length</b>	<b>mm</b>	<b>2,164</b>	<b>2,464</b>	<b>2,950</b>
<b>Width</b>	<b>mm</b>	<b>883</b>	<b>983</b>	<b>1,157</b>
<b>Height</b>	<b>mm</b>	<b>1,216</b>	<b>1,566</b>	<b>1,716</b>
<b>Water connection</b>	<b>"</b>	<b>1</b>	<b>1</b>	<b>1</b>
<b>Discharge nozzle DN</b>	<b>mm</b>	<b>25</b>	<b>25</b>	<b>32</b>
<b>Voltage/Frequency</b>	<b>VAC/Hz</b>	<b>400/50</b>	<b>400/50</b>	<b>400/50</b>
<b>Power uptake</b>	<b>kW</b>	<b>1.5</b>	<b>2.6</b>	<b>3.2</b>

# 6 Polymer Batching and Metering Systems Ultromat®

## 6.8 Metering System POLYMORE

The POLYMORE in-line batching station creates homogeneous and ready-to-use polymer solutions. Capacity range of up to 18,000 l/h



The metering system POLYMORE is the inline batching station in which the liquid polymer is introduced into the pressure-encapsulated multi-zone mixing equipment through a peristaltic pump. The result is a prepared and homogeneous polymer solution.

The POLYMORE metering system is an inline polymer batching system for processing liquid polymers. The unit was designed for wall-mounting and requires little space. Only water, liquid polymer and supply voltage need to be connected to the unit for commissioning. If the maturing time is not sufficient for certain applications, a maturing tank with stirrer and metering pump can be fitted downstream.

### Your benefits

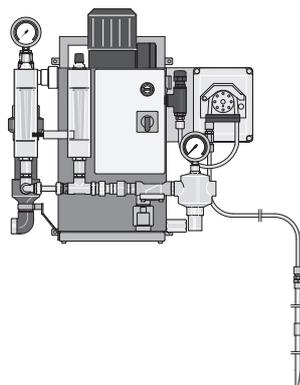
- Wall mounting: Saves space
- Low-maintenance peristaltic pump for metering the liquid polymer
- Simple and quick to connect Requires only water, liquid polymer and power
- Downstream installation of a maturing tank with stirrer and metering pump is possible if the maturing time is insufficient for certain applications
- Automatic control
- Pressure-encapsulated mixing system for the effective production of polymer solutions
- Waterside equipment includes pressure reducer and solenoid valve
- Re-dilution unit with static mixer and manometer
- Manual or 4-20 mA control of the peristaltic pump

### Technical details

- Peristaltic pump for metering liquid polymer
- Water apparatus includes pressure reducer and solenoid valve
- Pressure-encapsulated mixing system for the effective production of polymer solution
- Re-dilution unit with static mixer and manometer
- Controller for the automated control of the device. Manual or 4-20 mA control of the peristaltic pump

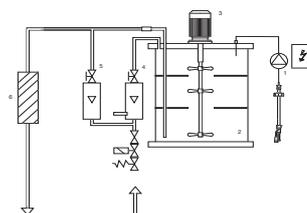
### Field of application

- Waste water treatment
- Sludge de-watering
- Paper production



pk\_7\_091

	Diluent water max. l/h	Metering output liquid polymer kg/h	Order no.
<b>POLYMORE mini 2-0.08</b>	120	0.08	1029568
<b>POLYMORE mini 3-0.6</b>	180	0.60	1029570
<b>POLYMORE mini 5-0.6</b>	300	0.60	1029571
<b>POLYMORE mini 5-1.2</b>	300	1.20	1029572
<b>POLYMORE mini 10-1.2</b>	600	1.20	1029574
<b>POLYMORE mini 10-2.4</b>	600	2.40	1029575
<b>POLYMORE mini 30-3.0</b>	1,800	3.00	1029576
<b>POLYMORE duo 40-6.0</b>	2,400	4.00	1029577
<b>POLYMORE duo 65-9.0</b>	3,900	8.00	1029579
<b>POLYMORE midi 100-12</b>	6,000	12.00	1029580
<b>POLYMORE midi 160-24</b>	9,600	20.00	1029581
<b>POLYMORE maxi 300-54</b>	18,000	50.00	1029584



- 1 Peristaltic pump
- 2 Mixer unit
- 3 Stirrer
- 4 Diluent water
- 5 Diluent water
- 6 Static mixer

AP\_UL\_0002\_SW

# 6 Polymer Batching and Metering Systems Ultramat®

## 6.9 Metering System PolyRex



**PolyRex can do more: Processes liquid and powdered polymers.**

**Capacity range of up to 3,820 l/h**

The metering system PolyRex is a double-decker batching station for the processing of liquid and powdered polymers. It consists of the feed and mixer unit and the two stainless steel double-decker tanks. The polymers used are ideally utilised.

The upper storage tank is the batching/maturing tank. The lower tank is the storage tank for the prepared polymer solution. The powdered polymer is transported to the powder metering unit by a vacuum conveyor and mixed with water in the underlying mixer unit. The solution is then transferred to the upper storage tank (batching/maturing tank) using the water pressure of the diluting water. After maturing, the solution can be transferred to the bottom storage tank via the motorised valve. If liquid polymers are used, a switch is made to the Spectra eccentric screw pump. The system is automatically controlled by a Siemens PLC Programmable Logic Controller S7.

### Your benefits

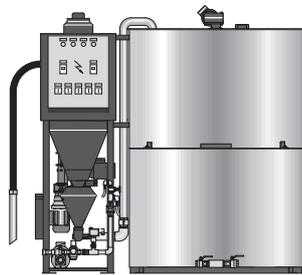
- Optimum utilisation of the polymer used
- Double screw metering unit enables low-pulsation metering with a high level of metering precision
- Optimal re-dilution with highly effective static mixers
- Optional: Automatic filling of the powder silo by vacuum filler
- Pressure reducer provides for a constant water supply
- Effective mixing of the polymer solution with the stainless steel design
- The system is automatically controlled by a Siemens PLC Programmable Logic Controller S7.

### Technical details

- Vacuum conveyor and powder metering unit for the metering of powdered polymers and an eccentric screw pump to meter liquid polymers
- Water apparatus with wetting cone and injector to produce an effective and homogeneous polymer solution from powdered polymers (modified apparatus when using liquid polymers)
- Double-decker storage tank made of stainless steel for maturing and storing the polymer solution
- Motorised valve to dispense the solution into the storage tank
- Stirrer in the upper storage tank for the gentle mixing of the polymer solution
- Control cabinet with S7 control for the automatic control of the system

### Field of application

- Waste water treatment
- Sludge de-watering
- Paper production



pk\_7\_092

	Tank volume m <sup>3</sup>	Discharge volume l/h	Metering output liquid polymer kg/h
<b>PolyRex 0.6</b>	2 x 0.3	240	1.2
<b>PolyRex 1.0</b>	2 x 0.6	460	2.3
<b>PolyRex 2.0</b>	2 x 1.0	940	4.7
<b>PolyRex 3.0</b>	2 x 1.5	1,280	6.4
<b>PolyRex 4.0</b>	2 x 2.0	1,900	9.5
<b>PolyRex 5.4</b>	2 x 2.7	2,400	12.0
<b>PolyRex 6.6</b>	2 x 3.3	3,200	16.0
<b>PolyRex 8.4</b>	2 x 4.2	3,820	19.2

# 6 Polymer Batching and Metering Systems Ultromat®

## 6.10 Metering System Ultromat® MT for Batch Operation

**This manual polymer batching station is worthwhile if you only work with small quantities.**  
Capacity range 120 – 3,800 l/h



Manual polymer batching station Ultromat® MT: Perfect metering system for the processing of small quantities of liquid and powdered polymers: extremely robust and cost-effective.

The Ultromat® MT is ideal for individually batching polymer solutions where there is no need for automatic operation. The powdered polymer is added manually through the wetting cone to the maturing tank and mixed by the stirrer. After the maturing time, the flocculant solution can then be metered into the application.

**Your benefits**

- Ideal for use where there is no need for continuous operation
- Manual addition of flocculants
- Robust and cost-effective
- Round polypropylene batching tank
- Flushing system with wetting cone and injector
- Gentle mixing of the polymer solution

**Technical details**

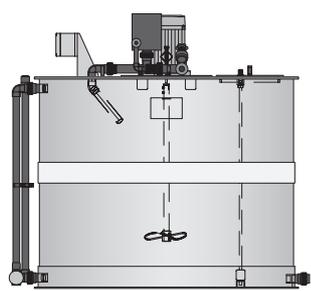
- Slowly-running stirrer
- Flushing system
- Level switch (Low flow, Min, Max contact)
- Terminal box

**Field of application**

Waste water treatment, sludge dewatering

**The systems consist of:**

- 1 PP batching tank
- 1 Flushing system for flushing and wetting the powder with wetting cone, injector and fitting set for the dilution water
- 1 Slow-running electric stirrer
- 1 Level switch with three switching points
- 1 Terminal box



P\_UL\_0025\_SW1

**Ultromat® MT**

		<b>Order no.</b>						
<b>MT 140, stirrer 0.18 kW</b>		1037073						
<b>MT 250, stirrer 0.55 kW</b>		1037094						
<b>MT 500, stirrer 0.75 kW</b>		1037095						
<b>MT 1000, stirrer 1.1 kW</b>		1037096						
<b>MT 2000, stirrer 2.2 kW</b>		1037097						
<b>MT 3000, stirrer 2.2 kW</b>		1037098						
<b>MT 4000, stirrer 3 kW</b>		1037099						

**Technical Data**

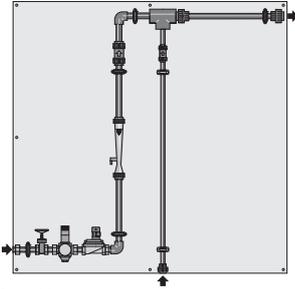
Type		MT 140	MT 250	MT 500	MT 1000	MT 2000	MT 3000	MT 4000
<b>Discharge volume</b>	l/h	120	210	440	920	1,890	2,850	3,800
<b>Tank volume</b>	l	120	210	440	920	1,890	2,850	3,800
<b>Diameter of tank</b>	mm	640	650	850	1,260	1,460	1,770	1,650
<b>Height of tank</b>	mm	714	1,116	1,018	1,016	1,518	1,620	2,072
<b>Height</b>	mm	1,003	1,405	1,309	1,320	1,875	1,998	2,496
<b>Water connection DN</b>	mm	20	20	20	25	32	40	40
<b>Discharge nozzle DN</b>	mm	20	20	20	25	32	40	40
<b>Voltage/Frequency</b>	VAC/Hz	400/50	400/50	400/50	400/50	400/50	400/50	400/50
<b>Power uptake</b>	kW	0.18	0.55	0.75	1.10	2.20	2.20	3.00

The systems are also available with flushing water fitting, level indicator and switchgear.

# 6 Polymer Batching and Metering Systems Ultromat®

## 6.11 Ultromat® Accessories

### Ultromat® VS dilution unit



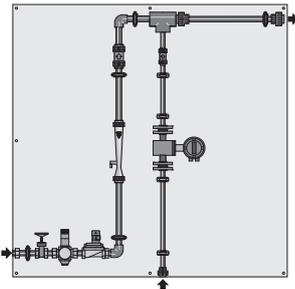
pk\_7\_030

Ultromat® dilution units are pre-assembled turnkey units for the dilution of polymer solutions, essentially comprising:

- 1 Water fitting for the dilution water with manual stop tap, pressure release valve, solenoid valve 24 V DC and flow meter float including minimum contact
- 1 Pipe for the polymer solution to be diluted including non-return valve
- 1 Static mixer for mixing stock solution with the dilution water

	Process solution	Order no.
<b>VS 1000</b>	1,000 l/h	1021386
<b>VS 2000</b>	2,000 l/h	1021387
<b>VS 5000</b>	5,000 l/h	1021388
<b>VS 10000</b>	10,000 l/h	1021389
<b>VS 20000</b>	20,000 l/h	1021390
<b>VS 30000</b>	30,000 l/h	1021391
<b>VS 50000</b>	50,000 l/h	1021392

### Ultromat® VS-IP dilution unit with flow meter



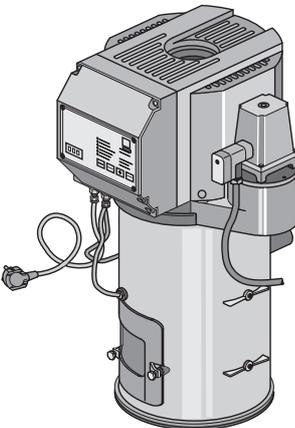
pk\_7\_031

The Ultromat® dilution units are pre-assembled turnkey units for the dilution of polymer solutions, essentially comprising:

- 1 Water fitting for the dilution water with manual stop tap, pressure release valve, solenoid valve 24 V DC and flow meter float including minimum contact
- 1 Pipe for the polymer solution to be diluted including non-return valve and inductive flow meter
- 1 Static mixer for mixing stock solution with the dilution water

	Process solution	Order no.
<b>VS 1000 IP</b>	1,000 l/h	1021490
<b>VS 2000 IP</b>	2,000 l/h	1021491
<b>VS 5000 IP</b>	5,000 l/h	1021492
<b>VS 10000 IP</b>	10,000 l/h	1021493
<b>VS 20000 IP</b>	20,000 l/h	1021494
<b>VS 30000 IP</b>	30,000 l/h	1021495
<b>VS 50000 IP</b>	50,000 l/h	1021496

### Ultromat® powder conveyor FG 205



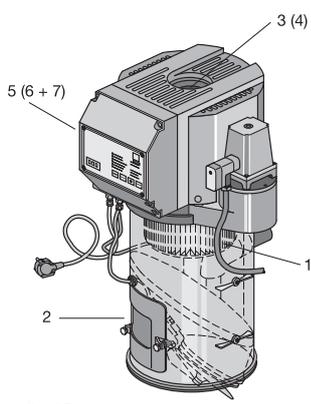
pk\_3\_032

The Ultromat® powder conveyor205 is used to refill the powder feeder in Ultromat® systems with commercially available powdered polymers. With the aid of a suction hose and suction lance, the powder is sucked out of the storage container (Big-Bag, powder storage tank) into the powder conveyor and via a flap into the powder feed screw of the polymer diluting station. The powder conveyor is self-operating and simply requires a 230 V DC terminal. External control contacts are not necessary. Depending upon the powder quality, approx. 75-90 kg of powder polymer can be conveyed per hour. The 4 m feed tube and suction nozzle are included as standard.

	Feed rate	Order no.
<b>Powder conveyor FG 205 230 VAC/50 Hz</b>	75 – 90 kg/h	1000664
<b>Powder conveyor FG 205 230 VAC/60 Hz</b>	75 – 90 kg/h	1061422

# 6 Polymer Batching and Metering Systems Ultramat®

## Spare parts for the FG 205 powder conveyor

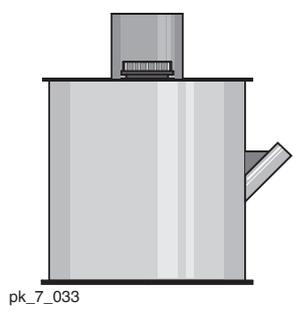


- pk\_2\_105
- 1 Filter cartridge
  - 2 Filter mat
  - 3 Fan
  - 4 Carbon brushes, set
  - 5 Control

	Order no.
Filter cartridge 0.2 m <sup>2</sup>	1010773
Filter insert	1010774
Fan	1036770
Set of carbon brushes	1036771
Control	1050453
Set of carbon brushes (till 2012/08)	1010769

## Powder pre-storage tank

The powder pre-storage tank is used for interim storage of powdered polymers that are delivered in Big-Bags. The Big-Bag is suspended over the tank on a frame and emptied into the powder pre-storage tank.

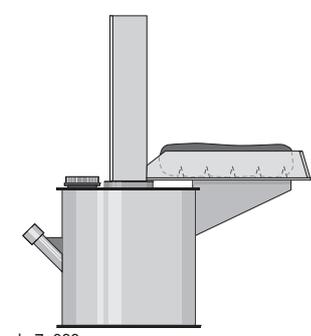


pk\_7\_033

	Tank volume	Order no.
Powder pre-storage tank	280 l	1005573

## Powder pre-storage tank with bag tipper

The powder pre-storage tank with bag tipper is used for interim storage of powdered polymers delivered in 25 kg sacks.



pk\_7\_060

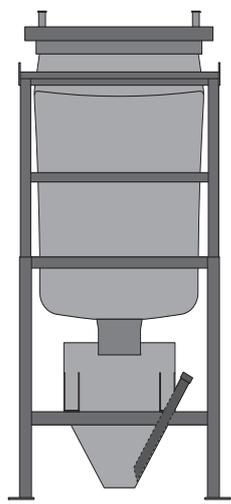
	Tank volume	Order no.
Powder pre-storage tank with bag tipper	280 l	1025137

## Big Bag emptying Unit

This emptying unit is used to accommodate and empty Big Bags weighing up to 1,000 kg. The Big Bags are suspended in the frame with the aid of a lifting cross bar. The 30-litre powder storage tank is used to transfer the powder into a feed unit.

The emptying unit consists of the following components:

- Frame 1570 x 1300 x 2540 mm (WxLxH). The height can be adjusted up to 2040 mm
- Suspension cross bar
- Powder storage tank with powder filling sensor, 30-litre content



P\_UL\_0021\_SW

	Tank volume	Order no.
Big Bag Emptying Unit	30 l	-



# 7 Membrane Technology and Membrane Filtration

## 7.1 Overview of Membrane Technology

### Systems for membrane filtration

In water treatment, membrane filtration is the process for removing particles and salts in the water ensuring the lowest operating costs. ProMaqua offers versatile and high-quality system technology in this field. This is complemented by the extensive ProMaqua® product range to produce customer-specific complete solutions.

Membrane filtration is a physical process to separate substances with the help of semi-permeable membranes. There are four types of processes, depending on the size of the particles/molecules to be removed:

- Microfiltration
- Ultrafiltration
- Nanofiltration
- Reverse osmosis

The following table shows the separation limits of the individual processes:

	<b>Microfiltration</b>	<b>Ultrafiltration</b>	<b>Nanofiltration</b>	<b>Reverse osmosis</b>
Particle size	> 0.1 µm	0.1 – 0.01 µm	0.01 – 0.001 µm	< 0.001 µm
Particle type	Suspended particles, colloidal turbidity, oil emulsions	Macromolecules, bacteria, cells, viruses, proteins	Low-molecular organic compounds, ions	Ions

ProMaqua experts, with their detailed industry knowledge, are not only able to put together the optimum system for the relevant application but also deliver complete water treatment solutions from one source, supported by the extensive ProMinent product range.

# 7 Membrane Technology and Membrane Filtration

## 7.2 Performance Overview of Ultrafiltration

Ultrafiltration is a membrane process which is increasingly used in water treatment to separate undesired water components. Parasites, bacteria, viruses and high-molecular organic substances as well as other particles are retained.

The applications of ultrafiltration are widespread and may include different types of water.

Typical applications include drinking water, river water, process water, swimming pool water, salt water and waste water.

The tasks range from potable water purification to meet physical and microbiological limit values in accordance with the German Drinking Water Ordinance up to the pre-treatment of seawater for desalination by reverse osmosis.

The systems are matched to a specific task by individually selecting the membrane type and the operating mode. ProMaqua<sup>®</sup> uses extremely robust and resistant UF membranes and the dead-end principle to ensure optimisation with regard to investment costs, required space and operating costs. With this selection, all raw waters with the exception of waste water can be filtered largely without using chemicals.

The dead-end operation represents the standard operating mode. The raw water flows into the capillaries. The pure water (filtrate) passes through the membrane while the other constituents are retained on the surface of the membrane.

The constituents form a layer on the membrane. The membrane is backwashed fully automatically in regular intervals to remove the filter cake.

### Ultrafiltration systems basically consist of:

- Stainless steel or high-grade coated steel rack
- Pre-filter to protect the membranes, if required. This filter can optionally be designed as a backwashing filter.
- UF membrane modules
- Pneumatically controlled valves made of high-quality materials
- Electronic pressure measurement
- Filtration pump and backwash pump with frequency converter made of suitable high-quality materials
- Magnetically inductive flow metering to control the flow rates for filtration and backwashing.
- Integrated filling system for the backwash water tank. The backwash water tank is also integral to small systems. With larger systems, tanks from our product range can be integrated or an application-specific solution found depending on the customer's requirements.
- PLC control with touch screen panel or microprocessor control unit.  
The PLC control simultaneously monitors all important parameters, such as pressure, pressure difference and flow rates. This ensures that the membranes are optimally protected. The control of pre- and post-treatment processes can be integrated, if required.

### Advantages of ultrafiltration systems

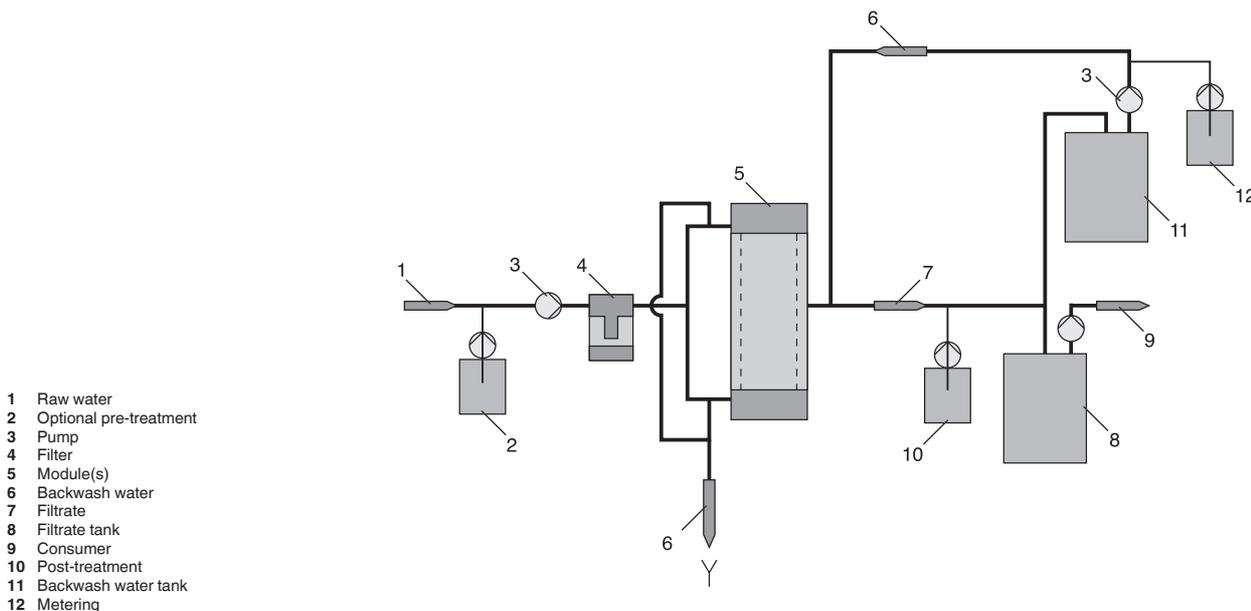
- Filtrate values of less than 0.1 NTU independent of the turbidity of the raw water.
- Molecular weight cut off of the diaphragms (MWCO) approx. 100 kDa (kilodalton).
- Best possible retention rates for bacteria (99.9999 %) and viruses (99.99 % based on MS2 phages).
- Very easy to use and simple to combine with other systems owing to PLC Programmable Logic Controller with touch screen.
- Optimum operating processes due to modern measuring and control technology.
- Complete solutions with perfectly coordinated pre- and post-treatment are available on request.

# 7 Membrane Technology and Membrane Filtration

## Areas of application of ultrafiltration systems

Typical areas of application include the removal of particles, turbidity and pathogens in public or private potable water supplies. Ultrafiltration is predominantly used for the treatment of fresh water, in particular surface water, spring water or well water. In principle, brackish water and salt water can also be treated, e.g. as pre-treatment for subsequent desalination by nanofiltration or reverse osmosis. Further areas of application include the treatment of swimming pool water, process water from the food and beverage industry.

A typical general system layout is shown below:



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Our engineers use their wide experience in water treatment to determine the ultrafiltration system to meet the specific raw water requirements. If desired and/or required, the best-suited pre- and post-treatment is also defined. Numerous further ProMinent® and ProMaqua® products are available for this purpose. Thus, customers are offered a complete package of solutions from one single source.

The filtration capacity of ultrafiltration systems ranges from 1 to 80 m<sup>3</sup>/h. Other capacities are available on request. Please contact us, we will be glad to assist you.

# 7 Membrane Technology and Membrane Filtration

## 7.3 Nanofiltration System Dulcosmose® NF



### Partial desalination for industrial applications - compact and cost-effective

#### Permeate outputs from 1 to 50 m³/h, higher outputs possible on request

As a nanofiltration system, the Dulcosmose® NF, a compact and value-for-money unit, can take over partial desalination in industrial applications. Maximum permeate output at low operating pressures ensures low investment and operating costs thanks to the latest "ultra low pressure" diaphragm.

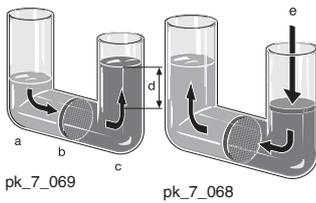
Equipped with the latest generation of "ultra low-pressure" diaphragms, this system achieves maximum permeate performance with low operating pressures and high outputs, thereby lowering investment and operating costs.

As the system runs with low operating pressures, the entire system can be fitted with inexpensive PVC pipework. This system is also available with an integral, semi-automated cleaning system and permeate and/or raw water flushing option.

The system can easily be adapted to meet specific customer requirements. Pipework material, other types of diaphragm for enhanced salt retention or discoloration, integration of measuring and control technology (such as conductivity, redox potential or pH measurement) and metering technology (in pre- and post-treatment) to visualisation of the entire process with peripheral components on a PLC.

#### Your benefits

- Efficient operation with a low pressure diaphragm with outputs of up to 85% and high salt retention rates of up to 90% (depending on the type of diaphragm used).
- Reduced maintenance and service costs, as well as long diaphragm service lives, thanks to integrated cleaning concepts and flushing options.
- Optional permeate flushing of the entire system, including the diaphragms, after switching off to avoid deposits and extend the life of the diaphragms.
- Best ProMinent manufacturing quality: High proportion of in-house manufacturing.
- Pure quality: Use of long-life, high-quality components.
- Service-friendly construction of systems on a corrosion-resistant powder-coated steel or stainless steel frame.
- Simple and safe to operate: Microprocessor control with direct connection option for peripheral system components and integrated conductivity measurement with plain text display in the graphic display.
- One-stop shop: no interface problems, smooth running with short times between definition of the task to joint commissioning and on-site system supervision with our global subsidiaries.



pk\_7\_069  
pk\_7\_068

a Diluted solution (permeate)  
b Semi-permeable membrane  
c Concentrated solution (concentrate)  
d Hydrostatic head corresponding to the osmotic product  
e Pressure

Osmosis                      Nanofiltration

#### Technical details

- Turnkey systems constructed on a high-quality, double powder-coated steel or stainless steel frame.
- Highly efficient low-pressure diaphragms with maximum output and system retention rates, built into epoxy-glass resin or stainless steel pressure pipes
- Pre-filter 5 µm with manometer for determining differential pressure
- Pressure switch to protect the high-pressure pump
- Flow meter to display permeate, concentrate and concentrate return volume
- Semi-automatic cleaning system for chemical module cleaning for long module service lives
- Central control for the entire system and peripheral components by the company's own microprocessor controller with graphic display and integrated temperature-compensated conductivity measurement.
- Optional permeate flushing of the entire system, including the diaphragms, after switching off
  - 2 switching inputs for level control of the cleaning tank
  - 2 switching inputs for level control of the permeate tank
  - Pause switching input for external On/Off
  - External fault switching input
  - Temperature measuring input (PT 100)
  - Active permeate valve output (filling of cleaning tank)
  - Active output for flushing valve for initial permeate disposal (depending on conductivity), raw water, permeate and interval flushing (idle time management)
  - Active output for controlling a metering pump (anti-scalant)
  - Analogue output 0/4...20 mA conductance
- Optional industrial PLC with touch panel and process visualisation

# 7 Membrane Technology and Membrane Filtration

## Field of application

- Low-cost alternative to reverse osmosis systems for special desalination tasks, such as the elimination of multiple charged ions or the removal of dyes
- Partial water softening or water softening in public drinking water
- Partial desalination in the chemical and pharmaceutical industry, food and beverage industry, metal processing industry and in electroplating

Nanofiltration is based on the same principle as reverse osmosis. The difference: The separation limit is slightly lower. Admittedly this type of membrane filtration retains ions dissolved in water, but to a significantly lesser extent than with reverse osmosis. Ultimately that saves operating costs.

Typical salt retention rates are around 80 – 90%. Multi-value ions (e.g. Ca and Mg) are retained better than single-value ions (e.g. Na, K) so that nanofiltration systems are often also used as an alternative to traditional water softening.

In principle with nanofiltration, the raw water to be softened is introduced into a chamber, separated by a semi-permeable diaphragm. An artificial pressure is generated in the chamber against the osmotic pressure gradient. The diaphragm is permeable to pure water and smaller ions. All other components of the water are retained. This produces partially softened water (permeate) and a concentrated solution (concentrate). ProMaqua uses high-quality nanofiltration diaphragms for this process.

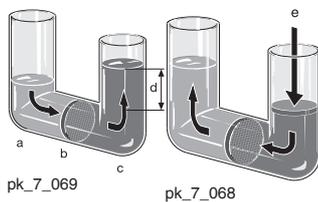
# 7 Membrane Technology and Membrane Filtration

## 7.4 Performance Overview of Reverse Osmosis

Reverse osmosis is a sub-sector within membrane filtration. It is the process with the highest separation limit and represents the reversal of the natural process of osmosis. It is therefore used as a method for desalinating aqueous solutions. With suitable high-performance diaphragms, it is possible today to remove over 99% of all salts from an aqueous solution.

In principle with reverse osmosis, the raw water to be softened is introduced into a chamber, separated by a semi-permeable diaphragm. An artificial pressure is generated in the chamber against the osmotic pressure gradient. As the diaphragm is only permeable to pure water, not to the ions and other particles dissolved in it, a proportion of pure desalinated water (permeate) and a proportion of concentrated solution (concentrate) is produced from the raw water. ProMaqua uses high-quality low-pressure diaphragms for this process.

### Basically, Dulcosmose<sup>®</sup> Reverse Osmosis Systems Consist of:



pk\_7\_069      pk\_7\_068

a Diluted solution (permeate)  
b Semi-permeable membrane  
c Concentrated solution (concentrate)  
d Hydrostatic head corresponding to the osmotic product  
e Pressure

Osmosis      Reverse Osmosis

- Stainless steel, PP or powder-coated steel frame
- Pre-filter 5 µm
- High-quality inlet valve, made of appropriate materials, depending on the salt content of the raw water
- Pressure switch to protect the high-pressure pump
- High-pressure pump, made of suitable high-grade materials, depending on the salt content of the raw water
- Low-pressure diaphragms, designed as spiral winding modules, integrated into epoxy-glass resin pressure pipes
- Float flow meter and manometer
- Stainless steel control and regulating valves to regulate pressure and concentrate
- ProMaqua's own conductivity measuring cell and reverse osmosis control with diverse programming options also for controlling external pre- or post-treatment components
- Semi-automatic chemical cleaning system

### Advantages of Dulcosmose<sup>®</sup> Reverse Osmosis Systems

- Simple and reliable operation, thanks to modern microprocessor control with integrated conductivity measurement and clear text display of the operating status
- Efficient operation with pure water output of up to 85% and separation of more than 99% of dissolved ions
- Minimal energy consumption by the use of "low energy" reverse osmosis diaphragms and energy recovery from the concentrate flow (salt water desalination)
- Long service lives of the diaphragms, thanks to integrated cleaning concept and permeate and/or raw water flushing option
- Well thought-out, service-friendly construction of the systems on stainless steel or PP frames or made of powder-coated steel
- Minimal investment and operating costs, as components are used, optimised and matched to the individual case
- On request, complete solutions with precisely coordinated pre- and post-treatment, such as ProMinent metering and measuring and control technology, i.e. simple networking, perfect operation and overall monitoring of the different components of the system

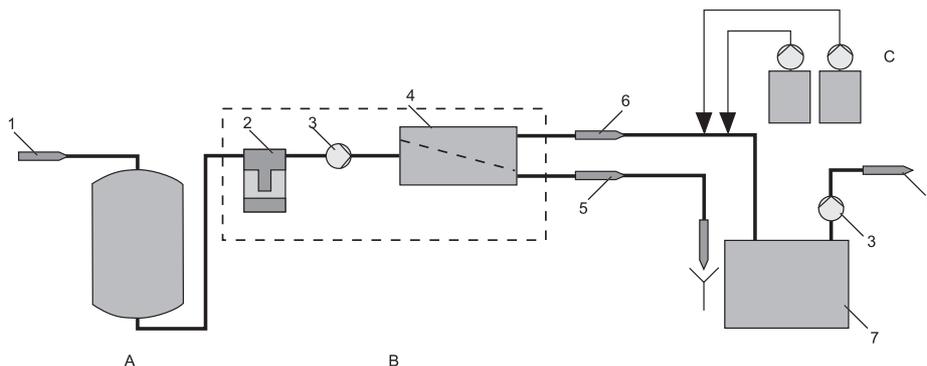
# 7 Membrane Technology and Membrane Filtration

## Applications of Dulcosmose® Reverse Osmosis Systems

Typical applications are desalination duties in municipal or private potable water supply, in the chemical and pharmaceutical industries, food and beverage industry, metal processing industry, electroplating, in boiler feed water treatment and in power stations, for example.

A typical general plant diagram is shown below:

- 1 Raw water
- 2 Filter
- 3 Pump
- 4 Module(s)
- 5 Concentrate
- 6 Permeate
- 7 Permeate tank
- 8 User
- A Pre-treatment
- B Reverse osmosis
- C Post-treatment



pk\_7\_067

Basically, three types of raw water with different salt contents can be considered for desalination:

- Potable water (typically up to 1,000 mg/l)
- Brackish water (typically up to 2,000 - 5,000 mg/l)
- Sea water (typically higher than 35,000 mg/l)

Our engineers use their years of experience in the treatment of this raw water to determine - based on the particular raw water analysis - the optimum version of reverse osmosis plant for the customer. At the same time, the most suitable pre-treatment and post-treatment stages are selected using other ProMinent® products. So a complete package is put together for the customer, from a single source. One of our specialities here is the supply of complete plants installed in a standard transport container.

ProMaqua also has wide experience in building other special plants, e.g. two-pass plants for higher permeate quality requirements. Please contact us - we'll be happy to advise you.



Type	ecoPRO	TW	BW	SW
Permeat-output [m³/h]	50	25	10	5
	2,5	1	0,5	0,25
	1	0,5	0,25	0,1
Salinity Drinking water	< 1.000 mg/l	< 1.000 mg/l	< 5.000 mg/l	< 40.000 mg/l

P\_PMA\_MT\_0002\_SW

# 7 Membrane Technology and Membrane Filtration

## 7.5 Questionnaire

### 7.5.1 Questionnaire on the Design of a UF System

- Application:**
- Drinking water production
  - Process water for food/beverage industry
  - Circulation water for swimming pools
  - Flushing water for swimming pools
  - Other: \_\_\_\_\_

- Type of raw water**
- Drinking water
  - Surface water (lake, river water)
  - Source water
  - Ground water
  - Brackish water, sea water

**Design principles: (please state maximum (peak), minimum and average values)**

- |  |  |
|--|--|
| Clear water requirement: _____ m <sup>3</sup> /h   | Chloride: _____ ppm  |
| Clear water requirement: _____ m <sup>3</sup> /day | Iron in solution: _____ ppm  |
| Temperature: _____ °C                              | Particular iron: _____ ppm   |
| Turbidity: _____ NTU                               | Manganese in solution: _____ ppm                                       |
| COD: _____ ppm                                     | Particular manganese: _____ ppm  |
| TOC/DOC: _____ ppm                                 | Fluctuations? Yes <input type="checkbox"/> No <input type="checkbox"/> |
| Total hardness: _____ °dH                          |  |

**Remarks (current pre-treatment, special requirements)**

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# 7 Membrane Technology and Membrane Filtration

## 7.5.2 Questionnaire on the Design of an RO System

Clean water requirement: _____ m <sup>3</sup> /h	Available space HxWxD: _____ m
Clean water requirement: _____ m <sup>3</sup> /day	Location of the system: _____ Floor
Operating hours: _____ h/day	Location of the users: _____ Floor
Required clean water pressure: _____ bar	Existing clean water tank: _____ m <sup>3</sup>
Raw water temperature, min./max.: _____ °C	Existing clean water pump: _____ m <sup>3</sup> /h _____ bar
<b>Required quality of clean water:</b>	Lift <span style="float:right">yes <input type="checkbox"/></span> <span style="float:right">no <input type="checkbox"/></span>
Conductivity: _____ µS/cm	H x W x D: _____ mm
pH value: _____	Door dimensions
<b>Bacteriological quality:</b>	H x W _____ mm
Drinking Water Directive <input type="checkbox"/>	Crane on site: <span style="float:right">yes <input type="checkbox"/></span> <span style="float:right">no <input type="checkbox"/></span>
Germ-free and sterile <input type="checkbox"/>	Lifting capacity: _____ t
Intended use of clean water: _____	Raw water pressure: _____ bar
<b>Type of raw water:</b>	Raw water connection: _____ "
Drinking water <input type="checkbox"/>	Clean water pipes available <span style="float:right">yes <input type="checkbox"/></span> <span style="float:right">no <input type="checkbox"/></span>
Well water <input type="checkbox"/>	Material: _____ Ø _____ "
Brackish water <input type="checkbox"/>	Mains voltage: _____ V/Hz
Lake water <input type="checkbox"/>	
or _____ <input type="checkbox"/>	
Fluctuations: <span style="float:right">yes <input type="checkbox"/></span> <span style="float:right">no <input type="checkbox"/></span>	
<b>State fluctuations:</b>	
Conductivity: _____ µS/cm	HCO <sub>3</sub> : _____ mg/l
pH value: _____	SO <sub>4</sub> : _____ mg/l
Ca: _____ mg/l	Cl: _____ mg/l
Mg: _____ mg/l	NO <sub>3</sub> : _____ mg/l
K: _____ mg/l	F: _____ mg/l
Na: _____ mg/l	PO <sub>4</sub> : _____ mg/l
Ba: _____ mg/l	CO <sub>2</sub> (free): _____ mg/l
Sr: _____ mg/l	SiO <sub>2</sub> : _____ mg/l
Fe: _____ mg/l	COD*: _____ mg/l
Mn: _____ mg/l	
Al: _____ mg/l	

\*COD = chemical oxygen demand

# 7 Membrane Technology and Membrane Filtration

## 7.6 Ultrafiltration System Dulcoclean® UF

### 7.6.1 Ultrafiltration Systems Dulcoclean® UF

Pure, crystal-clear potable water at all times

8 – 75 m<sup>3</sup>/h filtrate output



Ultrafiltration system Dulcoclean® UF reliably and safely uses diaphragm technology to remove turbidity, particles and microbiological contamination.

The ultrafiltration system Dulcoclean® UF is used in water treatment to separate the finest particles and turbidity. The diaphragms provides a sterile barrier, so that bacteria, parasites and viruses are safely removed from the water – even with fluctuating water quality, as can occur after heavy rainfall. The quality of the filtrate remains consistently good! In potable water treatment, the filtration process is ideally used before final disinfection.

In regular cycles, back washes are performed to prevent blockages in the modules. Cleaning is supported by the addition of chemicals, where necessary, and adapted to the raw water quality present

#### Your benefits

- Very high retention rates for bacteria and viruses (based on MS2 phages) of 99.999% and/or 99.99%
- Minimal consumption of energy and water by economical dead-end operation
- Maximum operational reliability due to fully automated system control with PLC and data storage and by user-friendly touch panel with clear process visualisation
- All relevant events are recorded electronically for system optimisation and can be easily evaluated.
- Constant filtrate output and efficient back flushing by speed-controlled filtration and backwash pumps
- Complete solutions with perfectly coordinated pre- and post-treatment and waste water treatment

#### Technical details

- Compact design can be installed in existing plant rooms or in a container
- Fitted with extremely resistant and shatter-proof PES ultrafiltration diaphragms

#### Field of application

- Municipal potable water treatment: Potable water is produced from surface, spring or well water.
- Food and beverage industry: Improved water quality.
- Desalination: Pre-treatment for downstream desalination plants (RO, NF or ion exchange)

Dulcoclean® ultrafiltration systems are suitable for use with the following water values in the feed:

<b>pH range</b>	3.0 ... 12.0
<b>Free chlorine</b>	< 1.2 mg/l
<b>Turbidity</b>	0.5 ... 30 NTU
<b>DOC</b>	0.5 ... 12 mg/l
<b>Suspended solids</b>	50 mg/l

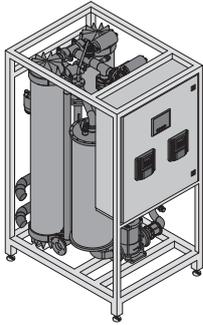
Deviating values influence the performance data and require a separate design of the system. Please contact our experts.

Dulcoclean® type	Filtration capacity* at 15 °C m <sup>3</sup> /h	Approx. backwash water per rinse m <sup>3</sup>	Raw/rinsing water connector [Rp/DN]	Approx. dimensions LxWxH [mm]
UF 2	8 - 15	0.34	1 1/2 "/2 "	1,200 x 920 x 2,100
UF 3	12 - 22.5	0.51	2 "/DN 65	1,600 x 920 x 2,100
UF 4	16 - 30	0.68	2 "/DN 80	1,600 x 920 x 2,100
UF 6	24 - 45	1.02	DN 65/DN 80	2,000 x 920 x 2,100
UF 8	32 - 60	1.36	DN 80/DN 100	2,400 x 920 x 2,100
UF 10	40 - 75	1.70	DN 100/DN 125	2,800 x 920 x 2,100

\* Filtrate performance depends on the water quality

Systems with filtration capacity of more than 18 m<sup>3</sup>/h are designed on a project basis. Offers are available on request. Please contact us.

Optionally available are a fully automatic neutralisation system for the treatment of acid and alkaline backwash water, an integrity test as well as customised data logging.



P\_PMA\_MT\_0003\_SW

# 7 Membrane Technology and Membrane Filtration

## 7.7 Reverse Osmosis System Dulcosmose®

### 7.7.1

### Reverse Osmosis System Dulcosmose® ecoPRO

Potable water desalination for industrial applications - compact and cost-effective

Permeate output 100 – 2,700 l/h



Reverse osmosis system Dulcosmose® ecoPro ensures low investment and operating costs with maximum permeate output at low operating pressures.

As the system runs with low operating pressures, the entire system can be fitted with inexpensive PVC pipework and/or with pressure hoses. The system sizes ecoPRO 600-2,700 are also available with integrated semi-automatic cleaning system and raw water flushing option. The cleaning system can also be simply retrofitted. Equipped with the latest generation of "ultra low-pressure" diaphragms, this system achieves maximum permeate performance with low operating pressures, thereby lowering investment and operating costs.

#### Your benefits

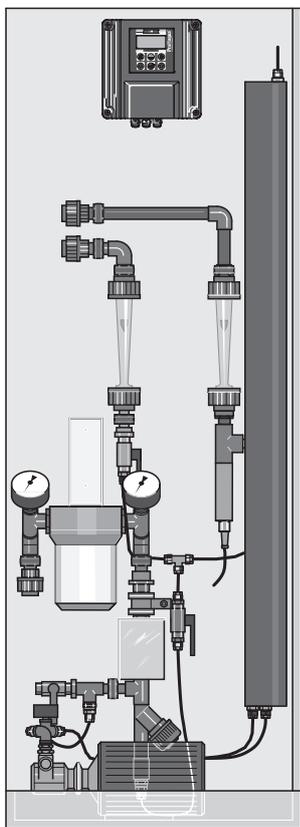
- Efficient operation with low pressure diaphragms with outputs of up to 85% and salt retention rates of up to 97%
- Reduced maintenance and service costs as well as long diaphragm service lives, thanks to integrated cleaning concepts and flushing options
- Service-friendly construction of systems on a corrosion-resistant powder-coated steel or PP frame
- Simple and safe to operate: Microprocessor control with direct connection option for peripheral system components and integrated conductivity measurement with plain text display in the graphic display
- One-stop integration into customised complete solutions by perfectly coordinated pre- and post-treatment from ProMinent.

#### Technical details

- Types ecoPRO 100 – 1,500 are mounted on an extremely stable and corrosion-free PP frame.
- Larger types ecoPRO 1,800 – 2,700 are mounted on a high-quality, double powder-coated steel frame.
- Highly efficient operation with outputs of up to 85% and system retention rates of up to 97% integrated in epoxy-glass resin pressure pipes
- Pre-filter 5µm with manometer for determining differential pressure
- Pressure switch to protect the high-pressure pump
- Flow meter to display permeate and concentrate volume
- Optional semi-automatic cleaning system for chemical module cleaning for long module service lives
- 2 switching inputs for level control of the cleaning tank
- 2 switching inputs for level control of the permeate tank
- Pause switching input for external On/Off
- External fault switching input
- Temperature measuring input (Pt 100)
- Active permeate valve output (filling of cleaning tank)
- Active output for flushing valve for initial permeate disposal (depending on conductivity), raw water, permeate and interval flushing (idle time management)
- Active output for controlling a metering pump (anti-scalant)
- Analogue output 0/4 - 20 mA conductance

#### Field of application

- Power plants: Provision of boiler feed water
- Electroplating / metal processing industry: Provision of rinsing water
- Beverage industry: Provision of rinsing water, product water and process and return dilution water
- Food industry: Provision of rinsing water and process water
- Chemical industry: Provision of rinsing water and process water
- Provision of rinsing water and process water for laboratory purposes and industrial rinsing machines
- Pure water for laboratory applications, hospital uses (autoclaves, high-speed steam generators)
- Feed water for cooling and air conditioning plants (air humidification and air scrubbers)
- Process water in printing plants, the pharmaceutical or cosmetics industry
- Car-washing systems: Provision of rinsing water



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# 7 Membrane Technology and Membrane Filtration

## Dulcosmose<sup>®</sup> ecoPRO reverse osmosis systems on PP rack; capacity range 100-1,500 l/h

This range is the cost-effective standard system for modern potable water desalination. Equipped with the latest generation of “ultra low-pressure” membranes, these systems achieve maximum permeate capacity at low operating pressures, thereby ensuring reduced investment and running costs. The low operating pressures enable the systems to be fitted cost-effectively with PVC pipes or pipes with pressure hoses throughout.

The ecoPRO 600-1500 models are additionally available with an integrated semi-automatic cleaning system and raw water flushing option. The semi-automatic cleaning system can also be simply retrofitted.

The ecoPRO 100-1500 range was designed for the following values in feed water:

<b>Max. salt content ecoPro 100-500</b>	650 mg/l*
<b>Max. salt content ecoPro 600-1,500</b>	1,000 mg/l*
<b>pH range</b>	3.0 ... 10.0
<b>Silt density index max.</b>	3
<b>Free chlorine max.</b>	0.1 mg/l
<b>Total Fe, Mn max.</b>	0.2 mg/l
<b>Total hardness max.</b>	0.1 °dH
<b>Bacteria count max.</b>	100 KBE/ml
<b>Turbidity max.</b>	0.5 NTU
<b>COD max.</b>	5 mg/l**

\* Differing salinities affect the performance data accordingly

\*\* As O<sub>2</sub>

### Systems with 2.5" or 4" diaphragms, system salt retention 90-97%

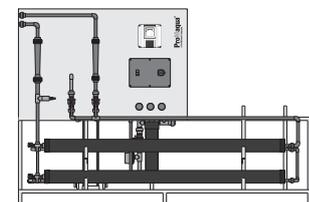
Plant	Permeate capacity at 15 °C water temperature l/h	Number of 2.5" and 4" membranes No.	Connected load kW	Dimensions H x W x D mm	Weight kg
ecoPRO 100	100	1	0.37	1,400 x 500 x 320	47
ecoPRO 200	200	2	0.55	1,400 x 500 x 320	63
ecoPRO 300	300	1	1.10	1,500 x 600 x 400	88
ecoPRO 550	550	2	1.10	1,500 x 600 x 400	112
ecoPRO 600	600	2	1.50	1,650 x 700 x 720	167
ecoPRO 900	900	3	1.50	1,650 x 700 x 720	192
ecoPRO 1200	1,200	4	1.50	1,650 x 700 x 720	217
ecoPRO 1500	1,500	5	2.20	1,650 x 700 x 720	243

# 7 Membrane Technology and Membrane Filtration

## Dulcosmose® ecoPRO reverse osmosis systems on powder-coated steel rack; capacity range 1,800-2,700 l/h

This range is the standard model for modern potable water desalination. Equipped with the latest generation of "ultra-low-pressure" membranes, these systems guarantee maximum permeate output at low operating pressures and thus low investment and operating costs. The low operating pressures enable cost-effective PVC pipes to be used. These systems are also available with an integrated semi-automatic cleaning system and with raw water flushing option.

The ecoPRO 1800-2700 range was designed for the following values in feed water:



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<b>Salt content max.</b>	1,000 mg/l*
<b>pH range</b>	3.0 ... 10.0
<b>Silt density index max.</b>	3
<b>Free chlorine max.</b>	0.1 mg/l
<b>Total Fe, Mn max.</b>	0.2 mg/l
<b>Total hardness max.</b>	0.1 °dH
<b>Bacteria count max.</b>	100 KBE/ml
<b>Turbidity max.</b>	0.5 NTU
<b>COD max.</b>	5 mg/l**

\* Differing salinities affect the performance data accordingly

\*\* As O<sub>2</sub>

### Systems with 4" diaphragms, system salt retention 90-97%

Plant	Permeate capacity at 15 °C water temperature l/h	Number of 4" membranes No.	Connected load kW	Dimensions	Weight
				H x W x D mm	
ecoPRO 1800	1,800	6	2.2	1,750 x 2,600 x 750	260
ecoPRO 2400	2,400	8	3.0	1,750 x 2,600 x 750	299
ecoPRO 2700	2,700	9	3.0	1,750 x 3,500 x 750	315

# 7 Membrane Technology and Membrane Filtration

## 7.7.2

### Reverse Osmosis System Dulcosmose® TW

Potable water desalination for industrial applications - compact and cost-effective

Permeate output 3 – 50 m<sup>3</sup>/h



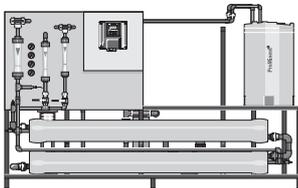
Reverse osmosis system Dulcosmose® TW is the all-purpose model for modern potable water desalination. Maximum permeate output at low operating pressures ensures low investment and operating costs.

As the system runs with low operating pressures, the entire Dulcosmose® TW can be fitted with inexpensive PVC pipework. This system is also available with an integral, semi-automated cleaning system and permeate and/or raw water flushing option. Equipped with the latest generation of "ultra low-pressure" diaphragms, this system achieves maximum permeate output with low operating pressures, thereby lowering investment and operating costs.

The system is very adaptable to specific customer requirements. Pipework material, other types of diaphragm for enhanced salt retention, integration of measuring and control technology and metering technology to visualisation of the entire process with peripheral components via a PLC.

#### Your benefits

- Efficient operation with low pressure diaphragms with outputs of up to 85% and high salt retention rates of up to more than 99% (depending on the type of diaphragm used)
- Reduced maintenance and service costs as well as long diaphragm service lives thanks to integrated cleaning concepts and flushing options, such as permeate flushing
- Service-friendly construction of systems on a corrosion-resistant powder-coated steel or stainless steel frame
- Simple and safe to operate: Microprocessor control with direct connection option for peripheral system components and integrated conductivity measurement with plain text display in the graphic display
- One-stop shop: no interface problems, smooth running with short times between definition of the task to joint commissioning and on-site system supervision with our global subsidiaries.



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#### Technical details

- Turnkey systems constructed on a high-quality, double powder-coated steel or stainless steel frame
- Highly efficient low-pressure diaphragms with maximum output and system retention rates of over 99% integrated in epoxy-glass resin pressure pipes
- Pre-filter 5µm with manometer for determining differential pressure
- Pressure switch to protect the high-pressure pump
- Flow meter to display permeate, concentrate and concentrate return volume
- Semi-automatic cleaning system for chemical module cleaning for long module service lives
- 2 switching inputs for level control of the cleaning tank
- 2 switching inputs for level control of the permeate tank
- Pause switching input for external On/Off
- External fault switching input
- Temperature measuring input (PT 100)
- Active permeate valve output (filling of cleaning tank)
- Active output for flushing valve for initial permeate disposal (depending on conductivity), raw water, permeate and interval flushing (idle time management)
- Active output for controlling a metering pump (anti-scalant)
- Analogue output 0/4...20 mA conductance
- Optional industrial PLC with touch panel and process visualisation

#### Field of application

- Power plants: Provision of boiler feed water
- Electroplating / metal processing industry: Provision of rinsing water
- Beverage industry: Provision of rinsing water, product water and process and return dilution water
- Food industry: Provision of rinsing water and process water
- Chemical industry: Provision of rinsing water and process water
- Provision of rinsing water and process water for laboratory purposes and industrial rinsing machines
- Pure water for laboratory applications, hospital uses (autoclaves, high-speed steam generators)
- Feed water for cooling and air conditioning plants (air humidification and air scrubbers)
- Process water in printing plants, the pharmaceutical or cosmetics industry

# 7 Membrane Technology and Membrane Filtration

The product range Dulcosmose® TW was designed for the following values in feed water:

<b>Salt content max.</b>	1,000 mg/l*
<b>pH range</b>	3.0 ... 10.0
<b>Silt density index max.</b>	3
<b>Free chlorine max.</b>	0.1 mg/l
<b>Total Fe, Mn max.</b>	0.2 mg/l
<b>Total hardness max.</b>	0.1 °dH
<b>Bacteria count max.</b>	100 KBE/ml
<b>Turbidity max.</b>	0.5 NTU
<b>COD max.</b>	5 mg/l**

\* Differing salinities affect the performance data accordingly

\*\* As O<sub>2</sub>

Systems with 8" diaphragms, system salt retention 90-97%

Plant	Permeate capacity at 15 °C water temperature l/h	Number of 8" membranes No.	Connected load kW	Dimensions H x W x D
				mm
PRO 0300TW	3,000	3	3.0	1,800 x 4,000 x 1,000
PRO 0400TW	4,000	4	3.0	1,800 x 3,000 x 1,000
PRO 0500TW	5,000	5	4.0	1,800 x 4,000 x 1,000
PRO 0600TW	6,000	6	4.0	1,800 x 4,000 x 1,000
PRO 0700TW	7,000	6	5.5	1,800 x 4,000 x 1,000
PRO 0800TW	8,000	7	5.5	1,800 x 4,000 x 1,000
PRO 0900TW	9,000	7	7.5	1,800 x 4,000 x 1,000
PRO 1000TW	10,000	8	11.0	1,800 x 3,000 x 1,000
PRO 1100TW	11,000	9	11.0	1,800 x 4,000 x 1,000
PRO 1200TW	12,000	10	11.0	1,800 x 4,000 x 1,000
PRO 1300TW	13,000	11	11.0	1,800 x 4,000 x 1,000
PRO 1400TW	14,000	12	11.0	1,800 x 4,000 x 1,000
PRO 1500TW	15,000	12	11.0	1,800 x 4,000 x 1,000
PRO 2000TW	20,000	18	11.0	1,800 x 7,000 x 1,200
PRO 2500TW	25,000	24	15.0	1,800 x 7,000 x 1,200*
PRO 3000TW	30,000	28	18.5	1,800 x 7,000 x 1,200*
PRO 4000TW	40,000	34	22.0	1,800 x 7,000 x 1,200*
PRO 5000TW	50,000	48	22.0	1,800 x 7,000 x 1,200*

\* Separate cleaning tank

On request, these plants can also be supplied with different membrane types for further salt rejection, and with measuring and control equipment (conductivity, ORP, pH measurement) and metering equipment (in pre-treatment and post-treatment).

# 7 Membrane Technology and Membrane Filtration

## 7.7.3

### Reverse Osmosis System Dulcosmose® BW

**Brackish water is transformed into drinking water**

**Permeate output 2,000 – 50,000 l/h**

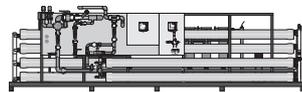


Reverse osmosis system Dulcosmose® BW is the standard model for the modern desalination of brackish water. Equipped with the latest generation of "high rejection low-pressure" diaphragms, this system achieves maximum permeate output with moderate operating pressures, thereby lowering investment and operating costs.

A reverse osmosis system of type of BW has PVC pipework on the low-pressure side. The system has high-grade stainless steel (type DIN 1.4571) on the high-pressure side. Stainless steel pipes are welded under shielding gas and a forming gas atmosphere and subsequently passivated in a pickling bath. The integrated semi-automatic cleaning system with permeate and/or raw water flushing ensures exceptionally long diaphragm service lives, as scaling and fouling effects are minimised. The system is very adaptable to specific customer requirements. Pipework material, other types of diaphragm for enhanced salt retention, integration of measuring and control technology and metering technology to visualisation of the entire process with peripheral components via a PLC.

#### Your benefits

- Efficient operation with low pressure diaphragms with maximum output and salt retention rates of up to over 99 %
- Reduced maintenance and service costs as well as long diaphragm service lives, thanks to integrated cleaning concepts and flushing options
- Service-friendly construction of systems on a corrosion-resistant powder-coated steel or stainless steel frame
- Simple and safe to operate: Central control of the entire system by microprocessor controller or industrial PLC with touch panel and process visualisation.
- Application-optimised design taking into account economic aspects, such as the durability of the diaphragms, energy efficiency and process automation
- One-stop shop: no interface problems, smooth running with short times between definition of the task to joint commissioning and on-site system supervision with our global subsidiaries



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#### Technical details

- Turnkey systems constructed on a high-quality, double powder-coated steel or stainless steel frame.
- Highly efficient low-pressure diaphragms with maximum output and system retention rates of over 99% integrated in epoxy-glass resin pressure pipes
- Pre-filter 5µm with manometer for determining differential pressure
- Pressure switch to protect the high-pressure pump
- Flow meter to display permeate, concentrate and concentrate return volume
- Semi-automatic cleaning system for chemical module cleaning for long module service lives
- 2 switching inputs for level control of the cleaning tank
- 2 switching inputs for level control of the permeate tank
- Pause switching input for external On/Off
- External fault switching input
- Temperature measuring input (PT 100)
- Active permeate valve output (filling of cleaning tank)
- Active output for flushing valve for initial permeate disposal (depending on conductivity), raw water, permeate and interval flushing (idle time management)
- Active output for controlling a metering pump (anti-scalant)
- Analogue output 0/4...20 mA conductance
- Optional industrial PLC with touch panel and process visualisation

#### Field of application

- Decentralised, public or private supply of potable water.

# 7 Membrane Technology and Membrane Filtration

The product range Dulcosmose® BW was designed for the following values in feed water:

<b>Salt content max.</b>	5,000 mg/l*
<b>pH range</b>	3.0 ... 10.0
<b>Silt density index max.</b>	3
<b>Free chlorine max.</b>	0.1 mg/l
<b>Total Fe, Mn max.</b>	0.2 mg/l
<b>Total hardness max.</b>	water must be chemically stabilised
<b>Bacteria count max.</b>	100 KBE/ml
<b>Turbidity max.</b>	0.5 NTU
<b>COD max.</b>	5 mg/l**

\* Deviating salt contents have a corresponding influence on the performance data.

\*\* As O<sub>2</sub>

**Systems with 8" diaphragms, system salt retention 95-99%**

Plant	Permeate capacity at 25 °C water temperature	Number of 4" and 8" membranes	Connected load	Dimensions H x W x D
	l/h	No.	kW	mm
PRO 0200BW	2,000	9	4.0	1,800 x 3,500 x 750
PRO 0300BW	3,000	3	5.5	1,800 x 4,000 x 1,000
PRO 0400BW	4,000	4	5.5	1,800 x 3,000 x 1,000
PRO 0500BW	5,000	5	5.5	1,800 x 4,000 x 1,000
PRO 0600BW	6,000	6	7.5	1,800 x 4,000 x 1,000
PRO 0700BW	7,000	7	7.5	1,800 x 4,000 x 1,000
PRO 0800BW	8,000	8	15.0	1,800 x 4,000 x 1,000
PRO 0900BW	9,000	9	15.0	1,800 x 4,000 x 1,000
PRO 1000BW	10,000	10	15.0	1,800 x 4,000 x 1,000
PRO 1100BW	11,000	11	15.0	1,800 x 4,000 x 1,000
PRO 1200BW	12,000	12	15.0	1,800 x 5,000 x 1,000
PRO 1300BW	13,000	13	15.0	1,800 x 6,000 x 1,000
PRO 1400BW	14,000	14	15.0	1,800 x 5,000 x 1,000
PRO 1500BW	15,000	15	18.5	1,800 x 5,000 x 1,000
PRO 2000BW	20,000	21	18.5	1,800 x 6,000 x 1,200
PRO 2500BW	25,000	26	30.0	1,800 x 6,000 x 1,200*
PRO 3000BW	30,000	29	30.0	1,800 x 6,000 x 1,200*
PRO 4000BW	40,000	42	45.0	1,800 x 7,000 x 1,200*
PRO 5000BW	50,000	51	60.0	1,800 x 7,000 x 1,200*

\* Separate cleaning tank

On request, these plants can also be supplied with different membrane types for other salt rejection, and with measuring and control equipment (conductivity, ORP, pH measurement) and metering equipment (in pre-treatment and post-treatment).

# 7 Membrane Technology and Membrane Filtration

## 7.7.4

### Reverse Osmosis System Dulcosmose® SW

Salt water is transformed into drinking water.

Permeate output 780 – 29,000 l/h



The reverse osmosis system Dulcosmose® SW is the standard model for modern desalination of salt water. Equipped with the latest generation of "high rejection low-pressure" diaphragms, this system achieves maximum permeate output with moderate operating pressures, thereby lowering investment and operating costs.

A reverse osmosis system of type of SW has PVC pipework on the low-pressure side. The high-pressure side of the system has a potable water-compatible, highly corrosion-resistant inner seal due to the high NaCl content. The integrated semi-automatic cleaning system with permeate and/or raw water flushing ensures exceptionally long diaphragm service lives, as scaling and fouling effects are minimised. The system can be adapted with ease to specific customer requirements. Pipework material, other types of diaphragm for enhanced salt retention, integration of measuring and control technology and metering technology to visualisation of the entire process with peripheral components via a PLC. Everything can be selected at random. Optional for all systems: They can be fitted with a system for energy recovery from the concentrate flow. The latest generation of what are known as pressure controllers is used.

#### Your benefits

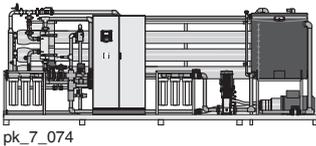
- Integrated energy recovery system based on state-of-the-art pressure controllers
- Efficient operation with low pressure diaphragms with outputs of up to 50% and high salt retention rates of up to over 99%
- Reduced maintenance and service costs as well as long diaphragm service lives, thanks to integrated cleaning concepts and flushing options
- Service-friendly construction of systems on a corrosion-resistant powder-coated steel or stainless steel frame
- Simple and safe to operate: Central control of the entire system by microprocessor controller or industrial PLC with touch panel and process visualisation
- Application-optimised design taking into account economic aspects, such as the durability of the diaphragms, energy efficiency and process automation
- One-stop shop: no interface problems, smooth running with short times between definition of the task to joint commissioning and on-site system supervision with our global subsidiaries

#### Technical details

- Turnkey systems constructed on a high-quality, double powder-coated steel or stainless steel frame
- Highly efficient low-pressure diaphragms with maximum output and system retention rates of over 99% integrated in epoxy-glass resin pressure pipes
- Pre-filter 5µm with manometer for determining differential pressure
- Pressure switch to protect the high-pressure pump
- Flow meter to display permeate and concentrate volume
- Semi-automatic cleaning system for chemical module cleaning for long module service lives
- Central PLC of the entire system and peripheral components, adapted to customer requirements.

#### Field of application

- Decentralised, public or private supply of potable water.



pk\_7\_074

# 7 Membrane Technology and Membrane Filtration

The product range Dulcosmose® SW was designed for the following values in feed water:

<b>Salt content max.</b>	40,000 mg/l*
<b>pH range</b>	3.0 ... 10.0
<b>Silt density index max.</b>	3
<b>Free chlorine max.</b>	0.1 mg/l
<b>Total Fe, Mn max.</b>	0.2 mg/l
<b>Total hardness max.</b>	water must be chemically stabilised
<b>Bacteria count max.</b>	100 KBE/ml
<b>Turbidity max.</b>	0.5 NTU
<b>COD max.</b>	5 mg/l**

\* Differing salinities affect the performance data accordingly

\*\* As O<sub>2</sub>

Plants with 4" and 8" membranes, salt rejection of the plants 99%

Plant	Permeate capacity at 25 °C water temperature l/h	Number of 4" and 8" membranes No.	Connected load without energy recovery kW	Connected load with energy recovery kW	Dimensions H x W x D mm
PRO 0078SW	780	6	5.5		1,800 x 3,500 x 1,000
PRO 0185SW	1,850	3	11.0		1,800 x 4,000 x 1,000
PRO 0240SW	2,400	4	15.0		1,800 x 4,000 x 1,000
PRO 0300SW	3,000	5	18.5	11.2*	1,800 x 4,000 x 1,000
PRO 0360SW	3,600	6	18.5	14.7*	1,800 x 4,000 x 1,000
PRO 0490SW	4,900	8	30.0	20.5*	1,800 x 5,000 x 1,200
PRO 0610SW	6,100	10	37.0	20.5*	1,800 x 6,000 x 1,200
PRO 0730SW	7,300	12	41.0	24.0*	1,800 x 5,000 x 1,400
PRO 0920SW	9,200	15	75.0	27.5*	1,800 x 6,000 x 1,500
PRO 0980SW	9,800	16	75.0	35.5*	1,800 x 5,000 x 1,500
PRO 1230SW	12,300	20	75.0	35.5*	1,800 x 6,000 x 1,500**
PRO 1470SW	14,700	24	90.0	41.0*	1,800 x 7,000 x 1,500**
PRO 1840SW	18,400	30	110.0	56.0*	1,800 x 7,000 x 1,500**
PRO 2210SW	22,100	36	132.0	66.0*	1,800 x 7,000 x 1,500**
PRO 2580SW	25,800	42	150.0	66.0*	1,800 x 7,000 x 1,500**
PRO 2900SW	29,000	48	180.0	90.0*	1,800 x 7,000 x 1,500**

\* Energy recovery by pressure exchanger technology

\*\* Separate cleaning tank

On request, these plants can also be supplied with different membrane types for other salt rejection, and with measuring and control equipment (conductivity, ORP, pH measurement) and metering equipment (in pre-treatment and post-treatment).



## 8 Gravity Filter INTERFILT® SK

### 8.1 Sand Filter INTERFILT® SK

**Economical water treatment with gravity filters - using the gravity of the water alone.**

**Filtration capacity 6.5 – 62.0 m<sup>3</sup>/h**

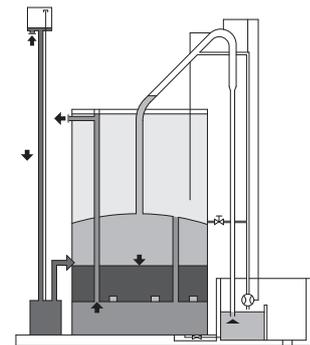
The gravity filter INTERFILT® SK is an open sand filter system for extremely economical water treatment. The filter system operates with differential pressure-controlled backwashing and an integral backwashing water tank.



The automatic gravity filter uses the principle of differential pressure and essentially consists of the cylindrical tank, its fittings, the automatic backwashing system with injector, the raw water feed and baffle tube, filter nozzles and filter filling unit

#### Your benefits

- No controls: The filter needs no moving parts, like valves, flow meter, controller or display equipment, for filtering/backwashing and post-rinsing
- No pumps: The required volume of backwashing water is stored in the storage tank below the filter, making a back-flushing pump redundant.
- No compressed air, pressurised water and electrical energy: The filter controls and performs all processes independently
- No operating personnel: The filter works fully automatically, without external intervention
- No wearing parts: No moving parts – no wear and tear.



pk\_7\_029

#### Technical details

- Material: Polyethylene PE-HD
- Filter material: Filter sand DIN EN 12904, other filter materials on request

The filter essentially consists of:

- Cylindrical tank
- Fittings
- Automatic backwashing system with injector
- Raw water feed and baffle tank
- Filter nozzles and
- Filter filling unit

#### Field of application

- Cooling water, partial flow filtration
- River water, process water and potable water treatment
- Removal of iron from well water
- Waste water cleaning to reduce the content of suspended matter, CSB, BSB<sub>5</sub> and phosphate (4th cleaning stage)

#### Optional additional equipment:

- Cover for cylindrical tank
- Frost protection insulation with supplementary electric heating
- Combined air/water backwashing
- PE-HD backwashing water sump tank
- Other options on request

## 8 Gravity Filter INTERFILT® SK

### Type List and Capacity Data

Type	Filter diameter mm	Filter capacity m <sup>3</sup> /h	Back wash Water ~ m <sup>3</sup>	Weight empty ~ t	Weight in operation ~ t
<b>SK- 9</b>	900	6.5	1.4	1.2	4.5
<b>SK- 12</b>	1,200	11.5	2.5	1.5	7.1
<b>SK- 15</b>	1,500	18.0	4.5	1.9	10.5
<b>SK- 18</b>	1,800	26.0	5.5	2.3	15.0
<b>SK- 21</b>	2,100	35.0	8.5	2.8	19.5
<b>SK- 24</b>	2,400	46.0	10.0	3.0	25.0
<b>SK- 28</b>	2,800	62.0	14.0	3.5	30.0

Flow rate:	3 ... 10 m/h
Backwash intervals: (depending on type and amount of pollutants)	Approx. 8 ... 36 h
Head loss:	120 ... 150 mbar
Clean water solids figure: (depending on raw water and filter material)	0 ... 3 mg/l
Backwash flow rate::	
At the start	44 m/h
In the middle	37 m/h
At the end	30 m/h
Cylinder height: (same for all types)	4,500 mm
Overall height: Depending on filter diameter	6,500 mm
Backwash and refilling time:	13 ... 15 min.
Filter sand in accordance with EN 12904	
– Height of bed	600 mm
– Grain size range	0.71 ... 1.25 mm
Filter nozzles:	
– Type	Lamellar nozzle
– Material	PPN
– Slot width	0.2 mm

As system components are produced individually according to application, we will inform you of prices on request.

We reserve the right to change components and their construction, as long as these do not affect their performance or function.



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