

XENO ZONE

Water Technologies and Equipment



WATER TREATMENT SOLUTIONS FOR SWIMMING POOLS

Ultraviolet Units

Advanced Oxidation Systems



ULTRAVIOLET DISINFECTION

UV technologies have been used for more than a century – they are widely applied for air and water disinfection and surfaces treatment. The principle of operation is based on the ability of UV-light to cause photochemical transformations in the irradiated medium. When treating water, ultraviolet light bring irreversible damage to pathogens, leading to their death.

ULTRAVIOLET LAMPS: LOW AND MEDIUM PRESSURE

Both low and medium pressure mercury UV lamps are used for swimming pools disinfection. The main difference between them is in their spectrum. Low-pressure lamps emit 95% of their energy at a wavelength of 253.7 nm – that is why they are called monochrome. Medium-pressure lamps are polychrome and emit at wavelengths in the range from 200 to 400 nm. Despite the fact that they act differently on microorganisms - in terms of disinfection, both types of lamps are comparable in effectiveness. The benefits of medium-pressure lamps become apparent in pools which use chlorine for disinfection.

COMBINED CHLORINE CONTROL

Bacteria and viruses are not the only problem in the swimming pool. Bathers bring a large amount of impurities (e.g. sweat and urine), which are able to form disinfection by-products when reacting with chlorine. A significant part of them are chloramines – compounds of chlorine with nitrogen containing biological fluids. Their accumulation in water is a common cause of complaints from pool visitors about unpleasant odors, allergic reactions and eye irritation. A number of studies associate chloramines exposure with exacerbation of asthma and other respiratory diseases. Chloramines constitute an indicator of combined chlorine, which is set by sanitary rules at a level of not more than 0.2 mg/l.

UV light in the range of 300-400 nm destroys chloramines, so UV-units with medium-pressure lamps are quite effective in chloramines removal. Ultraviolet radiation of low-pressure lamps does not affect chloramines, although they are a reliable and proven method of water disinfection.

TECHNICAL FEATURES

Apart from the differences in the emission spectrum and application, medium pressure lamps are significantly smaller, so the UV-units are more compact and fit easily into size-limited technical rooms.

UV-UNITS WITH LOW-PRESSURE LAMPS

UV-units with low-pressure lamps are designed to ensure epidemically safe water free from pathogens of bacterial and viral nature. The disinfecting effect is provided by in-flow water exposure to a UV light of the bactericidal spectrum on wavelength 254 nm.

The units use low-pressure mercury and amalgam lamps. The lifetime of mercury LP lamps is 9 000 – 12 000 hours depending on the model. All units are equipped with a lamp operating time counter.

Optionally, the units can be equipped with a UV-sensor for measuring and control of the UV-radiation intensity. The UV sensor allows user to monitor the decline of the UV-radiation intensity due to quartz sleeves contamination or lamp aging and perform sleeves cleaning or lamp replacement in time. To automate the process of quartz sleeves cleaning, modifications with a chemical washing or an ultrasonic cleaning device are provided.

TECHNICAL DATA

Name	Max Flow	Lamp Type	Lamp Number	Power Consumption, W	Extra Options		
					Ultra-sound	UV-sensor	Chemical Washing
UVU-6	6 m ³ /h	TUV 55	1	60			
UVU-10	10 m ³ /h	TUV 55	1	60			
UVU-20	20 m ³ /h	TUV 55	2	120	+	+	+
UVU-50	50 m ³ /h	TUV 55	4	240	+	+	+
UVU-100	100 m ³ /h	DB-300	3	900	+	+	+
UVU-150	150 m ³ /h	DB-300	4	1200	+	+	+
UVU-250	250 m ³ /h	DB-300	6	1800	+	+	+
UVU-500	500 m ³ /h	DB-500	6	2700	+	+	+



APPLICATION:

Swimming pools, drinking water, treated wastewater, aquaculture

CONSUMABLE PARTS:

Low-pressure mercury UV-lamps – lifetime 9 000/12 000 hours

MATERIALS:

Disinfection chamber – stainless steel
AISI 304/AISI 316

SCOPE OF SUPPLY:

- Disinfection chamber with UV-lamps
- Electric power cabinet with lamp operating time counter
- Mounting set (brackets or stand)
- Temperature sensor*
- Ultrasonic device for quartz sleeves cleaning*
- Chemical washing set with pump and pressure gauge*
- UV radiation intensity sensor*

* optionally

UV-UNITS PERFORMANCE AND UV-DOSE

The selection of the UV-equipment should be carried out taking into account the values of the maximum hourly water flow and the required UV-irradiation dose, which is determined depending on the type of water supply source or customer requirements. The performance of UV units and delivered UV-dose depend on the quality of the source water, particularly on its UV-transmittance, which is mostly affected by the color and turbidity of water and the content of iron in it.

The table below shows the calculated data on the performance of the **XENOZONE UV-units**, depending on the water transmittance and the required UV-dose. The flow rate values are calculated taking into account the UV-radiation decline at the end of lamps service life, as well as the quartz sleeves contamination factor.

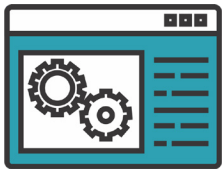
Name	Drinking water and Pool water									Waste waters			
	UV-Transmittance 90%			UV-Transmittance 85%			UV-Transmittance 70%			UV-Transmittance 70%		UV-Transmittance 65%	
UV-dose, MJ/sm ²	16	25	40	16	25	40	16	25	40	30	65	30	65
UVU-6	6*	4	3	5	3	2	3	2	1	1,4	0,9	0,9	0,6
UVU-10	10*	8	5	10	6	4	6	4	2	3	1,4	2	0,9
UVU-20	20*	19	12	20*	14	9	14	9	5	7	3	4,8	2
UVU-50	50*	37	23	43	28	17	26	17	10	14	6	9	4
UVU-100	100*	100*	68	100*	82	51	77	49	31	41	19	27	13
UVU-150	150*	143	89	150*	107	67	100	64	40	54	25	36	17
UVU-250	250*	232	145	250*	174	109	163	104	65	87	40	58	27
UVU-500	500*	423	264	496	317	198	278	178	111	127	59	106	49

* The maximum allowable flow rate is determined by the capacity of the connecting pipes.

UV-UNITS WITH MEDIUM-PRESSURE LAMPS

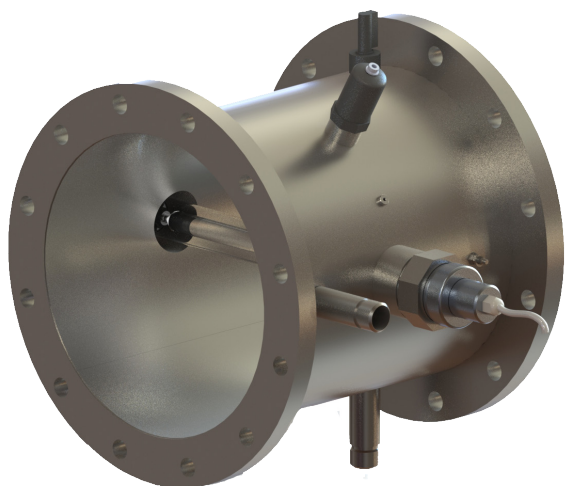
UV-units with medium-pressure lamps are designed for disinfection of drinking and swimming pool waters, as well as reducing the level of combined chlorine (chloramines) in swimming pool water. The lifetime of medium pressure lamps is **5,000 - 10,000 hours**, depending on the type of lamp. All units are equipped with a lamp operating time counter.

To control the decline in the UV-radiation intensity due to quartz sleeves contamination or lamp aging, the units are equipped with a UV-sensor which allows them to be cleaned or replaced in time. To automate the process of quartz sleeves cleaning, a chemical washing set is provided.



ADVANTAGES:

- ✓ Destruction of chloramines and control of combined chlorine
- ✓ Compact size – easily fit into size-limited technical rooms
- ✓ Fewer lamps – easy to maintain
- ✓ The lifetime of the medium-pressure lamps is comparable to low-pressure lamps



APPLICATION:

Swimming pools, drinking water

CONSUMABLE PARTS:

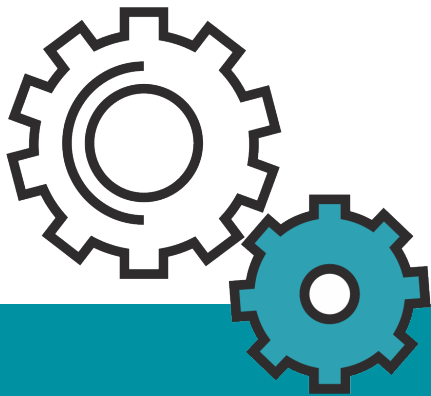
Medium-pressure mercury UV-lamps – lifetime 5 000/10 000 hours

MATERIALS:

Reaction chamber – stainless steel AISI 316

TECHNICAL DATA

Name	UVM-300 LITE	UVM-600 LITE	UVM-600	UVM-1000	UVM-1800	UVM-2400	UVM-3000
Water flow, m³/h	20	30	30	50	100	150	200
Lamp type	medium-pressure mercury UV-lamps						
Connection	2"	2 ½"	2 ½"	DN100	DN150	DN200	DN300
Power consumption, kW	0,3	0,6	0,6	1	1,8	2,4	3,0
Extra options							
Temperature sensor	+	+	+	+	+	+	+
Flow sensor	+	+	+	+	+	+	+
UV-sensor			+	+	+	+	+
Chemical washing			+	+	+	+	+



To reduce the level of combined chlorine (chloramines) in pool water to the values less than 0.2 mg/l, the UV-dose of 60 mJ/cm² should be provided.

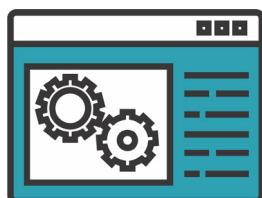
The performance of XENOZONE UVM units is given taking into account the required UV-dose of 60 mJ/cm² and water parameters corresponding to swimming pool water.

ADVANCED OXIDATION TECHNOLOGIES

Advanced Oxidation Technologies – are water purification methods involving reactions with hydroxyl radicals (OH* radicals).

Hydroxyl radicals are highly reactive species with an extremely short lifetime. In nature they are formed by the interaction of water, atmospheric ozone and sunlight and take part in the processes of natural purification of the surface waters.

Using a powerful source of ozone and ultraviolet radiation XENOZONE systems reproduce the same natural processes, while the speed and intensity of them increases multiple times.



AOP ADVANTAGES:

✓ **Fast**

OH radicals are extremely active - the reaction rates of OH* radicals with organic compounds are on average 6 orders of magnitude higher than the reaction rates of these compounds with ozone. This means that the reactions go millions times faster.

✓ **Deep**

Hydroxyl radicals are capable of triggering chain oxidation reactions. Chain reactions are similar to the domino principle, when each interaction generates an impulse to continue the reaction and the process repeats over and over again. This makes it possible for a deep decomposition of the impurities, down to basic components – water, carbon dioxide and mineral salts.

✓ **Universal**

Unlike ozone, which is relatively selective and does not react with all organic impurities, OH* radicals are equally active against any organic molecules in the pool water conditions. This means not only disinfection of water, but also decomposition of organic load from bathers and reducing the chlorination by-products formation, including chloramines.

XENOZONE advanced oxidation technologies are a strategic solution to the problem of water safety.

AOP SOLUTIONS FOR PUBLIC SWIMMING POOLS

XENOZONE SCOUT (SCOUT - System of Combined Ozone & UV Treatment)

is a line of efficient and reliable solutions designed for public swimming pools. The systems are based on the Advanced Oxidation Technology and do not use any chemical reagents. Water purification occurs due to the combined ozone and ultraviolet interaction.

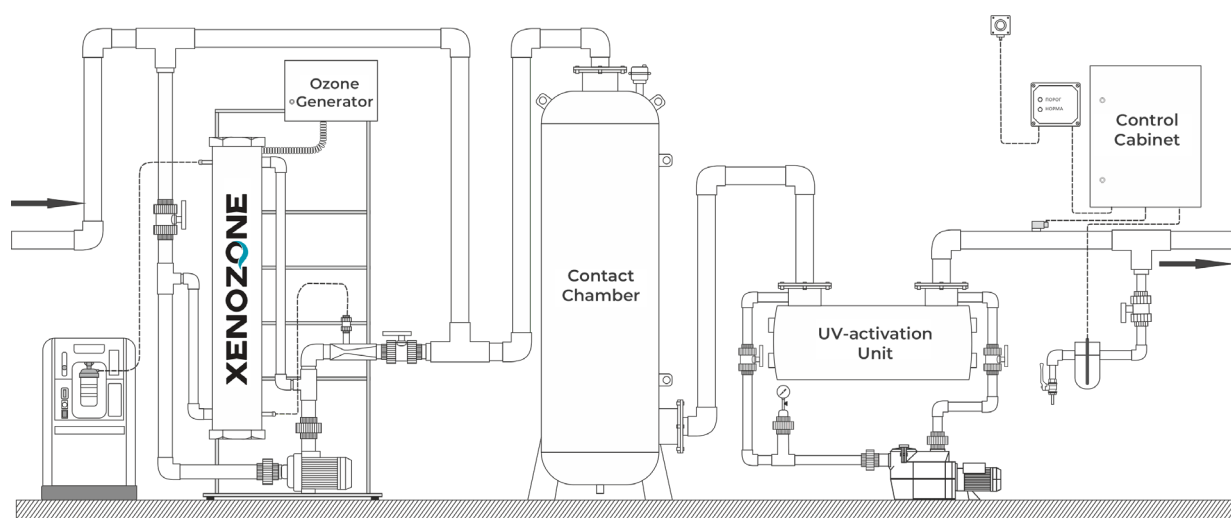
XENOZONE SCOUT meets all legal safety requirements for the ozone equipment of public swimming pools, and are suitable for sports, wellness, children's pools and water parks. The automation system based on industrial microcontrollers minimizes the human factor - the operation and maintenance is carried out automatically.

TECHNICAL DATA

Name	Pool volume*	Filtration, m3/h	Ozone, g/h	Power consumption, kW	Power supply, V
SCOUT-200	200 m3	25	25	1,70	230/400V
SCOUT-300	300 m3	37	37	2,75	230/400V
SCOUT-400	400 m3	50	50	3,74	230/400V
SCOUT-500	500 m3	62	62	4,33	230/400V
SCOUT-600	600 m3	75	75	4,63	230/400V
SCOUT-800	800 m3	100	100	5,38	230/400V

* The recommended pool volume is specified in accordance with legal requirements that 3-fold water exchange per day is provided

EQUIPMENT LAYOUT



APPLICATION:

Swimming pools, drinking water

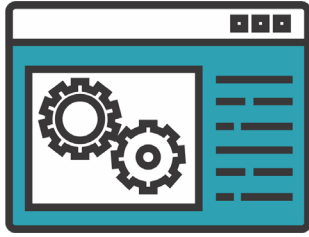
CONSUMABLE PARTS:

Medium-pressure mercury UV-lamps – lifetime 5 000/10 000 hours

MATERIALS:

Reaction chamber – stainless steel AISI 316

Elements of XENOZONE SCOUT	Configuration	Purpose and principle of operation
Ozone generation unit	<ul style="list-style-type: none"> • Electric discharge ozone generator • Oxygen concentrator • Ejector • Static mixer • Booster pump 	<p>Ozone is formed from the oxygen fed by oxygen concentrator and is supplied through the ejection system to a static mixer. The mixer spreads ozone evenly in water, and then returns the ozone-saturated water to the main line.</p>
Ozone Dissolution Unit	<ul style="list-style-type: none"> • Contact chamber • Gas outlet valve • Residual ozone destructor 	<p>In the contact column, ozone dissolves in water and interacts with impurities. A non-dissolved part of it is removed into destructor and destroyed on a special catalyst.</p>
UV-Activation Unit	<ul style="list-style-type: none"> • UV-activation unit • UV-intensity sensor • Chemical washing set 	<p>In the UV-unit, ozone converts into hydroxyl radicals under the influence of ultraviolet radiation.</p> <p>This triggers the processes of intensive decomposition of impurities and destruction of microorganisms.</p> <p>The water then enters the carbon filters, and after them returns into the pool.</p>
Sensors and controls	<ul style="list-style-type: none"> • Control system • Flow sensor • Temperature sensor • Pressure sensor • Ozone sensor - air • Ozone sensor - water 	<p>Operation and maintenance takes place in automatic mode with the help of microcontroller and sensors that monitor and control the main operation parameters.</p>



ADVANTAGES :

- ✓ Destruction of microorganisms resistant to chlorine
- ✓ Decomposition of chlorination by-products, including chloramines
- ✓ Combined chlorine control
- ✓ Decline of chlorine demand
- ✓ Better filtration due to decomposition of organic impurities
- ✓ Complete neutralization of residual ozone by UV-activation
- ✓ Safe operation
- ✓ Low operating costs

APPLICATION:

Public swimming pools with pool volume 200 – 800 m³ and more, water parks

CONSUMABLE PARTS:

Low-pressure mercury UV-lamps – lifetime 12 000 hours
Ozonator electrode - rated lifetime 45 000 hours

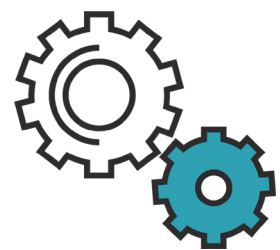
MATERIALS:

UV-chamber, ozone chamber, contact chamber – stainless steel AISI 316



XENOZONE SCOUT

SCOUT designed in accordance with legal requirements for the ozonation equipment of public swimming pools and provide water disinfection, elimination of unpleasant odors and removal of organic impurities, including chlorinated disinfection by-products and chloramines in chlorinated pools.



OPERATION CONDITIONS:

- SCOUT systems are designed for operation at temperatures from +5 to +30 ° and relative humidity in a technical room of no more than 70%
- SCOUT systems are not allowed to use in swimming pools fed with seawater or in case of disinfection with electrochemically generated chlorine reagents.
- Warranty period – 12 months.

Parameter	SCOUT-200	SCOUT-300	SCOUT-400	SCOUT-500	SCOUT-600	SCOUT-800
Max. Ozone Capacity, g/h	25	37	50	62	75	100
Recommended Filtration, m ³ /h	25	37	50	62	75	100
Recommended Pool Volume, m ³ *	200	300	400	500	600	800
Ozone Dose per 1 m ³ of processed water, g/m ³	1					
Power Consumption, kW	1,7	2,75	3,74	4,33	4,63	5,38
Power Supply, V	230/400 V					
Ozone Generator Specifications						
Type of ozone generator	electric discharge					
Number of electrodes, pcs	1	7	7	7	12	12
Housing Material	AISI-321					
Service life, years	5					
Replacement of the electrode, h	45000					
Feeding gas	oxygen					
Oxygen Generator Specifications						
Oxygen capacity, l/min	5	5	10	10	10	10
Contact Chamber Specifications						
Dimensions Dxl, mm	300x2200	300x2200	600x2200	600x2200	600x2200	600x2200
Material	stainless steel AISI-316					
Active anodic corrosion protection	yes					
UV-unit Specifications						
Number of UV lamps, pcs	1	2	2	3	4	4
UV-sensor	yes					
Chemical washing	yes					
Lamp lifetime, h	12 000					
Chamber material	stainless steel AISI-316					

*provided 3-fold water exchange per day

Designing systems of higher ozone capacity is carried out individually, taking into account customer requirements.

AOP SOLUTIONS FOR PRIVATE SWIMMING POOLS

XENOZONE SCOUT DUO is a series of compact units designed for private swimming pools. Systems can be used in public pools as an additional disinfection. Depending on the type of pool and mode of use, the systems can be used both independently, without chlorine reagents, or in combination with minimal doses of chlorine.

XENOZONE SCOUT DUO provide water disinfection, elimination of unpleasant odors and removal of organic impurities, including chlorinated disinfection by-products and chloramines in chlorinated pools.

The system has a “plug&play” design - all elements are mounted on a rack and suitable for small technical rooms, the whole unit is ready for use.

OPERATION PRINCIPLE

The main element of the SCOUT DUO systems is an ozone generator with UV activation. The generator chamber is divided into two independent circuits - air and water. The air circuit is used for ozone production, and water circuit is an ozone activation zone, where UV-lamp is installed.

The process starts in the air circuit, when ozone is feeded with an ejector into the water line. Then ozone-saturated water enters the UV-activation zone in the water circuit, where ozone transforms into hydroxyl radicals under the UV-light. Finally, OH-radicals trigger the processes of advanced oxidation and destruction of microorganisms, decomposition of impurities, including chlorine by-products. In addition, processed water gains additional bactericidal treatment with UV light of 254 nm. Thus, water undergoes three stages of treatment - ozone, UV radiation and hydroxyl radicals. After the water circuit, clean water returns to the main pipeline and then to the pool basin.

TECHNICAL DATA

Name	Pool volume*	Ozone, g/h	Power Consumption, kW	Power Supply, V	Dimensions, mm
SCOUT DUO-50	50 m ³	2	1,39	230 v	1680x600x480
SCOUT DUO-100	100 m ³	4	1,52	230 v	1680x600x480
SCOUT DUO-200	200 m ³	10-12	1,76	230 v	1780x600x480
SCOUT DUO-500	500 m ³	20	1,89	230 v	1780x600x480

APPLICATION:

Private (domestic) pools 50 - 500 m³

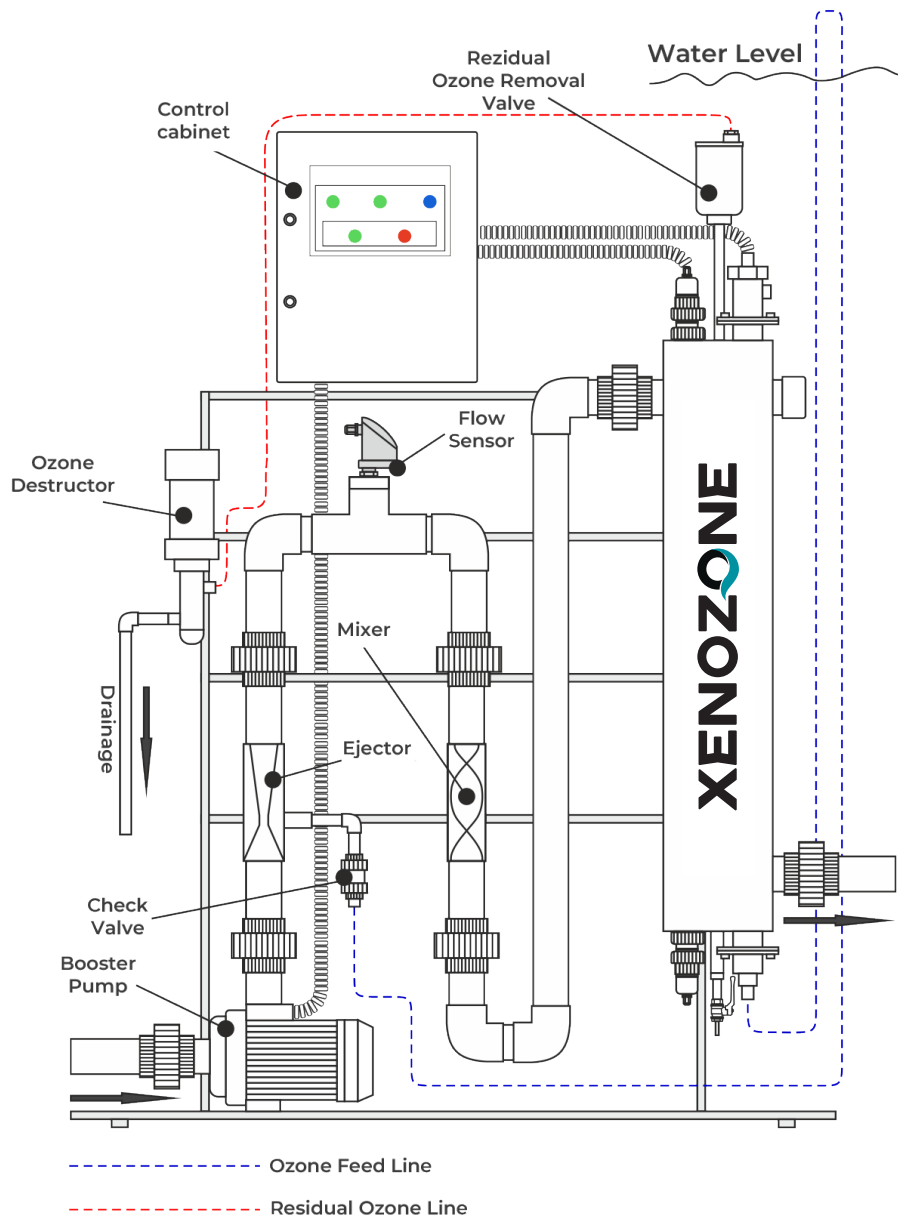
MATERIALS:

Ozone generator chamber – stainless steel AISI 304

CONSUMABLE PARTS:

Low-pressure mercury UV-lamps – lifetime 9 000 hours
Ozonator Electrode – service life 45 000 hours

EQUIPMENT LAYOUT



ADVANTAGES:

- ✓ Safe and reliable disinfection
- ✓ Destruction of chlorine-resistant micro-organisms
- ✓ Elimination chlorination by-products
- ✓ No eye and skin irritation
- ✓ Removal of unpleasant smells and tastes
- ✓ Color elimination
- ✓ Lower allowed residual chlorine levels
- ✓ Decline of chlorine demand
- ✓ Better filtration due to decomposition of organic impurities
- ✓ Low operating costs

TECHNICAL DATA XENOZONE SCOUT DUO

SCOPE OF SUPPLY:

- Ozone generator with UV activation
- Oxygen concentrator *
- Booster pump
- Flow sensor
- Ozone ejector
- Ozone line check valve
- Static mixer
- Residual ozone destructor
- Automatic gas outlet valve
- Ozone sensor (air)
- Control cabinet

*in SCOUT DUO-200, SCOUT DUO-500 models



SPECIFICATIONS

Parameter	SCOUT DUO-50	SCOUT DUO-100	SCOUT DUO-200	SCOUT DUO-500
Max. Ozone Capacity, g/h	2	4	10-12	20
Recommended Pool Volume, м3*	до 50	до 100	до 200	до 500
Power Consumption, kW	1,39	1,52	1,76	1,89
Power Supply, V	230			
Water flow through the ejection system, m3/hour	up to 4	up to 6	up to 6	up to 6
Dimensions, mm	1680x600x400		1780x600x400	
Ozone Generator Specifications				
Type of ozone generator	Electric discharge with UV-activation			
Housing Material	stainless steel AISI-304			
Number of electrodes, pcs	1	2	1	2
Feeding gas	air		oxygen	
Generator Power Consumption, W	130	240	130	240
Electrode lifetime, h	45 000			
Lamp power, W	60		140	
Number of UV-lamps, psc	1			
UV-lamp lifetime, h	9000			

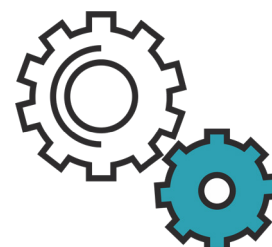
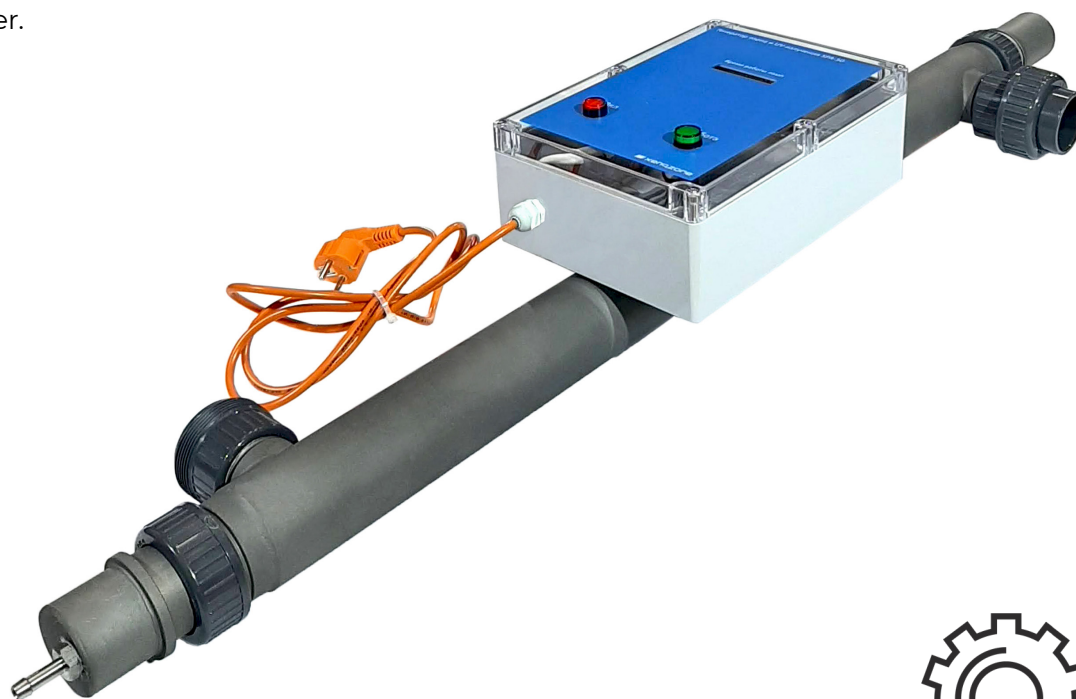
* provided 4-four water exchange per day



AOP-SYSTEMS FOR HOT TUBS AND SPA BATHS

XENOZONE SPA is a compact solution for additional disinfection of swimming pools with a volume up to 50 m³. It is suitable for stationary concrete, composite and polypropylene pools, hot tubes, SPA baths. Depending on the type of the pool, the systems can be used either independently without additional reagents or in combination with minimal doses of chlorine.

XENOZONE SPA systems are based on mercury dual-band UV-lamps (254/185 nm) which generate both ozone and bactericidal UV-irradiation, providing double treatment of the pool water.



TECHNICAL DATA

Name	Pool volume, m ³	Ozone, g/hou	Power Consumption, W	Power Supply, V
SPA-50	up to 50	0,5	130	230V

XENOZONE SPA can be used independently without additional reagents in indoor swimming pools located in rooms where there are few or no sources of natural light, such as windows or a transparent roof.

In outdoor swimming pools, in the hot season, as well as during active operation and a large number of bathers, additional dosing of reagents is recommended.



WITHOUT CHLORINE

- ✓ Indoor swimming pool
- ✓ Few bathers
- ✓ Low natural light
- ✓ Ground source water from a well



WITH CHLORINE

- ✓ Outdoor swimming pool
- ✓ Many bathers
- ✓ High water temperature
- ✓ Surface source water from a river or lake

APPLICATION:

Additional disinfection in swimming pools, jacuzzis and hot tubs with a volume of up to 50 m³

MATERIALS:

Reaction chamber – stainless steel AISI 304

CONSUMABLE PARTS:

Dual band mercury UV-lamps – lifetime 8 000 hours



ADVANTAGES:

- ✓ Compact size and easy installation
- ✓ Destruction of microorganisms resistant to chlorine
- ✓ Neutralization of residual ozone by UV-activation
- ✓ Better filtration due to decomposition of organic impurities
- ✓ Safe operation

WHEN COMBINED WITH CHLORINE:

- ✓ Lower allowed residual chlorine levels
- ✓ Decline of chlorine demand

XO