ProMinent® Ozone Generators

ProMinent's ozone generators have been used worldwide for more than two decades for a wide variety of water treatment applications, such as:

- Pre-oxidation of iron and manganese
- Potable water disinfection for inactivation of Giardia and Cryptosporidium
- Disinfection of bottled water for long shelf life
- · Advanced oxidation for destruction of toxic wastes
- Swimming pool, spa and therapy pool water treatment
- Aquaria/zoo water treatment for fish and mammal habitats
- Disinfection of water in hydroponic greenhouses
- · Disinfection of industrial cooling water
- · Disinfection of high purity water systems
- Hydrogen sulfide oxidation in odor control scrubbers
- · Recirculating water in car wash process

ProMinent's ozone generators include:

- OZONFILT® OZVA a wall mounted, totally integrated package including ozone generation and mixing system for small applications. Variable output, via 4-20 mA signal, of 0.26 to 2.11 lbs./day (5 to 40 grams/hour).
- BONa an ozone generation system with adjustable output ranging from 2 to 38 lbs./day (40 to 720 grams/hour).

OZONFILT® OZVa Universal Compact Plant

Compact plant for all applications with ozone requirement of up to 2.11 lbs./day (40 grams/h).

The OZONFILT[®] OZVa is designed with state of the art microprocessor control and a digital display of the following parameters:

- Ozone capacity
- Air flow
- Temperature

Ozone is produced in the mid-frequency range, allowing the plant to operate at a considerably reduced high voltage. This increases the operating safety of the generator.

The ozone is produced from the oxygen in surrounding air and metered simultaneously. The air treatment is designed as an alternating pressure dryer which guarantees reliable and safe ozone production even when the surrounding air humidity is high. The dewpoint of the dried air is less than $-76^{\circ}F$ (-24°C).



pk_7_001_1

Module: Ozone generation (1)

The ozone is produced via a controlled medium frequency with reduced high voltage. This efficient technique in combination with a directly cooled high performance dielectric allows the compact construction and forms the basis for the attractive cost of ownership ratio of the OZONFILT® OZVa.

^{51.18 in.} The modern microprocessor controller monitors the essential operating parameters ^{1300 mm} and adjusts the ozone production to the preset value, or to a value transmitted via a standard signal.

PCC technology ensures optimum operating safety

The introduction of PCC technology (primary current-controlled) offers complete protection of electrical components (high voltage transformer and power stage) and also permits an accurate digital display of the ozone capacity in lbs/day (gr/h). This allows the user to set a reproducible ozone quantity between 3% and 100% of the nominal capacity.

The use of an integrated pressure-swing dryer and the installation of a dielectric with optimum heat conductivity allow the extraordinarily compact system design.

Ozone Generators OZONFILT® OZVa



Silent electrical discharge takes place at the dielectric. The new generator design ensures excellent cooling of the dielectric and removes generated heat rapidly to prevent the ozone from breaking down due to overheating.

Ozone capacity is accompanied by gas throughput. The current and voltage at the input of the high voltage transformer, the temperature at the outlet of the ozone generator and any fault messages are displayed in plain text.

As well as ozone capacity, the gas flow, current and voltage at the input of the high voltage transformer and the temperature at the outlet of the ozone generator and any failure messages are displayed in text form.

Thus, even in difficult application conditions, this robust system offers excellent operating reliability and safety.

Module: Ozone mixing (2)

(2)



pk 7 043

The OZONFILT® systems are designed for an ozone concentration in the gas phase of 20 ppm (20 g/m³) corresponding to the German standard for ozone generating systems. Via the use of medium frequency technology, the ozone concentration can be increased to values of more than 30 ppm (30 g/m³). After dosing, the ozone enters a mixing system where it is thoroughly mixed with the water. This ensures an optimum effectiveness rate. Up to a backpressure of 29 psi (2 bar) there is no need of an added injector and/or booster pump.

The ozone mixer module should correspond to the nominal flow rate in the bypass line (see Identity code and Technical data).

The OZONFILT® series comprises four types:

OZONFILT® OZVa, types 1, 2, 3 and 4 with respective ozone capacities of 0.26, 0.79, 1.85 and 2.11 lbs/day (5, 15, 35 and 40 gr/h). Types 1 and 2 are installed in a control cabinet designed for wall mounting. Types 3 and 4 are housed in a freestanding control cabinet.

Type 1: the bypass line comprises of a float and orifice-type flow monitor with minimum contact, the pre-assembled metering station and a transparent mixing system for monitoring gas bubbles. For flows of 2.2 to 13.2 gpm (0.5 to 3 m³/h), use the identity code version OZVa 1 x 1xX and for flows from 13.2 to 22 gpm (3 to 5 m³/h) use the identity code version OZVa 1 x 2xX.

Alternatively type 1 can be used with a simplified form of bypass line consisting of a preassembled metering station and a PVC static mixer. For flows of 2.2 to 1.32 gpm (0.5 to 3 m³/h), this is defined as identity code version OZVa 1 x 8xX and for flows from 13.2 to 22 gpm (3 to 5 m^3/h) it is the identity code version OZVa 1 x9xX.

OZONFILT[®] OZVa: Capacity Range 0.26-2.11 lb/day (5-40 ar/h)

Type 2: the bypass line comprises a pre-assembled metering station and a PVC static mixer in three different sizes. For flows of 13.2 to 22 gpm (3 to 5 m³/h), the identity code version is OZVa 2 x2xX. For flows from 22 to 44 gpm (5 to 10 m³/h) use identity code version OZVa 2 x3xX and from 44 to 66 gpm (10 to 15 m³/h) use identity code version OZVa 2 x4xX.

Ozone Generators OZONFILT® OZVa

Types 3 and 4: the OZONFILT[®] is supplied without a pre-assembled bypass line. Included in the delivery is a PVC static mixer and the stainless steel parts required to construct the gas pipe between the OZVa and the static mixer. These parts are supplied loose and consist of two stainless steel pipes length 4-1/2['] (1.40 m), diameter 12/10) and one 90° elbow. Longer pipes or additional elbows can be ordered. The flow range from 44 to 66 gpm (10 to 15 m³/h) corresponds to the identity code version OZVa 3 x4xX, from 66 to 110 gpm (15 to 25 m³/h) to identity code version OZVa 3 x5xX and from 110 to 176 gpm (25 to 40 m³/h), identity code version OZVa 3 x6xX and/or OZVa 4 x6xX.

The bypass pipework and the static mixer are also available in stainless steel for all OZONFILT[®] types on request (charged accordingly).

Note:

The pipe lengths for the gas pipe and the number of connection points should be kept to a minimum for OZVa types 3 and 4. Any room with a connection point should be monitored with a gas detector according to accident prevention directives applicable in Germany.

All OZONFILT[®] systems are equipped to accommodate a Life CGM 1060 type gas detector (see accessories).

Note:

It is necessary to adjust the ozone generator to the water flow for each installation.

Note:

To prevent backflow of ozonated water into the feed pipes we recommend the installation of a non-return mechanism upstream from the OZVa.

Body Stress Ozone Generators: OZONFILT® OZVa Dechnical Data Data Dechnical Data: OZONFILT® Ozone Generating Systems Environmental Parameters: "Maximum air humidity of surrounding air 85% non condensing", max. ambient temp

"Maximum air humidity of surrounding air 85% non condensing", max. ambient temperature: 104° F (40° C).

Module: Ozone gerneration (1)

Ozone generator operating pressure: 11.6-29 psi (0.8-2 bar)

OZONFILT [®] Type		OZVa 1	OZVa 2	OZVa 3	OZVa 4
Number of generator modules:		1	1	2	2
Ozone capacity measured in accordance with DIN at air 68° F (20° C),					
cooling water 59° F (15° C):	lbs/day (gr/h)	0.26 (5)	0.79 (15)	1.85 (35)	2.11 (40)
Airflow for Ozone generation:	ft³/min. (m³/h)	0.15 (0.25)	0.44 (0.75)	1.03 (1.75)	1.18 (2)
Ozone concentration in the gas phase related to standard conditions:	ppm (g/m³)	20 (20)	20 (20)	20 (20)	20 (20)
Power consumption for Ozone generation:	kW	<0.15	<0.45	<0.75	<0.8
Power factor at full capacity:	cos f	0.7	>0.98	>0.98	>0.98
Ozone connection:		integrated into mixing system	integrated into mixing system	G 1/4" internal thread	G 1/4" internal thread
Cooling Water					
Cooling water requirement:	gals/hr. (m³/h)	2.64-15.84 (0.01-0.06)	5.28-15.84 (0.02-0.06)	13.2-26.4 (0.05-0.10)	18.48-26.4 (0.07-0.1)
Cooling water input pressure range:	psi (bar)	14.5-72.5 (1-5)	14.5-72.5 (1-5)	14.5-72.5 (1-5)	14.5-72.5 (1-5)
Cooling water inlet, PE discharge hose:	in.	1/4 x 3/16	1/4 x 3/16	1/4 x 3/16	1/4 x 3/16
Cooling water outlet, zero pressure:	in.	1/4 x 3/16	1/4 x 3/16	1/4 x 3/16	1/4 x 3/16
Cooling water temperature at ambient temp. <95° F (35° C):	°F (°C)	<86° F (30° C)	<86° F (30° C)	<86° F (30° C)	<86° F (30° C)
Cooling water temperature at ambient temp.			770 5 (050 0)		
95-104° F (35-40° C): Should be potable water quality	°F (°C)	<77° F (25° C)	<77° F (25° C)	<77° F (25° C)	<77° F (25° C)
Power supply					
Main power supply:	V, Hz (3 phase)	460 V, /60	460 V, /60	460 V, /60	460 V, /60
Enclosure rating:	NEMA (IP)	2 (43)	2 (43)	2 (43)	2 (43)
Air Connection (upstream from	n air cleaning u	nit)			
Total air requirement:	ft³/min. (m³/h)	0.22 (0.37)	0.59 (1)	1.33 (2.25)	1.47 (2.5)
Required air pressure:	psi (bar)	87-116 (6-8)	87-116 (6-8)	87-116 (6-8)	87-116 (6-8)

Ozone Generators: OZONFILT®OZVa Technical Data (cont.)

Technical Data: OZONFILT[®] Ozone Generating Systems (cont.)

OZONFILT® Type Module: Ozone mixing (2)		OZVa 1	OZVa 2	OZVa 3	OZVa 4
Material: PVC (standard), stainless stee	el (on requ	est)			
Flow volume for OZVa xx1xX:	ft³/min. (m³/h)	0.29-1.77 (0.5-3)	-	-	-
Flow volume for OZVa xx2xX:	ft³/min. (m³/h)	1.77-2.94 (3-5)	-	-	-
Flow volume for OZVa xx3xX:	ft³/min. (m³/h)	-	2.94-5.9 (5-10)	-	-
Flow volume for OZVa xx4xX:	ft³/min. (m³/h)	-	5.9-8.8 (10-15)	5.9-8.8 (10-15)	5.9-8.8 (10-15)
Flow volume for OZVa xx5xX:	ft³/min. (m³/h)	-	-	66-110 (15-25)	66-110 (15-25)
Flow volume for OZVa xx6xX:	ft³/min. (m³/h)	-	-	110-154 (25-35)	110-154 (25-35)
Flow volume for OZVa xx7xX:	ft ³ /min. (m ³ /h)	-	-	154-220 (35-50)	154-220 (35-50)
Flow volume for OZVa xx8xX:	ft³/min. (m³/h)	0.29-1.77 (0.5-3)	-		
Flow volume for OZVa xx9xX:	ft³/min. (m³/h)	1.77-2.94 (3-5)	-	-	-
Raw water connection for OZVa xx1xX:	in.	1.5	-	-	-
Raw water connection for OZVa xx2xX:	in.	1.5	-	-	-
Raw water connection for OZVa xx3xX:	in.	-	1.5	-	-
Raw water connection for OZVa xx4xX:	in.	-	2	2	2
Raw water connection for OZVa xx5xX:	in.	-	-	2.5	2.5
Raw water connection for OZVa xx6xX:	in.	-	-	3	3
Raw water connection for OZVa xx7xX:	in.	-	-	4	4
Raw water connection for OZVa xx8xX:	in.	1.5	-	-	-
Raw water connection for OZVa xx9xX:	in.	1.5	-	-	-
Raw water temperature:	°F (°C)	<95° F (35° C)	<95° F (35° C)	<95° F (35° C)	<95° F (35° C)
Pressure range in raw water pipe:	psi (bar)	2.9-29 (0.2-2)	2.9-29 (0.2-2)	2.9-29 (0.2-2)	2.9-21.8 (0.2-1.5)
Total dimensions					
Width:	in. (mm)	46.8 (1190)	32.7 (830)	27.9 (710)	27.9 (710)
Height:	in. (mm)	51.2 (1300)	41.7 (1060)	55.1 (1400)	55.1 (1400)
Depth:	in. (mm)	12 (305)	12.2 (310)	12.2 (310)	12.2 (310)
Weight:	lbs. (kg)	154.2 (70)	165.3 (75)	266.8 (121)	266.8 (121)

OZONFILT [®] Accessorie	es				
OZONFILT [®] Type		OZVa 1	OZVa 2	OZVa 3	OZVa 4
Compressors					
Mains connection value, compressor:	V, Hz (1 phase)	230 V, 50/60	230 V, 50/60	230 V, 50/60	230 V, 50/60
Power consumption at maximum operating pressure: - average:	kW kW	0.18 0.06	0.55 0.2	1.02 0.6	1.02 0.6
OZVa with compressor, oil lubricat Note: The oil-lubricated compress operation of less than 6 hours/day	ted ID code sor can only be use	OZVa 1xx1X ed at ambient ter	nperatures < 82° F	⁻ (<28° C) and for a	a period in
*OZVa with compressor, oil free:	ID code	OZVa 1xx2X	OZVa 2xx1X	OZVa 3xx1X	OZVa 4xx1X
		Part No.	Part No.	Part No.	Part No.
*Module: Residual ozone gas elimination:		<u>Part No.</u> 879022	<u>Part No.</u> 1004267	Part No. 1004267	<u>Part No.</u> 1004267
*Module: Residual ozone gas elimination: *Module: Ambience ozone monit	tor	<u>Part No.</u> 879022	<u>Part No.</u> 1004267	<u>Part No.</u> 1004267	<u>Part No.</u> 1004267
*Module: Residual ozone gas elimination: *Module: Ambience ozone monif Gas detector Life CGM 1060, pre-mounted on OZVa:	tor	<u>Part No.</u> 879022 1002840	Part No. 1004267 1002840	<u>Part No.</u> 1004267 1002840	<u>Part No.</u> 1004267 1002840
*Module: Residual ozone gas elimination: *Module: Ambience ozone monit Gas detector Life CGM 1060, pre-mounted on OZVa: Flow monitor with float and orifice and min. contact	tor	<u>Part No.</u> 879022 1002840	Part No. 1004267 1002840	Part No. 1004267 1002840	<u>Part No.</u> 1004267 1002840
*Module: Residual ozone gas elimination: *Module: Ambience ozone monir Gas detector Life CGM 1060, pre-mounted on OZVa: Flow monitor with float and orifice and min. contact Flow meter Min. contact	tor	Part No. 879022 1002840 1008584 1003014	Part No. 1004267 1002840 1003013 1003014	Part No. 1004267 1002840 on request	Part No. 1004267 1002840 on request
 *Module: Residual ozone gas elimination: *Module: Ambience ozone monir Gas detector Life CGM 1060, pre-mounted on OZVa: Flow monitor with float and orifice and min. contact Flow meter Min. contact On the flow meter input side, nominal connection width DN 40 	tor	Part No. 879022 1002840 1008584 1003014	Part No. 1004267 1002840 1003013 1003014	Part No. 1004267 1002840 on request	Part No. 1004267 1002840 on request
 *Module: Residual ozone gas elimination: *Module: Ambience ozone monif Gas detector Life CGM 1060, pre-mounted on OZVa: Flow monitor with float and orifice and min. contact Flow meter Min. contact On the flow meter input side, nominal connection width DN 40 Additional adapters for gas pipe for OZVa 3 and 4 	tor	Part No. 879022 1002840 1008584 1003014	Part No. 1004267 1002840 1003013 1003014	Part No. 1004267 1002840 on request	Part No. 1004267 1002840 on request

*NOTE: Optional. Please specify when ordering.

Ozone Generators: Ozonfilt® Identity code

ozv

Series Bona Zon®

			0.				
		1	0.2	26 lbs./c	lay (5 g	gr/h)	
		2	0.7 1.8	'9 lbs./c 35 lbs./c	lay (15 lay (35	gr/h)	
		4	2.1	1 lbs./c	lay (60 lay (40	gr/h)	
				Pow	ver Sup	oply:	
			0	230	V, 50/6	60 Hz	
			1	115	V, 50/6	0 HZ	
					Ozo	ne mix	ing module:
				0	none with	e transn:	arent mixing system and flow monitor
						in an iop	[flow rate 0.29-1.77 (0.5-3 m ³ /h)]
				2	with	transp	arent mixing system and flow monitor
				3	with	static r	[flow rate 1.77-2.94 (3-5 m ^{-/} n)] nixer [flow rate 2.94-5.9 (5-10 m ³ /h)]
				4	with	static r	nixer [flow rate 5.9-8.8 (10-15 m ³ /h)]
				5	with	static r	nixer [flow rate 8.8-110 (15-25 m³/h)]
				7	with	static r	mixer [now rate 110-134 (25-35 m ³ /h)] mixer [flow rate 154-220 (35-50 m ³ /h)]
				8	with	static r	nixer [flow rate 0.29-1.77 (0.5-3 m³/h)]
				9	with	static r	nixer [flow rate 1.77-2.94 (3-5 m ³ /h)]
						Co	mpressor:
					0	nor	ne ndard compressor*
					2	oil-	free compressor for OZVa 1
						* 0	ZVa 1: oil lubricated: OZVa 2,3 and 4: oil-free
						_	Language:
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Ozone Generators OZONFILT[®] Compact OMVa

OZONFILT® Compact OMVa



The OZONFILT[®] Compact OMVa is a complete, turnkey assembled ozone package for the treatment of drinking, process or swimming pool water in the capacity range of 0.26-2.11 lbs/day (5-40 gr/h) ozone and consists of the following modules:

Module: Ozone generation (1) constructed in accordance with DIN 19627

The ozone is generated with an OZONFILT OZVa in a pressure tight ozone generator and with the aid of an electronically produced and controlled medium frequency.

Module: Ozone mixing (2)

This module consists of an ozone dosing station and a mixing system connected downstream made from stainless steel, which incorporates two static mixing elements connected in series for intensive mixing of the ozonated air with the water to be treated. The ozone gas transfer pipes and the raw water pipes leading from the raw water connector to the inlet of the reaction tank are manufactured entirely from stainless steel and have been subjected to a pressure inspection on the factory premises.

There is no need for an injector to extract the ozone up to maximum backpressures of 29 psi (2 bar), since ozone generation is carried out under positive pressure.

Module: Reaction tank (12)

The stainless steel reaction tank provides all the necessary components for water feed and has an automatic vent valve (13). To this tank (12) are attached the ozone generator module (1), the unused ozone gas destructor (14) and the plant room air monitor (16).

Module: Residual ozone gas elimination (14)

The unused ozone gas destructor (14) is designed with an integrated water separator (6) for the removal of ozone gas traces present in the exhaust air emitted from the reaction tank (12). There is also present a connector for the exhaust air from a filtration system (15) connected downstream, if present.

Module: Ambience ozone monitor (16)

The plant room air is continuously monitored for ozone gas traces by a calibratable gas detector (Life CGM 1060) fitted with a long-term stable electrochemical sensor.

If alarm thresholds are exceeded the ozone generation is stopped and an alarm is triggered. At the same time a buzzer is activated.

Ozone Generators: OZONFILT®Compact OMVa Technical Data

Technical Data: OZONFILT® Compact OMVa

Performance data for drinking and swimming pool water treatment.

OZONFILT [®] Compact	Туре	OMVa 1	OMVa 2	OMVa 3
Drinking water treatment				
Nominal flow	gals/min. (m³/h)	13.2 (3)	39.6 (9)	88 (20)
Ozone dosage	ppm	1.7	1.7	1.7
Reaction time	min.	4.1	3.5	3
Swimming pool treatment				
Nominal flow	gals/min. (m³/h)	22 (5)	66 (15)	154 (35)
Ozone dosage	ppm	1	1	1
Reaction time	min.	2.5	1.9	1.8

Maximum flow at different temperature ranges in accordance with DIN 19643:

	≤ 82.4° F (28° C)	gals/min. (m³/h)	27.5 (6.25)	82.7 (18.8)	192.7 (43.8)
> 82.4° F (28° C)	< 89.6° F (32° C)	gals/min. (m3/h)	22 (5.0)	66 (15)	154 (35)
> 89.6° F (32° C)	< 95° F (35° C)	gals/min. (m3/h)	18.5 (4.2)	55.5 (12.6)	127.6 (29)
> 95° F (35° C)		gals/min. (m³/h)	14.5 (3.3)	44 (10)	101.2 (23)

The reaction time consists of the time in the reaction tank and the time spent waiting above the filtration material in the filter connected downstream. The resulting reaction time of 3 minutes complies with the reaction time stipulated by DIN 19643.

Requirements of water to be treated

OZONFILT [®] Compact	Туре	OMVa 1	OMVa 2	OMVa 3
Temperature	°F (°C)	41-104° F (5-40° C)	41-104° F (5-40° C)	41-104° F (5-40° C)
Pressure	psi (bar)	7.25-29 (0.5-2)	7.25-29 (0.5-2)	7.25-29 (0.5-2)
Chloride content	ppm	<500	<500	<500
pH value		4-10	4-10	

Ozone Generators Bono Zon[®] BON-**BONA Featur** The BON^{*} re^{*}

The BONa systems range in ozone capacity from 2 to 38 lbs/day (40 to 720 grams/hour) . Each includes an automaticregenerating dual dessicant dryer system, corona discharge ozone generation modules, infinitely variable primary transformer and PLC control system. The ozone contact system is not included with the generator. Power supply must be specified upon order.

FEATURES

- Source gas is atmospheric air.
- High efficiency: only 18 W/gram O₂.
- Direct water cooling of dielectric.
- Negative pressure (vacuum) system.
- Automatic load-dependent regeneration of dual air dryers.
- Manual or optional automatic control.
- Monitors for airflow, voltage, current and temperature.
- Cabinet door interlocks.
- Mimic diagram with status lamps.
- Booster pump interlock.
- PLC control of all functions.
- TUV-GS stamped.

BENEFITS

- Only cost of operation is electricity. No oxygen generator or bottled oxygen required.
- Low life cycle costs due to minimal power consumption.
- Greater output per tube, reduced ozone decomposition.
- Eliminates possibility of ozone leaks to atmosphere.
- Assures required -60°C dewpoint for maximum efficiency, provides continuous operation.
- Allows greater process control, reduces operating cost if full capacity not required.
- Displays status, shuts down system upon any faults.
- Prevents exposure to high voltage during operation.
- Illustrates operating status of system components.
- Booster pump and ozone generator operate simultaneously.
- Reliable and accurate safety assurance.
- Each unit tested and approved for safety per DIN 19627.



BONa

Ozone Generators: BONO ZON® BONa PVC Technical Data

Technical Data

Bono Zon® ozone generating system	s series B	ONa - PVC	;				
Type list with performance data							
Type BONa		1B	1A	2C	2A	3A	4A
Environmental parameters							
Max. air humidity of surrounding air 60% noncon-	densing, max.	ambient tem	perature, 86°	= (30°C).			
Module: Ozone generation (1)							
Ozone generator operating pressure: -1.16 to 0 p	sig (-0.08 to 0	bar)					
Corrosion-resistant PVC generator modules with	directly-coole	d dielectric					
Number of generator modules		1	1	2	2	3	4
Ozone capacity measured in accordance							
with DIN at air 68°F (20°C),	lbs/day	2	4	6	8	13	17
cooling water: 59°F (15°C)	(gr/h)	40	80	120	160	240	320
Max. airflow for ozone generation	ft³/min.	1.18	2.36	3.53	4.71	7.06	9.42
	(m³/h)	2	4	6	8	12	16
Ozone concentration	ppm	20	20	20	20	20	20
	(gr/m³)	20	20	20	20	20	20
Power consumption for ozone	HP	1.0	2	3.0	4.0	6.0	8.0
generation (excluding air drying)	kW	0.7	1.5	2.2	3.0	4.5	6.0
Ozone connection	in.	1/2"	1/2"	3/4"	3/4"	1"	1-1/4"
	(DN)	15	15	20	20	25	32
Cooling water requirement							
Cooling water requirement	gph (m³/h)	15.8 0.06	21.1 0.08	31.7 0.12	42.3 0.16	63.4 0.24	84.5 0.32
Cooling water inlet pressure upstream	psi	22-87	22-87	22-87	22-87	22-87	22-87
from pressure reducer	(bar)	1.5-6	1.5-6	1.5-6	1.5-6	1.5-6	1.5-6
Cooling water inlet	Thread						
	inches	1/2	1/2	1/2	1/2	1/2	1/2
Cooling water outler, zero pressure	in.	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"
	(DN)	15	15	20	20	20	20
Cooling water temperature	F°	<77	<77	<77	<77	<77	<77
	(C°)	<25	<25	<25	<25	<25	<25
Cooling water quality, drinking water, not complete	tely desalinate	d water					
Power supply							
Mains power supply including booster pump	kVA	4	5.5	7	10	14.5	20
Amperage	3x A	16	25	50	50	63	50
Enclosure rating	NEMA	3	3	3	3	3	3
0	(IP)	23	23	23	23	23	23
Interface to Module Ozone mixing							
Connection for booster pump integrated into control cabinet	А	1.6-2.5	2.5-4	4-6.3	4-6.3	6-10	6-10
Motor protected switch (standard valve)	HP	1.0	1.5	3.0	3.0	4.0	5.0
Total dimensions	kW	0.75	1.1	2.2	2.2	3	4
14/ ² .111	•	04 50	04 50	00.00	00.00	70 74	045
vvidtn	IN. (mm)	31.50 800	31.50 800	62.99 1600	62.99 1600	78.74 2000	94.5 2400
Height	in.	76.77	76.77	76.77	76.77	76.77	86.61
	(mm)	1950	1950	1950	1950	1950	2200
Depth	in.	19.69	19.69	19.69	19.69	19.69	23.62
	(mm)	500	500	500	500	500	000
Weight (PVC ozone generator)	lbs. (kg)	683 310	750 340	1,455 660	1,499 680	1,676 760	2,447 1110

Image: Second State Sta **BONa PVC Technical Data (cont.)**

Bono Zon [®] ozone generating systems series BONa - PVC									
Type list with performance data									
Type BONa		5A	6A	7A	8 A	9A			
Environmental parameters Max. air humidity of surrounding air 60% noncondensing, max. ambient temperature, 86°F (30°C). Module: Ozone generation (1)									
Ozone generator operating pressure: -1.16 to 0 psig	(-0.08 to 0 b	oar)							
Corrosion-resistant PVC generator modules with directly-cooled dielectric									
Number of generator modules 5 6 7 8 9									
Ozone capacity measured in accordance with DIN at air 68°F (20°C), cooling water: 59°F (15°C)	lbs/day (gr/h)	21 400	25 480	30 560	34 640	38 720			
Max. airflow for ozone generation	ft³/min. (m³/h)	11.77 20	14.12 24	16.48 28	18.83 32	21.19 36			
Ozone concentration	ppm (gr/m³)	20 20	20 20	20 20	20 20	20 20			
Power consumption for ozone generation (excluding air drying)	HP kW	10.0 7.5	12 9.0	14 10.5	16 12.0	18 13.5			
Ozone connection	in. (DN)	1-1/4" 32	1-1/2" 40	1-1/2" 40	1-1/2" 40	2" 50			
Cooling water requirement									
Cooling water requirement	gph (m³/h)	105.6 0.4	126.7 0.48	147.8 0.56	169.0 0.64	190.1 0.72			
Cooling water inlet pressure upstream from pressure reducer	psi (bar)	22-87 1.5-6	22-87 1.5-6	22-87 1.5-6	22-87 1.5-6	22-87 1.5-6			
Cooling water inlet	Thread, inches	1/2	1/2	1/2	1/2	1/2			
Cooling water outler, zero pressure	in. (DN)	3/4" 20	3/4" 20	3/4" 20	3/4" 20	3/4" 20			
Cooling water temperature	F° (C°)	<77 <25	<77 <25	<77 <25	<77 <25	<77 <25			
Cooling water quality, drinking water, not completely	desalinated	water							
Power supply									
Mains power supply including booster pump	kVA	22.5	27.5	34	36	38			
Amperage	3x A	63	80	80	80	80			
Enclosure rating	NEMA (IP)	3 23	3 23	3 23	3 23	3 23			
Interface to Module Ozone mixing									
Connection for booster pump integrated into control cabinet	A	6-10	16	9-14	9-14	9-14			
Motor protected switch (standard valve)	HP kW	5.0 4	7.5 5.5	10.0 7.5	10.0 7.5	10.0 7.5			
Total dimensions									
Width	in. (mm)	94.5 2400	110.2 2800	126.0 3200	134.0 3400	134.0 3400			
Height	in. (mm)	86.61	86.61	86.61	86.61	86.61			
Depth	in. (mm)	23.62 600	23.62 600	23.62 600	23.62 600	23.62 600			
Weight (PVC ozone generator)	lbs. (kg)	2,579 1170	2,774 1240	3,902 1770	4,012 1820	4,123 1870			

Ozone Generators: Bono Zon[®] BONa SS Technical Data

Technical Data

Bono Zon [®] ozone generating systems	series BONa -s	tainless steel			
Type list with performance data					
Type BONa		1A	2A	3A	4Δ
Environmental parameters					
Max. air humidity of surrounding air 60% nonconde	ensing, max. ambient	temperature, 86°F (30°C).		
Module: Ozone generation (1)					
Ozone generator operating pressure: -1.16 to 0 psi	g (-0.08 to 0 bar)				
Stainless steel generator modules with directly-coo	led dielectric				
Number of generator modules		1	2	3	4
Ozone capacity measured in accordance					
with DIN at air 68°F (20°C),	lbs/day	4	8	13	17
cooling water: 59°F (15°C)	(gr/h)	80	160	240	320
Max. airflow for ozone generation	ft³/min. (m³/h)	2.36 4	4.71 8	7.06 12	9.42 16
Ozone concentration	ppm	20	20	20	20
	(gr/m³)	20	20	20	20
Power consumption for ozone	HP	1.1	4.0		
generation (excluding air drying)	kW	1.5	3.0	4.5	6.0
Ozone connection	in.	1/2"	3/4"	1"	1-1/4"
	(DN)	15	20	25	32
Cooling water requirement					
Cooling water temperature 59°F (15°C) and air temperature <77°F (<25°C)	gph (m³/h)	0.1	0.2	0.3	0.4
Cooling water temperature 77°F (25°C) and	gph				
air temperature <86°F (<30°C)	(m³/h)	0.3	0.6	0.9	1.2
Cooling water inlet pressure upstream	psi	22-87	22-87	22-87	22-87
from pressure reducer	(bar)	1.5-6	1.5-6	1.5-6	1.5-6
Cooling water inlet inches	Thread,				
	inches	1/2	1/2	1/2	1/2
Cooling water outlet, atmospheric pressure	in.	1/2"	3/4"	3/4"	3/4"
	(DN)	15	20	20	20
Cooling water temperature, max.	F°	<77	<77	<77	<77
	(C ^o)	<25	<25	<25	<25
Cooling water quality, drinking water, not total desa	linated water, Chlorid	de content max. 250	ppm		
Power supply					
Mains power supply including booster pump	kVA	5.5	10	14.5	20
Amperage	3x A	25	50	63	50
Enclosure rating	NEMA	3	3	3	3
Interface to Module Ozona mixing	(IP)	23	23	23	23
		054	4.0.0	0.40	0.40
into control cabinet	A	2.5-4	4-6.3	6-10	6-10
Motor protected switch (standard valve)	HP	1.5	3.0	4.0	5.0
Total dimensions	KVV	1.1	2.2	3	4
Width	in	31 50	62.00	78 74	9.45
Wall	(mm)	800	1600	2000	2400
Height	in.	76.77	76.77	76.77	86.61
Death	(mm)	1950	1950	1950	2200
рерш	IN. (mm)	19.69 500	19.69	19.69	23.62
				000	
Weight	lbs. (ka)	794 360	1,587 720	1,808 820	2,645 1200

Total dimensions

Width

Height

Depth

Weight

Ozone Generators: Bono Zon[®] BONa SS Technical Data (cont.)

Technical Data Bono Zon® ozone generating systems series BONa -stainless steel Type list with performance data Type BONa ... 5A 6A 7A 8A **Environmental parameters** Max. air humidity of surrounding air 60% noncondensing, max. ambient temperature, 86°F (30°C). Module: Ozone generation (1) Ozone generator operating pressure: -1.16 to 0 psig (-0.08 to 0 bar) Stainless steel generator modules with directly-cooled dielectric 5 6 7 8 Number of generator modules Ozone capacity measured in accordance 25 30 34 with DIN at air 68°F (20°C), lbs/day 21 cooling water: 59°F (15°C) (gr/h) 400 480 560 640 ft³/min. 11.77 14.12 16.48 18.83 Max. airflow for ozone generation (m^3/h) 20 24 28 32 Ozone concentration 20 20 20 20 ppm (gr/m³) 20 20 20 20 10.0 Power consumption for ozone HP generation (excluding air drying) kW 7.5 9.0 10.5 12.0 Ozone connection 1-1/4" 1-1/2" 1-1/2" 1-1/2" in. (DN) 32 40 40 40 **Cooling water requirement** Cooling water temperature 59°F (15°C) and gph 147.8 169.0 190.1 21.1 air temperature <77°F (<25°C) 0.5 0.7 0.8 (m³/h) 0.6 Cooling water temperature 77°F (25°C) and gph air temperature <86°F (<30°C) (m³/h) 1.5 1.8 2.1 2.4 22-87 22-87 22-87 22-87 Cooling water inlet pressure upstream nsi from pressure reducer 1.5-6 1.5-6 1.5-6 1.5-6 (bar) Cooling water inlet inches Thread, 1/2 1/2 1/2 1/2 inches 1/2" 3/4" 3/4" 3/4" Cooling water outlet, atmospheric pressure in. 20 (DN) 15 20 20 F° Cooling water temperature, max. <77 <77 <77 <77 (C°) <25 <25 <25 <25 Cooling water quality, drinking water, not total desalinated water, Chloride content max. 250 ppm Power supply kVA 22.5 27.5 36 Mains power supply including 34 booster pump 63 80 80 80 Amperage 3x A Enclosure rating NEMA (IP) 23 23 23 23 Interface to Module Ozone mixing Connection for booster pump integrated 6-10 16 9-14 9-14 А into control cabinet Motor protected switch (standard valve) HP 10.0 10.0 5.0 7.5 kW 5.5 4 7.5 7.5

9A

9

38

720

21.19

36

20

20

13.5

2"

50

?

0.9

2.7

22-87

1.5-6

1/2

3/4"

20

<77

<25

38

80

23

9-14

10.0

7.5

134.0

3400

86.61

2200

23.62

600 4,409

2000

134.0

3400

86.61

2200

23.62

600

4.365

1980

9.45

2400

86.61

2200

23.62

600

2.822

1280

110.2

2800

86.61

2200

23.62

600

2.998

1360

126.0

3200

86.61

2200

23.62

600

4,233

1920

in.

in.

in.

(mm)

(mm)

(mm)

lbs.

(kg)

Design Conditions

- Ozone generation at a rate of 20 ppm (20 g/m³)
- Ambient conditions according to DIN 19627: intake air 86°F (30°C), cooling water < 59°F (15°C), 60% relative humidity, dust-free location, no corrosive gases, well ventilated room. At higher ambient temperatures and /or humidities, an optional pre-cooler or implementation of suitable climate control measures may be necessary.
- Systems are supplied in all voltage/frequency versions (standard 230 V, 50/60 Hz), or as multi-circuit systems in which a simple air treatment system serves multiple ozone generators.
- Manufactured in compliance with DIN 19627 and applicable VDE guidelines; maximum of 86°F (30°C); 60% relative humidity, a dust-free environment, with no corrosive gases present and with installation in a well-ventilated room. It may be necessary to install an air conditioner where there is a higher ambient temperature and/or higher humidity at the installation site. Please give specific details when ordering. The build up of condensation (water) can be avoided when the unit is not operating, by taking appropriate measures (e.g. installing an air conditioning system at the installation site). We reserve the right to make alterations to components and construction, when these do not affect the functioning of the system.

Ozone Contact Systems

A variety of application-specific ozone contact systems are available from ProMinent for each of the BONa ozone generation systems. These may include a booster pump, venturi, backflow prevention, ozone contact tank, off-gas destruct system, residual ozone destruct system, or other components. In addition, process control systems for controlling ozone residual in water based on ozone-specific sensors or ORP sensors are available from ProMinent. Contact the factory for details.

Bono Zon[®] High Capacity Ozone Systems Ozone Transfer System

The Ozone Transfer System

It is essential that, during water treatment, the ozone gas is brought into direct contact with the water being treated. It is important to note that the effective use of the ozone depends, first of all, on the degree to which the added ozone has been dissolved. Thus better results are obtained with pressure mixing systems than with those which are not under pressure. This is particularly the case when the ozone concentration is high, as in the Bono Zon[®] Ozone Generating Plant.

The ozone/water contactor for the Bono Zon® Ozone system works on the slipstream principle which is efficient and requires relatively low energy when working efficiently.



The ProMinent^ $\ensuremath{^{\oplus}}$ mixing systems are adapted to each particular application. They consist of the following subcomponents:

The Ozone Transfer system

consists of a pressure booster pump, an injector, a set of valves and a water trap to protect the ozone cabinet against water back flow.

Module: Ozone Mixing

The ozone mixing module consists of the BONa systems of the ozone transfer system and the in-line mixing vessel.

The ozone transfer system consists of an injector, booster pump, the valve set and the water safety trap with non-return valve.

The passage of water through the eductor creates a negative pressure which draws in ozone gas from the BONa system. In the in-line mixing vessel, the bypass flow is mixed with the entire flow of water requiring treatment and is fed from there to the reactor tank.

In the ozone gas pipe upstream from the injector an angle seat valve is installed with check valves before and after it. In the bypass water pipe from the injector to the in-line mixing vessel is situated an isolation valve or, in larger systems, a stop flap. Both up and downstream from the booster pump are also situated an isolation valve and a pressure gauge.

Ozone Generators: Bono Zon[®] Ozone Transfer System Technical Data

The Ozone Transfer System

Module: Ozone Mixing (cont.)

To prevent leakage from the check valves when the system is not operating, a T-piece is installed into the ozone gas pipe for water drainage. This pipe ends at a check valve with a floating (green) ball in the water trap.

The components of the ozone feed assembly are supplied as a complete assembly set – designed for a pressure of 21.8 psi (1.5 bar) in the in-line mixing vessel. For other operating pressures we can supply a quote, on request, for an adapted custom version of the ozone feed system.

Module: Ozone Mixing

For a system pressure of up to 21.8 psi (1.5 bar).

For ozone												
capacity:	lbs./day (gr/h)	2 (40)	4 (80)	6 (120)	8 (160)	13 (240)	17 (320)	21 (400)	25 (480)	30 (560)	34 (640)	38 (720)
Order Number:		1008868	1008869	1008870	1008871	1008872	1008873	1008884	1008885	1008886	1008887	1008888
Injector nominal value g	as flow:											
	ft³/min. (m³/h)	1.2 (2)	2.4 (4)	3.5 (6)	4.7 (8)	7.1 (12)	9.4 (16)	11.8 (20)	3 14.1) (24)	16.5 (28)	18.8 (32)	21.2 (36)
Nominal diam.	in. (DN)	1 (32)	1.5 (40)	2 (50)	2.5 (65)	2.5 (65)	3 (80)	3 (80)) 4 (100)	4 (100)	4 (125)	5 (125)
In-line mixing	, vessel m	echanisr	ns:									
Stop valve	in. (DN)	1 (32)	1.5 (40)	2 (50)								
or flap	in. (DN)				2.5 (65)	2.5 (65)	3 (80)	3 (80) 4 (100)	4 (100)	5 (125)	5 (125)
Ozone gas pi	pe housin	g:										
Angle seat valve check valve	e and in. (DN)	0.5 (15)	0.5 (15)	0.75 (20)	0.75 (20)	1 (25)	1 (32)	1 (32) 1.5 (40)	1.5 (40)	1.5 (40)	1.5 (40)
Pump:	Туре	CH4/40	CH8/40	CH12/40	40125	40125	50125	50125	50160	50160	50160	65125
Booster flow	gals/min. (m³/h)	17.6 (4)	35.2 (8)	52.8 (12)	70.4 (16)	105.6 (24)	140.9 (32)	176 (40)	211 (48)	246 (56)	282 (64)	317 (72)
Booster head	psi (bar)	36.25 (2.5)	36.25 (2.5)	43.5 (3)	33.35 (2.3)	33.35 (2.3)	33.35 (2.3)	33.35 (2.3)	33.35 (2.3)	33.35 (2.3)	33.35 (2.3)	33.35 (2.3)
Power supply	(kW)-A	(0.7)-1.7	(1.0)-3.1	(1.2)-4.1	(2.2)-4.6	(3)-6.3	(4)-8	(4)-8	(5.5)-11.8	(7.5)-14	(7.5)-14	(7.5)-14
Connector	in. (DN)	1.25-1	1.25-1.5	1.5-1.5	2.5-1.5 (65-40)	2.5-1.5 (65-40)	2.5-2 (65-50)	2.5-2 (65-50)	2.5-2 (65-50)	2.5-2 (65-50)	2.5-2 (65-50)	3-2.5 (80-65)
Pump valves:	1											
2 x stop tap or 2 x flap	in. (DN) in. (DN)	1 (32)	1.5 (40)	2 (50)	2.5 (65)	2.5 (65)	3 (80)	3 (80)	4 (100)	4 (100)	5 (125)	5 (125)

Required accessory (No longer standard)

Water return-flow safety device including water collecting main, non-return valve 0.75" (DN 20) with green ball, two presssure gauges, 87 psi (6 bar). 1008761

Ozone Generators: Bono Zon[®] Ozone Transfer System

Ozone Mixing



Static mixer

pk_7_044

In - line mixing housing

Static mixer designed for intensive mixing of the combined liquids. Mixer made of PVC-U with two integrated non-spinning mixers and a transparent PVC mixing tank, non-transparent for types with nominal width 8" (DN 200).

The size is dependent on the volume of water to be ozonated.

Pressure rating: PN 4, other pressure ratings available on request.

Connection 2-1/2"-8" (DN 65-200): removable flange PN 10.

Flow gpm (m³/h)	Flange connection in. (DN) (mm)	Length in. (mm)	Part No.
66-110 (15-25)	2-1/2" (65)	13.8 (350)	1007841
110-154 (25-35)	3" (80)	17.7 (450)	1007842
154-220 (35-50)	4" (100)	21.7 (550)	1007843
220-396 (50-90)	5" (125)	25.6 (650)	1007864
396-704 (90-160)	6" (150)	31.5 (800)	1007865
704-1100 (160-250)	8" (200)	39.4 (1000)	1007866
1100-1540 (250-350)	8" (200)	39.4 (1000)	1007867
· · · · · ·	. ,	. ,	

Larger flow rates on request

Reaction tank

Made out of glass fiber reinforced plastic. Its role is to remove the undissolved gases from the water and it is fitted with an automatic exhaust valve for this purpose. The desired reactions between the ozone and the contents of the water also take place here. The size and design of the tank depends upon the application and the volume of water to be ozonized.

Vent valves

Vent valve 1.06 lbs/day (20 gr/h) Vent valve 4.23 lbs/day (80 gr/h) Vent valve 12.7 lbs/day (240 gr/h) Part No. 302525 302526 303845

Ozone Generators: Bono Zon[®] **Ozone Transfer System**

Excess ozone eliminator

ProMinen

1003009

The mixture of gases leaving the gas relief and reaction tank (and possibly also an activated charcoal filter if arranged in tandem) is dried over an appropriate piping system and passes through a pipe system to an activated charcoal cartridge where the remaining ozone is removed. The exhaust gas is released into the atmosphere. In special cases hot catalytic systems can be supplied.

	Ozone quantity			
	Туре	lbs/day	(grams/hr)	Part No.
Resid. ozone gas elimination 3 L	10	0.5	(10)	879022
Resid. ozone gas elimination 14 L	40	2	(40)	1004267
Resid. ozone gas elimination 30 L	100	5	(100)	879019
Resid. ozone gas elimination 60 L	200	10	(200)	879018

Note:

The ozone quantities given above relate to the quantities dosed to raw water. The unused ozone gas destructor is designed to accommodate the normal unused ozone concentrations in swimming pool applications.

CGM Life[®] Gas Detector

The CGM Life Gas Detector is a compact measuring and switching unit which monitors the surrounding air for dangerous concentrations of chlorine, chlorine dioxide, or ozone.

Technical Data

	Ozone	Part No.
Type Designation	Life CGM 1050	1002839
Alarm limit value	0.5 ppm	
Warning limit value	0.3 ppm	

The gas-warning device has 3 output relays:

· output relay for alarm as potential-free normally closed contact, must be manually reset.

 horn relay for alarm as potential-free change over contact, independently acknowledgeable via key button, must be manually reset

· warning relay as potential-free normally closed contact, automatically resets when measured value drops below warning limit value

Maximum contact rating:	230 V, 1 A
Electrical connection:	230 V, 50/60 Hz, 7 VA
Type of enclosure:	IP 54, NEMA 3
Dimensions (without sensor):	length: 8.66 in. (220 mm)
	height: 5.71 in. (145 mm)
	width: 3.15 in. (80 mm)
Safe environmental conditions:	
Temperature:	14° to 113° F (-10° to 45° C)
Pressure:	atmospheric pressure $\pm 10\%$
Air humidity:	20 to 90% rel. humidity
Sensor operational life:	2 years
Spare sensor:	

