



*The ozone generator from Water ApS applies the latest and patented technology for Ozone generation.*

*Ozone is a powerful Oxidation agent used for disinfections, for purification and for many other chemical applications such as drinking water treatment, swimming pools, kitchen, odor treatment, process water treatment and pulp bleaching as a few samples.*

*Ozone is poisonous in high concentrations. International recommendations state that exposure should not exceed 0.1 PPM over 8 hours or 0.3 PPM over 15 minutes. Long term exposure to too high concentrations can cause damage on the respiratory system. The gas will itself warn you as it starts to smell at concentrations as low as 0.04 PPM. At a concentration of 0.1 PPM you will find the smell unpleasant and also irritating.*

*We recommend the user to frequently check the WO3-K 20 unit for leakages.*

*There are ozone measuring instruments available that can be placed at other places if you want to have increased safety. Consult your distributor for further information.*

## **ATTENTION!**

*Safety procedures must be followed during installation, start-up and operation:*

- 1. Study the manual carefully before installation and start-up.*
- 2. A proper and complete installation must be performed before any ozone production is started.*
- 3. Check that all tube and electrical connections are in position to ensure a completely functional system.*
- 4. Always shut down the power completely and unplug unit before opening ozone generator unit.*
- 5. Never open the ozone generator cabinet during operation or without a complete power shut-off.*

*Certain parts of your WO3-K 20 and certain data may differ from those described in this manual.*

## **GENERAL INFORMATION**

*This WO3-K unit produces ozone from concentrated Oxygen that comes from the integrated Oxygen concentrator. The unit produces up to 90 -94% pure oxygen*

*The ozone molecule, O<sub>3</sub>, consists of three Oxygen atoms. Ozone is formed from ordinary Oxygen gas, O<sub>2</sub>, using electric corona discharges. The corona frequency on the electrode is 20-30 kHz, which allows a compact design of the generator.*

## **OZONE GENERATOR ELEMENT**

*High voltage board deliver appr. 4000 Volt to the dielectric plate.*

*2 Heat Sinks for cooling of the dielectric.*

*A fan for cooling*

*Dielectric.*

*The central parts in the WO3-K 20 unit are the ozone generator elements i.e. the electrodes. This is a flat plate ceramic dielectric barrier with an internal steel electrode connected to a high voltage transformer. The Ozone forming cell consists of two ceramic dielectric plates with a metallic spacer in between. On both side of the dielectric a conductive material is attached. For removing the heat generated from the dielectric a heat sink on each side of the dielectric is mounted. A fan is blowing fresh air over the Heat sinks once the generator is in operation and over the High Voltage board. The Dielectric and the Heat sink forms the main component of the WO3-K 20 "the ozone generator". A high Voltage board is located on top of the Heat sink. Components in the High voltage board are producing heat and cooled by the above fan.*

## COOLING

Only part of the corona energy is used to produce ozone. The rest of the energy is released as heat and needs to be removed. At higher temperatures the speed at which the ozone is transformed back to Oxygen is increased. It is therefore essential to have efficient cooling of the dielectrics. This is the reason why the WO3-K 20 is cooled by a fan, mounted on the one side of the chassis. It is essential to make sure that cool air is available to produce maximum amount of Ozone. The air should be free of dust and particles. For most efficient production try to place the unit in the coolest place possible. High humidity will over time start corrosion of essential parts in the electrical system.

## GAS SUPPLY AND GAS MIXING

The WO3-K unit is with a build in Oxygen concentrator of Swing Absorber type. The unit is self regulating but the oxygen fed should not be less than 90 % purity! Humid air and locations with a lot of Sulfur may damage the seave beds in the concentrator. Make sure to place the unit in a well ventilated dry environment.

Operated this way the WO3-K 20 will produce up to 20 gram/h of Ozone, 17 degree C. ambient room temperature.

Hydrocarbons and water are not allowed in the gas supply as they present a risk of damage to the ozone generating cells.

## INDICATORS AND OPERATION COMPONENTS OF THE WO3-K 20 SAFE

### 1 POWER ON/OFF

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This is the main on/off switch. The switch is located on the right hand of the cabinet. It will give of a red light when placed in the On position. Before trying to control or change circuits always disconnect the WO3-K 20 unit from the power source.

### 2 FUSE HOLDER

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Socket for fuse to the WO3-K 20 (5 x 20 mm) 2 Amp – O3/ 5 Amp – O2. The Fuse holder is just beside the terminal block.

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### 3 ELECTRICAL / TERMINAL

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*A terminal for connection of 230/50 Hz is placed inside the cabinet. There is also a connection point for the 3 level set of the generator as well connection for a Volt free start/stop.*

### 4 OZONE GENERATOR

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*High concentration corona discharge ozone generator. Nominal concentration 10% by Weight.*

### 5 COMPRESSOR

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*230 V oil free air compressor rated 3,5 Bar @ 28 L/min for the air to oxygen seave beads and as oxygen to the ozone generator.*

### 6 INTAKE FILTER

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*Compressor air intake filter.*

### 7 AIR COOLER

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*Air cooler for compressed air.*

### 8 O<sub>2</sub> FAN

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*Cooling fan for compressor. Capacity 120 m<sup>3</sup>/hour, 230 V. 120 mm high flow.*

### 9 WATER TRAP

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*Automatic removal of water in compressor air.*

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10 SAFETY VALVE

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*Compressor safety over pressure valve.*

11 SWITCHING SOLENOID

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*Sieve bed valve. Switching from sieve bed 182.*

12 O2 COOLING FAN

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*Compressor cooling. 90m<sup>3</sup>/H, 90 mm high flow.*

13 OXYGEN SIEVE BED 182

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*Double cylinder oxygen sieve beds.*

14 FLOW METER

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*Oxygen flow in L/min. Rota meter where top of the ball is showing the flow.*

15 OZONE LED

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*Indication light for ozone in operation – red light.*

16 OXYGEN LED

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*Indication light for oxygen in operation.*

17 HOUR METER

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*Hour counter*

18 OZONE OUTLET

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*Bulkhead joint for outlet gas (1/4" inside)*

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19 O3 FAN

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*Cooling fan for ozone. 120 m3/H, High flow version.*

### **CONTROLLING THE WO3-K 20**

*All WO3-K 20 units have adjustable ozone production in three steps build in into the main internal board. As an option a control panel can be hooked up to the unit whereby the production can be set to between 10 % - 100 % of maximum effect. By connecting the control panel display you have a number of possibilities to adjust the Ozone production (see appendix 1 ).*

**Warning!** *Never open the ozone cabinet during operation!*

### **COMPONENTS OF THE WO3-K 20 UNIT**

*The consists of few components and is assembled in an easy way for both observation as well as maintenance.*

*The major components are:*

*Compressor (5)*

*Switching solenoid (11)*

*Sieve bed for Oxygen production, 2 pce(13)*

*Equalizer tank*

*Flow meter (14)*

*Ozone Generator consists of:*

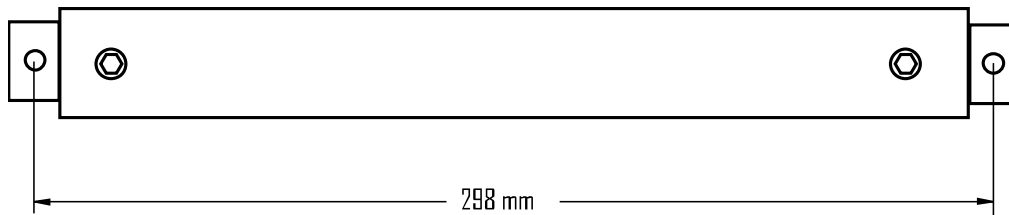
- A. Electronic board with transformer.*
- B. Cooling fins*
- C. Dielectric ( Ceramic substrate.)*

### **PREPARE TO INSTALL**

*Check the systems for transport damage before installation! The WO3-K 20 should be set up and used in a dry, clean and cool place. If possible install the unit in a cool*

*environment this will enhance the function. The generator system must not be exposed to extreme high humidity, steam or to a corrosive atmosphere at any time.*

*With each generator there are wall bracket supplied. This should be fixed to the wall. The generator will fit directly to the wall bracket.*



### **GAS SUPPLY**

*The WO3-K 20 is designed to be fed from the built in Oxygen concentrator. The Ozone generator is connected to the mains with a cable from the Oxygen concentrator.*

*Inside the cabinet there is a flow meter connected to the Oxygen concentrator. The gas flow to the ozone generator should be 2,4 L/min (top of the ball).*

**Attention!** *Make sure that the ozone distribution pipe is tightly fastened and has no leaks! It could be dangerous for you and for the environment!*

### **POWER SUPPLY**

*The power supply is standard 220/230 V and 50/60 Hz 7 Amp. The incoming power cable should be min 0,75 mm<sup>2</sup>. In humid or wet areas consult your installer to be sure you meet local installation codes.*

### **COOLING AIR**

*Make sure that the unit is placed in the coolest place possible. Ambient temperature affects the production of ozone. There is a filter on the intake air to the compressor. It is recommended that you periodically check the filter for impurities. The filter can be*

*cleaned with soapy water. Make sure the filter is completely dry before it is put back and the machine. If necessary replace the filter. Replacement filters are available from the manufacturer.*

***Warning!** Never run the ozone generator when the cooling fan is not working! It may cause severe damage to the ozone generator! The generator may overheat and may become a fire hazard.*

### **CONNECTION OF EXTERNAL COMPONENTS**

*The Oxygen generator is connected to the mains and controls by the Ozone units. Oxygen Concentrator is slaved to control of the ozone generator to make it run only when the ozone generator needs the Oxygen supply. The maximum amperes from the ozone generator to the Oxygen generator are 4 amperes. The fuse in the Oxygen generator is located in the electrical inlet to the concentrator and is rated 5 Amp (5x20 mm).*

### **START UP**

*Switch the power On/Off switch to On position located on the left side. Check and adjust the gas flow on the flow-meter to be 1.7 l/m for ONY 10 and 2,4 litter/m for the WO3-K 20 ( top of the ball ) Once this is done the flow should be adjusted by the outside needle valve.*

*Ozone production will start instantly after oxygen concentration has reached >85%. Once the Ozone generator is producing ozone, it will in few seconds start an LED, illuminating in red.*

*Always check for possible leak and should you find close down the Ozone unit.*

### **SAFETY**

*Please note the following safety rules before you start or stop operating the system:*

- Avoid all exposure to ozone. Observe the limits for exposure to Ozone. This powerful unit can produce Ozone in higher concentrations then recommended maximum values for exposure. An extra ozone detector can be used to ensure that the limit for ozone exposure is not exceeded.*

- *Water ApS takes no responsibility if the product is used in other ways than here described.*

*Start of WO3-K 20 when operated by one remote control*

*Connected on the terminal block for remote control the main switch should always be in On position. In remote mode two settings are available: 1 – 50%; 2 – 100% power.*

**Attention!** *Make sure that all equipment and connections used are approved for the mix of ozone, oxygen and water.*

*It is recommended to use the volt free connector to start and stop the Ozone generator.*

**Warning!** *Pressure shocks in the gas system can result severe damage to the unit. Always make sure there is no back pressure in the gas line. If an injector is being used the suction over the injector might increase the gas flow through the system. Make sure that the pressure and gas flow are held within the injector specifications. Backpressure and water in the generator cell can cause problems. Water going up the gas pipe may cause the entire system to short circuit. O3 technology does sell a special water trap to secure the failure of above.*

**Attention!** *(Optional!) The WO3-K 20 is fitted with an automatic shut off function for safety reasons. If Ozone concentrations exceed the safety limit then the unit will automatically shut off. Once concentrations are back to normal the unit will start after pressing off/on on the main switch.*

*Likewise the unit will shut down in case of any internal fault. Once the fault has been removed the machine must then be manually restarted.*

## **SHUT DOWN OF OPERATION**

*Just switch the main button to off position and the ozone generator and the Oxygen generator, if used, will be switched off.*

*Is optimal for this product:*

<i>Model</i>	<i>WO3-K 20</i>
<i>Number of ozone generating elements</i>	<i>1 max</i>

<i>Ozone production, max g/h</i>	<i>10 g/h; 20 g/h</i>
<i>Gas flow, max L/min; ONLY 10/20</i>	<i>1,7/2,4</i>
<i>Current consumption, A</i>	<i>5.0/7.0 Amp</i>
<i>Dimensions (HxWxD)</i>	<i>365x200x505 mm</i>
<i>Weight</i>	<i>24 kg</i>

*Gas supply:*

*Oxygen Concentrator included in the unit!*

*Materials:*

*All materials in contact with ozone are of Teflon or approved stainless steel.*

*Cooling Fan capacity:*

*150 m<sup>3</sup>/h*

<i>FEATURES</i>	<i>CHARACTERISTICS</i>
<i>Gas supply</i>	<i>Normal air trough an Oxygen Concentrator. 92 % O2. Max 3 L/min</i>
<i>Max system gas pressure(after regulator)</i>	<i>1,5 bar Oxygn pressure</i>
<i>Power parameters:</i>	
<i>Power supply</i>	<i>230 V, 50 Hz (115 V, 60 Hz Optional)</i>
<i>Secondary frequency to generators</i>	<i>25 KHz</i>
<i>Secondary voltage to generators</i>	<i>4000 V</i>
<i>Cable</i>	<i>3 Wire 0,75 mm<sup>2</sup> cable; Power cable</i>
<i>Connections:</i>	
<i>OM connection:</i>	
<i>Oxygen</i>	<i>PTFE connector 6 mm</i>
<i>Ozone</i>	<i>10 % Nominal by weight!</i>
<i>Cable</i>	<i>3 Wire 0,75 mm<sup>2</sup></i>
<i>Power connection:</i>	<i>See above parameters</i>
	<i>5 Amp/7 Amp</i>

<i>Fuse</i>	
<i>To external equipment:</i>	<i>Setting for 30 / 50/ 100 % is on the main board.</i>
<i>Oxygen generator</i>	<i>230 V supplied maximum 3A Use extra relay!!</i>
<i>Volt free start</i>	<i>Two connectors, only for signal from laundry units ( optional ) or kitchen ventilation</i>

## **TROUBLE SHOOTING**

*The ozone generator is carefully tested before delivery. If problems should occur first check the following table. Before performing an inspection or maintenance make sure the unit is disconnected from the power supply.*

<i>Problem</i>	<i>Possible cause</i>	<i>Action</i>
<i>Ozone smell from the system</i>	<i>Connection leakage.</i>	<i>Make sure that all connections are tight. Check for ozone leakage with soapy water, run it with oxygen only!</i>
<i>The ozone generator does not start up</i>	<i>On/Off Switch Off, or a fuse blown.</i>	<i>Turn on the switch. Check fuse and replace if blown.</i>
<i>General</i>	<i>Water in the gas line!</i>	<i>Let it flow with Oxygen for 10 h.</i>
<i>“Control Unit” mode</i>	<i>The system is set to the wrong mode. (The control unit cannot establish communication). (Optional)</i>	<i>Change the control unit switch (2) from “Manual to slaved” to “Active”</i>
<i>“Stand Alone” mode</i>	<i>The Power Supply on the O3 is disconnected or the On/Off switch is set to Off.</i>	<i>Connect the power and turn On the On/Off switch</i>
	<i>The system is set to the wrong mode.</i>	<i>Change the control unit switch (2) from “active” to “Stand Alone”.</i>

<i>Insufficient Ozone production</i>	<i>Wrongly adjusted system parameters.</i>	<i>Check the system parameters, consult the technical data. Check the power setting.</i>
	<i>The power level is to low.</i>	<i>Adjust the power level.</i>

*If the problems still remain please contact your distributor! Water ApS takes no responsibility in damages due to an erroneous use of the Ozone generator.*

### **CHANGEABLE PARTS**

**Attention!** *Before changing any parts of the generator be sure to disconnect the main power and the gas supply.*

#### *Changing of the Generating cell*

*Complete exchange cells are available from your distributor. Consult your distributor for further details.*

### **CONTROL BOARD (OPTIMAL)**

*The Control board has been developed by Water ApS to be a universal control unit. You will find the same controller in many different applications where Ozone should be controlled or monitored.*

*The control board is aimed to control and monitor all of our units where there is a low volt inlet for the control. Such inlet is the models equipped with. The control board offers unique solutions to many of the requirements of control of a full ozone system.*

*There are three buttons to control and change parameters of the Ozone or the monitoring equipment:*

- A. On/Off ( Power to the generator)*
- B. Adjustment for larger amount*
- C. Adjustment to lower amount.*

Beside this the two lower buttons can be used for entering into the programming mode ( B & C ) or to be confirming a set value.

The control board shows in the basic configuration following:

<i>“Auto 100 % 00,0 l/min”</i>	<i>Generator will start producing ozone when power is available.</i>
<i>“ Stopped 00,0 l/m”</i>	<i>Generator will be with power but without producing Ozone.</i>

*By pressing one time on the Upper button (A) you can change between the two.*

*When in the operational mode: Auto the concentration which is the pulsing mechanism can be set from 0 – 100 %. The pulsing will be done in pulsing representing 1 to 100 % of the full power. For every 2 minutes the generator is checking the incoming voltage and correcting the output. During this procedure the generator has to operate at 100 % for te verification. This procedure last 5 seconds.*

*When pressing the two lower bottoms simultaneously you are entering into the programming mode:*

*“Auto st” starts the generator automatically when control board and power is present, and it is set in “yes”. To do so it is required to press the 2 lower buttons simultaneously. Once this is done you can alter the set value by pressing one of the lower bottoms. Yes respectively No will show in the lower part of the display. Once it is set your desire you have to confirm the setting by pressing the two lower bottoms simultaneously once again.*

*Should you have desire to operate the generator without a control board the two pin jumper has to be removed from the HV-board. In this position the generator will automatically start time the power is on. The setting will be the setting last set with the control board.*

*Generators with flow measurement:*

*Press the two lower bottoms simultaneously:*

*The configuration can be altered to other specific customer requirement. Each programming to a specific wish is being debited at Euro 500.*