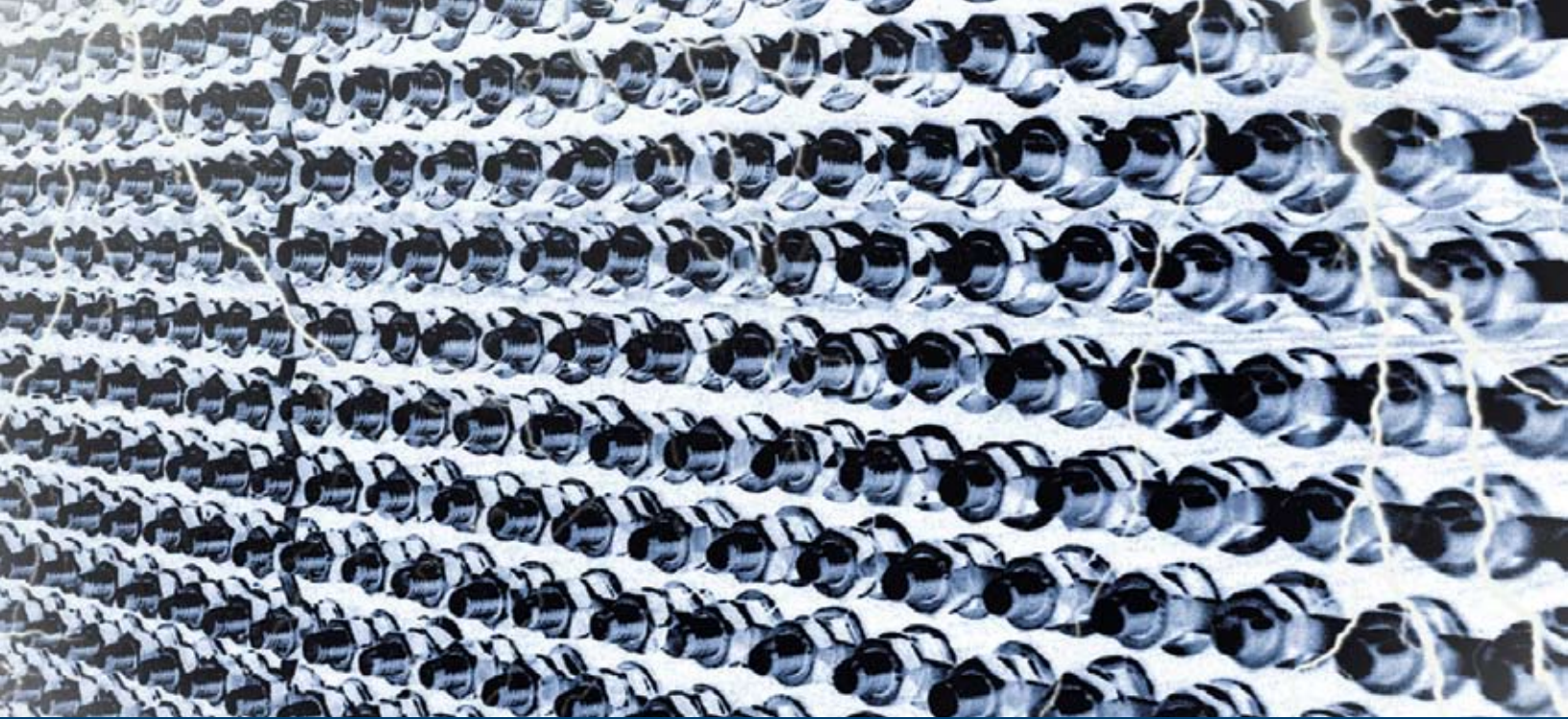


PDO/PDA Series Ozone Generators

Unique design, unique performance





Ozone technology — environmentally friendly and effective

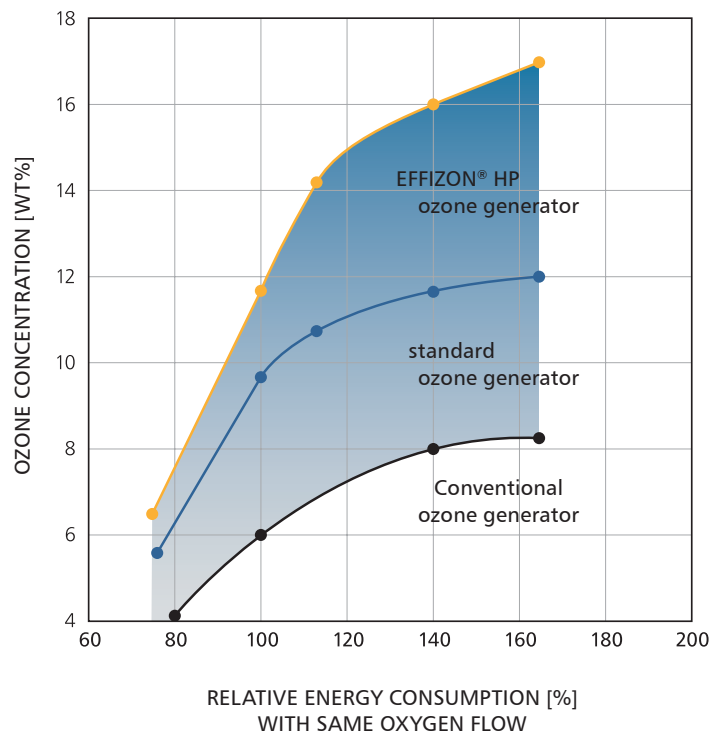
HIGH-TECH FOR THE ENVIRONMENT

Ozone is a powerful oxidant that is created from oxygen. Due to its high reactivity, it cannot be stored onsite but rather generated at the point of use from industrial oxygen or air. A high voltage is applied between two electrodes inside the ozone generator, which are separated from each other by a non-conducting dielectric (e.g. glass). Some of the oxygen molecules (O_2) break down into two individual oxygen atoms in the electrical field. These atoms immediately attach themselves to the nearest free oxygen molecules, thus forming ozone, or O_3 . ITT Water & Wastewater has developed a unique compact electrode, the EFFIZON[®] HP electrode, to maximize ozone yields and minimize operating costs.

UNIQUE EFFIZON[®] HP TECHNOLOGY

EFFIZON[®] HP technology provides the most efficient and reliable ozone production element available in today's market. As a result of this robust design, replacement warranty on their production elements and ensures that there are no requirements for routine cleaning or regular replacement of the electrodes, as required by conventional systems.

Reduced energy costs and less maintenance in connection with reduced system footprint are some of the considerable benefits.





WEDECO PDO/PDA Series ozone generators

WEDECO PDO/PDA Series ozone generators are the overwhelming choice of design engineers and end-users worldwide who require reliable, efficient production of large quantities of ozone to meet their process needs. That's because PDO/PDA series generators have been engineered from the ground up with customer requirements in mind. The result is the most compact, cost-effective and reliable ozone generation system available.

UNIQUE DESIGN

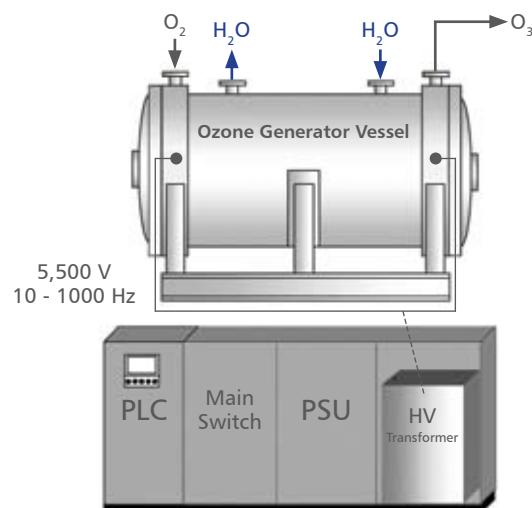
Two key features separate PDO/PDA generators from the others: The exclusive use of the EFFIZON® HP electrode technology and the variable frequency power supply. These features combined are the basis for an ozone generator with unmatched reliability, efficiency and production flexibility and low specific power consumptions — all in a compact package that minimizes space requirements and associated facility construction costs.

EFFIZON® TECHNOLOGY

The heart of the WEDECO ozone system is the EFFIZON® HP electrode technology. Inside the ozone generator vessel, stainless steel tubes are welded between two fixed tube plates serving as grounded electrodes. The EFFIZON® HP electrodes, each consisting of a high voltage electrode, a stainless steel mesh and dielectric glass tube, are placed inside the grounded tubes. Ozone is produced in the gaps, both on the inside and the outside of the glass.

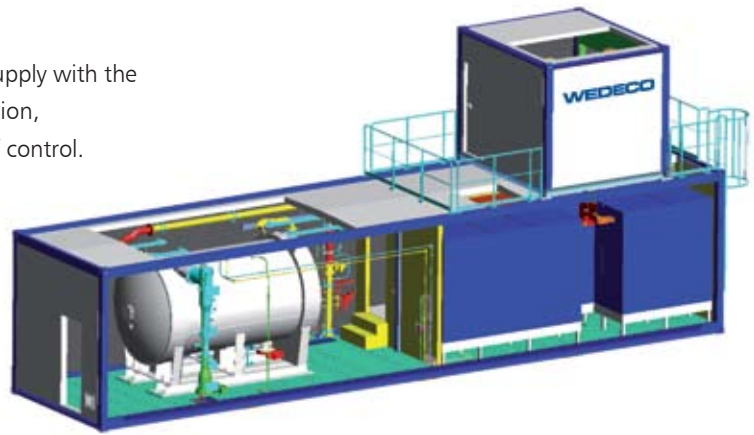
VARIABLE FREQUENCY POWER SUPPLY UNITS (PSU)

The performance of any ozone generator is dependent not only on the electrode assembly, but also on optimum power supply to the ozone generator cell. By using frequency to adjust the ozone concentration and production capacity, the WEDECO PSU exhibits precise and linear ozone output control, as well as a very wide turndown range (up to 100:1). In contrast to variable voltage PSU designs, the voltage is held constant throughout the range. As a result, our variable frequency PSU maintains a very high power factor throughout its operating range.



Options for PDO/PDA Series generators

A number of options and ancillary equipment are available for supply with the PDO/PDA Series ozone generators. All necessary instrumentation, PLC logic, etc. would be included to provide the required level of control.



▲ Standard container arrangement for PDO/PDA series ozone generators

Options	
Containerized systems	<ul style="list-style-type: none"> • Insulated, lighted and painted container • Complete with alarms and monitoring equipment • Electric heating and ventilation fans
Instrumentation & control	<ul style="list-style-type: none"> • Ozone concentration control • Ozone residual in water • Alarm monitoring and indication
Feed gas supply	<ul style="list-style-type: none"> • Liquid oxygen (normally supplied by the oxygen manufacturer) • (V)PSA oxygen ([Vacuum] Pressure Swing Adsorption) • Air compressor, desiccant dryer, filtration
Ozone mixing and contacting	<ul style="list-style-type: none"> • Side stream injection systems • Fine bubbles diffusers • Closed reactors • Degassing tanks
Electronic process control	<ul style="list-style-type: none"> • Operation panel • Overall process control
Ozone destruction in off gas	<ul style="list-style-type: none"> • Catalytic ozone destructors • Blowers • Demisters
Cooling water supply	<ul style="list-style-type: none"> • Air / water cooled chiller units • Heat exchangers



PDO 1000 Ozone Generator

Standard skid-mounted PDO/PDA Series ozone generators

The Standard scope of supply for PDO/PDA Ozone systems includes:

- Ozone generator including the EFFIZON® HP electrodes
- Power supply unit utilizing the variable frequency technology
- PLC system for internal control and monitoring of the ozone systems
- Local operator interface panel
- Ambient monitors
- Air conditioning systems for electrical cabinets
- Ancillary equipment as required for complete operation of the system
- Control and monitoring instrumentation
- Complete system, fully assembled, piped and cabled on a skid
- Certified factory test



▲ Containerized ozone generator for 8,500 lbs/day



PDO/PDA series for large capacity applications

For individual ozone capacities beginning at 800 lbs/day and continuing to more than 13,000 lbs/day, there is a PDO/PDA model to meet your needs. Whether the challenge involves drinking water treatment, chemical oxidation, bleaching or pollution control, PDO/PDA series generators can provide the solution.

WATER TREATMENT

- Pre-oxidation of organic or inorganic constituents
- Disinfection
- Oxidation of toxic agents

CHEMICAL OXIDATION AND SYNTHESIS

- Organic synthesis (ozonolysis)
- Coating surface preparation

POLLUTION CONTROL

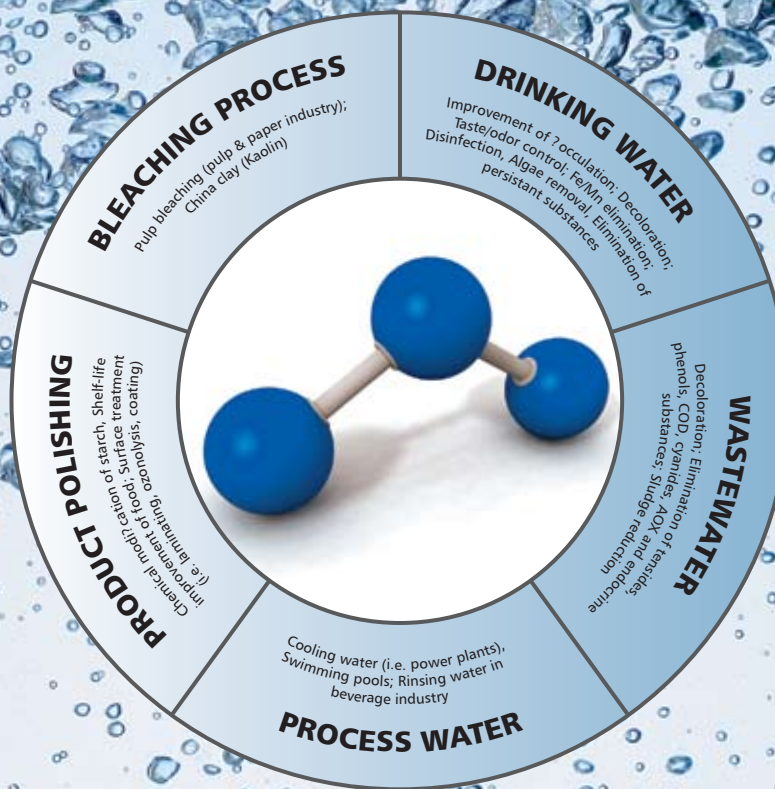
- COD reduction and cracking for improved biodegradation
- Color and odor elimination
- NOx reduction in offgas streams

BLEACHING

- Pulp
- China clay

ADVANTAGES

- Highest efficiency at guaranteed ozone production
- High operational reliability
- “Plug and play” systems (completely mounted and instrumented)
- Easy operation
- Robust design for operation under rough ambient conditions
- Certified factory test prior to delivery
- Low maintenance



3

Ozone in use

Ozone is one of the most powerful commercially available oxidants and is commonly used for municipal water and wastewater treatment. In addition to its oxidizing capabilities, it is an environmentally friendly method of treatment. Pollutants, colored substances, odors and microorganisms are directly destroyed by oxidation, without creating harmful chlorinated byproducts or significant residues. By decomposing to oxygen as it reacts, ozone provides a cost effective and environmentally friendly alternative to oxidation with chlorine, absorption (activated carbon) or separation processes (reverse osmosis).

ADVANTAGES OF OZONE

- Ozone eliminates bacteria, viruses and most other organic and inorganic contaminants
- Ozone can significantly reduce levels of dangerous chemicals, such as chlorine
- Ozone acts as a microflocculant aiding in the removal of minerals such as iron and manganese
- Ozone leaves neither chlorinated byproducts nor unpleasant chemical tastes or odors
- Ozone is generated on site and on demand from air/oxygen and power
- No storage and handling of chemicals

THE OXIDATIVE ACTION OF OZONE

Ozone reacts quickly with a large number of compounds. In doing so, these compounds are attacked either directly by the ozone molecule or indirectly by the intermediately occurring hydroxyl radicals. Preferably, the ozone is completely consumed in this reaction process, releasing only oxygen. In case of remaining ozone in the off-gas, these residues are converted to oxygen by a residual ozone destructor.

By combining ozone with UV or peroxide, advanced oxidation processes are formed which are able to reduce even the most persistent substances. These advanced oxidation processes (AOP) help to render other, previously nondegradable, water pollutants harmless.



▲ OZONE INTRODUCTION: Once introduced into water ozone breaks pollutants down by oxidation