



**Complete Integrated Solutions.  
Single Trusted Source.**



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# CUSTOMERS FOR *LIFE*

THE OVERARCHING GOAL AT PACIFIC OZONE IS SIMPLE; WE WANT TO MAKE “CUSTOMERS FOR LIFE”. CUSTOMERS THAT ARE DELIGHTED WITH OUR PRODUCTS, SERVICES, AND SUPPORT. CUSTOMERS THAT, AS WE EARN THEIR TRUST, COME TO THINK OF PACIFIC OZONE AS A TRUSTED GUIDE AND PARTNER. CUSTOMERS THAT COME BACK TO US AGAIN AND AGAIN AS THEIR OZONE SYSTEMS NEEDS CHANGE AND GROW.



## Complete Ozone Solutions

“Customers for life” is more than a catchphrase at Pacific Ozone; it is a core value that drives the behavior of each associate. The strategy to make “customers for life” is built upon a solid core of proven technology and continuous innovation. This core gives rise to superior performance, unparalleled reliability, ease of servicing, and a broad range of ozone systems. These benefits are surrounded by excellent application assistance and responsive service and support.



## Single Trusted Source

Our goal is to earn the trust of each client; to become their trusted guide and partner. We work closely with each client to navigate the challenges of their application and arrive at successful integration of the ozone system. We begin this process by listening carefully to each client's needs and desires for their ozone system. We then couple our understanding of the goals, processes, and requirements with our considerable experience in ozone technology and applications to arrive at the best possible solution. Finally, we work with each client to ensure successful implementation of their ozone systems. We're not satisfied until our clients are satisfied.

## Looking Ahead

In addition to providing the best possible ozone systems today, Pacific Ozone continues to invest in development of groundbreaking technology for the future. This commitment to continuing innovation ensures that the company remains on the forefront of ozone technology. In turn, our dedication to ongoing research and development ensures that we are poised to provide the best solutions and exceed our customers' future requirements.

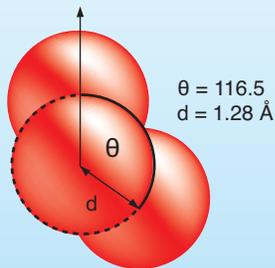


# A **CLEAN** TECHNOLOGY

OZONE IS A NATURALLY OCCURRING COMPOUND IN WHICH THREE ATOMS OF OXYGEN ARE COMBINED TO FORM THE OZONE MOLECULE (O<sub>3</sub>). OXYGEN MOST COMMONLY EXISTS AS TWO OXYGEN ATOMS (O<sub>2</sub>). OZONE IS FORMED WHEN ENERGY FROM ULTRAVIOLET (UV) LIGHT OR ELECTRICAL DISCHARGE BREAK THE O<sub>2</sub> BONDS, FORMING SINGLE OXYGEN ATOMS WHICH RECOMBINE WITH O<sub>2</sub> MOLECULES TO FORM OZONE. PACIFIC OZONE EQUIPMENT GENERATES OZONE BY HIGH VOLTAGE ELECTRICAL DISCHARGE (CORONA DISCHARGE).

## A Strong Oxidizer

Ozone is an unstable molecule owing to the weak bonds holding the third oxygen atom. This instability makes ozone a naturally powerful oxidizing and disinfecting agent. Oxidation occurs when ozone molecules come in contact with oxidizable substances, including microorganisms (viruses, molds, and bacteria), as well as organic and inorganic compounds (metal ions, plastics and rubbers).



Ozone Molecule

## A Natural Disinfectant

In these reactions, the unstable third oxygen atom is transferred, with a large release of energy, from ozone to the molecule being oxidized. The transfer of energy in oxidation causes the outer membranes of microorganisms to rupture. As ozone molecules enter lysed microorganisms, genetic material (DNA and RNA) is oxidized and destroyed. Oxidation typically hydrolyzes inorganic molecules, causing them to become insoluble, and facilitating removal by filtration. Organic molecules most often disintegrate as a result of oxidation, destroying their biological activity.

## Complete Integrated Ozone Systems



Commercial ozone systems are comprised of four basic components:

**O<sub>2</sub>** *Oxygen/Feed Gas Preparation*

**O<sub>3</sub>** *Ozone Generation*

**MT** *Mass Transfer*

**CN** *Control/Monitoring*

### Feed Gas Preparation

Processes requiring low concentrations of ozone may be serviced with clean, dry air (21% O<sub>2</sub>). Typically, ozone is generated from concentrated oxygen (> 90% O<sub>2</sub>) to yield higher concentrations of ozone.

### Ozone Generation

Pacific Ozone generators produce high concentrations and volumes of ozone by corona discharge utilizing patented Floating Plate Technology™ reaction chambers. Oxygen gas flowing through the electrical corona in the reaction cell is converted to ozone (4-8% conversion is typical, depending on reaction conditions).

### Mass Transfer

In ozone mass transfer, ozone gas is typically dissolved into a stream of water through a venturi injector and transferred to a contacting tank. Pacific Ozone's pre-configured, integrated Enhanced Mass Transfer™ system maximizes the transfer rates for each application. Excess ozone gas that does not dissolve into the water stream is vented from the top of the tank through a destruct device that safely converts the excess ozone back to oxygen (O<sub>2</sub>).

### Control / Monitoring

Controls are typically designed into ozone systems to monitor and optimize ozone production and demand. Systems can be designed to automatically compensate for changes in demand and operational conditions to maintain a preset level of residual ozone.

## Applications

Ozone has been utilized in municipal water disinfection for over 100 years and has very broad application potential in a variety of industries and applications:

- Bottled water and beverage
- Clean-In-Place (CIP)
- Food processing and preservation
- Industrial process and cooling tower water
- Laundry
- Groundwater and soil remediation
- Marine and fishing fleet
- Aquaculture
- Municipal water and wastewater treatment

Article reprints, application notes, and additional information on these and other applications are available on our web site.

## Regulatory Approval

Ozone has achieved regulatory approval in the United States and the European Union.

### US Regulatory Approvals

- 1982 – FDA approval for bottled water
- 1986 – Adoption by EPA of CT Values
- 1996 – USDA approval as disinfectant
- 1997 – Declared GRAS (Generally Regarded As Safe)
- 2001 – FDA approval for food contact
- Accepted by USDA National Organic Program



### Ozone Benefits

- Powerful oxidant and disinfectant
- Natural compound
- Few undesirable byproducts
- Broad application potential
- Regulatory acceptance





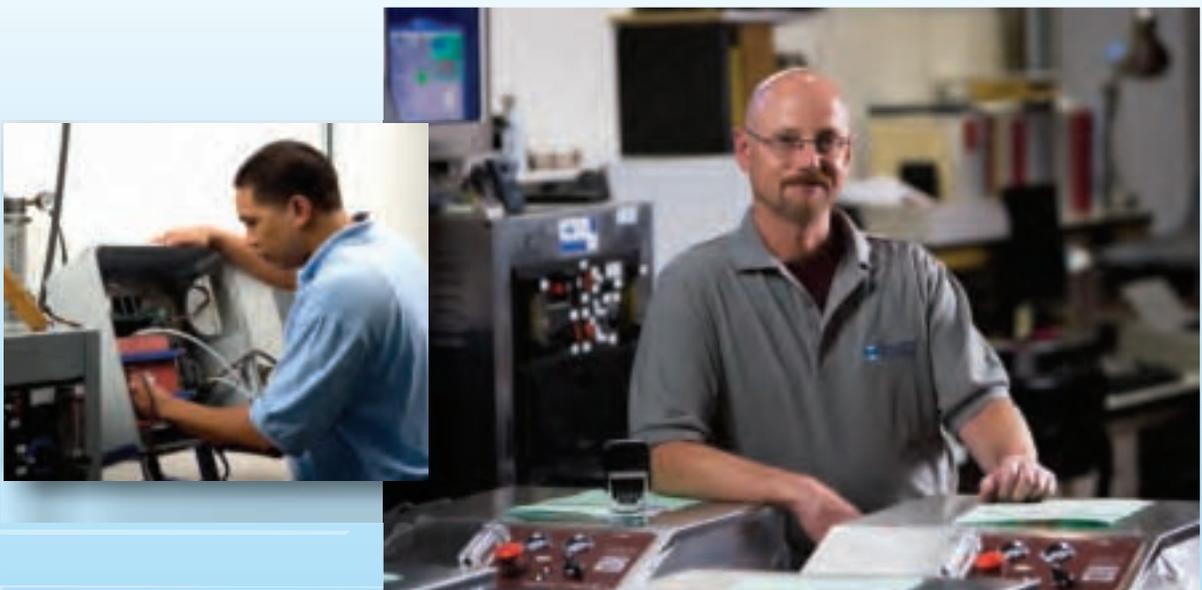
# A **GREEN** TECHNOLOGY

THE POTENT DISINFECTING POWER OF OZONE CAN BENEFIT THE ENVIRONMENT IN MANY IMPORTANT WAYS. OZONE CAN REPLACE CHLORINE, HOT WATER, AND STEAM IN MANY APPLICATIONS THEREBY REDUCING THE CONSUMPTION OF CHEMICALS AND WATER, AS WELL AS ELIMINATING THE ENERGY REQUIRED TO PRODUCE HOT WATER AND STEAM.

## Preserving Fresh Water

Fresh water is becoming increasingly scarce in the face of skyrocketing world population growth. The World Health Organization estimated that in the year 2000, at least 1.1 billion people lacked access to safe drinking-water and 2.4 billion people were living without access to sanitation systems.

Ozone can help ease the water crunch by reducing water demand in a broad range of applications, from industrial laundry to car washes to clean-in-place sanitation utilized in the food processing, beverage, and pharmaceutical industries.

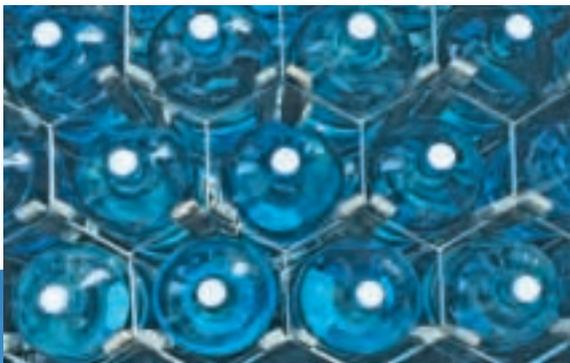


## A Smaller Carbon Footprint

The environmental and monetary savings resulting from the use of ozone can be considerable. Ozone is more effective in cold water, thereby greatly reducing demand for hot water. This translates into significant energy savings and less greenhouse gases.

## Reducing Chemical Risks

Ozone greatly reduces the environmental burden and risks associated with traditional oxidants, such as chlorine. Ozone resolves to elemental oxygen ( $O_2$ ) and produces few hazardous or undesirable byproducts. Further, ozone is produced on demand at the site of the application and used immediately, thus eliminating the danger of accidental releases of traditional oxidants during transportation and storage.



## Our Environmental Commitment

The stated mission of Pacific Ozone is “To design, develop and deliver ozone solutions worldwide for the benefit of people and the environment.” This mission clearly underscores our commitment to improving the environment through the application of ozone. We are confident that ozone will play a continually expanding role in conserving both energy and water and enhancing quality of life.

PROVEN

# INNOVATIVE TECHNOLOGY

THE HEART OF PACIFIC OZONE SYSTEMS IS OUR PATENTED FLOATING PLATE TECHNOLOGY™ (FPT™) IN THE OZONE REACTION CELLS. THE EXCLUSIVE FPT DESIGN PRODUCES HIGHLY RELIABLE AND EFFICIENT OZONE GENERATION IN AFFORDABLE, AIR-COOLED SYSTEMS. THE BENEFITS OF PACIFIC OZONE'S FLOATING PLATE TECHNOLOGY ALLOW CHALLENGING OZONE APPLICATIONS AND PRODUCTS – PREVIOUSLY DEEMED UNREALISTIC DUE TO COST, WEIGHT, OR LOCATION – TO BE APPROACHED WITH CONFIDENCE AND EASE. STATE-OF-THE-ART OZONE APPLICATIONS HAVE NEVER BEEN MORE EFFECTIVE, EFFICIENT, OR AFFORDABLE.

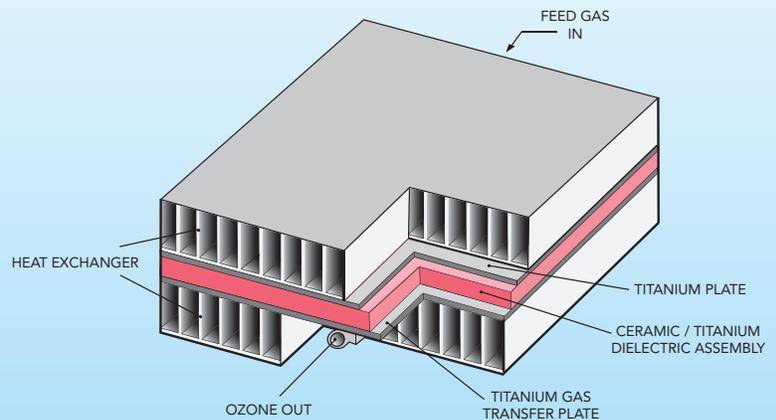
## High Reliability

In the FPT reactor cell, an electric field is created across an ultra-narrow gap between a fixed titanium plate and a floating titanium-ceramic dielectric plate. Because the titanium-ceramic dielectric plate is not mechanically constrained, it is virtually impervious to the stresses of heat, pressure, and vacuum of corona discharge ozone generation. This yields very high reliability, even in harsh environments, from the Bering Sea to the Arabian Desert.

In conventional corona discharge devices, the dielectric is mechanically attached by a rigid connection to the electrode, making it susceptible to breakage from the stresses that are characteristic of high voltage ozone generation. The rigid connection to the electrode can snap like the filament of a light bulb, rendering the conventional ozone generator useless.

## High Efficiency

The ultra-narrow gap of our patented FPT reactor cells increases the efficiency of the ozone generation module. The smaller the gap between the plates, the less energy required to generate ozone. In turn, lower voltage reduces heat generation, allowing Pacific Ozone generators to be air cooled – even while continuously producing high concentrations of ozone.



## Air Cooling

Air cooling increases the flexibility of installation of the generators and the reliability of the entire ozone system by eliminating the need to plumb in cooling water. Conventional devices typically have large electrode gaps, demanding higher voltages to generate corona discharge. Higher voltages generate more heat that is typically removed by water-based cooling, which limits the flexibility and utility of conventional ozone generators.

## Easy Maintenance and Repair

The modular design of all Pacific Ozone generators and systems increases uptime by simplifying maintenance and service. The excellent reliability of the air-cooled FPT reactor cells greatly reduces preventative maintenance. In the rare event of a failure, the inherent modularity of Pacific Ozone generators and systems minimizes down time by allowing repairs to be made quickly and easily.

## Unparalleled Stability and Control

Proprietary electronics have been developed to maximize ozone output efficiency and control from Pacific Ozone products. The FPT ozone reactor cells are powered by advanced, amplitude-modulated variable control power supplies that deliver responsive and accurate ozone output control. The stability of our ultra-narrow gap reactor cells and Engineered Electronics provide accurate control of ozone concentration with advanced process controls.



# BROAD SPECTRUM OF *APPLICATIONS*

OZONE HAS BEEN USED FOR COMMERCIAL DISINFECTION FOR OVER 100 YEARS. THE FIRST COMMERCIAL APPLICATION OF OZONE OCCURRED IN A WATER TREATMENT PLANT IN BELGIUM IN THE LATE 1890'S. TODAY, OZONE IS BEING EMPLOYED IN A CONTINUALLY EXPANDING ARRAY OF APPLICATIONS.

AT PACIFIC OZONE, WE ARE FOCUSING OUR EFFORTS ON THE APPLICATIONS AND MARKETS IN WHICH WE CAN MAKE SIGNIFICANT IMPACTS.



## Marine

- Potable water/effluent treatment
- Process water
- Ballast water/macroulont eradication
- Seafood processing
- System sanitization

## Wine

- Barrel washing
- Equipment and surface sanitization
- Tank sanitization
- Piping clean-in-place

## Agriculture, Produce, & Food Processing

- Fresh produce/fruit washing
- Product preservation
- Packaging sanitization
- Equipment and surface sanitization
- High-purity process water
- Cooling tower water

## Beverage

- Product water preparation
- Clean-in-place
- Tank, equipment sanitization
- Bottle and cap rinsing
- Bottled water preservation



## Laundry

- Improve disinfection
- Cleaner, softer laundry
- Extend linen life
- Improve throughout efficiency
- Cost savings: water, energy, labor

## Industrial

- High-purity process water
- Cooling tower water
- Equipment and surface sanitization
- Clean-in-place

## Aquaculture

- Incoming water treatment
- Wastewater management/disinfection
- System sanitization
- Product Processing

## Groundwater and Soil Remediation

- Degradation and neutralization of organic contaminants
- Oxygenation of target zone (accelerates bioremediation)

# SYSTEMS & PRODUCT *FAMILIES*

PACIFIC OZONE IS THE WORLD'S LEADING SUPPLIER OF AIR-COOLED, CORONA DISCHARGE OZONE GENERATORS, COMPLETE INTEGRATED OZONE SYSTEMS, AND OZONE PROCESS CONTROLS. OUR PRODUCT OFFERINGS INCLUDE A BROAD RANGE OF OZONE GENERATORS THAT GENERATE 0.5 TO MORE THAN 50 POUNDS OF OZONE PER DAY. IN ADDITION, PACIFIC OZONE OFFERS COMPLETE, INTEGRATED OZONE CONTACTING SYSTEMS DESIGNED TO ADDRESS THE CONTINUALLY EXPANDING RANGE OF INDUSTRIAL AND MUNICIPAL OZONE SYSTEM REQUIREMENTS.



## IOCS AND ICS SERIES

### Complete, Integrated Ozone Solutions

The IOCS and ICS Series are complete and fully Integrated Ozone Contact Systems with Pacific Ozone's unique Enhanced Mass Transfer™ ozone injection and off-gas destruction all engineered into an elegantly constructed stainless steel package. The IOCS and ICS systems can be customized with any Pacific Ozone generation system. The IOCS systems are equipped with stainless steel contact tanks specifically sized to meet the requirements of each application.



## M SERIES

### Modular, High Output Ozone Generators

Modular redundancy is the key to the M Series' revolutionary design, providing unsurpassed reliability. The advanced chassis based design of M Series Ozone Generators is the foundation for the most powerful, high-yield, air-cooled ozone generators in the world, with standard designs from 7 lbs/day to more than 50 lbs/day ozone.



## SG SERIES

### SGA Series, SGC: Flag Ship Integrated Generators

Our flagship SGA and SGC Ozone/Oxygen Systems combine air-cooled ozone generators with onboard oxygen concentrators in compact, wall-mountable stainless steel enclosures. In addition, the SGC Series is equipped with a self-contained onboard compressor.



## G AND O SERIES

### Dependable, Compact Ozone Production

The G Series and O Series Ozone Generators outperform other ozone generators many times their size. The reliable, versatile, and cost effective G Series Ozone Generators are built to interface with a wide range of industrial applications.



## PC SERIES

### Easy and Cost Effective Portable Ozone Systems

The portable, cart-based PC Series integrated ozone systems incorporate Pacific Ozone high concentration ozone/oxygen generation systems with onboard injector pump, compressor, and mass transfer system in a rugged, all-stainless steel package. Simply connect plant water in and get high concentration ozonated water out with no loss of flow or pressure. The PC Series systems are ideal for barrel washing, tank sanitization, surface disinfection, and other point-of-use applications.



## HiPro™ SERIES

### High Pressure Soil and Groundwater Remediation

The HiPro Series delivers high-pressure ozone gas for *in situ* groundwater and soil remediation at stabilized and continuous concentrations. The patented high-pressure reactor cell delivers concentrated ozone at high pressure without secondary compression and resultant degradation. Operation and uptime are facilitated with the advanced PLC control with “touch-screen” interface that is remote access ready.



## LAB SERIES

### Control and Flexibility in a Bench Top Package

Ideally suited for application development in a lab setting with a broad range of ozone output and discrete control.



## OEM SERIES

The OEM Series models are totally self-contained ozone generators that include all of the features of our high quality industrial and commercial ozone generators are packaged in a 19” rack mountable chassis.

PRODUCT LINE	Elements of Ozone				Maximum Ozone Production†	
	O <sub>2</sub>	O <sub>3</sub>	MT	CN*	Grams/Hours	Pounds/Day
IOCS and ICS Series	●	●	●	●	240	12.8**
M Series		●		●	1000+**	50+**
SGA Series	●	●		●	240	12.8
SGC Series	●	●		●	25	1.3
O and G Series		●		●	60	3.2
PC18 & PC25 Portable Series	●	●	●	●	25	1.3
Lab Series		●		●	60	3.2
OEM Series		●		●	60+**	3.2+**

Notes:

\* Process control provided as standard on ICS and IOCS Series. All other series provided with standard manual control; process control optional.

\*\* Ozone output may be configured as necessary. Please contact Pacific Ozone for more information.

† Maximum Ozone Production: values quoted are as determined at standard conditions. Contact Pacific Ozone for more information



# APPLICATION ASSISTANCE **SERVICE** AND SUPPORT

PACIFIC OZONE CUSTOMERS HAVE ACCESS TO A FULL RANGE OF SUPPORT SERVICES, FROM CUSTOM PRODUCT SUPPORT DOCUMENTATION AND RESOURCES FOR YOUR APPLICATION OR OEM PRODUCT, TO FIELD TECHNICAL RESOURCES AVAILABLE FOR START UP ASSISTANCE, TO TECHNICAL SUPPORT TRAINING. ARMED WITH DECADES OF OZONE APPLICATIONS DEVELOPMENT EXPERIENCE, THE SERVICE TEAM AT PACIFIC OZONE CAN HELP YOU CHOOSE AND IMPLEMENT THE SUPPORT RESOURCES YOU'LL NEED TO ENSURE SMOOTH DEVELOPMENT, INTEGRATION, AND COMMISSIONING OF YOUR OZONE SYSTEM OR OEM PRODUCT.

## Product Support Services

Fast response with accurate technical support has earned Pacific Ozone a reputation our customers appreciate. User friendly, concise product manuals and troubleshooting guides are downloadable from our extensive support website. Your technical contact or team can expect fast, friendly assistance via telephone, fax, or e-mail – from basic product inquiries to complex applications challenges. Our comprehensive support network is available to help you meet your ozone objectives Monday through Friday, 8am to 5pm Pacific Time.

## Field Services

Pacific Ozone generators are engineered to perform flawlessly—but if difficulties arise, Response Now Field Service is only a phone call away. Our carefully trained technical staff is ready to be dispatched throughout the world to tackle your ozone problem quickly and efficiently. Years of on-site troubleshooting have prepared us for virtually every application challenge.

## System Commissioning

Pacific Ozone field service resources are available to assist with setup, startup, and initial commissioning to ensure a smooth launch of your ozone system. Save valuable time and money by utilizing our extensive experience and expertise in commissioning your new ozone system.

## Pilot and Rental Systems

As some ozone applications are unique, a thoughtful investigative approach is the foundation of successful project implementation. For pilot programs or other short-term requirements, Pacific Ozone has a fleet of ozone generators available for short-term or monthly rental. Rely on our experience and easy-to-install generators to help you successfully implement your ozone application.

## Product Warranty

Pacific Ozone warrants ozone generators to be free from defects in parts and workmanship for one year. This warranty covers all components under normal use and proper operation. See complete warranty information online or contact Pacific Ozone Technical Service or your Pacific Ozone representative.



OUR MISSION AT PACIFIC OZONE IS TO DESIGN, DEVELOP AND DELIVER COMPLETE OZONE SOLUTIONS WORLDWIDE FOR THE BENEFIT OF PEOPLE AND THE ENVIRONMENT.

[www.pacificozone.com](http://www.pacificozone.com)



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