Plasma & Reactive Gas Solutions

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LIQUOZON® Stream

OZONATED WATER DELIVERY SYSTEM

LIQUOZON® Stream Ozonated Water Delivery System is a powerful source of dissolved ozone for wet wafer processing especially in multi-chamber single wafer tools.

The new, LIQUOZON Stream series was designed for applications requiring up to 140 lpm flow and ozone concentrations of 115 - 25 ppm such as wet wafer cleaning, contaminant removal, surface conditioning, water mark removal and oxide growth. Several versions are available to suit special requirements, including an integrated booster pump for low pressure UPW supply, media connections from bottom or lower rear side, and more. As a part of the production proven family of LIQUOZON systems, the LIQUOZON Stream series is based on the same highly reliable and production proven ozone generating and contacting technology.

Ozone is an environmentally friendly alternative to many process chemicals in the semiconductor industry. It has a high redox potential, can be generated at the point-of-use and is easily converted back to oxygen. Cost of purchase, storage and disposal of many chemicals can thus be reduced considerably.

Features & Benefits

Superior Ozone Output

- Greater than 115 ppm dissolved ozone
- Ozonated water flow up to 140 lpm
- Ultra clean for semiconductor applications
- Long ozone lifetime in water

Reliable System Performance

- Constant ozone concentration and operating pressure at varying flow rates
- Overcomes issues arising from poor UPW facility pressure
- Ensures sufficient pressure for multi chamber single wafer tools
- Industry leading ozone technology
- MTBF > 20,000 hours

Space Saving Footprint

- Extreme compact size compared to dissolved ozone production

Faster, Easier Installation and Operation

- No analyzer or cabinet drain connection required
- Simple operation via Touch Screen
- Allows subfab installation

Clean, Safe Alternative

- High redox potential of ozone
- Can be generated at point-of-use
- Green chemical which is easily converted back to oxygen

Low Cost of Ownership

- Reduced chemical consumption and disposal costs
- Low O_2, CDA, cooling water and exhaust consumption
- Supports batch, single or multiple process tools for maximum efficiency

The LIQUOZON® Family

In addition to the LIQUOZON Stream system, the well established family of LIQUOZON ozonated water delivery systems include LIQUOZON Smart, LIQUOZON Single, LIQUOZON LoopO_3 and LIQUOZON PrimO_3.

The LIQUOZON Single is the most compact single pass system available, especially designed for single wafer application supplying up to 95 ppm at 2 L/min, the maximum flow rate is 20 L/min at 30 ppm. The LIQUOZON Smart is a small, low cost-of-ownership system with performance ranging from 114 ppm dissolved ozone at 5 L/min to 22 ppm at 80 L/min. The LIQUOZON PrimO_3, 115 ppm at 2 L/min, 30 ppm at 60 L/min is a smaller version of the LIQUOZON Stream.

The LIQUOZON family features the field-proven SEMOZON® ozone generation technology, proprietary MKS-designed contactors for unsurpassed dissolving efficiency of ozone gas in water, state-of-the-art controls and an ozone destruct unit for safe re-conversion of residual ozone gas to oxygen. The LIQUOZON systems are enclosed in a vented cabinet and are S2 and CE compliant.

LIQUOZON® Stream System

The LIQUOZON Stream system delivers ozonated ultra pure water (DIO_3) at a pressure of up to 2.8 bar_{gauge} (0.28 MPa) and at flow rates of up to 140 L/min. The integrated analyzer for dissolved ozone is used for accurate closed loop control of the DIO_3 concentration.

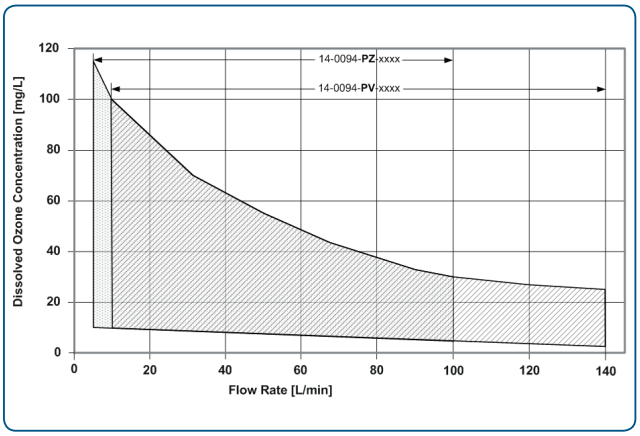
Different ozone gas sources, such as the highly reliable SEMOZON AX8407 series, produce ozone from oxygen by dielectric barrier discharge, can be chosen according to the performance requirements. A minute amount of carbon dioxide (CO_2) is used as a dopant gas. The CO_2 considerably increases the lifetime of ozone in the DI water and is ultra-clean. With CO_2 there is no possibility of formation of NO_x compounds or resultant metal contamination. High-quality, ozone resistant materials and the unique doping technique ensure ultra-clean ozonated water delivery for high-purity semiconductor and flat panel applications.

Performance

Concentration and Flow

The specified maximum achievable ozone-in-water concentration of the LIQUOZON Stream depends on the DIO_3 flow rate. The specifications refer to a UPW temperature of 20°C. At higher UPW temperatures or at a lower system pressure, the maximum performance will decrease. The internal closed loop control allows for a fast and precise adjustment of the O_3 output concentration.

The LIQUOZON Stream is designed to deliver a stable O_3-in-water concentration under constant controlled pressure even for varying DIO_3 demands. Several different models of the LIQUOZON Stream are available to suit the required performance.

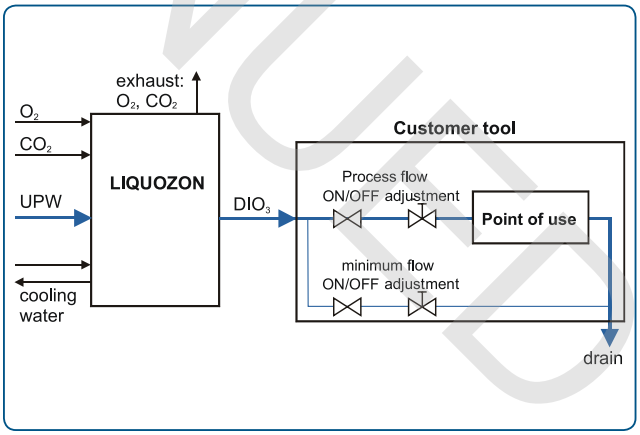


Operation range for nominal system pressure and 20°C UPW temperature

System Flow and Configuration

The ozone gas is generated by an integrated ozone generator based on the SEMOZON AX technology through partial conversion of oxygen O_2 into O_3. The transfer of O_3 from the gas phase into the de-ionized water is accomplished by special MKS designed ozone contactors. The residual O_3 gas is converted back to O_2 in the integrated ozone gas destruct unit.

Optionally a booster pump at the UPW inlet can be integrated to lower the necessary inlet pressure. The ozone generator incorporates an inlet for O_2 gas and an outlet for the O_2/O_3 mixture. CO_2 is added to the O_2 gas as a dopant to stabilize the ozone generation performance, as well as to stabilize ozone in the de-ionized water.

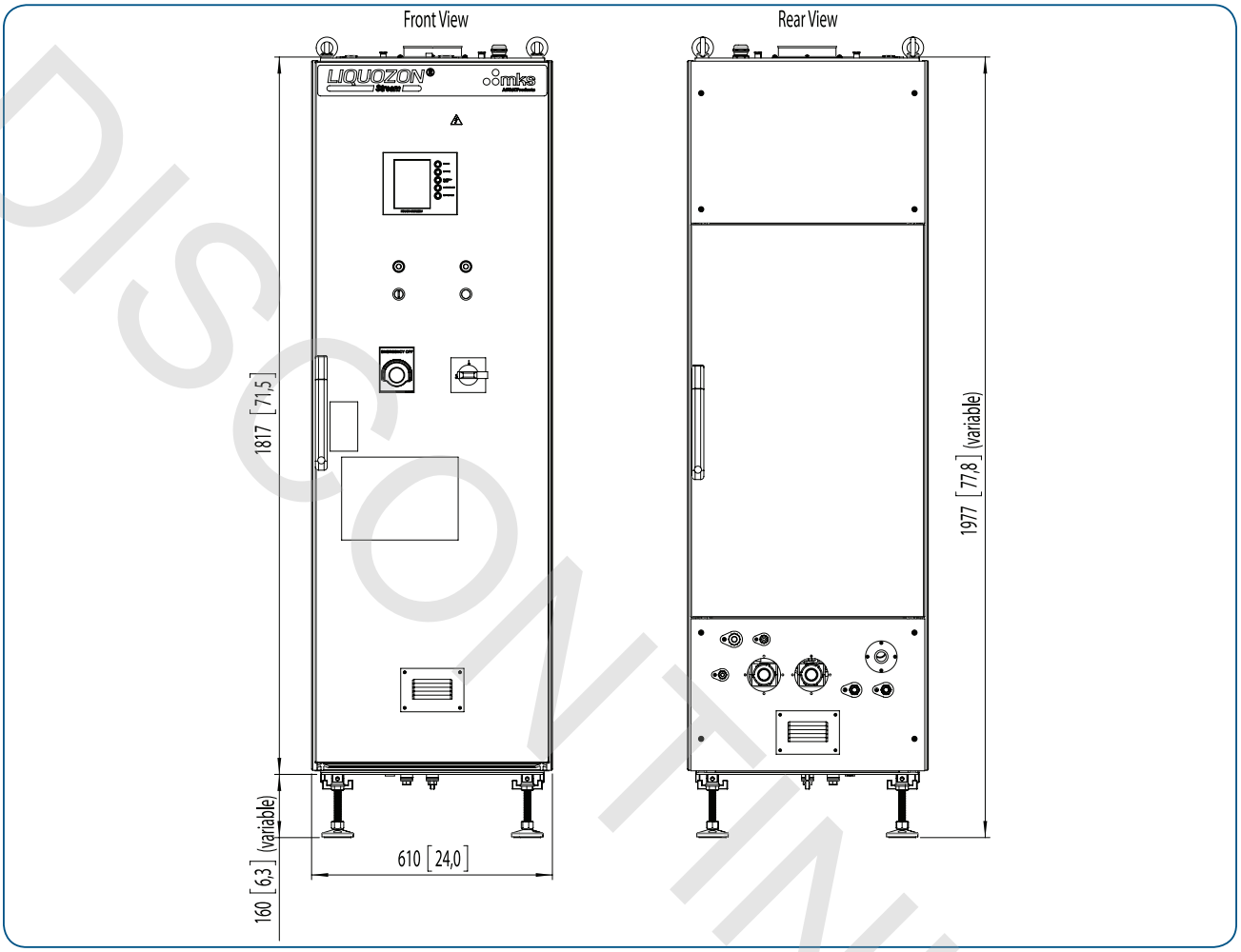


Typical example of LIQUOZON application

Specifications

Performance Summary		
Specified achievable dissolved Ozone Concentration in UPW at nominal 20°C		
LIQUOZON® Stream	**14-0094-PZ-xxxxx**	**14-0094-PV-xxxxx**
at 5 L/min DIO_3 flow at 10 L/min DIO_3 flow at 50 L/min DIO_3 flow at 90 L/min DIO_3 flow at 100 L/min DIO_3 flow at 120 L/min DIO_3 flow at 140 L/min DIO_3 flow	115 ppm 100 ppm 55 ppm 33 ppm 30 ppm - -	115 ppm 100 ppm 55 ppm 33 ppm 30 ppm 27 ppm 25 ppm
Plumbing Materials	Liquid wetted surfaces: PFA, PTFE, quartz glass Gas wetted surfaces: 316L stainless steel, PFA , PTFE	
Communication	Binary in/out (dry contacts), RS232	
Compliance	CE, SEMI S2-0302, SEMI F47, SEMI S2	
Cabinet, Dimensions (W x L x H)	Coated Steel 610 x 1011 x 1,977 mm (24" x 39.8" x 77.8")	
Weight	Approx. 420 kg	Approx. 450 kg
Facility Requirements		
Ambient Temperature	15 – 25°C (59 – 77°F), rated 20°C (68°F)	
Feed Gas O_2		
Purity	≥ Grade 4 (purity ≥ 99.99 %), dew point < -40°C	
Pressure	5.0 - 7.6 bar_g (0.50 - 0.76 MPa_g)	
Volume Flow Rate	Approx. 20 slm	
Dopant Gas CO_2		
Purity	≥ Grade 4.5 (purity ≥ 99.995 %)	
Pressure	5.0 - 7.6 bar_g (0.50 - 0.76 MPa_g)	
Volume Flow Rate	Typ. 0.5 slm	
Pressurized Ultrapure Water (UPW)		
Purity	According to the process demands. Typically with filtration, demineralization, reverse osmosis, deionization (< 0.1 ppb Metals, < 10 particles/ml of 0.1 µm size, free of organics)	
Half Life Time of O_3 in UPW	> 12 min @ 20°C	
UPW IN Pressure (for full flow)	1.0 bar_g - 4.0 bar_g	
Temperature	15 – 25°C (59 – 77°F), rated 20°C (68°F)	
Cooling Water		
Quality and Purity	Demineralized, filtration (≤ 20 µm)	
Temperature	Rated 20°C, range 17 – 23°C	
Max. supply pressure	5.0 bar_g (0.50 MPa_g)	
Volume Flow Rate	Typ. 9.0 L/min	
Power		
	3/PE~ 200 - 208 V ± 10%	3/PE~ 200 - 208 V ± 10%

Dimensional Drawing and Ordering Information



Dimensional Drawing —

Note: Unless otherwise specified, dimensions are nominal values in millimeters (inches referenced).

Ordering Information

Please contact your local MKS sales office for price and availability information.

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