

# Reactive

# Gas

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## LIQUOZON® LoopO<sub>3</sub>

### OZONATED WATER DELIVERY SYSTEMS

### THE MOST COMPACT RECIRCULATION SYSTEM AVAILABLE

LIQUOZON® LoopO<sub>3</sub> Ozonated Water Delivery System is the most compact source for wet wafer processing with ozone including a pump for the recirculation loop.

The new, compact LoopO<sub>3</sub> series was especially designed for low flow applications with ozone concentrations > 62 ppm such as wet wafer cleaning, contaminant removal, surface conditioning, water marks removal and oxide growth. The system has an integrated recirculation pump which allows zero UPW consumption during IDLE mode and a very fast concentration control. Part of the production proven family of LIQUOZON systems, the LoopO<sub>3</sub> Series based on the same highly reliable ozone generating and contacting technology.

### Features & Benefits

#### Compact Footprint with Excellent Performance and Reliability

- Extremely compact size of only 412 x 512 x 1407 mm (16.2" x 20.2" x 55.4")
- Greater than 62 ppm dissolved ozone
- Ozonated water flow up to 10 lpm
- Constant ozone concentration and operating pressure at varying flow rates
- Ultra clean for semiconductor processing applications
- Long ozone lifetime in water

#### Faster, Easier Installation, System Integration and Operation

- No analyzer or cabinet drain connection required
- Simple operation via Touch Screen
- Overcomes issues arising from poor UPW facility pressure
- Allows subfab installation
- Ensures sufficient pressure for single wafer tools
- Reduced dead volume by recirculation

#### Clean, Safe Alternative to Conventional Chemical Processing

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

#### Low Cost of Ownership

- Reduced chemical consumption and disposal costs
- Lower UP water consumption by recirculation during idle mode
- Low O<sub>2</sub>, CDA, cooling water and exhaust consumption
- Supports single or multiple process tools for maximum efficiency
- Small footprint

#### Proven Reliability

- Industry leading ozone generating technology
- MTBF > 20,000 hours
- CE Mark, S2 compliant, NTRL



## Description (cont'd)

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.

## The LIQUOZON® Family

In addition to the LIQUOZON LoopO<sub>3</sub> system, the well-established family of LIQUOZON ozonated water delivery systems includes LIQUOZON 100, LIQUOZON XF, LIQUOZON Smart and LIQUOZON Single.

The LIQUOZON Single is the most compact single pass system available, especially designed for single wafer application supplying up 95 ppm at 2 L/min, the maximum flow rate is 20 L/min at 30 ppm. The LIQUOZON Smart is a compact, low cost-of-ownership system with a performance range from 114 ppm dissolved ozone at 5 L/min to 22 ppm at 80 L/min. LIQUOZON 100 and XF (the traditional members of the family) - cover a performance range from 90 ppm at 5 L/min to 15 ppm at 60 L/min.

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® LoopO<sub>3</sub> System

The LIQUOZON LoopO<sub>3</sub> system delivers ozonated ultra pure water (DIO<sub>3</sub>) at a pressure of up to 3.7 bar<sub>gauge</sub> (0.37 MPa) and at flow rates of up to 10 L/min.

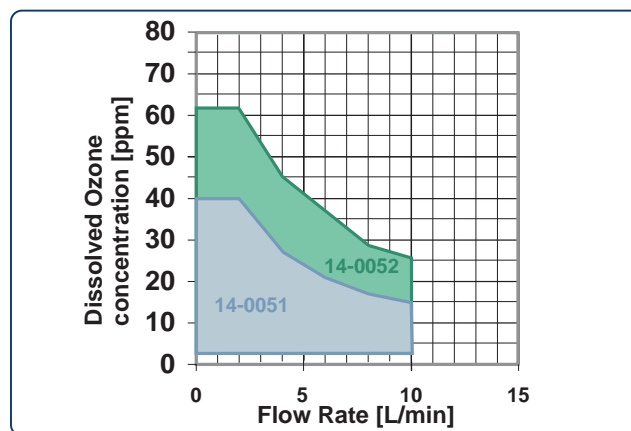
The system has a particle free recirculation pump which allows zero UPW consumption during IDLE mode and a very fast concentration control. An externally attached ambient ozone monitor, which shuts down the LIQUOZON Single should an ozone leak occur, is available as an option.

The ozone gas module is part of the highly reliable SEMOZON AX8407 compact series, which produces ozone from oxygen by silent discharge. A minute amount of carbon dioxide (CO<sub>2</sub>) is used as a dopant gas. The CO<sub>2</sub> considerably increases the lifetime of ozone in the DI water and is ultra-clean. With CO<sub>2</sub> there is no possibility of formation of NOx 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

Ozonated deionized water (DIO<sub>3</sub>) is generated at a pressure of up to 2.5 bar<sub>gauge</sub> and a volumetric flow rate of up to 10 L/min. At low flow rates (2 L/min is delivered at a pressure of up to 3.7 bar) dissolved ozone (O<sub>3</sub>) concentration > 62 ppm is achieved; at high flow rates (10 L/min) concentration is a maximum of 25 ppm.



Concentration and Flow Diagram

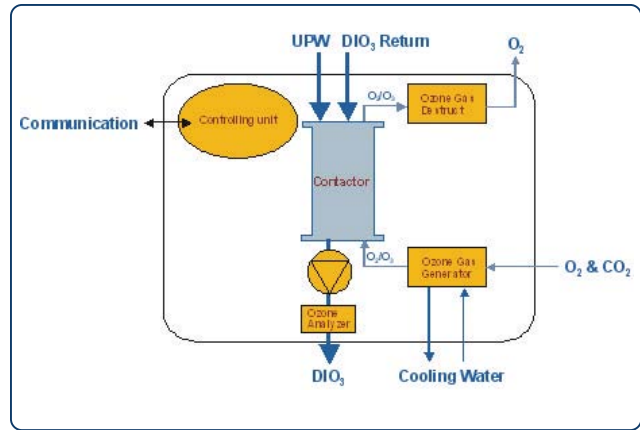


## System Flow and Configuration

The ozone gas is generated by the 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 deionized 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.

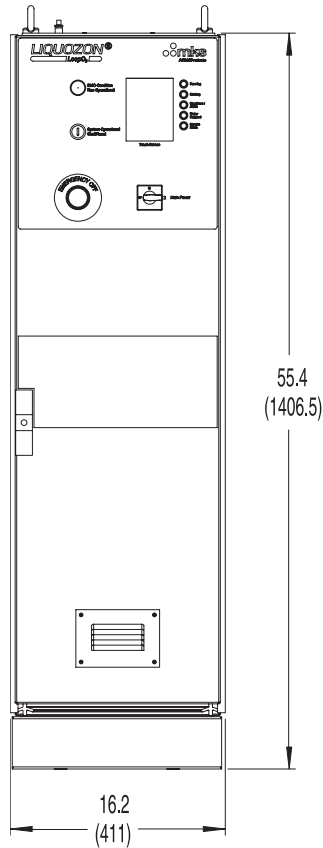
The internal recirculation pump and the  $DIO_3$  return, the LIQUOZON Loop $O_3$  does not need a minimum  $DIO_3$  flow to the tool or to the drain.

Optionally a booster pump at the UPW inlet can be integrated and 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 deionized water.

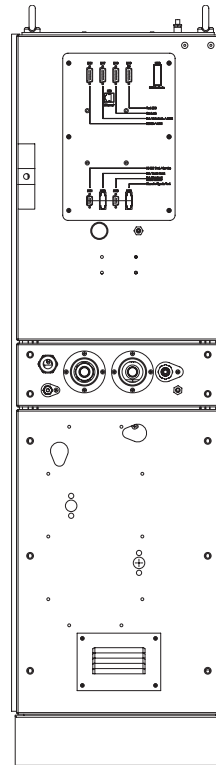


System Flow Diagram

### Front View



### Rear View



### Dimensional Drawing —

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



# Specifications and Ordering Information

## Performance

### Specified Maximum Dissolved Ozone Concentration at UPW Flow Rate (at 20°C)

LIQUOZON Single Version and Ordering Part #:	14-0051-1000-000	14-0052-1000-000
<b>DIO<sub>3</sub> Flow Rate</b>		
@ Nominal System Pressure		
2 L/min	≥ 40 ppm	≥ 62 ppm
4 L/min	≥ 27 ppm	≥ 45 ppm
6 L/min	≥ 21 ppm	≥ 36 ppm
8 L/min	≥ 17 ppm	≥ 28 ppm
10 L/min	≥ 15 ppm	≥ 25 ppm
<b>Operating Range</b>		
DIO <sub>3</sub> Flow	0 - 10 L/min	
Recirculation Flow	0 - 4 L/min	
Nominal System Pressure	> 2.0 bar <sub>gauge</sub> (29 psig)	
Available Operating Pressure	Outlet pressure with the internal pump: adjustable range 1.2 to 3.7 bar <sub>gauge</sub> (15 - 54 psig), maximal 0.7 bar higher than system pressure	

## Facility Requirements

	14-0051-1000-000	14-0052-1000-000
<b>Ambient Temperature</b>	15 - 35°C (59 - 95°F)	
<b>Feed Gas O<sub>2</sub></b>		
Quality	Grade 4 or better	
Inlet Pressure	4.5 – 7.6 bar <sub>gauge</sub> (65 - 110 psig)	
Flow Rate	Typically 1.5 slm	Typically 2.5 slm
<b>Dopant Gas CO<sub>2</sub></b>		
Quality	Grade 4.5 or better	
Inlet Pressure	5.0 – 7.6 bar <sub>gauge</sub> (73 - 110 psig)	
Flow Rate	Typically 0.1 slm, max 0.25 slm	
<b>Ultra Pure Water UPW</b>		
Pressure	2.6 – 5.0 bar <sub>gauge</sub> (38 - 73 psi), min. 0.8 bar (11.6 psi) above system pressure	
Quality	Resistivity > 18MΩ cm ≅ conductivity <0.05 μS/cm	
Temperature	15 - 25°C (59 - 77°F)	
<b>Cooling Water</b>		
Quality	Demineralized (Resistivity > 50 kΩ cm), 20 μm filtered	
Recommended Flow	Typically 1.5 L/min (0.3 gpm), minimal 1.0 L/min (0.2 gpm)	Typically 3 L/min (0.7 gpm), minimal 2.0 L/min (0.4 gpm)
Temperature	17 - 23°C (63 - 73°F), rated 20°C (68°F)	
Pressure	Max. 5.0 bar <sub>gauge</sub> (73 psig)	
<b>Power</b>	2/PE~ or 1/N/PE~ 187 - 264V, 50/60Hz, 6 A (max)	2/PE~ or 1/N/PE~ 187 - 264V, 50/60Hz, 11 A (max)
<b>Compliance</b>	SEMI S2, NRTL, CE mark	
<b>Control Interfaces</b>	RS232, Discrete communication	
<b>Physical Data</b>		
Weight	150 kg (330 lbs)	
Dimensions	412 x 512 x 1407 mm (16.2" x 20.2" x 55.4")	

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



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