

# LIQUOZON® VariO<sub>3</sub>

Dissolved Ozone Delivery System for Electronic Thin Film Applications



The LTPS/LTPO TFT (Low Temperature Polycrystalline Silicon/Oxide Thin Film Transistor) process is a critical step in the production of flat panel displays (FPDs). In the LTPS TFT process, the cleanliness of the substrate prior to the transformation of silicon from an amorphous phase to a polycrystalline phase plays an important role in determining the ultimate electrical properties of the thin film transistor. In particular, metal and carbon contamination can have detrimental effects on transistor performance.

DI-O<sub>3</sub> substrate cleaning using MKS LIQUOZON® Dissolved Ozone Delivery System products has proven particularly useful against contaminants and has clearly shown to provide enhanced electrical performance and yield improvement. Furthermore, using DI-O<sub>3</sub> can represent a significant cost savings over conventional RCA and SPM cleaning technologies.

## Product Features

- 140 lpm dissolved ozone flow rate
- High outlet pressure compatibility, up to 3 bar<sub>g</sub>
- High purity ozone environment
- Integrated reference measurement for DI-O<sub>3</sub>
- Variable CO<sub>2</sub> doping
- Easy installation and operation
- Versatile mechanical system interface



## Key Benefits

- Improves yield by effectively removing metallic and carbon contamination in LTPS applications
- Significantly improves cleaning process cost over alternate methods
- Number of outlets, pumps, filters, and sensors can be tailored to meet individual customer needs

The LIQUOZON® VariO<sub>3</sub> for Electronic Thin Film (also known as Flat Panel Display) system is designed for use with wet benches having cleaning applications requiring up to 140 L/min DI-O<sub>3</sub> flow and ozone concentrations of 25 - 90 ppm (Figure 1). The LIQUOZON® VariO<sub>3</sub> system uses closed-loop controls to maintain stable DI-O<sub>3</sub> concentrations, even with varying DI-O<sub>3</sub> demands. The built-in optional pump makes it ideally suited for fabs with low pressure UPW supply.

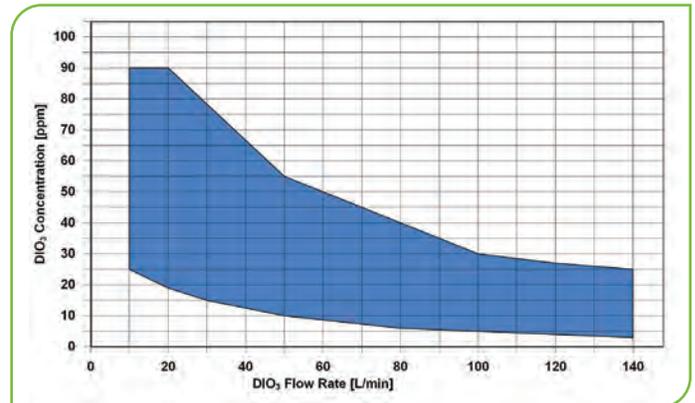
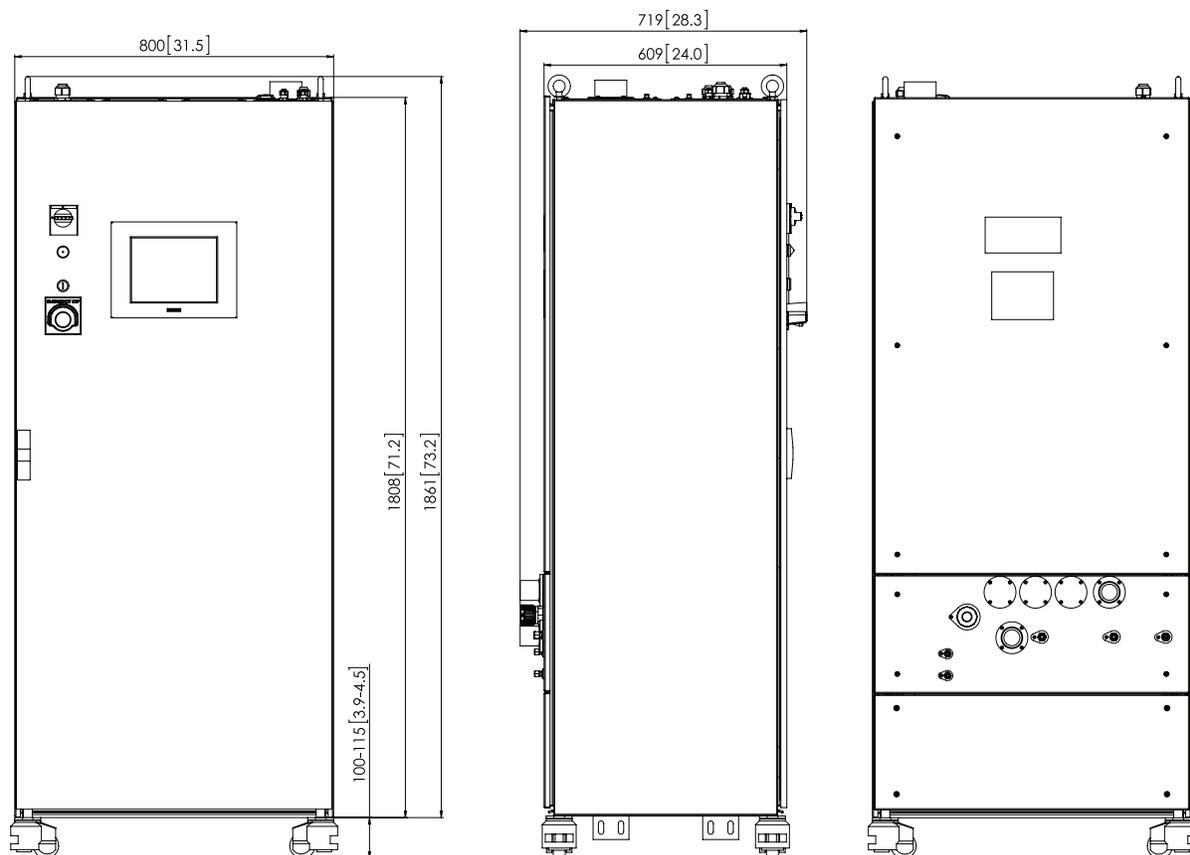


Figure 1 - Specified achievable dissolved ozone concentration in UPW for a system pressure of 2.5 bar<sub>g</sub>, a cooling water temperature and UPW temperature of 20°C. At higher UPW temperatures, lower system pressure or higher cooling water temperature, the maximum performance will decrease.

## Dimensional Drawing



Note: Unless otherwise specified, dimensions are nominal values in millimeters (inches referenced). Back-plane design may vary according to chosen configuration.

## Specifications

System Specifications	
<b>Ozonated Water Pressure</b>	Configurable 1.8-3.0 bar <sub>g</sub> flow rate depending, 120 lpm – max. 3 bar <sub>g</sub> ; 140 lpm max 2.5 bar <sub>g</sub>
<b>Plumbing Materials</b> <b>Liquid Wetted Surfaces</b> <b>Gas Wetted Surfaces</b>	<ul style="list-style-type: none"> <li>• PFA, PTFE, quartz glass</li> <li>• 316L stainless steel, PFA, PTFE</li> </ul>
<b>Communication</b>	Binary in/out, RS232/RS485, analog 4 – 20 mA in/out, USB
<b>Cabinet, Dimensions (H x W x D)</b>	Coated steel, approx. 1810 mm x 800 mm x 610 mm (71.2" x 31.5" x 24.1") Overall height: Approx. 2000 mm (79")
<b>Weight</b>	Approx. 315-400kg, depending on configuration
<b>Compliance</b>	CE, SEMI S2, SEMI F47, NRTL
Facility Requirements	
<b>O<sub>2</sub></b> <b>Inlet Pressure</b> <b>Flow Rate</b>	<ul style="list-style-type: none"> <li>• ≥Grade 4 (purity ≥99.99%)</li> <li>• 4.5 - 7.6 bar<sub>g</sub> (65 - 110 psig), at least higher 3 bar than system pressure</li> <li>• ≤15 slm, typ. 9 slm, according to SEMI E12 (0°C / 1.01325 bar)</li> </ul>
<b>Dopant Gas CO<sub>2</sub></b> <b>Inlet Pressure</b> <b>Flow Rate</b>	<ul style="list-style-type: none"> <li>• ≥Grade 4.5 (purity ≥99.995%)</li> <li>• 5.0 - 7.6 bar<sub>g</sub> (73 - 110 psig)</li> <li>• Typ. 0.15 - 0.5 slm, depending on the configuration</li> </ul>
<b>Ultra-Pure Water (UPW)</b> <b>Half Life Time of O<sub>3</sub> in UPW</b> <b>UPW IN Pressure (full flow)</b> <b>Temperature</b>	<ul style="list-style-type: none"> <li>• &gt;12 min @ 20°C, (which is standard in semiconductor fabs)</li> <li>• 1 - 4 bar<sub>g</sub> (14.5 - 58 psig)</li> <li>• 15 – 25°C (59 – 77°F), rated 20°C (68°F)</li> </ul>
<b>Cooling Water</b> <b>Quality</b> <b>Temperature</b> <b>Pressure</b> <b>Flow Rate</b>	<ul style="list-style-type: none"> <li>• Demineralized, filtration ≤20 μm</li> <li>• 17 – 23°C (63 – 73°F), rated 20°C (68°F)</li> <li>• Max. 5.0 bar<sub>g</sub> (73 psig); differential pressure ≥3 bar (43 psig)</li> <li>• Min. 10.0 L/min</li> </ul>
<b>Power</b>	3/PE~, 200 - 208 V ±10 %, 50/60 Hz, 3000 - 8000 W

## Ordering Information

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