

**High Concentration, High Flow Ozone Generator** 



AF010000- High Concentration & High flow Ozone Generator: Uniquely configurable to optimize performance

#### • AF010000 High Concentration & High flow Ozone Generator

The AFO10000 Generator redefines ozone supply subsystems and it is designed to produce high concentration, high-purity ozone at high gas flow rate by means of electrical discharge in oxygen.

The Cell technology of AFO10000 is convert pure oxygen into ozone through silent electrical discharge and achieves the highest ozone concentration levels available, AFT ozone generators are the highest purity ultra-high concentration ozone generators on the market. The combination of generator design, high purity wetted materials and extremely minute levels of dopant gas (far below the levels required for competitive ozone generators), result in ultra-clean ozone and the lowest levels of contaminants (e.g. NOx compounds), available at ultra-high concentrations. The AFO10000 series can operate *without the Dopant gas*.

## • Operation Principle

The ozone-generating cell may be represented as a capacitor with two electrodes. One is covered by a thin dielectric the other with a refractory metal. Oxygen flows between the electrodes and is converted to ozone. When electrical discharge occurs between electrodes, thermal, photochemical and electron effects form ions. Between the two electrodes free electrons present are accelerated by the action of the electric potential difference between the electrodes and the electric field. They form further ions by colliding with other atoms. When enough gas ions have formed in the space between the electrodes and a sufficient amount of electrical potential has accumulated on the electrodes, a barrier discharge is initiated. During the discharge, the gas becomes conductive and current starts to flow between the electrodes. The dielectric barrier prevents the formation of a single large plasma channel between the electrodes. Instead,



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a large number of smaller discharges uniformly distributed over the surface of the dielectric will form, each carrying a small amount of current that corresponds to the local displacement current in the dielectric. The surface of the dielectric contacting the oxygen has a very large resistance which prevents spreading of electrical discharges over its surface. The ozone produced as a result of oxygen ionization is then ducted to the application. The power board will be designed to take and power 14 oscillators to make future expansions possible.

## - Application

Typical ozone applications in semiconductor processing include atomic layer deposition (ALD) TEOS/Ozone chemical vapor deposition (CVD), Ta<sub>2</sub>O<sub>5</sub> CVD, photoresist strip, wafer cleaning, contaminant removal, surface conditioning, and oxide growth.

#### • Features

- Can operate with N2 and without N2
- Ozone cell loaded 1 to 14 maximum
- Ozone concentration up to 335 g/Nm3
- O2 flow rate from 5 slm to 40 slm enables process flexibility
- Closed-loop operation for accurate process control
- High redox potential
- Can be generated at the point of use
- Green chemical, easily converted back to oxygen Low Cost of Ownership
- No chemical disposal costs

## - Specification

Model: AFO10000

Max Cell loaded Q'ty: 14

Minimum Ozone output: see figure 1



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| Feed Gas              |                              |
|-----------------------|------------------------------|
| Oxygen:               | Grade 6 or better O2         |
| Nitrogen:             | 100ppm grade 5 or better N2  |
| Cooling Water         |                              |
| Temperature:          | 17deg +/-,1deg               |
| Filtration            | 100 microns                  |
| Quality               | Resistivity $\geq$ 50Kohm/cm |
| AC Power              |                              |
| VAC(+,-10%)           | 208VAC                       |
| Phase                 | 3 phase                      |
| Amps                  | max 21A                      |
| Hz                    | 50/60Hz                      |
| Dimensions(W x D x H) | 480 X 410 X 266mm            |
| Compliance            | CE, SEMI S2                  |

### • Part number Matrix

<*Table 1, Generator part number Matrix*>

| AFO    | 01           | XX        | 00            | 0             | X         |
|--------|--------------|-----------|---------------|---------------|-----------|
| O3 GEN | 10000 Series | Cell Q'ty | Future option | Future option | NF: N2    |
|        |              |           |               |               | Free      |
|        |              |           |               |               | 0: N2 Use |

Performance



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<Figure 1, Performance chart>

- Dimension
- -. AFO10000 series



<Figure2, AFO10000 Front View>



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#### <Figure3, AFO10000 Rear view>



<Figure4, AFO10000 Top view>