Applications / Notifications (for the Domestic Use in Japan)

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- High Pressure Gas Production Notification
- High Pressure Gas Production Facilities Change Notification
- Class 2 Storage Place Establishment Notification
- Class 2 Storage Place Position Change Notification

This Equipment is developed by AIST (National Institute of Advanced Industrial Science and Technology) and Meidensha.

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Specifications in this catalog are subject to change without notice.

The seller shall not be liable for incidental damages, consequential damages including loss of profit and special damages.

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Continuous supply of high purity ozone gas
Overview

Our Pure Ozone Generator (POG) condenses ozone to >100% purity, which is stored as liquid using cryogenic freezers. The pure ozone can be delivered as a continuous supply of process gas during CVD, ALD, MBE or industrial materials fabrication where nitrogen or other constituents can create defects.

Safety and Quality

- Always keep the system safe by operating under the condition of high purity and low pressure.

Safety Features
- Explosion-proof Design
- Temperature/pressure control with the fail-safe system by power supply.
- Has an emergency purge mechanism to dilute ozone in the process gas line and discharge residual ozone within the apparatus in times of power outage.
- Can be switched off manually by an EMO (emergency off) switch in the event of any anomaly.
- Even in the unlikely event of an explosion, the structure is designed to prevent any mechanical damage to external equipment by having the liquefaction chamber housed within a vacuum-insulated stainless-steel container.
- The liquid ozone cooling unit has sufficient heat capacity for the amount of accumulated liquid ozone so as to reduce the risk of rapid vaporization by energy from outside such as vibration, which otherwise is a risk factor for explosive decomposition of ozone.

Certifications and Quality Assurance
- The Pure Ozone Generator has been certified according to SEMI-S2, UL, NFPA and CE standards.
- A third-party tracer gas test has been performed to ensure safety from gas leaks.

Applications by field

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Formation of high quality metal oxide thin films can be formed by using pure ozone (high purity ozone) gas as oxygen source. Superiority of using pure ozone (high purity ozone) as oxygen source has been beginning to introduced in the international market.

**Example**

- **Growth of high quality metal oxide thin films**
  - The example of the oxygen source for MBE (Molecular Beam Epitaxy)
  - Results
    - Formation of high quality metal oxide thin films can be formed by using pure ozone (high purity ozone) gas as oxygen source.
    - Superiority of using pure ozone (high purity ozone) as oxygen source has been beginning to introduced in the international market.

- **In-situ cleaning**
  - The example of in-situ cleaning process after EUV lithography
  - Results
    - Low pressure & highly reactive source makes in-situ real-time (24/7) cleaning possible. (A feat which low concentration O₃ never achieved)
    - Just removing C contamination without growing oxidation layer and keeping reflectivity of mirrors.
    - No mask and mirror damage thanks to NOx free O₃.
    - Even low-pressure supply in ultra-high vacuum (UHV), highly concentrated ozone works as a sufficient oxidizer to ash carbon contamination.

- **Surface modification**
  - The example of the surface hydrophilization of carbon fiber
  - Results
    - Hydrophilic termination into whole surface of the fiber
    - More than 1 month duration of the termination
    - No thermal and physical damages confirmed

- **Film deposition at low temperature**
  - The example of high-barrier film
  - Results
    - No heating needed and no physical damage introduced by generated OH radicals.
    - High throughput process thanks to no vacuum standby time.
    - High uniformity in the substrate due to proprietary shower head structure and gas flow sequence.

- **Film deposition on semiconductor substrate**
  - The example of SiO₂ film deposition on swallow trench (Aspect ratio 1:15)
  - Result
    - SiO₂ film can be deposited on sidewall and trench-bottom

- **Cleaning/Removal(Ashing)**
  - The example of resist ashing of semiconductor production process (high ion implantation)
  - Results
    - High-speed ashing at low temperature
    - Highly ion implanted photoresist can be removed without popping.
Device configuration (Continuous supply type)

**Specifications**

- **Type**: Batch type (Standard), Continuous supply type
- **Unit configurations**
  - Number of Ozone Chambers: 1, 2, 3
  - Maximum Ozone Accumulation Volume (cc): 8000/unit, 16000/chamber
  - Liquid Ozone Concentration (%): ≒ 100
  - Continuous Supply Rate (sccm) × 100: 100
  - Maximum Supply Rate (sccm): 100, 300
  - Ozone Gas Concentration (%): More than 90
  - Maximum Supply Time (min): 2
  - International Quality & Safety Standards: SEMI-S2, UL, NFPA, CE
  - Negative Pressure Control*: ○ ○ ○ ○
  - Emergency Purge Mechanism*: ○ ○ ○ ○
  - Manual Flushing*: ○ ○ ○ ○
  - Auto Flushing**: ○ ○ ○ ○

**Dimensions** (Except for projection part) [Unit: mm]

- **Batch type**
  - Weight: 545 kg

- **Continuous supply type**
  - Weight: 490 kg
  - Weight: 470 kg

Note:
- The refrigerator compressor is built-in.
- The maintenance space is required.

*Volume calculated in standard state conditions: (0 °C, 1 atm)
*Generation of ozone gas permitted only when the enclosure pressure is negative to atmospheric pressure.
**Ozone toxic fumes are purged from the system when abnormal operations are detected.
*Automatically removes the impurities accumulated in the ozone chamber while still in operation.
**Flushing operation of ozone chamber will be carried out only when device is stopped.
**Device automatically flushes itself out while still in operation.
**Device must be stopped for flushing every 5 days.
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