# Jupiter Scientific

## IO THERMAL WET SCRUBBER

Jupiter Scientific's IO scrubber incorporates the synthesis of three scrubbing technologies to form a single, extremely versatile, scrubbing system.

The Jupiter Scientific IO scrubber includes the IO Furnace for the destruction of flammable and pyrophoric gases.
The IO furnace is constructed of nickel alloy. This allows the IO's extremely powerful electric heaters to heat the gas stream to a temperature in excess of 1000 C in sustained operation. These high temperatures allow the IO to completely destroy pyrophoric gases.


The IO particle scrubber is a nickel alloy Venturi scrubber that quenches the hot gas stream from the IO furnace and removes over 99 percent of the particles from the exhaust stream. The IO particle scrubber's nickel construction allows it to maintain operation for years without suffering corrosion.

The IO's packed scrubbing column removes acid gases, ammonia, and halogens, along with other water-soluble gases from the waste stream. Together, these three tools provide complete abatement for complex CVD waste streams.

The IO scrubbing system is particularly well suited to the toughest abatement challenges. The combination of furnace, particle scrubbing, and packed column enable the IO to completely abate processes that combine multiple scrubbing challenges.

The fact that the IO scrubbing system uses all electric power means that operators do not need to route flammable gases and risk the associated hazards of said flammable gases. In addition, the IO's electric furnace is PID controlled to ensure absolute temperature control as the process flow varies. The IO's integrated lift station makes added lift capability unnecessary and allows for water lift to 15 feet. The IO system includes data logging and an impressive array of monitored interlocks and performance metrics including: utility pressure, water level, temperature, water flow rate, differential pressure, thermocouple status, closed loop monitoring, and water pressure.

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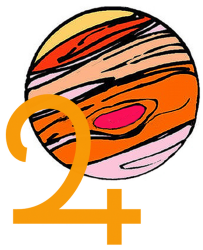

## IO Scrubber Key Features

- Inconel heater at 800 C, 8 kW Peak Power (Average usage 4kW)
- Venturi particle scrubber integrated after furnace
- Integrated packed column to remove corrosive gases
- Integrated Bypass Valve
- Color touch panel
- Remote Ethernet communication
- Self cleaning heater
- Integrated lift station capable of lifting water to 10 m
- FM approved interlocks on heaters
- Acoustic water level monitoring
- Interlocks for temperature, pressure, FM limit, water level, water flow rate, ground fault interrupt

**Common Gases Abated By IO**

| Gas | Removal efficiency (at 950 C) |
|---|---|
| **Silane** | **>99.99** |
| **Hydrogen Fluoride** | **>99.9** |
| **Fluorine** | **>99** |
| **Hydrogen** | **>99.99** |
| **Hydrocarbon** | **>99.99** |
| **Nitrogen trifluoride** | **>99** |
| **Boron Trichloride** | **>99.99** |
| **Ammonia** | **>99.99** |
| **Silicon tetrafluoride** | **>99.99** |

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**Jupiter IO Utility Requirements**

| Utility | Average Consumption | Requirement |
|---|---|---|
| Water | 6 LPM | 30 PSI |
| N2 | <1 LPM (more in idle mode) | 60 PSI |
| CDA | 4 LPM (varies by application) | 60 PSI |
| Electricity | 4 kW avg, 8 kW Peak | 35 A,208 V, 3P |