

# Integrated unit for precise flow rate steam generation and delivery

Flow rates up to 25 slm

The **RASIRC Steamer** combines a clean steam generator and steam purification assembly into a single system. All wetted components in the liquid path are quartz or Teflon®. The purified steam path components are quartz and Teflon® fittings and valves. The **RASIRC Steamer** is proven to increase oxide growth rate, chamber uniformity, film quality, and/or reduce operating cost when compared against all other steam technologies.

Tests show reduction of 67 different metals to below detectable limits. Some contaminants have been verified to less than 0.0005 parts per billion. Urea, Nitrogen and CO2 can also be eliminated. Because the **RASIRC Steamer** works with water vapor at low pressures, stainless steel delivery systems can be replaced with quartz and fluoropolymer piping systems.

There are two major components of the RASIRC Steamer:

- **RASIRC Steamer**—Steam generator that converts DI water into high flow, Ultra High Purity (UHP) water vapor.
- **RASIRC SPA**—Purifier assembly that purifies clean steam to Ultra High Purity (UHP) steam by selective removal of dissolved gases, metals, and particulates to below levels of detection.

## Benefits of the RASIRC Steamer

The **RASIRC Steamer** is the only system that can provide controlled delivery of ultrapure steam from DI water. Some of the benefits include:

- **Purity**—Patent pending technology eliminates volatiles, ionic contaminants and other impurities, resulting in equal to or better purity than pyrolytic

steam created by burning oxygen and hydrogen.

- **Yield**—Metals, hydrocarbons, and particles are rejected by the non-porous membrane to deliver the purest steam possible.
- **Throughput**—Continuous unattended 24/7 operation. Up to 10% improvement in growth rate by elimination of carrier gases such as hydrogen and oxygen that can slow the growth rate. No thermal build up with increased flow rate as with pyrolytic torches.
- **Safety**—Eliminates H2 and O2 from the oxidation process, eliminating flammable and explosive materials. Operates at significantly lower temperature (below 125°C as opposed to above 500°C).
- **Cost of ownership**—Eliminates costly hydrogen and oxygen usage and storage. Low operating cost generates a rapid pay back and there is no cooling requirement unlike with torches.
- **Versatility**—Handles a wide range of flow rates and pressure levels.

## How It Works

- The heater generates steam from DI water.
- A non-porous hydrophilic membrane within the RASIRC SPA purifies the steam, selectively allowing water vapor to pass. Selectivity is significant with up to 1,000,000x relative to nitrogen molecules. In the vapor phase, the membrane selectively passes water molecules. All other molecules are greatly restricted, so contaminants in water such as dissolved gases, ions,

TOCs, urea, particles, viruses, bacteria, pyrons, and metals can be removed in the steam phase.

- The flow rate is controlled by closely monitoring and automatically adjusting the upstream and downstream pressure.



- The flow rate is increased or decreased by adjusting heater energy.
- Water levels are constantly monitored and adjusted to ensure continuous steam flow.

## Product Specifications

- Flow up to 25 slm of water vapor
- Auto level / fill control
- Vacuum to 1200 Torr (0 to 23 psia)
- Manual and automatic operations
- PLC driven
- Remote and local control
- Secondary temperature control loop
- Downstream / upstream pressure sensing
- Patent pending flow control of steam
- Purge/drain capability
- Integrated purifier

Purification Performance Results (ppb)			
	DI Water Source	Pre-Purified Steam	Purified Steam
Total Metals	19.8	0.15	0.009
Total Organic Carbon	1200	380	22
Total Silica	28	4.3	0.7
Urea	2200	48	2.6
Ammonium	1.468	1.117	0.116



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**Installation**

The RASIRC Steamer requires the following environmental conditions:

- 20°-40° Celsius
- 30% to 90% humidity, non-condensing
- Class 1000 cleanroom or tool cabinet
- Protection of the unit from water leaks from surrounding process equipment

The **RASIRC Steamer** is 370mm wide by 375mm deep by 400mm high (14.6" W x 14.76" D x 15.7" H) and weighs approximately 13.6 Kg (25 lbs). Front Access is required to supply water, drain and deliver process steam.

**How to Order**

To place an order for the **RASIRC Steamer**, simply identify the model number from the chart below based on your Flow Rate and Electrical Requirements.

Model #	Min Flow Rate (slm)	Max Flow Rate (slm)	AMPs	Voltage	Water @ 15 psig ml/min	CDA
102A-10	1.0	10	9	100-120	30	60 psig
102B-10	1.0	10	5	200-240	30	60 psig
102A-15	1.5	15	17	100-120	50	60 psig
102B-15	1.5	15	10	200-240	50	60 psig
202B-25	2.5	25	15	200-240	70	60 psig

Add a dash and designator from the options below.

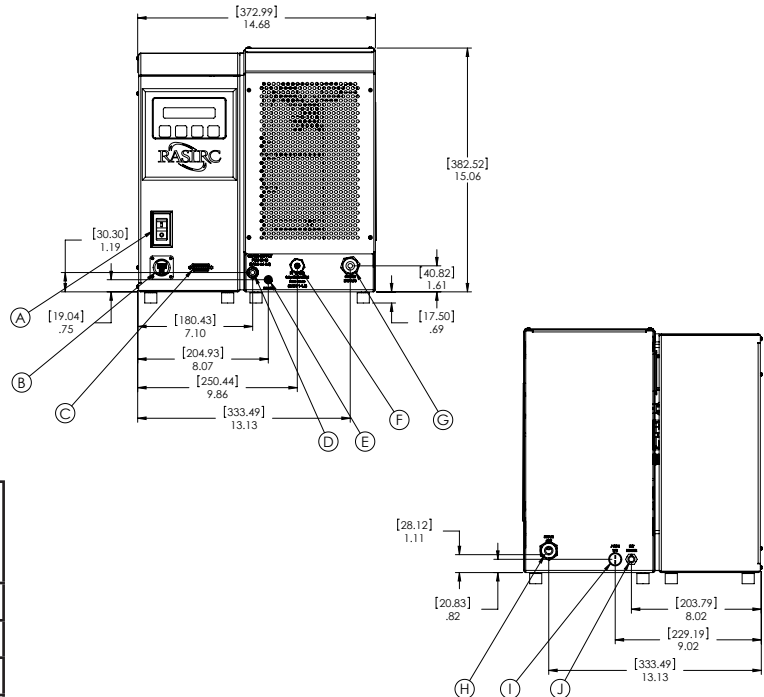
Designator	Option
O	Standard cabinet
SC	Split cabinet. The split cabinet option allows the electronics to be remoted up to 6 feet (2 meters) from the steam cabinet.
V	Vacuum to Atmospheric Delivery. 316L stainless steel pressure transducer is located downstream of the steam purifier on the steam process line to monitor downstream pressure. This provides the ability to control flow into vacuum and atmospheric processes and makes flow independent of atmospheric pressure fluctuations.
A	Atmospheric Delivery. The unit is designed to deliver to atmospheric process. Downstream pressure is based on pressure within the tool cabinet.

For example, to order a unit with a Flow Rate Range of 2.5 slm to 25 slm, operating in a 208VAC environment, with a split cabinet and atmospheric delivery, specify: 202B-25-SCA.

**Additional optional components**

- Silicon Rubber heater tape to prevent condensation of the steam in delivery lines.
- DI Water Kit (100195)
- Delivery Line Kit

Orders can be placed through authorized dealers or directly with the factory.



**Connections**

	Description	Size and Recommended Tubing
A	Power On/Off	Switch
B	Electrical Connection	Tyco Type VII
C	Remote Interface	DB 15 pin
D	Pneumatic Air	1/4" Push Lock Tube—PFA, PTFE, Poly
E	Pneumatic Port for Process Valve	4mm (5/32) Push Lock Tube—PTFE or Poly
F	System Drain	1/4" Male Flare—PFA or PTFE
G	Auxiliary Heat Tape	200-240 VAC <200 Watts
H	DI Water Inlet	1/4" Compression Tube—HP PFA
I	Process Steam Out	1/2" Male Flare—HP PFA

**About RASIRC**

RASIRC develops products that purify and deliver ultra pure liquids and gases, with a primary focus on water vapor. RASIRC dryers, humidifiers and steam generators are of critical importance for many applications in the semiconductor, pharmaceutical, medical, biological, fuel cell, and power industries. Custom systems are available upon request. Call RASIRC to see how they can solve your water vapor challenges.



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