



# In-line Ultra-clean Nitrogen Ionizer

## MODEL 4214

Simco-Ion's In-line Ultra-clean Nitrogen Ionizer Model 4214 is specifically designed to ionize a nitrogen gas flow in ultra-clean semiconductor or other high purity processes. Unlike other nitrogen ionizers which depend on the trace gases in the nitrogen stream to produce ionization, this state-of-the-art product ionizes nitrogen molecules using a small, but efficient power supply.

The Model 4214 In-line Ionizer utilizes high frequency AC ionization technology to provide a fast discharge time for optimal static charge neutralization. The microprocessor controls and small form-factor make it an ideal nitrogen ionizer for in-tool integration. The ultra-clean design, utilizing an internal particle containment system assure the cleanest, most compatible ionization available for critical semiconductor processes. By providing a continuous flow of nitrogen through the ionizer, this breakthrough technology meets Extended ISO Class 1\* cleanliness requirements, making it ideal for 22 nm and below technology nodes.

### Features

- Extended ISO Class 1 cleanliness
- Alarms indicating low ion output (maintenance required), high voltage power supply failure, and low gas flow
- Standby mode
- Self-balanced ionization
- Auto shutoff with low gas flow
- Compact size
- +24 VDC Input Power


### Benefits

- Provides clean ionization for any ultra-clean process; ideal for 22 nm and below technology nodes
- Constant ionizer status monitoring for continued continuous optimal performance
- Nitrogen saving Standby mode that reduces gas flow while maintaining fast ionization start up
- Eliminates calibration or difficult setup
- Prevents product damage
- Designed for in-tool applications with tight space constraints
- Connects to tool power for simple integration

\* See Defining Extended ISO Class 1 Cleanliness on the back.



## Specifications

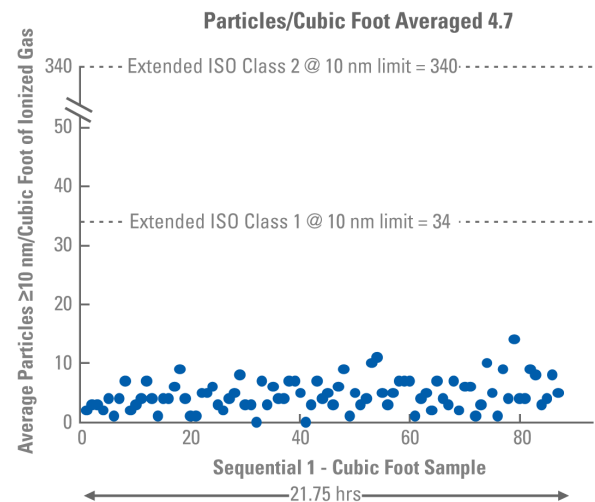
Input Voltage	+24 VDC, $\pm 5\%$ @ 0.25 A, 6W (typ)
Balance	$\pm 25V$ or less range with no output manifold, measured @ 150 mm (6") from CPM, standard nitrogen flow rate 40 lpm @ 36.5 kPa (1.4 cfm @ 5.3 psi)
Discharge	Without manifold $\pm 1000$ -100V, 10 sec or less (typ), measured @ 150 mm (6") to CPM, nitrogen flow rate 40 lpm @ 36.5kPa (1.4 cfm @ 5.3 psi); with manifold 1000-100V, 100 sec or less (typ), measured @ 500 mm (19.6") with custom manifold
Ion Emission	High frequency AC corona discharge
Cleanliness	ISO Class 1 (0.1 $\mu$ m particles); Extended ISO Class 1 (0.01 $\mu$ m particles)
Ion Emitter	Single crystal silicon (SCSi)
Gas	Nitrogen, minimum purity 99.999%
Gas Flow Rate	Minimum 40 lpm @ 36.5 kPa (5.3 psi); recommended 90 lpm @ 171 kPa (24.8 psi); maximum 100 lpm @ 197 kPa (28.5 psi)
Gas Supply Temp	60°C (max)
Gas Connections	Inlet: Swagelok <sup>®</sup> 316L SST 1/8" FNPT Adapter to 3/8" OD tubing (#SS-600-7-2); outlet: Internal 1/4 NPT female threaded in ionizer block; optional manifold 1/4 NPT male
Operating Temp	Ionizing unit 15-60°C (max); custom manifold per individual specification
Control System	Microprocessor controlled ionization, self balancing
Alarms	HV alarm; low ions alarm; low gas flow alarm
Status Relays 1 & 2	$\pm 24$ VDC @ 0.2A (max)
Filter Cartridge	Disposable, 99.999% filtration efficiency for 0.01 micron particles
Dimensions	6.0L x 2.85W x 1.26H in. (152.4 x 72.4 x 32 mm) without manifold
Weight	0.64 kg (1.4 lbs) without manifold
Enclosure	Stainless steel
Mounting	Two M5 threaded inserts provided on bottom of unit; M5 screws should not exceed 10 mm in length
Certifications	 RoHS 2 Compliant

## Ordering Information

91-4214UN-03	4214 Ionizer with Silicon Emitter Points for Nitrogen, 24 VDC
71-24219-01	Silicon Emitter Point Kit for 4214 Ionizer
33-24214-41	Filter Cartridge Kit, 99.99998% efficient (filter cartridge, 2 O-rings)
33-4214-05	4214 Power-Signal Distribution Box
33-4214-15	4214 Power-Signal Distribution Kit (Distribution Box, cable, 24 VDC universal input power supply); power cord must be specified separately, see below:
25-20660	Northern America Power Cord
25-20710	UK Power Cord
25-20735	Europe Power Cord
25-20750	China Power Cord

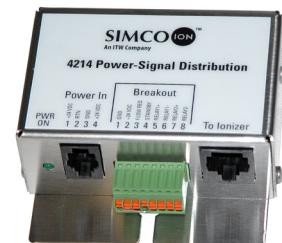
## Defining Extended ISO Class 1 Cleanliness

To meet current technology node cleanliness requirements, Simco-Ion utilizes an in-house standard that extrapolates ISO 14644-1 down to  $>0.01$  micron ( $>10$  nm) particles. Greater than 10 nm particle size is typically measured using a condensation nucleus counter (CNC). The result is defined as "Extended ISO Class 1". The basis of the extrapolation employs the formula which was used to define the existing ISO 14644-1 class limit lines. The formula is provided in ISO Standard 14644-1, and when extrapolated the permitted number of particles sized 0.01 micron and larger = 1200 particles/m<sup>3</sup> (or 34 particles/ft<sup>3</sup>). The Simco-Ion in-house standard makes no changes to ISO 14644-1, it only extrapolates ISO 14644-1 to smaller particle sizes. Additional information regarding the ISO 14644-1 standard can be found at [www.iso.org](http://www.iso.org).



## Easy Tool Integration

The Model 4214 is a stand-alone unit providing a high voltage power supply, an ultra-clean ionization cell, and I/O connections for remote status and control of ionization all within a small footprint package. The end-user's nitrogen is plumbed through the unit where it is ionized and then delivered to the tool's static-sensitive product or process area. Custom manifolds or nozzles can be attached to shape the area of coverage to the customer's requirements.



Power-Signal  
Distribution Box

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