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Nano Particle Technology

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Cleanroom Ultrapure LN2 Fogger Technology

In 2001 and prior to 2001, clean room fogger technology was designed to produce dense fog to visualize airflow, turbulence, airflow balance, and to video airflow for 3D airflow modeling. Ultrapure fogger technology provides much more fog, fog density and visual fog distance than ultrasonic fogger products, albeit ultrasonic fogger products are less expensive but produce less fog volume than ultrapure LN2 foggers. A fogger tool using ultrapure fog technology produces more fog volume, more fog density and greater fog visual distance than a comparable ultrasonic fogger to visualize turbulence for smoke studies in clean rooms, sterile rooms, ISO suites, etc.

An Ultrapure Fogger is defined as using LN2 and Deionized water or WFI water, combining water vapor and nitrogen vapor to form an ultrapure fog. Ultrapure fog is generated by allowing LN2 to boil at room temperatures to form a very high concentration of nitrogen molecules, which are then introduced to a water vapor, as generated from a heated water source. LN2 boils at room temperature, thus water is the only liquid that needs a heating device. The ultrapure fog is the result of bringing the two vapors together allowing nitrogen and water molecules to readily combine at very high concentrations, forming highly visible, ultrapure vapor droplets at about 3 microns in diameter. The dense, ultrapure fog is then directed into a cleanroom to visualize airflow direction, turbulence, balance, etc.

In 2001 era, the ultrapure fogger technology was quite unique and basic in operation. In 2018, the technology has advanced considerably by adding airflow velocity control, fog volume control, wireless remote control and modular assembly, none of which is available on early ultrapure fogger technology from 2001 era and prior.

By providing fog volume control, airflow velocity, a customer can match the fogger output to each cleanroom operation. By adding wireless remote control, the fogger can be operated from behind a closed room or inside a controlled area. By providing modularity, the assembly is reduced in complexity, and allows a spare LN2 Dewar to be made available for customers, who want to operate for long periods of time.

The **AP35 Ultrapure Fogger** now offers adjustable fog volume, adjustable airflow velocity, direct touchpad control and wireless remote control; features not available from 2001 era fogger technology. The AP35 provides about 5 cubic meters of ultrapure fog per minute with 533 ml / minute fog density for up to 70 minutes to visualize airflow for 20 to 30 feet. This surpasses all other ultrapure foggers with 3X more fog volume, 2X more fog density and 2X more visual fog and airflow distance - for about the same cost as the older 2001 era and LN2 fogger technology and prior technology.

Patterns of air flow, turbulence and velocity can be viewed with a non-contaminating fog; thus no clean up is required. The AP35 ultrapure fog generator is used in Semiconductor and Pharmaceutical companies to visualize airflow patterns, turbulence, find dead zones, see direction and visualize velocity. The ultrapure fogger provides a very dense fog by generating vapor fog droplets at 2-3 micron diameter, permitting the fog to travel much further in the air stream. As the fog evaporates, it reverts back to the same air we breathe. The exit temperature of the fog is about 78 F degrees with adjustable air velocity to match your airflow speeds. The high purity fog floats into the airflow. Included is a Wireless Remote Control Wireless FOB and 5 M x 80 mm Fog Hose. The ultrapure fogger rolls easily across a floor with wheel casters. A front storage parts drawer is provided to hold small accessories. 9 accessories available including a spare LN2 Dewar.



AP35 Ultrapure LN2 Fogger

AP35 Advantages:

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|------------------------------------|---|
| Very High Fog Density | 533 ml / minute fog density enables 20-30 feet visible airflow for about 70 minutes |
| Highest Fog Volume | about 5 Cubic Meters / minute |
| Fog Control | Adjustable Fog volume, Adjustable Airflow Velocity |
| Remote Operation | Wireless Remote Control to operate inside a closed room or behind a wall |
| Low Fog Exit Pressure | Minimal fog entry pressure is created |
| Ultrapure Fog, SS Enclosure | No cleanup required, no contamination, fog evaporates back to air we breathe |
| Modular Product Design | Modular design provides accessibility to individual sub-assemblies |
| Neutrally Buoyant Fog | Ultrapure fog floats into airflow according to airflow direction |
| Video Capabilities | Video and 3D Modeling of the airflow turbulence is much easier with dense fog |
| Fog Curtain Wand | Optional Fog Curtain Wand to spread out the fog visibility |
| Y Adaptor and T Adaptor | Optional Y Adaptor for two fog inputs, Optional T Adaptor to provide extra wide fog curtain |
| Fog Illumination | Optional LED Light Contrast, Fog Illuminator, to contrast airflow visualization |
| LN2 Dewar | Optional LN2 Dewar permits longer operating periods |










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AP35 Optional Accessories

						
Accessory Rolling Carry Case	Y Adaptor (Requires 2 Hoses)	T Adaptor (Requires 2 Fog Wands)	LED Fog Contrast Light	5 Meter Fog Hose	1.3 Meter Fog Wand	Remote Wireless Control

Cleanroom Fogger Technical Performance Comparisons

Model	Fog Purity	Fog Volume	Fog Density	Fog Duration	Visual Airflow Distance	Liquids Used	Where Used	Standard Power	Other Power
AP35 Ultrapure Fogger	Ultra Pure	≈ 5 cubic M / minute	≈ 533 ml / minute	≈ 70 minutes	≈ 20 - 30 feet visual airflow	LN2 + DI H2O or LN2 + WFI Water	for mid sized clean rooms, sterile rooms and ISO suites	115 VAC	220 VAC, 115VAC, 100VAC
AP100 Ultrapure Fogger	Ultra Pure	≈ 15.5 cubic M / minute	≈ 1520 ml / minute	≈ 70 minutes	≈ 30 - 40 feet visual airflow	LN2 + DI H2O or LN2 + WFI Water	for large clean rooms, sterile rooms and ISO suites	220 VAC	220 VAC
Older Ultrapure Foggers	Ultra Pure	#1: ≈ 1.5 cubic M / minute #2: ≈ 1 cubic M / minute	#1: ≈ 250ml per minute #2: ≈ 125ml per minute	#1: ≈ 40 Minutes #2: ≈ 25 Minutes	#1: ≈ 10 - 15 feet visual airflow #2: ≈ 10 feet visual airflow	LN2 + DI H2O or LN2 + WFI Water	for mid sized clean rooms, sterile rooms and ISO suites	115 VAC	220 VAC, 115VAC, 100VAC
CRF4 Cleanroom Fogger	Pure	≈ 1.25 cubic M / minute	≈ 170 ml / minute at max fog volume; and 57 ml / minute at low fog volume	≈ 45 minutes at max fog volume; and ≈ 90 minutes at low fog volume	≈ 10 - 15 feet visual airflow	DI Water or WFI Water	for mid sized clean rooms, sterile rooms and ISO suites, RABs, Barrier Isolators	115 VAC	220 VAC, 115VAC, 100VAC
CRF2 Cleanroom Fogger	Pure	≈ 0.26 cubic M / minute	≈ 55 ml / minute	≈ 50 minutes	≈ 7 - 8 feet visual airflow	DI Water or WFI Water	for smaller barrier isolators, fume hoods, flow hoods and glove boxes	115 VAC	220 VAC, 115VAC, 100VAC
CO2 Fogger	CO2	≈ 0.20 cubic M / minute	≈ 20 ml / minute, decreasing over fog duration	≈ 8 - 10 minutes	≈ 6 - 7 feet visual airflow	DI Water or WFI Water	for smaller barrier isolators, fume hoods, flow hoods and glove boxes	115 VAC	220 VAC, 115VAC, 100VAC
Portable Glycol Fogger	Glycol	≈ 0.10 cubic M / minute	≈ 1.0 ml / minute	≈ 45 minutes	≈ 3 - 4 feet visual airflow	DI Water + 90% Glycol	For industrial clean rooms	115 VAC	220 VAC, 115VAC, 100VAC