

## Comparisons between Space Sterilization System and Traditional Formaldehyde Fumigation and Ozone Sterilization

Item	Space Sterilization System	Formaldehyde Fumigation	Ozone
Residue	Nearly zero Residue in surface space	It needs to clear away white crystals during sterilization but it can hardly remove all the residues	It does not need to remove residues but it is also hard to remove residue
Chemical Toxicity	Hydrogen Peroxide/Peroxy acetic acid is non- toxic	It may lead to cancer	EPA will not grant any certification for its strong oxidation and harm to human respiratory system
Sterilization efficiency	Log 4 to Log 6 broad-spectrum sterilization against spore and fungi	Unable to fully achieve the log 4 to log 6 sterilization against spore	High concentration can kill spores, but it is difficult to kill spores in a clean room because of fast pyrolysis
Total Sterilization time	2 to 6 hours	At least 2 days	Most users perform such sterilization every day, causing a potential hazard to the compatibility of clean room environment
Residue neutralization	It does not need to neutralize residues	It needs to neutralize residues	-----
Residue detection System	The residual amount of hydrogen peroxide can be detected by a space residual detector	-----	-----



## Specifications

Technical Items	Description
<b>Appearance design</b>	The shell is made of PC + ABS and aluminum alloy, which is antibacterial and easy to clean
	Dimensions: 540mm x 580mm x1250 mm
	Small volume, with built in high power sprayer
<b>Hardware Parameters</b>	Processor: integrated Intel J1900 quad-core processor 2.00 Ghz chip set Intel Bay trail SOC chip set
	Autonomous navigation: multi-sensor fusion navigation scheme based on at least 3 types of sensors ( laser ray/speedometer/gyroscope)
	Intelligent obstacle avoidance: The robot can flexibly avoid any obstacles. It is able to avoid any obstacles under low light condition
	Motor torque: 8:1 Nm ( high load capacity and low power consumption)
	The chassis is equipped with a suspension system, which is used to effectively improve the threshold-passing smoothness
<b>Operating Parameters</b>	Speed of motion: 0.45m/s (under navigation state)
	A high- precision laser positioning function, with a laser measuring precision of 2cm
	steering performance: 360 degree zero- radius steering
	Continuous operating duration under full load condition>= 4 hours; operating duration under normal condition:>= 6 hours
	The robot can move autonomously, thus realizing autonomous navigation obstacle avoidance and other functions
	In the process of task execution, the robot supports a pause mode and can continue task execution after resuming
	The robot is capable of controlling the automatic opening/closing of electric door via the internet of Things
	Support the expansion of elevator control scheme to achieve cross-area multi floor operation
	There is no need for the secondary modification, or the addition and installation of route and location marking device. The robot can achieve full autonomous navigation during operation
	The robot supports automatic recharge function, which provides automatic charging under low battery level and continues operation
<b>Sterilization methods</b>	The robot is provided with a new dry fog space sterilization system with an average diameter of liquid drom of 10um. The liquid drop is fine and small, similar to the gas particle, and evaporated once fully contacted with the surface. Such drop is dispersed in the air through Brownian motion so that it can maintain its concentration within the specified time limit and therefore achieve sterilization effect for space environment
	The sprayed dry fog has the following properties:
	1. The dry fog drops are not set and under irregular movement ( Brownian motion principle)
	2. The dry fog drops are not aggregated to produce large liquid drops
	3. The dry fog drops bounce once contacted with the surface without rupture which may result in wet surface
Therefore, such properties of the dry fog also achieve good space and surface contact effect in inaccessible places	
<b>Sterilization Performance</b>	1. Automized particle size: 10um in average: small automized radius non-set atomizing and free diffusion of non-polymerization energy achieves good space and surface contact effect
	2. Sterilization efficiency: broad spectrum sterilization effect of log4-log6
	3. Air mass flow =<3.9m3/min
	4. Dosage:15g/min
	5. Dry fog of sporicide: concentration of hydrogen peroxide: 5.0-7.9% containing peracetic acid of less than 0.4%
	6. Dosage of sterilization agent:2L
<b>Environmental detection</b>	Support access to data using an external multi-point environment detection sensor, including PM2.5, temperature and humidity.