

Intelligent Cleaning Drone VA-D50R

Multifunctional Cleaning Drone

Aerial high-efficiency cleaning, Safe Unmanned Operations at Height, Applicable to multiple scenarios



Challenges And Pain Points in PV Pannel Cleaning

As the global energy transition accelerates, photovoltaic (PV) power generation has become a key pathway for China to achieve its “dual carbon” goals. As of the end of June 2024, the nation’ s installed PV capacity reached 713 million kilowatts, demonstrating strong growth momentum. In PV power generation, solar panels serve as core components, and their routine cleaning and maintenance are crucial, directly impacting the system’ s overall power generation efficiency and lifespan.

According to the “Operational and Maintenance Procedures for Photovoltaic Power Stations,” solar panels require regular cleaning to maintain their efficiency. Clean and well-maintained panels can absorb solar energy more effectively, thereby improving power generation efficiency and reducing energy losses caused by the accumulation of foreign objects such as dust and bird droppings. At the same time, regular cleaning and maintenance can extend the service life of solar panels and lower overall operating costs.



Challenges And Pain Points in PV Panel Cleaning

The construction of photovoltaic power plants is primarily divided into two types: centralized and distributed. Considering factors such as sunlight and land costs, centralized photovoltaic power plants are often located in remote, open areas such as deserts and gobi, while distributed photovoltaic systems are typically deployed on the rooftops of various buildings, particularly on the roofs of factories in industrial parks. Although each type has its own advantages, both face the significant challenge of cleaning solar panels.

On the one hand, traditional manual cleaning is inefficient and poses safety risks, making it difficult to meet daily operation and maintenance requirements. On the other hand, while the use of automated equipment such as cleaning vehicles and robots can improve cleaning efficiency, these systems often require frequent relocation, struggle to adapt to different PV array layouts, and face significant challenges in high-altitude deployment, resulting in overall low efficiency;



High Labor Cost

Photovoltaic power stations are typically located on building rooftops or in remote mountainous areas. They are numerous and widely dispersed, and require frequent cleaning, which results in a significant labor investment and high costs for manual cleaning.



Safety Risks

There are safety hazards such as falls from heights; touching live parts, such as component frames or cable connectors, with wet hands or using damp tools may result in electric shock.



Complex Management , Low Efficiency

Because solar power plants cover a large area, cleaning vehicles or robots must frequently move to different locations during cleaning operations, which not only increases equipment wear and tear but also reduces cleaning efficiency.



Poor Flexibility

Large-scale photovoltaic power plants are typically built in remote mountainous areas with complex terrain, including slopes and depressions; traditional cleaning equipment is poor flexibility in these conditions.

Intelligent Drone Cleaning: Maximizing the Value of Sunlight

VA-D50R cleaning drone is widely applicable to high-altitude cleaning tasks such as large-scale ground-mounted solar panels, commercial and industrial rooftop solar systems, and residential rooftop solar systems.

Multi Scenario - Stable operation at height, support various nozzles, cover different angles



Modular Design

Support the optimal mounting and nozzle for each specific task to meet cleaning requirements in various complex high-altitude environments.



Stable Operation at Height

Equipped with a dual RTK system, accommodate a wide range of high-altitude cleaning needs.



50L Large-Capacity Water Tank

Covers a large area in a single cycle, less frequency of tank changes, supporting quick fluid changes for high continuous operation efficiency.



Compatible with Multiple Liquids

Compatible with various liquids, featuring a quick-change tank, offers high efficiency.

Safety - Unmanned aerial operations, dual RTK, and forward-facing obstacle-avoidance radar



Replacing Manual Work at Heights

Operators can remotely control the equipment to perform various complex high-altitude cleaning tasks, thereby eliminating the risks associated with working at heights.



Dual RTK Configuration

Built-in dual RTK modules enhance positioning accuracy and enable fault-tolerant switching, ensuring reliable façade and photovoltaic cleaning operations.



Intelligent Obstacle Avoidance System

Equipped with front radar sensors for obstacle avoidance, it detects nearby obstacles in real time, ensuring a safer flight.

Intelligent Drone Cleaning: Maximizing the Value of Sunlight

VA-D50R cleaning drone features a modular design, with a 50-liter water capacity and a newly designed high-pressure water spray system. It supports two cleaning modes: **side-by-side cleaning with multiple nozzles** and **oscillating cleaning with dual nozzles**.

The high-pressure nozzle design meets a variety of cleaning needs, providing the industry with a convenient, efficient, and versatile aerial high-pressure cleaning solution suitable for multiple scenarios. It is widely applicable to high-altitude cleaning tasks such as large-scale ground-mounted solar panels, commercial and industrial rooftop solar systems, and residential rooftop solar systems.

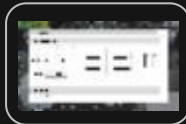
➤ 50L large Capacity Tank

It covers a wide area in a single pass, less frequency of tank changes, supporting quick fluid changes for high continuous operation efficiency.



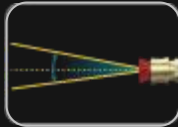
➤ End-to-end automation

Combines cleaning operations with flight path planning to enable aerial cleaning and achieve end-to-end automation across the entire workflow.



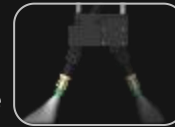
➤ Standard with High-Pressure Nozzle

Delivers powerful water pressure, ideal for cleaning crevices, stubborn stains, and more.



➤ Integrated Flight Control

Enables single-operator, all-in-one control of both flight and cleaning, and supports customized integration with a wider range of flight platforms.



VA-D50R drone supports 2 mounting options

Key Advantages of Smart Drone-Based Solar Panel Cleaning

VA-D50R a high-tech solution that integrates drone flight control technology, a cleaning system, intelligent path planning, and other advanced features. By configuring flight parameters, the drone can autonomously take off, perform cleaning tasks, and return to recharge and refill its water supply, thereby achieving truly “fully automated” solar panel cleaning operations.



Unmanned Aerial work

Simply presetting the parameters, the drone can automatically complete the entire process: **takeoff** → **patrol** → **cleaning** → **return to base** → **manual recharging and refilling** → **and preparation for the next mission**, significantly reducing labor requirements and management complexi



Wider Coverage, Superior Cleaning Power

Each unit operates for 8 hours a day and can **clean 690 square meters per hour, totaling 5,520 square meters of solar panels daily**. It is suitable for a wide range of scenarios, including centralized, distributed, large-scale, and complex terrain applications, far surpassing manual cleaning efficiency.



Water and Energy Conservation; Eco-Friendly

Equipped with high-pressure nozzles or a low-pressure, high-efficiency pump system, **it saves over 50% more water** than traditional manual cleaning methods and is suitable for areas with water shortages.



Safe and Contactless, Extending Component Lifespan

There is no need to step on the surface or use heavy equipment, so no mechanical pressure or scratches are applied to the components, **effectively preventing secondary damage such as scratches, cracks, or delamination**.

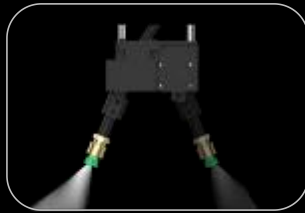
Multi-scenario - Modular design, various mountings

VA-D50R cleaning drone features a modular design compatible with two different cleaning configurations: fixed and oscillating nozzles. Combined with a high-pressure nozzle design, it meets a wide range of cleaning needs, providing the industry with a convenient, efficient, and versatile aerial high-pressure cleaning solution suitable for various scenarios. It is widely applicable for high-altitude cleaning tasks such as large-scale ground-mounted solar panels, commercial and industrial rooftop solar systems, and residential rooftop solar systems.



➤ Oscillating Nozzle

The nozzle oscillates through a 45° range. This oscillation significantly improves cleaning efficiency and intensity, and the oscillation speed can be adjusted via the remote control to suit the varying levels of dirt on the surface being cleaned.



➤ Fixed sprinkler head

The fixed sprinkler head features six high-pressure nozzles, which can be swapped out to suit different scenarios, meeting a wide range of needs.



Drone Cleaning vs Traditional Manual Cleaning

Compared to traditional manual methods, the VastArrive drone-based high-altitude cleaning system offers significant advantages in terms of safety, efficiency, and cost. According to third-party statistics, regular cleaning of solar panels can increase power generation efficiency by 5% to 30%, while fully automated cleaning can reduce total O&M costs by more than 40%. With a short ROI payback period, it is an indispensable smart facility for modern solar projects.



Indicator	VastArrive D50R Drone Cleaning System	Traditional Manual Cleaning
Cost	Automatic, lower labor cost	Teamwork + physically demanding work
Intelligence	Long equipment lifespan and intelligent maintenance	High-pressure water jets, ladders, and other items prone to damage
Efficiency	Setting clean at regular intervals, ensuring high efficiency	Cleaning is performed less frequently (due to high costs)
Return	Reduce hot spots and increase power generation revenue	Power generation losses; ongoing environmental impact
Security	Contactless, flight safety assurance	Safety Risks: Risks associated with climbing to heights and using step stools

Solar Panel Cleaning in Huizhou, Guangdong

Under high-temperature and humid conditions, algae and biological growth accumulate on the surfaces of photovoltaic panels. Since these panels are installed above bodies of water such as fish ponds, manual cleaning requires working on the water, a complex environment that poses a drowning risk.

The drone cleaning solution for floating photovoltaic panels offers significant advantages: leveraging the efficiency and flexibility of drones, it can rapidly cover large areas of photovoltaic panels without the need for manual work on the water, thereby reducing safety risks. Precise cleaning ensures the power generation efficiency of the solar panels and reduces labor costs. This solution provides an innovative, efficient, and safe approach to cleaning floating solar panels.



Challenges and Pain Points



High Safety Risks

Traditional operation works suspended, high safety risks



Cleaning Difficulty

Complex facade of buildings, hard to clean in traditional operation.



High Manual Cost

10+ person per group, one cost 300-500 yuan per person one day working.



Weather Conditions

Rainy day lead to frequent mold and dirt buildup, long time needed, hard to set up quickly.

- 01 High-Altitude Drone cleaning:** Unmanned operation, reduce safety risks.
- 02 Cost Saving:** Lower labor costs and equipment maintenance cost in long-term savings.
- 03 Stable Safe Cleaning:** Dual RTK configuration, real-time centimeter-level positioning dating for safe and stable cleaning.
- 04 Higher cleaning efficiency:** 1000m²/hour efficient cleaning capability, shorten time cost and increase efficiency.
- 05 Quick and Efficient Cleaning:** High-pressure cleaning, supporting various cleaner, achieves immediate cleaning results.

Applications




Important Parameters


NO.	VA-D50R
Dimensions (Unfolded)	1905mm *1720mm *815mm (Wings extended, propellers folded)
Dimensions (Folded)	635mm*1340mm *815mm (All folded)
Wheelbase	2300mm
Flow Rate	11L/ min
Tank Capacity	50L
Max Hover Time (Full Load)	7min
Max Hover Time (No Load)	22min
Operational Cycles	5 cycles/h

Cleaning Time per Cycle	5min
Cleaning Area per Min	34.5m ²
Cleaning Area per Cycle	138m ²
Cleaning Efficiency	690m ²
Battery	18S 30000mah
Max Flight Speed (Horizontal)	15 m/s
Operating Temperature	-10°C - 40°C
Operating Humidity	0-90%
Max Wind Resistance	12 m/s
Charging Time	30 min (standard) 12 min (fast charge)
Max Takeoff Weight	105kg



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