

SOLAR PANEL CLEANING EQUIPMENT

Customized Solutions



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COMPANY HONOR

















Some Authoritative Test Reports And Certificates Of Honor.















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MULTIFIT PROFILE MULTIFIT CULTURE

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THE IMPORTANCE OF CLEANING SOLAR PANELS

CHOOSING THE CLEANING EQUIPMENT YOU NEED

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COOPERATION

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MULTIFIT PROFILE

2009 Since

15+

Years In Solar Industry

Multifit Solar is a high-tech manufacturer which is mainly dedicated to research and development, produce, sale and construct of solar power systems and other green energy.

Our cleaning equipments include solar panel tracking cleaning robots, track-mounted fully automatic walking solar cleaning trolley, the third generation four-wheel drive mode of the solar cleaning robot with stronger cross-barrier ability, crawler-type upper and lower cleaning robot and semi-automatic photovoltaic cleaning brush for civil power stations.

Our cleaning robots realize the remote intelligent control and have many functions: automatic avoidance function to prevent the robot from slipping, automatic rectify correction mechanism and automatic adjustment to prevent the machine from deviation, running tilt, jamming, and good obstacle surmounting performance to surmount certain slopes, steps, and dislocations. Also, a new intelligent management cloud platform for remote photovoltaic panel cleaning robot has been set up in our robot. And our cleaning robot has our own unique technology in intelligent cleaning of photovoltaic panels by robots, automatic detection, tracking and positioning, group communication and control functions, as well as the establishment of an intelligent management platform with multi-terminal control.

In the future, Multifit will be continually committing to improve the renewable energy industry and develop more efficient and cost-effective solar cleaning solutions.







Research and development

Production

Sell



MULTIFIT CULTURE



ENTERPRISE MISSION

Bring more green electricity into our lives.



DEVELOPMENT VISION

Develop more efficient and cost-effective



TALENT CULTURE









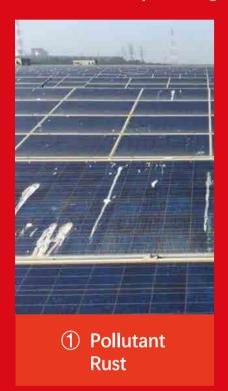




THE IMPORTANCE OF **CLEANING SOLAR PANELS**



The effect of power generation efficiency.





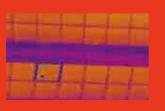




The solar panels covered by pollutant may cause hot spots, which will damage the panel and even make the panel burned.



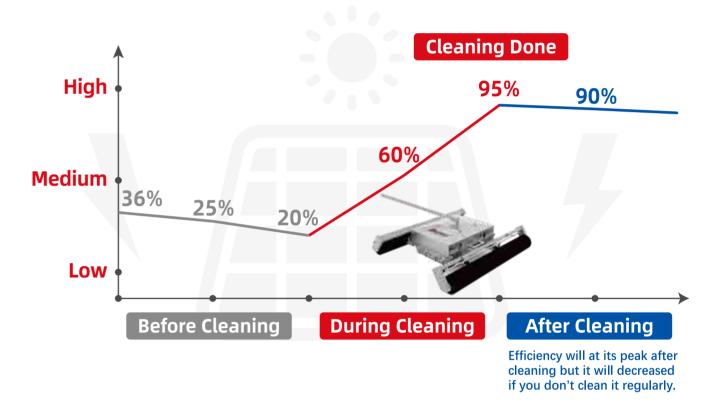






SOLAR PANEL POWER GENERATION EFFICIENCY





THE ADVANTAGES OF USING SOLAR **PANEL CLEANING ROBOT**







Longer **Service Life**

Improve Energy Production **Improve Efficiency**

CHOOSING THE CLEANING EQUIPMENT YOU NEED

Cleaning Efficiency Of Cleaning Brush And Robot

Module	Reference value	MW	Area(m²)	Efficiency (m²/H)	Cleaning area (m²/8H)	Required time (d)
MULR-C	1 person with 1 set of cleaning brush	1	4700	90	720	7
MR-G1 (single-board)		10	47000	1640	13120	4
MR-G1 (double-board)	Robot walking speed 12m/min, 550W solar panel	10	47000	3280	26240	5
MR-T1		10	47000	600	4800	10
MR-XY		10	47000	6560	52480	1

Scene Selection Of Cleaning Brush And Robot

MR-G series, MR-T1 series, MR-XY series and MULR series

MR-G Series









Single-board Robot

MR-G Series can be applied in common single-board and double-board panels, single-board robot can be suited in panels angle under 40°.

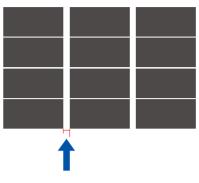
Double-board Robot

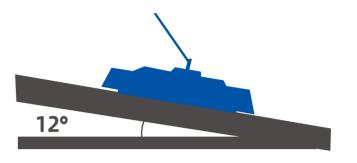
Double-board robot can be applied in panels size under 2384mm, angle under 30°.

Double-board Robot

It also can be applied in four-board transverse arrangement solar arrays. If there are pressing block, the robot should be customized.

• MR-T1 Series

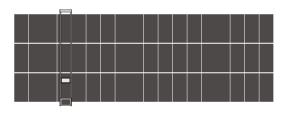


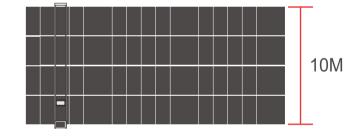


The gap is 90mm small.

T1 robot can be applied in large tile array, and angle under 12°. (Dry clean 19° below, Wash below 12°)

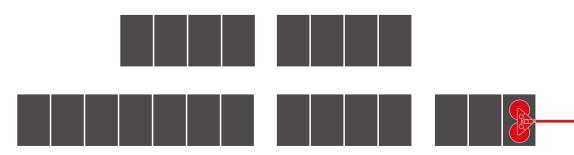
MR-XY Series





XY robot can be applied in three-board and four-board solar array, the width of panels can up to 10m.

MULR Series



Cleaning brush can be applied in scattered solar arrays.

APPLICATION SCENARIO

- · Single/dual Panel Photovoltaic Array · Three-plate Photovoltaic Array
- · Large Area Photovoltaic Power Station · Flat Roof Photovoltaic Systems



Customize the cleaning solution and maintain the photovoltaic system to ensure normal daily power supply.









MULTIPLE CLEANING EQUIPMENTS FOR VARIOUS SCENARIOS







PRODUCT CATEGORY PRODUCT CATEGORY —

PRODUCT CATEGORY

MR-G Series

Right & Left Solar Cleaning Robot



Through automatic walking right and left in the aluminum frame to achieve intelligent cleaning of the solar panels.

MR-G1

MR-G2

MR-G-D (Double Brush)

MR-T1 Series Tracking Solar Cleaning Robot



Through Al algorithm and visual detection to achieve full automatic cleaning of solar panels, cleaning the scene, without missing any dead corners.

MR-T1

MR-P1 (Photothermal glass cleaning robot)

MR-XY Series Up&Down Solar Cleaning Robot



Through automatic up and down cleaning to achieve intelligent cleaning of the solar panels.

MR-XY

MR-AR Series Shuttle Solar Robot Transfer Vehicle



By laying the track on the side of the solar array, the transport vehicle walks on the track automatically, and the automatic transport cleaning robot performs the cleaning task in different solar arrays.

MR-AR (Bridging, Robot-parking Spot, return space, Full-automatic rail-type transfer vehicle)

MULR Series Semi-Automatic Solar Cleaning Brush



Multiple Cleaning Equipments, for Various scenario.

MULR-A (Scrape brush)

(Single head brush) MULR-B

(Double head brush)

MULR-D (Rolling brush)

MULR-E (Water-driven brush)



Right & Left Solar Cleaning Robot





Characteristics of MR-G series



Automatic Adjustment Automatically correct and adjust to prevent machine deviation and jamming.



Solar power system Self-charging-comes with a solar power system, convenient and efficient, can last 4-6 hours.



Strong Adaptability Applicable to various arrangement arrays and various power stations.



Ambient Temperature -20°C(Unfrozen)~70°C



Intelligent Control

Internet Of Things Technology Application Independent control, grouping, Control by mobile, automatic cleaning time and cleaning mode can be set.



Lightweight equipment ≈30kg

The whole machine is about 30kg, which is more than 30% lighter than similar products, and it is convenient to carry.



Adjusting The Brush Up And Down

When the brush wears out, the cleaning ability decreases. You can adjust the brush downward to increase the cleaning ability and double the service life of the brush.



Stronger Obstacle-crossing Ability Including slope, step and misalignment, etc. Capable of spanning over 50mm misalignment of flat or end faces.



1min Disassembly **And Assembly Of Brushes**

Applicable to various arrangement arrays and various power stations.



Danger avoidance

Automatic edge sensing technology to prevent the robot from sliding down and avoid danger.

MR-G-D (Double Brush)

Better cleaning effect with double roller brush, overcome the disadvantage that the single-roller brush cannot clean the edge of the photovoltaic array, and can adapt to the photovoltaic system assembled by multiple rows of solar panels in an array.

OVERVIEW OF BRIDGE, ROBOT-PARKING SPOT AND RETURNING SPACE



The purpose of the construction is to make the cleaning robot work faster, start and stop smoothly and reduce the frequency of personnel handling cleaning machines.

Parking Spot ▼

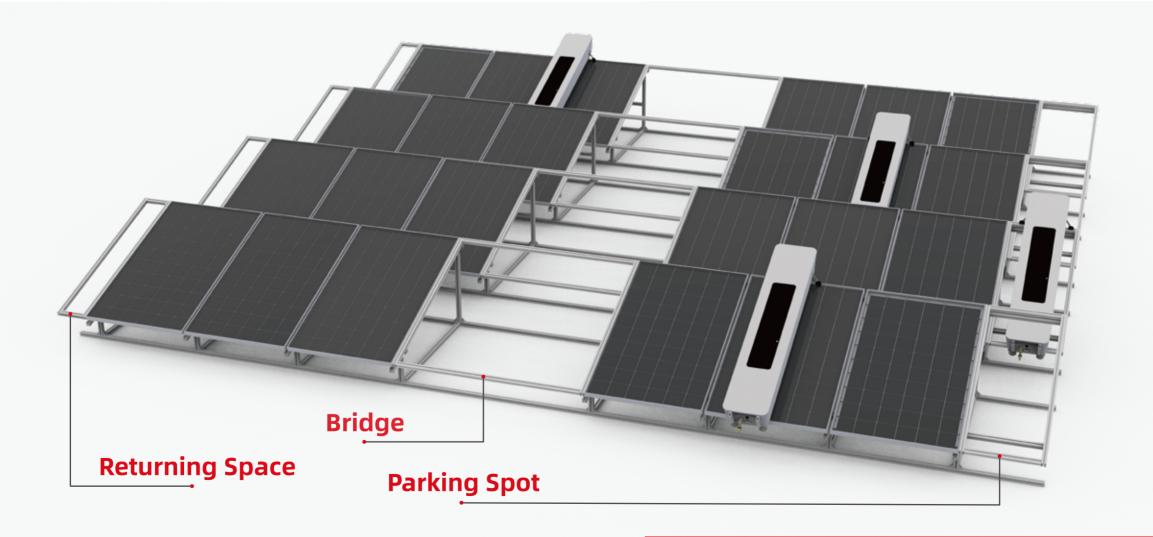
The harbor where the solar cleaning robot is parked.

Bridge ▼

According to the ups and downs of the array, establish a link track to allow the cleaning robot to walk smoothly into the next PV panel cleaning range.

Returning Space V

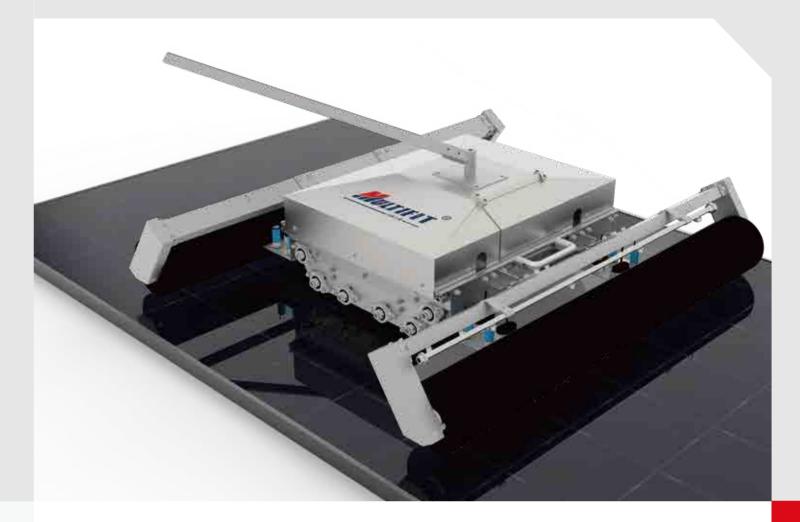
The return position is to allow the cleaning robot to extend the cleaning range and make each solar panel of the photovoltaic array clean in place, in addition, it can protect the cleaning robot from falling when the sensing wheel is out of control.



MR-T1 Series

Tracking Solar Cleaning Robot





Characteristics of MR-T1 series



Functional Design

The visual positioning accuracy is less than 1°(angle), and the accidental falling design is prevented. Global power planning and intelligent alarm function.



Path Planning

The path planning passes 100% coverage at one time, and only needs one key operation. The new sensing system and the algorithm accomplish the fully autonomous operation.



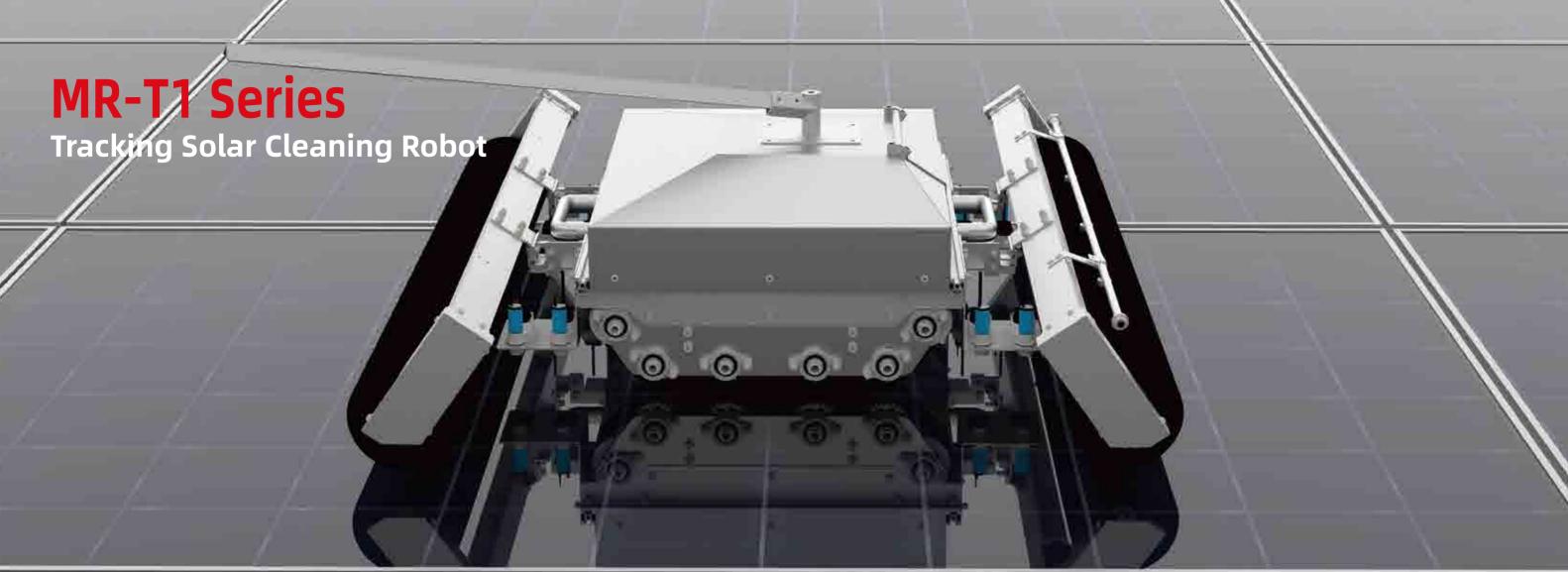
Falling Protection

Falling protection, one person can move it, more convenient transportation and loading, easy to replace consumable parts, eco-friendly economy and mutiple material consumption can be reused.



Manual Replacement

A single machine can replace 10 labours, and one single person can monitor over 100 robots. For large-scale photovoltaic power plants, they can realize large-scale manual replacement.





CLEANING ABILITY

Sink-float dust (adhesion ≤10-6N) cleaning result ≥99% Dust accumulation (adhesion ≤10-4N) cleaning result ≥99% Dry bird droppings (adhesion ≤10-2N) cleaning result ≥99% Heavy metal contamination (adhesion ≤20-10N) cleaning result ≥99% Cleaning efficiency (square meter/hour) ≥ 600



RECOMMENDED WORKING CONDITIONS

Ambient temperature: -20~70°C Component Humidity: 5%~95%

(No condensation)

Component splicing gap: 20~90mm

(bridge over 40mm)



SECURITY CAPABILITY

Working mode:autonomous operation(pre-planned path); remote control;

Positioning method: Al vision

Positioning accuracy: ≤1°

Steering mode: crawler-type maneuvering

Anti-slip protection: crawler-type resistance

Anti-falling protection: Al vision + gravity sensing Anti-tilting protection: Al self-correcting algorithm

IP Level: IP65



MR-P1 (CUSTOMIZED)

Photothermal Glass Cleaning Robot



MR-XY Series

Up&Down Solar Cleaning Robot





Characteristics of MR-XY series



The cleaning robot can adapt to the photovoltaic system assembled by multiple rows of solar panels in an array.



Convenient to use in different photovoltaic power stations. Remote control with independent power supply.



The aluminum alloy support. The frame part adopts multi segment splicing structure, which is convenient for transportation.



Automatic edge sensing technology to prevent the robot from sliding. Autistic danger. The length of the equipment can be adjusted according to the size of solar panel.



Without manual deaning, integrated dry cleaning and water cleaning model.



It adopts lithium battery and brushless motor, which is durable.

Smart Management Control System

Track the status of the MR-XY Cleaning Robot

- 1. Improve the transmission efficiency of solar panels.
- 2. Extend the service life of the panel.

Turn on the intelligently managing control system according to your needs, follow up in real time, and keep your solar panels as clean as new.

MR-AR Series

Shuttle Solar Robot Transfer Vehicle





Characteristics of MR-AR series



PURPOSE OF CONSTRUCTION

Make the cleaning robot work faster, start and stop smoothly, reduce the frequency of personnel handling cleaning machines.



According to the ups and downs of the array, establish a link track to allow the cleaning robot to walk smoothly into the next PV panel cleaning range.



The harbor where the solar cleaning robot is parked. According to your needs, the cleaning work will be carried out at fixed time and fixed point. The solar cleaning robot will return to the apron and wait for the next cleaning service. The parking will not affect the power generation rate of the photovoltaic power station.



RETURN POSITION

This is a position that is easy to be ignored. If there is no return position, there will always be an invisible position at the edge of the photovoltaic panel, which not only affects the power generation efficiency, but also affects the life of the photovoltaic panel. The return position is to allow the cleaning robot to extend the cleaning range and make each solar panel of the photovoltaic array clean in place, in addition, it can protect the cleaning robot from falling when the sensing wheel is out of control.

Overview of Transfer Vehicle

PHOTOVOLTAIC PANEL MAINTENANCE

It is used for the maintenance of large photovoltaic power station system, reducing the manual handling process, and can clean photovoltaic panels in time.



SAVE TIME AND EFFORT

It is time-consuming and laborious to carry the cleaning robot manually. If the photovoltaic power station is built on a flat ground and roof, it is recommended that you equip a transfer vehicle that can walk automatically when purchasing the cleaning robot. Press the start switch, the transfer vehicle moves forward, the sensor on the transfer vehicle senses the photovoltaic array and aligns with the array, the transfer vehicle stops moving forward, at this time, the front and rear rods are adjusted and lifted to the level of the photovoltaic array, and the G1 solar cleaning robot senses and starts the equipment to start cleaning.



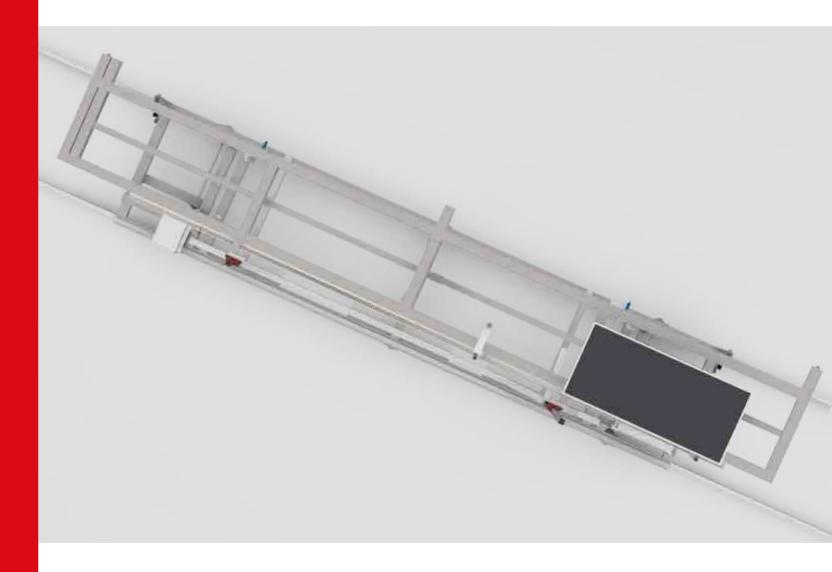
CONTINUE CLEANING

After cleaning, the G1 solar cleaning robot moves to the transfer vehicle, and the transfer vehicle moves to the next array to continue cleaning.

Customization of Transfer Vehicle

According to the array data of your photovoltaic power station, the technical department will provide you with the design scheme.





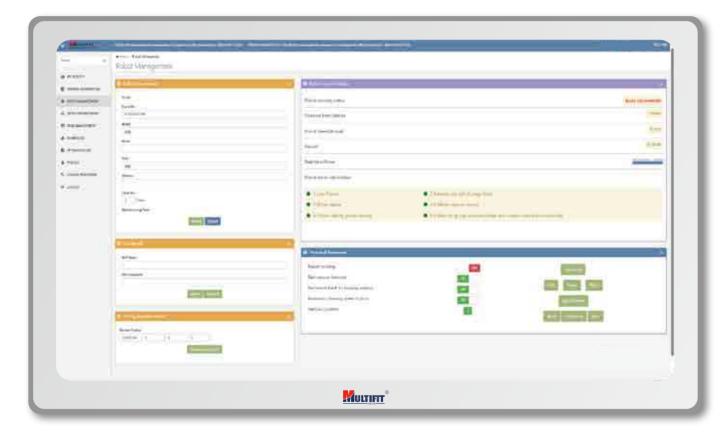
The data required are:

- 1. Width of solar panel array.
- 2. The height (maximum and minimum dimensions) of the solar panel array and the angle of the photovoltaic panel.
- 3. Array drawings and panoramic photos of the photovoltaic power station.

CONTROLLER/REMOTE SMART MANAGEMENT CONTROL SYSTEM



Smart Management Control System





Remote Control

Start at any time, stop at any time, scrub repeatedly, where there is no network, you can use the remote control to start and operate the solar panel cleaning robot.





REMOTE SMART MANAGEMENT CONTROL SYSTEM





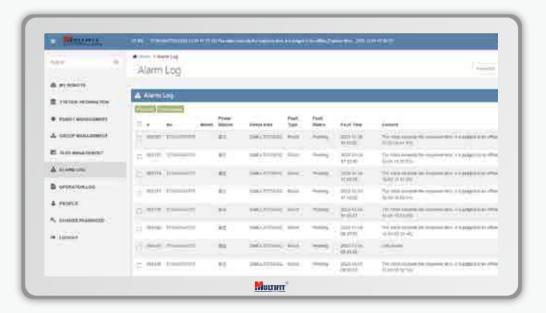
Fully Automatic.



No need for you to be on site.



Multiple cleaning robots work simultaneously.





PRODUCT PARAMETER

Solar Panel Cleaning Robot

MR-G1 Series Right & Left Solar Cleaning Robot



Length of Machine	Customized According To Photovoltaic Panel Size
Obstacle Crossing Ability (Gap Distance)	20mm
Traveling Distance	One-way Travel Distance From 1800~4320M (12m/min)
Traveling Speed	12-20m/min
Generator Power	100w/200w/300w
Weight of Machine	30-115kg
Width of Machine	365mm
Height of Machine	280mm
Water Used Per Hour	270~330 L/H (0.3mpa)
Charging Method	Flexible Photovoltaic Panel
Battery Type	LiFePO4 Battery
Working Time	4~6 Hours
Brush Life	2~3 Years
Applicable Temperature	-20°C(Unfrozen)~70°C
Cleaning Way	Dry/Watering Cleaning
Cleaning Mode	OneTime/Repeated Time/Positioning/Schedule
Bridge Mounting Rail/ Rain Sensor Device/ Wireless Remote Controller/ Intelligent Management App/ WiFi Module/Robot Group Control Module	Optional Configuration
4G Module	Standard Configuration

MR-T1 Series Tracking Solar Cleaning Robot



Body Size	685x600x500mm
Body Weigh	29kg
Total Weight	37.5kg (Brush Weight 8.5kg)
Bristle Length	46.5mm
Cleaning Efficiency/Hour(International Situations)	720 m ²
Waterproof Level	IP65
Warranty	2 Years
Design Life	10 Years
Battery Capacity	10 Ah
Working Time	6-8 Hours
Charging Time	3.5 Hours
12 Hours Working Time	Replace the Battery Every Four Hours
The Angle of PV Panels	Dry Cleaning Mode: 0-19° Washing Cleaning Mode: 0~12°
Wind Resistance	50-61km/H
Work at Night	Yes
Obstacle Crossing Distance	20-90mm

MR-XY Series Up&Down Solar Cleaning Robot



Name	Working Time (H)	Walking Speed (m/min)	Walking Distance (m)	Ambiant Temperature (°C)
MR-XY	>4	8-12 (m/min)	>2000m	-20°C~70°C No Condense

Control Mode	Field Remote Control And Manual Keys
Working Way	Use Remote Control To Operate Cleaning, No Manual Work Is Required
Parking Apron	Parking Areas On The Left And Right Side Of The Panel Array
Protection	IP65
Remark	Customized Based On Solar Pv Array Size

MULR Series

SCRAPE BRUSH MULR-A





Characteristics of MULR-A series



SIMPLE OPERATION

No ladder or stool is needed, just standing on the ground, you can easily finish.



ADVANTAGE

Cleaning, which is safe and convenient.



MULTIFUNCTION

The back of the brush head can be used to scrape snow and water without leaving dust.



MAKE UP

A brush and mop can be applied to one rod.

MULR Series

SINGLE HEAD BRUSH MULR-B





Characteristics of MULR-B series



CLEANING RANGE

Single-head cleaning brush can be used to clean small area solar panels.



BRUSH CHARACTERISTICS

The bristles are moderately soft and hard, and do not harm the photovoltaic panel.



ANGLE ADJUSTMENT

The angle of the brush head fits the solar panel, which can be adjusted with the angle of the solar panel.

MULR Series WOT DOUBLE HEAD BRUSH MULR-C





Characteristics of MULR-C series



DOUBLE-SPEED

Cleaning brush can be used for doublespeed and convenient cleaning.



SUPPORT CUSTOMIZATION

The length of the water supply pipe can be customized, please call for consultation.



HIGH EFFICIENCY

The design of dual motors can maximally offset the centrifugal force which originated from the running of the motor, because of that the brush can runs smoothly, as the operation become easier with higher efficiency for cleaning.



EASY TO CARRY

Lithium battery is carried in a backpack, no need to carry batteries, easy to carry.



ANGLE ADJUSTMENT

The angle of the brush head fits the solar panel, which can be adjusted with the angle of the solar panel.



MOTOR SPEED

Brush motor speed: 270rpm Brushless motor speed: 350rpm

MULR Series

ROLLING BRUSH MULR-D





Characteristics of MULR-D series



STRONG ADAPTABILITY

It can be used for both washing and drying, which can adapt to various complex terrains and environments.



HIGH SELECTIVITY

For water supply, this washing machine does not have its own water supply device, but provides a variety of water supply pump schemes for everyone to choose freely.



LONG ENDURANCE

The lithium battery pack can last about 5-8 hours, it is more convenient to clean.



MOTOR SPEED

High speed motor: 400rpm Super wide brush head: 65cm

MULR Series

WATER-DRIVEN BRUSH MULR-E





Characteristics of MULR-E series



HIGH PERFORMANCE

Better cleaning performance in high areas. Better lateral force balance.



EASY TO OPERATE

Lightweight and high-strength structure, easy to handle and operate at high altitude.



EASY TO CLEAN

The use of a two-way cleaning brush makes it easy to clean out dirt or residue without the use of chemical cleaning agents.



HIGH EFFICIENCY

Counter-rotating round brushes with ball bearings. The sturdy brass hinge allows for flexible adjustment of the working angle. Pre-flush adjacent modules.

PRODUCT PARAMETER

Solar Panel Cleaning Brush

MULR-A

Scrape Brush



Brush Head		
Size	350mm	
Material	Rubber Trim	
	Brush	
Size	2.8 Inch/ 70mm Width	
3126	3.9 Inch/ 100mm Length	
Material	PP	
	Telescopic Rod (Size)	
	3.6m (4 Segments)	
5.4m (4 Segments)		
6m (4 Segments)		
7.2m (4 Segments)		
9m (5 Segments)		
11m (5 Segments)		
12.8m (6 Segments)		
14.6m (7 Segments)		
16.5m (8 Segments)		
18.3m (9 Segments)		
Material		
Aluminum or Carbon Fiber		

MULR-B/C/D







MODEL	Power Supply	Telescopic Pole
AC SUPPLY MULR-B01 MULR-C01 MULR-D01	Be connected to 100-120V AC or 200-240V AC power source (Optional)	Material:
DC SUPPLY MULR-B02 MULR-C02 MULR-D02	Connect to 24V10Ah lithium battery	Glass Fiber/ Carbon Fiber/ Aluminum Alloy Length: 1.5-3.5m/ 1.7-5.5m/ 1.9-7.5m
DUAL SUPPLY MULR-B03 MULR-C03 MULR-D03	Connect to 110-240V power source, or to lithium battery (choose the supply you need for different cleaning environment)	(Optional)

MULR-D Rolling Brush



Specification	Suitable Voltage	AC 100-240V
	Туре	Direct Current
Motor	Working Voltage	24V
Motor	Power	100W
	Rotating Speed	350 Rpm
Patton	Lithium Battery	24V/20Ah
Battery	Working Hour	5H -8H
	Texture	Glass Fiber
Telescopic Rod	Wall Thickness	1mm
	Wire Length	8M
Brush Head	Bristle Length	650mm
	Texture	Nylon

SEMI-AUTOMATIC SOLAR CLEANING BRUSH

THREE CONFIGURATION LISTS

MULR-B MULR-C MULR-D —

AC Power Supply Version





Lithium Battery Supply Version



Dual Power Supply Version



PROJECT CASES





30.2KW roof of a cement plant



5MW ground PV power station in Maltese





CLEANING ROBOT



2MW industrial and commercial PV power station in Malaysia



200KW PV poverty alleviation power station in Zhengzhou, Henan province



2.1MW in Xinjiang



20MW ground-based PV power station in the United States



Transfer Vehicle in Indonesia

PROJECT CASES







CLEANING ROBOT







30 MW Solar Panels Cleaning Solutions in Hainan, China

PROJECT CASES

CLEANING BRUSH

















COOPERATION







MULTIFIT



















COOPERATION



RECRUITMENT

■ Hot blue ocean projects in emerging industry market.

ONE-STOP SUPPORT FOR ENTREPRENEURSHIP

■ The heart-level service of the headquarters saves you the trouble to start.

AUTHORIZED DISTRIBUTION

■ Franchised dealers sell products in authorized areas or channels.

FREE TRAINING

■ Provide marketing and technical training for franchised dealers.

REBATE REWARD

■ Complete the sales task and reward according to the incentive policy.

TECHNICAL SUPPORT

■ Assist in the design of schemes and comprehensive technical consulting services during the support period.

PRODUCT SUPPORT

■ Provide copies of relevant certificates and letters of authorization.