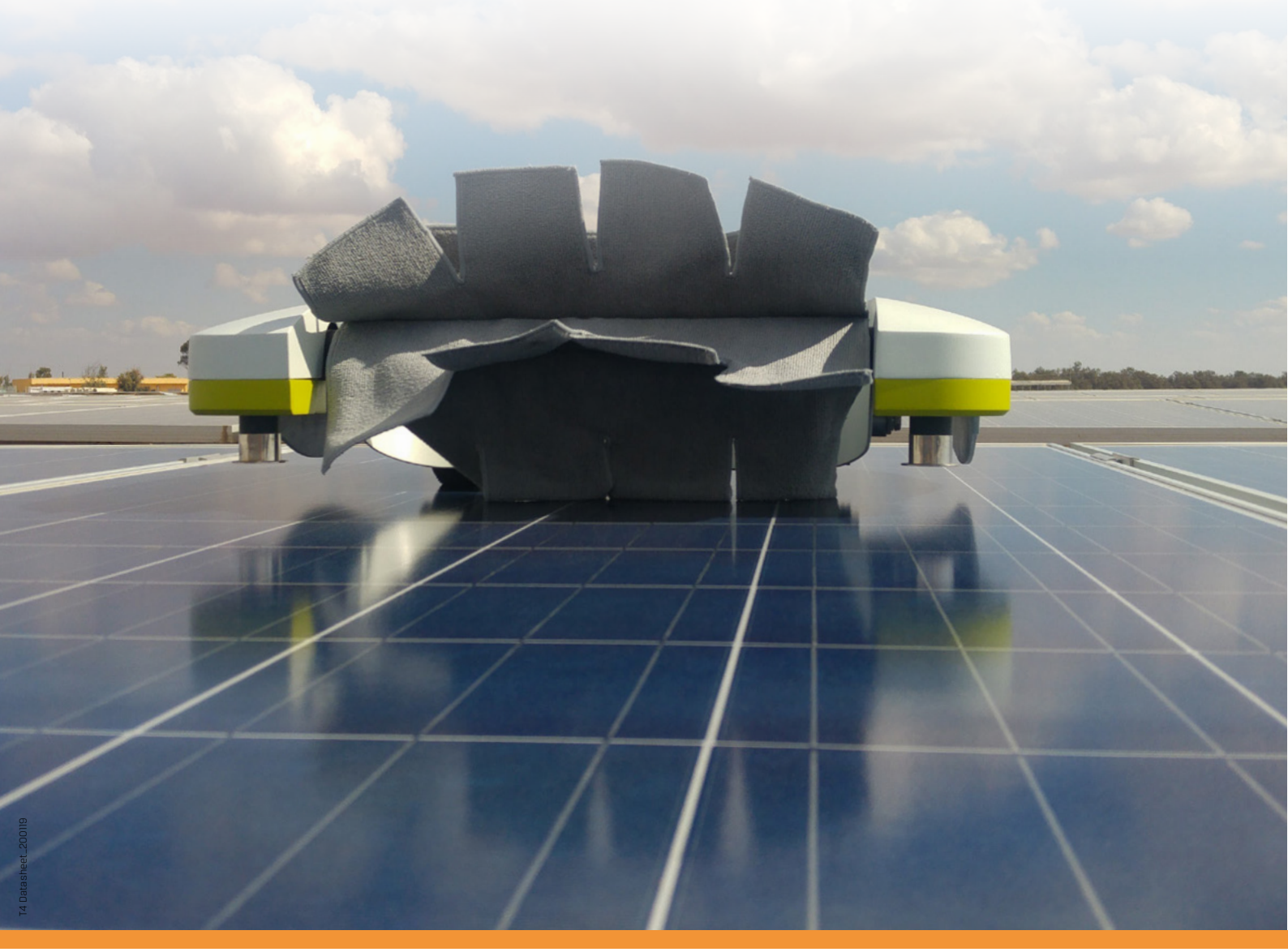
Ecoppia T4

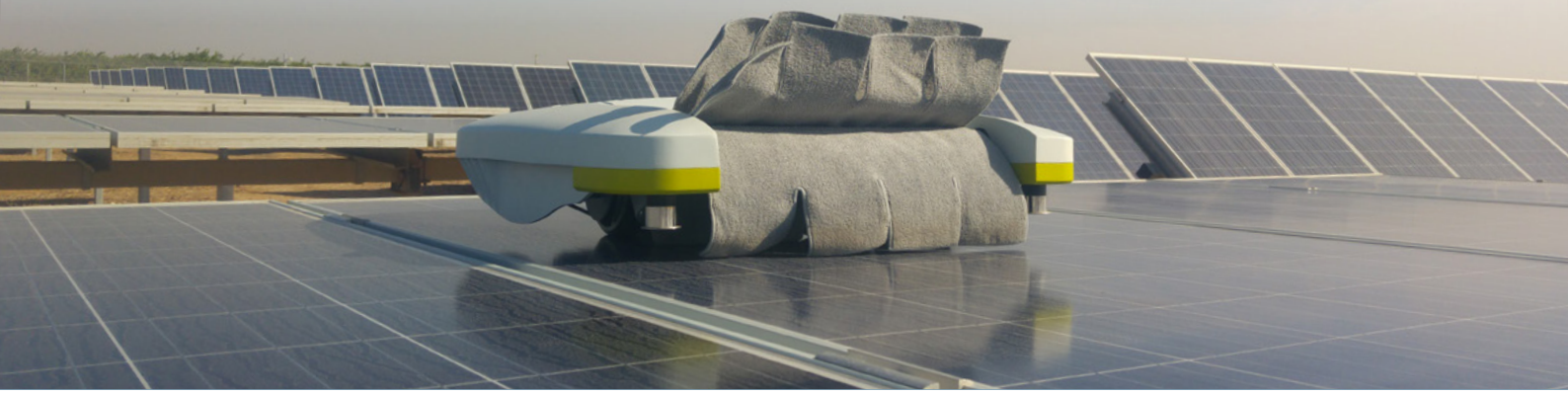
Autonomous robotic cleaning solution for Single Axis Trackers

DATASHEET



Ecoppia
Empowering Solar

Ecoppia's T4 is an autonomous, water-free cleaning solution for utility-scale solar PV installations using SAT technology



Dimensions:	70 cm x 63 cm
Weight:	12 Kg.
Cleaning speed:	4 sqm. / 1 minute (30-45 minutes per table)
Daily cleaning coverage area:	400 sqm.
Wind speed resistance at docking:	160 Km/h
Max. ambient temperature:	60° Celsius
Operational in flat position and up to 5° tilt of table	
Compatible with all trackers and modules type	
Certified by leading manufacturers and independent laboratories	

1. Cleaning Operation and Technique

1.1 Ecoppia's T4 robots safely remove over 99% of dust from the panels in a nightly automated cleaning operation of up to 400 sq. meters (200 modules).

1.2 Cleaning is performed when trackers are in a stow position, or a very low angle (up to 5 degrees) post energy production hours.

1.3 The light-weight robot uses a water-free cleaning method combining a rotation of soft microfiber elements and generation of controlled airflow to push dust particles off the solar panels.

1.4 The cleaning operation is fully autonomous and requires no operators / labor.

1.5 Using multiple sensors and integrated technologies, the robot detects the structure edges and navigates its way on the tracker using the optimal, most efficient and accurate pre-defined path.

1.6 The robot is capable of traveling across the tracker's central gap and on to the neighboring table using simple connecting bridges.

2. Communication and Management

2.1 Cloud-based and connected, all units are centrally managed via the Master control.

2.2 Robots communicate with the central T4 Master via on-board RF signal.

2.3 The Master control allows site owners to schedule cleaning, disable or enable individual robots or instantly send all robots back to base.

2.4 The Master control communicates with all robots, executing 'keep alive' commands, tracking battery status and managing cleaning operations.

2.5 Relevant data is projected in real time and offered through a web-based dashboard allowing authorized users to manage, monitor and analyze the cleaning process and robots' status.

2.6 Remote management and control are available via any mobile device using SMS-based commands.

2.7 The entire database is securely stored on the cloud, hosted by Amazon.

3. Secured Parking

3.1 In between cleaning cycles, each T4 robot docks in its dedicated docking station at the side of the table to avoid shading.

3.2 When docked, the T4 units are locked and prevented from moving horizontally or vertically, withstanding winds of up to 160 km/hour.

4. Weather Feeds

4.1 Real time and forecasted weather information are integrated into the Master application.

4.2 Weather data is received from leading global weather intelligence providers as well as from local weather stations on site.

4.3 Using sophisticated heuristics, the Master control analyzes the weather data and recommends optimal cleaning time based on wind speed, rain probability, humidity levels and more.

4.4 Alerts on severe weather conditions and cleaning initiation / termination are sent to customers (optional).

5. Energy Efficiency

5.1 The T4 does not require any external energy source and is fully energy independent. All robots are equipped with dedicated solar panels based on the docking station, allowing full batteries charge during daytime.

6. Self-cleaning

6.1 The T4 robots perform auto cleaning of the microfiber elements in each cleaning cycle.

6.2 The robotic units clean their dedicated charging solar panels at the beginning of each operation.

7. Deployment

7.1 Each robot is assigned to a specific tracker or series of trackers.

7.2 Quick and low-cost deployment with no need for construction retrofitting nor additional railing.

8. Maintenance / Predictive Maintenance

8.1 All maintenance work including parts replacement is performed by Ecoppia.

8.2 Advanced predictive maintenance provides real-time notifications on battery charge level and all other major components status, ensuring maintenance windows are planned well in advance.

8.3 A detailed longevity table per component is available on request.

9. Compliance and Certifications

9.1 The T4 is compatible with all module types and tracker structures.

9.2 The solution had been independently tested and approved by world renowned industry expert PI-Berlin (Photovoltaic Institute Berlin).

9.3 Tests included field and laboratory evaluations of micro cracks, reflection, electrical parameters (Pmax and Isc) and preservation of ARC.

10. Reporting

10.1 Ecoppia provides its customers monthly, quarterly and annual reporting covering all data related to cleaning cycles, maintenance work performed or required and recommendation for future operations.