

India Indoor Inverter IP54 Policy

PM-Surya Ghar | Rooftop Solar Technical Specification

Indoor requirement

IP54 or higher

Compliant with IEC 529

Inverter / PCU Requirements

- Integrated MPPT for maximum PV energy
- MPPT environmental test: IEC 60068-2 or BIS equivalent
- Enclosure: outdoor IP65+, indoor IP54+

Conclusion: indoor units must be designed for IP54

Design, materials, labels, and tests must match. A shell-only approach is not enough.

IP21, IP43, IP54 Comparison

First digit: dust protection. Second digit: water protection. Indoor target: IP54+.

Rating	Dust protection	Water protection	Typical use	Meaning for indoor inverters
IP21	Objects ≥ 12.5 mm	Vertical dripping	Basic indoor use	Too weak for dust and splash risk
IP43	Objects ≥ 1.0 mm	Spray within 60°	Semi-protected areas	Better, but still not IP54
IP54	Limited dust ingress	Splashing from any direction	Demanding indoor use	Policy threshold and design target

Key difference

The key gap is dust protection: level 4 to level 5. Shell-only changes cannot reliably reach IP54.

IP54

Fake IP54 Solutions in the Market

Case: IP21 main board + IP54 shell; two-layer housing, no board potting.

IP21 Board + IP54 Shell

The housing looks sealed, but the unpotted board remains exposed to dust, humidity, and condensation.

Core risks

- **IP54 shell does not equal IP54 system**
- IP21-rated mainboards commonly have **inherent heat dissipation defects**; double shells **cause heat buildup and extra weight**.
- Cable, terminal, and airflow paths may leak



Our Solution: Two Practical Paths

IP54 SKD + IP54 shell / IP43 SKD + IP54 shell

A. IP43 SKD + IP54 Shell

A transition path, if sealing and validation are upgraded.

B. IP54 SKD + IP54 Shell

Best for high-policy-risk or brand-critical projects.

Water Ptoof Test



Front



Side

Dust Ptoof Test



Front



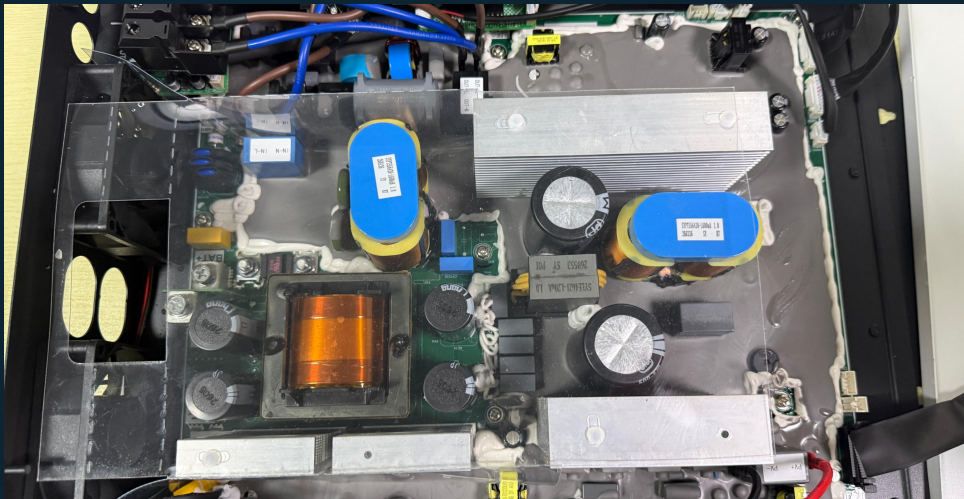
Side

IPS is more mature, WPS offers stronger protection

Item	IPS Series	WPS Series
Comparison image		
IP54 positioning	The enclosure protection level can reach IP54, suitable for most customers.	Can reach true IP54 with stronger overall protection measures.
Structure	Non-glue-coated mainboard + well-designed IP54 enclosure.	Glue coating mainboard + well-designed IP54 enclosure.
Suitable environment	Regular dusty environments and most Indian customer requirements.	Dustier environments with stricter protection requirements.
Market status	Mainstream IP54 choice in India, already proven popular in the market.	Better protection design, but not yet a mainstream solution in India.
Advantages	Sample stock available; fast delivery; high cost performance; proven in India.	More complete protection; glue-coated mainboard; closer to customers' expectation of true IP54.
Limitations	The enclosure meets IP54 needs, but the mainboard is not glue-coated, so it is not true IP54.	Still under testing and improvement; samples require a 30-day lead time.
Recommended use	Regular projects, tight delivery schedules, budget-sensitive customers, and quick sample validation.	High-dust projects or customers who clearly require glue coating on the mainboard.

Detail about Our IP54 inverter

Four protection details for stronger dust, moisture, and foreign-object resistance.



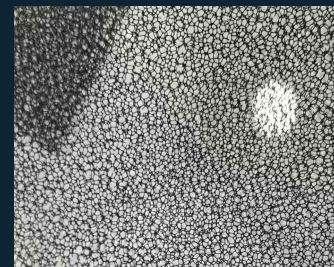
Semi-Potting Main Board

Half-cavity potting isolation dust and moisture protection for the control board.



Protective Mesh Cover

Extra barrier in the cooling air channel.



Dust Filter Foam

Filter layer for fine dust at intake.



Angled Air Inlet

Slanted inlet reduces direct dust entry.

Principle: protect the PCB, block foreign objects, and filter intake dust while keeping the thermal path open.