

Why Does the Inverter Casing Heat Up?

Applicable Models :

INVT XD7-10KTL Single-Phase Low-Voltage Hybrid Inverter

I. Reasons for Temperature Rise

The INVT XD7-10KTL series adopts a smart fan cooling design equipped with external high-efficiency temperature-controlled fans. Fans automatically adjust rotation speed based on internal temperature to force hot air out of the unit, ensuring stable full-range operation. Compared with natural cooling designs, active fan cooling better controls casing temperature, yet the casing will still experience temperature rises under high output power or high ambient temperatures.

Heat generation during operation mainly stems from the following factor:

- High Inverter Output: Higher inverter output power produces greater Joule heat in internal power devices. Fans will speed up to boost heat dissipation, and a rise in casing temperature is normal operating state.

Due to active fan cooling, the casing temperature of the XD7-10KTL series is generally lower than that of natural cooling models. However, under high ambient temperatures ($>45^{\circ}\text{C}$) or sustained full-load operation, casing temperature may still exceed 50°C . This is a normal physical feature of the fan cooling system and does not indicate product defects.

II. Working Principle

During operation of kilowatt-class inverters, large currents pass through internal power components and generate Joule heating. Smart fans forcibly exhaust accumulated heat to maintain safe operating temperatures for internal components. The casing temperature reflects normal operation of the heat dissipation system.

Per NASA's research on human contact surface temperatures (Ungar & Stroud, 2010), 44°C is the maximum safe surface temperature for indefinite skin contact with materials. The metal casing of the inverter may surpass this threshold during

operation. Therefore, we advise: Do not touch the casing while the unit is running, especially around heat exhaust vents.

III. Safety & Certification

The INVT XD7-10KTL series has passed rigorous reliability testing and safety certifications:

Item	Details
Cooling Method	Smart Fan Cooling (Temperature-Controlled Speed Regulation)
Operating Temperature	-30°C ~ +60°C (Full-load Operation)
Protection Degree	IP66 (Dustproof & Waterproof, Outdoor Installation Permitted)
Safety Standards	IEC/EN 62109-1/2, IEC/EN 61000
Grid Standards	IEC 61727, IEC 62116, EN50549, VDE 4105, G98/G99
Thai Certification	Compliant with Thailand MEA/PEA grid requirements and relevant national standards

All inverters of the INVT XD7-10KTL series are subjected to full-load aging testing at 45°C ambient temperature before delivery. Under extreme high-temperature conditions, the internal intelligent temperature control system guarantees safe, stable operation with no fire risks. Increased casing temperature signals normal heat dissipation performance and is by no means a product quality defect.

⚠ Important Reminder:

The smart fan cooling design enables efficient, consistent operation of the XD7-10KTL series. The fan automatically starts, stops and adjusts its speed according to temperature, which is normal.

Do not touch the casing or block heat exhaust vents during operation; wait for the unit to shut down and cool down before performing any operations.

IV. Key Points

- The XD7-10KTL series uses smart active fan cooling to secure stable unit performance.
- Do not touch the casing or exhaust vents during running to avoid scald injuries.

References

- [1] Ungar, E & Stroud, K, 2010, A New Approach to Defining Human Touch Temperature Standards, NASA/Johnson Space Center.
- [2] IEC 62109-1/2: Safety of power converters for use in photovoltaic power systems.
- [3] INVT XD7-10KTL Product Manual & Certification Documents.