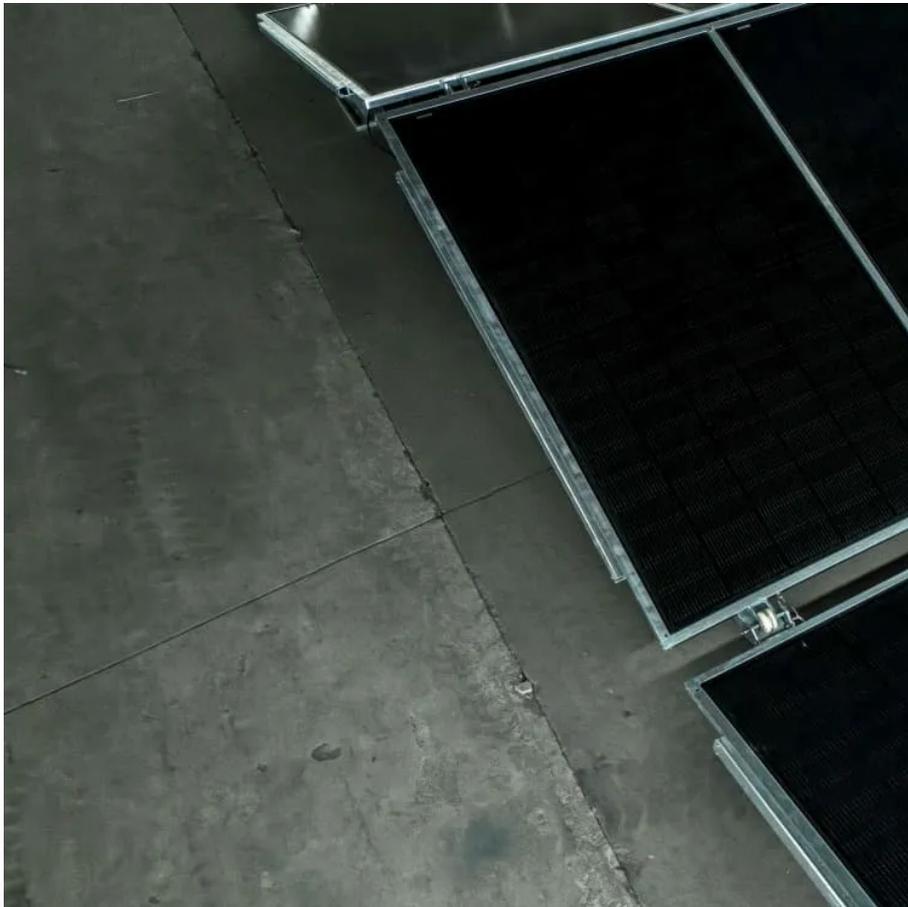


A-Core Container

New Energy Battery Cabinet Preheating



Overview

Low temperature is one of the major drawbacks of electric cars in high latitudes. This problem can be addressed using a battery self-preheating system. The existing self-heating systems have problems, such as:

How much energy can a battery preheat safely?

The system can preheat the battery safely in the capacity range of 20%–100%. When the battery pack is set in $-20\text{ }^{\circ}\text{C}$, the effective electric energy can be increased by 550% after preheating. An energy conversion model is also built to measure the relationship between the energy improvement of battery and the energy consumption by preheating.

Can a self-preheating system preheat a battery pack?

Owing to small energy consumption and preheat current during preheating, this self-preheating system could still preheat the battery pack from $-10\text{ }^{\circ}\text{C}$ to $20\text{ }^{\circ}\text{C}$ even at 0.2 SOC. As shown in Fig. 5 (c), the battery pack was preheated from $-10\text{ }^{\circ}\text{C}$ to $20\text{ }^{\circ}\text{C}$ in 180 s, with an increase of the voltage of the battery pack from 14.7 V to 19 V.

Does a battery self-preheating system work at low temperatures?

An energy conversion model of the self-preheating system was developed. Energy conversion relationship of the battery at low temperatures was explained. Low temperature is one of the major drawbacks of electric cars in high latitudes. This problem can be addressed using a battery self-preheating system.

How to control battery temperature after preheating?

The strategy contains two stages: preheating process for battery cold-start, and temperature holding process for battery temperature control after preheating. The strategy switches from the preheating to the temperature holding according to the power capability of battery pack.

What is a battery self-heating model?

The model explains the energy transformation of a battery during its operation and explains the decrease of battery discharge energy from the perspective of energy conservation and energy conversion. It can be used to design a more rational and energy-efficient battery self-heating system to obtain the best preheating strategy.

Does preheating affect battery performance?

In self-heating systems, a larger preheating current may result in overdischarge of the battery pack and damage the battery. Since this system can achieve a high heating rate using a relatively small current, it hardly damages the batteries. 3.2. Influence of the preheating system on battery performance 3.2.1.

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