

Nissan Leaf

- It can have two setups, with heat pump and without.
- Heater should be on both setups. If trouble code complains about PTC Heater 1 and 2, start the car, turn the front windshield defroster on and check high voltage wires (piercing wire is easiest), and 3 wires for computer in the heater. HV should have about 200V+ in between.

World's first EV power-saving cabin heater

A heat-pump cabin heater has been adopted for heating an electric vehicle (EV), using less power than conventional models. It greatly improves power consumption when the heater is being used. Nissan LEAF is the first mass-produced vehicle in the world to employ a heat-pump cabin heater.

Technology Functionality

Gasoline vehicles reuse engine exhaust heat to provide the warm air for the functions of the heater. An EV, however, does not have this heat source to recycle and so uses its general power for cabin heating.

Conventional air-conditioning systems used an electrical heater, but since the use of the heater directly relates to power consumption, actual driving range was significantly reduced.

A heat-pump system, meanwhile, heats the cabin using the temperature difference between a refrigerant and the outside air, obtaining a heating effect other than consuming electricity, and making it possible to heat the car cabin with less power than conventionally.

Technology Configuration

When the heater is in use, the external capacitor absorbs heat from the atmosphere [1] and then compresses it into high-temperature heat [2]. The cold air in the cabin is heated [3] and hot air is blown into the cabin out of the air-conditioning grille [4]. After the heat decompresses to a low temperature, it is released out of the car [5].

In the summer, heat is absorbed from inside the cabin and released outside by the external capacitor, functioning as a cooling and heating system.

A heat-pump is unique in that with one refrigerant circuit it can be used for both cooling and heating, with the heat from the outside air being transferable to the cabin just by the power consumption of the pump.

A more efficient air-conditioning system is achieved through optimization of the heat exchanger design that implements low power consumption, along with heating and cooling according to set temperatures, and temperature control when switching between cooler and heater that optimally adjust the compressor rotation.

