

# PURPOSE & METHOD

## ELECTRIC VEHICLE BATTERY HEATING

Electric car battery heating is mainly aimed at improving battery performance in low temperature environments, allowing it for better output energy and provide a longer driving range. This is because the chemical reaction rate of the battery will slow down in low temperature environments, resulting in decreased battery performance and slower charging rates.

There are several common ways to heat electric vehicle batteries:

### Coolant heating system



The vehicle's coolant is passed through the battery module to raise the battery temperature. This method works well in low temperature environments and has low equipment complexity.

### Air heating system



Air is passed through the battery module using a fan located nearby, which heats the battery by blowing hot air over it. This method has lower costs but may not be ideal for heating in extremely low temperature environments.

### Resistance heating system



Electric heating wires are installed around the battery module, generating heat to warm the battery. This method has higher equipment costs but provides stable heating.

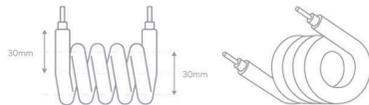
### Radiation heating system



Infrared radiation heaters are installed around the battery module, using infrared radiation to heat the battery. This method has advantages such as fast heating and high efficiency, but has higher equipment costs.

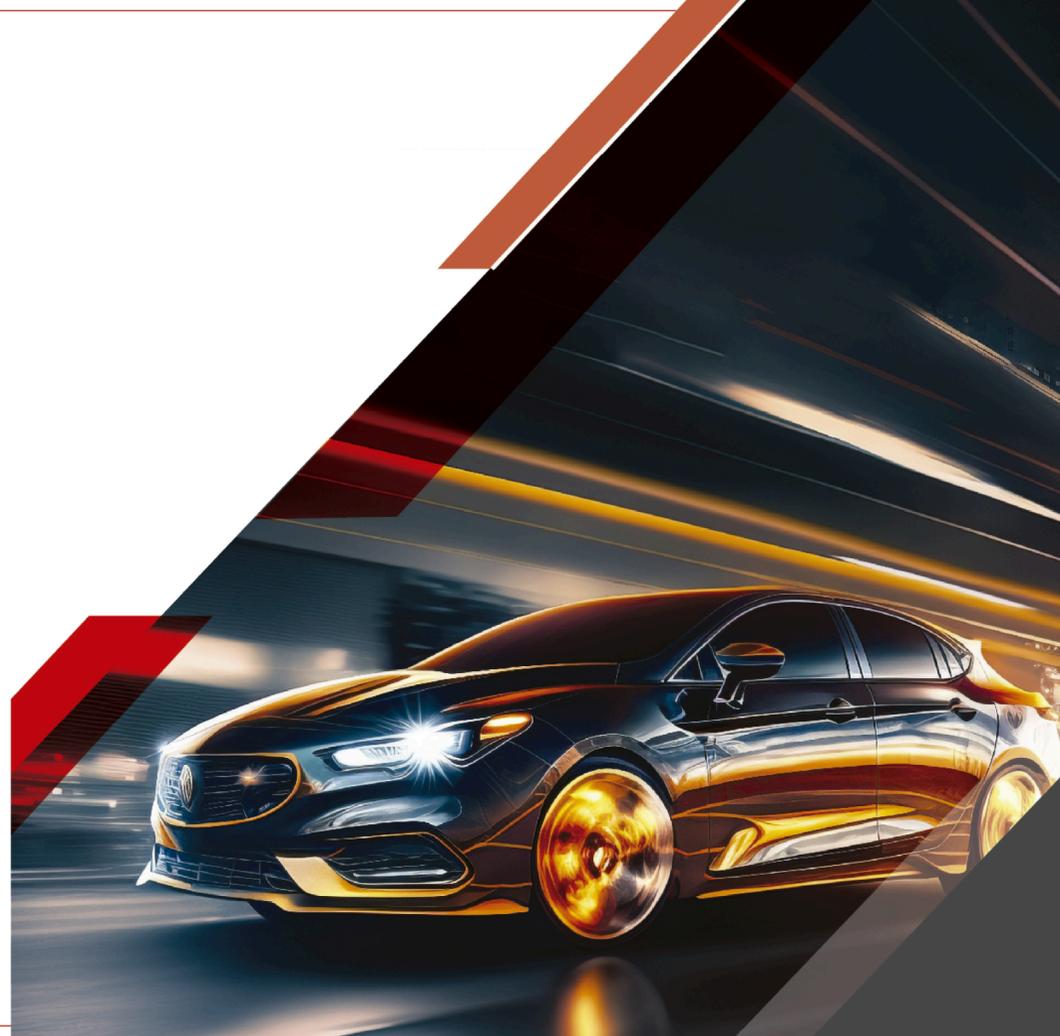
Each of the above heating methods has its own advantages and disadvantages, and the specific choice depends on different needs and conditions.

Shown below is a sample of heater used in E-Vehicle (EV):



Application :  
For EV battery heating  
(immersion type)

Rated : DC230V 10KW



# COMPANY INTRODUCTION

We have been manufacturing heating elements related to automobile for many years and we mainly co-operate with America and Japan automotive/EV parts manufacturers:

In the beginning stage, we developed projects with Philips & Tempra. End-users were Ford, GM, Chrysler, etc. The heating element was used to heat the coolant or to preheat the oil. We have production experience of about 16 years.

We are tier-1 supplier to Auto Parts Manufacturers. Our customers and end-user (Automobile manufacturers) are shown as follows:

In recent years, we have been developing heating element for Electric Vehicle (EV). Our prime customer will be Panasonic. End-user is Toyota. The product is AL die-cast heating element which its primary use is to keep the EV battery at its optimum temperature. This project has been launched currently and under mass production.

## HEATERS FOR AUTOMOBILE INDUSTRY



### 1 Automotive Heating System

PTC Fin Heater / PTC Cartridge Heater / Aluminum Casting Heater

Provide heat to heat up vehicle parts as well as to keep warm vehicle interior during winter.

### 8 Antifreeze Liquid Warming

Aluminum Casting Heater / Copper Heater

Prevent car engine / electric motor temperature drop due to cold weather and to ensure the engine / electric motor to function normally.



### 2 Rear View Mirror Defogging

PI Film Heater

Prevent rear view mirror from fogging, frosting and freezing.



### 3 Camera Defogging

PI Film Heater

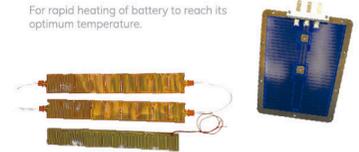
To prevent the camera from fogging, frosting and freezing.



### 4 Battery Preheating

PI Film Heater / Thick Film Heater

For rapid heating of battery to reach its optimum temperature.



### 7 Lamp Defogging

PI Film Heater

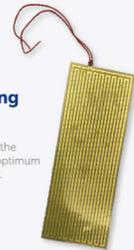
Prevent car lamp from fogging, frosting and freezing.



### 6 Liquid Crystal Display Warming

PET Film Heater

Provide heat to maintain the working temperature at optimum level during cold weather.



### 5 Cushion Warming

PI Film Heater

To keep cushion warm at constant temperature.

