

## ENGINE HEATING AND POWER SUPPLY

Calix is a leading industrial company with competence in development and manufacturing solutions for electric thermal management and intelligent power handling. For more than 50 years Calix has been working together with OEM companies in the industry for cars, trucks, buses and heavy equipment.

### Thermal Management

Electric heating solutions of driver compartments, batteries and engines for electric-, hybrid- and traditional fuel vehicles (ICE).

### Intelligent Power Handling

Products for on board charging of 12V and 24V batteries. Power conversion products for 12Vdc - 24Vdc - 48Vdc.

### Calix cable system

Calix plug & play cable system is the interface for a combination of our products such as battery chargers, engine heaters, cab heaters, converters and inverters.

Calix plug & play cable system is approved for permanent installations in cars, buses, trucks, off-road, agriculture and construction machinery.

The system is also widely used as interface for high voltage systems (230Vac/115Vac) in for example emergency and military vehicles. There is also a possibility to add the Calix timer by which you can set different timers to start/stop the Calix system via a smartphone.

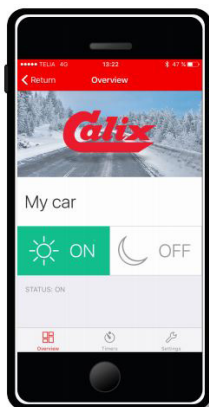


The Calix production, development and design is carried out in the same factory building in Eskilstuna, Sweden. This enables full control of all processes, short lead times for development and excellent quality control.

The R&D-center is equipped with a laboratory and climate chamber that has been third-party certified by Intertek. The climate chamber that operates in the temperature range of -40°C/+60°C is large enough to fit passenger cars, light weight trucks and cabins for heavier trucks.



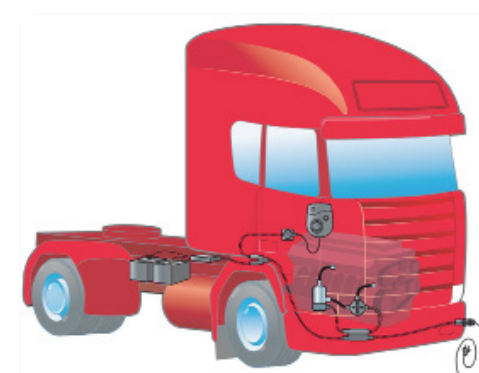
Connecting cable connected to the installed Calix system



App-solution



Calix Dual cables are approved for both EU and North America



System overview- truck

**Calix battery chargers**

Modern vehicles contain a great deal of electronic equipment that constantly consumes small quantities of electricity, even when the engine is switched off. This continuous discharge of batteries requires a charger installation.

A permanently installed battery charger from Calix is extremely useful; it is quick and easy for the user – just plug it into a wall socket and let the charger do the rest automatically.

The broad range of Calix battery chargers and the Calix cable systems meet all legal and quality requirements in the industry.

**Calix DC/DC converters**

DC/DC converters are commonly used in electrified vehicles. They are used to convert the input voltage into a different voltage or to ensure a stable voltage in a system where power supply voltage fluctuates.

Calix DC/DC converters are highly efficient: they generate less heat, thus ensuring minimal power loss.



Battery Charger, BC 1205



DC/DC converter

**Calix heaters**

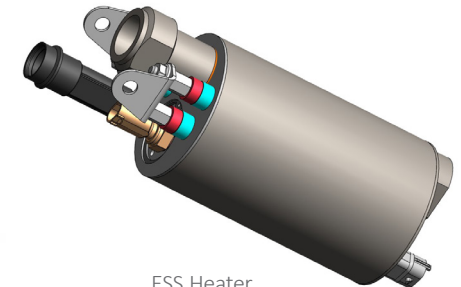
For traditional fuel driven engines it has been common for many years to pre-heat the engine and driver compartment. This increases not only comfort and a reliable start of the engine, it also ensures that the engine reaches the correct working temperature quickly and minimizes engine wear, fuel consumption and emissions, eg. nitrogen oxides (NOX) and particulate emissions (VOC).

Calix offers solutions for traditional pre-heating for almost all vehicles on the market.

In hybrid electric vehicles a Li-Ion battery is normally used and in cold temperatures the efficiency of these batteries is dramatically reduced. Calix has developed several solutions for pre-heating Li-Ion batteries. This solution can be combined with heaters for the fuel driven engine and driver compartment. This dramatically increases the range in which the vehicle can be used in fully electric mode. For fully electrified vehicles the access heat from the engine is almost zero and there is a need for not only pre-heating but also heating different parts of the vehicle during usage.

Calix has, together with several OEM's, developed solutions for heating batteries and driver compartments that is used in serial production today.

Example of different models of engine heaters



ESS Heater