

PRESS RELEASE

KONVEKTA AG

Topic: Electromobility / Vehicle Air Conditioning

The worldwide first CO₂ heat pump in an e-articulated bus

Since the beginning of this year the first electric articulated bus equipped with a Konvekta CO₂ heat pump thermal management system has been operated by the public transport company VAG in Nuremberg.

The future of our cities – living space of currently more than 50 % of our humanity – has to be improved, this is beyond question. The expansion of public transport and the development towards more electromobility are intended to improve the situation in our cities.

The e-bus is the emission-free alternative to diesel buses. If one wants to do completely without fossil fuel, also the a/c components have to be powered by the battery. Electric buses don't produce exhaust heat which could be used to heat the passenger compartment. In solo buses the efficient temperature control has already been managed quite well. But temperature control in articulated and double-deck buses is a new challenge.

E-articulated buses – a new challenge for the climate management

Due to its length of more than 18 meters the electric articulated bus needs more than one thermal management system which have to be networked optimally. Furthermore, the demands on air conditioning systems have changed. Classical applications comprise the air conditioning of the bus interior (driver's place and passenger compartment). Today's demands have been increasing. Thus, for example the temperature control of the batteries has to be integrated in the thermal management system because batteries need an optimal operation temperature frame to reach the maximum range and lifetime.

The first Konvekta CO₂ heat pump for e-articulated buses

Since the beginning of this year the worldwide first e-articulated bus equipped with a Konvekta CO₂ heat pump has been in scheduled service on routes in

Germany. The central part of the Konvekta CO₂ heat pump management system are the two UltraLight 500 CO₂ heat pumps 2.0 on the front and rear section, including the 2 energy carrier modules for hot and cold water. Both systems run on the refrigerant CO₂.

The heat pump system is the most intelligent and effective heating technology in the field of electromobility because a great part of the provided heating energy is sourced from the ambient air and not from fuel or electricity.

To obtain 100 % heat the Konvekta CO₂ heat pump needs at best only 25 % operating power (current) from the battery. **The rest of the needed energy is gained free of charge via the thermodynamic cycle from the ambient.**

Depending on the vehicle type, the CO₂ heat pump consumes for example at -10 °C approximately 45 kWh electric energy per 100 km in contrast to conventional electric heating components that consume more than 100 kWh for the same distance.

A Konvekta CO₂ heat pump saves the operator money and the environment CO₂ emissions

There are significant financial advantages by using the CO₂ heat pump system compared to conventional heating and cooling of e-articulated buses.

The public transport company of Munich **for example saves 53 % of the annual costs of temperature control** in the e-articulated buses that are equipped with a Konvekta CO₂ heat pump. That means that a CO₂ heat pump system **saves 1.700 € of the annual energy costs** compared to an air conditioning unit with electrical auxiliary heaters.

Additionally, **up to 5.500 kg of the annual CO₂ emissions are avoided.**

It is worth considering the lower energy consumption in the procurement of new e-buses. Depending on the area of application battery capacity worth 66.000 € can be saved and the vehicle range extended up to 30%.

A CO₂ heat pump system is the only option to temper an e-bus with regard to range optimization and sustainability.

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