

Higher degree of efficiency

# SMARTconverter 3 SiC

## Increasing energy efficiency



SMARTconverter 3 SiC available immediately in the performance classes 140 kVA + 20 kW and 170 kVA + 30 kW

**Rail-based public transport stands out for its high energy efficiency compared to other modes of transport. Increasing energy efficiency has always been one of the fundamental goals of all development at Dinghan SMART Railway Technology GmbH. The company focuses in particular on two parameters of the auxiliary power converters: their weight and their energy conversion efficiency.**

For more than 20 years, Dinghan SMART has been uncompromising in its reliance on medium-frequency galvanic separation. This technology is used in all SMARTconverters and depends on a transformer to achieve the necessary electrical isolation in the auxiliary power converter. This transformer runs at a significantly higher frequency which is independent of the AC grid that it supplies with power. This higher frequency allows building smaller, more light-weight transformers.

The improvements thus realised can be best demonstrated by looking at the power-to-weight ratio. While conventional auxiliary power converters have a power-to-weight ratio of only about 100 W per kg, even first-generation SMARTconverters achieved 200 W per kg. The latest third-generation SMARTconverters achieve as much as 300 W per kg. That means that a SMARTconverter 3 weighs only about a third as much as a conventional auxiliary power converter while providing the same function and output.

# High energy savings

The energy conversion efficiency provides a similar picture. The improvements are obvious. Where conventional auxiliary power converters have an energy conversion efficiency of 90 %, even first-generation SMARTconverters achieved 92 %. The latest SMARTconverters 3 even reach values above 94 %. These values are relative to the nominal voltage. Another positive feature is that the energy conversion efficiency of SMARTconverters increases even further at higher input voltages, whereas it typically drops in conventional auxiliary power converters and different designs. This is important because many operators work with higher overhead wire voltages where possible in order to minimise the transmission losses in the overall system.

New power semiconductors allow further improvements of the energy conversion efficiency even today. In particular, power semiconductors made of silicon carbon (SiC) have a high potential. For this reason, Dinghan SMART developed the SMARTconverter 3 SiC. In addition to conventional Si-IGBTs, this auxiliary power converter uses SiC-MOSFETs in the crucial functional units. This raised the energy conversion efficiency to over 95 % for a broad range; at high input voltages, it reaches up to 96 %. This may not sound like much, but it translates into substantial energy savings. Here is an example: At an average utilisation of 50 %, its increased energy conversion efficiency enables a SMARTconverter 3 SiC of performance class 170 kVA plus 30 kW to save about 200,000 kWh over its 30-year service life compared to a SMARTconverter 3, and even about 1,000,000 kWh compared to a conventional auxiliary power converter.

The new SMARTconverter 3 SiC is available immediately in the performance classes 140 kVA plus 20 kW and 170 kVA plus 30 kW for input voltages of 750 V and 1,500 V DC.

You are interested? We are looking forward to hearing from you.

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