Fraunhofer IISB



Full SiC-Inverters for High-Speed Electric Air Compressors

For Aircraft Applications

TheMa4HERA Motor Controller
© Jennifer Reißig / Fraunhofer IISB

Motivation

- High-speed motor drives – such as electric fuel cell or cabin air compressors – require very high inverter output frequencies, accompanied by high switching frequencies to minimize losses and torque ripple in the electric machine
- Wide-bandgap silicon carbide (SiC) semiconductors are the ideal choice for these demanding high-frequency, high-efficiency applications

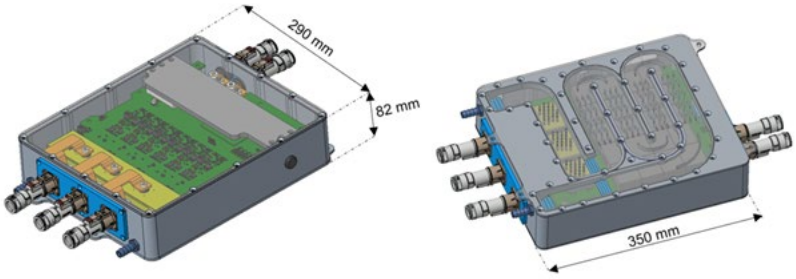
NEWBORN

TheMa4HERA

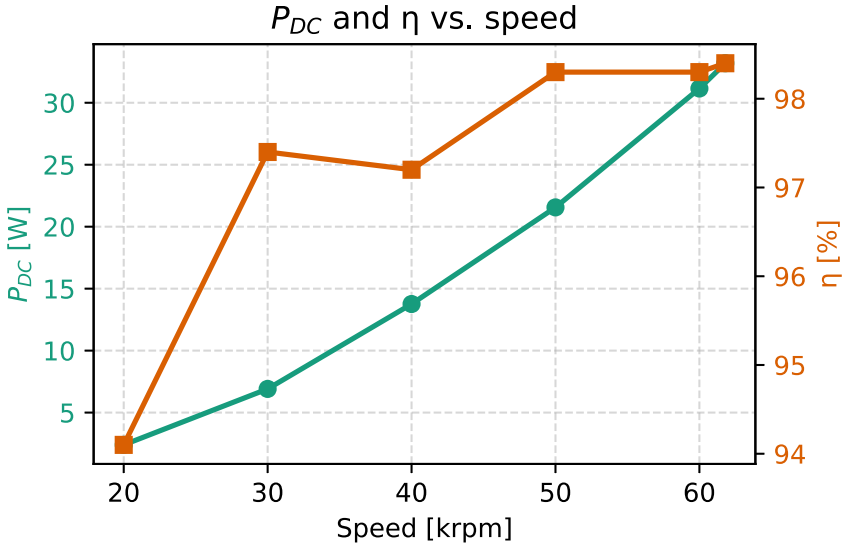
CLEAN AVIATION

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	NEWBORN	Thema4HERA
Nominal inverter output power P_{AC}	54 kW (max. 72 kW)	25 kW
Nominal phase current I_{RMS}	200 A_{RMS}	85 A_{RMS}
Nominal DC link voltage U_{DC}	800 V (max. 850 V)	560 V (max. 850 V)
Topology	B6 SiC Inverter	
Power modules	State-of-the-art commercial-off-the-shelf	
PWM switching frequency fPWM	typ. 25 kHz (up to 80 kHz)	
Cooling	Water-Glycol based fluid cooling	
Max. flight altitude	30,000 ft / 9,144 m	
Control board HW/SW	Project specific derivative	
Speed control algorithm	Sensorless FOC	
Housing	Sealed aluminum	



NEWBORN Inverter Dimensions© Paul Florea / Fraunhofer IISB



T4H inverter, measured with an application specific electric air compressor

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