

# PRESS RELEASE

## **AC2DC-II: Field validation of modular medium-voltage MMC for DC distribution grids begins at Kiel University**

Itzehoe/Kiel, 18 February 2026 – Fraunhofer ISIT has initiated field testing activities for a modular medium-voltage multilevel converter (MMC) developed within the AC2DC-II project. On 17 February 2026, two research containers were transported and installed at the Faculty of Engineering of Kiel University (CAU), where they will serve as a medium-voltage test environment until July 2027.

The container-based infrastructure enables validation of converter technologies under realistic grid conditions. The units were previously used in a medium-voltage grid analysis project by CAU and HAW Kiel and have now been repurposed for AC2DC-II testing.

### **Modular MVDC converter for wind-integrated DC distribution**

Fraunhofer ISIT is developing a modular medium-voltage MMC designed to operate as an AC/DC interface converter for a MVDC distribution grid connecting a wind farm. The system targets scalable MVDC architectures with enhanced controllability and grid-support capabilities.

The converter topology is based on full-bridge submodules. Each submodule integrates a dedicated local control board, an individual protection system and a distributed measurement functionality.

This decentralised architecture enables selective fault handling, improved operational robustness and fine-grained control of submodule behaviour.

Design, assembly and validation of the MMC are carried out in Fraunhofer ISIT's dedicated medium-voltage laboratory. Electrical insulation performance, switching behaviour, thermal management and dynamic control response are characterised prior to deployment in the field-test infrastructure.

### **Control architecture and grid-support functionality**

The control framework includes internal MMC control loops for active capacitor voltage balancing, minimisation of conversion losses and stabilisation of arm energy dynamics.

In addition, a grid-supportive control strategy has been implemented to actively utilise the comparatively large amount of energy stored in the submodule capacitors for grid stabilisation purposes. This approach allows the converter to contribute to voltage support and dynamic system behaviour within the DC distribution environment.

The advanced control architecture is enabled by a custom-developed main control and measurement board designed for deterministic real-time control and high-resolution signal acquisition at medium-voltage level.

“The move marks the start of our field tests for AC2DC-II and a major step in advancing our MVDC converter technology. With the installation at CAU, we are now able to validate our converter architecture under real medium-voltage grid conditions,” says Nidhi Bisht, Project Manager at Fraunhofer ISIT.

Field validation in cooperative research environment

The field validation is conducted in close cooperation between Fraunhofer ISIT and the Faculty of Engineering at CAU. While Fraunhofer ISIT is responsible for converter design, control architecture and system integration, CAU provides the medium-voltage grid interface and testing environment.

The long-term operation of the container-based test setup allows extended performance monitoring, dynamic testing and system-level evaluation under practical operating conditions.

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### **About Fraunhofer ISIT**

The Fraunhofer Institute for Silicon Technology ISIT is a European research institute specialising in microelectronics, microsystems technology and advanced power electronics. The institute develops semiconductor devices, modular converter systems and integrated control architectures for medium-voltage and renewable energy applications.

With state-of-the-art cleanroom facilities and dedicated medium-voltage laboratories, Fraunhofer ISIT combines device-level expertise with system-level converter development, supporting the advancement of scalable MVDC and hybrid AC/DC grid technologies.

### **About Kiel University**

Kiel University was founded in 1665. With 27,000 students and around 3,700 employees, it is the oldest, largest and best-known university in the federal state between the seas and the only comprehensive university in Schleswig-Holstein. Seven Nobel laureates have worked and researched here. Since 2006, the Kiel University has been successfully participating in the Excellence Strategy of the German federal and state governments.

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