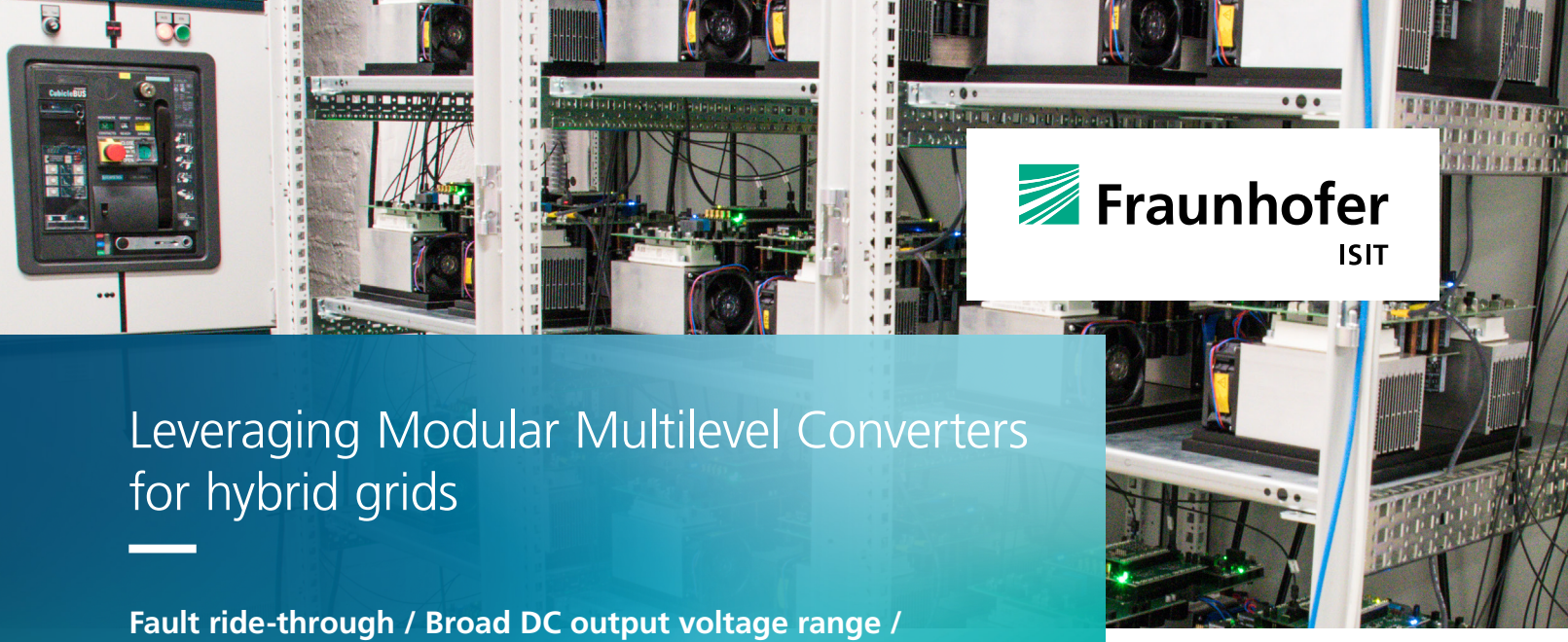

Fraunhofer ISIT

Leveraging Modular Multilevel Converters for hybrid grids

Fault ride-through / Broad DC output voltage range / Overcurrent management

24 MV-MMC cells

MV-Modular multilevel converter

Modular Multilevel Converters (MMCs) are essential technologies for the energy transition of our society, providing improved efficiency, power quality, fault-tolerance and enhanced density. Our innovative MMC capabilities bring a wide DC output voltage range and overcurrent management to meet the key attributes and requirements for the upcoming hybrid grids. ISIT's know-how is important to place MMCs as essential components for a successful energy transition.

Offshore Wind Farms

- High power transfer capability
- Low power losses for high distances
- Independent control of active and reactive power

Power Quality

- Fast dynamic for voltage regulation
- Lower harmonic distortion
- High efficiency for hot-standby solutions

Fast Charging stations

- High controllability
- Integration of energy storage units
- High power density and efficiency

MVDC Distribution

- Improved connectivity
- Increases power capacity by up to 80% compared to AC
- Power flow control
- High flexibility

Proven benefits at a glance

MV-MMC
Step-down operation to increase inter-connectivity to hybrid grids
DC fault ride-through by adopting full-bridge technology
AC grid support thanks to the innovative overcurrent management

MV Lab at ISIT@CAU

Fraunhofer ISIT has developed a broad range of expertise and facilities, including MV-power converters for grid forming and storage management systems. With its laboratory equipped with state of the art instrumentation, ISIT is ideally suited to testing and prototyping medium-voltage components and converters. By combining ISIT's know-how with its clients' technical requirements, ISIT can design advanced MV solutions to develop the modern hybrid grids of the coming years.

MV-MMC

- 500 kVA MMC
- Up to 10 kV_{DC} and 6 kV_{AC}
- Up to 48 cells
- Overload capabilities

Digital twin

- Online adaptive parameter observation
- Model fitting to prototype behaviour
- Models for various operating conditions

Test facility

- Up to 1 MW circulating power
- Connectivity up to 10 kV_{AC}
- Up to 1600 A
- Controllable cooling system

Power-HIL

- 3-Racks OPAL-RT
- Battery emulator (1.5 kV - 120 kW)
- Power amplifier (3-ph, 4-quadrant, up to 100 kW)

Proven benefits at a glance

Power HIL and Digital Twin
Optimising converter architecture and battery management
Testing converter in its environment reducing maintenance cost
Evaluating from the device level to complex power networks

Fraunhofer ISIT

Highly efficient and reliable electronic energy systems

Applied research from device- to network-level power electronics made in Northern Germany

What we can do for you @Fraunhofer ISIT

Active reliability

- Sensor integration
- Lifetime analysis
- Reliability-driven control
- Multichip power modules

Hybrid grids

- Medium voltage DC applications
- New components
- Grid forming converters

Battery integration

- Charging stations
- Grid support
- Bidirectional power transfer

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