Auxiliary Power Supply for Medium-Voltage Power Converters: Topology and Control

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Abstract— This paper presents an isolated auxiliary power supply for medium-voltage power electronics systems. The proposed converter comprises two stages: a non-isolated ac/dc stage that connects directly to the medium-voltage line, and an isolated dc/dc stage that provides 100-W output power at 24 V, with 10 kV isolation. The proposed modular ac/dc stage uses just one active semiconductor device per module, features an internal capacitor voltage balancing, and achieves power factor correction by employing predictive current control. High switching frequency operation of both converter stages enable a reduction in system size and weight when compared to traditional low-frequency transformer-based approach. The proposed converter is simulated and its operation is validated experimentally on a 100-W prototype.

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