

Solid-state circuit breakers for energy storage systems

What is a solid-state circuit breaker (ABB)?

A technological breakthrough by ABB - a solid-state circuit breaker - will enhance performance of renewable energy solutions, industrial battery storage solutions and so-called edge grids.

How are solid-state circuit breakers classified?

First, we categorize solid-state circuit breakers based on key features and subsystems, including power semiconductor devices, main circuit topologies, voltage clamping methods, gate drivers, fault detection methods, and commutation methods for power semiconductor devices.

What is a solid-state breaker?

The solid-state breaker concept replaces the traditional moving parts of an electromechanical circuit breaker with semiconductors and advanced software algorithms that control the power and can interrupt extreme currents faster than ever before.

Are solid-state circuit breakers a viable solution?

A viable solution to such protection needs is given by solid-state circuit breakers (SSCBs), exploiting the latest development of power semiconductor technology, such as low-losses IGCTs and WBG FET devices.

Why is a solid-state circuit breaker important?

Energy efficiency is a crucial aspect for all electrical installations, including those operating on islanded grids such as vessels with an onboard DC grid. Compared to other semiconductor technologies, ABB's solid-state circuit breaker guarantees 70% less power losses during the conduction phase.

Can a solid-state circuit breaker save you money?

For example, in the event of an electrical fault in a 4MW utility-scale battery system, the new solid-state circuit breaker can prevent losses of up to \$100,000 per plant from missed energy remuneration and system recovery costs.

A technological breakthrough by ABB - solid-state circuit breaker - will enhance performance of renewable energy solutions, industrial battery storage solutions and so-called edge grids. ...

Recently, Energy storage system (ESS) is gaining the fast expansion in the field of urban rail transit under the context of green and sustainable development. The number of DC/DC converters ...

A technological breakthrough by ABB - solid-state circuit breaker - will enhance performance of renewable energy solutions, industrial battery storage solutions and so-called edge grids. ... Prevents losses of up to \$100,000 per plant from ...

Solid-state circuit breakers for energy storage systems

This paper describes a Bidirectional Solid-State Circuit Breaker based on a new SiC SuperCascode power switch, and a multi-layered transient absorption network, and provides a ...

In this paper, the theoretical analysis and parameters design of SSCB are conducted based on three-level bidirectional DC/DC converter which is widely spreading in urban rail energy ...

This paper proposes a cost-efficient solid-state circuit breaker (SSCB) using series-connected IGBTs configured at the terminal of BESS for fault-isolation purpose. A multi-pulse fault ...

Solid-state transformers (SSTs) are developing as highly efficient interfaces in renewable energy, transport, and energy storage systems (ESSs). However, performance limitations, such as ...

tion of energy storage, and can be used to drive variable frequency drives for more ... Solid-state circuit breakers (SSCBs) utilize semiconductor-based device technolo- ... 9 Light-Triggered ...

Design of an IGBT-series-based Solid-State Circuit Breaker for Battery Energy Storage System Terminal in Solid-State Transformer. Authors: Rui Wang. State Key Laboratory of Advanced ...

Future energy systems face the fast growth of direct current (DC) in renewable power generation, energy storage, and loads. DC microgrids indicate a promising solution for efficiency, reliability ...

tive of a high-energy, low -impedance DC energy storage system as shown in Fig. 6. The dashed-line waveforms are simulation runs using the DC source and line inductances of 5, 15 and ...

Reference [83] proposes an interlinked solid-state MVDC circuit breaker (ISSCB). The author of [157] presents a SSCB for the protection of BESS terminals from overcurrents. The SSCB comprises...

