

Switching & Protection solutions for Battery Racks in Battery Systems

UL Utility Scale



Are you searching for Switching and Protection solutions to protect and secure Battery Racks in Utility Scale Battery Energy Storage System (BESS)?

Easily find the best solution to fit in Battery Racks and quickly configure your BESS installation thanks to our pre-configured and tested Application Bundles.

What is a Battery Rack?

A Battery Rack is a cabinet where more battery modules are installed in series to reach the system rated voltage. In addition to the batteries, switching and protective devices are installed along with auxiliary and/or communication circuits.

Why do you need Switching and Protection (S&P) solutions?

Every battery rack requires adequate galvanically switching and protection against overcurrents caused by battery modules. Unlike in PV strings, the overcurrents caused by batteries can be very high according to the battery technology.

Main benefits



Smarter protection

Increases power in your installation and reduces CAPEX by using the full range of 1500 VDC LV components.



Speeds up your projects

Speeds up your projects by using a range of products in compact sizes able to provide excellent performance at different temperatures and humidity ratings.



Smarter metering & monitoring

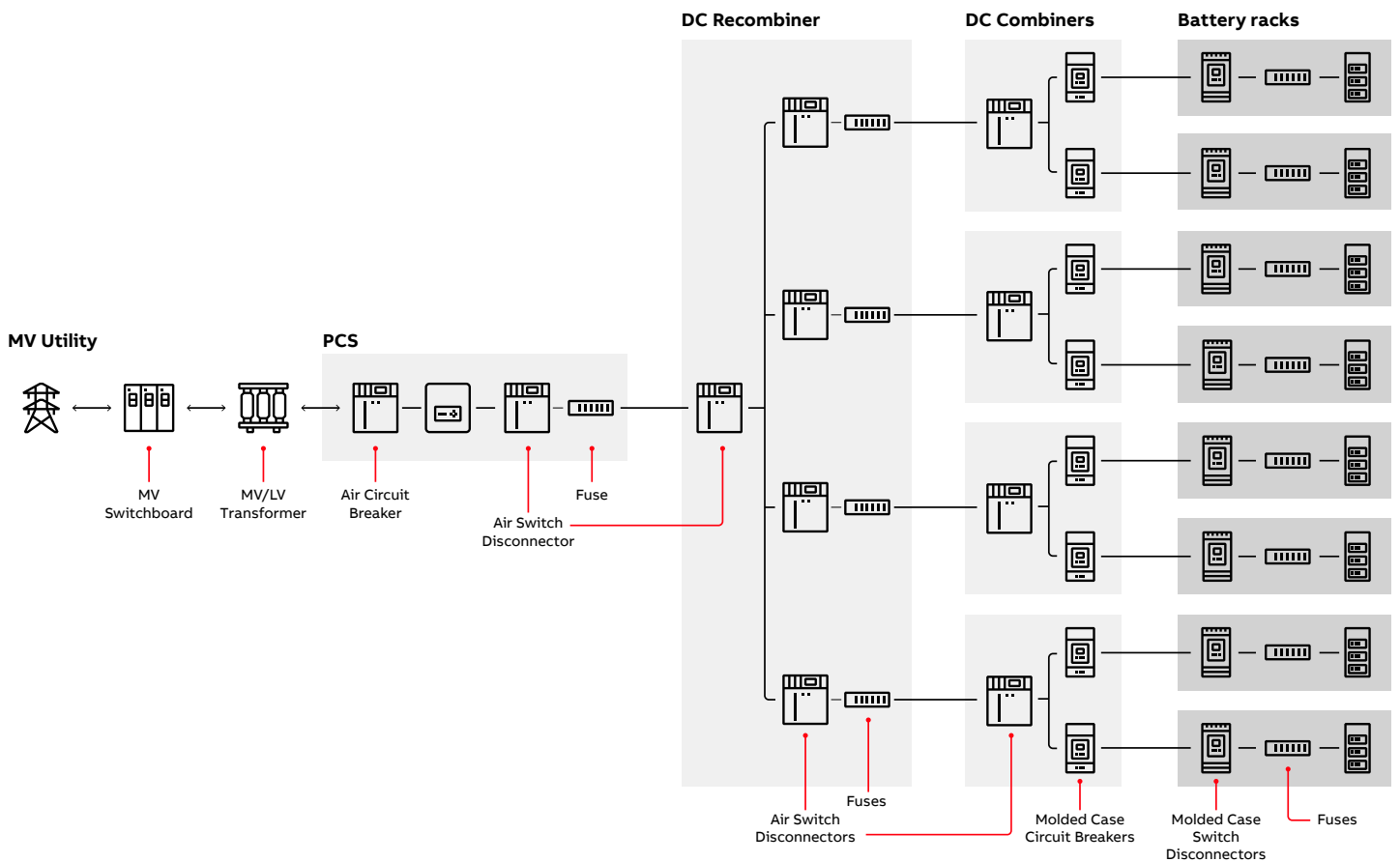
Maximizes power yield and cash generation by correct measurement of your BESS parameters.

Utility Scale Battery Systems

Utility scale stationary battery storage systems, also known as grid-scale front-of-the-meter storage systems, play a key role in integrating variable energy resources while providing the required flexibility. Battery storage increases flexibility in power systems, enabling an optimal use of variable electricity sources like photovoltaic and wind energy. Batteries can provide services for system operation, defer investments in peak generation and grid reinforcement.

Key characteristics of BESS in a Front-of-the-meter configuration:

- Direct connection to the AC Utility without the User's plant in parallel
- Grid support (ancillary services, fast power injection for peak requirements)
- Storage capacity typically ranging from just a few, to hundreds of MWh.

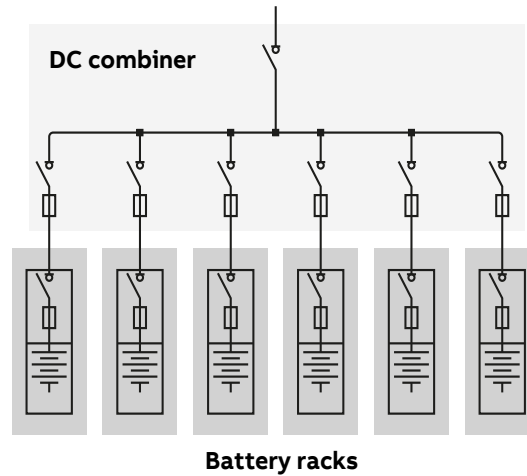


Battery Racks

Fundamentals, main components & functionalities

In Battery Energy Storage Systems, battery racks are responsible for storing the energy coming from the grid or power generator. They provide rack-level protection and are responsible for connecting/disconnecting individual racks from the system.

A typical Li-on rack cabinet configuration comprises several battery modules with a dedicated battery energy management system. The most commonly used batteries in energy storage installations are Lithium-ion batteries; the main topologies are NMC (Nickel Manganese Cobalt) and LFP (Lithium Iron Phosphate).



DC Battery rack main components

Switch-disconnector (Tmax PV/OTDC)

Fuses

Enclosure

Battery modules

Main functionalities:

- Overcurrent protection of battery modules
- Switching and isolation of battery modules

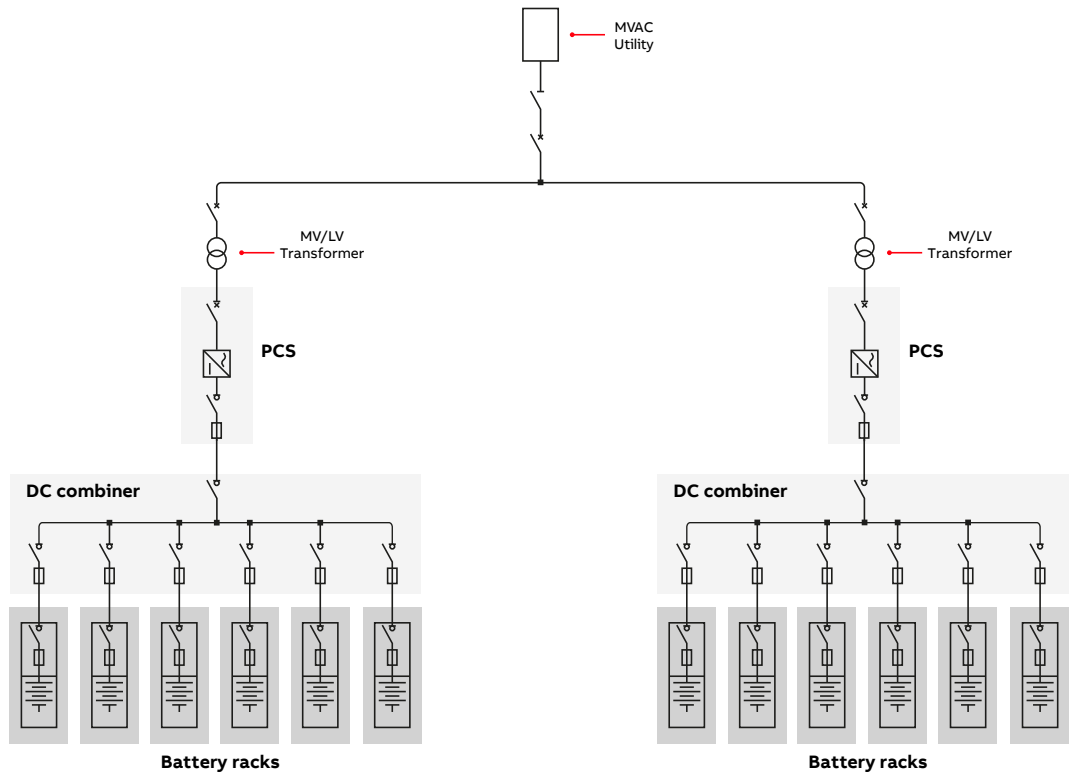
Additional functionality

- **Monitoring:** mainly where any drop in BESS plant performance may represent a significant economic loss
- **Voltage, current, or temperature monitoring**
- **Communication:** to communicate parameters to centralized monitoring system.
- **Remotely-operated:** need for remote control

Switching & Protection solutions for Battery Racks in Utility scale BESS

Discover our Switching & Protection solutions for easy Battery Racks configuration considering a 3MWh BESS architecture with two of 1.5MWh main system modules in parallel.

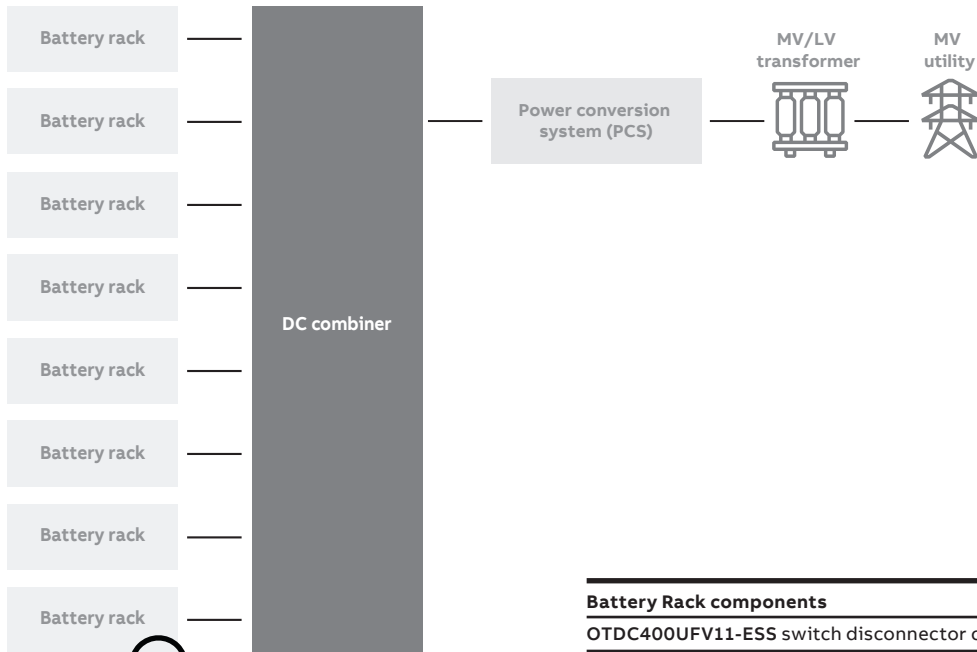
Single-line diagram of 3MWh, 3MW Utility Scale application



Specifications of electrical quantities of each single module

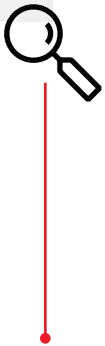
Input data		
Rated power	[MW]	1.5
Rated stored energy	[MWh]	1.5
Rated DC voltage	[V] +12%	1500
Rated AC voltage	[V] +10%	600
Rated AC current	[A]	1445
Prospective AC short circuit current	[kA]	50
Rack rated current	[A]	256
Rack short circuit current	[kA]	10
N. containers		1
N. racks per container		6
DC bus max current	[A]	1720
DC bus short circuit current	[kA]	60

ABB's offering (UL)

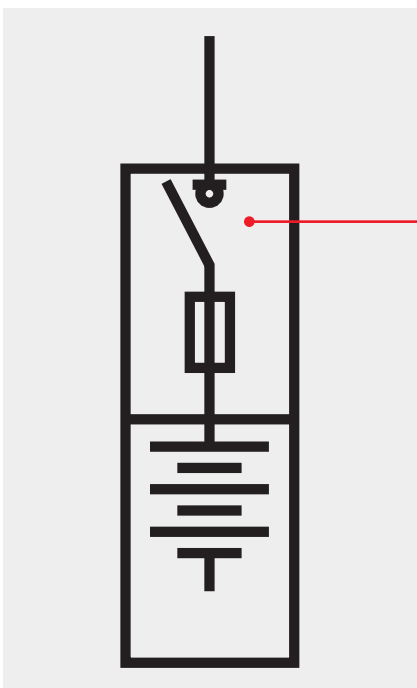


Battery Rack components

OTDC400UFV11-ESS switch disconnecter combined with any UL listed PV fuse



Battery Rack



DC switch-disconnector

ABB offering – List of components

Product	Part number	Description	Qty	Total Qty
OTDC400UFV11-ESS	1SCA158216R1001	2P 400A DC SW 1500VDC FOR ESS APP	6	12

Product offering

OTDC



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ABB S.p.A.
Electrification Business Area
Smart Power Division
5, Via Pescaria
I-24123 Bergamo - Italy
Phone: +39 035 395.111

new.abb.com/low-voltage

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