

# Switching & Protection solutions for Battery Racks in Battery Systems

## IEC 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

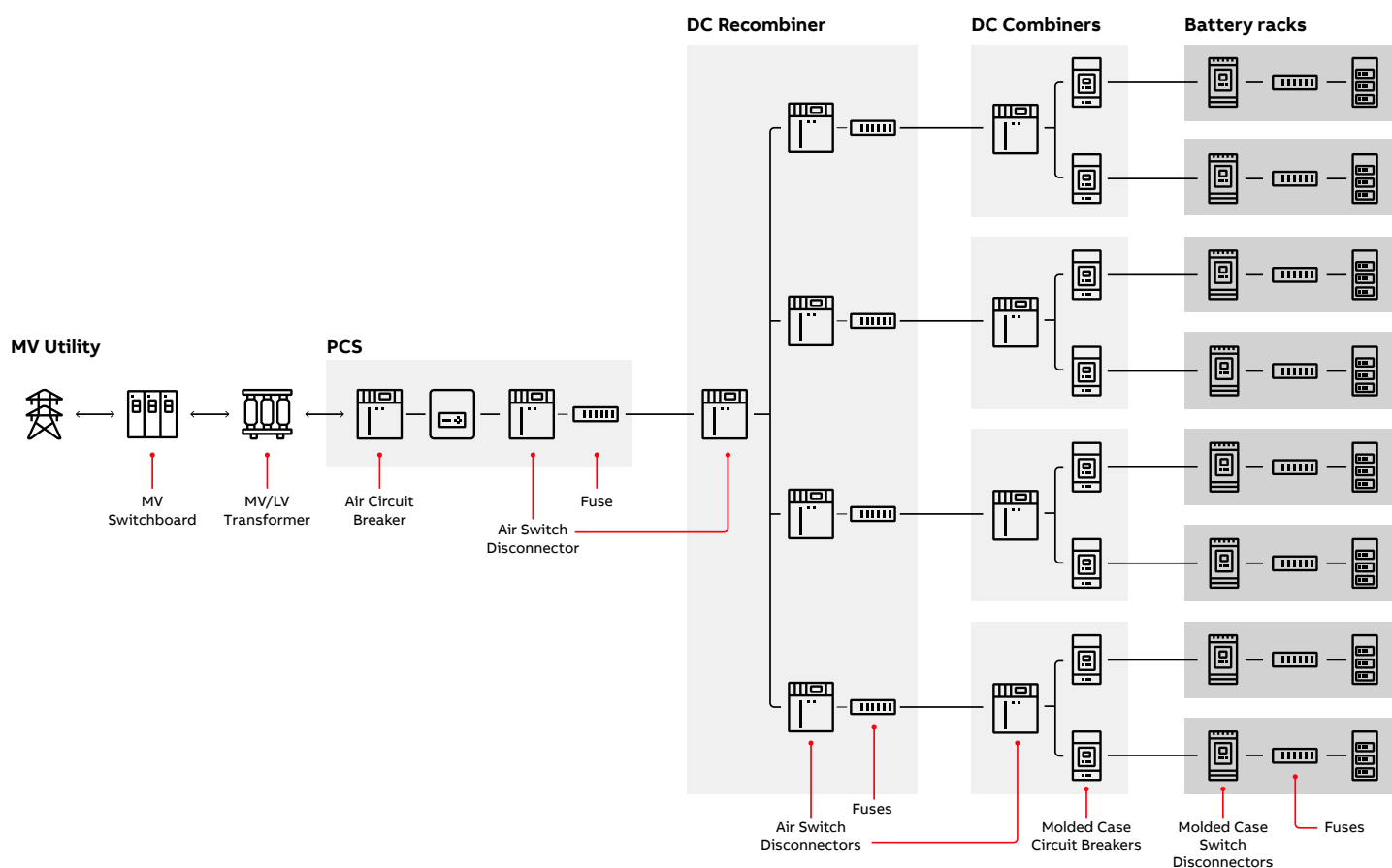
Maximizes power yield and cash generation by correct measurement of your BESS parameters.

# 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.



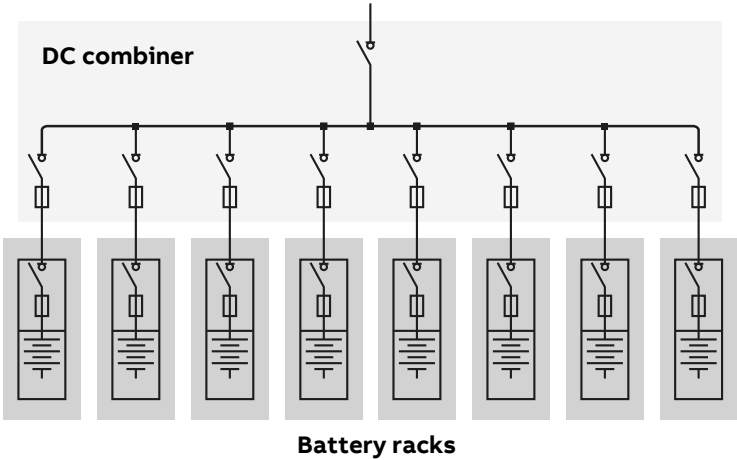


# Battery Racks

## 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 lithium-ion (li-ion) rack cabinet configuration comprises several battery modules with a dedicated battery energy management system. The most commonly used batteries in energy storage installations are li-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**

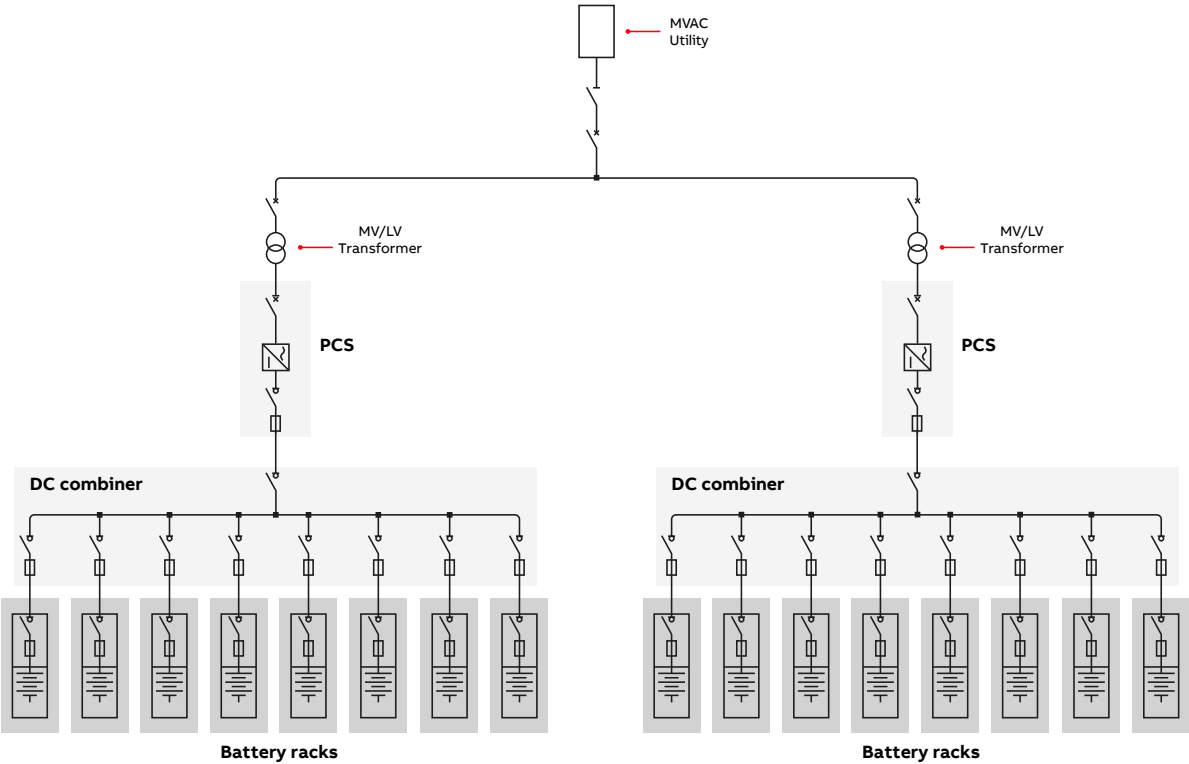
- Monitoring: mainly where any drop in BESS plant performance may represent a significant economic loss
- Voltage, current, or temperature monitoring
- Communication: to communicate parameters to centralized monitoring system.
- Remotely-operated: need for remote control



# Switching & Protection solutions for Battery Racks in Utility scale BESS

Discover our Switching & Protection solutions for easy Battery Racks configuration considering a 4MWh BESS architecture with two of 2MWh main system modules in parallel.

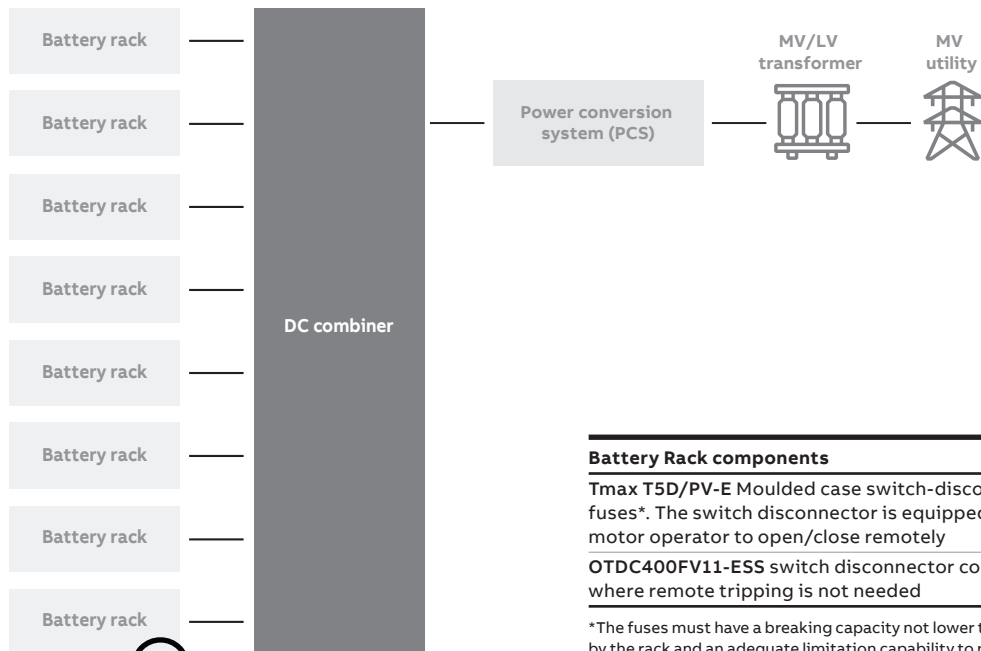
Single-line diagram of 4MWh, 4MW Utility Scale application



Specifications of electrical quantities of each single module

Input data		
Rated power	[MW]	2
Rated stored energy	[MWh]	2
Rated DC voltage	[V] +12%	1200
Rated AC voltage	[V] +10% IEC	528
Rated AC voltage	[V] +10% UL	528
Rated AC current	[A] IEC	2703
Rated AC current	[A] UL	2703
Prospective AC short circuit current	[kA]	50
Rack rated current	[A]	330
Rack short circuit current	[kA]	12
N. containers		1
N. racks per container		8
DC bus max current	[A]	2640
DC bus short circuit current	[kA]	96
DC recombiner box		NO

ABB's offering (IEC)



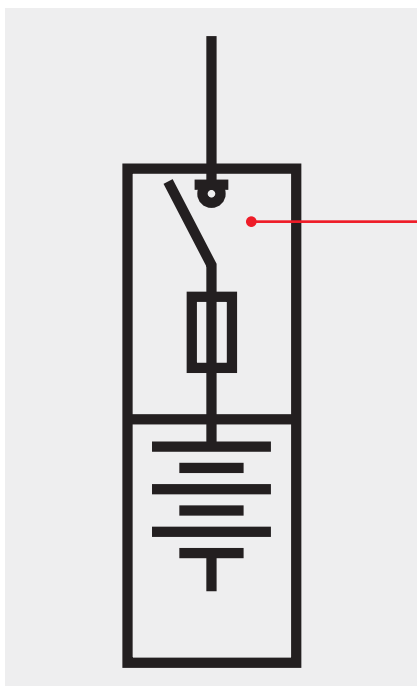
#### Battery Rack components

Tmax T5D/PV-E Moulded case switch-disconnector in fixed execution combined with fuses\*. The switch disconnector is equipped with the undervoltage release YU and the motor operator to open/close remotely

OTDC400FV11-ESS switch disconnector combined with maximum ETI 500A gPV fuses where remote tripping is not needed

\*The fuses must have a breaking capacity not lower than the prospective short-circuit current value provided by the rack and an adequate limitation capability to protect the Tmax T5D/PV-E switch-disconnector.

## Battery Rack



Moulded case  
switch-  
disconnector



DC switch-  
disconnector



# ABB offering – List of components

Product	Part number	Description	Qty	Total Qty
T5D/PV-E	1SDA076898R1	T5D/PV-E 500 4P F F 1500V DC	8	16
OTDC400FV11-ESS	1SCA158203R1001	OTDC400FV11-ESS DC Switch-disconnector	8	16

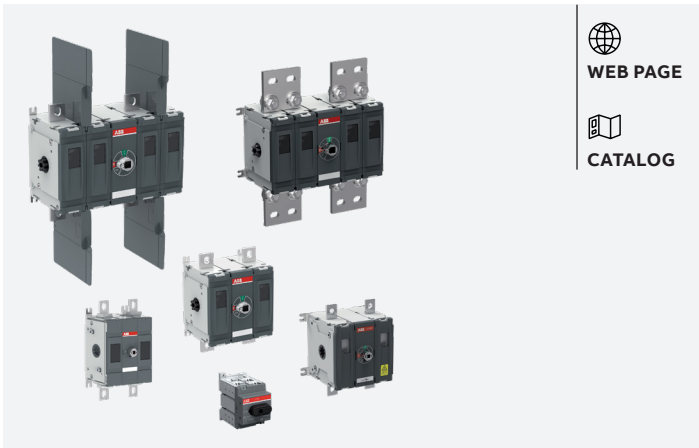


## Product offering

Tmax T PV



OTDC



[Rate this document](#)

