

Switching & Protection solutions for DC Combiners in Battery Systems

UL Commercial & Industrial scale



Are you searching for Switching and Protection solutions to protect and secure DC combiners and keep them running in Commercial & Industrial Battery Energy Storage Systems (BESS)?

You can easily find the best solution to fit in your DC combiner and quickly configure your BESS installation thanks to our Application Bundle based on concrete examples.

What is a DC Combiner?

If you want to connect several battery racks in parallel prior to connecting to the DC side of the Power Conversion System (PCS) or to the DC Recombiner, you need a DC Combiner. The DC Combiner is a switchboard where switching and protective devices are installed along with auxiliary and/or communication circuits.

Why you need Switching & Protection solutions

Every feeder supplying the relative battery rack needs adequate disconnecting apparatus and over-current protection devices (OCPD) to guard against faults and overloads, which can also come from the other battery racks connected in parallel.

Main benefits



Smarter protection

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



Safety

Avoids the risk of fire in your facility and loss of valuable assets by using a complete range of Surge Protection Devices (SPDs) to protect the whole electrical system from lightning and surges.



Speeds up your projects

Reduces CAPEX and 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

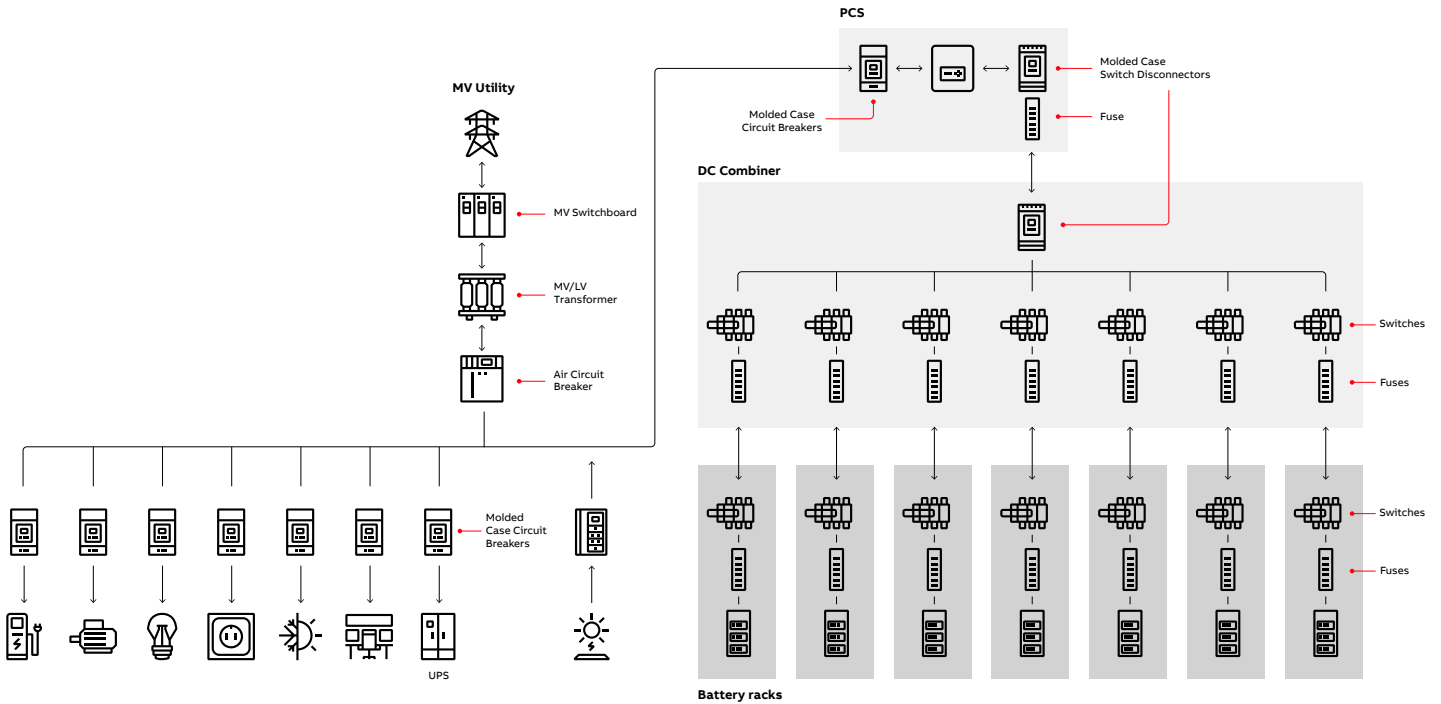
Maximizes power yield and cash generation by correct measurement of your BESS parameters.

Commercial & Industrial Battery Storage

Commercial & Industrial BESS, also known as customer-sited behind-the meter storage systems, represent an ideal solution for managing energy costs by leveraging on peak shaving, load shifting and maximization of self-consumption. By providing critical backup power for commercial & industrial facilities, BESS prevent revenue losses due to production outages and enable fuel savings by replacing gensets during electricity grid power outages of short-medium duration.

Key characteristics:

- Reduce electricity costs, minimize carbon footprint and improve resiliency.
- Manage energy consumption by leveraging on peak shaving, load shifting and maximization of self-consumption.
- Provide critical backup power by supporting/replacing gensets during electricity grid power outages of short-medium duration.
- Allow EV chargers to be installed without a dramatic increase in contractual power from the grid.

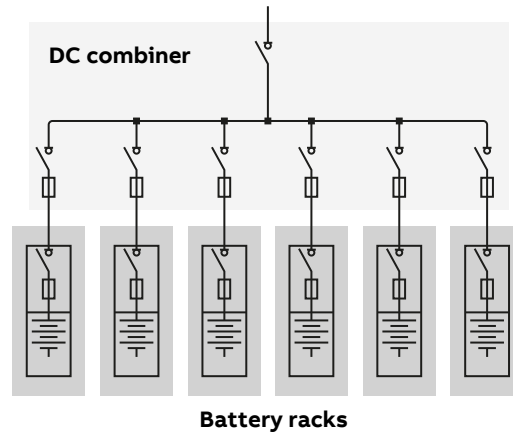


DC Combiner

Fundamentals, main components & functionalities

The power stored in battery racks and re-injected into the Utility through the Power Conversion System is collected by DC Combiners (in some cases also by a DC Recombiner).

The DC Combiner is a switchboard where several battery racks are placed in parallel by the relative feeder. Every feeder requires adequate switching and protection against overcurrents.



DC combiner components

- Main Switch: Molded case switch disconnecter (OTDC800UFV22-ESS (40kA with any PV fuse or PV circuit breaker)
 - Surge Protection Device: OVR PV T1-T2
 - Feeder switch disconnecter: OTDC200UGV11-ESS + fuse
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Main subsystem functionalities

- Grouping of battery racks (range of hundreds of A)
- Overcurrent Protection of battery rack feeder
- Switching of battery rack feeder
- Main Switching to segregate the group of battery racks from the rest of the BESS (range of thousands of A)
- Surge Protection to protect against voltage spikes, such as those caused by lightning.

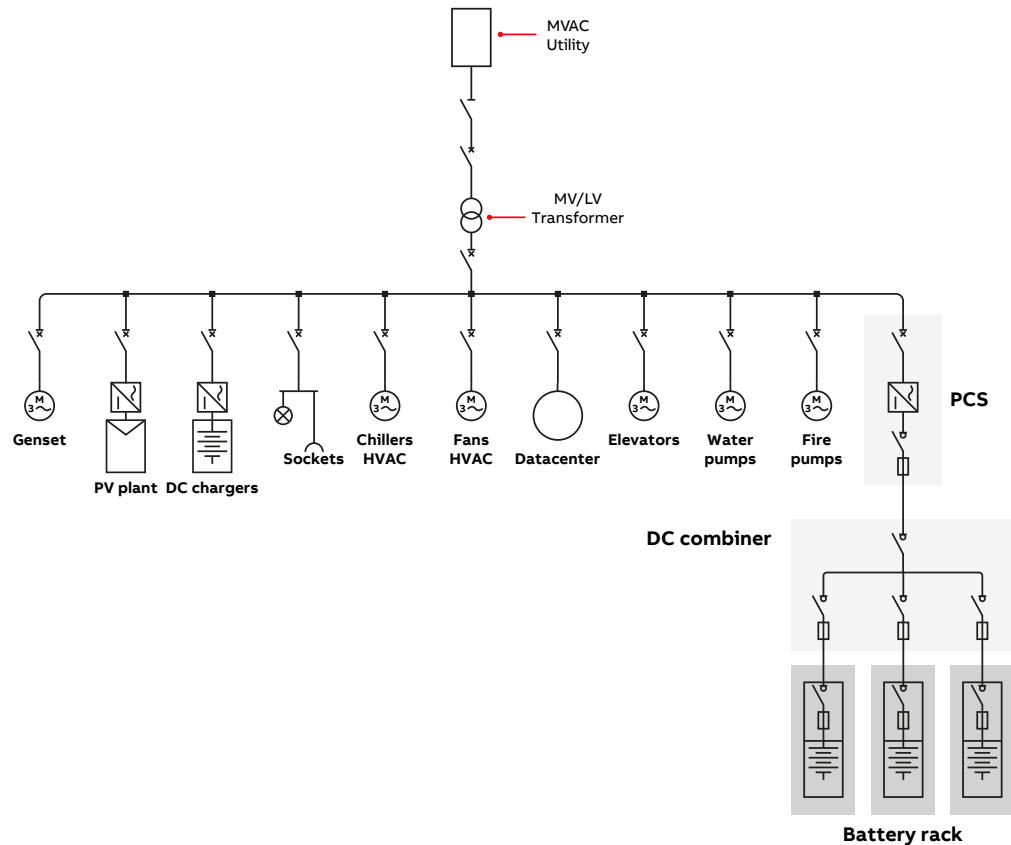
Additional subsystem functionalities

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

Switching and protection solutions for DC Combiners in BESS Commercial & Industrial applications

Discover our Switching & Protection solutions for easy DC combiner configuration considering 500 kWh BESS architecture with 1 single 500 kWh system module.

Single-line diagram of one 500 kWh PCS module, Commercial & Industrial application

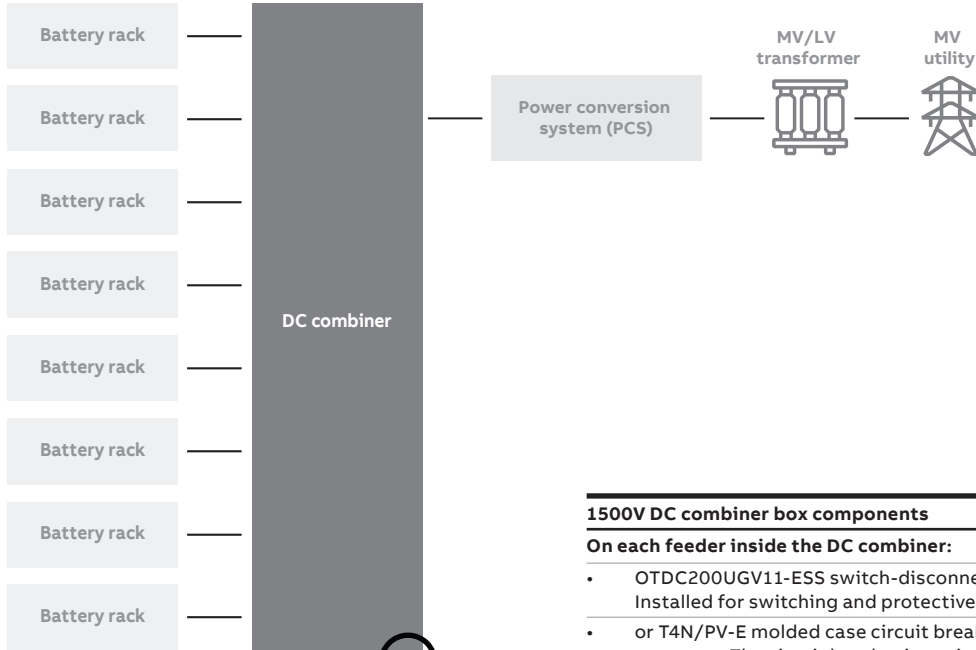


Specifications of electrical quantities with a 500 kWh PCS

Input data		
Rated power	[kW]	500
Rated stored energy	[kWh]	500
Rated DC voltage	[V]	1500
Rated AC voltage	[V]	600
Rated AC current	[A]	535
Rack short circuit current	[kA]	7
N. containers		1
N. modules per rack		30
Module capacity	[Ah]	4
Rack capacity	[Ah]	121
Energy per rack	[kWh]	181
N. racks per container		3
N. containers		1
Rack rated current	[A]	121
DC bus max current	[A]	362
DC bus short circuit current [kA]		21

ABB offering (UL)

DC combiner panel



1500V DC combiner box components

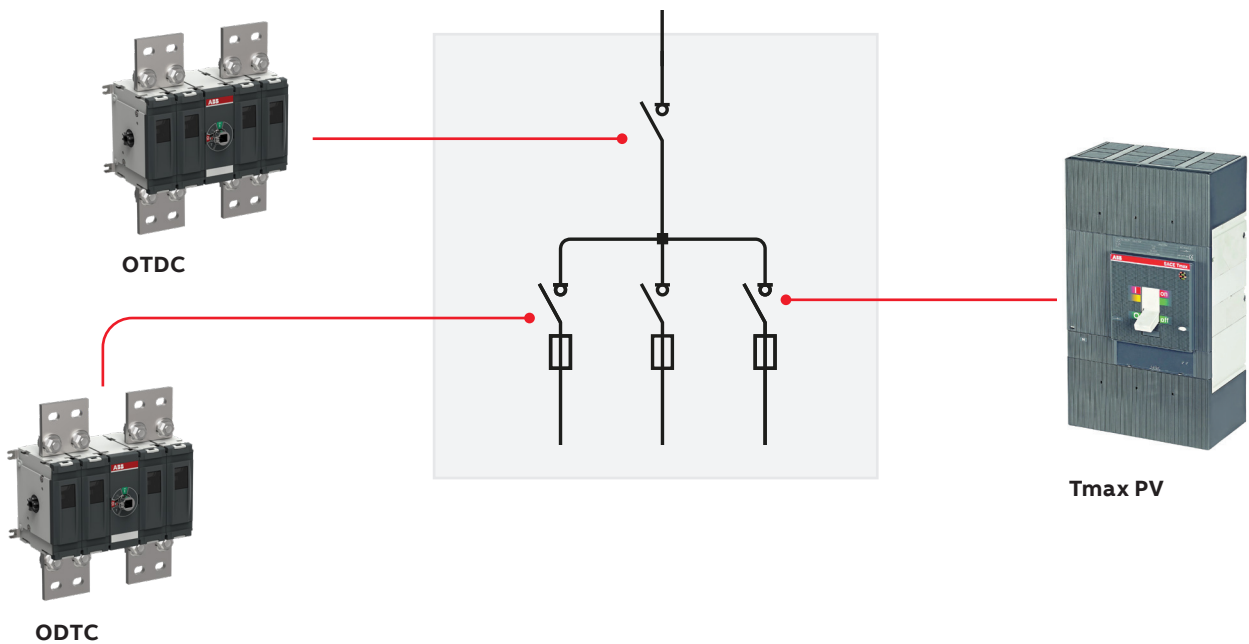
On each feeder inside the DC combiner:

- OTDC200UGV11-ESS switch-disconnector combined with any suitable PV fuse*. Installed for switching and protective purposes if remote tripping is not needed
- or T4N/PV-E molded case circuit breaker installed for switching and protection purposes. The circuit breaker is optionally equipped with undervoltage release UVR and motor operator to open/close remotely.

On Main DC bus:

- OTDC800UFV22-ESS switch disconnector
- Protection against over voltages: OVR PV T1-T2 10-1500 PQS

DC combiner



List of components - Part number & Quantity

DC Combiner C&I UL

Device	Part number	Quantity
OTDC800UFV22-ESS	1SCA161285R1001	1
T4N/PV-E	1SDA107431R1	3
OTDC200UGV11-ESS	1SCA161992R1001	3
OVR PV T1-T2 10-1500 PQS	2CTB812100R1500	1
KIT 2 JUMPER T4N/PV-E T4N-D/PV-E 200A UL4P	1SDA107441R1	3
MOE 24 V DC	1SDA054894R1	1
UVR 24..30 V AC / DC	1SDA054880R1	1
AUX-C 3Q 1SY 24V DC	1SDA054915R1	3

DC Combiner C&I UL (optional components)

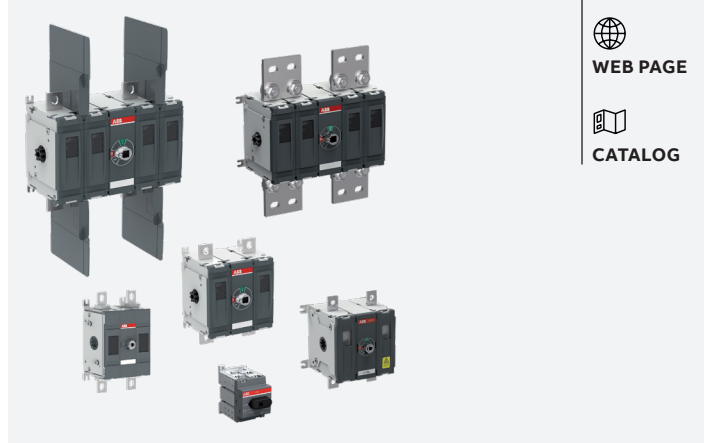
Device	Part number	Quantity
SOR 24..30 V AC/DC	1SDA054863R1	3
TVOC-2-48C	1SFA664001R1004	1
CSU-2LV	1SFA664002R5001	1
TVOC-2-DP2	1SFA664003R1020	1
TVOC-2-OP2	1SFA664004R1020	1

Product offering

Tmax T PV



OTDC



OVR



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