

MAY 2021

Energy Storage Components for the OEM

ABB Electrification USA

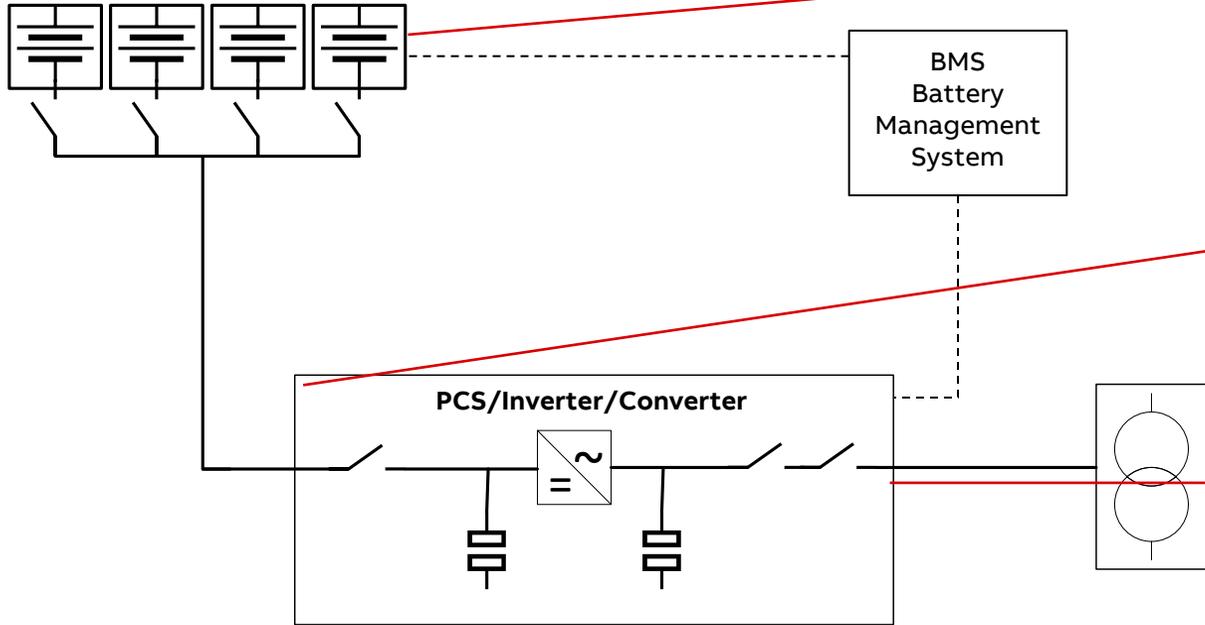
Allen Austin, Sr. Renewable Energy Market Development Manager



Typical Battery Energy Storage System Line Diagram

Example

Typical Battery Energy Storage System Line Diagram Low Voltage Application Overview



Selection parameters

Battery Side – DC*

- **Voltage:** up to 1500VDC
- **Protection device*:** semiconductor fuse or MCB/MCCB
- **Duty:** load break and short-circuit fault level/withstand rating
- **Short-circuit:** fault level or withstand rating required

DC Main Disconnect/Isolation

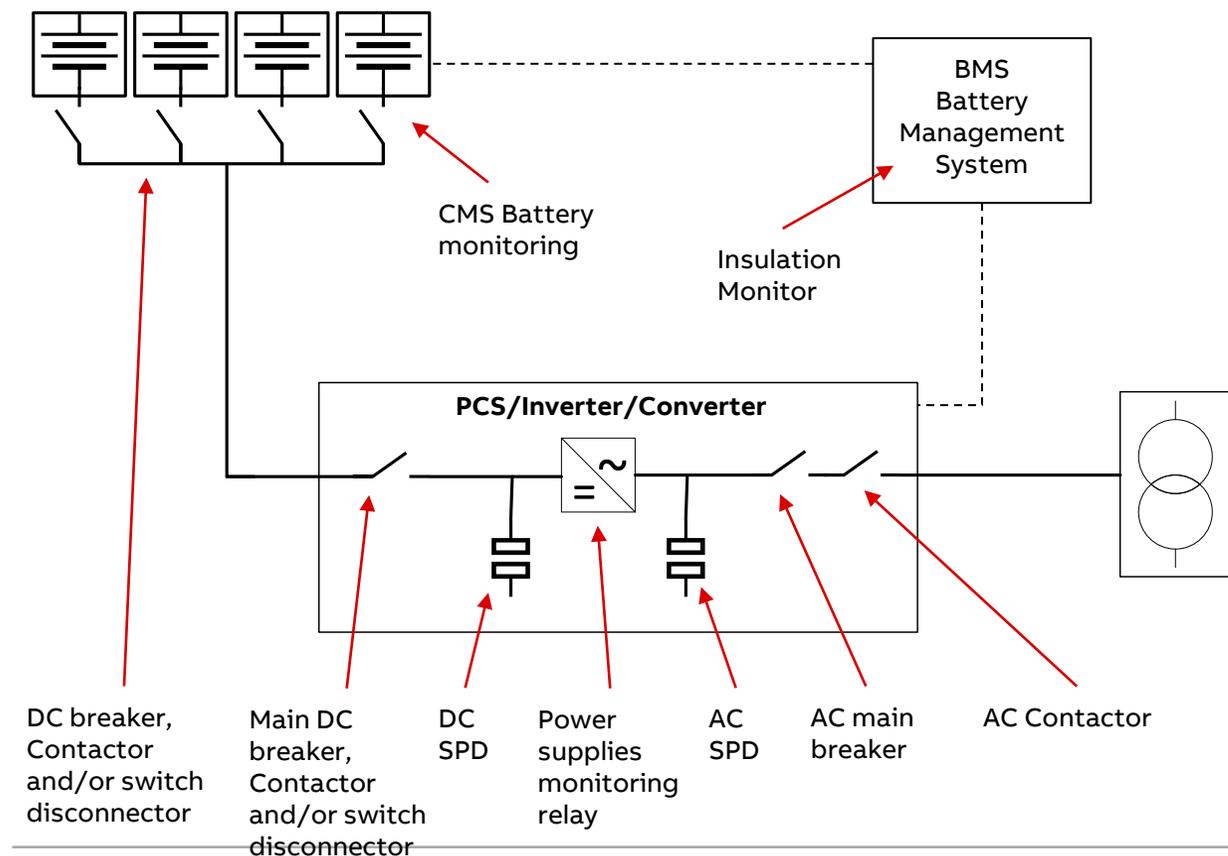
- **Voltage:** up to 1500VDC
- **Isolation:** Disconnect switch or breaker disconnect
- **Duty:** load break/no-load break
- **Short-circuit:** fault level or withstand rating required

AC Side

- **Voltage:** up to 800VAC
- **Protection device:** MCCB/ACB/Fusible switches
- **Duty:** load break
- **Short-circuit:** fault level or withstand rating required
- **Automatic AC or DC disconnection (optional)****

Example

Typical Battery Energy Storage System Line Diagram Low Voltage Component Overview



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- **Protection device*:** semiconductor fuse or MCB/MCCB
- **Duty:** load break and short-circuit fault level/withstand rating
- **Short-circuit:** fault level or withstand rating required
- **Insulation monitoring, voltage and current - CMS**
- **Battery state monitoring**

DC Main disconnect/isolation

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AC Side

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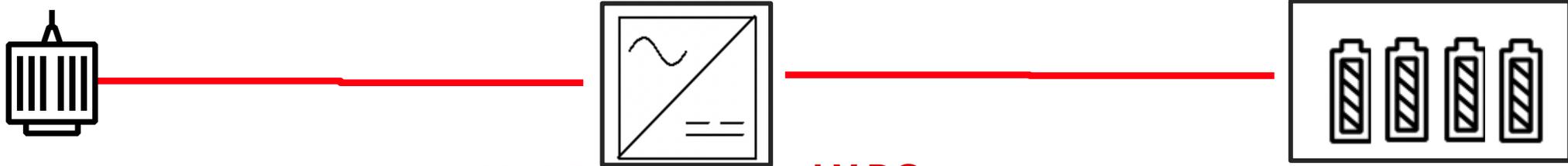
ACB: air circuit breaker

Breaker disconnect: breaker working as a disconnect switch w/o protection

** can be accomplished with motorized devices or contactors

Application Overview

Energy Storage System – Inverter and Batteries



- Transformer

LV AC

- Switchgear
- Switchboard
- Panelboard
- MCCB
- ACB
- SPD
- Contactor
- Disconnect Switch
- Fuse Holder
- RCD
- Power Supply
- Current Monitoring System
- Pilot Device
- MCB

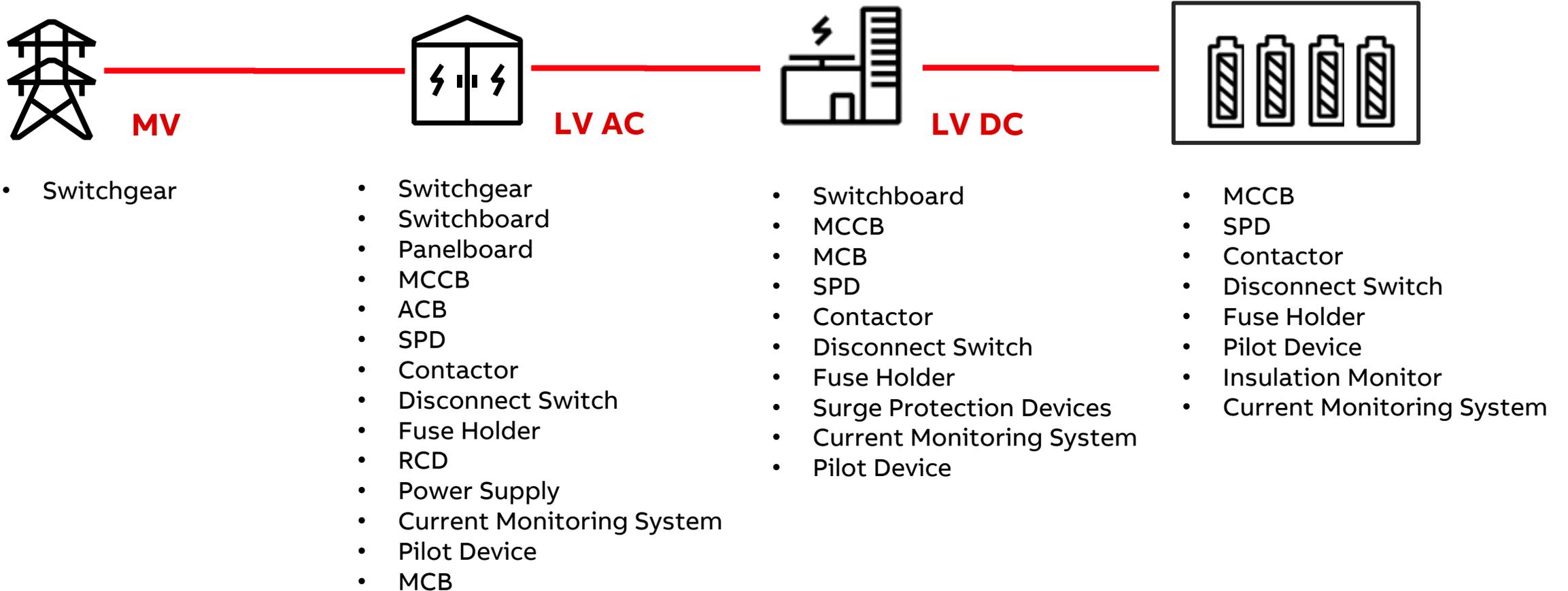
LV DC

- Switchboard
- MCCB
- MCB
- SPD
- Contactor
- Disconnect Switch
- Fuse Holder
- Surge Protection Devices
- Current Monitoring System
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- MCCB
- SPD
- Contactor
- Disconnect Switch
- Fuse Holder
- Pilot Device
- Insulation Monitor
- Current Monitoring System

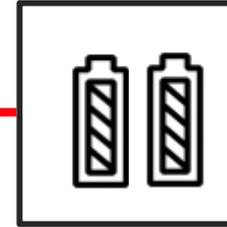
Application Overview

Energy Storage – Commercial and Industrial



Application Overview

Energy Storage - Residential



- Load Center
- MCCB
- MCB
- Contactor
- Disconnect Switch
- Fuse Holder
- Surge Protection Devices

- MCB
- Contactor
- Surge Protection Devices
- Fuse Holder
- Pilot Device

DC side components

Used in:

- **Battery Management System (BMS)**
- **DC side of the Inverter / Converter**
- **DC side of the Power Conditioning System (PCS)**
- **DC side of Energy Management System (EMS)**

Product Offering

DC Components

OTDC Disconnect Switch

- 100 to 1000A; Up to 1500VDC (UL)
- UL disconnect switches can breaker 1 or 2 circuits at the same time
- Modular construction, handle mechanism location variable



Tmax T PV Circuit Breaker

- 40 to 800A MCCB; 100 to 1000A MCS; Up to 1000VDC (UL)
- 40 to 200A MCCB; 200 to 1200A MCS; Up to 1500VDC (UL)
- 80 to 300A MCCB; up to 800VAC (UL)
- Remote opening with shunt trip or Open/Close with motor-operator accessory
- 3 to 4 poles in series, depending on the frame size



Emax DC ACB

- Frame sizes range from 800 to 5000A for a circuit breaker and 800 to 6300A for a switch disconnect
- Rated up to 1000VDC (IEC)
- Available with accessories that allow remote open or remote closing



Emax 2 MS/DC-E

- E4.2 frame size from 1600 to 3200A switch disconnect
- Rated up to 1500VDC and 100kA (UL)
- Available with accessories that allow remote open or remote closing



Product Offering

DC Components

OVR PV Surge Protection Device

- From 600VDC for small installation to 1000VDC and 1500VDC for large scale solar farms
- Rated both UL1449
- Pluggable cartridge, remote signaling possible, and status indicator
- Indicator window for fast visual status



S804U-PVS5 GFDI

- The S804U-PVS5 is for GFDI (ground-fault detector interrupter) applications in photovoltaic systems. In case of a ground fault, the breaker will trip, and the PV generator will not be damaged.
- UL 489B tested for 1000 V DC; UL Recognized for 1500V DC
- Rated current 5A
- -25 °C to 60°C ambient



CMS-660 Current Monitoring System

- Rated both UL and IEC, up to 1500VDC, and sensors up to 160A (TRMS)
- Up to 32 flexible monitoring points, placed where current and temperature measurement is required
- Modbus RTU protocol guarantees easy integration into plant or inverter monitoring systems
- Integration of SPD and Switch disconnecter status via 2 digital inputs



Product Offering

DC Components

DC Switching Contactors

- **GF Contactor:** 210A; Up to 1500VDC (UL)
- **GAF Contactor:** 250 to 2050A; Up to 1000VDC (UL)
- **GA75/GAE75 Contactor:** 35 to 100A; Up to 1000VDC (UL)
- Can manage large control voltage variations
- Wide range of control voltage options covering 24...500 V 50/60 Hz and 20...500 V DC
- Can withstand short voltage dips and voltage sags
- Built-in surge suppression



P90 PV Fuse Holders

E90/32 PV

- Up to 1000VDC and 30A
- 1 and 2 poles
- Rated both UL/IEC
- Optical blown fuse indicator

E90/32 PV 1500E

- Up to 1500VDC and 30A
- 1 pole
- Rated both UL/IEC
- Compact size



OVR TC Dataline Protection

- Dataline protection for UL1449
- From 6 to 200V DC
- Available with RJ11 and RJ45 bases
- IP20 finger safe
- Operating temperature is -40 to +80 °C



Product Offering

DC Components

Insulation Monitors

CM-IWx Insulation monitoring relays

- System voltage monitoring up to 1500 V DC and 1100 V AC
- System leakage capacitance monitoring up to 3000 μF
- Versatile system monitoring for 2-wire, 3-wire, 4-wire, and battery systems
- Easy-to-configure interrupted wire detection
- Easy-to-configure non-volatile fault storage



AC side components

Used in:

- **AC side of the Inverter / Converter**
- **AC side of the Power Conditioning System (PCS)**
- **AC side of Energy Management System (EMS)**

Product Offering

AC Components

OT Non-Fusible Switch

- 20 to 2000A; Up to 600VAC (UL)
- Modular construction, handle mechanism location variable
- Compact and light weight
- Visible contacts
- Quick-make/quick-break



OS Fusible Switch

- 30 to 1200A; Up to 600VAC (UL)
- Modular construction, handle mechanism location variable
- Compact and light weight
- Interlocking fuse covers prevent opening while the switch is in “ON” position



Tmax XT MCCB

- 15 to 1200A; Up to 600VAC (UL)
- Full range of thermal magnetic and electronic trip units with options for metering
- Full range of accessories such as terminal options, auxiliary contacts, operating mechanisms, communications, remote control, and locks



Emax 2 ACB

- 100 to 6000A; up to 600VAC (UL)
- Electronic trip units with options for metering
- Full range of accessories such as terminal options, auxiliary contacts, remote control, communications, and locks



Product Offering

AC Components

Contactors

- 25 to 2850A, Up to 600VAC (UL)
- Wide range of control voltage options covering 24...500 V 50/60 Hz and 20...500 V DC
- Built-in surge suppression
- Add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- Reduced energy consumption, therefore increasing the energy efficiency of the complete inverter package



Miniature Circuit Breakers

- UL489 breakers rated for 0.2 to 63A, Up to 480Y/277VAC and 250VDC
- UL1077 breakers rated for 0.5 to 100A, Up to 600Y/347VAC and 500VDC
- Energy Limiting
- Fast breaking time 2.3-2.5ms
- Wide range of accessories including shunt trips, auxiliary contacts, handle mechanisms, etc.



E90 Fuse Holders

- 30 to 125A, Up to 600V AC/DC (UL)
- 1 through 4 pole options with neutral availability
- IP20 finger safe
- Optical blown fuse indicator light
- Pad lockable (when open) and sealable (when closed)



Product Offering

AC Components

Power Supplies

Power Supplies (CP-D, CP-E, CP-T, CP-C.1):

- 5, 12, 24, and 48VDC rated output voltage
- 0.42 to 40A rated output current
- 10 to 960W rated output power



Power Buffer

Power Buffer (CP-B):

- 24VDC rated input voltage
- 3 to 20ADC rated current
- 100% load current from 13s to 38sec (dep. on device)



Current Monitoring System

- CMS-600 measures current and can use up to 64 sensors
- CMS-700 measures current, power, energy, etc. and can use up to 96 sensors
- Both open-core and solid-core sensors
- Uses Modbus protocol



Product Offering

AC Components

OVR Surge Protection Devices

- OVR T2 offers Type 2 protection according to UL 1449
- From 15kA and 40kA (150V AC to 660V AC)
- Protect 1, 2, 3, or 4 lines including neutral
- Pluggable and replaceable cartridges
- Optional auxiliary contact to signal status
- Status indicator window



Pilot Devices

- Wide range of pilot lights, pushbuttons, selector pushbuttons, selector switches, mushroom pushbuttons, toggle switches, joysticks, machine stops, etc.
- Self cleaning contacts
- Modular Plastic and Metal Range has snap on design that simplifies and quickens installation
- Compact Range reduces installation size in one compact design



Residual Current Device

- A protection device that trips when the system leaks a significant current to ground
- Contact position indicator (CPI) to always know the status of the contacts (red: closed contacts; green: open contacts) independent of the toggle position
- Up to 125A, 120 – 277VAC (2 pole), and 120 – 480Y VAC (4 pole)
- UL1053 compliant



ABB