

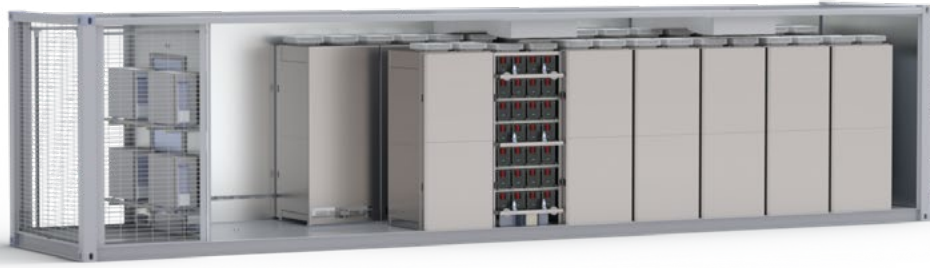


FREQCON BESS FQ

Battery Energy Storage System

FREQCON BESS FQ

Flexible energy storage system



Most Reliable Quality

- Reliable and robust BMS guarantees long battery lifespan
- State-of-the-art fire safety system (Stat-X 60 E)
- Compliance with all required grid codes
- Converters are designed for a lifetime of > 20 years

Outstanding Flexibility

- Flexible energy storage solution with high-quality LiFePO4 batteries
- Plug & play design with MSC Hybrid Converter 175 kW to 3 MW, scalable to > 100 MW
- Subsequent integration of energy sources / consumers requires minimal effort

Modular System

- Hybrid Converter Concept enables integration of additional energy sources / consumers such as PV, wind or hydrogen electrolysers
- Compact, modular solution in an ISO container (optionally available as in-house solution)

FREQCON Converter System with reliable Battery Storage

A compact, modular container solution for different applications

We have developed the FREQCON BESS FQ as a compact, modular container solution. It combines proven power converter technology, designed for a lifespan of 20 years, with battery storage, a robust Battery Management System (BMS) and project-specifically customisable Energy Management System (EMS). What makes our system so ingenious is not only its

quality, but also a flexible and easy customization for a wide range of applications in the Low and Medium Voltage.

Our modular system is available in multiple container sizes (20 ft., 30 ft. or 40 ft.)

The information in our brochure is related to operation up to 1C.

Applications

Our Grid & Storage Solutions allow an efficient and reliable use for various applications:

 Frequency Containment Reserve (FCR)	 Hybrid applications	 Peak shaving	 Peak shifting	 Energy arbitrage, Daytrading
 Uninterruptible Power Supply	 Voltage dip mitigation	 Voltage control	 Active harmonic filter	 Frequency control
 Microgrid operation	 Reactive power compensation	 Black start capability	 Synthetic inertia	 Grid forming

Container sizes

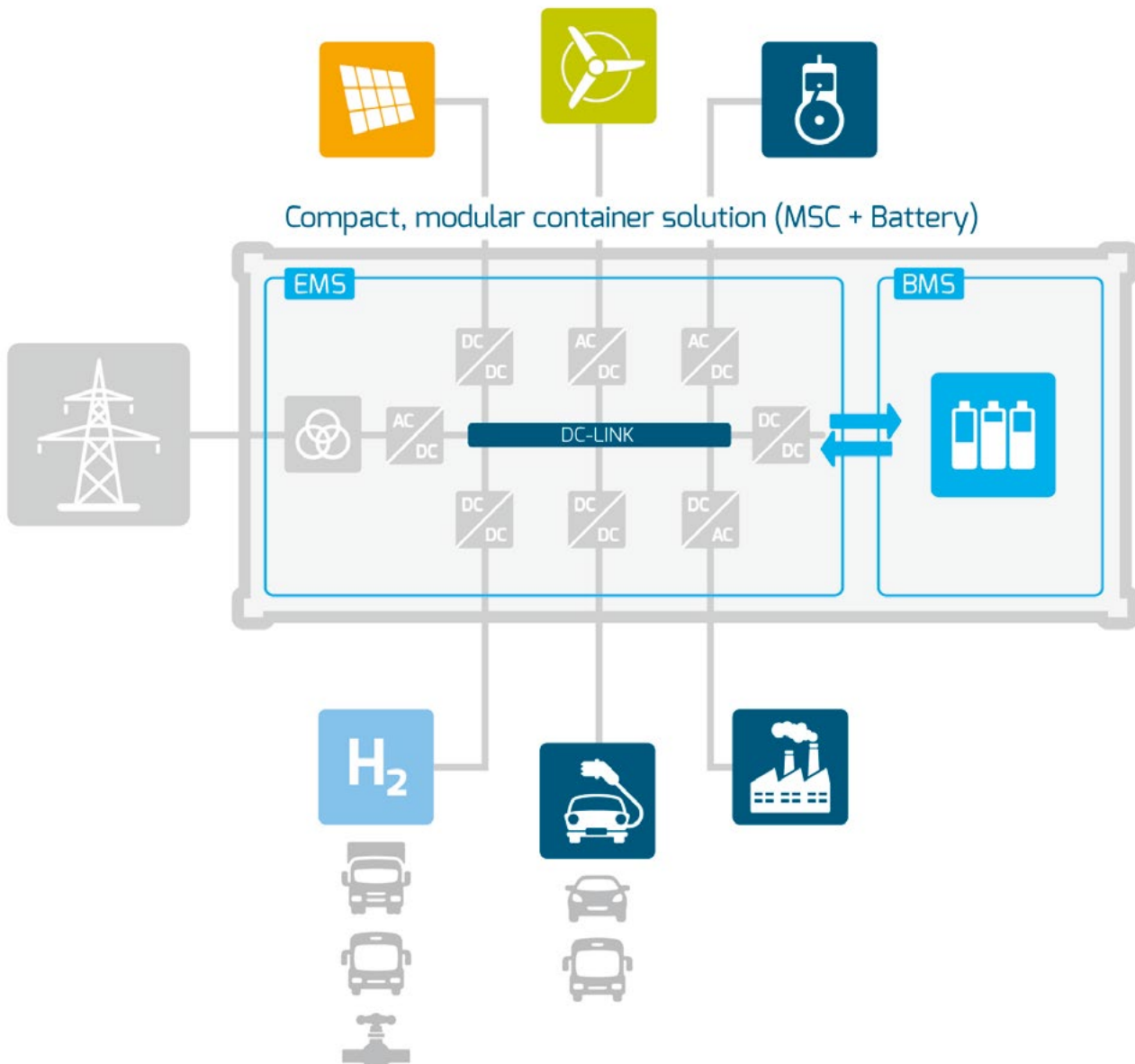
Overview/Variants 1 C

Power and Capacities (Low Voltage)			
Power	Capacity (usable)	Converter Container	Battery Container
0.5 MW	0.68 MWh	1 x 20 ft. Combi-Container	
1.0 MW	1.13 MWh	1 x 30 ft. Combi-Container	
1.5 MW	1.58 MWh	1 x 30 ft. Combi-Container	
2.0 MW	2.03 MWh	1 x 40 ft. Combi-Container	
3.0 MW	3.39 MWh	1 x 20 ft.	1 x 30 ft.
4.5 MW	4,74 MWh	1 x 20 ft.	1 x 40 ft.

Container sizes including medium voltage transformer and switch upon request

System Diagram

Battery storage with hybrid converter



FREQCON BESS FQ

Standard sizes

Technical Data	BESS 0.5 MW	BESS 1.0 MW	BESS 1.5 MW	BESS 2.0 MW	BESS 3.0 MW	BESS 4.5 MW
Usable capacity	677 kWh	1129 kWh	1581 kWh	2032 kWh	3387 kWh	4742 kWh
Installed capacity	753 kWh	1254 kWh	1756 kWh	2257 kWh	3763 kWh	5268 kWh
Corresponding Converter Model (1C)	MSC 500	MSC 1000	MSC 1500	MSC 2000	MSC 3000	MSC 4500
Housing container size	20 ft. Combi-HC	30 ft. Combi-HC	30 ft. Combi-HC	40 ft. Combi-HC	20 ft. + 30 ft. HC	20 ft. + 40 ft. HC
Battery type	Lithium-Iron-Phosphate					
Cell-Balancing	FREQCON Battery Management System (BMS)					
Voltage range	700 to 1022 VDC					
Battery efficiency	97.8 % @ 1C / 1C / @ 25 °C					
Capacity guaranteed	10 years					
Depth of discharge (DoD)	100 % DoD					
Lifetime-cycles (expected)	5000 @ 1C / 1C / @ 25 °C / 100 % DoD / 80 % EoL					
Lifetime-cycles (guaranteed)	3750 @ 1C / 1C / @ 25 °C / 100 % DoD / 80 % EoL					
Mixed sound source level	60 dB					
Temperature range (transport and storage)	0 °C to +35 °C					
Temperature range (operation)	-20 °C to +40 °C					
Environmental classifications (ISO 9223)	C3, C4 and C5 upon request					
Cooling	Integrated air-conditioning system					
Battery Racks						
Number of battery racks	3	5	7	9	15	21
Nominal storage capacity per battery rack	250.88 kWh					
Number of battery modules per battery rack	28					
Number of cells per battery rack	280					
Battery rack dimensions (wxdxh)	1000 x 1000 x 2200 mm					
Battery rack cooling method	Air cooled					
Battery rack BMS	FREQCON Battery Management System (BMS)					
Battery Cells						
Cell type	LiFePO4					
Model	EVE LF280					
Nominal voltage	3.2 V					
Nominal capacity	280 Ah					
Energy	896 Wh					
Standard charge/ discharge	Current	1C / 1C				
	Cut-off voltage	3.65 V / 2.5 V				
Max. current of charge/discharge	Continuous charge/ discharge	1C / 1C				
Data transmission and Remote control						
Supported communication protocols	MODBUS TCP, Ethernet IP (others available upon request)					
Remote access	Supports all Ethernet based protocols available					
Main Controller						
Main controller	Siemens Simotion P320-4					
Control software	FREQCON Framework					
Internal communication bus	Profinet					
External communication interface	MODBUS TCP, Ethernet IP (others available upon request)					
Control method	External control via MODBUS TCP or Ethernet IP with higher-level controller					
Protection Devices						
Fire detection method	CO sensor and temperature sensor combination					
Fire Extinguishing System	Stat-X					
Fire alarm	Yes					
Emergency stop button outside	Yes					
Standards and Certifications cells	Safety: IEC 62619					
Standards and Certifications Battery System	Safety: IEC 62619, 62620, 63056, 62485-1, 62485-5, 62281, 61140, Batt 2006/66/EG and EMC: IEC 55011, 61000-2, 61000-4					