

The system integrates two 1250kW PCS units and one transformer into a Grid-forming MV Turnkey Station, serving as the energy conversion stage that transforms battery storage energy into grid-forming support capability. Considering the 300% overload capacity for 10 seconds, a corresponding number of battery containers are configured to form a 2.5MW grid-forming BESS unit. Multiple grid-forming BESS units are integrated in parallel and centrally dispatched to function as grid support nodes with capacity matching traditional synchronous generators.

- Multiple grid-forming BESS units, combined with a grid-forming BESS coordinating control cabinet, form a station-level grid-forming BESS solution.
- The grid-forming BESS coordinating control cabinet integrates EMS, PMS, rapid station-level coordinated control, synchronizing devices, anti-islanding devices and other equipment, allowing flexible configuration based on station-level functional requirements.
- The grid-forming BESS coordinating control cabinet supports the connection of hundreds of grid-forming BESS units.
- Unified dispatch enables the construction of hundred-MW level grid-forming BESS power station.

#### Typical Configuration of Grid-forming BESS Power Station

Name	Name	Number	Notes
Typical Solution 1	100MW/400MWh	1	Single grid-forming BESS unit of 2.5MW/10MWh
1.1	Grid-forming MV Turnkey Station	40	Single MV Turnkey Station includes two 1250kW grid-forming PCS units
1.2	Battery Container	80	Single battery container of 5MWh
1.3	Grid-forming BESS Coordinating Control Cabinet	1	Integrating EMS, PMS, rapid station-level coordinated control, synchronizing devices, anti-islanding devices and other equipment, allowing flexible configuration based on station-level functional requirements.
Typical Solution 2	150MW/300MWh	1	Single grid-forming BESS unit of 2.5MW/5MWh
2.1	Grid-forming MV Turnkey Station	60	Single MV Turnkey Station includes two 1250kW grid-forming PCS units
2.2	Battery Container	60	Single battery container of 5MWh
2.3	Grid-forming BESS Coordinating Control Cabinet	1	Same as 1.3

# GRID-FORMING BESS SOLUTIONS



BEIJING SIFANG AUTOMATION CO., LTD.

Constructing the power conversion system (PCS) with the characteristics of a voltage source, centered around the grid-forming technology, and simulating the characteristics of a synchronous generator through grid-forming control, enables the BESS system to provide voltage and frequency support capabilities to the power grid. The main application scenarios are as follows:

#### Grid Integration and Island Operation of Renewable Energy in Desert/Gobi/Wilderness Areas:

Renewable energy sources are widely distributed in these regions, with weak system strength and low power supply reliability. An integrated solution centered on constructing grid-forming BESS provides frequency and voltage support, while also offering conventional BESS functions such as peak shaving and smoothing the output characteristics of renewable energy.

#### Renewable Energy Base Power Transmission via Flexible HVDC:

When flexible HVDC is used for power transmission from pure renewable energy bases, the sending-end converter station employs grid-forming BESS technology to control the voltage frequency and amplitude of the renewable energy base's collection bus, providing stable support for the renewable energy base.

#### Flexible HVDC Connected to Weak Systems:

When system strength is too low, the operational characteristics of flexible HVDC may be affected. In the event of grid frequency disturbances, grid-forming BESS can actively support the grid, resolving stability issues in flexible HVDC systems when system strength is reduced.



BESS Power Station



Grid-forming PCS

When the power source side is in a complete blackout state, multiple grid-forming PCS units can start in parallel with

### Primary Frequency Regulation:

In grid-connected operation, grid-forming BESS can coordinate with the BESS control system or autonomously adjust power output in response to system frequency variations.

### Damping Control:

When low-frequency oscillations occur in the grid, grid-forming BESS can regulate active power through damping control to suppress oscillations.

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Product Model	CSD-5831F-A	CSD-5831F-B	CSD-5831F-C
<b>DC Side</b>			
Rated DC Power	750kW	1250kW	1500kW
Maximum DC Power	842kW@long-term 2250kW@10s	1403kW@ long-term 3750kW@10s	1684kW@ long-term 4500kW@10s
Rated DC Power	842A@ long-term	1403A@ long-term	1684A@ long-term
Maximum DC Power	2250A@10s	3750A@10s	4500A@10s
Maximum DC Bus Voltage	1500V		
Working Range of DC Side Voltage	1000V-1500V		
Number of DC Input Circuits	1	1 or 2	1 or 2
<b>AC Side (Grid-Connected)</b>			
AC Output Power	750kVA @45°C 825kVA @30°C	1250kVA @45°C 1375kVA @30°C	1500kVA @45°C 1650kVA @30°C
Maximum AC Power	825kVA @ long-term 2250kVA @10s	1375kVA @ long-term 3750kVA @10s	1650kVA @ long-term 4500kVA @10s
Maximum AC Current	690A @ long-term 1883A @10s	1151A @long-term 3138A @10s	1381A @ long-term 3765A @10s
Rated Output Voltage	690V		
AC Voltage Range	621-759V		
Rated Grid Frequency	50/60Hz		
Total Harmonic Distortion of Current	< 3% (Rated Power)		
Power Factor	> 0.99 (at >20% Load) / -1 (Leading) ~1 (Lagging)		
Reactive Power Range	-100% ~ 100%		
<b>AC Side (Off-Grid)</b>			
Rated Output Voltage	690V		
AC Voltage Range	621-759V		
Voltage Unbalance Degree	< 2%		
Total Harmonic Distortion of Voltage	< 3% (Linear Load)		
Rated Output Frequency	50/60Hz		
Dynamic Voltage Transient Range	< 10% (when the load changes suddenly from 20% to 100% or from 100% to 20% under the condition of a balanced resistive load)		
<b>Efficiency</b>			
Maximum Efficiency	> 99%		

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Product Model	CSD-5831F-A	CSD-5831F-B	CSD-5831F-C
<b>System Parameters</b>			
Connection Mode	Three-phase three-wire		
Isolation Mode	Non-isolated		
Overload Capacity	1.1 times for long-term operation, 1.2 times for 10min, 3 times for 10s		
Allowable Ambient Temperature	-35°C~60°C ( Derated operation when the temperature is > 45°C)		
Allowable Relative Humidity	0~100% ( Without Condensation)		
Maximum Operating Altitude	5000m ( Customized for above 3000m)		
Noise	80dB		
Dimensions (Width x Height x Depth)	1080x2400x1250mm	2160x2450x1150mm	2160x2450x1150mm
Overall Weight	1400kg	2800kg	2800kg
Protection Level	IP65		
Cooling Method	Intelligent Forced Air Cooling		
<b>Communication</b>			
Communication Interface	RS485, CAN, Ethernet, Optical Port		
Communication Protocol	CAN2.0B, Modbus, IEC61850, GOOSE		

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