USER MANUAL

PowerMagic 400V C&I



Shenzhen SOFARSOLAR Co., Ltd.

3 About the product

3.1 Overview

The PowerMagic Commercial and Industrial Energy Storage System is designed for applications such as stand-alone energy storage, PV and energy storage, integrated PV storage charge solutions, and microgrid and energy storage scenarios.

Its primary functions include reducing electricity costs for enterprises by utilising peak-valley tariff differences and serving as a reliable backup power supply.

A typical application diagram of the PowerMagic C&I energy storage system is shown below:

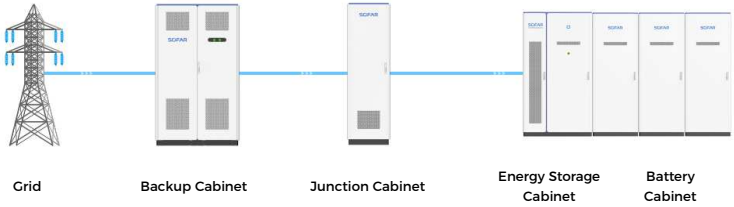


Figure 3.1: Schematic diagram of a typical PowerMagic application

3.2 Functions and features

- **Solution**

  The commercial and industrial energy storage system includes the energy storage cabinet (with PCS and liquid cooling unit), battery cabinet, combiner cabinet, and on/off-grid cabinet, providing customers with a one-stop solution.

- **Flexible capacity design**

  The system supports flexible parallel connection and capacity expansion. Maximum system power reaches 750 kW, and maximum system capacity reaches 6,192 kWh.

- **Cabinet parallel design**

In terms of reducing the footprint, energy storage cabinets (with PCS and liquid cooling units) and energy storage cabinets in commercial and industrial energy storage systems can be connected in parallel, with a maximum of 6 energy storage cabinets in parallel. Energy storage cabinets and battery cabinets can also be connected in parallel, with a maximum configuration of 1 energy storage cabinet + 3 battery cabinets. The parallel cabinet solution enables higher system energy density and lower costs.

- **Liquid and electricity separation design**

  The battery cabinet DC terminals are located at the upper part of the cabinet. During expansion, additional cabinets can be electrically and communicatively connected in a "hand-in-hand" manner at the top. The liquid cooling pipelines are arranged at the bottom. This design eliminates safety risks caused by coolant leakage near electrical connections, significantly enhancing system safety and reliability.

- **3 + 2 Safety design**

  Designed for ultimate safety:

  3 Levels of Fire Protection

  - Level 1: Pack-level perfluorohexanone gas fire suppression.
  - Level 2: Compartment-level and power distribution system-level perfluorohexanone gas fire suppression.
  - Level 3: Water-based fire suppression.

  2 Additional Safety Measures

  - Explosion venting design.
  - Combustible gas exhaust system.

  Note: For overseas projects, aerosol-based fire suppression can be provided upon request.

- **Large cell compatibility**

  The system design supports upgrading from 280Ah cells to 320Ah cells without changing the cabinet structure, further improving energy density.

- **Liquid cooling + Dehumidification**

  The liquid cooling system ensures temperature uniformity, longer lifespan, and higher efficiency of battery modules. The integrated dehumidification unit

reduces dew point temperature, effectively preventing condensation inside the battery cabinet.

- **On/off-grid switching**

  The system supports fast switching between on-grid and off-grid operation.

- **Local EMS functions**

  1. Anti-backflow protection.
  2. Balanced charging/discharging power across cabinets (based on each battery stack condition).
  3. System WEB monitoring interface.
  4. Demand response (non-real-time scheduling, pre-declared with grid or third-party system).
  5. Peak shaving & valley filling / capacity-to-demand conversion (using local TOU pricing to smooth load curves and keep peak power within limits).

  Main EMS strategies:

  1. Charge batteries fully during off-peak hours, with charging power determined by system capacity and configuration.
  2. Discharge during peak hours, fully utilising stored energy, with discharge power determined by peak pricing duration.
  3. If residual energy remains after the peak period, continue discharging.

- **Remote & Local control/upgrade**

  Supports both local and remote operation and software upgrades.

- **High efficiency & Reliability**

  Easy to install and operate, the system features high conversion efficiency, comprehensive protection functions, long service life, and compliance with grid interconnection requirements in China, North America, and Europe.

3.3 Model description

The main product models involved in this article are follows:

Table 3.1 Product model

	Energy storage cabinet	Battery cabinet	Junction cabinet	Backup Cabinet
6Pack	ESS-258KLA-SA1	ESS-258KLA-BD1	PAC-750K-H1	PAC-750K-W1
5Pack	ESS-215KLA-SA1	ESS-215KLA-BD1		

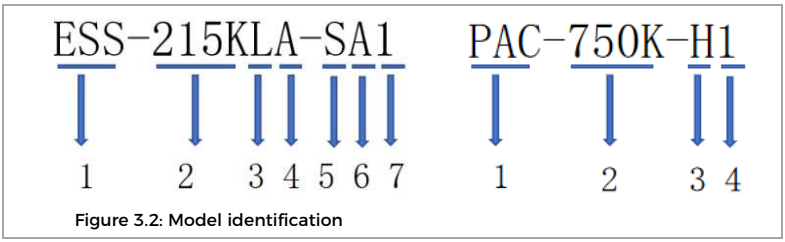


Figure 3.2: Model identification

Table 3.2 Description of energy storage cabinet/battery cabinet model

No.	Name	Meaning	Take value description
1	ESS	Product series name	Energy storage system
2	215K	Energy grade	Rated energy is 215kWh
3	L	Liquid cooling	Thermal management mode
4	A	Cell model	Example: 280Ah / 320Ah
5	S/B	With the PCS/battery	Whether the PCS module is included
6	A/D	AC/DC	Voltage type
7	1	Product version	The first generation of products

Table 3.3 Description of junction cabinet / off-grid cabinet model

No.	Name	Meaning	Take value description
1	PAC	Product series name	Energy storage system accessories
2	750K	Power level	Rated power is 750kW
3	H/W	/	Junction cabinet / Backup cabinet
4	1	Product version	The first generation of products

3.4 System description

- **Single Energy storage cabinet scenario (2h):** Backup cabinet (optional) + energy storage cabinet

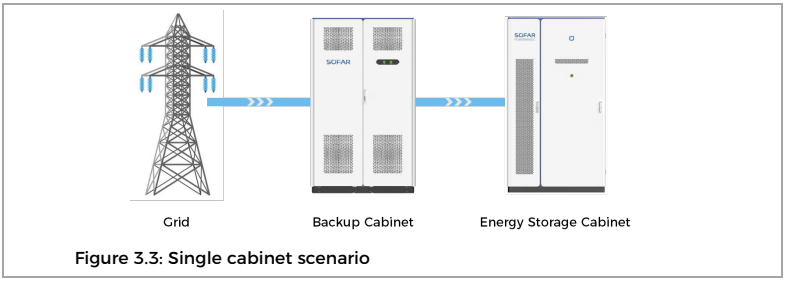


Figure 3.3: Single cabinet scenario

- **2-hour expansion scenario**: Backup cabinet (optional) + energy storage cabinet + battery cabinet

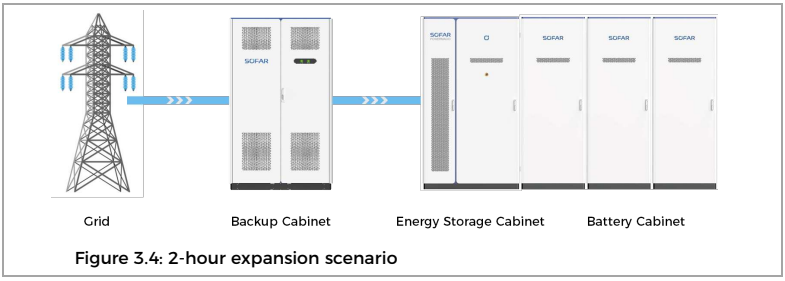


Figure 3.4: 2-hour expansion scenario

- **Parallel scenario (Max 6 units, 2h):** Backup cabinet (optional) + junction cabinet + energy storage cabinet



Figure 3.5: Parallel scenario

- **Parallel scenario (Max 6 units, 4h/6h/8h):** Backup cabinet (optional) + junction cabinet + energy storage cabinet + battery cabinet

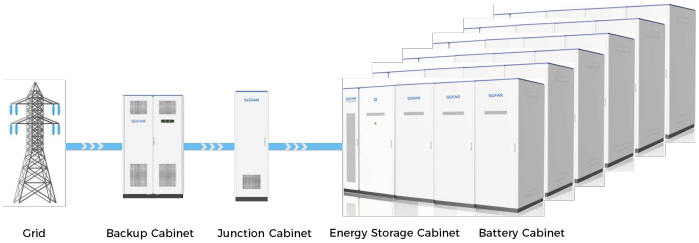


Figure 3.6: Parallel scenario

3.5 Dimension

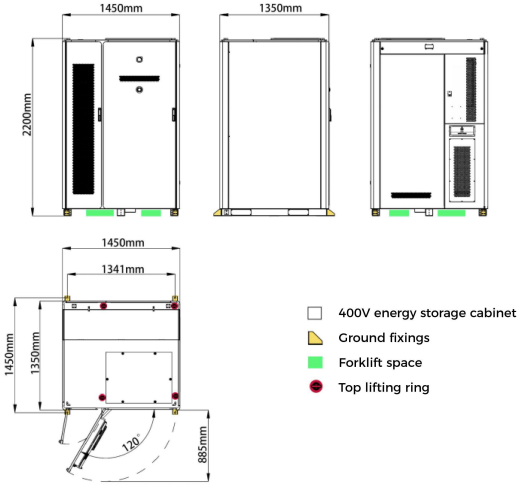


Figure 3.7: Dimensions of 400V energy storage cabinet and maximum door opening size

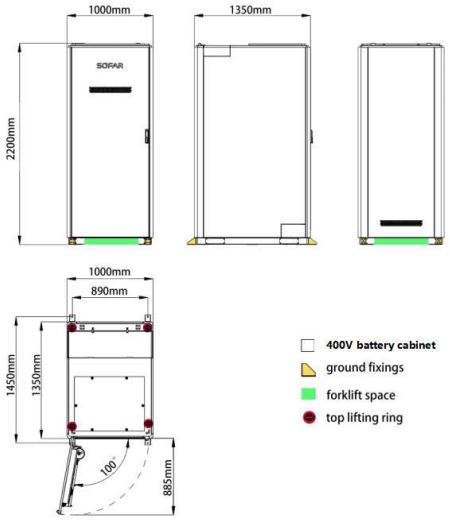


Figure 3.8: Dimensions of 400V battery cabinet and maximum door opening size

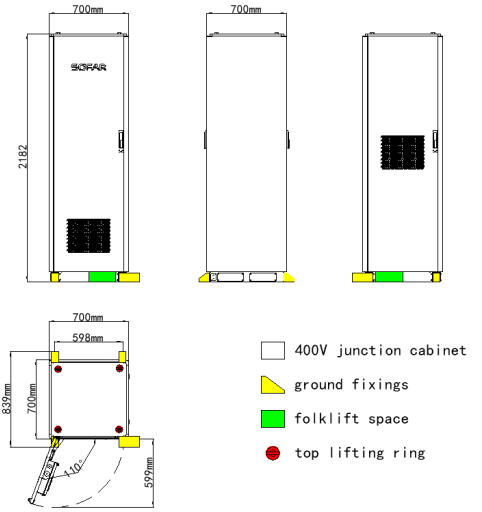


Figure 3.9: Dimensions of 400V junction cabinet and maximum door opening size

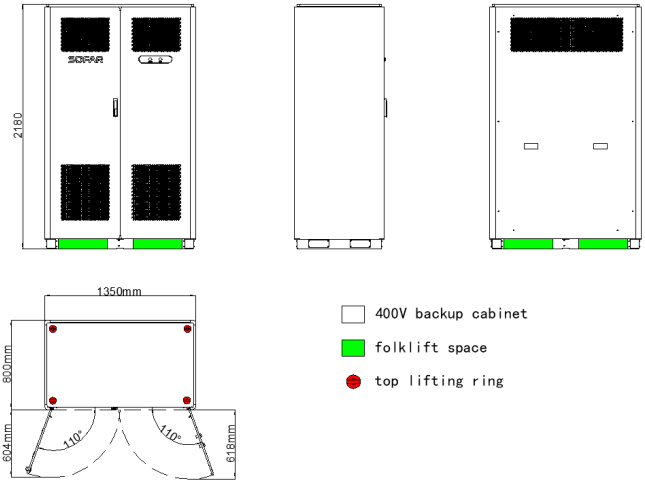


Figure 3.10: Dimensions of 400V backup cabinet and maximum door opening size