
SURYAMANU ENERGY TECHNOLOGIES

Energy365

Liquid-cooled battery energy storage, fully integrated in one 20-foot container.

Model SU9306MU5L00 · 0.5 P · LFP 306 Ah

Product Specification v1.1 · April 2023

suryamanu.com

ENERGY365 AT A GLANCE

Engineered around the numbers.

4,073.47 kWh

Rated energy, DC side — two hours of stable discharge at rated power

2,036.73 kW

Rated charge and discharge power at 0.5 P

306 Ah

New-generation LFP cell — slow degradation, long service life

1,331.2 V

Rated DC bus voltage, operating range 1,040–1,500 VDC

>270 kWh/m²

Area energy density from cell-to-pack modular integration

20 ft

Standard container footprint — land or sea transport, one-stop install

DC-side data for Model SU9306MU5L00 unless otherwise noted.



APPLICATIONS

One container. Every grid service.

Frequency regulation

Supplies active power to hold grid frequency steady through disturbances.

Voltage regulation

Reactive power support against inductive and capacitive load swings.

Peak shaving & valley filling

Absorbs surplus generation at peaks, releases energy when demand outruns supply.

Arbitrage & demand response

Shifts energy across time-of-use prices and answers grid dispatch signals.

PV & wind storage integration

Firms variable renewable output into dispatchable power.

Microgrid & backup

Operates islanded to support backup power and critical loads.



Energy365, doors open — five battery racks and the electrical compartment.

SYSTEM OVERVIEW

Fully integrated, inside one shell.

Battery

Five LFP racks, 4,073.47 kWh rated energy. The core that stores and releases energy.

BMS — Battery Management System

Distributed three-level control (CSC–SBMU–MBMU), UPS-backed, linked to PCS and EMS over CAN.

FSS — Fire Suppression System

Independent detection, explosion-proof ventilation, aerosol and dry-pipe suppression with a 24 h UPS.

TMS — Thermal Management System

40 kW liquid cooling with PTC heating, controlled by the BMS to hold cells in their optimal range.

Outdoor, non-walk-in design. Stable energy release for 2 h or 4 h when fully charged.

BATTERY ARCHITECTURE

Cell to container: 4,160 cells, one system.



Cell

LFP, 306 Ah · 2.5–3.65 V
979.2 Wh rated energy



Module

2P52S · 104 cells · ≈101.8 kWh
Integrated thermal & sensing



Rack

8 modules · 832 cells · ≈814.7 kWh
Sub control box per rack



Container

5 racks · 4,160 cells · 4,073.47 kWh
System: 5P2P416S

$$979.2 \text{ Wh} \times 4,160 \text{ cells} = 4,073.47 \text{ kWh}$$

Rated energy measured at the DC terminals of the container.

1,331.2 VDC

Rated system voltage, range 1,040–1,500 VDC

1,530 A

Rated charge & discharge current

1,883 A

Maximum current, 1-minute rating

DESIGN ADVANTAGES

Standard outside. New generation inside.

Standard 20-foot design

Convenient land or sea transportation; the standard design installs one-stop, on a prepared foundation.

New-generation LFP 306 Ah cell

More capacity per cell, slower degradation, longer service life and higher efficiency.

Highly integrated

Cell-to-pack, modular construction lifts area energy density beyond 270 kWh/m² of footprint.

Easy extension

Augment by racks or by containers; one PCS can drive two containers, cutting the covered area significantly.





SAFETY & RELIABILITY

Safety in depth, uptime by design.

01

Three levels of safety

Highly stable LFP cell chemistry; electrical protection with E-Stop, multiple fuses, insulation and voltage monitoring, multi-channel isolation and lightning protection; four-level fire control.

02

Adaptive thermal management

Single-cluster water pump with a control strategy that adjusts automatically to battery status, keeping cells at their best working point and prolonging life.

03

Four-level fire control strategy

Alarm; ventilation and smoke exhausting against deflagration; aerosol release to extinguish initial fire; dry-pipe sprinkling to stop fire spread.

04

Independent UPS for critical systems

Two integrated UPS circuits — 24 hours of backup for the fire suppression system and 10 minutes for the BMS — keep protection alive through outages.



SYSTEM SPECIFICATIONS

The numbers.

Model SU9306MU5L00 · 0.5 P rate

DC-side data unless otherwise noted

01 Power & energy

02 Electrical & communication

03 Mechanical

04 Environmental

05 Certification standards

DC-side performance.

CATEGORY	ITEM	VALUE	REMARK
Cell	Cell type	LFP	
	Capacity	306 Ah	
	Voltage range	2.5–3.65 V	
	Rated energy	979.2 Wh	
	Configuration	5P2P416S	
System	Rated energy	4,073.47 kWh	
	Rated voltage	1,331.2 VDC	
	Voltage range	1,040–1,500 VDC	
	Rated charging current	1,530 A	
	Max. charging current	1,883 A	For 1 minute
	Rated charging power	2,036.73 kW	
	Rated discharging current	1,530 A	
	Max. discharging current	1,883 A	For 1 minute
	Rated discharging power	2,036.73 kW	

Auxiliary power & communication.

01 Auxiliary power 1

Voltage range	3AC+N+PE 380–480 V ±10%, 50/60 Hz
Power	Max. 36.7 kW
Inrush current	≤65 A, <5 s

Standard configuration is two auxiliary circuits; a single-circuit option is available on request.

UPS for the BMS

DC 24 V, 7 Ah capacity at 25 °C. Supplies the BMS components only, and is included in the auxiliary power circuit.

02 Auxiliary power 2

Voltage range	AC+PE 230 V ±10%, 50/60 Hz
Power	Max. 0.8 kW continuous
Inrush current	5 A

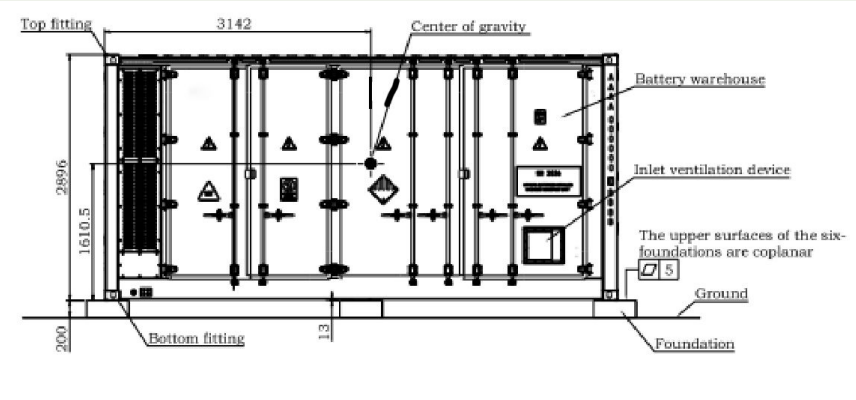
Communication

Protocols: CAN, Modbus/TCP
Ethernet optical fiber to the EMS recommended

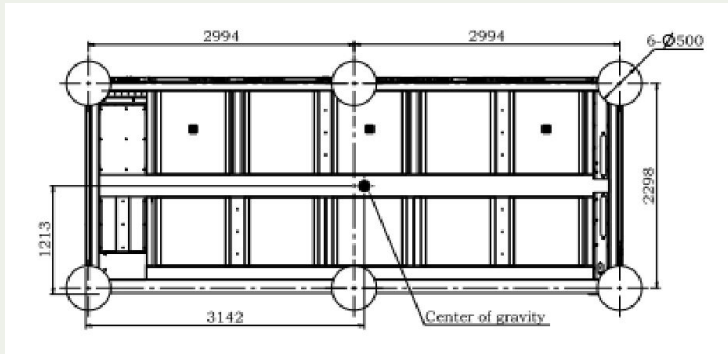
SPECIFICATIONS — MECHANICAL

Built to ship, sealed to last.

Size (H×D×W)	2,896 × 2,438 × 6,058 mm
Weight	≈36 t
Color	RAL 7042
Battery room	IP55
Electrical room	IPX5
Cooling unit	IPX5
Transportation	Land or sea



Front view and dimensions



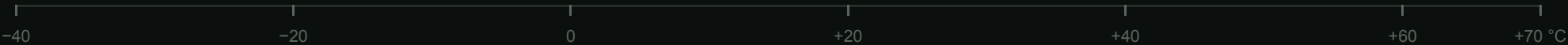
Top view — lifting points and center of gravity

Rated for real-world conditions.

Temperature envelope

Charge & discharge -25 °C ... +55 °C

Storage -30 °C ... +60 °C



Application altitude	≤2,000 m, no derating
Relative humidity	0–95 %, non-condensing
Anti-corrosion, battery unit	C4, optional C5
Seismic level	IEEE 693-2018, moderate design level

Inform Suryamanu for a professional evaluation when operating beyond the stated temperature range.

Tested to international standards.

LEVEL 1 Cell

UN 38.3	UN transport testing for lithium batteries
UL 1973	Stationary and light-electric-rail batteries
IEC 62619	Industrial secondary lithium cell safety
UL 9540A	Energy storage systems and equipment

Cell-level certification covers transport, stationary use and thermal-runaway test methodology, forming the base layer of container compliance.

LEVEL 2 Container

UL 1973	Stationary application batteries
NFPA 855	Installation of stationary ESS
UL 9540A	Energy storage systems and equipment
IEC 62477	Power electronic converter safety
IEC 62619	Industrial lithium battery safety
IEC 62933-5-2	Grid-integrated EES safety
IEC 61000-4	EMC emission, industrial environments
IEC 61000-6	EMC immunity, industrial environments
IEC 61000-4-6	Conducted RF disturbance immunity

BATTERY MANAGEMENT SYSTEM

Three levels of distributed control.

The BMS supervises voltage, current and temperature, manages energy flow and thermal control, and links to the PCS and EMS over CAN.

CSC — Cell Supervision Circuit · 40 units

Base unit of battery management; cell voltage and temperature sampling with balancing on every channel.

SBMU — Slave Battery Management Unit · 5 units

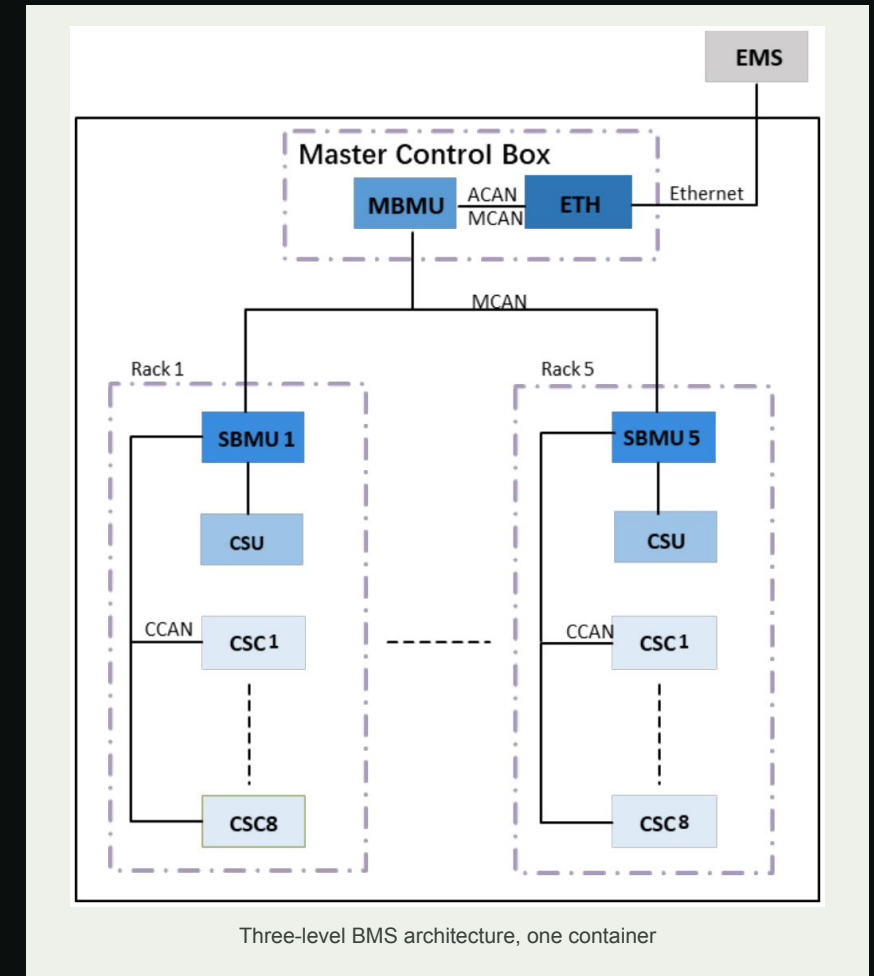
One per rack. Collects and analyses CSC data and uploads it to the MBMU.

MBMU — Main Battery Management Unit · 1 unit

The core control unit of the container, housed in the master control box with the IMM insulation module and ETH fiber conversion.

A dedicated UPS keeps the BMS running for 10 minutes through power loss.

Architecture scales to one PCS with two containers in parallel.



Seven jobs, one controller.

Battery status monitoring

Cell voltage, module temperature, current and total voltage. SOC and SOH within $\pm 5\%$. On faults — alarm, current limiting, then HV contactor disconnect.

Charge & discharge management

Controls HV main contactors, auxiliary relays and pre-charge across paralleled racks. Computes power limits from battery state and reports them to the EMS.

Thermal management

Samples cell and coolant temperatures and drives the liquid-cooling TMS start-up and shutdown.

Program refreshing

On-site flashing of MBMU, SBMU, IMM, CSC and ETH over MCAN; remote software update via Ethernet or through the EMS.

High-voltage safety monitoring

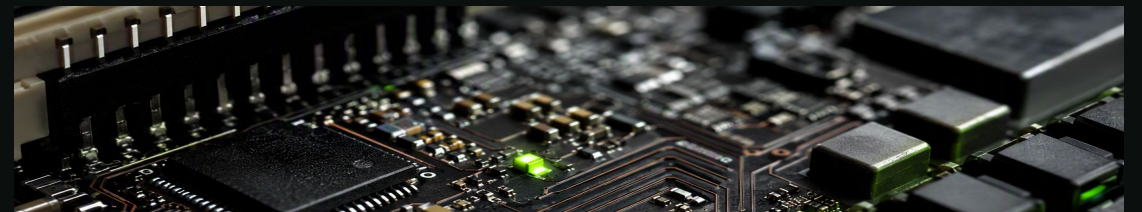
System insulation detection and high-voltage sampling; supervises dry contacts of MSD, fuse and switch plus contactor auxiliary contacts.

Peripheral monitoring & control

Ambient temperature and humidity sampling; multiple high-side drivers and dry-contact inputs matched to project requirements.

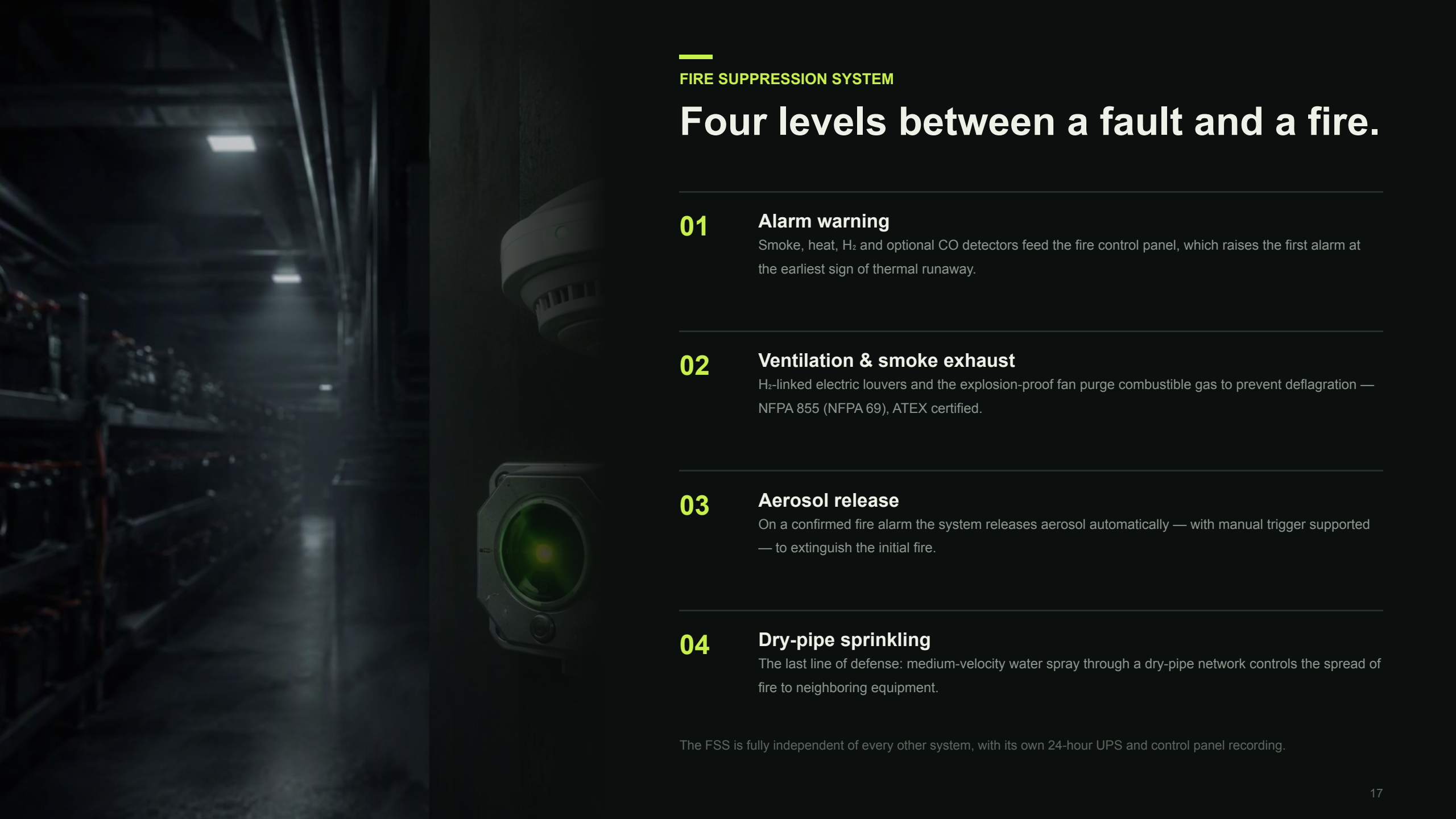
Fault diagnosis & records

Stores operational parameters and the latest historical alarms; data recording and fault waveforms are reported to the EMS host computer.



Measurement performance.

PARAMETER	RANGE	ACCURACY & CONDITIONS
Working voltage	20–26 V	—
Cell voltage sampling	1–4.85 V	±5 mV (0...+60 °C); ±10 mV (–40...0 / 60...85 °C)
Cell temperature sampling	–40...+125 °C	±2 °C (–20...+60 °C); ±3 °C at the extremes
Current sampling	±500 A	<1 % FSR, –40...+85 °C
HV sampling	0–1,500 V	1 % FSR
Cell balancing	100 mA @ 3.2 V	Open on all channels
SOC accuracy	—	<±5 %, LFP, per specific conditions
SOH accuracy	—	<±5 % after calibration
Insulation detection	0–10 MΩ	Detection time ≤10 s
Ambient temperature	–40...+85 °C	±3 °C



FIRE SUPPRESSION SYSTEM

Four levels between a fault and a fire.

01 Alarm warning

Smoke, heat, H₂ and optional CO detectors feed the fire control panel, which raises the first alarm at the earliest sign of thermal runaway.

02 Ventilation & smoke exhaust

H₂-linked electric louvers and the explosion-proof fan purge combustible gas to prevent deflagration — NFPA 855 (NFPA 69), ATEX certified.

03 Aerosol release

On a confirmed fire alarm the system releases aerosol automatically — with manual trigger supported — to extinguish the initial fire.

04 Dry-pipe sprinkling

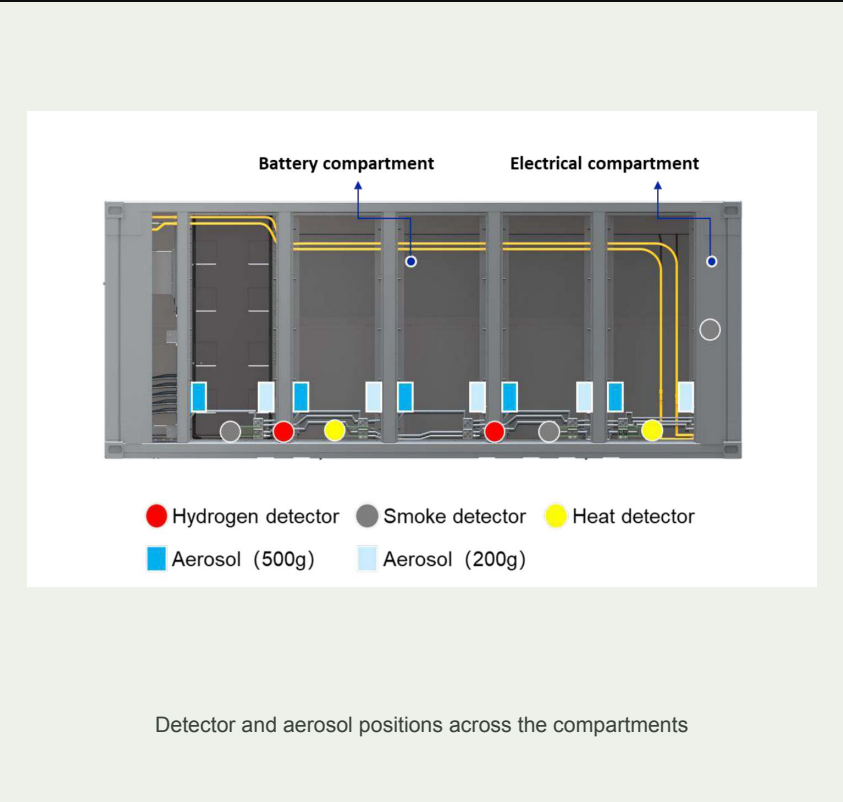
The last line of defense: medium-velocity water spray through a dry-pipe network controls the spread of fire to neighboring equipment.

The FSS is fully independent of every other system, with its own 24-hour UPS and control panel recording.

Detection: see it before it starts.

DETECTOR	QTY	CONFIG	PLACEMENT
Heat	2	Optional	Battery room
Smoke	2+1	Standard	Battery + electrical
H ₂	2	Standard	Battery room
CO	2	Optional	Battery compartment
Fire control panel	1	Standard	Electrical room

All detector signals are received and processed by the fire control panel. The H₂ detector is interlocked with the explosion-proof fan system, triggering ventilation before gas can accumulate.



FIRE SUPPRESSION SYSTEM

Explosion-proof ventilation.

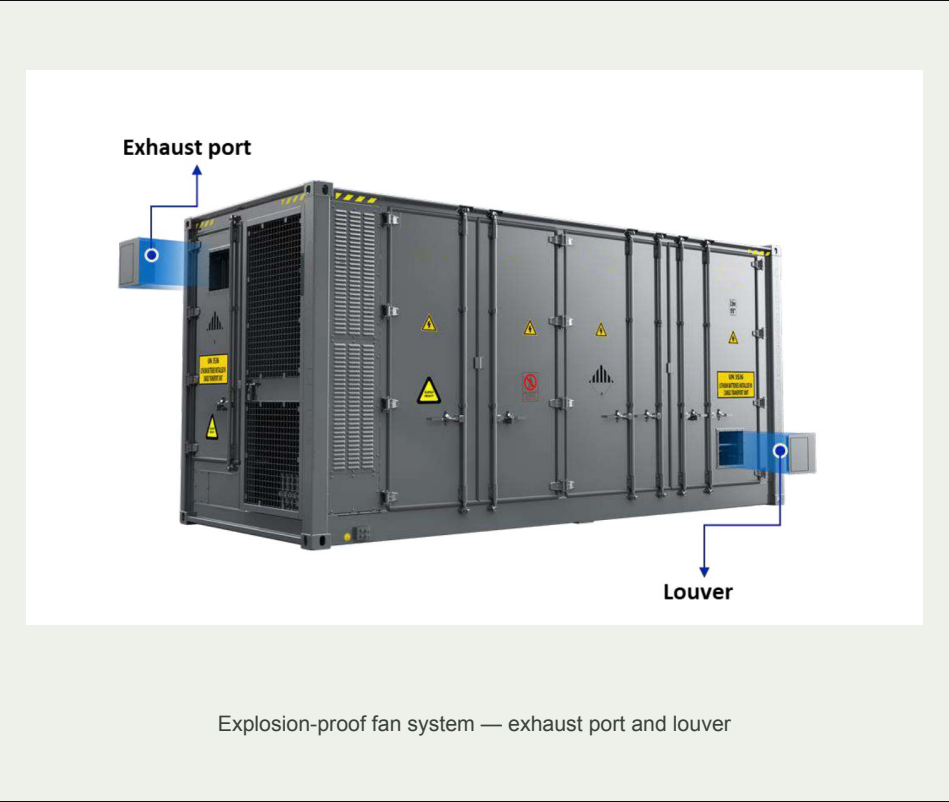
When the H₂ detector raises an alarm, the inlet louver opens and the explosion-proof exhaust fan purges the battery room. Both close automatically once gas concentration returns to a safe threshold — or on a secondary fire alarm.

01 Air inlet louver

Supply voltage	24 V DC
Rated / inrush power	60 W / 85 W
Position	Integrated in rack
Certification	ATEX in progress

02 Exhaust port & fan

Supply voltage	230 V AC
Rated / inrush power	72 W / 102 W
Max. air volume	820 CFM
Certification	ATEX



FIRE SUPPRESSION SYSTEM

Extinguishing: aerosol first, water last.

Aerosol

Released automatically on a fire alarm, with manual triggering supported. 500 g and 200 g units are distributed across the battery and electrical compartments.

Dry pipe

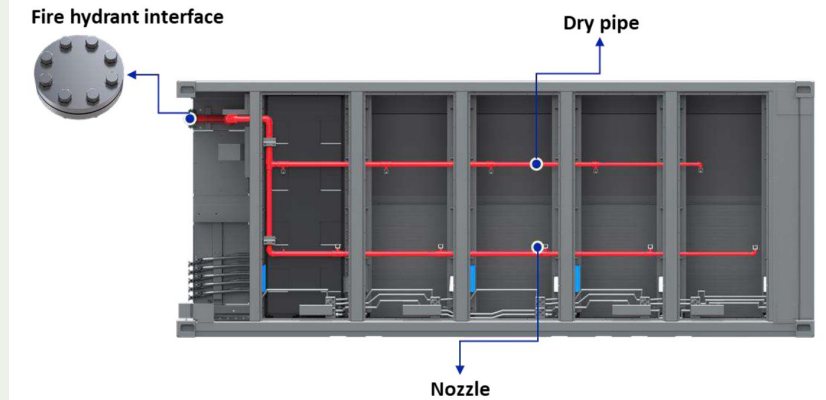
A dry-pipe network with a fire-hydrant interface at the container wall — the last line of defense against fire spread.

Flange — DN65

EN 1092-1, ASTM A105, class PN 16; welding plate and blind types; PED 4.3 material certificate.

Nozzle — MV-A

Brass medium-velocity open spray nozzle with rubber plug; 12 bar (175 psi) max working pressure, ½ BSPT connection.



Dry-pipe system with hydrant interface and nozzles

Liquid cooling, precisely held.

A high-efficiency cooling unit, liquid plates under every module and a PTC heater hold the battery in its optimal temperature window — maximizing energy throughput, slowing SOH degradation and extending service life. The BMS commands every mode change.



Operating modes

Cooling — chiller circuit absorbs battery heat

Heating — PTC warms the coolant in cold starts

Self-circulation — pump evens out cell temperatures

Shutdown — standby with minimal draw

Coolant	50 % ethylene glycol, 50 % DI water
Cooling capacity	40 kW for the 0.5 P system
Max. cooling power	27.54 kW
Max. heating power	17.6 kW
EER	≥2.6 (18 °C @ 35 °C)
Max. ambient	55 °C
Power supply	3AC 380–480 V
Adjustment	Auto, by ambient & charge status

Cooling power adjusts automatically to ambient temperature and charge/discharge state across the -25 °C to +55 °C operating range.

Inside the cooling loop.

01 Compressor

Raises refrigerant gas to high temperature and pressure.

02 Condenser

Rejects heat to ambient air, condensing the refrigerant to liquid.

03 Chiller

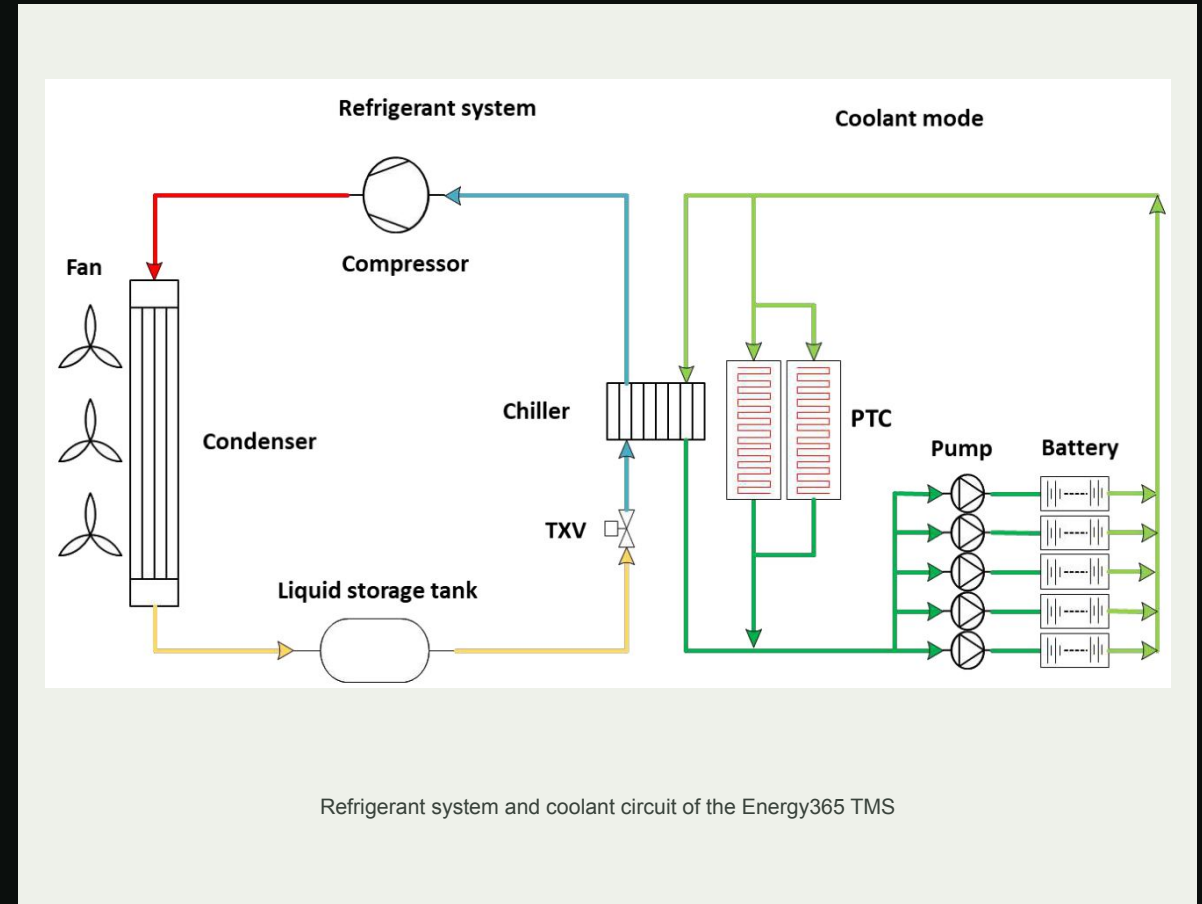
Exchanges heat between refrigerant and coolant; chilled coolant flows to the plates under each battery module.

04 PTC heater

Heats the coolant when it falls below the set point, warming the battery.

05 Pump

Drives continuous coolant circulation through the pipe network.



What the PCS must provide.

DC connection — one single copper busbar per pole when two containers run in parallel; a main circuit switch on the PCS DC side.

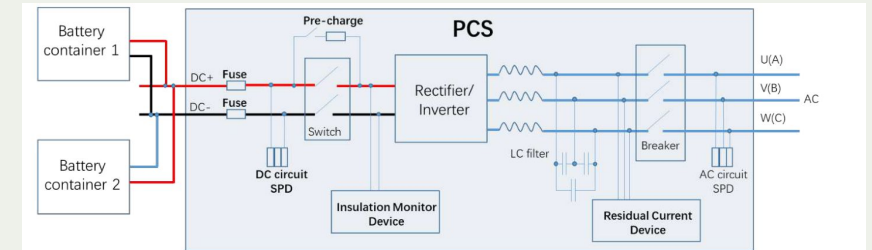
Pre-charge — the PCS must include a pre-charge circuit for rack paralleling.

Capacity — one PCS supports up to two battery containers.

Protection — SPD on the DC high-voltage bus and on the AC side; residual-current device monitoring AC leakage.

Insulation — BMS monitors before the DC relay closes; PCS monitors after.

Low SOC — PCS disconnects to prevent over-discharge during short-term storage.



PCS matching — DC bus, pre-charge and protection devices

Fuse coordination and clean power.

Fuse matching

Breaking-time order: **F < C-R-F < M-F** — the PCS-side fuse clears first, then rack fuses in the main control boxes, then module fuses in the packs.

Voltage level 1,500 V · rack short-circuit current 14.544 kA

Fuse F breaking ability: >72.72 kA (one container), >145.44 kA (two)

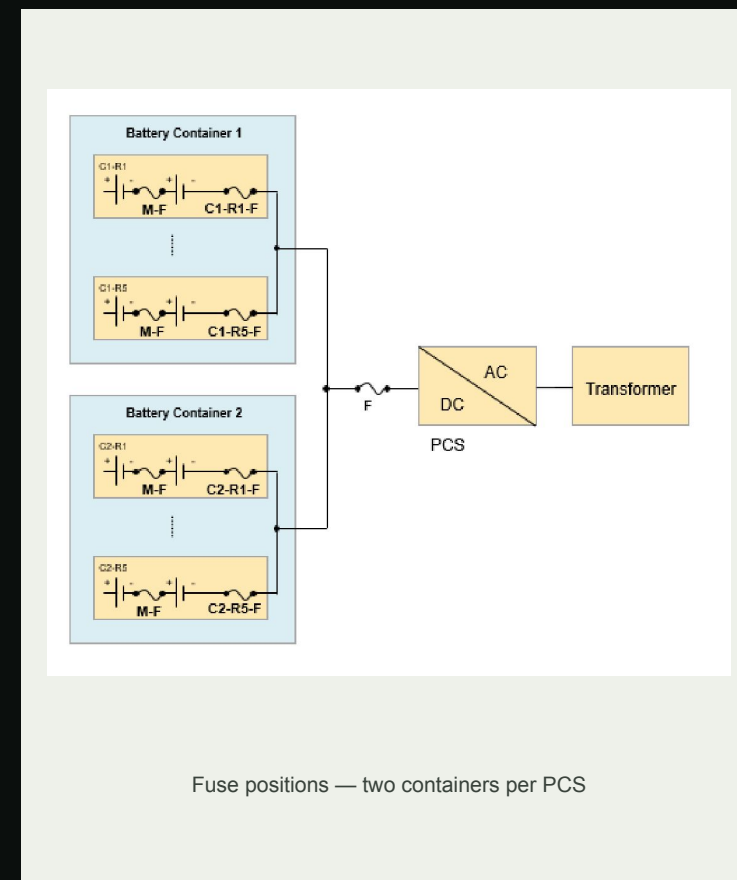
Common-mode voltage & cabling

DC-side common-mode voltage <100 VAC, <15 kHz. An insulation transformer is recommended; carrier synchronization keeps paralleled PCS switching from interfering.

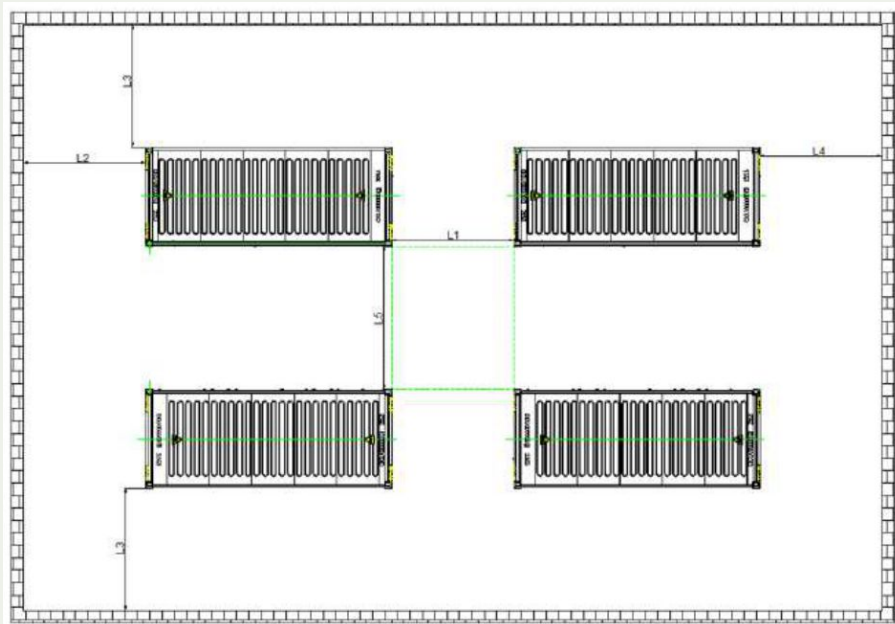
Never mix AC and DC power cables, input and output cables, or power and control cables.

Communication timing

PCS responds within 1 s to BMS commands, including emergency dry-contact signals, and derates to 0 W within 2 s of a zero-current command. Beyond 30 m CAN loops, add a CAN bridge.



Site layouts and clearances.

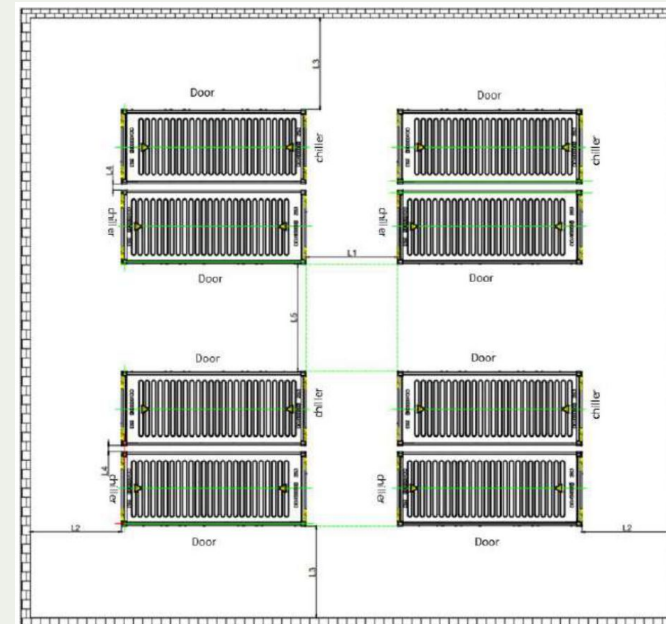


Case 1 — back-to-back rows

L1 3.0 m · L2 3.0 m · L3 3.0 m (3.5 m recommended)

L4 0.90 m (C5 or above) / 0.20 m (C4 or below)

L5 3.0 m (3.5 m recommended)



Case 2 — facing rows

L1 3.0 m (3.5 m recommended) · L2 3.0 m

L3 3.0 m (3.5 m recommended) · L4 1.10 m (1.5 m recommended)

L5 3.0 m (3.5 m recommended)

Back-to-back containers have opposite wiring directions — control HV cable length to the PCS and observe cooling-unit and door orientation.



SURYAMANU ENERGY TECHNOLOGIES

Let's talk storage.

Energy365 — 4.07 MWh of liquid-cooled LFP storage in a 20-foot container.

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