SVOLT

SVOLT Energy Technology Co.,Ltd.

No.8899 Xincheng Avenue, Changzhou City
Jiangsu Province
China

SVOLT Energy Technology (Europe) GmbH

Amelia-Mary-Earhart-Strasse 17
60549 Frankfurt am Main
Germany

WWW.SVOLT.CN
bbuesstd@svolt.cn

SVOLT Energy Technology Co., Ltd.

3S Energy Storage Product Introduction

About
SVOLT

SVOLT, established in 2018 and headquartered in Changzhou, Jiangsu province, is a global high-tech company specializing in the development and manufacture of battery materials, cells, modules, Pack and BMS as well as energy storage products.

Contents

Vision and Perspective

Mission	Vision	Spirit	Values
● Green Energy Everywhere	● To Be a Global Energy Interconnection Technology Company	● Driven By Innovation	● Customers First,Striver-Focused Innovation-Rooted,Synergy-Supported

Development
Milestone

12/11
B+round Financing

12/10
New production base
in Shangrao

10/29
New production base
in Yancheng

09/16
New production base
in Chengdu

07/30
B round Financing

07/16
SOP of Cobalt-free
Battery

2012
Started with
Battery Pack
Project Team

2017
Invest in
Pilbara Minerals
in Australia

2018
In February
SVOLT Energy
Technology Co.,
Ltd. was Established

2019
11/27
Grand Opening of
Automotive Grade
Intelligent Factory
in Changzhou

03/14
Established
Wuxi R&D Center

2020
11/17
Established Europe
production base in
Saarland, Germany

04/29
Pre-A Financing
SDIC Invested
1Billion RMB in SVOLT

2021
06/22
New production base
in Nanjing

04/28
New R&D and production
base in Ma'anshan

02/25
A round Financing

02/19
New production base
in Huzhou

01/27
New production base
in Suining

2022
06/13
Together with Sichuan NEP
and EVE invested in lithium
salt project in Sichuan

06/10
Established Dezhou lithium
industrial park

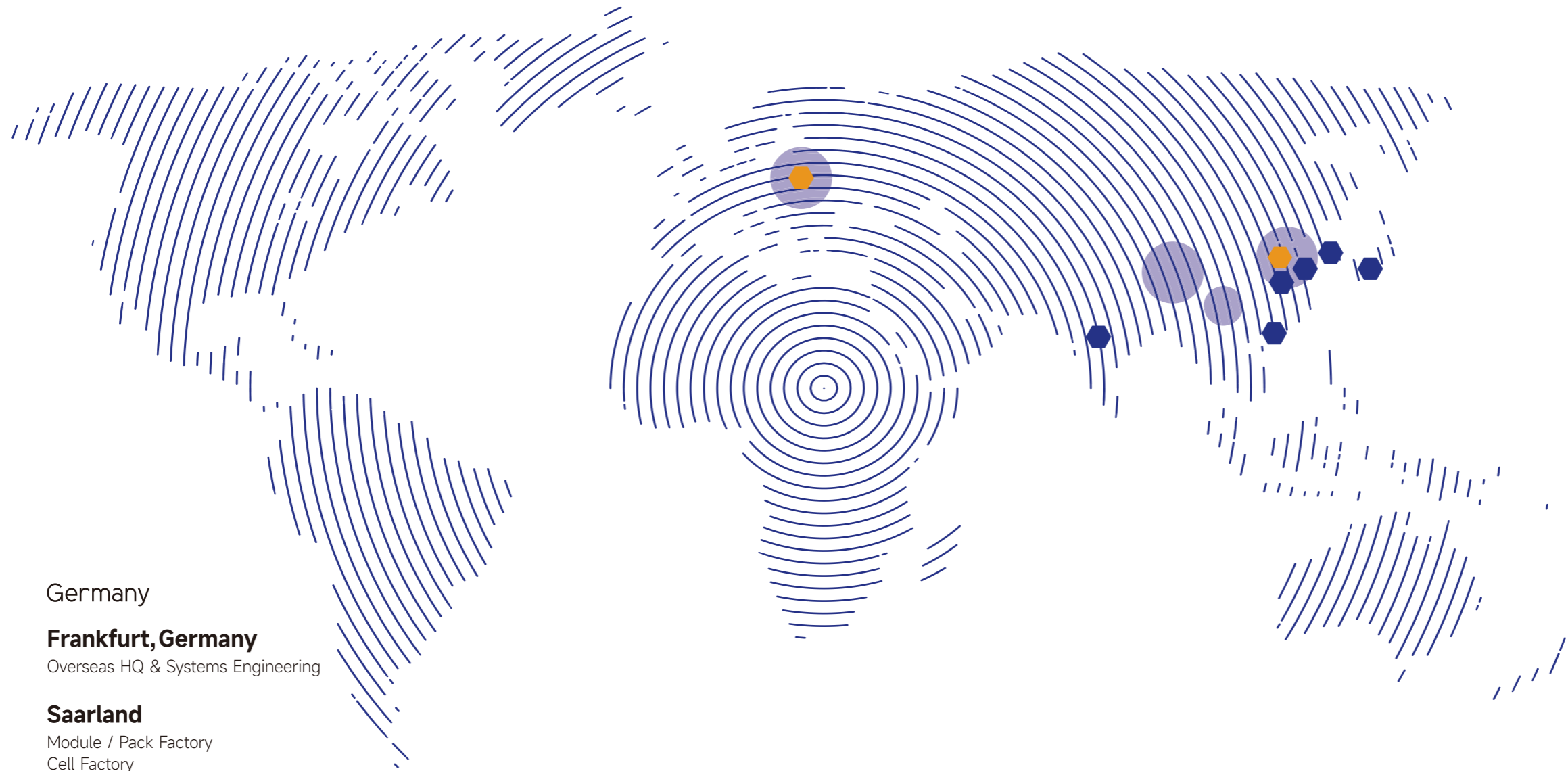**03/30**
Invested in Yongshan Lithium
with BASF SHANSHAN

01/06
Established Shanghai
R&D Center

Global Layout

⬤ Manufacturing Base   ⬣ Corporate HQ   ⬣ R&D

China

Northern China
Baoding

Western China
Suijning
Chengdu
Dazhou

Yangtze River Delta
Changzhou
Huzhou
Yancheng
Taizhou
Ma'anshan
Nanjing

Central China
Shangrao

Baoding
Product R&D

Wuxi
R&D HQ—Global Innovation Center

Shanghai
AI 2035 Laboratory

Shenzhen
Cylindrical Cell & AI R&D

Changzhou
Co-free Material & Battery

Ma'anshan
LFP/Cylindrical Cells

Bangalore
BMS R&D

Europe
Product Localization R&D

Seoul
Advance Material & Equipment

Germany

Frankfurt, Germany
Overseas HQ & Systems Engineering

Saarland
Module / Pack Factory
Cell Factory

Research
and **Development**

R&D centers layout stretch worldwide
Production bases increase continuously

As a high-tech enterprise in the battery industry, SVOLT planned R&D and manufacturing globally. In China, Baoding and Wuxi are the main bases for the R&D of battery and supporting technology. Globally, SVOLT has 12 manufacturing bases such as Changzhou, Suining, Huzhou, Ma'anshan, Nanjing and Germany to expand production capacity to meet the battery demand of the new energy vehicle industry.

| The latest data of applied patents (2022. Q2)	**> 4,000** Patent Applications	**> 1,300** Invention Patents	**> 200** Overseas Patents
R&D Team		**> 500** Foreign / Experienced Industry Experts	**> 3,000** R&D Staff

Energy Storage
Concept

3S ENERGY STORAGE ADVOCATE

To support carbon neutralization target, we understand the desire of energy storage industry thoroughly.
We devolpe our energy storage solutions based on 3S principles – Safe, Strong and Smart.
We keep being honed and cultivated with ingenuity, to conduct our promise.

SAFE

3S ENERGY STORAGE

STRONG   SMART
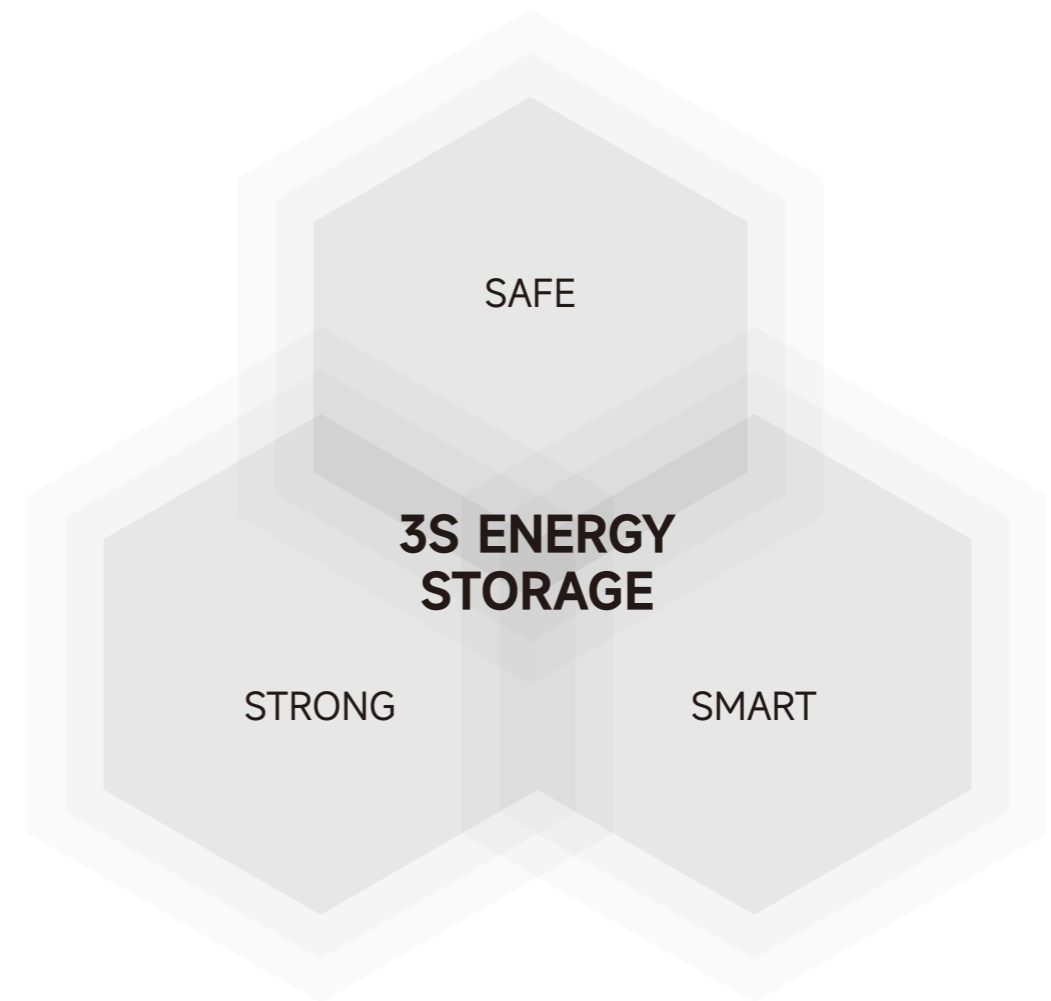
SAFE

Comprehensive Safety Strategy, from cell to whole life cycle, to ensure worry-free throughout process from production to delivery and to O&M (operation and monitoring).

STRONG

automotive grade premium-quality R&D and manufacturing DNA integrated with complete cycle-life optimization principle and efficient O&M technology, to ensure biggest stability and reliability.

SMART

AI and big data based intelligent measures to realize automatic monitoring, pre-warning, regional collaborative control and strategy optimization. Thus, to offer customers all-round intelligent experience flexibly and smartly.

Innovative
Products

SVOLT energy adheres to the vehicle level lean management and the future-oriented 3S energy storage system set or technology and product concept (Safe, Strong, Smart), and has creatively developed and created three series of energy storage products: CE, EQ and EI. According to the needs of different market segments, SVOLT energy is committed to providing one-stop energy solutions for customers at home and abroad.

CE
Scale
Application

CE-L series

CE-U series

CE-M series

CE-C series

EQ
Small Capacity
Application

EQ-C series

EQ-M series

EQ-BC series

EQ/E series

EI
Intelligent
Application

EI-E series

EI-C series

CE-L series
LARGE SCALE ENERGY STORAGE

It is applicable to large-scale wind-solar power stations, power grids, substations, industrial parks and other applications, features new energy co-generation, lower wind/solar curtailment, auxiliary services (peak shaving, frequency regulation, etc.), electricity expansion, power quality management, power-on maintenance, distributed power grid connection and control.

High Safety
- 100% real-time monitoring of cell, combustible gas and circulating current
- Inter cluster circulation suppression, I / O redundancy protection and outdoor emergency power-off protection
- Internal short circuit 7 days in advance
- Early warning / joint control of thermal runaway 5 ~ 8 minutes in advance

High Reliability
- ‐ 30 ~ 45 ℃ can be used in extreme weather
- Seismic grade of UBC zone 4
- ≥ 35m / s wind resistance grade

High Intelligence
- Electric core level intelligent temperature control, energy efficiency increased by 1%
- Intelligent charge and discharge management
- Intelligent early warning to improve the operation safety of the system
- Remote maintenance and control strategy upgrade

	Characteristic		**Specification**	
Environment conditions	Installation environment		Outdoors	
	Ambient temperature	℃	‐30 ~ 45℃	
	Humidity	%	5% ~ 90%	
	Altitude	m	≤3000m (capacity reduction to be considered at an altitude > 3,000m)	
AC grid connection parameters	Wiring system		3 Phase	
	Rated voltage		AC380/400V	AC550/690V
	Rated frequency		50Hz	50Hz
	Power factor		±1	±1
	Output harmonics		≤3 %	≤3 %
DC side parameters	Nominal battery voltage		761.6V	1254.4V
	Battery voltage range		DC666.4 ~ 844.9V	DC910 ~ 1328.6V
Power/capacity parameters	Split type		250kW-1260kWh / 500kW-3400kWh	4816kWh-5217kWh
	Integrated type		250kW-630kWh/ 500kW-2500kWh	-
Other parameters	IP rating		IP54	
	Heat dispersion method		A/C cooling + natural air cooling	
	Noise		≤70dB	
	Seismic grade		UBC Zone4	
	Wind resistance rating		Category 15 hurricane	
Standards and certification	Battery		IEC62619，UN38.3，GB/T36276	
Dimensions	Width × Depth × Height	mm	40-50ft container	

CE-U series
ENERGY STORAGE UNIT

This product, as a representative of highly modularized and standardized SVOLT products, is designed according to the 3S concept and the automotive grade quality requirements, features peak shaving, new energy co-generation, dynamic capacity expansion, demand management, power quality management, distributed power generation, emergency power standby and other functions, and can effectively support the rapid charging demand of electric vehicles. It can be widely used in large wind power stations, substations, large industrial and commercial parks, etc.

High Safety
- 100% cell real-time monitoring
- The battery shall be isolated by compartment for 2h fire prevention and thermal insulation
- 1230 fire fighting gas and water
- Big data active analysis and early warning; Cluster level and unit level fault isolation

Fine Management
- One to one fine temperature control, energy efficiency increased by 1.5%
- ≤ 35 ℃ cell temperature, ≤ 5 ℃ cell temperature difference
- Branch charging and discharging and distributed module unit management

High Reliability
- - 40 ~ 50 ℃ wide temperature adaptability
- 15 hurricane wind resistance grade and UBC zone 4 earthquake resistance grade
- IP55 high protection grade, C4 high anti-corrosion grade

Flexibility
- Small volume unit design, high site utilization
- Building block combination, supporting 500KWh ~ 10MWh multi scenario applications
- AC and DC are coupled in parallel to support the mixed use of old and new batteries

	Characteristic	Specification
Battery cluster	Number of battery modules	15-17
	Battery clustering mode	1P210S/1P224S/1P238S
	Nominal voltage	672/716.8/761.6V
	Battery cluster capacity	188.2-213.2kWh
Unit energy storage system	Number of battery clusters	3
	Nominal system capacity	564.5-639.6kWh
	Battery container dimension	4640*1200*2896mm

S/N	Power/kW	Nominal capacity/kWh	Endurance/h	Quantity of unit energy storage system	Remark
1	250	564	2	1	0.5P
2	250	1128	4	2	0.25P
3	500	1128	2	2	0.5P
4	500	1692	3	3	0.3P
5	500	2256	4	4	0.25P
6	630	1279	2	2	0.5P
7	630	2822.5	4	4	0.5P

CE-M series
MEDIUM SIZED ENERGY STORAGE

The product integrates battery, BMS, PCS, EMS, air conditioning and fire protection system. It can be widely used in substation, small industrial and commercial, hospital building, charging station, household electricity consumption, etc. It has the functions of peak-shaving, new energy co-generation, dynamic capacity increasing, demand management, power quality management, emergency power backup, etc.

Highly Integrated

- Modular design
- Small footprint
- Fixed with ground bolt
- Quick installation

Flexible Expansion

- Building block expansion, supporting 20 standard products directly connect in parallel.
- Long durable for 2-6 hours application

Various functions

- Integrated control of "cloud, edge and end" and online optimization of strategy
- Support peak shaving and valley filling, dynamic capacity expansion, reactive power compensation, reverse power control, AGC response and other functions

		CE-M-30/64.5	CE-M-60/175	CE-M-100/200
AC grid connection parameters	Wiring system	3 Phase/PE	3 Phase	3 Phase
	Rated power	30kW	60kW	100kW
	Rated voltage	AC400V	AC380V	AC400V
	Voltage range	AC400V(-20%~+15%)	AC380V(±15%)	AC400V (-15%~10%)
	Rated frequency	50Hz/60Hz	50Hz/60Hz	50Hz/60Hz (Settable)
	Power factor	±0.8	±1	±1
DC side parameters	Nominal battery voltage	537.6V	729.6V	716.8V
	Battery voltage range	470.4-604.8V	638.4V ~ 820.8V	627.2V ~ 795.2V
	Nominal battery capacity	64.5kWh	175kWh	200.64kWh
Other parameters	Maximum efficiency	86%	90%	90%
	Allowable ambient temperature	-20 ~ 55℃ (power reduction required at a temperature above 45℃)	-20 ~ 55℃	-20 ~ 50℃
	IP rating	IP55	IP54	IP55
	Cooling method	A/C cooling	A/C cooling	A/C cooling+natural air cooling
	Salt spray resistance rating	C3	C3	C3
	Noise	<75dB	<75dB	<75dB
	Seismic grade	Grade 9	Grade 9	Grade 8
	Allowable relative humidity	5%-95% with no condensation	5%-95% with no condensation	5%-95% with no condensation
	Maximum allowable altitude	2000m	2000m	2000m
	Communication interface	Ethernet、RS485	Ethernet、RS485	Ethernet
	Wiring method	Incoming and outgoing from bottom	Incoming and outgoing from bottom	Incoming and outgoing from bottom
	Weight	~1.2t	~2.8t	~2.9t
	Dimensions (W * H * D)	1433mm*2100mm* 1064mm	1900mm*2430mm* 1350mm	2150mm*2450mm* 1000mm
	Standards and certification	IEC62619,UN38.3, VDE-AR-N 4105, IEC62477-1	IEC62619, UN38.3	GB36276, IEC62619,UN38.3

CE-C series
Liquid Cooling Energy Storage

Integrated for transportation
- Suitable for Sea & Road
- 36% less Space occupied
- 5% on transportation cost

Autonomous plant-level EMS system
- SVOLT IP with core algorithms
- over 10 cellular data stacks simultaneous access
- cloud collaboration

Quick Expansion
- Both AC/DC side expansion possible
- More plant layout friendly
- Less than 5% oversizing in battery
- Cost efficiency
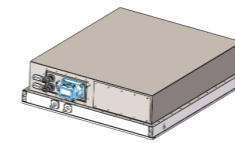
Armature simulation system
- Thermal & mechanical simulation to ensure performance
- thermal management performance improved by >10% compared to
- before simulation adopted
- system energy lose reduced by 1.4%

Item		Technical Parameter
Battery Parallel		2P416S@222Ah
Nominal Voltage	Vdc	1,331.2
Nominal Power	kWh	591.05
Operating Voltage	Vdc	1,164.8 - 1,497.6
Rate of Standard Charge	P	1P
Rate of Standard Discharge	P	1P
Round Cycle Efficiency	%	94%
Humidity		≤90% RH
Altitude	m	≤2000m
Cooling Method		Liquid Cooling
IP Rate		IP54

Liquid Cooled
PACK-222Ah Based

Item		Technical Parameter
Battery Parallel		1P52S@222 Ah
Nominal Voltage	Vdc	166.4
Nominal Power	kWh	36.94
Operating Voltage	Vdc	130V ~189.8
Operating Temperature	℃	0-55
Rate of Standard Charge	P	1P
Rate of Standard Discharge	P	1P
Humidity		≤95% RH
Altitude		≤2,000m
Cooling Method		Liquid Cooling
IP Rate		IP65
Weight	kg	280(±3)
Dimension (D*W*H)	mm	810±2*964±3*237±2

Liquid Cooling
RACK-222Ah Based

Item		Technical Parameter
Battery Parallel		1P416S@222Ah
Nominal Voltage	Vdc	1,331.2
Nominal Power	kWh	295.53
Operating Voltage	Vdc	1,164.8 - 1,497.6
Operating Temperature	℃	0-55
Rate of Standard Charge	P	1P
Rate of Standard Discharge	P	1P
Round Cycle Efficiency	%	94%
Humidity		≤90% RH
Altitude	m	≤2000m
Cooling Method		Liquid Cooling
IP Rate		IP20
Weight	kg	2,300 kg ±3%
Dimension (D*W*H)	mm	920±3 * 1,000±3 * 2,330±5

222Ah LFP Cell

Cell Format		Prismatic LFP
Technical Data		
Nominal Capacity	Ah	222 Ah, 1C@25℃
	Vdc	3,20
Operating Voltage	Vdc	2.5~3.65
Cycle Life	Cycle	6,000 cycles @1C/1C, 100% DoD, 80% EOL
Calendar Life	years	15
Charge & Discharge Conditions		
Rate of Standard Charge	C	1.0 C
Rate of Standard Discharge	C	1.0 C
Round Cycle Efficiency	%	94 − 95%
Other Parameter		
Dimension (L x W x D)	mm	207 x 173 x 54 mm
Weight	kg	4.3 ± 0.3 Kg

EI·EMS

Energy storage equipment and comprehensive coordination and management center of "gernation-Grid - load - storage".

The hardware has passed FCC / CE / EMC level 4 certification and can respond at ms level.

Meanwhile, it integrates superbms, which ensures system security, improving operation efficiency, prolonging service life.

It reduces operation and maintenance cost, providing microgrid control, multi-energy complementary energy management and so on.

Security Guarantee	• Multi level fault identification and real-time hierarchical control • Built in thermal runaway warning and cell identification algorithm, which can quickly judge and respond • Network access adopts bridging mechanism, strengthens encryption algorithm, and prevents data intrusion and leakage
Efficiency Improvement	• Adaptive optimal temperature control scheme to improve system efficiency by 1-3% • Adaptive optimal PCs control power based on SOC and PCs state to optimize operation efficiency • Real time and dynamic optimization of BMS safety threshold window to prolong battery life and improve revenue • Convenient remote programming, remote debugging and one click Project Import greatly shorten the delivery cycle and reduce the operation and maintenance cost
Intelligent Management	• It integrates data acquisition, communication management, data processing, edge computing, policy control and remote service • Modular wind / light, storage, charging and other comprehensive energy management schemes and strategies, which can be combined and matched freely

EI·Cloud ESS & Big Data Platform
Of Integrated Services

The cloud ESS & big data platform of integrated services is a major product launched in response to SVOLT's digital and intelligent transformation. The platform is built with a multi-source access data fusion platform base, and mainly features collaborative monitoring, intelligent O&M, energy revenue evaluation, intelligent warning, control strategy optimization and other functions to support the open services of the platform; the platform is suitable for energy ecology related services such as green building energy consumption, new energy power generation, vehicle-grid integration and hydrogen-electricity integration.

[Virtual factory] [Smart factory] [Hydrogen energy platform] [Intelligent energy storage] [Green building]

Security Management	• Patented deep learning algorithm (internal short circuit algorithm, thermal runaway algorithm, etc.) to greatly improve safety • Dynamic BMS parameter adjustment to improve 1% - 3% efficiency
Collaborative Monitoring	• 3D visualization; High performance electric core level monitoring and improving operation and maintenance efficiency by 30%
Intelligent Operation and Maintenance	• The operation and maintenance expert knowledge base can automatically push the operation and maintenance scheme, reduce the operation and maintenance difficulty by 100% and save the operation and maintenance cost by 50%
Energy Aggregation	• Built in multiple energy service sectors • Blockchain smart contract technology ensures the safety of power consumption and transaction
Smart Trading	• AI technology depth prediction (electricity price, supply and demand, etc.); Dynamically adjust the operation strategy to maximize the income of energy storage

Social
Responsibility

Comprehensive System of Battery
Production, Application and Recycling

Battery Manufacturing

Failure battery & performance degradation

Battery Recycling

ESS Application

3S Energy Storage Concept CE,EQ, EI Products

The Cloud ESS & Big Data Platform

Vehicle Application

SVOLT Cloud Platform
Battery performance index

Power exchange service

SVOLT cloud platform monitoring
Battery performance index

Echelon Utilization

Good Residual Value

Cycle Regeneration

Bad residual value

Decommissioned Battery

Battery residual value evaluation

Battery Raw Materials

Decomposition and extraction of metal elements from waste

Processing and making cathode materials for battery production