APEX SOLAR

# Pioneer Solid-State
## Lithium-ion Battery ESS



- High-performance high-voltage storage system.
- Modular design for ultimate flexibility.
- Suitable for a wide range of applications.
- Expandable up to 208.98 kWh(13S) capacity.

## PRODUCT FEATURES

Ultra safe with solid-state battery cells

Built-in fire extinguishing system(optional)

SOC balancing between clusters

Easy installation:save time and costs

Flexible expansion: up to 8 clusters in parallel

Built-in intelligent BMS

WAN Port in additon to WIFI

# Technical Specifications

APEX SOLAR

| Battery Module Image |  |  |
|---|---|---|
| **Model** | **APEX 16KM** | **APEX 16KS** |
| Battery Type | Semi-solid state Prismatic | |
| Nominal Energy | 16.076kWh | |
| Usable Energy* | 14.95kWh | |
| Nominal Capacity | 314Ah | |
| Nominal Voltage | 51.2V | |
| Operating Voltage | 48~56V | |
| Recommended Charge&Discharge Current | 150A/150A | |
| Peak Discharge Current（2min 25℃） | 175A | |
| Peak Discharge Power（2min 25℃） | 8.96kW | |
| Recommended Depth of Discharge (DOD) | 93% | |
| Charging Temp. Range | From 0~55℃ | |
| Discharging Temp. Range | From -20~55℃ | |
| Cycle Life | ⩾8000@25℃ | |
| Scalability | 1 Master series | Up to 12 Slave series |
| WIFI Module | Built-in | |
| Communication | CAN/ RS485 | |
| IP Rating | IP65 | |
| Recommended Humidity | 5%~95%(No condensed water) | |
| Cooling Type | Forced cooling | |
| Color | White(optional) | |
| Installation | Stack-mounting | |
| Net Weight | 118kg | |
| Dimension（W*H*D） | 750*450*298mm | |
| Protection | Over-current/Over-voltage/Short circuit/Under-voltage/Over temperature | |
| Heating Module | Yes | |
| Balancing Module | Yes | |
| Fire Protection | Built-in aerosol(optional) | |
| Warranty | 10 years* | |
| Certification | CE/UN38.3/IEC62619/IEC62477 | |

Testing conditions based on temperature 25℃ at the beginning of life.
*Total Energy/Usable Energy measured under specific conditions by Apex 0.2C CC-CV and based on recommended DOD(95%);

# Technical Specifications

APEX SOLAR

| Model | 64.30kWh | 80.38kWh | 96.46kWh | 112.53kWh |
|---|---|---|---|---|
| Battery Type | Semi-solid state Prismatic | | | |
| Nominal Energy | 64.30kWh | 80.38kWh | 96.46kWh | 112.53kWh |
| Usable Energy* | 59.80kWh | 74.75kWh | 89.70kWh | 104.65kWh |
| Nominal Capacity | 314Ah | | | |
| Nominal Voltage | 204.8V | 256V | 307.2V | 358.4V |
| Operating Voltage | 192~224V | 240~280V | 288~336V | 336~392V |
| Recommended Charge&Discharge Current | 150A/150A | | | |
| Peak Discharge Current（2min 25℃） | 175A | | | |
| Peak Discharge Power（2min 25℃） | 35.84kW | 44.80kW | 53.76kW | 62.72kW |
| Recommended Depth of Discharge (DOD) | 93% | | | |
| Charging Temp. Range | From 0~55℃ | | | |
| Discharging Temp. Range | From -20~55℃ | | | |
| Cycle Life | ≥8000@25℃ | | | |
| Scalability | 4S | 5S | 6S | 7S |
| WIFI Module | Built-in | | | |
| Communication | CAN/ RS485 | | | |
| IP Rating | IP65 | | | |
| Recommended Humidity | 5%~95%(No condensed water) | | | |
| Cooling Type | Forced cooling | | | |
| Color | White(optional) | | | |
| Installation | Stack-mounting | | | |
| Net Weight | 472kg | 590kg | 708kg | 826kg |
| Dimension（W*H*D） | 750*1800*298mm | 750*2250*298mm | 750*2700*298mm | / |
| Protection | Over-current/Over-voltage/Short circuit/Under-voltage/Over temperature | | | |
| Heating Module | Yes | | | |
| Balancing Module | Yes | | | |
| Fire Protection | Built-in aerosol(optional) | | | |
| Warranty | 10 years* | | | |
| Certification | CE/UN38.3/IEC62619/IEC62477 | | | |

Testing conditions based on temperature 25℃ at the beginning of life.
*Total Energy/Usable Energy measured under specific conditions by Apex 0.2C CC-CV and based on recommended DOD(95%);
NOTICE:When the number of stacks exceeds 6, please place them in two or more separate piles.

# Technical Specifications

APEX SOLAR

| Model | 128.61kWh | 144.68kWh | 160.76kWh |
|---|---|---|---|
| Battery Type | Semi-solid state Prismatic | | |
| Nominal Energy | 128.61kWh | 144.68kWh | 160.76kWh |
| Usable Energy* | 119.61kWh | 134.56kWh | 149.51kWh |
| Nominal Capacity | 314Ah | | |
| Nominal Voltage | 409.6V | 460.8V | 512V |
| Operating Voltage | 384~448V | 432~504V | 480~560V |
| Recommended Charge&Discharge Current | 150A/150A | | |
| Peak Discharge Current（2min 25℃） | 175A | | |
| Peak Discharge Power（2min 25℃） | 71.68kW | 80.64kW | 89.6kW |
| Recommended Depth of Discharge (DOD) | 93% | | |
| Charging Temp. Range | From 0~55℃ | | |
| Discharging Temp. Range | From -20~55℃ | | |
| Cycle Life | ⩾8000@25℃ | | |
| Scalability | 8S | 9S | 10S |
| WIFI Module | Built-in | | |
| Communication | CAN/ RS485 | | |
| IP Rating | IP65 | | |
| Recommended Humidity | 5%~95%(No condensed water) | | |
| Cooling Type | Forced cooling | | |
| Color | White(optional) | | |
| Installation | Stack-mounting | | |
| Net Weight | 944kg | 1062kg | 1180kg |
| Dimension（W*H*D） | / | / | / |
| Protection | Over-current/Over-voltage/Short circuit/Under-voltage/Over temperature | | |
| Heating Module | Yes | | |
| Balancing Module | Yes | | |
| Fire Protection | Built-in aerosol(optional) | | |
| Warranty | 10 years* | | |
| Certification | CE/UN38.3/IEC62619/IEC62477 | | |

Testing conditions based on temperature 25℃ at the beginning of life.
*Total Energy/Usable Energy measured under specific conditions by Apex 0.2C CC-CV and based on recommended DOD(95%);
NOTICE:When the number of stacks exceeds 6, please place them in two or more separate piles.

# Technical Specifications

APEX SOLAR

| Model | 176.83kWh | 192.91kWh | 208.99kWh |
|---|---|---|---|
| Battery Type | Semi-solid state Prismatic | | |
| Nominal Energy | 176.83kWh | 192.91kWh | 208.99kWh |
| Usable Energy* | 164.46kWh | 179.41kWh | 194.36kWh |
| Nominal Capacity | 314Ah | | |
| Nominal Voltage | 563.2V | 614.4V | 512V |
| Operating Voltage | 528~616V | 576~672V | 624~728V |
| Recommended Charge&Discharge Current | 150A/150A | | |
| Peak Discharge Current（2min 25℃） | 175A | | |
| Peak Discharge Power（2min 25℃） | 98.56kW | 107.52kW | 116.48kW |
| Recommended Depth of Discharge (DOD) | 93% | | |
| Charging Temp. Range | From 0~55℃ | | |
| Discharging Temp. Range | From -20~55℃ | | |
| Cycle Life | ⩾8000@25℃ | | |
| Scalability | 11S | 12S | 13S |
| WIFI Module | Built-in | | |
| Communication | CAN/ RS485 | | |
| IP Rating | IP65 | | |
| Recommended Humidity | 5%~95%(No condensed water) | | |
| Cooling Type | Forced cooling | | |
| Color | White(optional) | | |
| Installation | Stack-mounting | | |
| Net Weight | 1298kg | 1416kg | 1534kg |
| Dimension（W*H*D） | / | / | / |
| Protection | Over-current/Over-voltage/Short circuit/Under-voltage/Over temperature | | |
| Heating Module | Yes | | |
| Balancing Module | Yes | | |
| Fire Protection | Built-in aerosol(optional) | | |
| Warranty | 10 years* | | |
| Certification | CE/UN38.3/IEC62619/IEC62477 | | |

Testing conditions based on temperature 25℃ at the beginning of life.
*Total Energy/Usable Energy measured under specific conditions by Apex 0.2C CC-CV and based on recommended DOD(95%);
NOTICE:When the number of stacks exceeds 6, please place them in two or more separate piles.

# Reference scheme wiring diagram

## 2 Cluster Wiring Diagram









## 3 Cluster Wiring Diagram



# Product Advantages

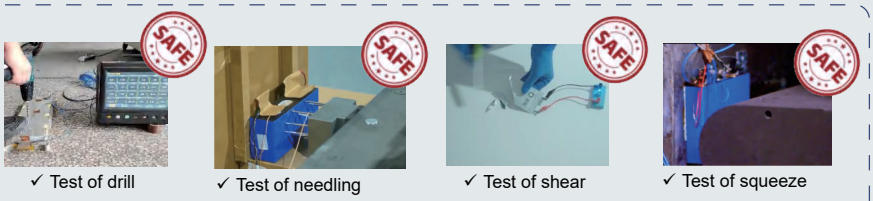
## What is Semi-Solid State

In solid-state lithium-ion batteries, lithium ions travel between electrodes through a solid electrolyte during the charging and discharging processes. However, full solid-state batteries encounter challenges related to limited contact efficiency between the electrodes and the electrolyte. To overcome this issue, a promising solution is to incorporate small amounts of liquid electrolytes, which can optimize battery performance and extend lifespan.

Semi-solid state batteries, the 1st generation of all solid state, offer enhanced safety compared to traditional LFP batteries, as the solid components significantly reduce the risk of leakage. Additionally, the special small amounts inclusion of liquid electrolytes improves ion conductivity, thereby enhancing overall battery performance.



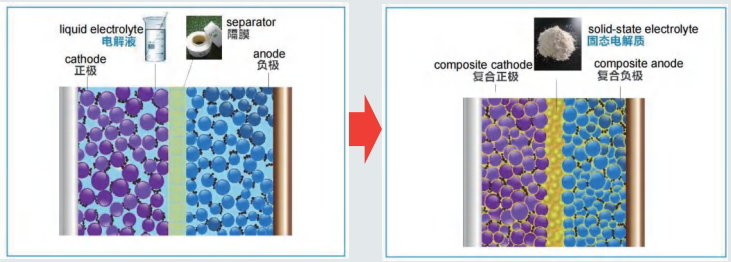

**The core and barrier of solid-state LIBs is the innovative development of materials.**

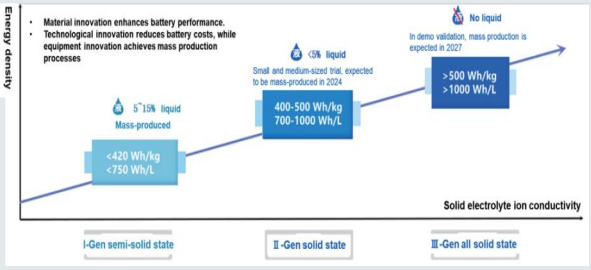



✓ Test of drill ✓ Test of needling ✓ Test of shear ✓ Test of squeeze

**Our products have undergone multiple rigorous tests.**

## Core Advantages

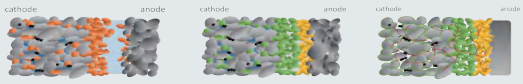



**MUCH SAFER:**The liquid electrolyte content of semi-solid state batteries is reduced to 5% -10%, and the semi-solid structure significantly reduces the risk of leakage. The solid-state electrolyte layer suppresses lithium dendrite growth and reduces the probability of thermal runaway.

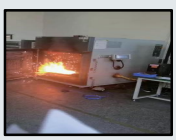
**LONGER SPAN LIFE:**Solid electrolytes slow down the corrosion and volume expansion of electrode materials, improving long-term stability.

**HIGHER COST-EFFECTIVENESS:**The semi-solid state battery adopts in-situ solidification technology, and only requires partial modification of the liquid battery production line to achieve mass production, greatly reducing equipment investment costs.

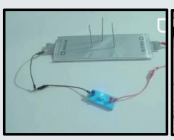



Energy density ↑ Liquid content ↓

Process steps ↓ Unit cost ↓

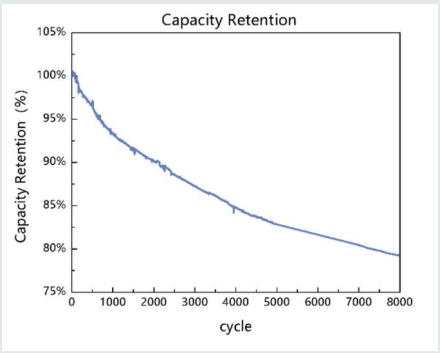

Thermal runaway traditional battery


Traditional battery after ARC test


Needle test Solid State Battery


Punch test on Solid State Battery

| 300℃ ARC Test (Accelerating Rate Calorimeter) | | |
|---|---|---|
| **Items** | **Solid state LFP Battery** | **Traditional LFP** |
| Max. temperature rise rate (dT/dt)max(℃/S) | 0.235 | 2.129 |
| Temperature point Tmax (℃) | No thermal runaway | 471.4 |
| Note: Definition conditions for thermal runaway, temperature rise rate dT/dt ≥ 1℃/S | | |





High Safety


Long Battery Life


More affordable

# Product Advantages

## Built-in Aerosol Fire Protection System(Optional)





Security upgrade and fire protection are guaranteed

The aerosol spray is white, green is used for better visibility while illustrating.

## Core Advantages

### Insulation and thermal runaway protection:

The thermal conductivity of aerogel is extremely low (0.013 – 0.025 W/(m · K)), only 1/5 – 1/3 of that of traditional materials, and can effectively block heat transfer between electric cores;

### Excellent flame retardant performance:

Silica aerogel can withstand temperature as high as 800℃ without decomposition, which is superior to traditional polyurethane and other materials, significantly reducing fire risk;

### Capable of quickly extinguishing fires:

The hot aerosol fire extinguishing device can release an abundance of inert gas within 10-13 seconds, quickly extinguishing fires in enclosed spaces such as data cabinets;

### Lightweight design:

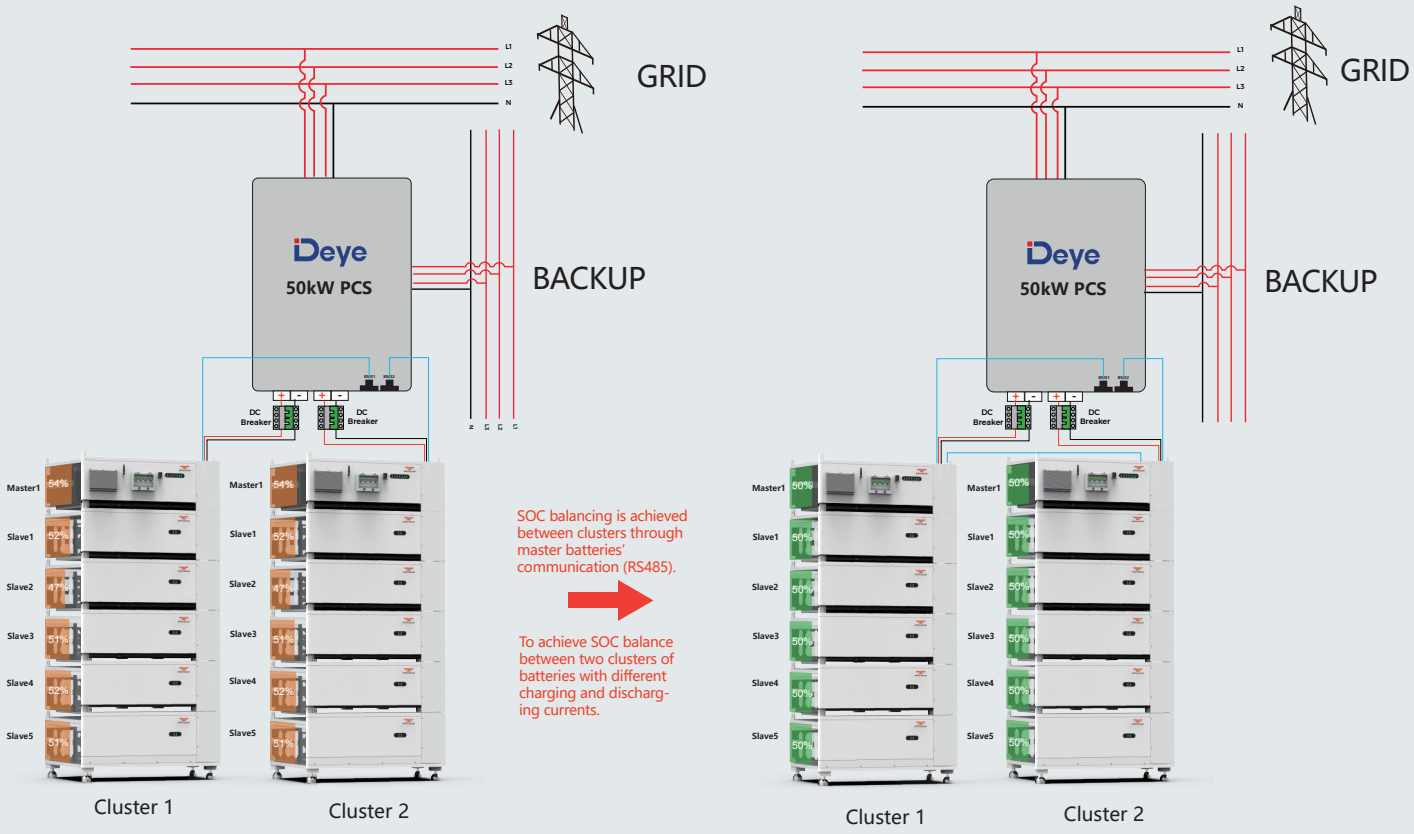
The density of aerogel is as low as 0.16 mg/cm $^3$ (all carbon aerogel), and the thickness is only 1/5 – 1/3 of that of traditional materials under the same thermal insulation effect, which can reduce the weight of battery pack and increase the energy density by 5% – 10%;

### More environmentally friendly and cost-effective:

The aerogel life cycle is 4 times that of traditional materials, and long-term use reduces maintenance costs;

# Product Advantages

## SOC Balancing Between Clusters




## NOTICE:

**In the case of multiple cluster batteries, the universal wiring for parallel operation of the host is shown in the following figure:**

