

Your Partner for High Quality Batteries



山东圣阳电源股份有限公司
SHANDONG SACRED SUN POWER SOURCES CO.,LTD

Overview of Sacred Sun



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(UPS)

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Products & Technologies

AGM, GEL, lead-carbon, Lithium-ion

04

Market & Service

Footprint, main users, service

Vision and Mission

✓ Vision

Develop industry, creation of value to society

✓ Mission

Make every effort, offer competitive and reliable power products to meet our customer needs

Headquarters

◆ HQ, at No 1 Shengyang Road, Qufu City, Shandong, 273100, PRC



- Marketing & Sales
- Administration
- Finance & Control



- Technical and R&D Center
- CNAS Certified Testing Center
- Intertek Joint Laboratory



Industry Zone

- ◆ Sacred Sun Battery Factory, at No.7 Custom East Road, Qufu City, Shandong Province

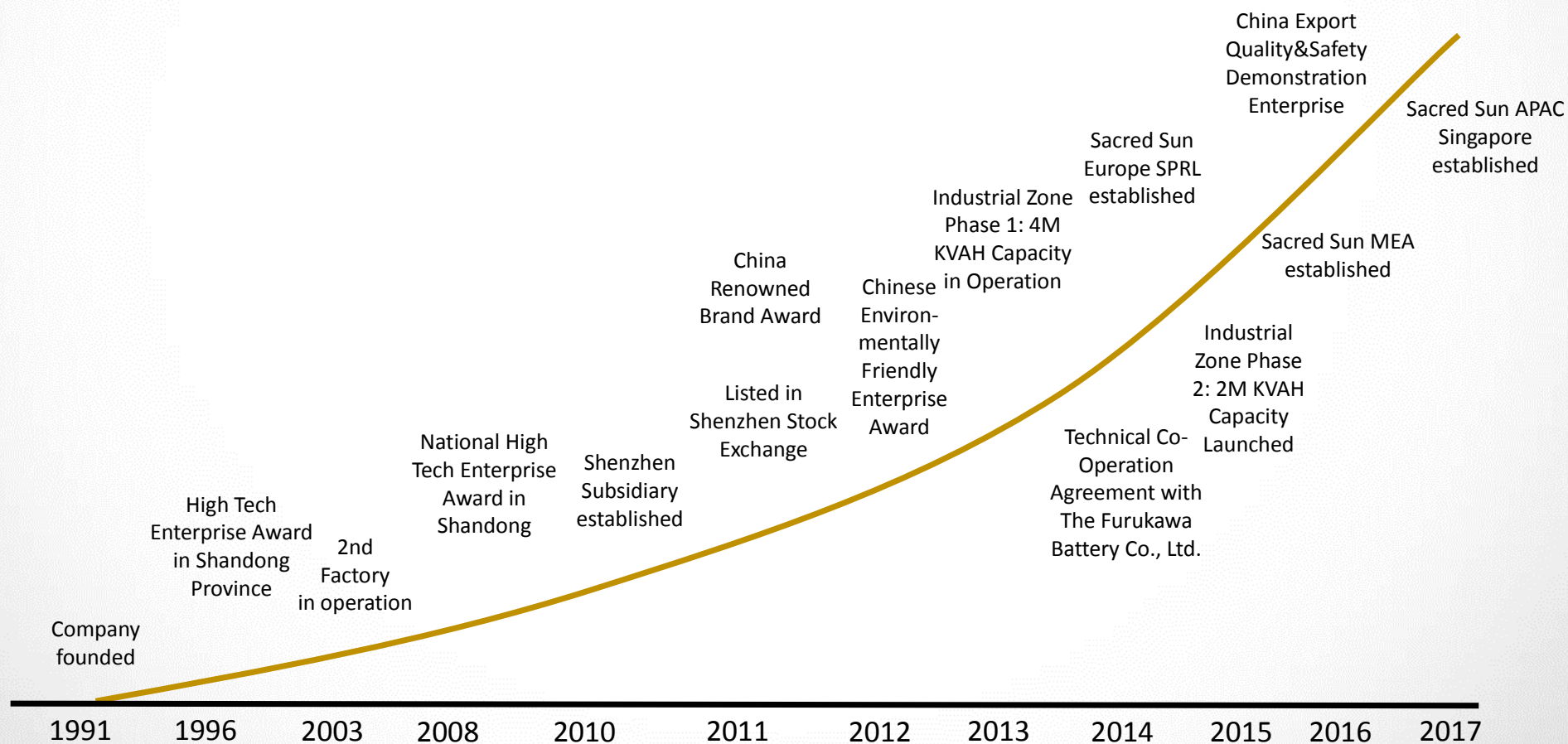


2 Phases:

- Phase 1 for full range of Standby and Energy Storage AGM & GEL batteries
- Phase 2 for Traction batteries and TPPL Technology

- 2000+ employees
- Factory space over 200,000m²
- 10 x 24T/12T Oxide Millers
- 43 x Casting Machines
- 10 x Pasting Mixing Machines
- 11 x Pasting lines
- 49 x Curing Chambers
- 9 x Assembly Lines
- 357 x Formation Tanks
- 9 x Packing Lines

Our Milestones



Certificates

ISO9001:2008
ISO14001:2004

OHSAS18001:2007
SA8000:2008

CNAS



Compliance with IEC, DIN, JIS, BS, Eurobat



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Corporate Profile

Profile, certificates, brands, R&D, facilities,
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Solutions & Cases

Energy storage (off-grid, on-grid),
backup (Telecom, UPS)

02

Products & Technologies

AGM, GEL, lead-carbon, Lithium-ion

04

Market & Service

Footprint, main users, service

AGM Technology

AGM Separator / Sulfuric Acid

| GFM Series | GFMG Series | GFM-H Series | GFM-C Series | 12VGFM Series | FTA Series | FTB Series | SPG Series | SP Series |
|--|--|-------------------------|--|----------------------------|--------------------------------|------------------------------------|---|---|
| C10 Capacity @1.8VPC | C10 Capacity @1.8VPC | C10 Capacity @1.8VPC | C10 Capacity @1.8VPC | C10 Capacity @1.8VPC | C10 Capacity @1.8VPC | C10 Capacity @1.8VPC | Watt(@1.67V PC, 15min) | C20 Capacity @1.75VPC |
| 2V200/300/400/500/600/800/1000/1200/1500 | 6V105/125/160/200 2V200/275/300/320/400/455/515/560 | 800/1000/1200/1500/2000 | 2V200/300/400/500/600/800/1000/1200/1500/2000/3000 | 12V38/50/65/80/100/150/200 | 12V100/125/150/160/175/190/200 | 12V55/80/85/95/100/105/125/150/165 | 175/215/255/300/320/340/390/440/490/500/570/660/720/770/870 | 12V7/8/9/12/18/26/33/38/42/50/65/80/100/120/150/200/245 |
| 9 Models | 12 Models | 5 Modules | 11 Models | 7 Models | 7 Models | 9 Models | 15 Models | 17 Models |

GEL Technology

PVC(Amer Sil) / Fumed Silica

| 2V OPzV (tubular plates) Series | 2V GFMJ (flat plates) Series | 6V&12V OPzV (tubular plates) | 12V GFMJ (flat plates) Series | 12V FTJ-A Series | 12V FTJ-B Series |
|---|---|---------------------------------|-------------------------------------|-------------------------|-------------------------|
| C10 Capacity @1.8VPC | C10 Capacity @1.8VPC | C10 Capacity @1.8VPC | C10 Capacity @1.8VPC | C10 Capacity @1.8VPC | C10 Capacity @1.8VPC |
| 150/200/250/300/ 350/420/490/500/ 600/800/1000/ 1200/1500/ 2000/2500/3000 | 200/300/400/500/600/ 800/1000/1200/1500/ 2000 | 12V50/100/150 6V200/250/300 | 33/50/65/100/ 120/150/200 | 100/125/150/ | 90/135 |
| 16 Models | 10 Models | 6 Models | 8 Models | 3 Models | 2 Models |

Product application solutions

| Applications | Application features | Recommended products | Remarks |
|--------------------------------|-----------------------------------|-------------------------------|----------------------|
| UPS/EPS | Standby use, power type discharge | SP/SPG /GFMG HRL/UPS-FT | Power type design |
| Industrial Rail Transportation | Standby use, | OPzV/GFMJ/FMJ | Long life design |
| Rebeware Energy | Cycle use, PSOC | FCP/OPzV DCS/SAJ/FAJ | Cycle type design |
| Telecom | Standby use | GFM/FT | Floating type design |

UPS Product solutions

| No. | Series | SP | SPG | HRL | UPS-FT |
|-----|----------------|-----------|--------------------|----------------------------------|--|
| 1 | Voltage | 12V | 12V | 12V | 12V |
| 2 | Power range | 3.5-245Ah | 175W-870W | 300W-910W | 410W-700W |
| 3 | UPS/EPS system | 3k-200k | 10k-600k | 200k-800k | 400k-600k |
| 4 | Backup time | 0.5h-2h | 10-30 mins | 10-30 mins | 10-30 mins |
| 5 | Design life | 10 years | 12 years | 15 years | 12 years |
| 6 | Advantage | Economic | High power density | High power density and long life | Front terminal, centralized venting system |

UPS Product

SP series

Design concept: for special applications, cost-effective design.

Appearance: compact structure, general container.

Plate: unique motherboard structure, high strength and corrosion resistant alloy..

Terminals: high-conductivity terminals with threaded inserts.

Design life: 10 years.

Capacity range: 3.5Ah~245Ah (20h rate @1.75V)

Applications: UPS, Emergency, Security, Alarms, Transportation, Medical



UPS Product

SPG series

Design concept: professional design for data center's short time power supply and large current discharge demand.

Plate: unique radiation motherboard structure, which is good for charging and discharging at large current. Special high power long life lead paste formula with excellent cycling performance.

Terminals: high-conductivity terminals with threaded inserts.

High power density: over 70W/kg, 30% higher than ordinary battery.

Design life: 12 years.

Power range: 175W~870W (15min rate @1.67V)

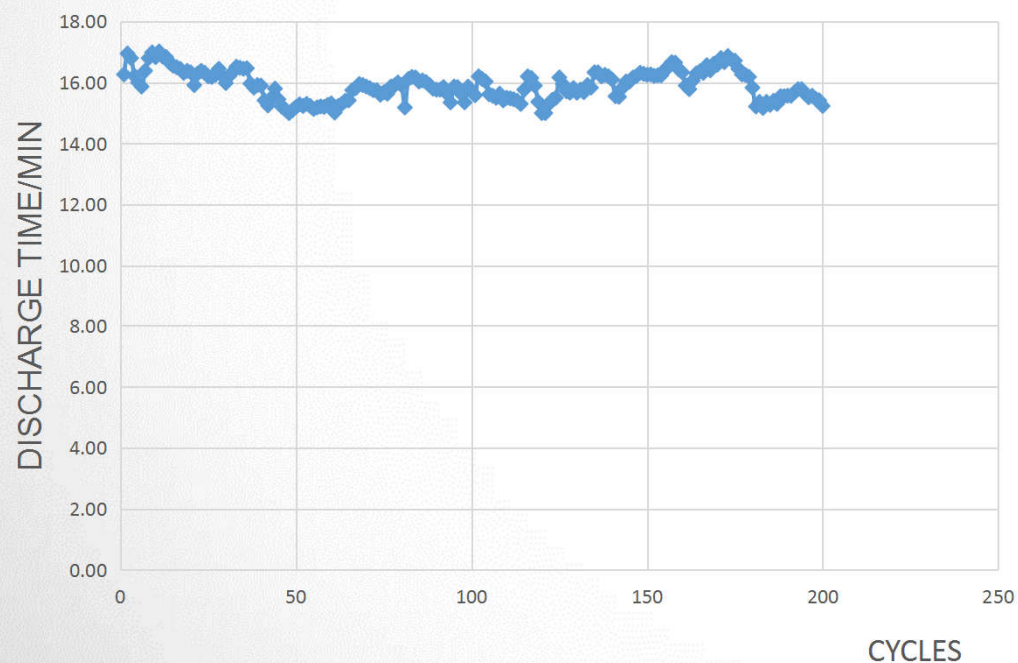
Applications: UPS/EPS



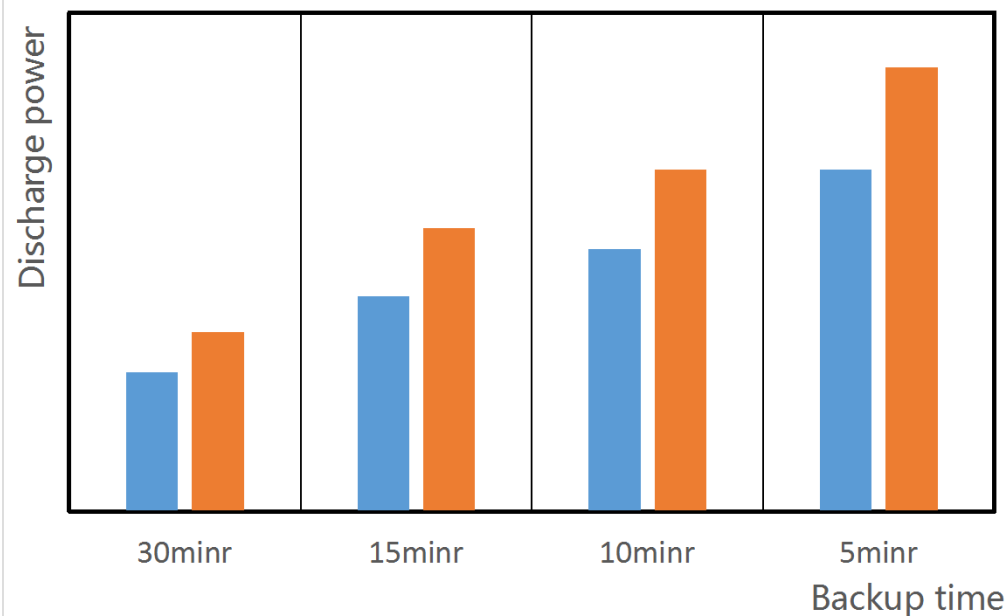
UPS Product

SPG series

15 MIN CONSTANT POWER DISCHARGE CURVE



Power performance comparison



Blue is 12V general type, Orange is SPG series

UPS Product

SPG series

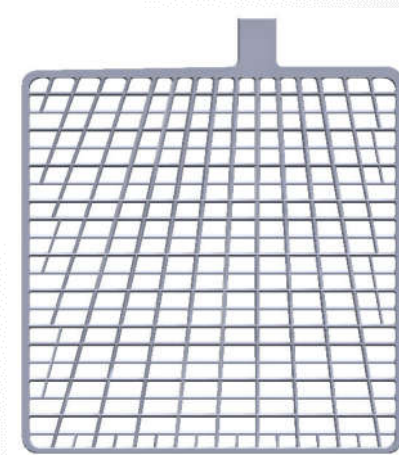
| No. | Model | Voltage (V) | C10 (Ah) | 15minr power (W) | Dimension (mm) | | | | Weight (kg) | Power density (W/kg) |
|-----|------------|------------------|----------|---------------------|----------------|-----|-------|-------|------------------|----------------------------|
| | | | | | L | W | H | TH | | |
| 1 | SPG12-175W | 12 | 42 | 175 | 196 | 165 | 165 | 170 | 13.9 | 75.54 |
| 2 | SPG12-215W | 12 | 55 | 215 | 228 | 138 | 209 | 214 | 17.2 | 75.00 |
| 3 | SPG12-255W | 12 | 70 | 255 | 261 | 171 | 209 | 217 | 22.5 | 68.00 |
| 4 | SPG12-300W | 12 | 80 | 300 | 50 | 167 | 179.5 | 179.5 | 24.6 | 73.17 |
| 5 | SPG12-320W | 12 | 75 | 320 | 261 | 171 | 209 | 217 | 25.5 | 75.29 |
| 6 | SPG12-340W | 12 | 90 | 340 | 306 | 171 | 209 | 217 | 27.2 | 75.00 |
| 7 | SPG12-390W | 12 | 100 | 390 | 330 | 174 | 217 | 226 | 31.6 | 74.05 |
| 8 | SPG12-440W | 12 | 115 | 440 | 375 | 174 | 209 | 227 | 36.2 | 72.93 |
| 9 | SPG12-490W | 12 | 135 | 490 | 375 | 172 | 275 | 280 | 42.5 | 69.18 |
| 10 | SPG12-500W | 12 | 140 | 500 | 483 | 171 | 219 | 227 | 43 | 69.77 |
| 11 | SPG12-570W | 12 | 145 | 570 | 483 | 172 | 219 | 227 | 45.6 | 75.00 |
| 12 | SPG12-660W | 12 | 180 | 660 | 497 | 203 | 228 | 233 | 58 | 68.28 |
| 13 | SPG12-720W | 12 | 200 | 720 | 522 | 234 | 218 | 225 | 63 | 68.57 |
| 14 | SPG12-770W | 12 | 210 | 770 | 522 | 234 | 218 | 225 | 65.7 | 70.32 |
| 15 | SPG12-870W | 12 | 250 | 870 | 534 | 271 | 225 | 233 | 77.9 | 67.01 |

New Technology

| New Products | | |
|----------------------------------|----------------------------------|---|
| HRL | UPS-FT | TPPL (Thin Plate Pure Lead) (12V) |
| C10 Capacity @1.80VPC(W@1.67) | C10 Capacity @1.80VPC(W@1.67) | C10 Capacity @1.80VPC(W@1.67) |
| 300W-910W | 410W-700W | 88/100/125/150/175/190/200/ 210/250 (300W-1000W) |
| 17 Models | 3 Models | 24 Models |

HRL Series

- Appearance: New appearance and constructure design, automaticly welding+throug the partition welding+heat sealing technolgy.
- Grid: Using new type corrosion resistant alloy, radiation grid structure.
- Formula: Special lead paste formual and additives.
- Design life: 15 years.
- Model: 300W-910W (15min at 1.67V/cell)
- Application: UPS, data center, IDC room

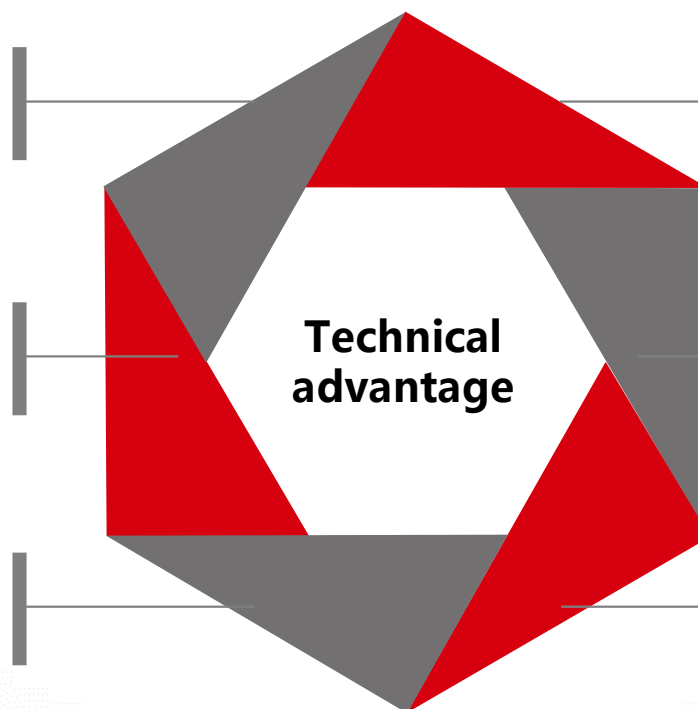


HRL Series

High power density, 30%
higher than ordinary batteries

Long design life (15 years),
longer warranty

Full automatic production
process with good consistency



Optimized plate design, long
cycle life

The cost of TCO is more than
20% lower than that of
conventional batteries

Wide range of power, easy
sizing of batteries

HRL Series

| No. | Model | Voltage (V) | C10 (Ah) | 15minr power (W) | Dimension(mm) | | | | Weight (kg) |
|-----|------------|------------------|-------------|------------------------|---------------|-----|-----|-----|------------------|
| | | | | | L | W | H | TH | |
| 1 | HRL12-300W | 12 | 80 | 300 | 262 | 172 | 218 | 225 | 23.8 |
| 2 | HRL12-320W | 12 | 86 | 320 | 262 | 172 | 218 | 225 | 25.5 |
| 3 | HRL12-360W | 12 | 95 | 360 | 343 | 173 | 218 | 225 | 30.8 |
| 4 | HRL12-380W | 12 | 98 | 380 | 343 | 173 | 218 | 225 | 32 |
| 5 | HRL12-410W | 12 | 103 | 410 | 343 | 173 | 218 | 225 | 33.7 |
| 6 | HRL12-440W | 12 | 100 | 440 | 343 | 173 | 218 | 225 | 34.5 |
| 7 | HRL12-475W | 12 | 115 | 475 | 375 | 174 | 218 | 225 | 38.5 |
| 8 | HRL12-490W | 12 | 140 | 490 | 483 | 174 | 219 | 226 | 42.8 |
| 9 | HRL12-520W | 12 | 145 | 520 | 483 | 174 | 219 | 226 | 44.5 |
| 10 | HRL12-550W | 12 | 155 | 550 | 483 | 174 | 219 | 226 | 46.2 |
| 11 | HRL12-570W | 12 | 150 | 570 | 483 | 174 | 219 | 226 | 47.8 |
| 12 | HRL12-690W | 12 | 200 | 690 | 534 | 272 | 221 | 228 | 60 |
| 13 | HRL12-740W | 12 | 220 | 730 | 534 | 272 | 221 | 228 | 63.4 |
| 14 | HRL12-790W | 12 | 210 | 760 | 534 | 272 | 221 | 228 | 66.8 |
| 15 | HRL12-840W | 12 | 225 | 840 | 534 | 272 | 221 | 228 | 76.1 |
| 16 | HRL12-880W | 12 | 255 | 880 | 534 | 272 | 221 | 228 | 77.6 |
| 17 | HRL12-910W | 12 | 250 | 910 | 534 | 272 | 221 | 228 | 78.8 |

UPS-FT Series

- Design concept: modular installation design, saving installation space.
- Appearance: narrow and long design, front terminal, convenient installation and maintenance.
- Grid: patent radiation motherboard design, excellent for large current discharge.
- Formula: special lead paste formula of long life and high power, good cycle performance.
- Safety design: centralized exhaust system, ensure the safety of equipment and battery.
- Design life: 12 years.
- Power range: 410W ~ 700W (15min rate @1.67V/ monomer);
- Application: Data Center, HVDC system, network operation center, core computer room, etc.

UPS-FT Series

High power density, 30%
higher than ordinary batteries

Centralized exhaust system,
more safety

Full automatic production
process with good consistency

**Technical
advantage**

Optimized plate design, long
cycle life

Space saving type, reduce the
area of 20%

Long and narrow design,
convenient for modular
installation and maintenance

UPS-FT Series

| Model | Voltage (V) | W/cell, (1.67V/cell) | Battery dimension (mm) | | | | Weight (kg) |
|--------------|-------------|----------------------|------------------------|-----|-----|-----|-------------|
| | | | L | W | H | TH | |
| UPS12-410FTA | 12 | 410 | 560 | 125 | 230 | 230 | 36 |
| UPS12-615FTA | 12 | 615 | 560 | 125 | 309 | 309 | 54 |
| UPS12-700FTA | 13 | 700 | 560 | 125 | 325 | 325 | 60 |



TPPL

UPS batteries:

- Positive grids: Pure Pb
- Plate: Thinner Plate
- High-rate discharge
- High power density
- Fast charge acceptance
- Temperature range: -40°C to +60°C



Telecom batteries:

- Positive grids: Pure Pb
- Plate: Thinner Plate
- fast charge acceptance and high cyclic performance
- High energy density
- Longer design life
- Stably operated in the harshest environments
- Temperature range: -40°C to +60°C

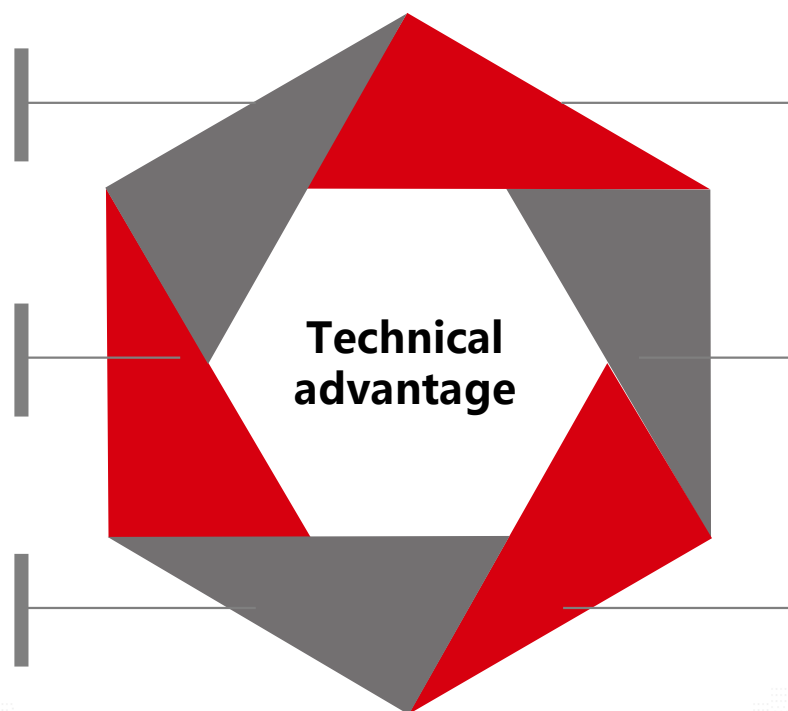


TPPL

Ultra thin plate design, chemical reaction surface area is large, power density is 15% higher than SPG series

Suitable for continuous production of thin grid with thickness of 1.0mm and below, high production efficiency (200-300 pieces per minute), good consistency, no porosity

High degree of automation, clean production process, energy saving



Grid alloy dense lattice, corrosion resistance, battery float charge, cycle life are better

Active material utilization is higher, lead content of battery manufacturing cost is low

Fast charge performance is excellent, 0.4C, 2.41V, the battery can be fully charged in 7h.

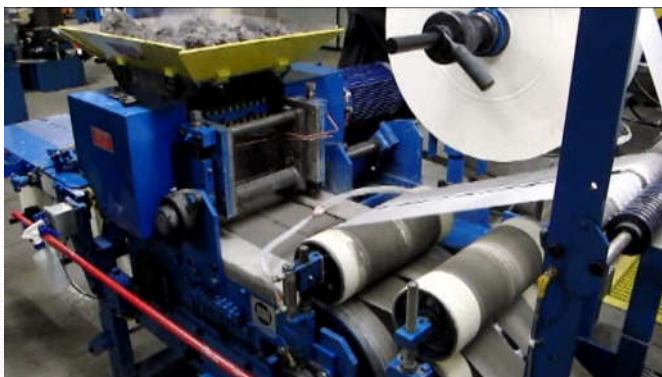
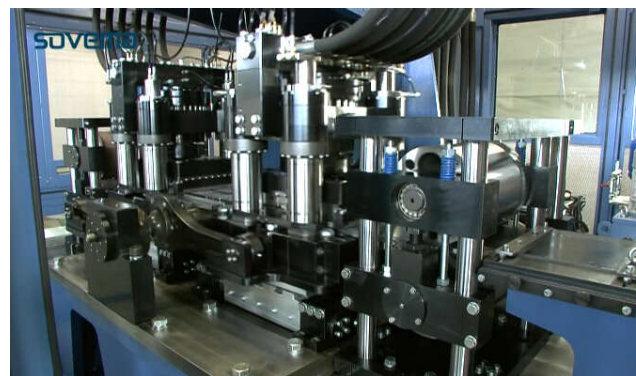
TPPL

| TYPE | Nominal voltage (V) | Power (W/cell) | Maximum external dimensions (mm) | | | Weight (Kg) |
|---------------|---------------------|--------------------------|----------------------------------|-------|--------|-------------|
| | | (15min to 1.67 VPC, 25℃) | Length | Width | Height | |
| HPPL12-300W | 12 | 300 | 259 | 173 | 216 | 28 |
| HPPL12-425W | 12 | 425 | 341 | 173 | 216 | 32 |
| HPPL12-480W | 12 | 480 | 371 | 173 | 216 | 38 |
| HPPL12-454WF | 12 | 454 | 560 | 125 | 227 | 37 |
| HPPL12-568WFN | 12 | 568 | 551 | 110 | 283 | 44 |
| HPPL12-568WF | 12 | 568 | 560 | 125 | 283 | 50 |
| HPPL12-652WF | 12 | 652 | 560 | 125 | 283 | 51 |
| HPPL12-695WF | 12 | 695 | 560 | 125 | 320 | 58 |
| HPPL12-705WF | 12 | 705 | 560 | 125 | 320 | 59 |
| HPPL12-731WF | 12 | 731 | 560 | 125 | 320 | 60 |

TPPL

| TYPE | Nominal voltage (V) | Capacity (AH) | Maximum external dimensions (mm) | | | Weight (Kg) |
|--------------|------------------------|------------------------|----------------------------------|-------|--------|----------------|
| | | (10h to 1.8 VPC, 25°C) | Length | Width | Height | |
| HEPL12-88 | 12 | 88 | 259 | 173 | 216 | 26 |
| HEPL12-100 | 12 | 100 | 341 | 173 | 216 | 32 |
| HEPL12-125 | 12 | 125 | 371 | 173 | 216 | 38 |
| HEPL12-100F | 12 | 100 | 560 | 125 | 227 | 37 |
| HEPL12-150FN | 12 | 150 | 551 | 110 | 283 | 44 |
| HEPL12-150F | 12 | 150 | 560 | 125 | 283 | 50 |
| HEPL12-175F | 12 | 175 | 560 | 125 | 283 | 51 |
| HEPL12-190F | 12 | 190 | 560 | 125 | 320 | 58 |
| HEPL12-200F | 12 | 200 | 560 | 125 | 320 | 59 |
| HEPL12-210F | 12 | 210 | 560 | 125 | 320 | 60 |

TPPL Key Equipment



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Corporate Profile

Profile, certificates, brands, R&D, facilities,
quality-control

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Typical Cases

(UPS)

02

Products & Technologies

AGM, GEL, lead-carbon, Lithium-ion

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Market & Service

Footprint, main users, service

Typical cases

Case of operator data center

Project name :

- China Mobile South Base

Project introduction :

- The China Mobile south base, which covers an area of 492960.3 square meters and the China Mobile south base of Gaotang Avenue in Tianhe District, Guangzhou, is mainly divided into three center groups of "R & D, IT support, communication" and a certain living supporting room. The base is the world's first class production research and development, it is an important base for China's communication services to international.

Battery configuration :

- GFMG-500C: 5568 pieces; GFM-600C: 3480 pieces;
- GFM-800C: 7368 pieces; GFM-200C: 144 pieces



Typical cases

Case of operator data center

Project name :

- China Unicom Shandong national data center Laoshan IDC room.

Project introduction :

- Laoshan IDC room is located in No. 168 Zhuzhou road in Laoshan district. According to the standard of five star machine room, the total area of the machine room is 21313 square meters and the cabinet is more than 3500. The project is awarded the "video cloud data center" and "five star data center" by the group.

Battery configuration :

- SPG12-150: 9480 pieces



Typical cases

Case of operator data center

Project name :

- China Unicom Jiangsu wuxi data center IDC room.

Project introduction :

- This project is the data center project of Wuxi Unicom. The center provides high level data storage and other value-added Internet services to IDC customers with reliability, security and scalability, providing comprehensive solutions for users and providing professional services for enterprise Internet access and enterprise IT management.

Battery configuration :

- GFMD-1000C: 1466 pieces
- SP12-100: 1466 pieces



Typical cases

Case of operator data center

Project name :

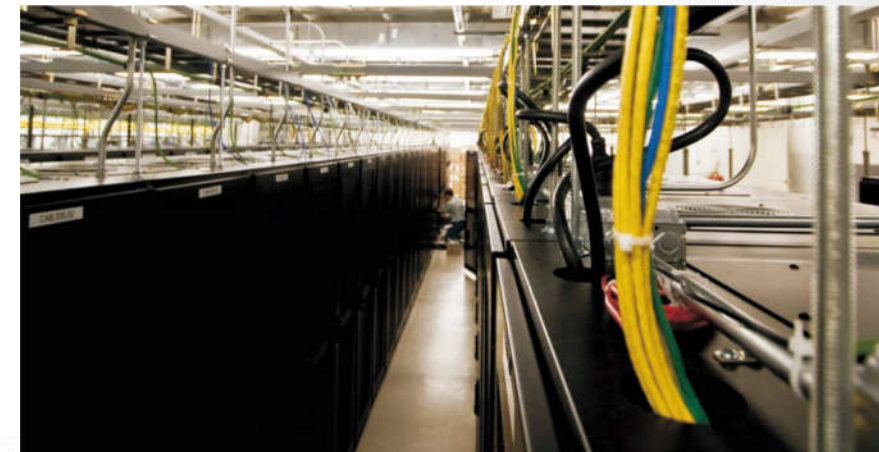
- China Mobile Communications Group (Hohhot) data center

Project introduction :

- China Mobile Communications Group (Hohhot) data center has invested 10 billion 700 million CNY, with a capacity of forty thousand racks. The cloud computing center will not only meet China Mobile's centralized IT support system, form an excellent business platform, but will also become a powerful IDC, support the national data interaction of China Mobile, and meet local IDC needs in Inner Mongolia.

Battery configuration :

- GFM-800C: 4082 pieces



Typical cases

Case of enterprise data center

Project name :

- Data center of Baidu big data industry park (Changzhou)

Project introduction :

- At the end of 2015, the Baidu Inc signed a strategic cooperation agreement with the Changzhou Municipal People's government. The Baidu big data industry park will be located in the Changzhou bell tower Economic Development Zone. The two sides will cooperate deeply in the large data analysis and application, the unmanned car, the intelligent city construction and other industries. The total investment of the project is 5 billion CNY

Battery configuration :

- SP12-120: 9600 pieces
- SPG12-200: 960 pieces



Typical cases

Case of business data center

Project name :

- Ordos international green IDC project

Project introduction :

- The Ordos international green IDC (Internet Data Center) project is the largest cluster of data centers in the Asia Pacific region, with the highest energy use efficiency and the most abundant application of cloud computing, with a frame of 1226.

Battery configuration :

- SP12-150: 4320 pieces
- SPG12-200: 120 pieces



Typical cases

Project name :

- Eurotunnel Telecom project

Project introduction :

- Sacred Sun is to continue providing backup power for the subsea English Channel rail link between the UK and France under a deal with Getlink, formerly known as Eurotunnel. Sacred Sun has provided a backup power solution for the tunnel since 2008. The underwater portion of the tunnel is 37.9km long and is the world's longest subsea section.

Battery configuration :

- EHP2-200: 960 pieces
- EHP2-275: 3240 pieces
- EHP2-400: 720 pieces



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AGM, GEL, lead-carbon, TPPL

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Market & Service

Footprint, main users, service

Our Footprint



Our Installed Base

NORTH AMERICA

- USA

SOUTH AMERICA

- Argentina
- Brazil

EUROPE

- Belarus
- Belgium
- Czech Republic
- Finland
- France
- Germany
- Greece
- Hungary
- Italy
- Kazakhstan
- Netherlands
- Poland
- Romania
- Russia
- Spain
- Sweden
- UK

MIDDLE EAST

- Egypt
- Iran
- Jordan
- Lebanon
- Saudi Arabia
- Syria
- Turkey
- United Arab Emirates
- Yemen

AFRICA

- Ghana
- Kenya
- Libya
- Nigeria/South Africa
- Tanzania/Zambia

ASIA

- Afghanistan
- Bangladesh
- Burma
- Cambodia
- China
- India
- Indonesia
- Malaysia
- Nepal
- Pakistan
- Philippines
- Singapore
- Sri Lanka
- Thailand
- Vietnam

AUSTRALIA

Main Users



Sacred Sun Europe Hub



- Stock & Logistics
- Testing & Charging & Measurement
- Service & Support