



SACRED SUN

SP SERIES
TECHNICAL MANUAL



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Security Instruction

Please read these instructions carefully in order to make correct, safe, and effective operation. This manual provides you with very important installation and operation guidelines, which will guarantee your equipment an optimal performance and longer service life.

- ▲ For your safety, please do not open battery by yourself, only professionals shall be allowed to open and maintain the battery;
- ▲ Due to battery be potential harmful to the environment and health, battery shall be replaced by manufacturer's service center. If there is need to replace and maintain, please contact after-sale service center.
- ▲ Used battery is recyclable, and improper disposal of battery may be great harmful to the environment and health. So, used battery shall be proper disposed following relative regulations and law or shall be returned to our company for disposal.
- ▲ Please choose the batteries of the same model for replacement, and batteries produced by different manufacturers shall be strictly forbidden for connecting in one system.

Notices

Warning	Electricity shock	Protecting eyes	With adults custody	No short circuit
No flame and spark	Recycled	Proper disposal	Read instructions	UL certificate

Chapter One Product Introduction

Product Characteristics

02

Basic Characteristics

AGM valve regulated technology, high-tin-low-calcium multielement special alloy, poor electrolyte design, negative adsorptive theory, restrain hydrogen separate out effectively, reduce the electrolyte loss during usage, there is no need to add electrolyte among battery service life.

Reliable sealing technology

Patent multi-layer electrode pole sealing structure ensure sealing safety and reliability, except upside down, any other installation orientation is allowed.

Long service life

Patent grid structure design preventing grid prolongation, special 4BS lead paste technology and tight assembly and container formation technology prolong battery service life.

Low self-discharge rate

High purity raw material, clean production environment, ensure low self-discharge rate of battery.

Good consistency

During plate production, cell assembling and finished products test, one homogenization procedure added in each process, thus ensure battery quality consistency.

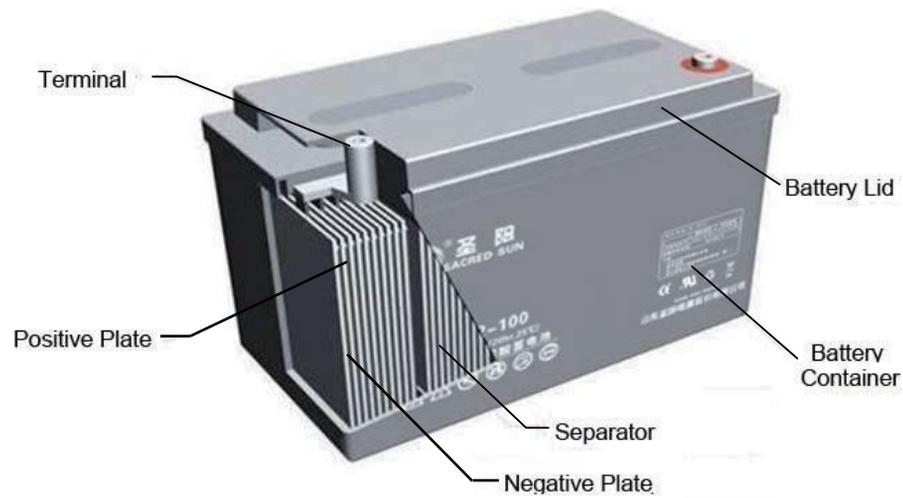
Applicable for wide temperature range

Special electrolyte formula and special active substance formula, enhance good high and low temperature performance.

Main Applications

- ⊗ UPS/EPS
- ⊗ Telecommunication and power supply equipment
- ⊗ Security system
- ⊗ Alarm system
- ⊗ Medical treatment
- ⊗ Electrical tool
- ⊗ Portable instrument
- ⊗ Signal light
- ⊗ Solar and wind energy storage

Battery Structure



Type and Dimensions

SSP/SP series

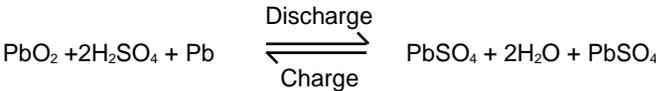
- Table 1-1 SSP/SP series battery type and dimensions

Model	Rated Voltage (V)	Rated Capacity(Ah) (Ah)				Dimensions (mm)				Weight (kg)
		End voltage 1.75V/cell C20	End voltage 1.75V/cell C10	End voltage 1.75V/cell C5	End voltage 1.70V/cell C1	Length	Width	Height	Total Height	
SSP12-6.5	12	6.5	6.0	5.935	4.218	151	65	94	98	2.0
SSP12-7	12	7	6.5	6.35	4.543	151	65	94	98	2.1
SSP12-8	12	8	7.5	7.305	5.192	151	65	94	98	2.4
SSP12-9	12	9	8.2	7.7	5.927	151	65	94	98	2.45
SSP12-9HR	12	8	7.5	7.2	5.31	151	65	94	98	2.7
SSP12-12	12	12	11	9.6	7.4	151	99	94	100	3.6
SSP12-18	12	18	16.7	16.5	11.52	181	76	166	166	5.3
SP12-26(R)	12	26	24.27	23.5	16.2	166	175	125	125	8.0
SP12-26(F)	12	26	24.27	23.5	16.2	166	175	125	125	8.0
SSP12-33	12	33	30.7	28	19.8	195	130	158	163	10.5
SP12-35	12	35	32	29	22.2	223	93	175	175	9.5
SP12-38	12	38	35.4	32.3	22.8	196	166	165	170	12.0
SP12-40B	12	40	37.2	34.0	24.0	198	165	170	170	13.5
SP12-42	12	42	39.1	35.7	25.2	196	165	165	170	12.9
SP12-50	12	50	46.5	42.5	30.0	257	133	201	201	16.1
SP12-65	12	65	60.5	55.3	39.0	324	166	175	175	20.5
SP12-70	12	70	65.1	59.5	42.0	324	166	175	175	21.7
SP12-80	12	80	74.4	67.5	48.0	350	167	179	179	23.2
SP12-100	12	100	93.0	85.0	60.0	329	172	215.5	223	29.8
SP12-120	12	120	111.6	102.0	72.0	407	173	222	231	36.0
SP12-150	12	150	139.5	127.5	90	483	171	240	240	42.5
SP12-200A	12	200	186	170	120	522	234	218	223	59.0
SP12-200B	12	200	186	170	120	497	259	228	237.5	61.9
SP12-245	12	245	227.8	208.3	147	521	269	220	225	69.6

Customed series

Working Principle

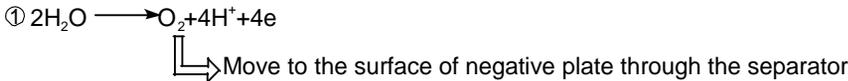
⚙️ **The electrochemical reaction of batteries in charge and discharge process as follows:**



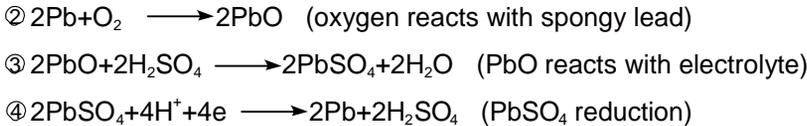
In the final stage of charge process, active substance in positive plate transformed to lead dioxide, negative plate has not reached fully charged stage, the process of active substance in negative plate transformed to spongy lead has not finished, oxygen gas generated in positive plate reaches the negative plate through separator pores and reacts active substance in negative plate, resulting depolarized state in negative plate, and restraining the generation of hydrogen.

⚙️ **The working principle of electrochemical reaction to realize sealing as follows:**

- The reaction in positive plate (oxygen generated)



- The reaction in negative plate (oxygen absorbed)



- The whole reaction in the negative plate is: $\textcircled{2} + \textcircled{3} + \textcircled{4} : \text{O}_2 + 4\text{H}^+ + 4\text{e}^- = 2\text{H}_2\text{O}$

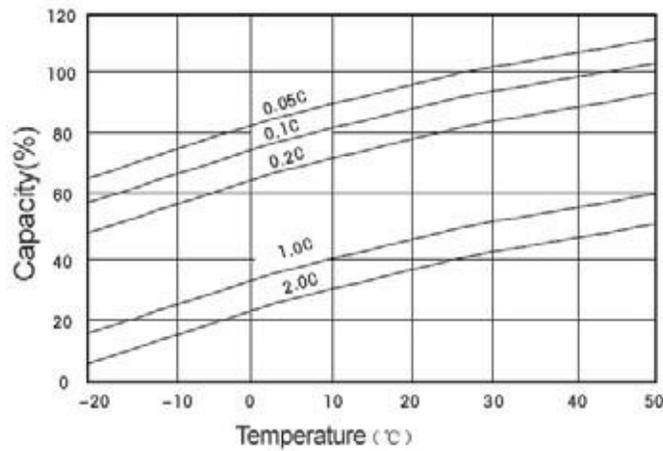
The final production returns to $\textcircled{1}$, and recycles like this.
 In general, in charging process oxygen gas generated in positive plate could quickly reach the negative plate and recombine into water through react with active substance in negative plate, no gas escape and water loss, achieving the sealing.

Chapter Two Technical Characteristics

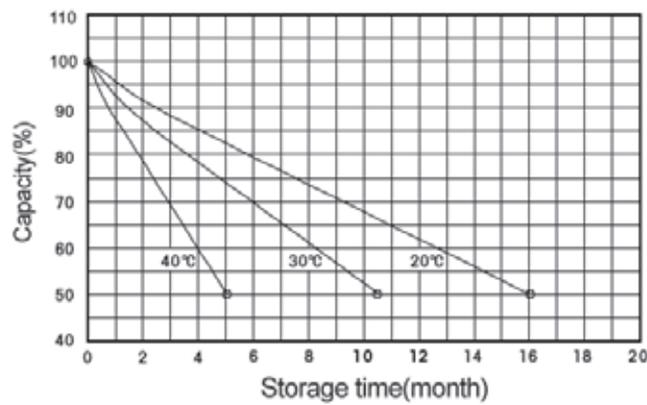
Discharge Curve

⚙️ All series common curves

- Figure 2-1 Discharge capacity and temperature curve



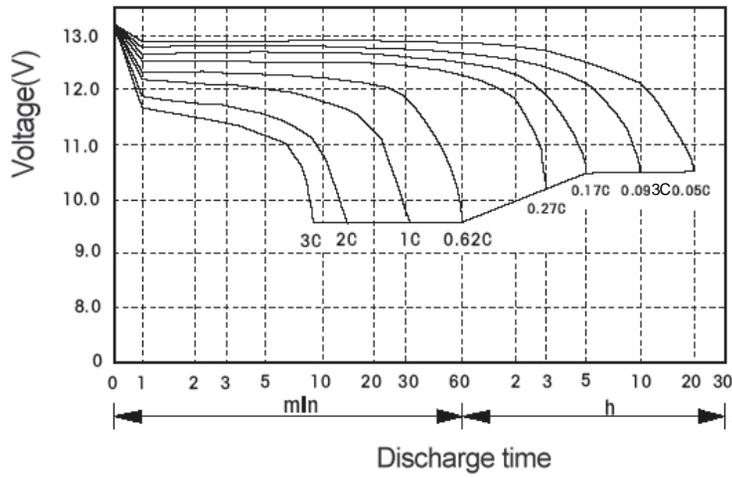
- Figure 2-2 Discharge capacity and storage time curve



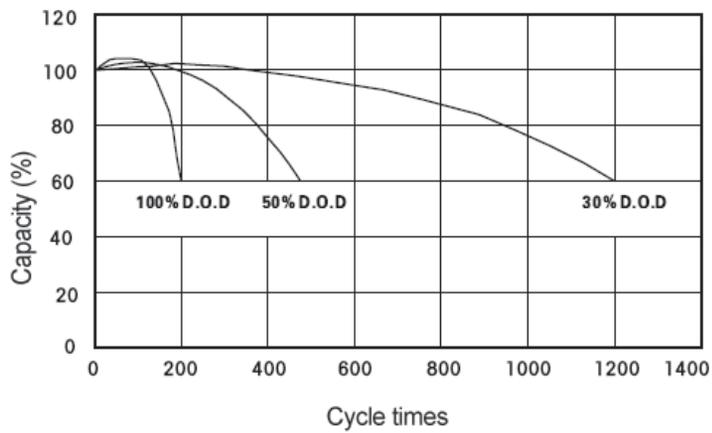


⚙️ All series characteristic curves

- Figure 2-3 Discharge characteristic curve under different discharge rates(25 °C)



- Figure 2-4 Cycle times and depth of discharge curve



Charge Curve

Figure 2-5 Charge characteristic curve

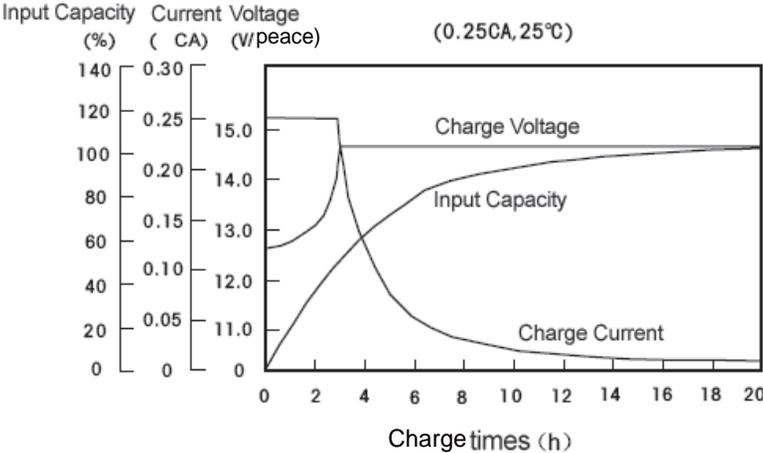
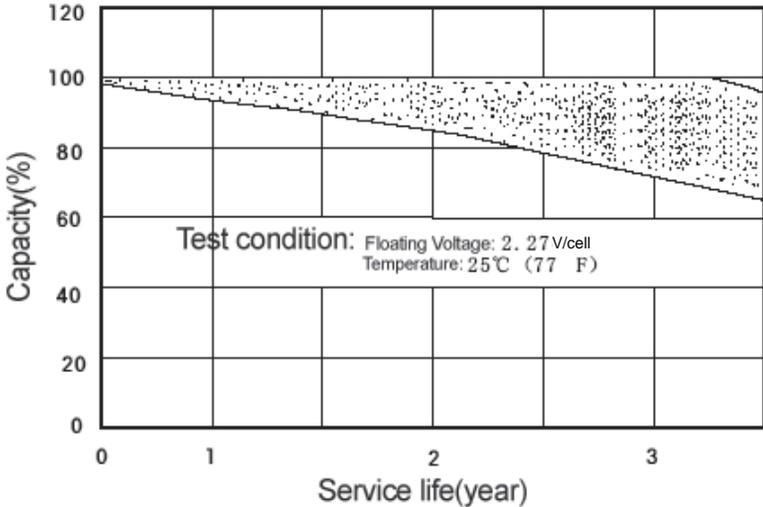
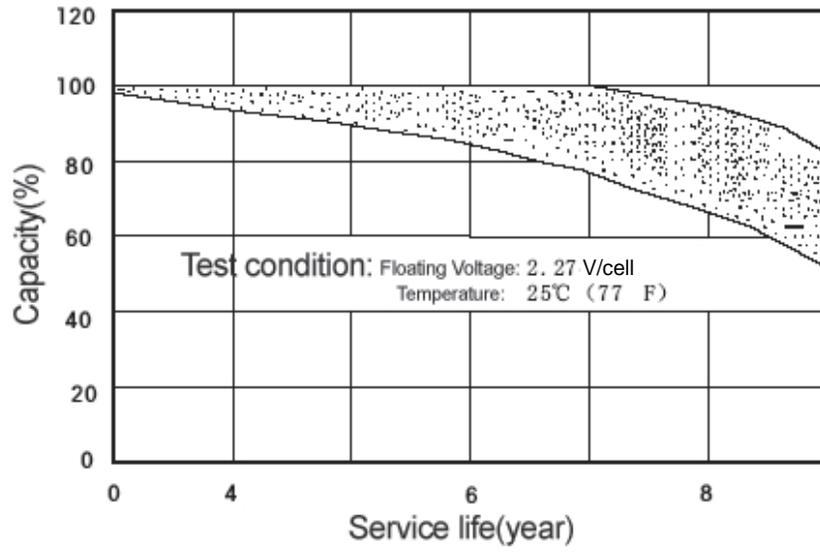


Figure 2-6 Floating charge service life characteristic curve---below 24Ah batteries



- Figure 2-7 Floating charge service life characteristic curve---24Ah and above batteries



Internal Resistance and Short Circuit Current

The internal resistance is dynamic nonlinear parameter, it continuously varies with the temperature, charge state and service duration. The internal resistance is the lowest when the battery is fully charged.

Below tables present the internal resistance and short circuit current of the battery which the internal resistance is measured by HIOKI 3551 BATTERY HITESTER resistance tester at an ambient temperature of $25\pm 5^{\circ}\text{C}$, in the fully charged state.

■ Table 2-3 The internal resistance and short circuit current(25°C)

Battery Type	Reference Internal Resistance(m Ω)	Short Circuit Current(A)	Battery Type	Reference Internal Resistance(m Ω)	Short Circuit Current(A)
SSP12-6.5	32	170			
SSP12-7	30	190	SP12-42	8.5	1400
SSP12-8	19	210	SP12-50	7.5	1600
SSP12-9HR	13	230	SP12-65	7.0	1700
SSP12-12	14	310	SP12-70	6.0	2000
SSP12-18	15	460	SP12-80	4.5	2600
SP12-26(R)	12	670	SP12-100	4.0	3000
SSP12-26(F)	12	670	SP12-120	3.8	3100
SP12-33	10.5	850	SP12-150	3.2	3650
SP12-35	9.3	910	SP12-200A	3.0	3900
SP12-38	9.0	1300	SP12-200B	3.0	4000
SP12-40B	8.8	1350	SP12-245	2.5	4600

Chapter Three Operation and maintenance

Parameters

Ambient temperature is $-15^{\circ}\text{C}\sim 45^{\circ}\text{C}$ and the optimal operation temperature is $25^{\circ}\text{C}\pm 5^{\circ}\text{C}$.

Ambient humidity less than RH92%

Altitude less than 4500m,if operation altitude more than 4500m,please make special reminder when confirm order.

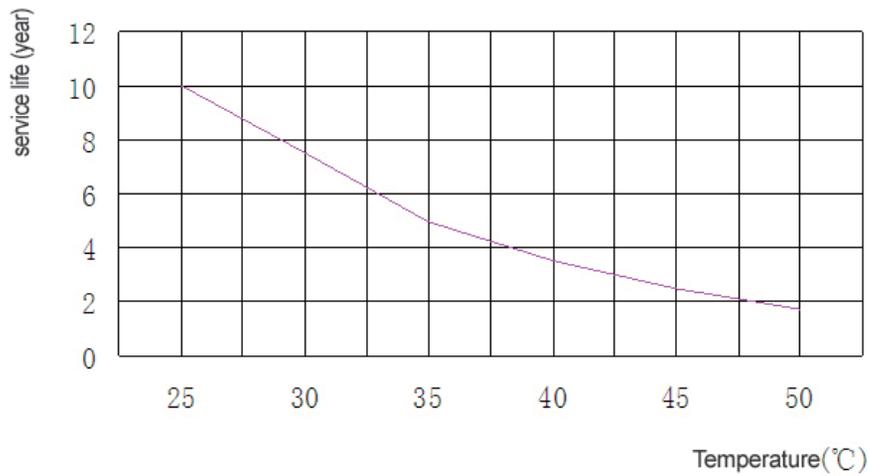
Factors Influencing capacity

Quantity of electricity battery discharge under certain condition is called battery capacity,symbol is C ,normal unit is Ampere Hour,in short is Ah.

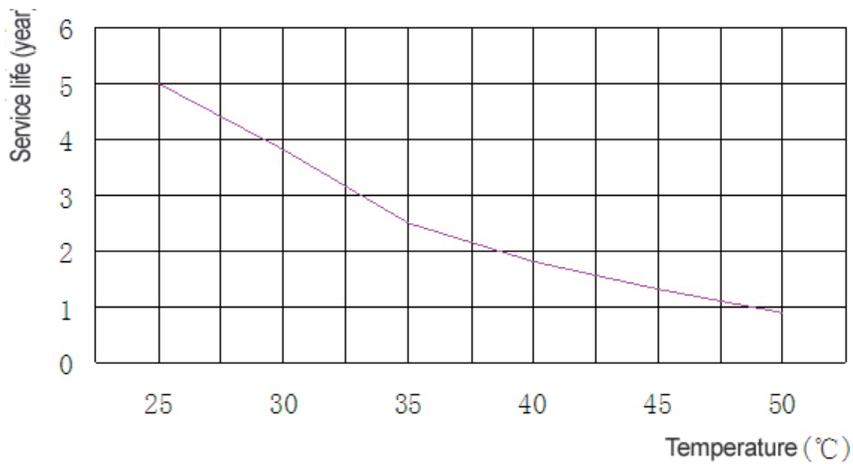
Battery capacity contains rated capacity and actual capacity,for rated capacity please refer to Table 1-1.Actual capacity is real quantity of electricity battery discharge under certain condition,it is equal to discharge current multiply discharge time.

High temperature will speed up battery grid corrosion and water loss, thus greatly shorten the battery life, when the temperature is over 25°C , the service life of the battery will be shortened by half as the temperature increasing by 10°C . The optimal operation temperature is $25^{\circ}\text{C}\pm 5^{\circ}\text{C}$, charge voltage should be adjusted according to ambient temperature.

■ Figure 3-1 Service life and temperature curve---SP series



■ Figure 3-2 Service life and temperature curve---SSP series



Charge

Floating charge

Charge method: 2.27V / cell with limited current of 0.3 C₂₀ (A).

Charge voltage should be adjusted according to ambient temperature,temperature compensation coefficient is -3mV / cell / °C.

Floating charge voltage at different ambient temperature, as below table

Temperature(°C)	0	10	20	25	30	35
Floating charge volage (V/cell)	2.33~2.36	2.30~2.33	2.27~2.30	2.25~2.28	2.24~2.27	2.22~2.25

Cycle application

Charge method: 2.45V / cell with limited current of 0.25 C₂₀ (A).

Charge voltage should be adjusted according to ambient temperature,temperature compensation coefficient is -4mV / cell / °C.

Setting charge capacity as 105-110% of discharge capacity, when the constant charge current keep as same value for 3hrs, charge end.

Storage

The battery should be fully charged before storage, and then be stored in clean, ventilate and dry environment without corrosive gas or explosive gas nearby.

Supplementary charge is required in storage period, the method as follows.

Storage Temperature	The interval of supplementary charge	Methods(choose either one)
Below 25°C	per 6 months	Charge with 0.25C ₂₀ A limited current and 2.27V/cell constant voltage for 2~3 days. Charge with 0.25C ₂₀ A limited current and 2.45V/cell constant voltage for 10-16 hours.
25~30°C	per 4 months	
30~35°C	per 3 months	
35~40°C	per 2 months	

Maintenance

To ensure the performance of battery, the battery should be correctly inspected and maintained. The maintenance methods are recommended as follows.

Monthly Maintenance

- Measure and record the ambient temperature of the battery-room, battery container and electrode pole temperature.
- Check battery cleanliness, terminal damage track and temperature, container and lid damage and temperature.
- Measure and record the total voltage and floating current of the battery system.

Quarterly Maintenance

- Repeat every item of monthly inspection.
- Measure and record the floating voltage of each on-line battery.

Annually Maintenance

- Repeat every item of quarterly maintenance and inspection.
- Check whether connectors are loose or not.

- Check whether safety valve is twisted tightly or not
- Perform a discharge test to check the exact load every year, discharge 30%-40% of the rated capacity.

Three yearly maintenance

- After three years operation, battery capacity should be tested, if battery bank actual capacity is below 80% of rated capacity, battery bank is considered life over.



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