



# VRLA-AGM

# BATTERIES

## Installation & Operation Guide





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**Jubilee Store sealed lead acid battery is shipped charged, handle the battery according to the following instructions before use:**



## **1. Introduction**

Jubilee Store produces world-class batteries based on years of research and development. Our products are manufactured under the guidelines of ISO9001 quality system. Each battery undergoes a series of strict manufacturing and quality control processes before shipment. We are committed to provide our customers the best batteries, with 100% customer satisfaction. We believe that the Jubilee Store battery is the ideal selection for your application and your ultimate DC power choice.

## **2. Safety precaution and protection kits**

- ❖ When working any battery system, be sure you have the necessary tools and safety equipment, including but not limited to:
  - insulated tools
  - rubber apron and gloves
  - face protection/face shield
  - safety goggles
  - fire extinguisher
  - emergency eye wash and shower, if available
  - acid spill cleanup kit
- ❖ Pay attention to the electrical warning symbols to avoid serious injury or death caused by electrical shock or burns.
- ❖ Multi-cell battery systems can attain high voltage and/or currents. Do **NOT** touch un-insulated batteries, connectors or terminals. To prevent serious electrical burns and shock, use **EXTREME CAUTION** when working with the system
- ❖ Always wear safety protection clothes and protect all exposed skin and eye surfaces
- ❖ Use non-conductive or insulated tools when working with **ANY** battery system.
- ❖ All installation tools should be adequately covered with vinyl electrical tape or suitable no-conducting material to minimize the possibility of shorting across connections.
- ❖ Never lay tools or other conductive objects on the battery.
- ❖ Avoid any possible reasons for shorting, explosions and personal injury.
- ❖ Do NOT throw away any batteries or battery components, they are recyclable resources.



### **3. Battery storage and using circumstances**

#### ❖ **Storage**

- If the battery has high temperature or poor ventilation during storage and delivery, self-discharge will be increased. Therefore, keep good ventilation and keep away from fire, flame, water and heat supply etc.
- When storing the battery, disconnect charger and load, Store in dry and cool conditions.
- After storing for any certain time, please charge the batteries before use.

#### ❖ **Using circumstances**

- No fire, flame or heat supply should be near the battery;
- Avoid operating near heat supply and in direct sunlight;
- Avoid operating in humid / damp locations;
- Do not operate in sealed enclosed or without ventilation.



### **4. Using conditions**

- ❖ Temperature range:
  - Charging : 0 ~ +40<sup>0</sup>C,
  - Discharging : -20 ~ +55<sup>0</sup>C,
  - Storage : -15 ~ +50<sup>0</sup>C;
- ❖ Parallel connection : recommended within 4 groups;
- ❖ Multilayer installation : temperature among layers should be controlled within 3degC;
- ❖ Heat dispersing : maintain 20mm inter-bloc distance between batteries.
- ❖ Ventilation : Ensure batteries are stored and used in ventilated conditions.
- ❖ Optimum ambient temperature : +5<sup>0</sup>C ~ +35<sup>0</sup>C.
- ❖ Float charge (25<sup>0</sup>C) : limited current ≤0.30C<sub>10</sub>, voltage 2.23~2.30V/cell
- ❖ Equalizing charge (25<sup>0</sup>C) : limited current ≤0.30C<sub>10</sub>, voltage 2.30~2.40V/cell
- ❖ Mixing batteries : Do not mix new and old batteries, batteries from Different manufacturers, if required consult Jubilee Store technical support.

## 5. Installation of batteries

### 5.1 Unpack and check

- ◇ Delivery: Prevent any force on the terminal; do not tamper with any seals.  
Do not place upside down, Do not throw or cause any impact to the battery;  
Do not cause any metallic short circuit.
- ◇ Inspection: packaging / appearance of battery for signs of damage;
- ◇ Check parts list: battery quantity; accessories;
- ◇ Reference: catalogue; installation drawing; other notices.

### 5.2 Notices before Installation

- ◇ If no abnormality after check, install the batteries in the designated position;
- ◇ If installing the batteries in the battery chamber, place them starting at the bottom of chamber;
- ◇ Avoid installing the batteries near any heat supply such as transformers or heat exhaust of other equipment;
- ◇ A battery may cause flammable gas during storage, avoid enclosing with any apparatus which produce flames / sparks
- ◇ Before connecting, clean the terminals to bright metal.
- ◇ Ensure that no conductive material can connect between positive and negative terminals.
- ◇ Before installation all tools are insulated;

### 5.3 Installation and connection

- ◇ Use insulated tools only;
- ◇ Connect batteries, then connect battery group with charger or load;
- ◇ When multi-group batteries are parallel connected, connect in series first and then parallel connection;
- ◇ To ensure good ventilation, the batteries per row should keep around 10 - 20mm inter-bloc spacing;
- ◇ Before connection, clean the battery terminals to bright metal;
- ◇ Before and after connection, apply antirust compound such as petroleum gel on the surface of battery terminal;
- ◇ After batteries are installed, test the voltage of the battery group, if correct link battery to load.
- ◇ Use correct torque on all terminals, ensuring every connecting nut and screw is secure; see torque settings as table 1

**Table 1 Suggested torque table**

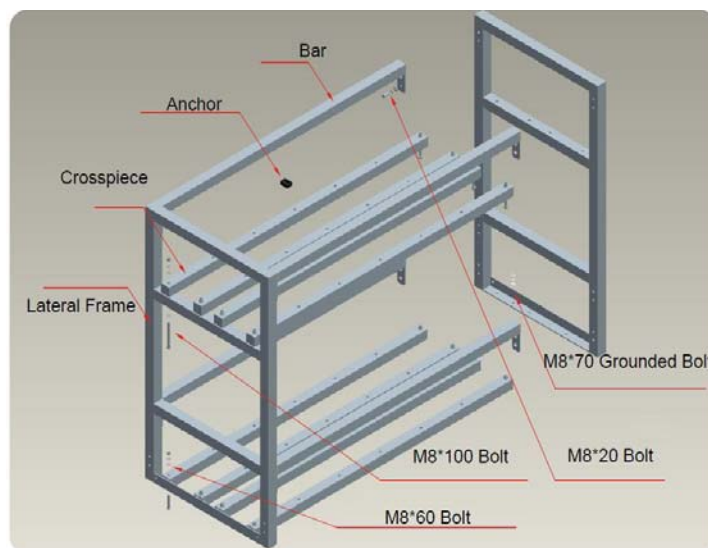
S/N	Range	Torque
1	M5	2.0~3.0N*m(20~30kgf*cm)
2	M6	3.9~5.4 N*m(40~55kgf*cm)
3	M8	11~14.7N*m(111~150kgf*cm)

### 5.4 Pre Installation Check

- ✧ **Floor bearing:** Batteries are heavy check the floor loading is not exceeded. Check rack/enclosure complies with any load spread requirement.

### 5.5 Battery example

To Assemble a follow the

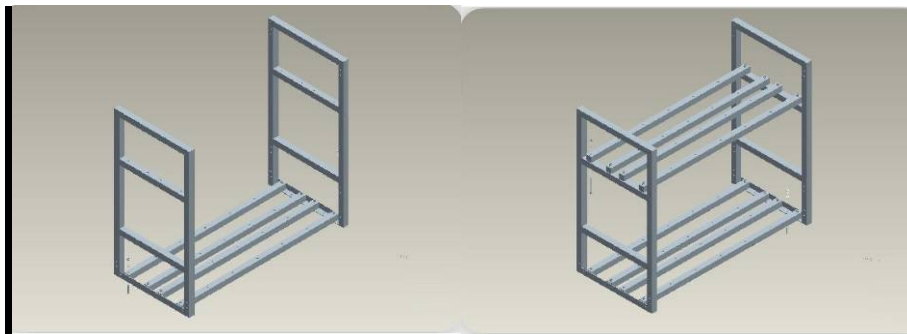


### rack assembly

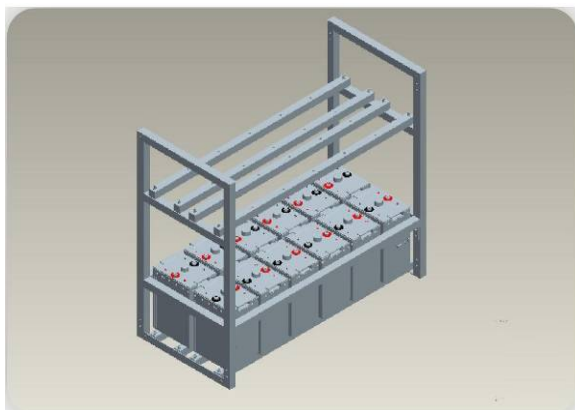
battery rack, procedures below:

- ✧ **Step 1** : Insert cross bolt from bottom to up into lower-layer backstop steel hole of lateral frame, then put lateral frame vertically.
- ✧ **Step 2** : Set under layer on the screw of lateral frame, lock the nut (notice not too tight).
- ✧ **Step 3** : Put the upper layer crosspiece between two lateral frame, fix them with M8\*25 bolt (notice not too tight);

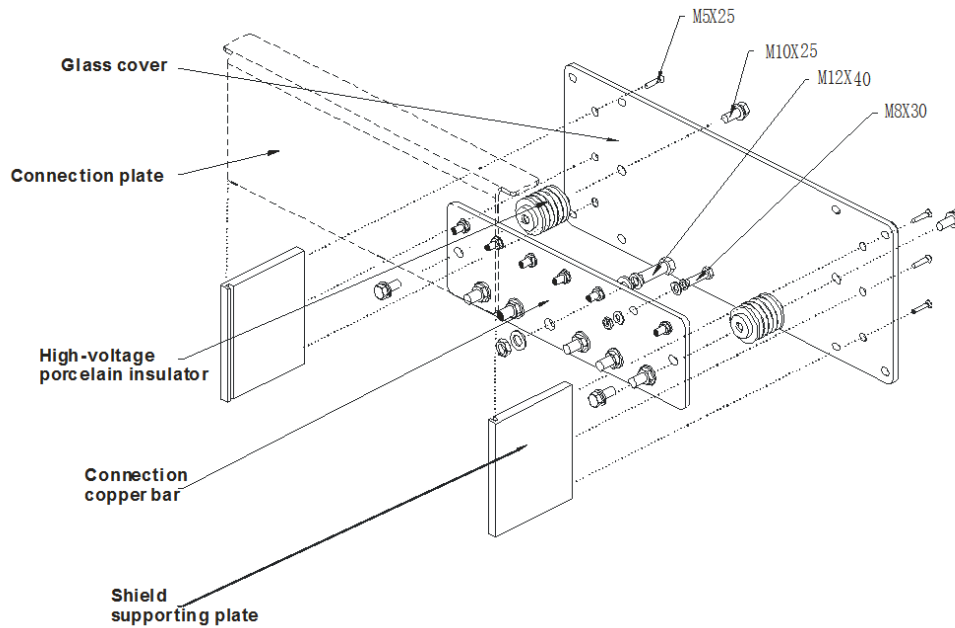




- ✧ **Step 4** : Collate the four angles of rack with tape measure to make sure that the rack is upright and stable, then tighten the connection bolt between upper-layer pallet lateral frame and under-layer pallet lateral frame;
- ✧ **Step 5** : Move and fix middle-empty rack to the appointed place. Mark the four holes with aiguille, then move rack away and dig vertically to 55mm from the mark point with percussive drill. Nail finestra with M8\*70 floor hole bolt. Strain it with spanner. Remove rack. Put wrench directly into four holes. Install nut and tighten it.
- ✧ **Step 6** : According to connection plan, start installing battery from bottom (notice the polarity as placing batteries), use to separate batteries. Once finish installing a level, tighten bar to lateral frame with M8\*16 bolt.
- ✧ **Step 7** : According to connection plan, install connector and component, if there is a junction box, refer to junction box installation specification.



 **Note** : junction box installation instructions

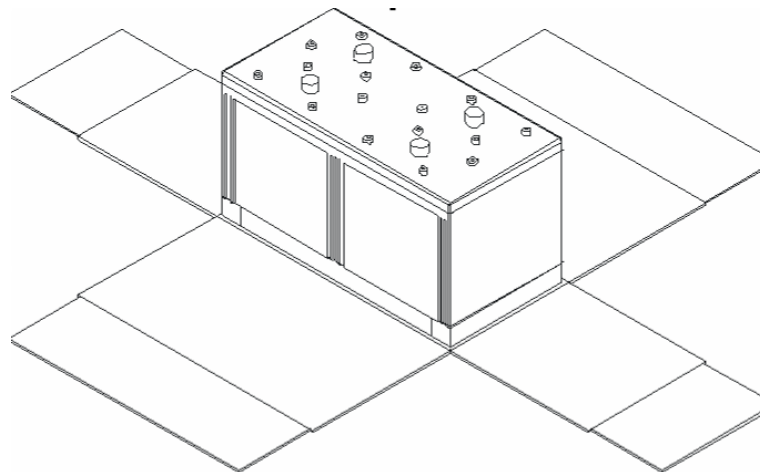


- Fix 2 high-voltage porcelain on the middle part of connection plate with hexagon bolt (M10\*25).
- Place connection plate and connection copper bar to parallel station, be close to high-voltage porcelain; Hexagon bolt was put through the 2 central holes of copper bar, which fastening copper bar on the porcelain.
- Place connection plate and 2 shield supporting plate vertically, be close to connection plate.
- Lift junction box be up close to corresponding site of shelf, and fastened with hexagon bolt.
- After connecting strings, paste P/N on in the middle part of glass cover and plug the cover into opposite groove of shield supporting plate.

## 5.6 Batteries mounting on racks

Rack mounted Jubilee Store batteries follow the procedures below:

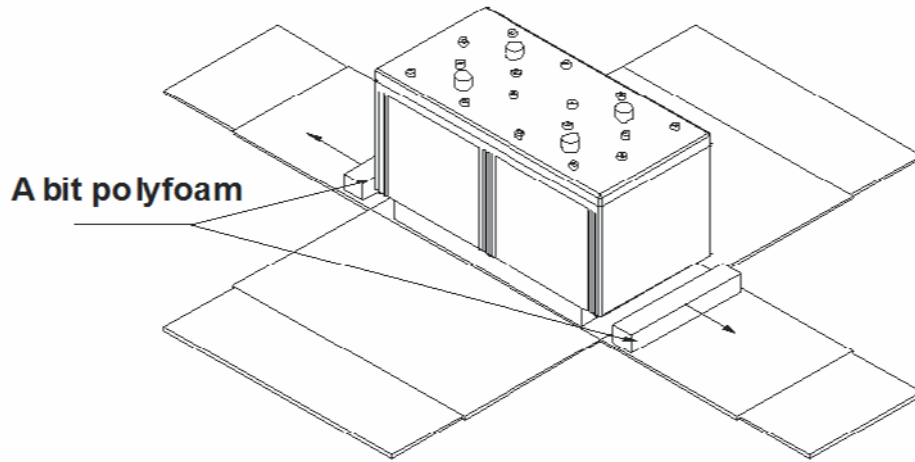
- ✧ **Step 1** : Carry batteries close to the rack, and then tear the box along its four corners.



**STEP 1**

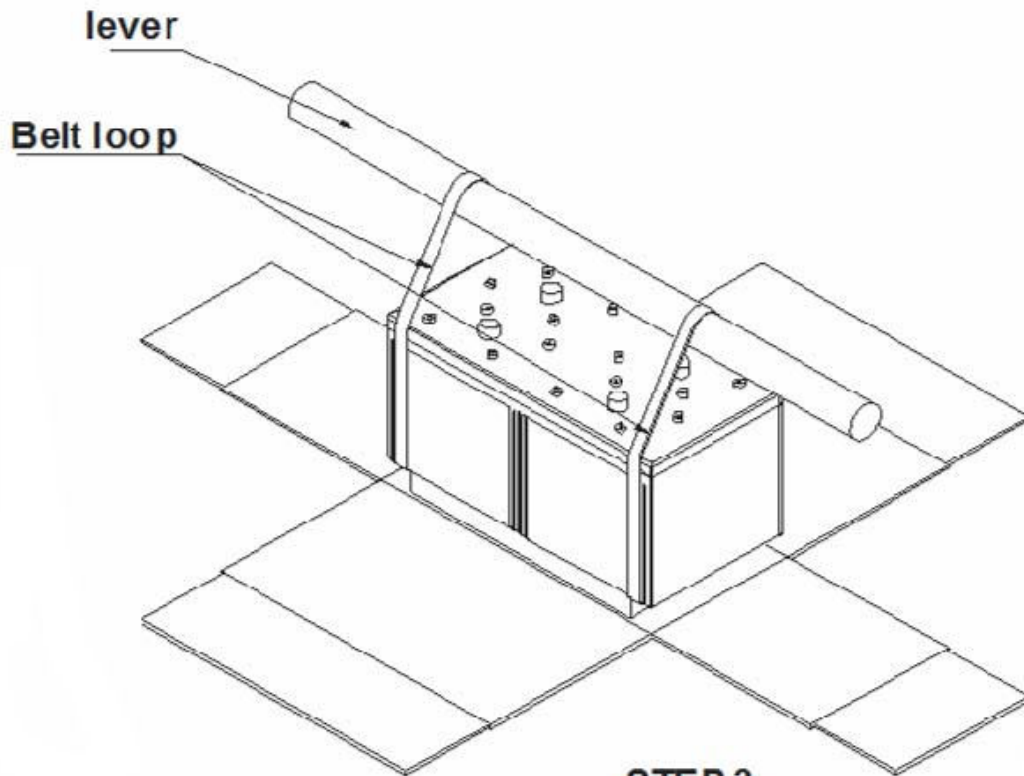


- ◇ **Step 2** : Remove all bit poly-foams out from the bottom of the battery.



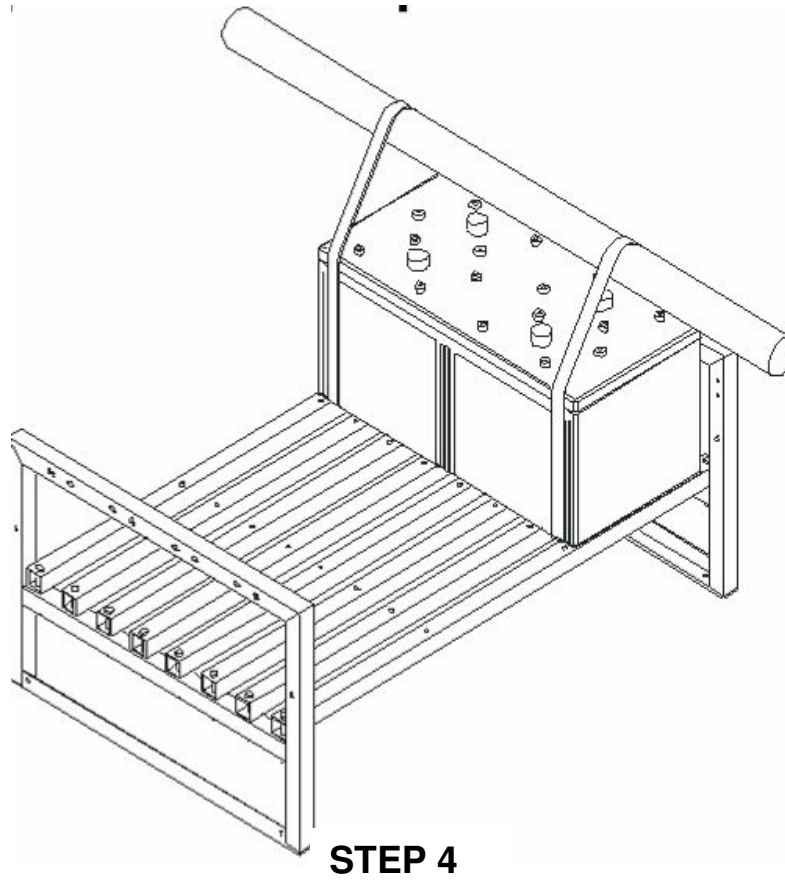
**STEP 2**

- ◇ **Step 3** : Hitch the battery with belt loops from the bit poly-foams, and then let the lever through the belt loop.

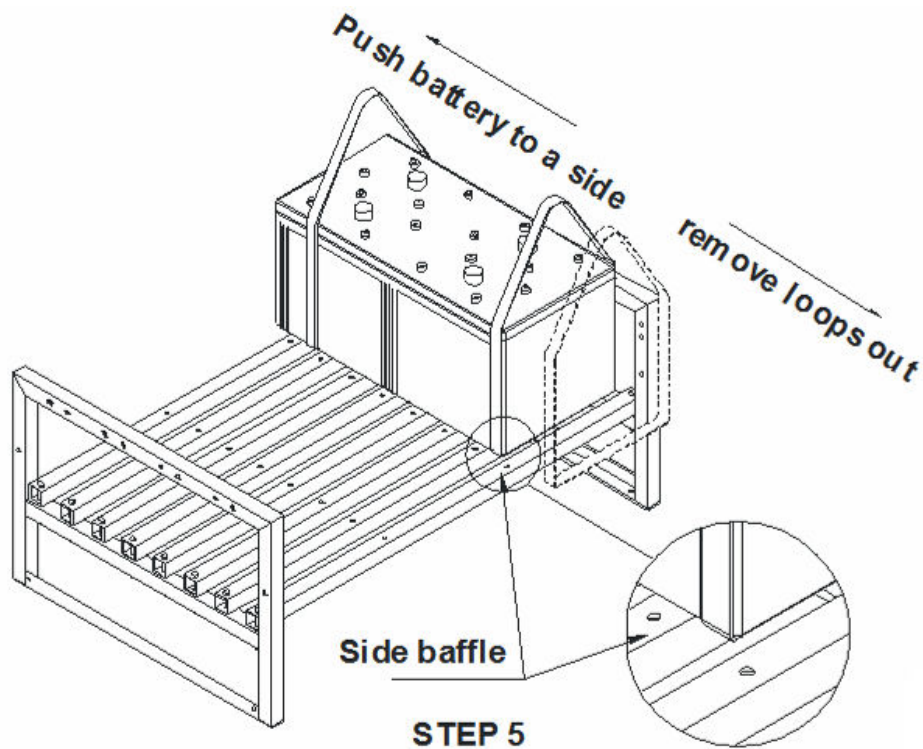


**STEP 3**

◇ **Step 4** : Carry the battery up to the top of baffle.

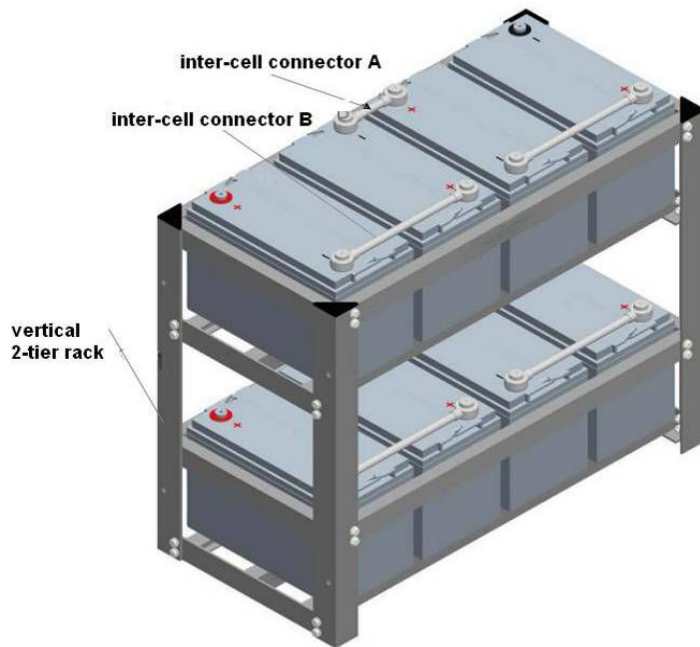


◇ **Step 5** : Put the battery close to a side for a little gap and remove loops out.

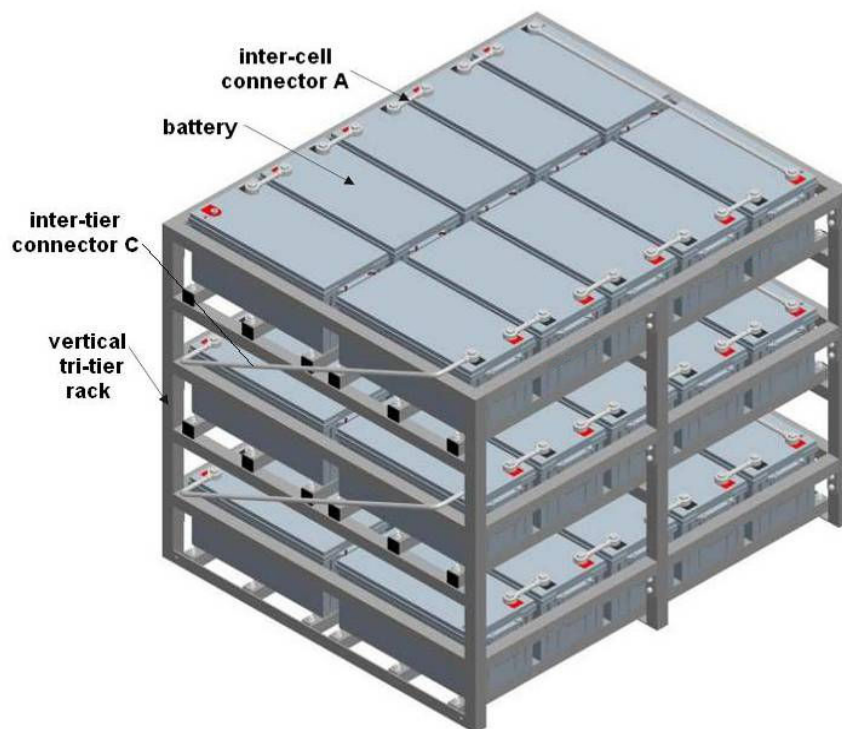


## 5.7 Example Images after Installation

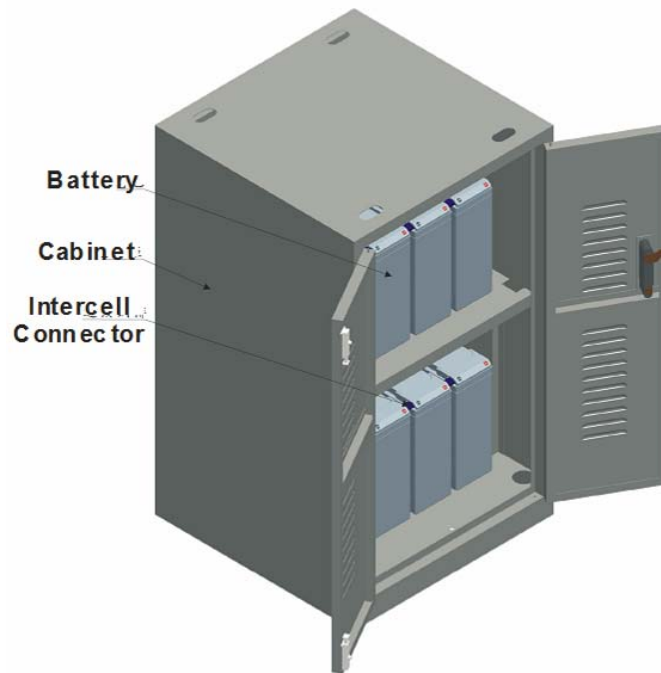
### 5.7.1 12V Battery Vertical Double-tier Rack (8 batteries)



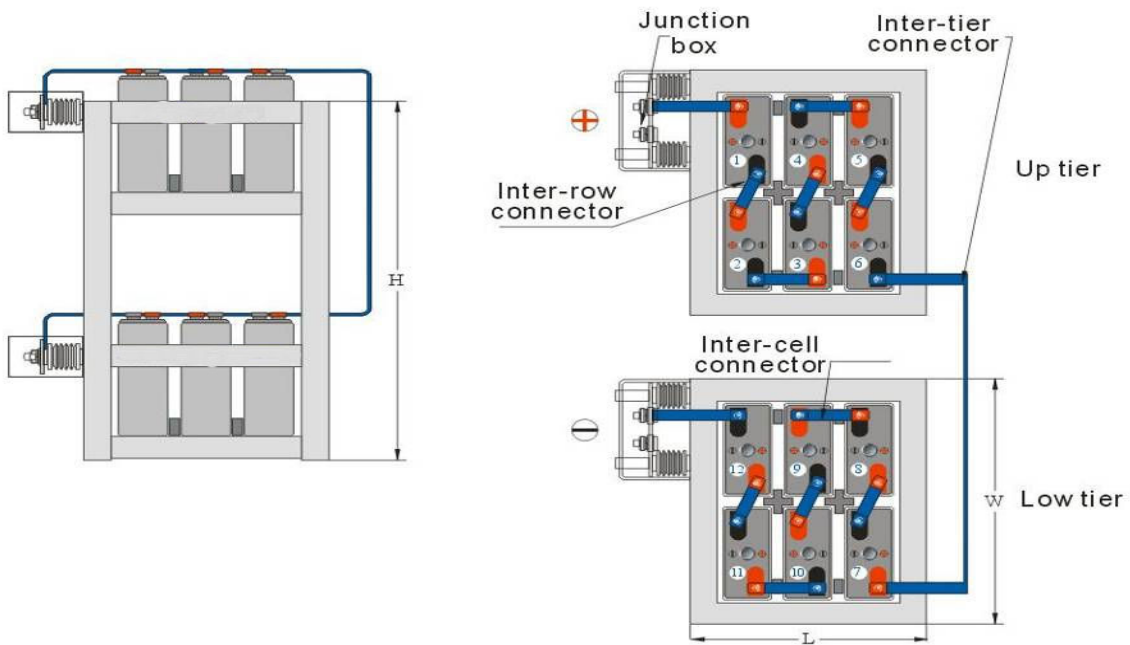
### 5.7.2 12V Battery Vertical Tri-tier Rack (30 batteries)



1) 12V FT Battery Vertical Double-tier Cabinet (8 batteries)



2) 2V Battery Vertical Double-tier Tri-rank Rack (24 batteries)



## 6 Use of battery

### 6.1 Supplementary charge

- ✧ During the delivery and storage, the battery will lose part of the capacity due to self discharge, **so please supplement charge before use;**
- ✧ If storage occurs before installation / connection, supplement charge regularly;  
Supplementary charge according table 2 below before use:

**Table 2 the time interval of supplementary charge and storage temperature**

Storage temperature	Time interval of supplementing charge	Supplementing charge way
20°C or less	Every 9 months	a) Charging at a constant voltage of 2.23-2.30V/cell and initial current to be less than 0.3C (A) for 2-3 days b) Charging at a constant current of 0.3C(A) and a constant voltage of 2.30-2.40V/cell for 10-16 hours c) Charging at a constant of 0.1C(A) for 8-10 hours Three options for choice
20°C ~30°C	Every 6 months	
30°C ~40°C	Every 3 months	

 **Note:**

Current value C is rated capacity of battery.


Example: rated capacity of 2V300AH battery is 300AH, 0.1C (A) = 0.1X300 = 30A;

### 6.2 Discharge

- ✧ Ensure the maximum allowable discharge current does not exceed the value below:
  - discharge current  $I \leq 1C_{10}$  (A), continuous discharge;
  - discharge current  $I = 3C_{10}$  (A), discharge time  $T \leq 2\text{min}$ ;
  - discharge current  $I = 6C_{10}$  (A), discharge time  $T \leq 10\text{s}$ .
- ✧ Final discharge protective voltage as table 3 below:

**Table 3 Final discharge voltage**

Discharge rate	Current of discharge(A)	Final discharge voltage (V/cell)	Testing standard of capacity
10h	$1.0I_{10}$	1.8	$\geq 1.00C_{10}$
5h	$1.7I_{10}$	1.8	$\geq 0.85C_{10}$
3h	$2.5I_{10}$	1.75	$\geq 0.75C_{10}$
1h	$5.5I_{10}$	1.75	$\geq 0.55C_{10}$

-  **Note:**
- 1) Do not let terminal voltages drop below the above specified values
  - 2) Do not store after discharge, re-charge immediately

## 6.3 Capacity discharging test

Examples.

### 6.3.1 Off-system test method

- a) Settle the battery group for 1 hour from the system after full charge, adopt the test load connect method and proceed the discharge test at 10hours discharging rate under the ambient temperature  $25\pm 5^{\circ}\text{C}$  .
- b) Terminal voltage, ambient temperature, and start time should all be checked and recorded before commencing discharge.
- c) Terminal voltage, discharge current, room temperature should be checked and recorded throughout the discharge period. Testing interval is 1 hour; discharge current shall not exceed 1% of the stipulated data. Reduce the time intervals to every 5mins as the test nears completion, Or approaches end point voltages.
- d) Discharge current multiplied by discharge time gives the capacity taken from the battery. When battery discharge at 10hour discharging rate, if the temperature is not  $25^{\circ}\text{C}$ , then it should be calculated according to the below formula on the base of the capacity obtained in the test.

$$C_e = C_r / \{ 1 + K (t - 25^{\circ}\text{C}) \}$$

t-refers to the temperature;

K-refers to the temperature coefficient ( $K = 0.006/^{\circ}\text{C}$  when discharging at 10H discharging rate,  $K = 0.008/^{\circ}\text{C}$  when discharge rate is 3H.  $K = 0.01/^{\circ}\text{C}$  when discharge rate is 1H.)

- e) Battery should be recharged by 1.1-1.3 times of the initial new specification after finishing discharge.

### 6.3.2 On-system test method

- a) In the direct current power system, adjust the out-put voltage of the inverter to protection voltage (e.g.46V), battery supply the power to the load, then identify and test the battery with the lowest voltage, and worst capacity.
- b) Open the inverter and charge the battery, then wait 1hour after full charge.
- c) Precede test at 10hour discharge rate on the worst battery identified in a). Terminal voltage, temperature, discharge time, and room temperature should be tested and recorded before and after the test and every hour. Notes should be taken at the moment the final voltage is showing to record the discharge time accurately.
- d) Discharge current \* discharge time = capacity of the battery group. If the room temperature is not  $25^{\circ}\text{C}$ , the capacity should be calculated according to the formula in (A).

- e) After finishing the test, re-charge the battery to recover its capacity.
- f) Draw the discharge curve according to the test data.

### 6.3.3 Check-aimed discharge test method

In order to control the estimated capacity of the battery group at any time, it is necessary to carry out the check-aimed discharge test.

- a) In DC power supply system, adjust the output voltage of the rectifier to protection voltage (for example 46V), and the battery supply electricity to communication load. Terminal voltage, temperature, room temperature and discharge time of the single battery should be tested and recorded before and after the battery discharge. Until 30-40% of the rated capacity is released.
- b) Re-charge the battery after finish discharge, the charged value should be 1.2times that of the discharged value.
- c) Draw discharge curve according to the notes, and keep record for comparing with future test.

#### Remark:

- 1) Off-system test method is not recommended for UPS system battery group.
- 2) When operating the on-system test method and check-aimed capacity test, if the tested UPS equipment equipped with discharge performance itself, the test performance of discharging should be opened. If it is without discharge test performance, its AC input should be disconnected before proceeding with discharge test.

#### Note:

- 1) The above mentioned capacity test are the most frequently used in daily maintenance, but whatever method is used, it is very important to keep a feed to the system during the test period. Therefore, before processing the test, we should investigate whether there is plan to stop electricity and the standby generator should be ready to work at any time.
- 2) Apply multi meter, inner-resistant instrument, conductance instrument to make a definitive test before the capacity discharge test.
- 3) In order to make sure that accuracy of the capacity test, professional on-system test instrument and test load should be adopted.

### 6.3.4 Judgment on lagged battery

Terminal voltage of the laggard battery is lower, so it should be tested under the discharging condition. If the terminal voltages are lower on the average during the three continuing discharging cycle test, it can be judged as the laggard battery of the group. Equalizing charge should be applied when laggard battery is identified

## 6.4 Charge

### 6.4.1 Float charge

#### ◆ Charge parameter

- ✧ Charge voltage: 2.23 ~2.30V/cell(25<sup>0</sup>C)
- ✧ The maximum charge current: 0.30C<sub>10</sub>
- ✧ Temperature compensation coefficient: -3mV/cell (taking 25<sup>0</sup>C as base point)
- ✧ Total variation range of charge voltage is ±0.02V/cell

#### 📖 Note:

- 1) All cell/bloc voltages of a battery group have a little difference at the beginning of use, half year later they become matched.
- 2) Effect from too high float voltage or too low float voltage as below:  
 Too high for a long time (overcharge): life shortened  
 Too low for a long time (not charge enough): Cannot meet load and/or make battery voltages inconsistent. The battery group capacity will drop accordingly and life is shortened.

### 6.4.2 Cycle use charge

#### ◆ Charge parameter

- ✧ Charge voltage: 2.40 ~2.50V/cell(25<sup>0</sup>C)
- ✧ The maximum charge current: 0.30C<sub>10</sub>
- ✧ Temperature compensation coefficient: -5mV/cell (taking 25<sup>0</sup>C as base point)
- ✧ Total variation range of charge voltage:±0.02V/cell
- ✧ Supplementary charge capacity is 110% ~ 130% of discharge capacity, ambient temperature is below 5<sup>0</sup>C, if do not know how many discharge capacity, please refer to the following table to supplementary charge:

**Table 4 Supplementary charge**

Ambient temperature (°C)	Charge voltage (V/cell)	Charge time (h)
5	2.31	7
	2.46	4
20	2.25	7
	2.40	4
35	2.21	7
	2.34	4

#### 📖 Note:

- 1) Charge time is the time when terminal voltage reaches value as the above table shows during charging at a constant 0.30C (A) or less.



- 2) If the charge time is over the time as above table, it will cause over charge, which will shorten the life of the batteries; if the charge time is less than the time as above table, the batteries can not meet the normal capacity.

#### 6.4.3 Equalization charge

- ◆ Charging parameter
- ◇ Charging voltage : 2.35 ~ 2.40V/cell (25<sup>0</sup>C)
- ◇ Maximal charging current : 0.30C<sub>10</sub>
- ◇ Temperature equalization parameter : -3mV/cell(25<sup>0</sup>C)
- ◇ Variation scope of charging voltage : ±0.02V/cell

#### Note:

Do not carry this operation under standard float charging. Adopt equalization charging under below situations:

- Discharging capacity is above 20% of rated capacity.
- Lay aside the battery without using it for more than 3 months.
- Float voltage of battery unit is less than 2.18V/cell
- Continuously float charging battery for 3 ~ 6 months or low voltage batteries appears in battery group.
- More than 1 year fully under float operation
- Supplementary charge the battery after installation and before using.
- Equalizing charge the battery after the capacity test.

#### 6.4.4 Notes during charging

- ◇ Charge current at the end of charge is over 0.05 C<sub>10</sub>A, which may result in permanent damage on battery appearance and battery life; pay more attention to charging voltage.
- ◇ The used charger should have digressive automatic constant voltage device, please contact us if use other kind of charger.
- ◇ If the ambient temperature is not 25<sup>0</sup>C , temperature compensation should be applied on the voltage, using the formula is  $U=U_{25^0C} - K \times (T - 25)$   
T—ambient temperature; K—temperature compensation coefficient
- ◇ Judgment on charge end point, usually, if the battery charge can meet any one of the below listed condition, it can be regarded as the charge end point.
  - a) Charged value is not less than 1.2 times of the released value.
  - b) The current is less than 0.005C<sub>10</sub>A (C<sub>10</sub> = rated capacity of the battery) during the final period of charging.
  - c) The current is steady for 5 hours during the final period of charging.

## 7 Battery maintenance

### 7.1 Cleanness

- ✧ Keep the battery surface and its working circumstance clean and dry.
- ✧ Keep battery clean and avoid static condition.
- ✧ Clean battery with damp cloth avoiding contact with terminals, no organic solvent such as gasoline, alcohol etc. or clothes with such substance should be used to clean battery.

### 7.2 Inspection and maintenance

To better understand the operation of battery and equipment and also to prevent battery damage during maintenance inspection, please periodically inspect the battery and record it

#### 7.2.1 Inspection items per month:

Items	Contents	Standards	Maintenance
Total float charging voltage of battery group	Measure output end voltage of positive and negative end of battery group with voltage meter.	<ol style="list-style-type: none"> <li>1. tested data comply with the data displayed on the meter and meet the voltage standard under the temperature conditions</li> <li>2. The error of float charge voltage after temperature compensation is <math>\leq \pm 50\text{mV}</math></li> </ol>	<ol style="list-style-type: none"> <li>1. If data attained by testing is varies from the standard, the tested data should prevail.</li> <li>2. For those adjusted by monitor module and still can't reach the allowed error range after module adjustment, repair is to be applied or send them back to factory.</li> </ol>
Battery appearance	Inspect battery case and cover for bulge, leakage or damage.	Normal	Find out the reasons if abnormal appearance exist, please change battery if it effects the normal use of battery group
	Inspect for dust or stains	Clean	Clean the dust and stain with damp cloth.
	Inspect the harness and terminal for rust or corrosion.	No rust	Clean the rust, change the harness and paste with antirust coating/paste.
Temperature of the battery	Test the temperature of the terminal and battery surface by infrared thermometer	Under 35°C	Determine reason for temperature being above standard value and proceed on relevant course of action.

Connection Parts	Check the tightness of terminal bolt/screw with torque spanner	Fastness please refer to the table of torque)	Tighten the loosen bolt/screw in time
	Check the connection cable and terminals for dirt and corrosion	Without appearance of corrosion or dirt	Take out the connection cable and clear it in water if it is light corrosion, for serious corrosion please replace the cable and clear the connection point with a steel brush before attaching new connectors
check safety valves (2V series)	Shake the valve lightly to check the valve is fixed tightly.	Valve is fixed tightly.	Please tighten the value if there is appearance of looseness
	Cover the valve with bubble liquid(soap solution) to check if the valve can exhaust gas cleanly	Staggered air bubble appears	The frequent tighten the valve if there is appearance of open and close the value is abnormal, in case happens, please replace the valve at the same time, please check the water lost status of the battery.
Switch DC power supply	Cut off AC power supply and change to UPS or DC power supply	AC power supply switch to UPS or DC power supply smoothly	Correct the potential difference

**7.2.2 Inspection items per quarter**

**Apart from the maintenance per month, additional articles added as below:**

Items	Contents	Standards	Maintenance
Float voltage of each battery	Measure the end voltage of each battery in battery group.	Float voltage value after temperature equalization $\pm 50\text{mV}$	If float voltage is over standard value, please apply equalization charge the battery group after discharging them and then float charge them for 1~2 month, please contact us if still have any deviation from standard.

Repair batteries which with laggard single cell	1. Equalization charge of the battery group: charge the battery at upper limit voltage and last more than 10H, 3 times of discharge cycle is necessary when case is serious.	The difference of float charge voltage between single cell in a group of battery should meet the below standard: 2Vseries 90mv 6vseries 240mv 12Vseries 480mv	Single cell should be replaced if it fails in repair.
	2. On-line repair of single cell: connect the cell the activation meter or charger with the laggard battery and charge the single cell.		
Activation charge and discharge	Charge and discharge the battery by one cycle, then charge the battery by the lower limit of the equalization voltage	About 30% of the rated capacity is released.	Produced this text on the batteries which float charge more than 6moths but without discharge.

**7.2.3 Inspection item per year**

**Apart from the maintenance per quarter, additional articles added as below:**

Items	Contents	Standards	Maintenance
Checking discharge test	Cut off AC power supply, discharge battery with load, and discharging 30%~40% rated capacity.	Battery voltage should be over 1.90V/cell after discharging.	If battery voltage is lower than standard value, please equalization charge the battery group after discharging and then float charging it for 1~2 month, please contact us if still have any departure.
Capacity test	Adopt the on-system capacity test instrument or fake load discharge battery and discharge 60~80%of the rated capacity	More than 80% of the capacity is reserved.	Take down the parameters during the discharging test, if any laggard battery is found, please proceed to relevant operation.

**7.2.4 Basic requirements and cautions on maintenance**

**Requirements:**

- 1) Principle “find out the hidden trouble and insure the safety” Should be complied when make test on the battery.
- 2) Daily maintenance and performance analysis should be carried out strictly according the processing plan.
- 3) Battery parameter setting operation should be strictly complied with the maintenance rules and related requirement.

- 4) Always wear insulated gloves when handling the batteries to avoid electric shock. Make sure the metal instrument is insulated.
- 5) Use instrument and meters which meet the test requirement.
- 6) Physical articles:
  - a) Check whether the post and connection is clean or not, whether there is any appearance of oxidation or corrosion. In case it is serious, please clear it and reduce the resistance.
  - b) Check for any loose connection, if any, please tighten them up.
  - c) Check if there is any appearance of acid climbing, leakage of liquid, and whether there is liquid overflow around the safety valve.
  - d) Check if there is any damage, leakage and distortion on the battery case and the post; it should be without any damage and distortion.
  - e) Check there is any abnormal temperature increase on the battery and its connection.
- 7) Check and adjust the set of related parameters.
  - a) Check the float voltage, equalization voltage, float charging current is normal or not on the base of technical parameters and site environment. Please handle it in time.
  - b) Check the limited charge current set is correct, please adjust immediately.
  - c) Check the alarm voltage (below voltage and over voltage alarm) of the battery set is correct, if not, please adjust promptly.
  - d) If there is off-load set, please check the off-load voltage is correct, if not, please adjust promptly.

## Cautions

- ✧ Keep batteries out of reach of children.
- ✧ Do not use batteries for application other than those specified in its specification.
- ✧ Do not attempt to dis-assemble revised, damaged, impacted, disposed batteries, otherwise the battery would leak, get hot, or explode.
- ✧ Do not dispose of the batteries in water, fire, and do not heat the batteries.
- ✧ Do not cause any short circuit
- ✧ If the voltage of battery pack is above 45V, please be sure to wear insulated gloves when working; otherwise, there is a risk of severe electrical shock.
- ✧ Do not bring face close to the top of batteries, please keep a sensible distance when you are measuring and repairing, you must wear safety goggles.
- ✧ There is sulphuric acid in the battery, do not allow contact of sulphuric acid with skin, cloths, especially eyes. If eyes come in contact with sulphuric acid, please wash with a lot of clean water, and consult a physician immediately.
- ✧ Longer service life will be attained when the battery is operated within an ambient temperature range of 20~30degC

## **8. Exchange of Batteries**

### **8.1 Exchange judgments:**

The batteries are discharged 80% (refer the corresponding discharge rates, such as C10, C2 etc.) of rated capacity, at the same time, the voltage is below 1.8V/cell (the discharge rate for 1 hour is 1.7V/cell). It should be exchanged.

### **8.2 Exchange time**

The VRLA battery has the certain service life; please replace the old battery with the new one before the end of service life so that the application can run safely and normally.



Today 's battery needs  
reasonable price, reliable quality,  
prompt delivery and good service. It is **JUBILEE.**

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