



Dratronix (Pty) Ltd.



OPzV Installation & Maintenance Manual



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Chapter 1 Installation



Read the *Installation & Maintenance Manual* carefully before installing batteries.

Installation Procedure

1.1 Check Installation Environment

1. The recommended operating temperature is $25\pm 5^{\circ}\text{C}$ ($68^{\circ}\text{F} \sim 86^{\circ}\text{F}$), relative humidity $\leq 95\%$, the maximum temperature difference among batteries of the same bank $\leq 3^{\circ}\text{C}$.
2. The height above sea level of the installation place should not be more than 4,000 m (if above 4,000, please state it when you order batteries).
3. The operation place must be kept away from fire (safe distance $> 1\text{m}$), dry, clean and well-ventilated.
4. Keep batteries away from radiation, organic solvent, corrosive gas; and direct sun light and ultraviolet rays should not be over level 2.
5. Prevent dust, rain, immersion or any other pollution on batteries.
6. Prevent lightning, electric shock, and small animals.
7. Insulation resistance $\geq 22\text{M}\Omega$.
8. Batteries are required to be protected against freezing if installed in a severed cold area; the recommended operating temperature: $25\pm 5^{\circ}\text{C}$.
9. Prevent batteries from being used in high temperature and longtime operation at an environment temperature above 45°C .

1.2 Installation Cautions



Installation work must be conducted under the guidance of certified professionals on the spot.

1. Batteries of different batches or banks must not be exchanged. Please check the bank number on the packing label and make sure to install batteries in their own banks. If you install batteries of different banks together mistakenly, it may cause warranty invalid. Batteries are prohibited to be used together with those of different models or those made by other manufacturers.
2. Battery temperature compensation detector should be put between sides of two batteries and close contact the battery shell.
3. Keep heaters, air conditioner vents or the heating part of switching power supply away from battery. The temperature difference of different banks should not be more than 3°C . It's recommended to use an infrared thermometer to measure temperatures of battery different parts.



Dangerous! Do not smoke during installation!

4. To install batteries, use the mounting rack (optional) provided by the manufacturer. The gap between batteries of a bank should not be less than 20mm.
5. Before installation, consult your local construction institute to make sure the installation place meets the weight bearing requirements; if your local seismic fortification intensity is above level 7, please use shockproof racks and fix them with anchor bolts for purpose of stress relief.
6. The OPzV battery has been charged when it leaved the factory. During installation, be careful to move it and avoid any shock hazard.
7. Safety valves are prohibited to be opened except by professionals; prevent dust, water and other things invading through safety valve slits.



Do not direct connect or short-circuit the negative and positive terminals of the same battery.



Be careful when handling or installing batteries. In the event of a spill of the inside electrolyte or if electrolyte contacts with the human body, please rinse with plenty of water, and consult a physician as soon as possible.

8. Battery banks should be as close as possible to the load when being installed. Select proper wires, connection copper bars and connectors (if there are special requirements for connection wires it should be stated before delivery) to guarantee the safety of the connecting wires and bars, to prevent increasing the line drop of wires. When in multiplex parallel connection, the line drop of all wires should be kept in the same.

9. The voltage of a battery bank is high, be careful of electric shocks. Use insulating tools and wear insulating gloves during assembling or disassembling wires (connection copper bars, connectors).

Please wear protective devices (protective glasses, gloves etc) to install batteries.

Batteries are very heavy, please use assistant tools when moving or lifting them. Be careful to avoid personal injury!

Keep away from children when installing!

10. Dirty contact surface or loose connection may cause temperature rising and sparks on battery terminals, and may cause fire. During installation, keep wires and output terminal surface clean and connected tightly. A single battery is connected in series with stainless steel bolts, tinned copper bars (wires, cables), and flat washers. Bolts must be screwed tightly, but do not exceed the required torque range or it will cause damage to batteries.

Apply some Vaseline on the terminals before connecting!

Tightening Torque		
No.	Application	Tightening Torque
1	M5	6.5N*m
1	M6	9.0N*m
2	M8	12.0N*m

11. Connect battery banks according to the requirements strictly. It's prohibited to short circuit a single, several or a bank of batteries without load.

12. If the load wires have been preset, please pay attention to the output position of battery banks and the output direction of positive and negative terminals while in installation.

13. In the use of multipath in parallel, each path's positive output terminal should be connected with another path's positive one, and the negative should be connected with another negative.

14. Please leave enough space around the battery rack for transportation, installation and maintenance, and ensure good ventilation of battery banks.

15. Battery banks should be equipped an external short-circuit protection device (fuse).

1.3 Choose Installation Methods

1.3.1 There are three standard installation methods for OPzV batteries. Please choose the proper installation method according to your space and ground bearing capacity. The installation should comply with the related industry or national standards.

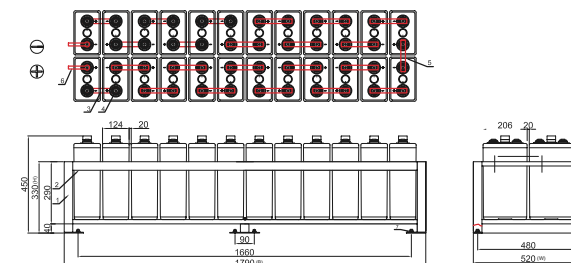
Single-tier Vertical Installation Rack

Double-tier Vertical Installation Rack

Three-tier Vertical Installation Rack

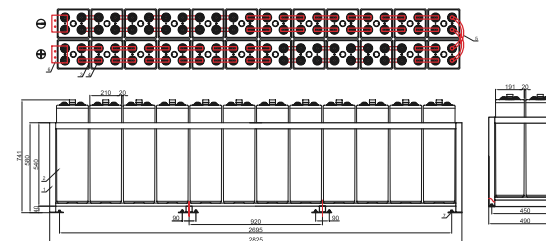
Caution: If you cannot use the standard installation methods due to the limit of space, ground bearing capacity, output voltage or other factors, please contact us.

1) OPzV2-250/48V - OPzV2-500/48V Single-tier Vertical Installation Rack

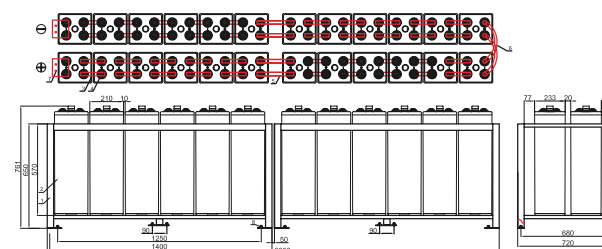


Model	OPzV-205V/48V	OPzV-350V/48V	OPzV-500V/48V
B	1790	1790	2300
H	330	430	430
W	520	520	520

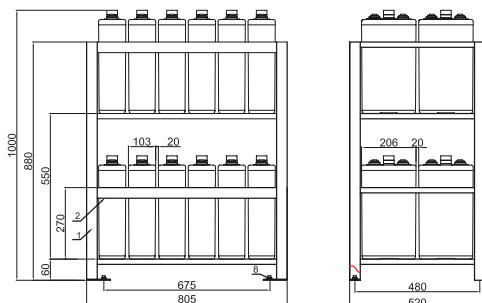
2) OPzV-800/48V Single-tier Vertical Installation Rack



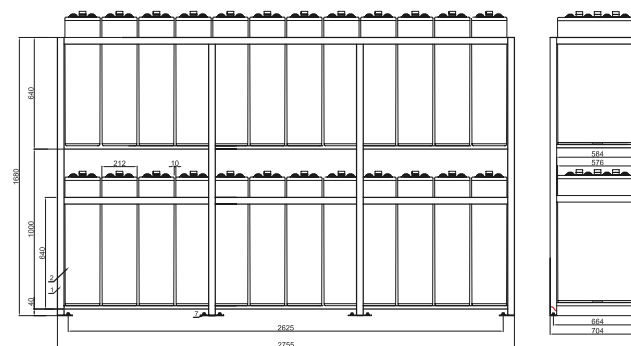
3) OPzV2-1000/48V Single-tier Vertical Installation Rack



Model	OPzV-2000V/48V	OPzV-3000V/48V
B	2894	2850
H	733	680
W	529	664

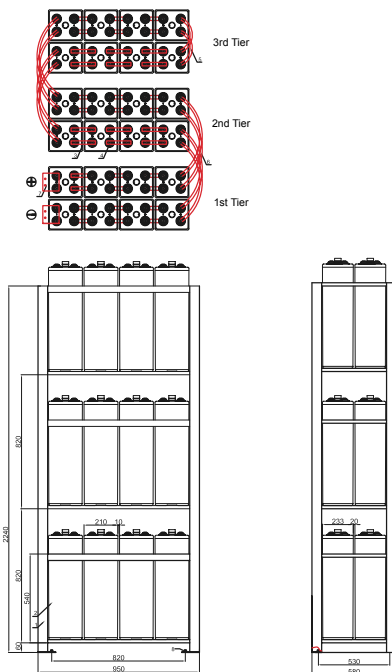


Model	OPzV-200V/48V	OPzV-300V/48V
B	805	1060
H	880	880
W	520	520



Model	OPzV-2000V/48V	OPzV-3000V/48V
B	2755	2755
H	1680	1680
W	530	704

7) OPzV2-1000/48V - OPzV2-1500/48V Three-tier Vertical Installation Rack



Model	OPzV-1000V/48V	OPzV-1500V/48V
B	950	950
H	2240	2640
W	580	660

1.4 Installation Steps

Installation Steps of the Vertical Rack:

1. Please read the installation instructions in this manual carefully before installation.
2. Please check all the parts according to the packing list. The specific installation methods are different and please conduct the installation according to the *Installation Drawing* in the attached data.



The following installation steps are for your reference:

3. Connect standing frames and the load bearing chassis with screws (washers).
4. If it is a double or three tier rack, install the upper load bearing chassis.
5. Connect bars and standing frames with screws (washers), and pay attention not to turn upside down.
6. Connect fixing pieces and standing frames with screws.
7. Check according to the *Installation Drawing*.
8. Fasten all connecting bolts, and make sure the whole rack stands upright and is square without skew or loose.
9. Move the empty assembled rack to the installing location, and confirm the rack's specific installation position and the position and direction of positive and negative terminals according to the position of transmission bus (or cable), rack dimension, the surrounding facilities, etc. (You can also confirm the position based on the dimensions provided in this manual. However, it's recommended and more accurate to base on the actual objects.)
10. Mark on the pole position of the rack's anchor bolts and move away the rack after confirmation. Use a punching drill or electric hammer to hit anchor bolt holes.
11. Move the rack onto the installation position and fasten it with anchor bolts.
12. Confirm the rack installation is correct, then take out side bars to assemble.
13. Install and fasten the output terminal pieces (or insulating support).
14. Put batteries onto the rack according to the *Installation Drawing*. Pay attention to the battery's position and the gap between batteries. (Use spacer block if it is provided.)



Caution: Pay special attention to the position and the positive and negative direction of the first battery put onto the rack, according to which decide the output terminal's positive and negative position and direction. Make sure they are consistent with the positive and negative position and direction of connection wires reserved in the installation place.

15. Select matched connection wires or bars to connect batteries or output terminal pieces (insulating support) with bolts. Pay attention to positive and negative's color matching of wires and batteries. Be aware of battery short circuit while connecting.

16. After completing battery installation, use a voltage meter to measure the positive and negative output voltage, which should be larger than 48V (48V system), otherwise it should be checked whether the short circuit occurs. Confirm everything is normal, then paste number sequence codes on batteries.

17. Install the battery terminal voltage monitor on the rack and fix it.
18. Connect the monitor's signal wires with the poles of batteries according to their corresponding sequence numbers.
19. Test the battery terminal voltage with the monitor and voltmeter, record, and compare the data. Beware of wiring errors or poor contact.

20. Make insulation protection identification for connection bars.
21. With a soft cloth carefully clean the battery and battery rack, and clean up the work site.
22. According to the manual set the parameters of switch power supply. (If it is for the use in the solar system and other different application occasions, call us to discuss specific parameter design.) Confirm that batteries are correctly installed before switching on the power to enter into other subsequent procedures.

23. Begin the corresponding procedures if need to do the first test.



Caution: If it is not equipped with a monitor, step 17~ 19 should be omitted

1. 5 Check after Installation

The battery system should be checked carefully after installation and record the main items – see the table below.

Check List after Installation

No.	Check Items	Qualified
1	Battery bank polarity is correct; total voltage of positive and negative output terminals is greater than or equal to 48V.	☐ Yes ☐ No
2	The battery terminal voltage of each single battery is 2.10-2.20V.	☐ Yes ☐ No
3	In multiple parallel use, for output terminals, a positive should be connected with another positive, while negative with negative.	☐ Yes ☐ No
4	The positive of a battery output terminal should be connected with the positive of a charging equipment, while negative with negative.	☐ Yes ☐ No
5	All Bolts, nuts, screws are wrenched with tightening torque.	☐ Yes ☐ No
6	The rack is square without deformation after bearing the weight; its vertical angle is less than 5°.	☐ Yes ☐ No
7	On the batteries and the rack there are no excess connecting wires, tools etc.	☐ Yes ☐ No
8	The battery appearance has no crack or damage.	☐ Yes ☐ No
9	The safety valves are fastened without loose or damage.	☐ Yes ☐ No
10	The surrounding environment of the batteries and rack is clean.	☐ Yes ☐ No
11	The battery bank's equalizing charge, floating charge and other parameter setting is correct.	☐ Yes ☐ No
12	The resistance between the output terminals and the rack is normal.	☐ Yes ☐ No
13	The gap between batteries $\geq 20\text{mm}$; adjacent cells are placed in parallel.	☐ Yes ☐ No
14	Internal copper cables of connecting lines are not exposed.	☐ Yes ☐ No
15	Other self-defining items.	☐ Yes ☐ No

Chapter 2 Operation and Maintenance

Correct operation and maintenance will make the battery performance and life more excellent.

2. 1 Operation

2. 1. 1 Caution Items

1.We are not responsible for the accident and harm caused by the user's wrong operation or equipment parameter setting errors.

2.Equalizing charge will switch to floating charge when the current of equalizing charge declines to 20mA /Ah or the temperature of the battery surface is over 45°C. Continuous equalizing charge should not be over 16 hours.

3.The floating charge voltage and equalizing charge voltage is not fixable, and need to be suitably adjusted according to temperature. Please refer to the *Charging Voltage VS Temperature Curve* in the appendix. It will damage the battery or stop the battery life earlier if you did not properly adjust the battery floating charge voltage and equalizing charge voltage.

4.The final discharge voltage is not fixable, and please make adjustment according to the battery discharge current (refer to attached form). If you do not adjust the battery final voltage it will damage the battery, even stop the battery life earlier. Please pay more attention this issue, especially on high voltage (220V, 380V) UPS systems.

5.When batteries are using on UPS etc converters, please make sure the return current of converter do not inflow to the battery. Please set the current parameter below 0.1C₁₀(A), if it cannot be avoided on return circuit. It will reduce the battery life and make the battery get abnormal heating if over this current value.

6.Please do not make batteries short circuit.

7.After long time storage, please recharge the batteries before installation.

8.Please do not open the safety valves.

9.Please keep the batteries clean.

10.Please recharge the batteries regularly if in long time storage.

11.After accident discharge, it will not be allowed to continue supply power if the battery is not recharged in time.

12.Different capacity batteries are not allowed to be used in parallel.

13. Make sure it is not burning hot when you touch the connecting parts and terminals.

14. Do not use any dioxide fire extinguishers to put out a battery fire, and it should be equipped with the professional dry powder extinguishers.

2.1.2 Charging

1.Classification:

There are two charging methods: floating charge and equalizing charge.

•Floating charge is a method of battery charging. When a battery is full, the charger will not stop charging and still supplies the constant floating charge voltage and slightly floating charge current to the battery. The floating charge method can balance the natural lose of the battery capacity and make the battery in a slow charged state.

When the electricity stops (the battery charger stops charging this moment), batteries will discharge immediately.

•Equalizing charge is another method of charging. In battery banks of long time floating charge, insufficient charge or capacity lag may occur on some batteries. Therefore, please use the previously set charge current and time (high equalizing charge voltage) to charge the discharged batteries and balance the battery bank to make sure every operating battery always fully charged.

When you make the battery maintenance, please discharge firstly. Then, use the equalizing charge because the equalizing can balance the capacity lag batteries so that battery bank (voltage, capacity etc) can reach a consistency.

2. Charging Parameter

Charging Parameter

Parameter	Charging Method		Remark
	Floating Charge	Equalizing Charge	
Charging Voltage	2.25V/Unit	2.35V/Unit	Average value of positive and negative terminals tested at 20°C
Maximum Charging Current	0.20C ₁₀ A	0.20C ₁₀ A	Recommend setting is 0.10C ₁₀ A
Temperature Compensation Factor	-3mV/°C	-4mV/°C	Please refer to the Charging Voltage VS Temperature Curve
Charger Precision	Voltage±1% ; Current ±2%		Ripple Voltage≤4%

3. Equalizing Charge

(1) Charging parameter: The charging parameter of equalizing is shown as the above table.

(2) Application:

• Please do the equalizing charge before battery first time use. It will switch to floating charge automatically when the equalizing charge current is less than 20mA/Ah. Floating charge should be not less than 24 hours.

• In using batteries, please equalizing charge the battery when a single cell's floating charging voltage is below 2.18V, and the equalizing charge time cannot be less than 8 hours, but cannot exceed 12 hours. If the power supply condition is terrible or there are frequent power failures, please equalizing charge the battery regularly according to the actual situation.

• If batteries have been in continuous floating charge for 6 months, please equalizing charge the batteries once.

• Please equalizing charge the lag batteries. The lag batteries are those whose final discharge voltage is less than 1.80V/cell after being discharged at 0.10C₁₀A current for 5 hours.

• Please equalizing charge batteries after accident discharge or the regular battery capacity testing.

2.1.3 Capacity Testing

1. Please equalizing charge batteries before the capacity testing.

2. Please test the battery capacity after constant current charge of 24 hours @ 20mA / Ah when equalizing charge current is (10-20)mA /Ah.

Capacity Test Standard

Discharge Rate	Discharge Current (A)	Final Discharge Voltage(V/cell)	Capacity Test Standard
10h	1.0I ₁₀	1.80	≥1.0C ₁₀
5h	1.7I ₁₀	1.75	≥0.85C ₁₀
3h	2.5I ₁₀	1.75	≥0.75C ₁₀
1h	5.5I ₁₀	1.75	≥0.55C ₁₀

Note:a. I₁₀ indicates the discharge current @10 hours rate, this numerical value is one tenth of capacity C₁₀.

b. When batteries are in parallel connection by several banks, the battery capacity is the sum of battery bank capacity.

c. Please do not reduce the voltage of battery terminal to the suggested final discharge voltage above.

3). After stopping discharge, it must make the equalizing charge within 8 hours, and will switch to floating charge when the equalizing charge current below 20mA/Ah. After floating charge over 24 hours, the battery will go to the normal using situation.

2.1.4 Discharge

There are 3 methods to control the depth of discharge.

1). Control the depth of discharge by discharge time: the product of discharge time and load current should be ≤0.80C₁₀Ah.

2). Control the depth of discharge by battery capacity: the battery discharge capacity should be set ≤0.80C₁₀Ah.

3). Control the depth of discharge by the final voltage of discharge: it will protect a battery from over discharge by setting the first electrical voltage and the second electrical voltage.

2.1.5 The Parameter Setting of Switching Power Supply

1). The control parameter of switching power supply should be set according to load current situation. The setting data of switching power supply's first electrical voltage and the second electrical voltage is as below.

Setting Table of Switching Power Supply' 1st&2nd Electrical Voltage

Load current I _o	The first electrical voltage		The second electrical voltage	
	Unit cell (V)	Battery bank(48V)	Unit cell (V)	Battery bank(48V)
6/6	1.90	45.6	1.88	45.0
5/6	1.95	46.8	1.93	46.3
2/3	1.96	47.0	1.94	46.5
1/2	1.97	47.3	1.95	46.8
1/3	1.98	47.5	1.96	47.0
1/6	1.98	47.5	1.96	47.0

2). The parameter of switching power supply setting table

Items	OPZV Parameter
Floating voltage	2.25V/cell
Equalizing voltage	2.35V/cell
Charge current limiting	≤0.20C ₁₀ A
High voltage warning value	57V
Low voltage warning value	45V
Temperature compensation coefficient	3mV/cell
Highest battery temperature	35°C
LVDS Out-off voltage	44V
LVDS Reset voltage	49V
Equalizing charge period	6 months for batteries in a machine room
Equalizing charge time	10~12h
Starting conditions of equalizing charge after power recovering	Equalizing charge the battery as soon as power recovers
Condition of floating charge converting to equalizing charge	≥50mA/Ah
Equalizing charge time of electricity cut off	10h
Withdraw equalizing charge condition	≤20mA/Ah
Battery shunting capacity setting	According to battery actual capacity
Battery connection	Series connection firstly, then parallel connection
Battery terminal voltage difference (6 months later)	Floating charge state ≤90mV Steady state ≤20mV

Note: a. When the environment temperature is out of the range of 20°C ~ 30°C, temperature compensation should be made on floating charge and equalizing charge voltage according to the above table.

b. Please set the equalizing charge voltage to be 2.35V/Cell in the areas with good power supply condition, perennial high temperature, and without temperature compensation equipments.

c. This table is suitable for the applications the discharge current of which is below 0.1C₁₀A.

2.1.6 The using requirement of power cut time

1. When a battery was not recharged fully after accident discharge, and equipments cut power, it is not allowed to use the battery to continue to supply power.

2. The accumulative total discharge power is 50% ~ 80% of the rated capacity in a power cut, then equalizing charge will switch to floating charge and floating charge time is not less than 24 hours.

3. If there are several power cuts during one day, the total accumulative discharge capacity is less than 50% of the rated capacity. After equalizing charge switch to floating charge, the floating charge time is not less than 12 hours.

4. The equipments with good power supply condition, if did not discharge capacity of proofreading regularly, it will be requested protected discharge @ C10 every 6 months.

5. For the equipments with frequent or long time power cut, they should be equipped with oil machines and other auxiliary power supply equipments. When the depth of battery discharge is at or above 80%, but electric supply does not recover, please use the oil engine to supply power for the base station equipments and recharge the batteries in time.



If recharge the battery after battery deep discharge for more than 12 hours, it will not only influence the recharge performance, but also affect the battery life.

2.2 Daily Maintenance

To guarantee the battery normal using life, please inspect and maintenance the battery regularly. "Regular" can be divided into monthly, quarterly and yearly three time phases. Regular inspection items are as below.

Regular Inspection Items

Time	Items	Contents	Benchmark	Maintenance
Monthly Inspection	The total floating charge voltage of the battery bank	Inspect the voltage of battery bank positive and negative terminals	The floating charge voltage of a benchmark single cell x battery quantity	Adjust the deviation value to the benchmark value
	Battery appearance	Inspect the battery case, lid (leakage, blow-up, damage)	The appearance is normal	Please check the reason of unusual appearance; and if it affects the normal use, replace the battery
		Inspect whether there is dust and dirt	The Appearance is clean	Clean the dust and dirt with a wet cloth
		Inspect whether the vertical rack, connection cables and terminals get rusty	No rust	If there is rust, please clean the rust, replace the connection cable, and apply the rust inhibitor
	Connection parts	Inspect whether bolts and nuts get loose	Firm connection	Tighten the loose bolts and nuts according to the requested torque
	DC power supply switch	Cut off AC power, and switch to DC power	AC power supply switches to DC power smoothly.	Correct the possible deviation
Quarterly Inspection	The floating charge voltage of every battery	Inspect the terminal voltage of every battery	The floating charge voltage with temperature compensation (±45mV)	If it exceeds the benchmark value, please discharge firstly and then equalizing charge and switch to floating charge for 1-2 months. If it still deviates from the benchmark value, please replace it immediately
Yearly Inspection	Verification discharge testing	Cut off the AC power and discharge with load, please set the discharge current as 0.1C ₁₀ A, final voltage as 1.80V/cell	Discharge time should be more than 8 hours when discharge stops	Please recharge the battery immediately if discharge time is less than 8 hours. Please check if there are failed batteries.

1. If the average floating voltage tolerance exceeds +0.2V or -0.1V or the temperature difference of battery surface exceeds 4°C, please consult the sales service and increase maintenance before confirming the corrective work, and observe the frequency and make relative record.

2. There are some new Gel Batteries with different voltage, please check below reasons.

★、It adopts the thick plate design which will improve the battery life, whereas, its inner resistant is also high slightly so that the initial voltage difference is bigger than the AGM type battery.

★、There is plenty of Gel inside the new battery, water loss and parching dose not occur in most Gel electricity to shape oxygen compound channel so that oxygen compound sufficient is low. At this moment, the oxygen generated by the positive terminal will expand from the positive high concentration region to the negative low concentration region. Meanwhile, the oxygen of restoring to water is not much, and when the negative liberates hydrogen this reaction will be blocked up. It will cause the negative terminal potential drift (When the Gel battery is in the initial use, each battery in the same battery bank uses floating charge with the same current, the negative electric potential of each battery is difference so that the voltage difference among batteries increases). With prolongation of using time, after floating charge use for 6 months, all Gel parching begins shaping, and the oxygen compound channel is established. The floating voltage will become consistency. Therefore, there is no need to handle the floating voltage difference of new Gel batteries. Normally, the battery voltage will become more and more even after one year using.



If you need to make the battery floating voltage difference to become consistency quickly, please charge the battery @ 100 hours rate.

3. When batteries are used for solar and wind power systems, it will circulate between charge and discharge in unstable ways. The charge method will not follow floating charge and recycle setting so that no need to test the floating voltage. We suggest follow and test the discharge voltage, and please consult us if final voltage is more different in the end of discharge.

2.3 Fault Handling

Please find the fault diagnosis and solution as below:

Fault Diagnosis and Solutions

Fault Situation	Fault Reason	Solution
The single battery voltage and total voltage of battery bank reduce quickly when in battery bank initial discharge.	The bolts of battery terminal are loose, or there is dust on terminal or connect cable surface, which increase continuous pressure drop	Tighten the bolt, clean dust, reinstall the bolt.
Battery bank can discharge as usual in initial stage, but load will cut off quickly.	The battery electric protection voltage set on the battery management device (such as switching power supply) is too high.	Decrease the electric protection voltage; choose according to the actual situation.
The measurement value of battery bank total voltage is about 4V lower than the calculated value	Electrodes of a single battery in the battery bank are connected in a reversed way.	According to the positive and negative marks on the single battery terminals or battery lid, correct its connection timely
There are some voltage deviations between batteries of the same battery bank in initial operation.	It is caused by slight differences of battery inner structures or slight differences during battery storage and transportation.	After normal floating charge for 6 months, the voltage values will become consistent.

Please do not hesitate to contact us, if you need further technical support.

Chapter 3 Model Selection, Transportation, Storage and Waste Disposal

This chapter introduces the model selection method, storage condition and the transportation notice of OPZV batteries.

3.1 Battery Selection

Select the battery model according to the following conditions.

1. Battery operating environment
2. Discharge requirement (i.e.: discharge current, power and frequency)
3. Discharge time
4. Please select models with bigger capacity (refer to the calculating result) for avoiding damage to batteries when in over discharge and strong current discharge. Please keep the discharge current below $1C_{10}A$ during battery discharge.

3.2 Transportation

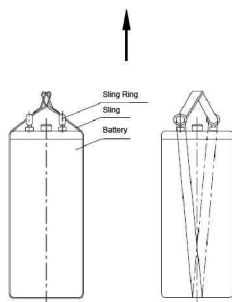
3.2.1 Please pay more attention to the below caution items when carrying and hoisting batteries.

1. Do NOT use the M10 screw threaded hole of a battery to hoist it.
2. Do NOT invert, roll, throw, and strike batteries.
3. Do NOT expose batteries to the sun and rain, or put batteries into water directly.
4. Do NOT press or pull the battery top and output terminals directly.
5. Do NOT open or loose the vent valve.
6. Do NOT make the positive and negative short circuit. Package design should consider battery anti-vibration and lash protection.

3.2.2 ENERSTAR OPZV Battery hoisting instruction

For avoiding damage to batteries or cause danger, please pay attention to the following caution items when carrying and hoisting batteries.

1. Please carry a battery in its standing upright way, and handle it carefully to avoid collision.
2. Please do not destroy the battery appearance and keep the printing information clear and complete.
3. ENERSTAR provides carrying slings with enough strength (nonmetal material) to hold the battery bottom for making sure to carry it in its standing upright way as shown below.



OPZV Battery Hoisting Layout

3.3 Storage

Battery storage should meet the following conditions.

- ★ Batteries should be stored in $0^{\circ}C \sim 25^{\circ}C$ environmental temperature before installation.
- ★ Storage period is 3~6 months normally. Please recharge the battery after ex-work 3~6 months.
- ★ The place of battery storage should be dry, clean, well ventilated.
- ★ Do not store batteries in the environment with plenty infrared rays, radiation, organic solvents and corrosive gas.
- ★ Please keep batteries far away the fire and direct sunlight.
- ★ Please keep batteries stand upright during storage, the top of a battery should not be pressed.
- ★ Do not put batteries without wooden box packaged in overlapping stacking.

3.4 Waste Disposal

Please handle the waste battery recycling following the country laws and regulations.



Please do not throw away waste batteries directly because there are pollutants in batteries. The main materials of a battery can be recycled.



Please do not disassembly waste batteries. Dangerous!



Please classify and store waste batteries according to the above storage requirements. Please make sure the anti-corrosion and isolation can be done well.



Please do not handle a waste battery privately. Please submit it to a professional recycling company for handling.