

# Installation and Operating Instructions

## 1. Identification of company and product







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Product : AGM VRLA Battery  
Absorbant Glass Material  
Valve Regulated Lead-Acid

Ranges : GP, GPL, HC, HR, HRL and XHRL.

## 2. Safety Issues

-  Read carefully this document.
-  Fire hazard.
-  Use safety goggles.
-  Explosion hazard.
-  Corrosive hazard.
-  Electrical hazard.
-  Dispose spent batteries properly.

## 3. Transporting.

When transporting the battery, avoid excessive vibration and impacts. We recommend transporting the battery in an upright position. When transporting a battery connected to equipment, secure it firmly and keep the circuit open.

## 4. Battery Receiving.

Previously the installation of the battery, check for correct shipment quantities and transport damage.

## 5. Storage.

Store battery indoors in a cool (25°C (77°F) or less), clean and dry location.

During storage, the capacity of the battery decreases due to self-discharging.

Supplementary charging has to be carried out according to Table 1.

Table 1 : Storage temperature and recommended supplementary charge interval.

Storage temperature in °C (°F)	Recommended supplementary charge interval	Supplementary charging methods
Lower than 25°C (77°F)	Each 6 months	16 to 24 hours with a constant voltage of 2.275 V/cell
25 - 30°C (77 - 86°F)	Each 3 months	5 to 8 hours with a constant voltage of 2.45 V/cell

When using a stored battery, always carry out supplementary charge before use according to Table 2.

Table 2 : Supplementary charge characteristics.

Charge Method	Charge time in h	Ambient temperature in °C (°F)
Constant Voltage Charging at 2.45V/Cell	6-12	5-35
Constant Current Charging at 0.05CA	6-12	5-35

## 6. Installation and connection.

- Secure the battery firmly to protect it from excessive vibration or impact.
- When placing the battery in equipment, keep it away from a heat generating source (e.g., a transformer) and install it in an upright position with proper ventilation. The weight will be concentrated as much as possible in the low part of the equipment.
- The battery may produce a combustible gas. Avoid installation in closed compartment or near sparks (i.e., near a switch or fuse).
- Using vinyl chloride sheathed wire or a vinyl chloride sheet may crack the battery container and cover. Either keep it away from the battery or use a non-plasticizing vinyl chloride material.
- Never bend the terminal nor solder directly to it.
- Avoid using the battery in the following places:
  - Areas exposed to direct sunlight
  - Areas where there is excessive radioactivity, infrared radiation, or ultraviolet radiation
  - Areas filled with organic solvent, vapor, dust, or corrosive gases
  - Areas of abnormal vibration
- When connecting the battery to a charger or a load, keep the circuit switch OFF and connect the battery's positive (+) terminal to the positive (+) pole of the charger or the load and the battery's negative (-) terminal to the negative (-) pole of the charger or the load.
- Never use the batteries of different capacities, batteries of different performances, or new and old batteries together.
- Do not series connect more than 32 pieces of battery in a single string or parallel connect more than 4 strings. If more batteries are needed for series/parallel application as stated above, please contact CSB Technical Support.

Table 3 : Torque specifications.

Screw/Bolt diameter	Torque value					
	Peak		Min		Max	
	N.m	kg.m	N.m	kg.m	N.m	kg.m
M5	6.4	63.4	5.73	56.7	4.14	41.0
M6	11.5	113.9	10.32	102.2	7.45	73.8
M8	28.0	272.2	25.23	249.8	18.22	180.4

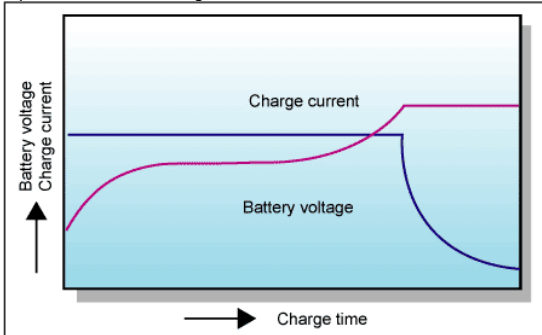
Battery must be installed in accordance with EN-50272-2 standard.

## 7. Charging.

Constant voltage charging method is recommended to charge our battery. This method consists of applying constant voltage to the battery with a constant voltage unit. This charging method utilizes a

different voltage between its voltage and battery voltage. The charging current is initially large and decreases towards the end of charging. It is necessary to set the charging voltage according to battery charging and temperature characteristics. Inaccurate voltage causes an overcharge or an undercharge.

Graph 1 : Constant Voltage Characteristics.



Initial charging current should be 0.3CA or less, **min 0.1CA**.

Table 4 : Charge voltage and maximum charge current.

Applications	Charging voltage in V/Cell			Max charging current in A
	Temp. in °C (°F)	Set point	Allowable range	
Cycle service	25°C (77°F)	2.45	2.40 ~ 2.50	0.3CA
Standby	25°C (77°F)	2.275	2.25 ~ 2.30	0.3CA

Temperature compensation is not necessary when the battery is charged at an ambient temperature between 5°C (41°F) to 35°C (95°F), with average temperature below 25°C (77°F). At temperatures below 5°C (41°F) or above 35°C (95°F), temperature compensation for charging voltage is necessary.

Table 5 : Temperature coefficient.

Applications	Temperature coefficient
Cycle service	-5mV/°C/cell
Standby	-3.3mV/°C/cell

When batteries are used in serial, a single current is imposed on all the cells. However, if the voltages begin to differ, the result is a charge imbalance. To restore balance or at least prevent it from growing, equalization charging is required. Equalization charging characteristics are a constant voltage of 2.45 V/cell for 5 to 8 hours.

More sophisticated charging methods are available : constant-current, constant-voltage charging method, semi-constant current charging method, constant current charging method, multi-steps charging method, high frequency pulse charging method. Please contact CSB Technical Support for more details.

## 8. Discharging.

- The continuous discharge and maximum discharge current (for 5 Seconds) should never exceed the values shown in Product Specifications.
- Never discharge the battery until the voltage and current are less than the values shown in Product Specifications. Repeated over discharge will shorten the battery's life.
- After discharging, immediately recharge the battery. Never leave it discharged. The capacity to hold a charge may not be recovered if the battery is left discharged for a long period.

## 9. Periodic Inspections & Maintenance.

For optimum reliability, it is recommended that the battery system be monitored quarterly. If the battery system incorporates an automatic monitoring system to gather the electrical and environmental data,

the quarterly checks are limited to the evaluation of the recorded data and a visual inspection of the battery.

In general the types of inspections to be made during periodic maintenance include :

- Visual battery inspection,
- Battery system capacity test,
- Battery system voltage inspection,
- Ambient temperature,
- Individual battery float voltage inspection,
- High rate load test,
- Electrical resistance and tightness of inter-unit connections.

A test of the individual unit resistance, impedance or conductance, while optional, is also recommended on a periodic basis. This data and its trends can be a valuable aid in troubleshooting the system and predicting the need for a system capacity test.

Prior to starting the periodic maintenance activity assure that all the required maintenance tools and equipment is available and functional. Notify anyone who will be affected by the intended maintenance or troubleshooting activity.

All units in the battery should be numbered so as to facilitate the recording and analysis of data unique to each unit.

### 9.1 Quarterly VRLA Battery Inspection

- Assure the battery room is clean, free of debris and with proper lighting.
- Assure that all facility safety equipment is available and functional.
- Measure and record the air temperature within the battery room.
- Visually inspect the battery for :
  - Cleanliness,
  - Terminal damage or evidence of heating,
  - Container or cover damage.
- Measure the DC voltage from each polarity of the battery to ground and detect any ground faults.
- Measure and record the individual unit DC float charging voltage, and current.
- Measure and record the system equalization voltage, and current.
- Measure and record the temperature of the battery cabinet inspections.

### 9.1 Semiannual VRLA Battery Inspection

- Repeat the quarterly inspection.
- Randomly measure and record the resistance/conductance of the individual units to trend the condition of the individual units over time and to detect dramatic differences between individual units and the **average**.

### 9.3 Annual VRLA Battery Inspection

- Repeat the semiannual inspection
- Re-torque all of the inter-unit connecting hardware. This can be omitted if the connection resistance is measured and found to have not increased more than 20% from the value recorded at installation