

Battery Charging



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A battery is simply a device that stores electrical energy in a chemical form and charging is the process of replacing the used electrical energy back into the battery.

When maintaining batteries at a fully charged level, and recharging batteries from a discharged state, correct charging methods and processes play an important role in battery life and performance. A number of charging methods exist; each designed for different applications and battery types.

Automatic Battery Chargers

The basic stages of charging from flat, using an automatic type charger are:

Bulk Charge

During this process a constant current is supplied to the battery at a rate determined by the battery charger. Most automatic battery chargers will detect the type of battery being charged and apply an appropriate current at a constant rate until the battery is about 70% charged.

Absorption Charge

During this stage the charger maintains a constant voltage to the battery and the charging current tapers off naturally when the battery nears full charge.

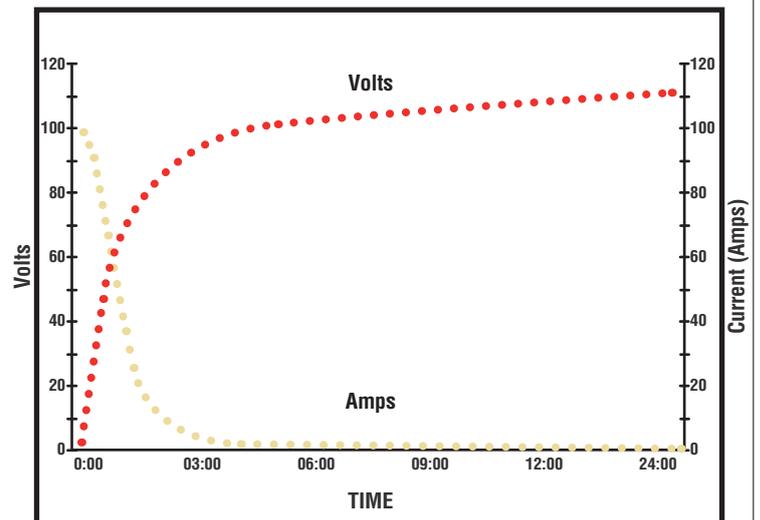
Float Charge

When the current flow reaches a pre-determined set point which indicates the end of the absorption charge stage, the charger automatically switches over to float charge. The purpose of this stage is to simply maintain the battery at full charge.

Most modern battery chargers are of the automatic 3 stage type and will detect the type of battery under charge to adjust the above 3 stage charging process accordingly.

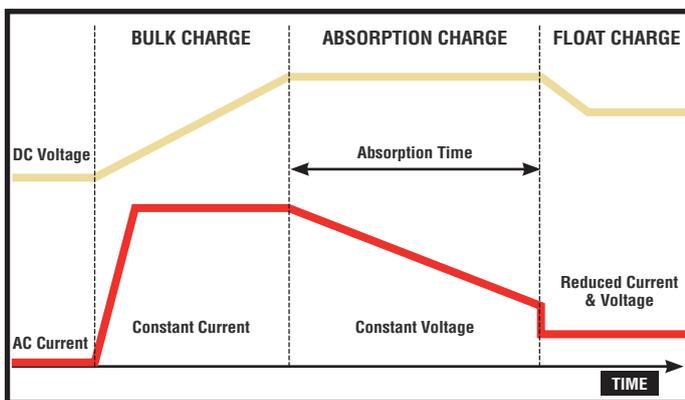
Constant Voltage Charging

This method charges a battery at a maximum voltage, typically from 13.8V to 15V and a maximum current depending on the charger specification. When a "flat" battery has been charged for a period of time and the maximum voltage is approached, the charge current drops off in proportion to the battery voltage increase.



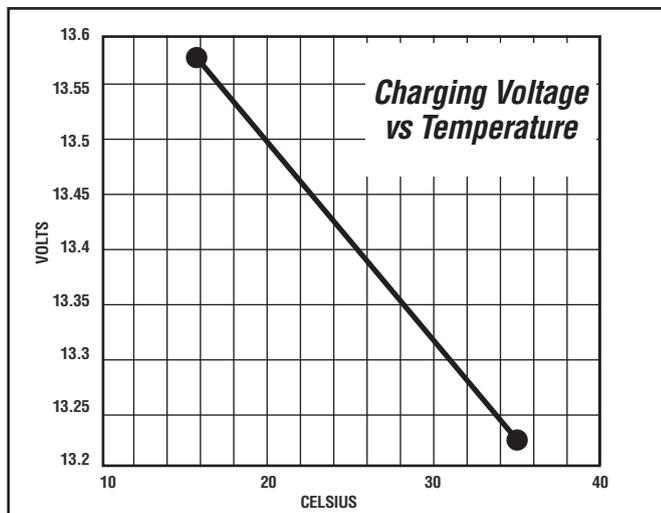
Constant Current Charging

This requires a specially designed charger that maintains a pre-selected constant current until a specific voltage has been achieved. This type of charger is not generally used, as without careful monitoring and control of battery temperature, overcharging and overheating (cooking) of the battery can occur.



Temperature Effect During Charging

Temperature correction is important during charging as battery characteristics differ according to temperature. For example at 20°C a 12V battery should be float charged at 13.5V however at 30°C the same battery should be charged at 13.3V. The chart below can be used to determine the correct charging voltage according to temperature. Some Automatic chargers often incorporate a temperature selection feature to account for temperature variations.



What Size Battery Charger

As a general rule of thumb, when selecting a charger choose an Australian approved battery charger equal to at least 10% of the battery capacity i.e. for a 120Ah battery choose a 15A charger.

In the absence of an Ah rating being displayed on the battery, the following table can be used to quickly determine the Ah capacity of a Century battery. Always round up to the next size charger.

Approximate Amp Hour by Battery Type

TYPE	Amp Hour
47	40
57	50
67	55
NS70	60
N70	70
86	85

Charger Size by Battery Capacity

BATTERY CAPACITY (Ah)	Solar Panel		Charger (240 Volt)				Generator	
	60-80 watt	80-100 watt	Up to 5 amps	5-10 amps	15-20 amps	40 amps	40-60 amps	80-100 amps
45 to 55 Ah	●	●	●	●			●	
65 to 70 Ah		●		●	●	●	●	●
75 to 85 Ah		●		●	●	●	●	●
95 to 115 Ah					●	●		●

Maximum Charge Voltage by Battery Type

Type:	Absorption Charging	Float Charging
SLI/Flooded	14.2V to 14.5V	13.2V to 13.5V
Sealed	14.2V to 14.5V	13.2V to 13.5V
VRLA	14.2V to 14.5V	13.2V to 13.5V
AGM	14.6V to 14.8V	13.2V to 13.8V
GEL	14.1V to 14.4V	13.2V to 13.4V

Charging Century Batteries

General information:- Charging at 14.5V will fully charge most lead acid flooded batteries. Century UHP and HP batteries can be charged using any generally available automotive battery charger of appropriate capacity.

SLI Batteries (UHP and HP range):- Century wet flooded lead acid starting batteries such as the Ultra Hi Performance range can be slow charged, at a rate of 0.1C (10% of the battery capacity). For example a 100Ah battery should be recharged using a 10A charger.

Calcium (HP Range):- With Calcium lead acid batteries, such as the Century Hi Performance range, there may be situations which require recharging of an over discharged battery. In these circumstances the abnormally high internal resistance of such batteries will prevent charge acceptance and can lead to over heating and gassing without effectively charging the battery. The aim in such situations is to supply a low current flow for an extended period of time and this may require a special type of charger.

Yuasa and Katana Motorcycle Batteries:- Conventional, maintenance free and factory activated motorcycle batteries should be recharged according to the manufacturer's instructions. All Katana and Yuasa motorcycle batteries feature detailed charging instructions.

Deep Cycle Batteries:- Wet flooded deep cycle batteries should be recharged overnight at a rate equivalent to 10% of the battery capacity. State of charge should be regularly checked using a hydrometer or multimeter to ensure optimum battery condition is achieved.

Deep Cycle AGM:- AGM batteries should be charged using a charger with a mode switch for AGM type batteries. It is recommended to use a charger, current limited to 20% or 0.2C of the batteries capacity at a charging voltage of between 14.6 – 14.8V following deep cycle use, or 13.6V – 13.8V for standby use. Charging should be paused if the battery or ambient temperature exceeds 50°C.

Deep Cycle Gel:- Century Deep Cycle Gel batteries should be recharged using a charger recommended for Gel type batteries. The charging voltage is lower for Gel batteries and charging should be paused if the battery or ambient temperature exceeds 50°C. Charging using a vehicles alternator is not recommended as the current limit will be too high and can lead to over charging if not regularly checked. Use a charger, current limited to 0.2C (20% of battery capacity) at a charging voltage between 14.1-14.4Volts following cyclic use or 13.5-13.8V following standby use.

VRLA Batteries:- Correct charging of a VRLA battery is essential to optimise battery performance and life. Although a constant voltage charge should be applied, optimum charging also depends on temperature (Nominally 20°C) and charge current (max 0.25 battery capacity). Two basic categories of charging exist:

Float/Standby:- This method is used in applications such as emergency back-up where the battery is required upon mains failure e.g. Emergency Lighting. The battery is continuously on charge and consequently the recommended charge voltages are slightly lower than cyclic charging to avoid damaging the battery. (Float voltage for Yuasa NP range = 2.275 volts/cell)

Cyclic:- Cyclic charging is used in applications where the battery is repeatedly discharged then charged, e.g. Wheel chairs and golf trolleys. A higher charging voltage is used however care should be taken to avoid leaving the battery on charge indefinitely as this will overcharge and destroy the battery. (Cyclic voltage for Yuasa NP range = 2.4 - 2.5 volts/cell). Refer to the battery labels for charging instructions or refer to the manufacturer's instructions where possible.

Further information regarding battery charging can be found in the Century Batteries selection guide, Century Deep Cycle user guide and Yuasa NP product brochure.

For more information contact your Century Yuasa representative.
www.centurybatteries.com.au