

## Charging guide for OPTIMA Deep Cycle batteries in 12 V applications

YT U 4.2  
 YT S 4.2



YT U 3.7  
 YT R 3.7



YT SS 2.7  
 YT SJ 2.7



BT DCM 4.2



**Table 1. Charging OPTIMA Deep Cycle batteries 2,7; 3,7 and 4,2 only.**

Application / System	Type of Charging	Current, Voltage and Time limits	
<b>Alternator</b>	Voltage Regulated	Voltage:	13.65 to 15.0 Volts
<b>Mains charger</b> (Automotive use)	Voltage Regulated	Voltage:	13.8 to 15.0 Volts
		Current:	10 Ampere maximum
		Time:	Depends on depth of discharge – 6 to 12 hours
<b>Mains charger</b> (Deep cycle use)	Current and Voltage Regulated	Phase 1:	no current limit as long as battery temperature is <51 °C
		Phase 2:	Continue charge at 14.7V until current < 1 Ampere
		Phase 3:	2 Ampere constant current 1 hour no voltage limit
		Phase 4:	Float charge of 13.8V with max. current of 1 amp.
<b>Boost charger</b> (Deep cycle use)	Current and / or Voltage Regulated:	Voltage:	Maximum 15.6V Volts
		Current:	No limit as long as temperature < 51.7°C
		Time:	Return 110% to 120% of charge removed or until current < 1 Ampere
<b>Float charger</b> (Standby use)	Voltage Regulated	Voltage:	13.6 to 13.8V
		Current:	1 Ampere maximum
		Time:	Indefinite at lower voltages

Note: When using external chargers float charge can always be applied after finishing the main charging process

## Charging guide for OPTIMA Deep Cycle batteries in 12 V applications



YT 5,5



BT 5,5



BT 5,0

**Table 2. Charging OPTIMA Deep Cycle batteries 5,0 and 5,5 only.**

Application / System	Type of Charging	Current, Voltage and Time limits	
<b>Alternator</b>	Voltage Regulated	Voltage:	13.65 to 15.0 Volts
<b>Mains charger</b> (Automotive use)	Voltage Regulated	Voltage:	13.8 to 15.0 Volts
		Current:	10 Ampere maximum
		Time:	Depends on depth of discharge – 6 to 12 hours
<b>Mains charger</b> (Deep cycle use)	Current and Voltage Regulated	Phase 1:	no current limit as long as battery temperature is <51 °C
		Phase 2:	Continue charge at 14.7V until current < 1 Ampere
		Phase 3:	3 Ampere constant current 1 hour no voltage limit
		Phase 4:	Float charge of 13.8V with max. current of 1 amp.
<b>Boost charger</b> (Deep cycle use)	Current and / or Voltage Regulated:	Voltage:	Maximum 15.6V Volts
		Current:	No limit as long as temperature < 51.7°C
		Time:	Return 110% to 120% of charge removed or until current < 1 Ampere
<b>Float charger</b> (Standby use)	Voltage Regulated	Voltage:	13.6 to 13.8V
		Current:	1 Ampere maximum
		Time:	Indefinite at lower voltages

Note: When using external chargers, float charge can always be applied after finishing the main charging process

## Charging guide for OPTIMA Deep Cycle batteries in 12 V applications

### Optima Deep Cycle batteries in deep cycle applications

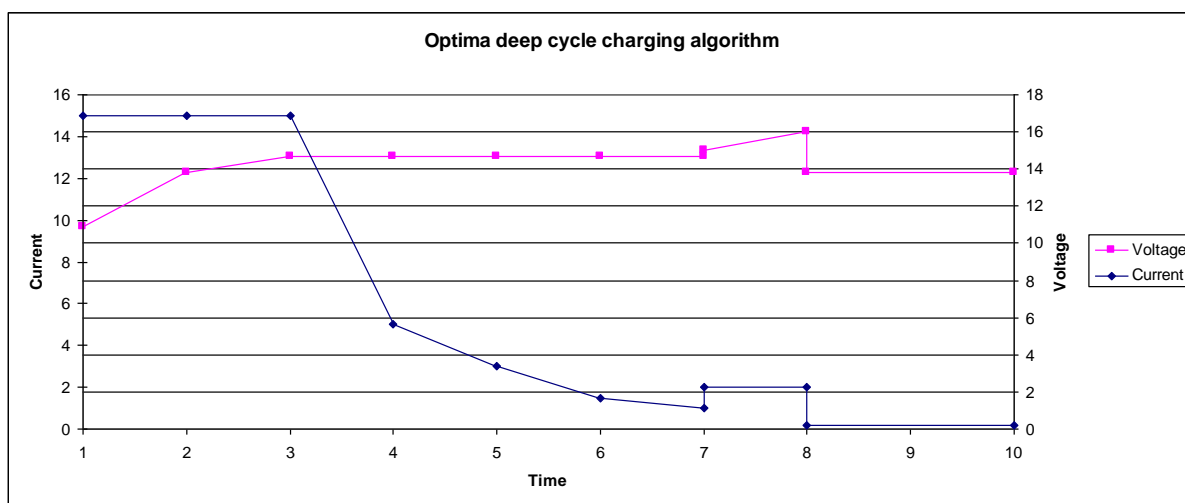
#### Scope

In a deep cycling application proper charging is critical to good performance. The ideal of charge is a balance between undercharging and overcharging. Undercharging will result in gradual losses in capacity and thus early cycle life failure. Overcharging, although achieving full capacity, can also result in a severe loss of cycle life. High voltages (>15 V) must be properly managed. They are required for short periods (1 hour) to fully charge and equalise the six cells within the battery the battery and yet if allowed to continue for longer periods they can cause overcharging and in extreme cases thermal runaway. Thermal runaway is a condition where the battery gets hot during charge resulting in acceleration of gassing and recombination reactions leading to further temperature increase and ultimate venting and damage to the battery.

#### A Constant Current / Constant Voltage Charge (IU1a)

Charge with a 14.7 V limit. After charge has tapered to <1 A, provide a finishing (equalisation) charge for the battery of 2A for batteries mentioned in table 1, or 3A for the 5,5 in table 2 for 1 hour, with no voltage limit ( a voltage of 17,5V can be set as a safety precaution) and temperature less than 51.7° C.

No initial current limits as long as voltage and temperature limits are observed. If OPTIMA Deep Cycle is being used in a multiple battery system or pack, problems of overcharging individual batteries may be encountered if individual batteries within the pack are seriously out of balance.



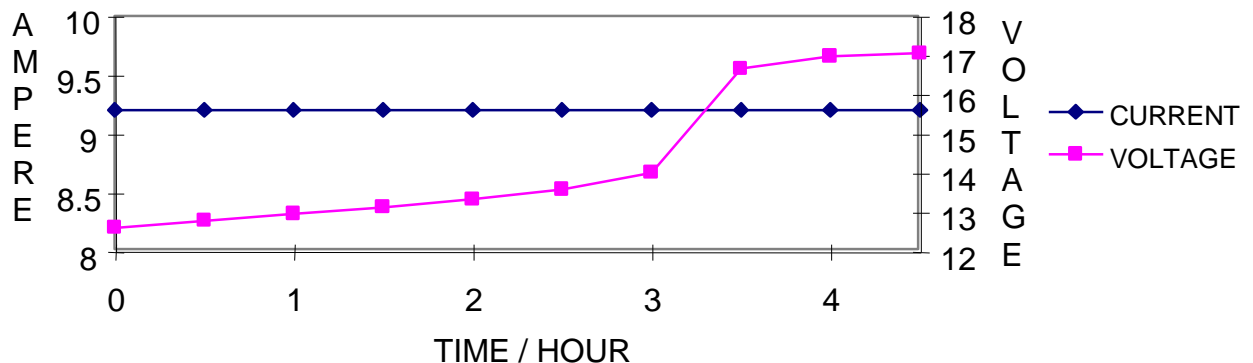
## Charging guide for OPTIMA Deep Cycle batteries in 12 V applications

It is recommended that 5 step automatic chargers with current interrupt charging during Equalisation stage be considered for charging OPTIMA Deep Cycle when being used in deep cycle applications or multiple battery systems. In large packs, effective battery management is essential.

### **B Constant Current Charge**

Return 115 to 120 % of charge removed on previous discharge. Current = 25 A or less. Temperature < 51.7°C. Problems may occur due to inability to establish Ah of previous discharge or seriously out of balance batteries in a pack. Constant current charging is only recommended for very specific applications. Please consult OPTIMA BATTERIES.

#### **CONSTANT CURRENT (4.2L)**



### **Float Charge**

Float charge at 13.2 to 13.8 V. Maximum current = 1A.

### **Conditioning Charging (recommended for new batteries or after long storage to quickly attain full capacity)**

For OPTIMA group 34 Deep Cycle apply a 4A constant current for 16 hours ( on a discharged battery) with no voltage limit. Temperature < 51.7°C. Discharge: 25 A to a 10.5V cut-off. Typically 2 or 3 cycles will see capacity increase significantly. This charge is extremely useful for electric vehicle operators as an intermittent means to obtain / maintain high capacity. Note: Continuing this charging method will reduce battery life.

### **Temperature Compensation**

Temperature compensation should be set to -18 mV / °C for temperatures around 25°C. As temperature increases, charging voltage should be decreased. As temperature decreases, charging voltage should be increased.