



UNIVERSAL TWELVE-VOLT, FIVE-AMP BATTERY CHARGER—MODEL 2.70

Instructions

Cautions

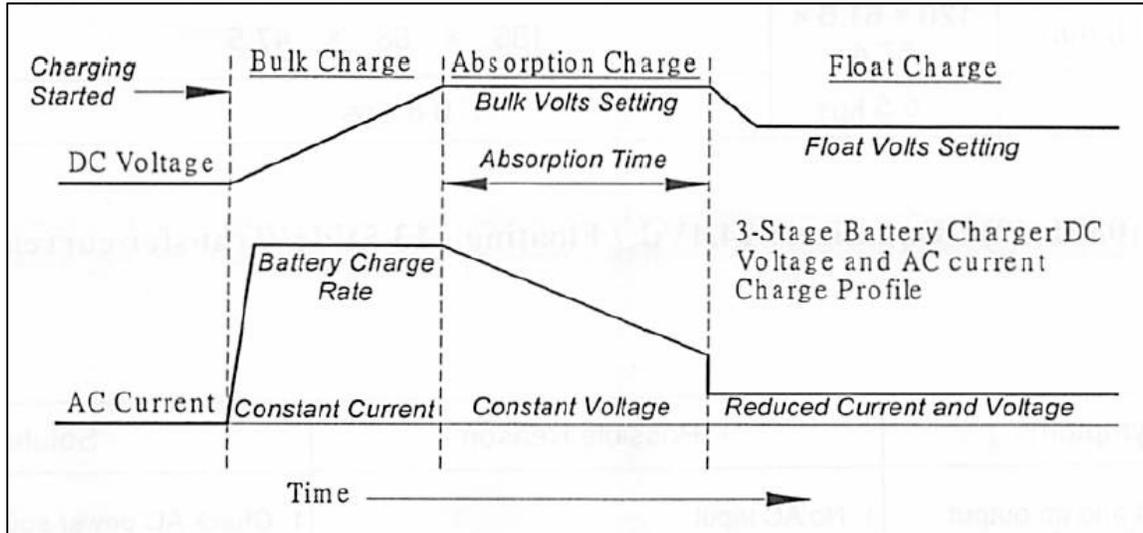
1. Before using the battery charger—please read all instructions and cautionary markings on the charger.
2. Use the battery charger in a well ventilated area—for indoor use only.
3. To avoid the risk of injury, charge only 12 volt lead-acid or gel cell type rechargeable batteries that have a minimum capacity of 12 Amp; smaller batteries can be damaged by the 5 amps of charger output.
4. Beware of correct polarity, red to positive and black to negative.
5. Slight surface warming of charger is normal.

Instructions for charging

1. **FIRST!** Connect the red and black terminals or alligator clips to the positive and negative battery terminals, respectively.
2. Plug the charger into the AC power source (mains); any voltage between 90 and 240 VAC, 50/60 Hz is suitable.
3. Switch the charger to the on position; the switch is near the AC power cord.
 - a. The RED LED will indicate power on.
 - b. If the battery is discharged, a second LED will light ORANGE indicating that charging is occurring (during bulk charge and adsorption charge phases, see figure below). During these phases, the cooling fan will on fast speed. Voltage is 14.6 ± 0.2 VDC.
 - c. When the second LED turns GREEN the battery is fully charged; charger puts out reduced voltage (13.7 ± 0.2 VDC) and current. During the float charge phase, the battery will NOT harmed if left indefinitely. Fan speed will be at slow speed while the charger is in the float charge phase.
4. Shut off charger and disconnect the charger from the AC power source (mains).
5. **FINALLY!** Remove the charger's terminals from the battery terminals.



Charging curve



Troubleshooting

Problem and Symptoms	Possible Reasons	Solution
If power RED LED indicator is off and no output voltage when connected to AC mains and charger is switched on:	<ol style="list-style-type: none"> 1. No AC input. 2. Fuse blown. 3. Charger malfunction. 	<ol style="list-style-type: none"> 1. Check AC power. 2. Replace fuse if blown (replace with 250 volt 6.0-6.3 amp, 5 x 20 mm fast acting). 3. Contact us.
If AC power is normal. But charging LED is not ORANGE:	<ol style="list-style-type: none"> 1. Reversed polarity (will blow fuse). 2. Loose fuse in holder. 3. Charger malfunction. 	<ol style="list-style-type: none"> 1. Replace fuse. 2. Tighten. 3. Contact us.
If AC power is normal. But charging LED remains ORANGE for a long time:	<ol style="list-style-type: none"> 1. Battery malfunction (may be in deep discharge condition). 2. Charger malfunction. 	<ol style="list-style-type: none"> 1. See below for possible recovery from deep discharge. If impossible to recover from deep discharge, replace battery. 2. Contact us.
If the charge rate LED goes immediately to GREEN:	<ol style="list-style-type: none"> 1. The battery is fully charged. 2. Battery malfunction. 	<ol style="list-style-type: none"> 1. Great, battery is ready to use. 2. Replace battery.

Useful resources

1. See : <http://johnwhock.com/resources/battery-tutorial/>
2. Battery and Charger tutorial:
http://johnwhock.com/wp-content/uploads/2012/09/tutorial_BatteryChargers.pdf
3. Recovery Charge After Deep Discharge:
http://johnwhock.com/wp-content/uploads/2012/09/tutorial_RecoveryCharge.pdf

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