FlexCharger Battery Chargers

Operating Instructions

Definitions (as used in these instructions)

Flooded Battery
Lead-acid battery with liquid electrolyte that requires open-venting and regular water replacement.

Sealed Battery
Maintenance-free, lead-acid battery that uses an oxygen recombination technique to prevent water loss. VRLA (valve regulated lead-acid), Gel, AGM (absorption glass mat) or other technology. Sealed batteries do not require water replacement.

80% Charge Point
Point during charge when the battery reaches 80% of full charge.

80% Charge Point Voltage
Specific "on-charge" battery voltage the charger uses to determine when the battery is 80% charged.

Initial Charge
Charge up to the 80% charge point where cell voltage is 2.37 to 2.40 volts. Flooded batteries begin to emit gas (hydrogen & oxygen) after reaching the 80% charge point. Upon reaching the 80% charge point, sealed batteries are kept at a constant cell voltage to reduce or eliminate gassing.

Finishing Charge
Charge after Initial Charge up to the time the battery is fully charged.

Equalize Charge
An extended Finish Charge given periodically (once a week or every 5 to 7 charges) to ensure that each cell of the battery is fully charged. Flooded batteries only.

Float Charge
Low current charge that maintains the battery at full charge. It supplies enough current to replace amperes lost through internal discharge, but not enough to overcharge the battery. Batteries can be left on float charge indefinitely until needed.

Soft Start
When the charger is activated the current builds slowly, reducing shock and noise on the ac lines.

Temperature Compensation
Processor adjusts the charge profile according to the ambient temperature. For high temperatures,

the 80% charge point voltage is lowered, charge time shortened. For low temperatures, the 80% charge point voltage is raised, charge time lengthened.

Interlock
Optional feature of On-Board chargers. Allows lift operation using power from the charger, but prevents vehicle movement while the charger is connected to an ac source.

Charger Overview

Ferroresonant Chargers
Traditional lead-acid battery chargers that use ferroresonant transformers. The transformer, itself, provides current limiting and voltage regulation during charge. These chargers work well with flooded batteries, but overcharge and damage more delicate modern sealed batteries. Do not use ferroresonant chargers on sealed batteries.

SCR Chargers
Chargers that use SCR (silicon controlled rectifiers) in conjunction with transformers. The output current and voltage are closely controlled by signals sent from the microprocessor to the SCRs. This close control suppresses gassing and prevents damage to sealed batteries, while still adequately charging flooded batteries. SCR chargers may or may not have several charge profiles for different manufacturer's batteries.

FlexCharger
Arrgh's standard SCR charger uses a single charge profile to safely and fully charging both sealed and flooded commercial batteries. When the Finish Charge ends, FlexCharger switches to Float Charge to maintain the battery at full charge and equalize the battery cells. For special needs, customized charge profiles are available through simple software changes.

FlexCharger comes in two configurations -- "Portable" with handle and rubber feet, or "On-Board" with optional interlock and provision for a mounting bracket.

Safety

Do
Ensure charger output voltage is the same as the battery voltage.
Ensure battery and charger cables and connectors are intact, tight and clean.
Charge in a ventilated area.
Clean and dry the battery if wet or dirty.
If flooded battery, check electrolyte level and add water before charge. Do not overfill.
Use gloves and glasses when adding water.
If on-board charger, disconnect from ac before using vehicle.

Do Not
Charge in the rain or allow water to get into the charger.
Stand in water while connecting the battery to the charger.
Leave flooded battery vent plugs off during charge.
Smoke or cause sparks near batteries on or after charge.

Use charger for purposes other than to charge lead-acid batteries.
Block the charger vent grill.
Use charger near flammable materials or vapors.
Move charger by pulling on charger cables.
Open or attempt to repair the charger – no serviceable parts inside.

Operation

1. Connect the charger to a 110 or 220 volt, 15 amp, 50/60 hz, ac supply. FlexCharger will automatically adjust to either voltage and frequency. The charger will remain off until a battery is connected.

2. Connect the battery to the charger.

3. Charger will run an internal self-check and read the battery voltage. All 3 LEDs will flash in sequence one time -- Red/Yellow/Green. The numeric display will briefly show the ampere output rating of the charger.

4. If the charger will not turn on -- Red "Initial Charge" and Yellow "Finishing Charge" LEDs will alternate on and off. Problem is:

   A. Battery/charger mismatch -- battery voltage higher than the charger rating. (If the battery voltage is lower than the charger rating, the charger will charge the battery for 9 hours, then turn off because it was unable to reach the charger 80% charge point voltage within the 9 hour time limit).

   B. Short circuit.

   C. Battery voltage too low to power the processor and/or close the relay (8 volts dc +/- for 12 volt dc chargers; 16-20 volts dc for 24 volt dc or higher chargers).

   D. Charger malfunction.

5. If the charger does turn on, it will use a 10 -15 second "soft start" -- charger fan speed will slowly increase to full speed and the ammeter needle will rise to the appropriate output reading.

   A. if the battery is below the 80% charge point voltage:

      1. The Red "Initial Charge" LED will light and the charger will supply the maximum current the battery will accept up to the charger output rating.

      2. Charger will charge the battery for a maximum of 9 hours or until the battery reaches the 80% charge point voltage.

         a. If the battery does not reach the 80% charge point voltage within 9 hours, the charger will turn off and the Red and Yellow LEDs will alternate on and off.

b. If the battery does reach the 80% charge point voltage within 9 hours, the charger will switch to "Finishing Charge", the Yellow LED will light and the charger output voltage will be held at 2.37 volts per cell. "Finishing Charge" time is based on the charge profile up to the 80% charge point, with a minimum of 1 hour and a maximum of 6 hours.

c. At the end of the "Finishing Charge," the charger will switch to "Charge Complete" and the Green LED will light. If the battery is left connected to the charger, the charger will "Float Charge" the battery at 2.20 volts per cell and the Green LED will remain lit.

d. When the battery is disconnected during or after charge, the charger and all LEDs will turn off.

B. If the battery is above the 80% charge point voltage:

1. Charger will go to "Finishing Charge" for 20 minutes, the Yellow LED will light and the output voltage will be held at 2.37 volts per cell.

2. After 20 minutes, the charger will switch to "Charge Complete" and the Green LED will light. If the battery is left connected to the charger, the charger will "Float Charge" the battery at 2.20 volts per cell and the Green LED will remain lit.

6. Any time the battery is disconnected from the charger or the charger is disconnected from the ac power, the charger program is reset.

7. There is no ON /OFF switch. The charger turns on automatically when a battery and ac are connected, and turns off when the battery or ac is disconnected.

8. The numeric display normally shows the charging current.

9. If the charger is connected to the battery but not to an ac supply, the numeric display will briefly blink "ac" as a reminder it has no ac power.

10. If the charger is disconnected from the ac supply during charge, the numeric display will briefly show the software version installed. This is for factory use.

11. The label on the back of the charger lists the charger model, ac input, dc output, and serial number.

12. There are no user serviceable parts in the charger. If the charger does not function correctly, contact your dealer or the factory.

LEDs

Red / Yellow / Green
Flash in sequence one time -- battery & ac power connected, charger initiating internal self-check.

Red
Initial Charge

Yellow
Finishing Charge

Green
Charge Complete and Float Charge.

Red / Yellow
Alternating on & off -- indicate a **Fault**:
Battery/charger mismatch
Short circuit
Battery did not reach 80% charge within 9 hours
Charger malfunction