# Hawkins Manufacturing (Pty) Ltd

## Model 2400/SR Automatic/Manual Bank Charger - Instructions & Operating Guide

## GENERAL

- **IMPORTANT SAFETY INSTRUCTIONS**

WARNING – RISK OF EXPLOSIVE GASES. WORKING IN THE VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION AND WHEN BEING CHARGED. KEEP BATTERY AND CHARGER AWAY FROM OPEN FLAMES AND SPARKS.

- **CAUTION.** Charge only rechargeable VENTED OR FLOODED LEAD-ACID TYPE batteries. These may include MAINTENANCE-FREE, LOW MAINTENANCE, DEEP CYCLE OR LEISURE lead-acid batteries.

**Never recharge dry-cell batteries or non-rechargeable or defective batteries. These batteries may burst and cause personal injury and property damage.**

If you are uncertain as to the type of battery you are attempting to charge, or the correct procedure for checking the battery's rate of charge, contact your battery supplier or battery manufacturer. Always follow the battery manufacturer's instructions.

- Connect and disconnect battery leads only when AC supply cord is disconnected.
- Do not overcharge battery.
- When charging a battery, locate only in a dry, well-ventilated area.
- Do not obstruct the flow of cooling air through the charger cabinet.
- Never place the charger on a heated surface.

**WARNING**

- This equipment employs parts such as switches and circuit breakers that tend to produce arcs or sparks. Use the charger in a well-ventilated room only.
- Do not operate the charger with a damaged cord or plug. **ANY REPLACEMENT OF THE MAINS SUPPLY CORD DUE TO DAMAGE MUST BE MADE BY HAWKINS MANUFACTURING OR ITS APPROVED SERVICE AGENT.**
- The charger must never be exposed to water in any form. Avoid extreme humidity. Use indoors only.

**PERSONAL PRECAUTIONS**

- Wear complete eye protection, clothing protection and rubber soled shoes. Place damp cloth over battery to protect against acid spray. Avoid touching eyes while working near battery. If ground very wet or covered with snow, wear rubber boots.

- Caution! Battery Acid is corrosive. If battery acid contacts skin or clothing, wash immediately with soap and water or a solution of Bicarbonate of Soda and water. If acid enters eye, immediately flush eye with running cold water for at least 10 minutes and get doctor's attention.

**NEVER** smoke or allow a spark or flame in vicinity of battery.

- Be extra cautious to reduce the risk of dropping a metal tool onto battery. It might spark or short circuit battery or other electrical part that may cause an explosion or severe burns.
- Before working with a lead-acid battery, remove personal items such as rings, bracelets, necklaces, watches etc. A lead-acid battery can produce a short circuit current high enough to weld such items causing a severe burn.
- **NEVER** charge a frozen battery – thaw it out first.

**MODEL 2400/SR AUTOMATIC/MANUAL BANK CHARGER**

**1. BATTERY CONNECTION**.

- This charger is intended to charge up to **20 x 12v lead-acid** batteries at a time. The batteries must be arranged in **two (2) banks of 10** batteries each, connected as per the layout printed on the front face of the charger. **NOTE. Within each bank, the 10 batteries must be arranged as 5 pairs**. The following diagram suggests a layout that can be followed.

- REMOVE ALL BATTERY VENT CAPS FIRST BEFORE CONNECTION IS ATTEMPTED

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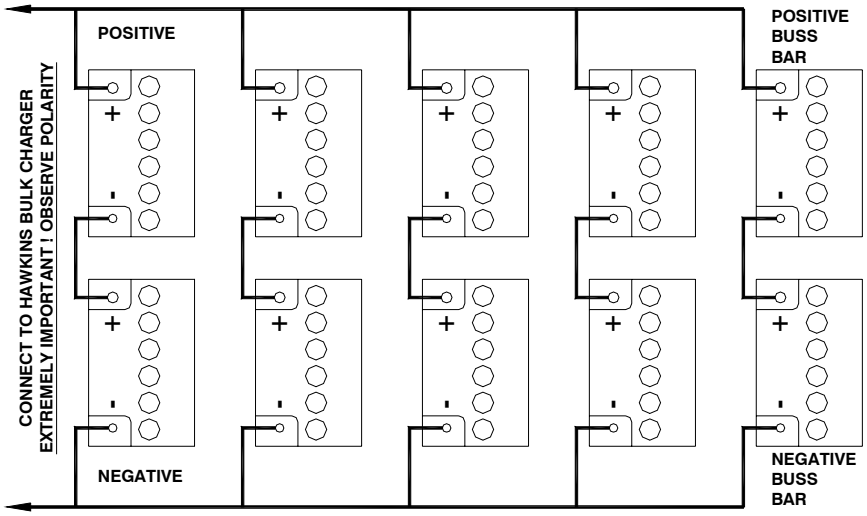
- CHECK THE WATER LEVEL IN EACH BATTERY CELL AND IF NECESSARY, TOP UP THE CELL WITH DISTILLED WATER ONLY.

- CHOOSE ONLY BATTERIES OF THE SAME AMP HR RATING AS A PAIR.

- WE STRONGLY RECOMMEND THE USE OF BUSSBARS FROM THE CHARGER TO SUPPLY EACH BANK OF BATTERIES AS PER THE FOLLOWING DIAGRAM. WE RECOMMEND THAT WHERE BUSSBARS ARE USED, THESE BE COPPER PIPES OR RODS OF NOT LESS THAN 16MM SQUARED CROSS SECTIONAL AREA. 20MM COPPER WATER PIPE IS PERFECTLY ACCEPTABLE.




- **CABLE SPECIFICATION & RATING**. The supply cable from the charger to and from each bussbar should be multistrand and not less than 16mm squared cross sectional area. Not less than 120amp clamps are recommended. Within each bank, each pair of batteries should be connected to the relevant bussbars by multistrand cables not less than 1,0mm squared cross sectional area and 40amp clamps. Between each battery in the pair, use Hawkins interbattery connectors.

- Within each pair, connect the two (2) batteries in ***SERIES*** – connect the POSITIVE (marked POS. or +) post of the first battery to the NEGATIVE (marked NEG. or -) post of the second battery. Connect each pair of batteries to the relevant bussbars. Connect the vacant POSITIVE post of each pair to the POSITIVE bussbar in the same bank. Connect the vacant NEGATIVE post of each pair to the NEGATIVE bussbar in the same bank.

- Repeat for the batteries in the second bank.

- Each bank must be connected to the charger by connecting the POSITIVE bussbar of the bank to the POSITIVE (marked +) terminal on the charger and the NEGATIVE bussbar of the same bank to the NEGATIVE (marked -) terminal on the charger. Follow the diagram printed on the front face of the charger.

- NOTE It is quite practical to charge more or less than 20 x 12v batteries at a time but if this is intended, the batteries must still be arranged in two banks of equal numbers of pairs.

## 2. CHARGING

- The Hawkins 2400/SR charger is designed to charge series/parallel combinations of standard automotive batteries with a rated output current of 100 Amps at 24 Volts D.C
- In manual mode, batteries are connected in series parallel as shown in the connection diagram on the front panel. Take care to observe polarity when making connections to avoid the danger of fire or explosion. The rectifier is protected against reverse polarity or short circuit by a 125 amp FERRAZ 22 x 58 cartridge fuse type aM 125A. If this fuse is blown, do not substitute with any other type of fuse, or damage to the charger will result.
- With all battery connections made and checked, connect the AC power cord to the power outlet. Switch on the AC power switch with the charger switch in the **Man (Down)** position. Adjust the current control knob to the desired current level. e.g. for a total of 20 batteries, choose 100amps: for a total of 10 batteries, choose 50amps and so on. If only a few small batteries are being charged, take care not to exceed safe charge levels. A set of batteries in good but discharged condition will easily draw more than 100 amps. As the battery bank voltage reaches 24 volts or higher, the current will start to fall, even with the current setting at maximum. This is normal and as the batteries reach 28 volts, the current setting should be reduced to a lower level (about 10 amps per pair) to prevent overcharging and excessive gassing.
- **Batteries in poor condition will very quickly rise above the 24 volt level and the charge current will fall rapidly. It will be noted that individual cells or batteries gas freely, spraying an acid mist around the filler cap. Take great care, this gas can explode violently causing serious injury. It also indicates weak cells or broken internal connections to the plates. A smell of rotten eggs also accompanies this type of gassing indicating that the battery should be serviced by an expert or replaced. In the MANUAL position, the charger and batteries should NOT be left unattended for long periods, as there is no control over the voltage applied to the batteries. This will cause damage to the plates and excessive loss of water from the battery.**
- The preferred method of charging is to use the charger in AUTOMATIC mode {charger switch in **Auto (Up)** position}. When the voltage of the battery bank is below the factory set cut off voltage, the charger will behave in exactly the same manner as described under the MANUAL mode. However, as the battery voltage rises and approaches the pre-set cut off point, (28,4 Volts) the charger switches off and the current falls to zero. The battery voltage then falls quite rapidly back to the switch on point (25,5 Volts). The charger switches on again, rises to the cut of point, and once more switches off. When this happens, the battery bank is about 90% fully charged. In this mode, the charger can be left ON and connected to the battery bank completely unattended without danger of overcharging the batteries. It will be noticed that the periods between switch on and switch off become progressively shorter, and the periods between switch off and switch on become progressively longer. As the battery bank approaches 100% charge, the off period - with good batteries - can be an hour or more. Batteries kept in this manner will be at peak charge and in no danger of rapid loss of water due to excessive gassing.
- In AUTOMATIC mode, a set of batteries in poor condition will reach the cut off point very rapidly with the fall in voltage back to the switch on point being equally rapid. This is normal and it is probably better to switch to MANUAL mode being careful to watch the batteries for signs of excessive gassing or overheating. We repeat the warning that this gas can cause an explosion and serious injury. The batteries have reached the end of their useful life and should be replaced.
- Once the batteries have been brought up to the best charge that they will accept, switch back to AUTOMATIC and if there is time available leave the batteries on charge. The HAWKINS charger in AUTOMATIC mode will do a better job of getting the maximum charge into the battery than in MANUAL mode and at a reduced risk of causing further damage to already ailing cells

- Use a hydrometer to establish when charging is complete.

**3. DISCONNECTION**

- After charging is complete, DISCONNECT THE CHARGER FROM THE SUPPLY MAINS FIRST. TO DISCONNECT THE BATTERIES, REVERSE THE ABOVE CONNECTION PROCEDURE. NEVER DISCONNECT LIVE CHARGER CLIPS FROM THE BATTERY POSTS.

**4. GENERAL**

- The internal wiring and rectifier in the charger are protected by a FERRAZ 400Vac 125amp fuse. PLEASE ENSURE THE CORRECT POLARITY OF THE BATTERIES AND CABLES WHEN CONNECTING TO AVOID UNNECESSARY DESTRUCTION OF THE FUSE. USE OF ANY OTHER FUSE WILL RENDER OUR WARRANTY NULL AND VOID.

- Please follow the above recommendations and procedures and this charger will give you many years of satisfactory service with little need for maintenance.

- IN CASE OF DIFFICULTIES OR PROBLEMS, PLEASE CONTACT US BY **TELEPHONE (031) 5792813 OR FAX (031) 5794642 OR e-mail**: support@hawkins.co.za