

PRO Charging Systems

Emergency Services (ES)

Installation and Operating Instructions

Professional SERIES

Uni Pro
One 15 Amp
Bank



Dual Pro
Two 15 Amp
Banks



Tri Pro
Three 15 Amp
Banks



Quad Pro
Four 15 Amp
Banks



Sportsman SERIES

Uni Pro
One 10 Amp
Bank



Dual Pro
Two 10 Amp
Banks



Tri Pro
Three 10 Amp
Banks



Quad Pro
Four 10 Amp
Banks



**For additional information please call our
Technical Support Group 615.471.5300**



063022-70352

PRO CHARGING SYSTEMS, LLC
1551 Heil Quaker Boulevard, LaVergne, TN 37086-3539

INSTALLATION AND OPERATING INSTRUCTIONS

FOR THE FOLLOWING BATTERY CHARGING SYSTEMS:

Model	AC Supply	DC Output	Battery System	Total Series Capability*	Battery Capacity
PS1ES	120VAC 60 HZ	One 15 amp bank	12 volts per bank	12 volts	75-150 ah (20hr rating)
PS2ES	120VAC 60 HZ	Two 15 amp banks	12 volts per bank	24 volts	75-150 ah (20hr rating)
PS3ES	120VAC 60 HZ	Three 15 amp banks	12 volts per bank	36 volts	75-150 ah (20hr rating)
PS4ES	120VAC 60 HZ	Four 15 amp banks	12 volts per bank	48 volts	75-150 ah (20hr rating)
SS1ES	120VAC 60 HZ	One 10 amp bank	12 volts per bank	12 volts	75-150 ah (20hr rating)
SS2ES	120VAC 60 HZ	Two 10 amp banks	12 volts per bank	24 volts	75-150 ah (20hr rating)
SS3ES	120VAC 60 HZ	Three 10 amp banks	12 volts per bank	36 volts	75-150 ah (20hr rating)
SS4ES	120VAC 60 HZ	Four 10 amp banks	12 volts per bank	48 volts	75-150 ah (20hr rating)

*Total Series Capability - This refers to the Battery Pack. The charger will charge each 12 volt battery within the series pack INDEPENDENTLY of the other with that same pack based on 12 volts.

Parallel Charging - The chargers may be hooked up to batteries that are connected in parallel, however the batteries will not be charged independently. All banks of the charger will see the same voltage.

IMPORTANT NOTICE

Please save and read all safety, operating and installation instructions before installing or applying AC power to your on-board battery charging system. Please contact us with any product, installation, or service questions at technical support (615.471.5300).

INTRODUCTION

Pro Charging Systems, LLC (PCS) has been manufacturing waterproof, on-board battery charging systems since 1989. Our charging systems are designed and built tough to withstand intense vibration, extreme temperature variations and submersion without damaging the unit. Our systems use temperature compensation in order to fully charge a battery in hot or cold environments and are controlled by microprocessors in order to assure precise control over each totally independent charging bank. All of our chargers have true reverse polarity protection and shut off completely after each charge cycle.

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IMPORTANT SAFETY INSTRUCTIONS

Use of attachments not recommended or sold by PCS may result in a risk of fire, electrical shock, or injury to persons.

To reduce risk of damage to the electrical plug and power cord, always pull by the plug rather than by the power cord when disconnecting charger.

When using an extension cord, make sure:

1. That pins on the extension cord plug are the same number, size and shape as those of the charger's plug;
2. That extension cord meets UL (Underwriters Laboratories, Inc.) acceptance and is in proper operating condition;
3. That wire size is large enough for the ac ampere rating of charger.

Do not operate charger with a damaged cord or plug—replace the cord or plug immediately.

Do not operate charger if it has received a sharp blow, been dropped or otherwise damaged in any way; contact our technical support group for assistance (615.471.5300).

Do not disassemble charger; contact technical support when service or repair is required. Incorrect reassembly may result in risk of electrical shock or fire.

To reduce risk of electrical shock, unplug charger from outlet before attempting any maintenance or cleaning.

WARNING: RISK OF EXPLOSIVE GASES

1. **WORKING IN THE VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS.** Batteries generate explosive gases during normal battery operation. For this reason, it is of utmost importance that each time before using your charger, you read this manual and follow the instructions exactly.
2. To reduce risk of battery explosion, follow these instructions and those published by the battery manufacturer and by the manufacturer of any equipment you intend to use in the vicinity of battery. Review all cautionary markings on any product being utilized in or around the charging device.

PERSONAL PRECAUTIONS

Someone should be within range of your voice or close enough to come to your aid when you work near a lead-acid battery.

Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, eyes, or other surfaces.

Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.

If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flood eye with running cold water for at least 10 minutes and seek medical attention.

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

Be extra cautious to reduce risk of dropping a metal tool onto battery. This might cause a spark or short circuit a battery, possibly resulting in an explosion.

Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a leadacid battery. A lead-acid battery can produce a short-circuit current high enough to weld a ring, or the like, to metal, causing a severe burn.

This charger's algorithm is normally configured to charge wet cell or AGM batteries. When a "special" algorithm has been provided for unique battery types, such as gelled electrolyte or lithium batteries, the charger will have a special label applied to the power cord indicating the type of battery to be charged. If you have any questions concerning your charger, please contact us before utilizing the charger.

NEVER charge a frozen battery.

PREPARING TO CHARGE

If it is necessary to remove the battery or batteries to charge, always remove grounded terminal from battery first. Make sure all accessories are off, so as not to cause battery arcing.

Be sure the area around any battery is well ventilated while batteries are being charged. On occasion, "gas fumes" may be present during charging and can be forcefully blown away by using a piece of cardboard or other nonmetallic material as a fan. Proper ventilation is always recommended in the charging area.

Clean all of the battery terminals. Be careful to keep corrosion from coming into contact with eyes.

Add distilled water in each cell (wet cell batteries) until battery acid reaches level specified by battery manufacturer. Do not overfill. For a battery without cell caps, carefully follow manufacturer's recharging instructions.

Study all battery manufacturers' specific precautions such as removing or not removing cell caps while charging and recommended rates of charge.

Extension cords should be industrial grade/heavy duty UL approved and grounded. Check extension cord before use for damage, bent prongs and cuts. Replace if damaged.

Always make your extension cord connection on the charger side first. After connecting the extension cord to the charger, proceed to plug the extension cord into a 120VAC GFCI protected (Ground Fault Circuit Interrupt) outlet.

Always remove the extension cord from the 120VAC outlet first when charging is completed followed by unplugging the charger.

When equipment is not in use, check on the batteries/charger at least every 30 days (more often if you have equipment constantly utilizing battery power).

PRODUCT SUMMARY

General Operation:

Use the following guidelines in this manual to install your fully automatic PCS battery charging system.

Assure that the area around your charger and batteries is properly ventilated. Connect your extension cord with no AC power present to the battery charger and proceed to plug your extension cord in at a nearby 120VAC outlet.

Once you plug in your PCS battery charging system, your batteries will be simultaneously and independently charged to 100%. Unlike systems that utilize one large charger to attempt to charge multiple batteries, your system utilizes a totally independent battery charger for each battery. Each charging bank will remain in a maintenance ("float") stage once the battery is charged and then monitor and/or maintain the battery indefinitely* provided that you leave your system plugged in, which is what we

recommend. ***During the Float stage current will flow to the battery for 5 minutes and then shut off completely for 60 minutes.***

*Check batteries and charger every 30 days.

Your system provides an equalization stage every 30 days while plugged in. If the charger is normally disconnected from A/C after completing charge, equalization can be accomplished by plugging back into A/C whenever this stage is desired. Battery manufacturers recommend that equalization is done once a month in order to further reduce sulfation on the lead plates of a battery, which helps promote longer battery life. Note: During this process, the LEDs will go through their normal routine (Red counting up for % of charge) and the Green Led will blink until the unit returns to the maintenance mode and a steady Green LED. (Not applicable to a Gel Profile)

INDEPENDENT CHARGING BANK INDICATIONS

When your battery charging system is activated, each bank provides charging information utilizing five red Light Emitting Diode (LED) indicators and one green Light Emitting Diode (LED) indicator.

The five red LEDs enable you to track the progress of the charge cycle on each battery as the voltage rises. A solid green LED indicates charge is completed and that bank of the charger is in the Float stage.

Fault conditions will be displayed by blinking certain combinations of LED's, these are explained below:

Bulk DVDT Fault – This fault condition occurs if the battery voltage has not risen at least .013 VPC during the previous 150 minute period during charging. (Note: First available failure point is 300 minutes into the charging process. The first voltage value is stored at 150 minutes into the charging process and the first comparison takes place at the 300 minute point) These checks take place once every 150 minutes until the Bulk Stage is complete and the charger bank has transitioned to the absorption stage at 2.42 VPC.

- 2.25 VPC is utilized as a threshold for determining how the fault is handled
- If the fault condition occurs at a battery voltage below 2.25 VPC, the charger bank will stop supplying charge current and flash the 30% and 100% together at 500 ms intervals. At this point, once the voltage settles to 2.17 VPC, the charger bank will supply charging current up to 5 amps in order to maintain 2.17 VPC while continuing to flash the fault code. Fault will reset upon physically cycling the AC power to the charger.
- If the fault condition occurs at a battery voltage at or above 2.25 VPC, the charger bank will transition to the Float Maintenance stage and display a steady 100% LED indication. Float maintenance voltage will be maintained at 2.21 VPC and charger bank will supply up to 5 amps in order maintain 2.17 VPC.

Forming Stage Fault – This fault condition will occur if the battery voltage does not rise above 1.83 VPC within the first 3 hours of charging. If this fault occurs, the charger bank will stop supplying charge current, flash the 30% and 50% LEDs together at 500 ms intervals for 1 hour to allow batteries to cool. Charger bank will automatically fully reset (microcontroller re-initialization) after 1 hour in fault loop and resume charging.

Charger Internal Over Temp Fault – This fault condition will occur if the internal charger temperature exceeds the factory preset limit in order to prevent damage to internal components. If this fault occurs, the charger bank will stop supplying charge current, flash the 30% and 90% LEDs together at 500 ms intervals for 30 minutes to allow internal cooling. Charger bank will automatically fully reset (microcontroller re-initialization) after 30 minutes in fault loop and resume charging.

Bulk Timeout Fault – This fault condition will occur If the charger bank has not transitioned to the

Absorption Stage within 30 hours. If this fault occurs, charger bank will stop supplying charge current, flash the 30%, 50%, 90% LEDs together at 500 ms intervals for 1 hour to allow batteries to cool. Charger bank will automatically fully reset (microcontroller re-initialization) after 1 hour in fault loop and resume charging.

INSTALLATION INSTRUCTIONS

All PCS battery charging systems are designed to be permanently installed in a well-ventilated area and have no mounting restrictions.

Do not make any electrical connections to the power supply (AC) or to a battery (DC) until the installation process has been completed.

Use the mounting flanges of the charger to mark locations for starter holes. Drill a 1/16 inch hole at each marked location. Then, utilize all stainless steel screws that have been provided and install the charger securely, being cautious not to over tighten the screws. Silicon sealer should be used to secure and waterproof the screw holes.

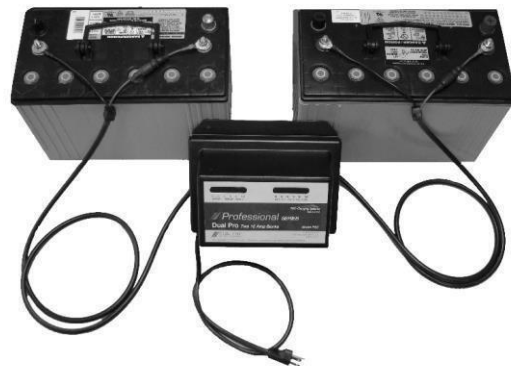
IMPORTANT NOTICE

The mounting brackets of the system may contain keyholes that are designed so that screws can be started before putting the charger into place. If applicable, the keyhole locations vary depending on which model you own.

Before making any connections, prepare batteries as follows:

- (a) With caps securely in place, thoroughly clean the case and posts with a quality battery terminal cleaner or a solution of baking soda and water.
- (b) All posts, terminals, and connectors should be cleaned to a shiny bright finish, using a wire brush or sandpaper. This should be done periodically to assure maximum conductivity between the battery and the charger.

*The charger pictured is a **Professional Series PS2**, which has two independent 15 amp outputs.*



In addition, your charging system is supplied with an AC plug receptacle designed to hold the power cord plug when it is not being used. Locate a convenient site for the receptacle and attach it using the supplied four smaller stainless steel screws.

Connect a heavy duty UL approved extension cord to the power cord of your charger and then plug the extension cord into a nearby 120VAC GFI protected (Ground Fault Circuit Interrupt) outlet. **NOTE: Charging indications will not start immediately, there will be a time delay of up to 3 minutes before an audible click can be observed followed by an LED indication that the charge cycle has begun.** You should now observe a red LED indication on each bank of the charger representing each individual battery being charged. The voltage of each battery will reflect the number of LED indicators illuminated.

When charging is complete, remove the extension cord from the 120VAC outlet first and then unplug the charger.

TROUBLE SHOOTING

PROBLEM: No LED indicators illuminate in any of the charger banks.

Solution Sequence: **Assure charge cable leads are connected securely to the batteries and that polarity is correct.**

Call the technical support group for further assistance (615.471.5300).

PROBLEM: The green LED will not illuminate after excessive charging time (16 hours or more).

Solution Sequence: Disconnect AC power to the charging system. On multi bank chargers, remove the charge cable assembly of the affected bank from the battery and attach it to another battery in the boat. Take the original charge cable assembly from this battery and attach it to the battery from which you removed the first cable. Plug the charger in and observe the LED indications. If the same problem occurs on a different bank of the charger, this confirms the existence of a battery problem.

On single bank systems, simply try the charger on another battery. If the charger now operates normally (steady red LEDs or changes to green and holds), this indicates a possible problem with the original battery.

If the same bank continues to malfunction, please call our technical support group (615.471.5300).

PROBLEM: A green LED was illuminated before disconnecting the power from the charger, but upon reconnection, red LEDs appear and remain on.

Solution Sequence: This is normal operating procedure for the system and simply indicates that a reanalysis of the battery status has been initiated and after a series of steps, the green LED will illuminate.

PROBLEM: 30 AND 50% LED indicators flashing.

Solution Sequence: This indicates a Forming Stage timeout and alerts the user that the battery voltage has not risen above an acceptable limit within 3 hours. Battery should be tested.

PROBLEM: 30, 50 AND 90% LED indicators flashing.

Solution Sequence: This indicates that the charger has exceeded the maximum amount of time allowed for charging the battery. Battery should be tested.

PROBLEM: 30 AND 90% LED indicators flashing.

Solution Sequence: This indicates that the internal temperature of the charger has exceeded allowable limits and this bank of the charger has shut down. If charger is in a closed compartment, open compartment doors and allow charger to cool for 8 hours. After this period, connect the charger to AC and begin charging again.

LIMITED WARRANTY

Pro Charging Systems, LLC (PCS) makes this Limited Warranty only to the original retail purchaser. PCS warrants this battery charger for three years (unless the charger is used in a Restricted Market) from the date of retail purchase against defective materials and/or workmanship. Restricted markets include markets outside of the USA, Rental applications and Heavy Industrial applications. Sometimes RM is designated in the PCS Part number when ordered but is not part of the model number. Chargers used in Restricted Markets will have a warranty period of 18 months from the date of retail purchase against defective materials and/or workmanship. CR refers to "Certified Reconditioned" and designates a 1 year warranty.

If such defects should occur, this unit will either be repaired or replaced at the discretion of the manufacturer. It is the responsibility of the original purchaser to return the charger along with proof of purchase, transportation, and/or any mailing or handling charges prepaid to the manufacturer or its authorized representative. Chargers that are purchased more than two years beyond the date of production will automatically have a warranty start date that will be the two year anniversary of the production date.

This limited warranty is void if the product is misused, improperly maintained, handled carelessly or incorrectly operated. Additionally, this warranty is void if the charger is disassembled, the charger's charge cables are cut, the power cord is cut off, the charger is altered without authorization from PCS, the serial number is removed, or repair is attempted by anyone other than an authorized representative. PCS makes no other warranty other than this limited warranty and expressly excludes any implied warranty, including warranty for any incidental or consequential damages. This is the only expressed limited three year warranty authorized by PCS and does not authorize anyone to assume or make any other obligation towards the product other than this three year Limited Warranty. Some states do not allow limitation of incidental or consequential damages.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state. Please call Pro Charging Systems, LLC for full warranty information and/or service please call (615.471.5300).