

# CHARGER OPERATION

The TPRO320 is fully automatic once installed properly. The indicator lights (LEDs) inform the user of the progress of the charging cycle and confirm proper connections. The charger monitors each battery individually and charges each to full capacity. The charging current is distributed to the three banks as determined by the state of charge of the batteries.

## ELECTRICAL CHARACTERISTICS

AC Input Voltage Range: 100-132VAC  
 AC Input Current: 6A rms Maximum  
 Max. Charging Current: 22A (Fast Mode)  
 Max. Charging Voltage (Absorption Mode): 14.5-14.85VDC  
 Max. Float Voltage (Float Mode): 13.2-13.5VDC

## LED INDICATORS

Charging Mode LEDs indicate the state of charge of the batteries. The green Float light is the final charge state indicating the batteries are fully charged. Only one Charging Mode LED should be on at any one time.

Charging Current LEDs indicate the amount of charging current being delivered by the charger to all three outputs.

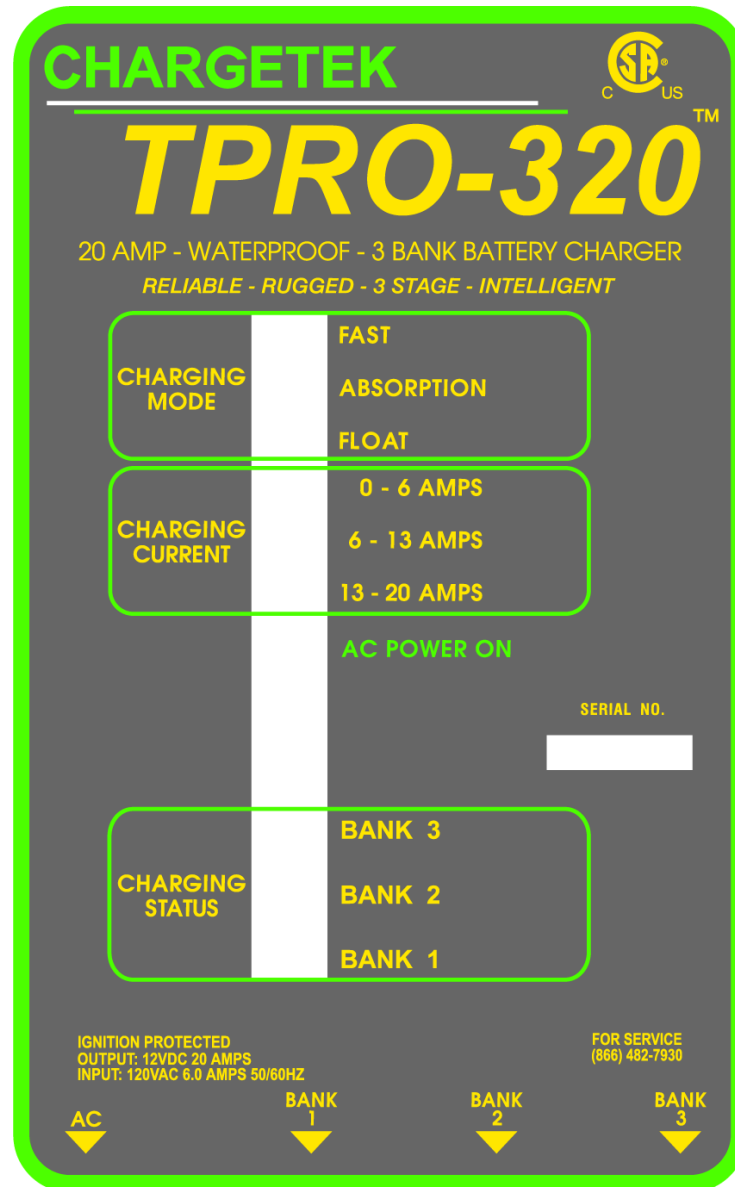
AC Power On LED indicates AC power is applied to the charger

Charging Status LED indicates outputs are connected properly to their respective batteries and are being charged. When properly installed all Charging Status LEDs should be on.

## PROTECTION MODES:

**Over Temperature:** The TPRO320 will reduce its charging current as its case temperature increases to insure proper operation. In the event of a charger over temperature the unit will turn off until it cools off and then restart automatically. This over temperature condition is indicated by the AC Power on and Float LEDs flashing. If the unit is operated in a very high ambient temperature, it is possible for the temperature to increase further, as indicated by the AC Power on and 14-20 Amp Charging Current LEDs flashing. In the rare event this condition occurs the AC power and three Battery Banks should be disconnected and reconnected once the charger has cooled off.

**Over Voltage:** The charger is equipped with an overvoltage protection circuit in the event of a regulation malfunction. The charger will turn off if the overvoltage persists. The AC power and three Battery Banks should be disconnected for 2 minutes and reconnected to the batteries. An over voltage condition is



indicated by the AC Power On and Fast LEDs flashing. If the over voltage persists then the factory should be consulted.

Good battery maintenance procedures dictate that battery fluid levels be checked on a regular basis, especially in high ambient temperatures.

**LIMITED WARRANTY**  
 For two years from date of purchase, Chargetek Inc. will at its discretion repair or replace for the original consumer, free of charge any part or parts found to be defective by Chargetek in workmanship or material. All shipping charges under this warranty must be paid by the consumer. Proof of purchase is required.  
 There is no other expressed warranty. Implied warranties, including those of merchantability and fitness for a particular purpose are limited to two years from the date of purchase. This is the exclusive remedy and consequential damages are excluded where permitted by law.

# CHARGETEK

## TPRO-320

## INSTALLATION MANUAL



The TPRO320 is a sophisticated 20A three-bank battery charger. It can be configured in a multitude of battery system configurations and used as either an on-board or portable unit

Charging is controlled by an embedded microcontroller that contains software developed and proprietary to Chargetek. This electronic "brain" insures that all batteries will be fully and properly recharged regardless of the condition of any one battery. The TPRO320 precisely controls charging voltage and current

to insure a complete recharge every time. The charger may be left connected indefinitely to the batteries, maintaining full charge at all times.

The TPRO320 utilizes state of the art high frequency power processing that converts the AC line power to 12 VDC efficiently and safely. The charger is completely waterproof and sealed with UL approved 94VO flame retardant epoxy. This sealing also provides extreme vibration and shock resistance since the encapsulated unit is effectively a "brick".

## CHARGETEK

2240 CELSIUS, UNIT E ~ OXNARD, CA 93030 ~ PHONE: (866) 278-4925 FAX: (805) 278-7966

WWW.CHARGETEK.COM

# INSTALLATION

## LOCATION

- ❑ Do not mount directly over or under a battery or onto a carpeted, upholstered or varnished surface.
- ❑ Install in an area where all charger electrical cords will avoid hot surfaces such as exhaust pipes and moving parts such as fan wheels.
- ❑ Operating ambient temperature is 15 to 130 degrees Fahrenheit. Storage temperature is -20 to 160 degrees Fahrenheit.
- ❑ Pick an area that will provide as much surrounding cooling clearance as possible for maximum efficiency and shortest recharge times. Maintain a 12 inch clearance around charger and never mount in the vicinity of explosives, pressurized cans or other flammable material.

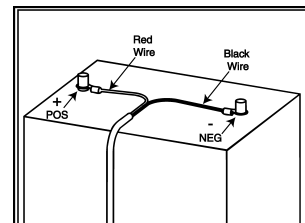
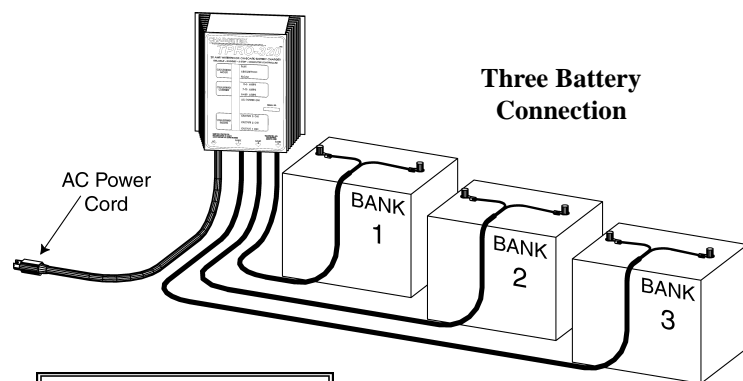
## MOUNTING

- ❑ Wear safety goggles, gloves and a long sleeve shirt when drilling mounting holes near a battery.
- ❑ In most cases, #10 stainless steel mounting bolts with aircraft nuts or nylocks or #10 screws provide for solid mounting.

## ELECTRICAL

### DC WIRE CONNECTIONS

- ❑ Each output should be connected only to a standard 12V lead-acid battery.
- ❑ DC wire connections must be made before plugging in the AC cord. The charger will not operate until DC connections are made. Do not remove DC connections while the AC cord is plugged in.
- ❑ When installing in the bilge and or battery compartment of boats, open hatches and operate bilge blowers if any for ten minutes to



**Do not leave any lead set disconnected when charging less than three batteries.**

remove any fumes and hydrogen gas. Be certain the area is ventilated for personal health and safety

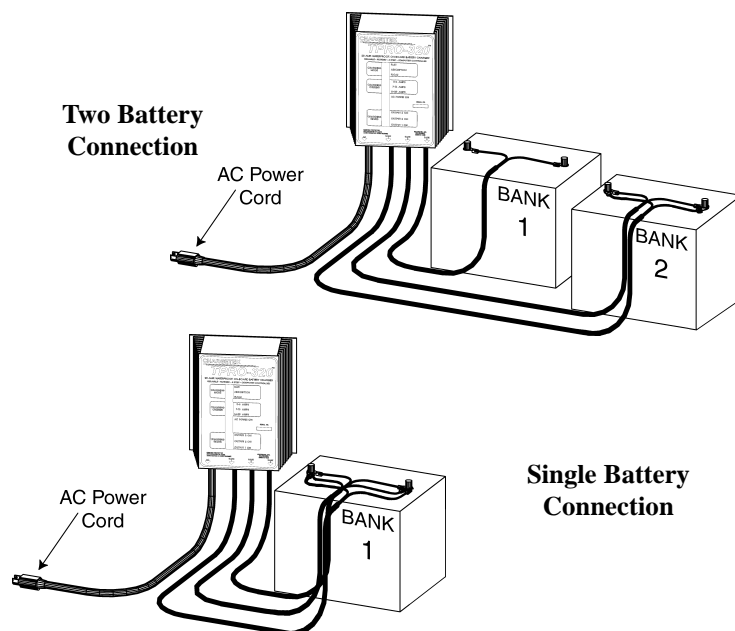
- ❑ Keep wire routing from the charger to the battery neat and secure by anchoring with cable tie to a solid surface every few inches, not to exceed 18" intervals.
- ❑ An in-line fuse must be installed to both the positive (red) and the negative (black) leads to the battery to provide protection if the DC cord is somehow damaged.
- ❑ Connect #1 lead set to battery #1, red to positive and black to negative. Connect lead set #2 to battery #2, red to positive and black to negative. Connect lead set #3 to battery #3, red to positive and black to negative. Do not leave any lead set disconnected when charging less than three batteries. If charging only one battery connect all three red leads to positive, and all three black leads to negative. If charging only two batteries, connect one of the lead sets to one battery and the other two lead sets to the other battery. All connections should be clean and tight. See installation diagrams.

### AC Wire Connections

**Note:**  
*The Chargetek TPRO320 is equipped with a factory installed 6' grounded AC cord. Though hook up is only a matter of plugging this cord into a suitable extension cord, please follow the following precautionary tips.*

- ❑ Insure that the AC cord cannot reach moving parts, lids, hoods, etc. Secure with a cable tie to solid anchor point if necessary.
- ❑ The charger will operate properly with either 115 volts 50 Hz or 115 volts 60 Hz AC input. Never use 220 volt service with this unit.

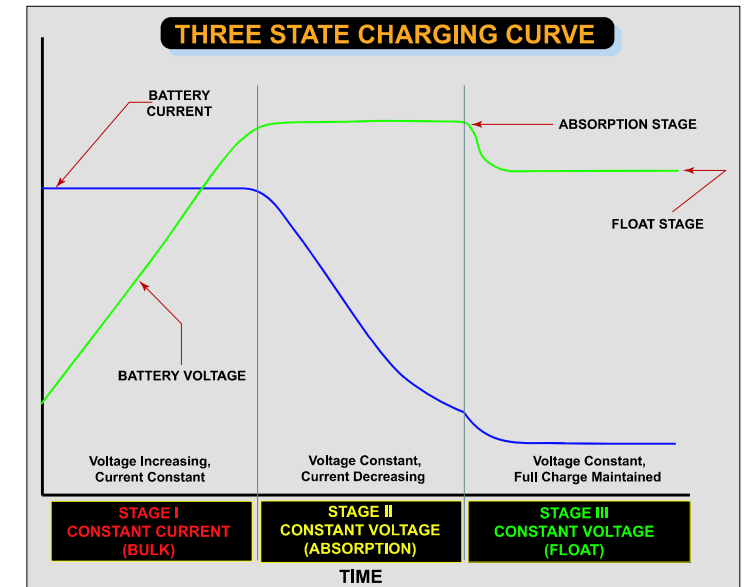
**CAUTION:**  
*Never connect the AC plug into an electrical outlet when you are wet or barefoot.*



# SAFETY INSTRUCTIONS

**CAUTION: The following are important safety instructions. Save these instructions.**

- ❑ Charge only lead acid, (maintenance free or refillable), or "gel-cell" rechargeable batteries. Other types of batteries may burst causing personal injury and damage
- ❑ Never smoke or allow sparks or flame in the vicinity of a battery.
- ❑ Someone should be within range of your voice and close enough to come to your aid when you are working near a battery.
- ❑ Wear eye protection and clothing protection. Avoid touching eyes while working near a battery.
- ❑ Have plenty of fresh water and soap nearby in case battery acid contact's skin, clothing or eyes.
- ❑ If battery acid contact's skin or clothing, wash immediately with soap and water. If acid enters eyes, immediately flood eyes with running cold water for at least ten minutes and get immediate medical attention.
- ❑ Never operate a charger with a damaged cord or plug. Wearing of AC and DC cords, accidentally nicking or cutting the cords could result in sparking and cause injury.
- ❑ Never operate a charger that has been damaged in any way or try to disassemble. Return to factory when service or replacement is required. Incorrect reassembly may result in a risk of electrical shock or fire.
- ❑ Become familiar with all instructions, specifications and cautionary markings on chargers, batteries and equipment used. Only adults should install and operate the charger. Children should be kept out of reach of the charger and batteries it is charging.
- ❑ When using an extension cord the Chargetek TPRO320 requires a quality grounded extension cord of at least 16 awg wire size for cords up to 50' and a minimum of 14 awg for cords up to 150'.
- ❑ Never unplug a cord by pulling on the cord itself. Always grasp the plug when disconnecting the charger.
- ❑ Even though the Chargetek TPRO320 is waterproof and designed for harsh environments, do not operate submerged.
- ❑ Never charge a frozen battery. If the battery has an odor or is visibly damaged disconnect charger and consult factory.
- ❑ Study battery manufacturer's precautions such as removing or not removing cell caps while charging.
- ❑ Keep batteries full. Add distilled water in each cell until it reaches levels specified by battery
- ❑ Keep battery terminals clean. Always unplug charger before cleaning and be careful to keep corrosion from coming in contact with eyes.
- ❑ Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery. A lead-acid battery can produce a short circuit high enough to weld a ring, etc. to metal, causing a severe burn.



## THREE STATE CHARGE CYCLE

The TPRO320 employs a three state charge routine. This is the charging procedure most lead-acid battery manufacturers recommend to return full capacity efficiently and extend battery life. Please refer to the figure Three State Charging Curve diagram.

### STAGE I: CONSTANT CURRENT CHARGING OR BULK CHARGE MODE

Assuming the battery is starting in a discharged state, the charging is operating in constant current mode, where the charger current is maintained at a constant value and the battery voltage is allowed to rise as it is being recharged. Approximately 80% of battery capacity is returned in the constant current region.

### STAGE II: ABSORPTION MODE

When the battery voltage reaches approximately 2.4 volts per cell, or 14.6 volts for a 12V battery, the charger voltage is held constant at this level and the battery current is allowed to reduce. This voltage is maintained until the charging current reduces substantially indicating a full charge. At this point the battery is fully charged.

### STAGE III: FLOAT MODE

Float mode is the final stage of the charging routine. Float mode is where the voltage on the battery is maintained at approximately 2.25 volts per cell, or 13.5 volts for a 12V battery. This voltage will maintain the full charge condition in the battery without boiling out electrolyte or overcharging the battery. When the charger is in this mode all lights on the TRPO320 should be green.