

## Charger operation

The RTIC-1405-FC is fully automatic once installed properly. The LED indicator lights inform the user of the progress of the charging cycle and confirm proper connections.

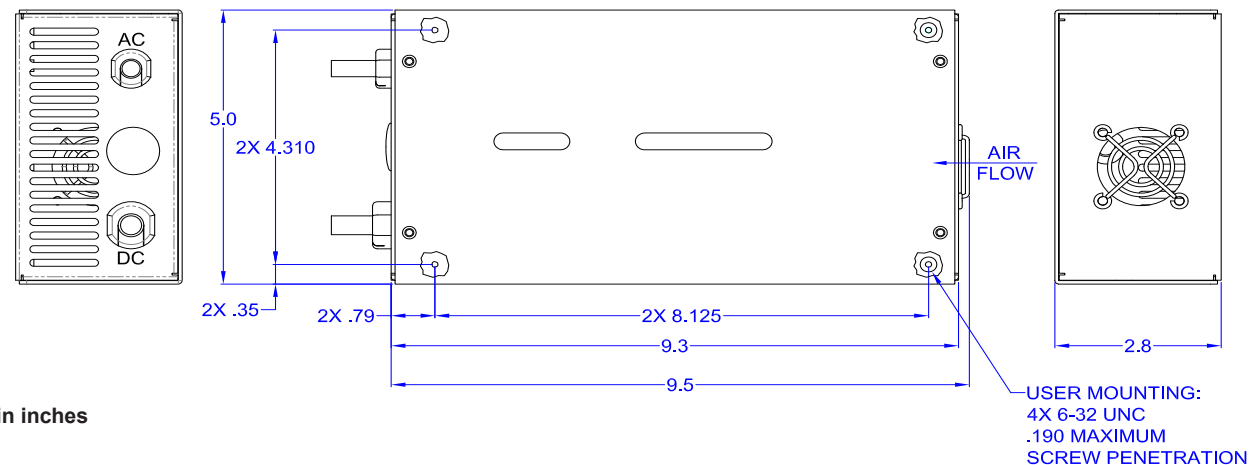
## Electrical characteristics

PARAMETER	DESCRIPTION / CONDITIONS	MIN	NOM	MAX	UNITS
V <sub>FSTERM</sub>	Fast charge voltage, 25C	57.6	58.0	58.2	VDC
V <sub>FLOAT</sub>	Float voltage, I <sub>OUT</sub> < 1.0 A, 25C	53.0	54.0	54.4	VDC
I <sub>FS</sub>	Fast charge, V <sub>BATTERY</sub> = 12V	5	6	7	Amps
I <sub>FLTERM</sub>	Float charge termination current	0.8	0.9	1.0	Amps
V <sub>AC</sub>	RMS AC voltage range	90	120	132	VAC
I <sub>SBY</sub>	Standby current, AC off			0.5	ma

## LED indicators

- Charging mode: Indicates the state of charge of the battery. The green Float light indicates the battery is fully charged.
- Charging current LEDs indicate amount of current.
- AC Power On LED indicates AC power is applied to the charger.
- Charging status LED indicates the output is connected properly to the battery and is being charged.

## Outline and mounting



Dimensions in inches

### 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.

## Protection modes

**Over temperature:** The unit inhibits until it cools off and then restarts automatically. This is indicated by the AC Power and Float LEDs flashing. In very high ambient temperatures, it is possible for the non-auto reset thermal protection to activate. This is indicated by the AC Power on and 14-20 Amp Charging Current LEDs flashing. If this occurs, the AC power should be disconnected and reconnected once the charger has cooled off.

**Over voltage:** Activates in the event of a regulation malfunction and inhibits the charger. An over voltage condition is indicated by the AC Power On and Fast LEDs flashing. If the over voltage persists, the factory should be consulted.

## Optional relay contacts

Up to four relay contacts are provided depending upon the option purchased. The relay specification is available on our web page. Please observe relay specifications in order to maintain proper operation.

## Optional temperature compensation

The temperature compensation pod can be tie-wrapped to the charger cable in the immediate vicinity of the battery or wall mounted. Standard compensation is 15mV-18mV per degree Celsius per cell or factory programmable upon request.

## Optional signal connector

PIN NUMBER	SIGNAL	DESCRIPTION
2,8	AC Fail	AC < 85VAC
3,9	DC High	DC > 15.5VDC
4,10	DC Low	DC < 6VDC
1,7	Charger Fail	Unit failed
11	TC Data	Temp sense data line
12	TC Rtn	Temp sense bias rtn
6	TC Bias	Temp sense bias power



# RTIC-1405-FC Installation Manual

Please read the entire installation manual before installing the battery charger. If there are any questions or concerns, please email us or call our toll-free number given below.

The RTIC-1405-FC is a rugged, waterproof and sophisticated three state lead-acid battery charger. With a wide operating temperature range and UL/CSA1012 certification, this product is especially suited for high end industrial applications and severe environments.

The RTIC-1405-FC is factory programmable to accommodate several charging algorithms, an LED display to indicate status, and optional four relay contacts to indicate

various scenarios. Temperature compensation is implemented digitally allowing accurate and noise free sensing up to a distance of 300 feet eliminating problems associated with conventional analog solutions.

The charging algorithm, LEDs, and relay control signals are generated by an embedded microcontroller that contains software developed by and proprietary to Chargetek. The RTIC-1405-FC precisely controls charging voltage and current to ensure a complete recharge every time. The charger may be left connected indefinitely to the battery, maintaining a full charge.

## CHARGETEK

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## 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 temperature is -30°C to 55°C (-22°F to 131°F). Storage temperature is -40°C to 80°C (-40°F to 176°F).
- ❑ Provide as much surrounding cooling clearance as possible for maximum efficiency, safety, and shortest recharge times. At a minimum, maintain a 3 inch clearance around the perimeter and top side of the charger.
- ❑ 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.
- ❑ Please see outline and mounting diagram for proper mounting.

### Electrical

#### AC wire connections

- ❑ The RTIC-1405-FC is equipped with a factory installed 6 foot AC cord with a ground connection. The ground connection is the round pin on the AC plug. **It is extremely important that only grounded electrical outlets or extension cords with a ground connection should be used when operating this charger.**
- ❑ Never connect the AC plug into an electrical outlet if you are wet or barefoot.
- ❑ Ensure 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 120 volts 50 Hz or 120 volts 60 Hz AC input. Never use 220 volts AC with this unit.

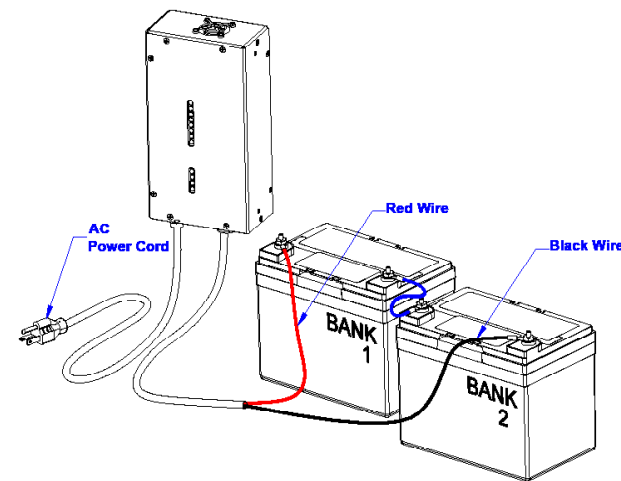
#### DC wire connections

- ❑ DC wire connections must be made before plugging in the AC cord.
- ❑ The charger should only be used with lead-acid type batteries such as AGM, SLA, flooded or maintenance free. If there is any question, please contact the factory.
- ❑ Do not remove DC connections while the AC cord is plugged in.
- ❑ When installing in the bilge of boats or any battery compartment, ensure that hatches are open and bilge blowers are operating for ten minutes to 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 inch intervals.
- ❑ Ensure that cables have sufficient clearance from moving

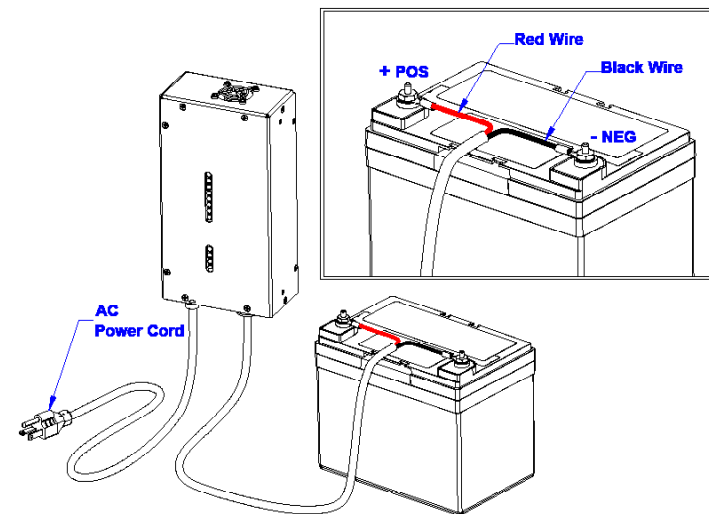
parts and hot surfaces such as exhaust components.

- ❑ The RTIC-1405-FC is short circuit protected. Batteries are a high current source and additional protection is needed in the event of physical damage to the DC cables or the charger, or electrical damage that may be externally induced. Do not remove the in-line fuse. A fuse (ATO mini/32V/30A) connected between the positive battery charger lead and the battery positive terminal is required for maximum safety. If the fuse ever blows, consult the factory before replacing it.
- ❑ For a single 12 volt battery, connect the charger DC cable to the battery as follows: the red lead is connected to positive terminal of the battery and the black lead is connected to the negative terminal of the battery. When charging two 6 volt batteries connected in a series, connect the red lead of the charger to the positive terminal of battery #1. Connect the negative terminal of battery #1 to the positive terminal of battery #2. Connect the black lead of the charger to the negative terminal of battery #2. All connections should be clean and tight. See installation diagrams below.

#### Two 24V battery connection



#### One 48V battery connection



- ❑ When connecting two batteries in series, it is imperative that the amount of charge and discharge be equal for both batteries. If there is an imbalance during charge or discharge, excessive battery voltage will occur. This results in an overvolted battery and causes dangerous battery out gassing and destruction. For accurate charge balancing, use a dual bank charger, such as CT500 or TPRO series.

## Safety instructions

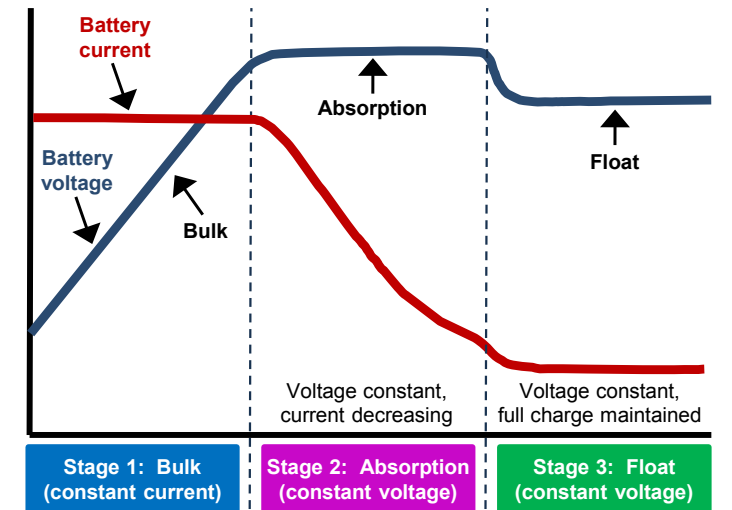
**CAUTION: The following are important safety instructions. Save these instructions.**

- ❑ Charge only lead acid, maintenance free, refillable, or “gel-cell” rechargeable batteries. Other types of batteries may burst causing personal injury or damage.
- ❑ Never smoke or allow sparks or flame in the vicinity of a battery.
- ❑ Someone should be within the 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 your eyes while working near a battery.
- ❑ Have plenty of fresh water and soap nearby in case battery acid contacts your skin, clothing or eyes.
- ❑ If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters your eyes, immediately flood them with cold running water for at least ten minutes and get immediate medical attention.
- ❑ Never operate a charger with a damaged cord or plug. Degradation 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 it. Return it to the factory when service or replacement is required. Incorrect reassembly may result in an 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. The charger and batteries should be kept out of the reach of children.
- ❑ When using an extension cord, the RTIC-1405-FC requires a quality grounded extension cord of at least 16 awg wire size for cords up to 50 feet and a minimum of 14 awg for cords up to 150 feet.
- ❑ Never unplug a cord by pulling on the cord itself. Always grasp the plug when disconnecting the charger.
- ❑ The RTIC-1405-FC is waterproof and designed for harsh environments. It is not designed to be submerged. Please consult the factory if there are any questions.
- ❑ Never charge a frozen battery. If the battery has an odor or is visibly damaged, disconnect the charger and consult the factory.
- ❑ Study the 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 the levels specified by the battery. Check battery fluid levels regularly.
- ❑ Good battery maintenance procedures dictate that the battery fluid levels be checked on a regular basis, especially in high ambient temperatures.
- ❑ Keep the battery terminals clean. Always unplug the charger before cleaning. Keep corrosion from coming into contact with your 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 objects to metal, causing a severe burn.

## Three stage charge cycle

The RTIC-1405-FC employs a three stage charge routine. This is the charging procedure most lead-acid battery manufacturers recommend to return full capacity efficiently and extend battery life.

### Three stage charging curve



#### Stage 1: Constant current or bulk charge mode

Assuming that the battery is starting in a discharged state, the charger is operating in constant current mode. 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 2: Absorption mode

When the battery voltage reaches approximately 2.4 volts per cell, or 57.6 volts for a 48V 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 3: Float mode

Float mode is the final stage of the charging routine. During float mode, the voltage on the battery is maintained at approximately 54 volts for a 48V battery. This voltage will maintain the full charge condition of the battery without boiling out electrolyte or overcharging the battery. When the charger is in this mode, all lights on the RTIC-1405-FC should be green.