



SPECIFICATIONS – 2408SRF Supercharger

Totally Automatic Switch-Mode Battery Chargers

"Suitable for Gel, Sealed & Wet Lead Acid Batteries"

Summary: **24 V, 4A Constant Current**
(equivalent to 8A tapered charger in charging time)

- Automatic Cut-off and then true Float. Can be left connected indefinitely without harming the battery.
- **North American (UL & ULc) and European (CE) listed .**
- **Input 115/230 VAC** - Suitable for U.S., Canada, Japan, Europe.
- Suitable for Off-board (external) & On-board (internal) Applications
- Increases battery life by de-sulfating the battery.
- Many advance features described in this spec.
- **Very small size and very light weight**

Explanation of the Features:

The advance technology of the OEM Battery Chargers supplied by Soneil is fundamentally different from other battery chargers. The conventional linear battery charger is an electrical device whereas the 2408SRF is a light weight sophisticated electronic device.

1. Switch-Mode Technology:

Most of the battery chargers use linear technology which convert the 115/230 VAC to 24 VDC at 60/50 Hz. This requires a large transformer which has the disadvantage of lower efficiency resulting in higher heat generation, larger size and weight.

Soneil's Battery Charger transforms the 115/230 VAC into 24 VDC at 100,000 Hz (3333 times faster than conventional charger) which requires a much smaller transformer and this results in a unit of smaller size, low weight and improved efficiency.

The 2408SRF Supercharger uses sophisticated electronic circuitry with microchips. All present day computers use switch-mode technology.

2. **International Safety Approvals & Listings:**

Both UL and CSA (cUL) listings in a single charger.

3. **Input Requirements:** Dual Voltage - Switch selectable

a) 115 VAC (range 90 - 140 VAC) or
230 VAC (range 180 - 280 VAC)

b) 47 - 63 Hz

Input AC tolerance +/- 20%. This means 2408SRF Supercharger will operate satisfactorily in areas where the input voltage is low.

This charger is also **suitable for every part of the world** including **Japan** where input is 100 VAC.

4. **Output:**

4.0 Amps Constant Current @ 24 Volts DC
(Equivalent to 8 Amps tapered in charging time)

a) Line Regulation @ Full Load 2%

b) Load Regulation @ 115/230 VAC 3%

c) **Ripple Voltage:** Very low

The peak to peak ripple voltage into a resistive load is less than 200mV for the output voltage above 24 VDC.

5. **Charging Cycle:**

The charging curve is attached. The explanation of the charging cycle is as following.

a) **AC connected and battery not connected:**

When the charger is connected to the AC power, the red light will be ON, showing that AC power is connected. If the output is not connected to the battery, the green light will flash informing the user that battery side is not connected. Some of the scooter users may be old and if they forget to connect the battery side, the green flashing light reminds them.

b) **Charging:**

When the charger is connected to the battery and AC is plugged in, the red (power) and yellow (charging) light will be ON.

i) **Deep discharge battery:**

The charger can start charging at the battery voltage as low as 0.5 volts. Soneil charger can charge a very deeply discharged battery. Not many chargers can do this. When charging starts, up to 5 volts, the current is 1/3rd of full current. We want to protect a very deeply discharged battery and do not want to give full current. This charging from 0.5V to 5V only takes few seconds (sometime a fraction of a second) and sometimes it is difficult to measure without sensitive equipment. The red and yellow lights will be on.

Then charger will charge at about full constant current rate and the red & yellow light will be on. Due to the constant current, the charging time will be same as a tapered charger of twice the current rating (e.g. In charging time the Soneil 4A constant current charger is equivalent to 8A tapered charger).

ii) **Full Charge:**

When the battery voltage reaches about 28.8 volts (called upper cut-off voltage), the yellow light changes to green light.

iii) **Maintaining full charge:**

Soneil charger maintains the battery at full charge and does not overcharge. This is done by pulse charging. The light remains green.

At upper cut-off voltage, the charger shuts-off complete (zero current). When the battery voltage falls (due to internal losses) to 27.6 volts (lower cut-off which is standby voltage), the charger turns ON and gives a current until the voltage reaches upper cut-off of 28.8V (gives a pulse of current). Then the charger shuts-off again.

By using the pulse method for final charging, the Soneil charger maintains the battery at full charge at all time without overcharging. For a new battery with lower internal losses, the pulses are less often. With an older battery with higher internal losses, the pulses are more often. The charger adjusts itself to the requirement of the battery.

Soneil charger can charge gel or sealed lead acid batteries without use of any switch.

6. **Temperature compensation:**

This is an advanced feature normally not found in most chargers. This charger automatically adjusts its output at temperatures above 75°F when the batteries need less terminal voltage to fully charge.

The maximum output voltage and the float voltage will be reduced for ambient temperature above 75°F by $(.03 \pm 0.003)V/^{\circ}F$.

7. **Two colors in one LED:**

LEDs are used to show the charging status. The Red LED shows AC on. The second bicolour LED shows Yellow when charging and changes to Green when the battery is fully charged. The charger will continue to provide very small current to cover internal losses and will maintain the battery at full charge.

8. **Very low voltage start:** 0.5 Volts

Will charge very deeply discharged batteries. Many 24 volts chargers in the market will not charge batteries discharge below 18 volts.

9. **Protection:**

User accessible input (AC) and output fuses are provided.

- a) **Reverse polarity protection** - provided
- b) **Short circuit protection** - provided
- c) **Over-Voltage Protection** - provided
- d) **Over current protection** - provided
- e) **AC Surge Protection** - provided
- f) **Power on-off switch** - provided
- g) **Soft start and stop:** Starts and stops gradually.

No sudden in-rush of current. This protects both the batteries and any other circuits connected to the charger.

10. **De-sulfation of battery:** The charger will remove loose sulfation and increase the battery life. (Hard sulfation cannot be reversed).

11. **No current drain:**

No (zero) current is taken from the battery when connected to battery but AC not plugged in. (Many other chargers in the market draw 30-40 mAmp which drains the battery.)

12. **Reliability:**

a) **Mean Time between failures (MTBF):**

30,000 power-on-hours (POH) or greater. This translates into 10 years of everyday operation of 8 hours.

b) **Burn-in**: All chargers are burned in at an average DC load of 4 Amps.

13. **Electromagnetic Interference (EMI)**:

The charger will not generate excessive radiated or conducted emissions. No interference with TV, radio, computer or other equipment.

14. **Ground leakage current**:

The ground leakage current is 87 microAmp which complies with the requirements.

15. **Size**: **Very Small** Length - 6.9" (175 mm)
Width - 3.7" (94 mm)
Height - 1.9" (48 mm)

Very Light Weight 1.5 lbs (700 grams)

Very nice looking **metal case with black matte finish**.

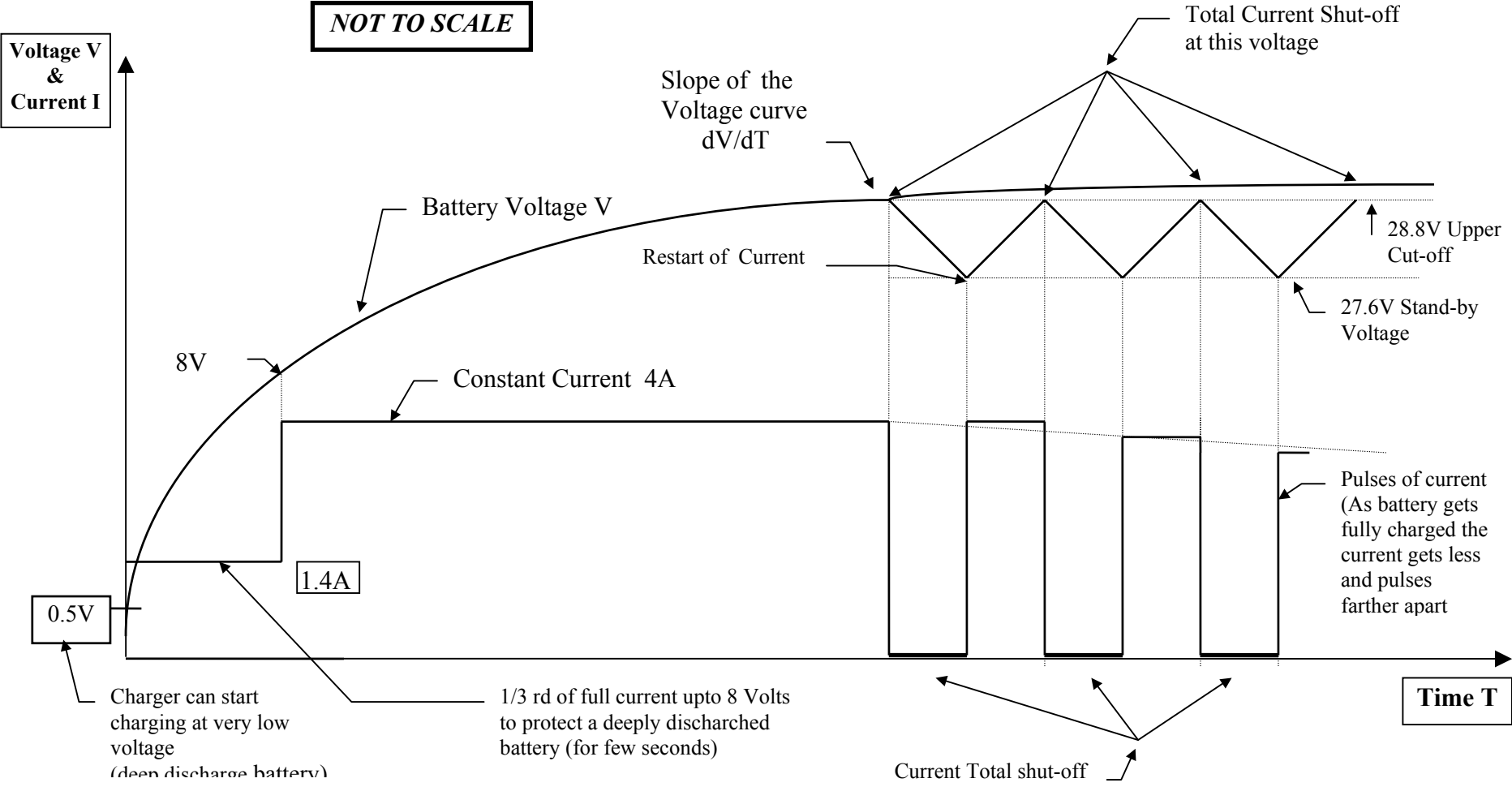
Ref: 2408SRF(Rev01).15-Jul-03

CHARGING CURVE

MODEL 2408SRF

SONEIL 24V/4A CONSTANT CURRENT CHARGER

NOT TO SCALE



0.5V

8V

1.4A

Battery Voltage V

Constant Current 4A

Slope of the Voltage curve dV/dT

Restart of Current

Total Current Shut-off at this voltage

28.8V Upper Cut-off

27.6V Stand-by Voltage

Pulses of current (As battery gets fully charged the current gets less and pulses farther apart)

Time T

Current Total shut-off

Charger can start charging at very low voltage (deep discharge battery)

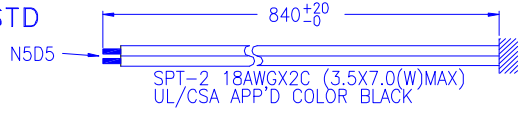
1/3 rd of full current upto 8 Volts to protect a deeply discharged battery (for few seconds)

Ref.Curve2408SRF.2809

506-2408-00X

OUTPUT CONNECTOR: (SEE REMARK A)

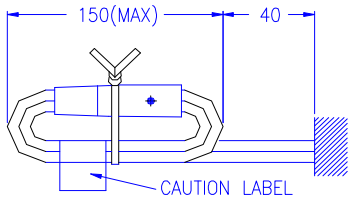
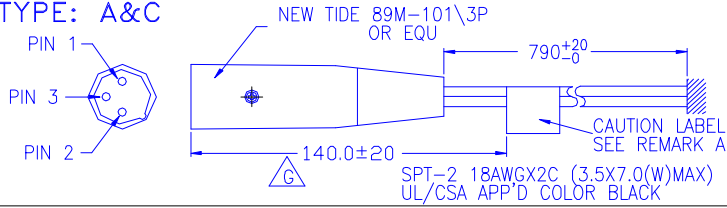
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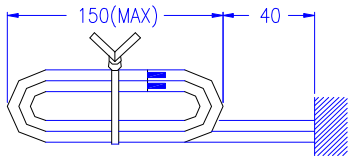
*** REMARK A:

P/N	TYPE	MODEL NAME	CONNECTOR & COLOR	WIRING	LABEL	POWER CORD	REMARK
506-2408-000	STD	STD 2408CAA	NONE	NONE	NONE	UL/CSA	
506-2408-00A	A	2408CBA	NEW TIDE 89M-101\3P COLOR BLACK	PIN 1=+VE PIN 2=-VE PIN 3=JUMPER FROM PIN 2	NONE	UL/CSA	
506-2408-00B	B	2408CBA	NEW TIDE 89M-101\3P COLOR SILVER	PIN 1=+VE PIN 2=-VE PIN 3=JUMPER FROM PIN 2	NONE	UK	CANCEL
506-2408-00C	C	2408CBA	NEW TIDE 89M-101\3P COLOR BLACK	PIN 1=-VE PIN 2=+VE PIN 3=JUMPER FROM PIN 1	YES	UL/CSA	

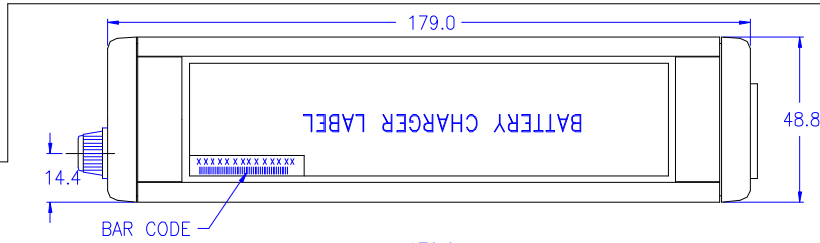
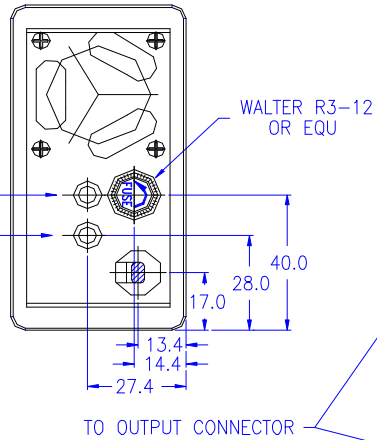
TYPE: A&C



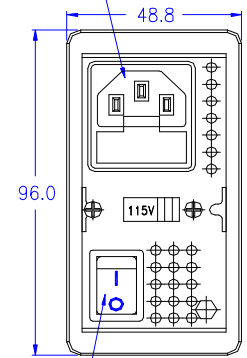
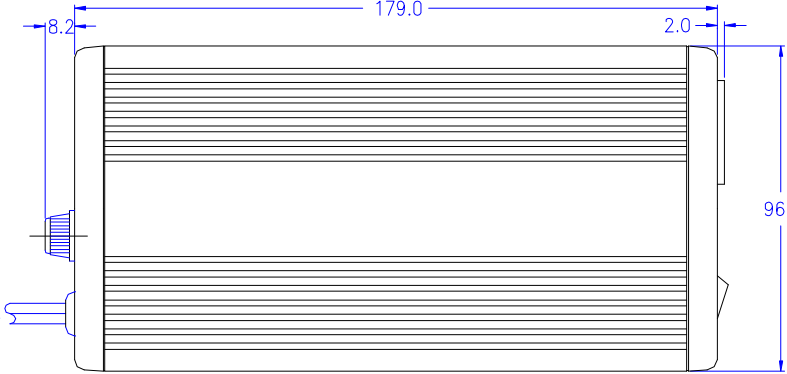
TYPE: A,B,C 綁線方式



TYPE: STD 綁線方式



INALWAYS 0717-1(-S)
OR EQU



SOLTEAM MR21
OR EQU

FILE: 2408CAA\CASE

ISSUE

SONEIL - MISSISSAUGA CANADA
ONTARIO

UNIT mm	SCALE 1/2	SHEET 1 OF 1	R 0 G
TOLERANCE: UNLESS OTHERWISE SPECIFIED .XXX ±0.05 .XX ±0.3			
DRAWN	DESIGNED	CHECKED	APPV'D DATA JUN.03.2002

506-2408-00X

TITLE X=A OR C
2408CXA