

## SONEIL

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# SPECIFICATIONS - 2412SRF SuperchargerPlus

## Totally Automatic Switch-Mode Battery Chargers

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

- Summary:**    **24 V, 6Amp Constant Current**  
(equivalent to 12A tapered charger in charging time)
- Automatic Cut-off and then true Float. Can be left connected indefinitely without harming the battery.
  - **UL , CSA, European Standard EN60335 Part 2.29 and CE European EMC Directive) Listed.**
  - **Input 115/230 VAC** - Suitable for U.S., Canada, Japan, Europe.
  - Suitable for On-board (internal) & Off-board (external) Applications.
  - Increases battery life by de-sulfating the battery.
  - Many advance features described in this spec.
  - **Very small size and very light weight.**
  - **0.5 seconds time delay for output ON.**

## 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 2412SRF 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.

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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 2412SRF uses sophisticated electronic circuitry with microchip. All present day computers use switch-mode technology.

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

UL, CSA (ULc), European Standard EN60335 Part 2.29 and CE (European EMC Directive) approvals in a single charger.

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

- a) 115 VAC (range 90 - 130 VAC) or  
230 VAC (range 180 - 260 VAC)
- b) 47 - 63 Hz

Input AC tolerance +/- 20%. This means 2412SRF 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:**

6 Amps Constant Current @ 24 Volts DC  
(Equivalent to 12 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 1/3<sup>rd</sup> 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 the twice the tapered charger (e.g. In charging time the Soneil 6A constant current charger is equivalent to 12A 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 +/- 0.003) V/°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 6 Amps.

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

The charger will not generate excessive radiated or conducted emissions. No

interference with TV, radio, computer or other equipment.

The charger is in compliance with CE (European EMC Directive). . Meets EN55022, EN50081-1& -2, EN60555 -2 & -3, EN 50082 -1, IEC 801 -2, -3 & -4.

14. **Ground leakage current:**

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

15. **Time Delay of 0.5 seconds:**

The model 2412SRF has a 0.5 seconds delay before the charging starts after the AC power has been turned **ON**.

16. **On-board Feature:** Option

The model has a third output wire which provides an interlock signal that will prohibit the operation of the vehicle's motor controller whenever the charger is plugged to an AC source.

**Interlock signal:** The interlock signal is an open circuit output, leakage less than 5 microAmp or less, when the charger is not connected to an AC source. This signal will be less than 50 mV DC while sinking 10 mA when the charger is connected to an AC source.

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

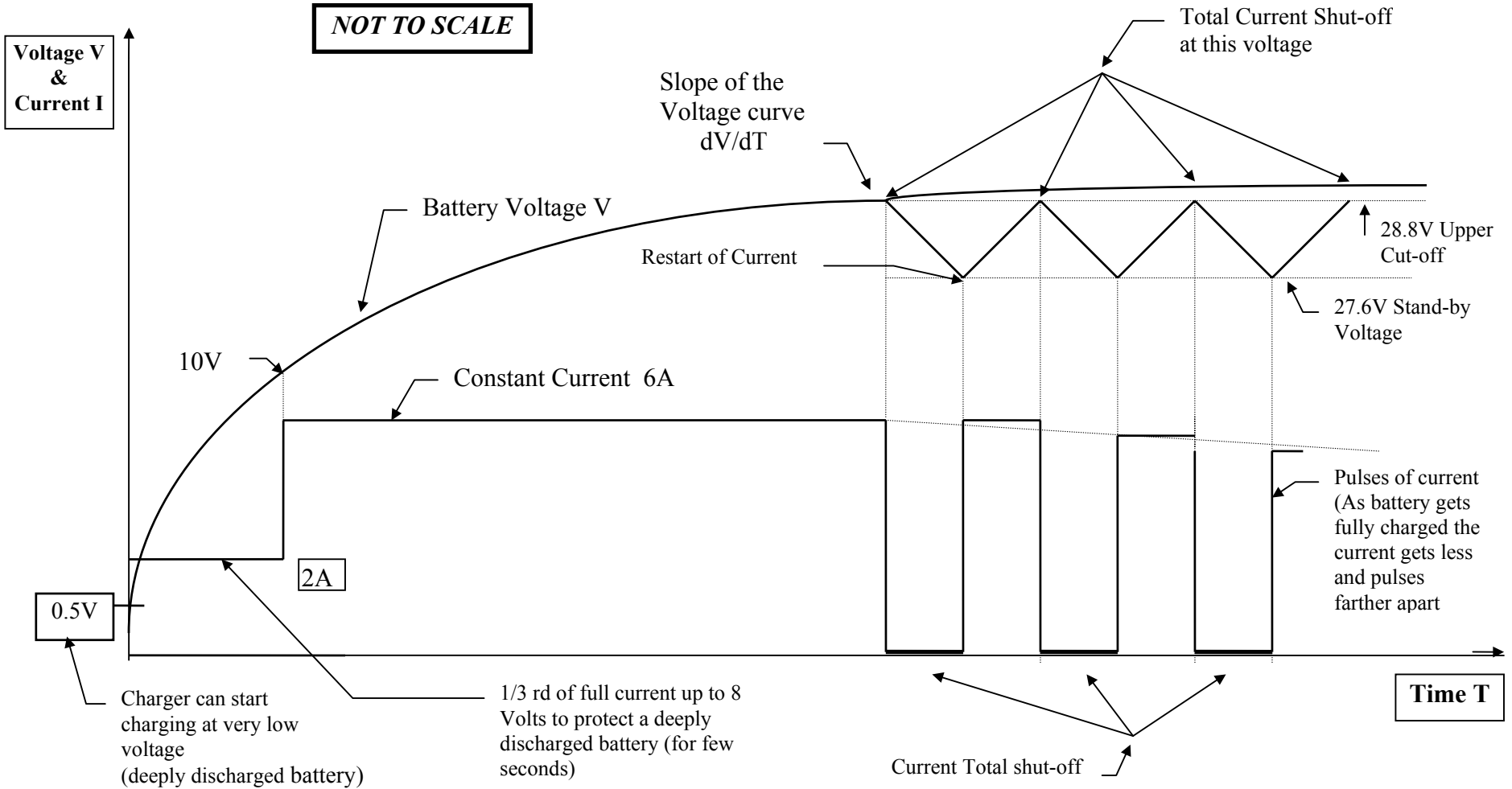
**Very Light Weight** 1.7 lbs. (750 grams)

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

# CHARGING CURVE

## MODEL 2412SRF

### SONEIL 24V/6A CONSTANT CURRENT CHARGER



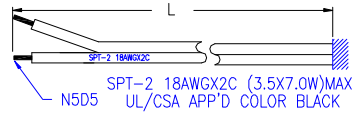
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506-2412-R1X

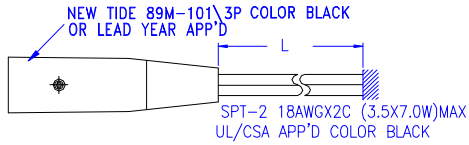
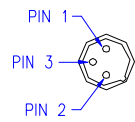
OUTPUT CONNECTOR:(TYPE SEE REMARK1)

TYPE: STD

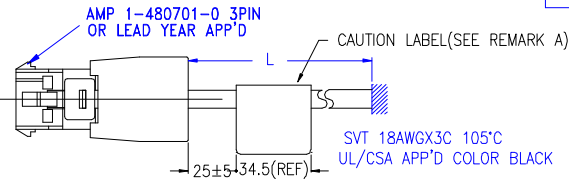
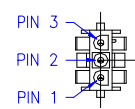
PRINTED: +VE  
NO PRINT: -VE



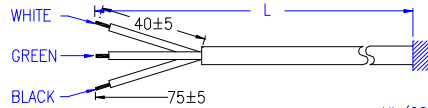
TYPE: A



TYPE: B

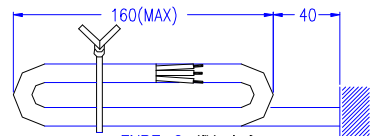


TYPE: C

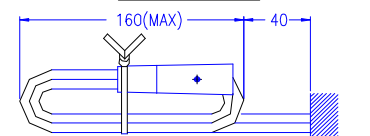


REMARK A:

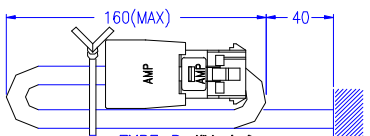
P/N	TYPE	MODEL NAME	WIRING	L (WIRE LENGTH)	CAUTION LABEL	REMARK
506-2412-R11	STD	2412SRF-C	PRINTED: +VE NO PRINT: -VE	1500±50	N/A	NOT 3P HEAD
506-2412-R12	A	2412SRF-B	PIN 1 : +VE PIN 2 : -VE PIN 3 : JUMPER FROM PIN2	1450±50	N/A	3P CONNECTOR
506-2412-R14	B	2412SRF-B	PIN 1 : -VE PIN 2 : INHIBIT PIN 3 : +VE	265±10	YES	AMP 1-480701-0 3P CONNECTOR
506-2412-R15	C	2412SRF-B	BLACK : -VE GREEN : INHIBIT WHITE : +VE	315±10	N/A	



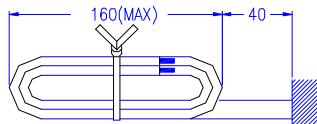
TYPE C 綁線方式



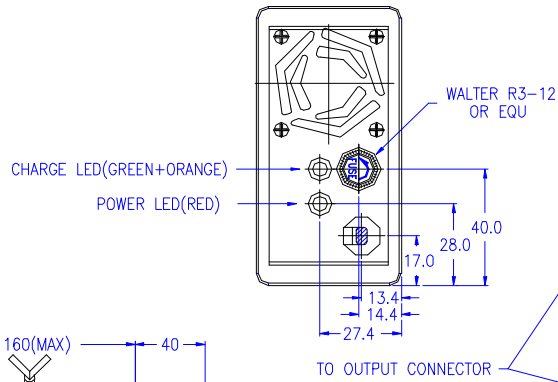
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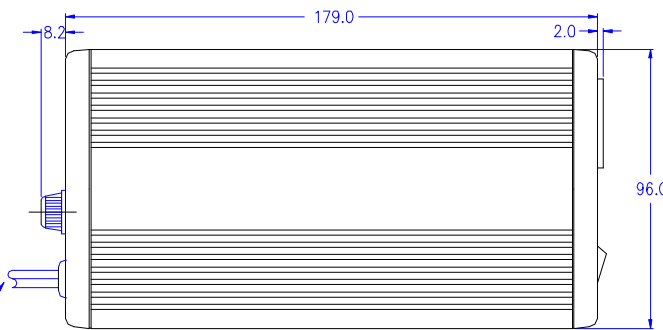
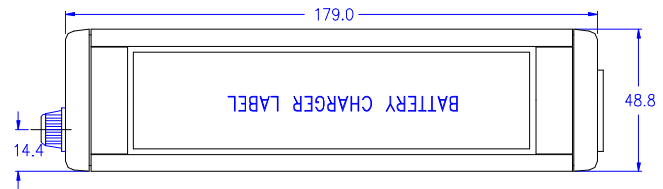
TYPE B 綁線方式



TYPE: STD 綁線方式



TO OUTPUT CONNECTOR



FILE:2412\OUTLINE

ISSUE

SONEIL - MISSISSAUGA ONTARIO CANADA

UNIT mm SCALE SHEET 1 OF 1 R O C

TOLERANCE: X ±0.3 X ±1.0 UNLESS OTHERWISE SPECIFIED XXX ±0.05 XX ±0.3

DRAWN DESIGNED CHECKED APP'VD DATE JUL.31.2001

506-2412-R1X

TITLE X=B OR C

2412SRF-X1