

## SONEIL

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# SPECIFICATIONS - 2409SR CHARGER

## 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.
- **UL, cUL (CSA) and CE Listed. CISPER 11 Class B**
- **Input Universal (90VAC~264VAC)** - Suitable everywhere in the world.
- Suitable for On-board (internal) & Off-board (external) Applications. **Onboard inhibit / interlock (green wire) is included.**
- Increases battery life by de-sulfating the battery.
- Many advance features described in this spec.
- **Very small size and very lightweight**

## 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 2409SR is a light weight sophisticated electronic device.

### 1. Switch-Mode Technology:

Most of the battery chargers use linear technology, which convert the 115 VAC or 230VAC to 24 VDC at 60 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 90VAC~264VAC into 24 VDC at 100,000 Hz (1667 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 2409SR uses sophisticated electronic circuitry with microchips. All present day computers use switch-mode technology.

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

UL, cUL and CE listings in a single charger.

EMC - Passed CISPER 11 Class B, EN55011 Class B & EN55022 Class B.

3. **Input Requirements:**

a) **Universal** 100~240VAC (Range 90VAC~264VAC). No switch to change AC voltage.

b) 47 - 63 Hz

Input AC tolerance +/- 20%. This means 2409SR will operate satisfactorily in areas where the input voltage is low.

This charger is also **suitable for every part of the world.** where the AC is 100VAC (Japan), 115VAC (USA), 230VAC (Europe) or 240VAC (UK).

4. **Output:**

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

a) Line Regulation @ Full Load 2%

b) Load Regulation 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:

If the LED is ON (Orange or Green), it shows that AC power is ON.

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

Stages	Condition	Mode*	Current	Voltage	LED Indication
Stage 1	Constant Current mode	CC mode	4A	5.0V to 28.8.V	Orange
Stage 2	Constant Voltage mode	CV mode	Reduces from 4A***	Holds at 28.8V	Orange
Stage 3	Standby Voltage mode	Standby CV mode	Reduces to zero	Maintains 27.6V	Green
	Recharging mode	CC mode	4A	27.6V	Orange

\* CC mode = Constant current charge

\* CV mode = Constant voltage charge

\*\*\* See Stage 3 description below

### **Stage 1: Constant Current Mode (CC): LED Orange**

The charger changes to constant current 4A. When the battery voltage reaches up to 28.8V, the charging stage changes from CC (Constant Current) to CV (Constant Voltage) mode.

### **Stage 2: Constant Voltage Mode (CV): LED Orange**

The charger holds the battery at 28.8V and the current slowly reduces. When the current reaches at 0.5CC (CC = Constant Current), this point called the Switching Point. The Switching Point is one of the great feature of this battery charger that it can adjust the current automatically according to battery capacity. Other chargers are not capable to adjust the current automatically.

### **Stage 3: Standby Voltage Mode: LED Green**

The charger maintains the battery voltage at 27.6V and current slowly reduces to zero. Charger can be left connected indefinitely without harming the battery.

### **Recharging: LED Orange**

If the battery voltage drops down to 27.6V, the charger changes from any mode to Constant Current mode and restart charging. The charging cycle will go through Stage 1 to Stage 3.

**Soneil charger can charge gel or sealed lead acid batteries without use of**

any switch.

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

LED shows the charging status. The LED ON shows presence of AC power. The bicolour LED shows Orange 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.

7. **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.

8. **Protection:**

User accessible output fuse is 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) **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.

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

10. **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 mA which drains the battery.)

11. **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.

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

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

13. **Ground leakage current:**

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

14. **On-board Inhibit (Interlock) Feature:** Standard

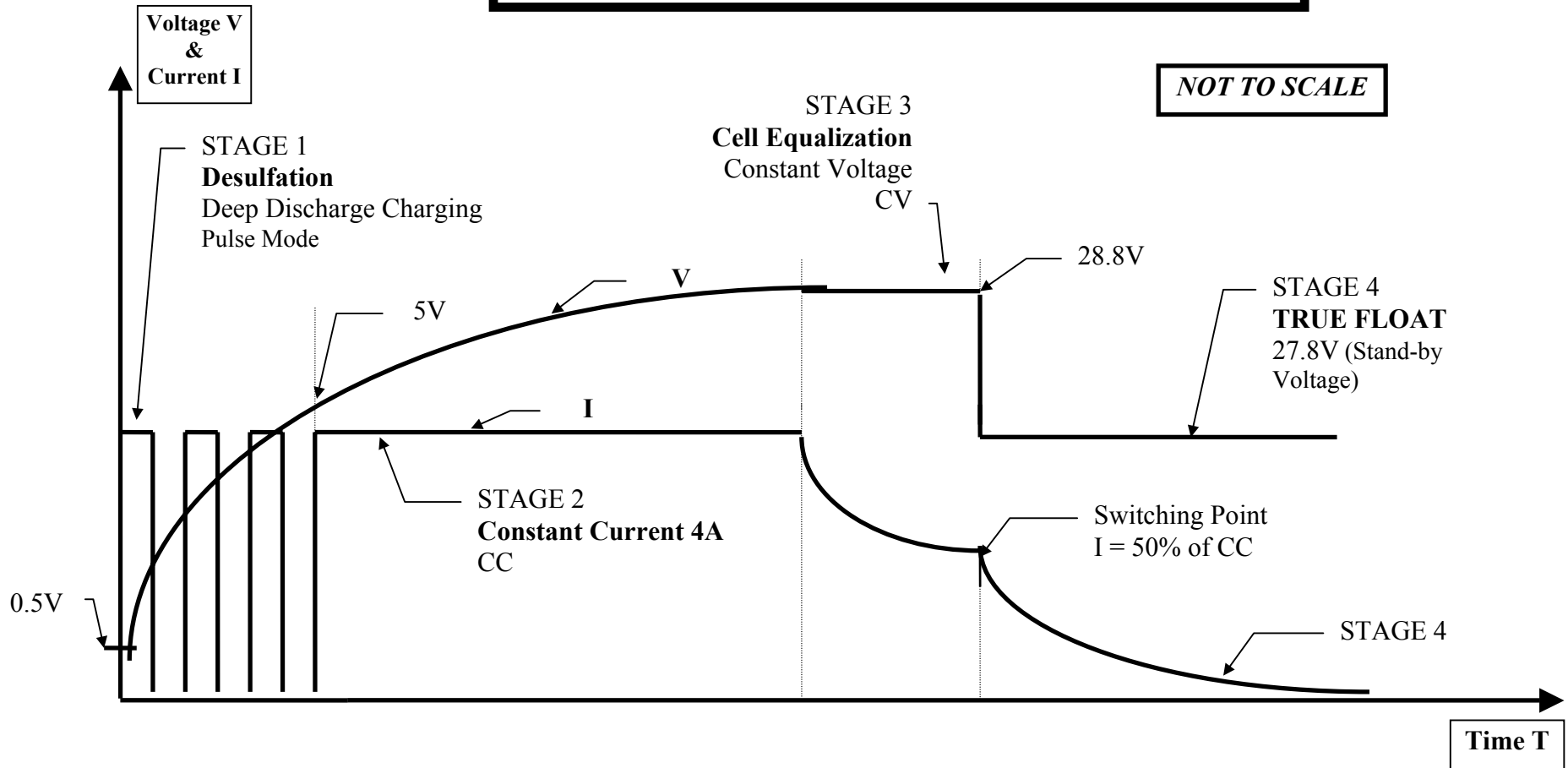
The model has a third output green wire, which provides an interlock signal that will prohibit the operation of the vehicle's motor controller whenever the charger is plugged to an AC source.

**Inhibit (Interlock) signal:** The inhibit 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.

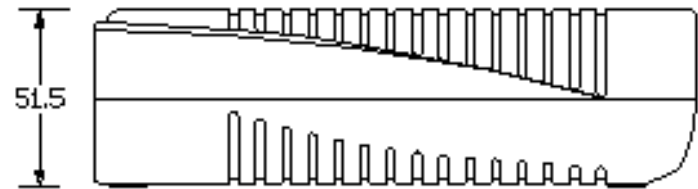
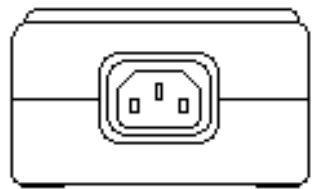
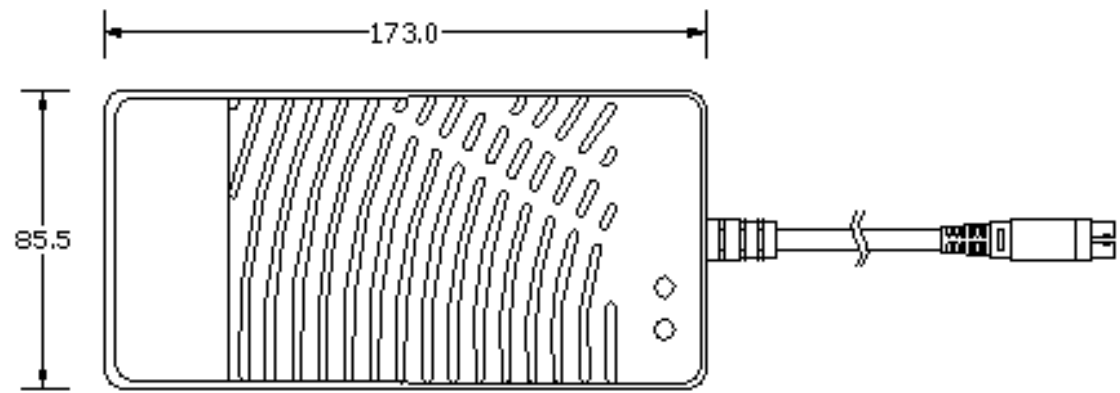


# CHARGING CURVE MODEL 2409SR

SONEIL 24V/8A CHARGER  
(4A CONSTANT CURRENT)



Ref: Curve2409SR.23-Jan-04



<b>THIRD ANGLE PROJECTION</b>	<b>UNLESS OTHERWISE SPECIFIED</b>	<b>SIGNATURES</b>	<b>DATE</b>	<b>SCALE</b>	
	DIMENSIONS ARE IN MM TOLERANCES ON L PL DECIMALS ± R PL DECIMALS ± ANGLES ± FRACTIONS ±	DRAWN <i>[Signature]</i> CHECKED ENGINEER ISSUED	E00E-02-27	page 1	<b>2409SR</b>
<b>SONEIL INTERNATIONAL LIMITED</b>					<b>DWG NO</b>

REV: 02/2008/SONEIL/02