



# SONEIL INTERNATIONAL LIMITED

6033 Shawson Dr., Unit 29, Mississauga, Ontario, Canada L5T 1H8  
Ph.: (905) 565-0360 Fax: (905) 565-0352 <http://www.soneil.com>

---

Revision No.: R01  
06/13/2008

## Specification of Soneil Battery Charger

**MODEL: 2424 SR**

**24V / 12A LEAD ACID BATTERY CHARGER**



## General

The 2424SR charger is a fully automatic high frequency switch mode 4 – stage battery charger with pulse mode, constant current, constant voltage and float voltage. It comes with a selector switch for 120Vac/230Vac input.

The 24V/12A battery charger can charge any gel, glass-matt, sealed and wet lead acid batteries.

### 1. Main product specification

Max. output power	Input voltage	Output voltage	Output current range	Voltage tolerance
350W	120/230Vac	+28.5V ~ 29.1V	10.8A ~ 13.2A	+/-0.3V

### 2. Environmental condition

No.	Item	Technical specification	Remark
1	Humidity	5~95%	With packing in box
2	Altitude	≤3000m	Works normally
3	Cooling	The battery charger is cooled by a 12VDC ball-bearing fan.	Working under full load

### 3. Electrical characteristics

#### 3.1 Input characteristics

No.	Item	Technical specification	Remark
1	Input voltage range	120Vac +/-10% & 220Vac +/- 10%	
2	AC input voltage frequency	47 - 63 Hz	
3	Max input current	5.0 A at 120Vac input 2.5A at 230Vac input	At 120Vac and 230Vac rated load input.

#### 3.2 Output characteristics

No.	Item	Technical specification	Remark
1	Fast charge voltage	+28.5 ~ 29.1Vdc	
2	Floating voltage	+27.1 ~ 27.7Vdc	
3	Constant current	12.0A +/- 10%	
4	Switching current	About 2.0A - 3.6A	
5	Power efficiency	≥80 %	At 120Vac rated input voltage.

#### 3.3 Protection features

- a) Short- circuit protection.
- b) Reverse polarity protection.

- c) Over- voltage protection.
- d) Over-current protection.
- e) Output DC present when AC is plugged and battery not connected (non-trigger charger).
- f) No current drain (when output is connected to battery, there is very minimal current flow from battery if AC is off).

### 3.4 Charging explanation

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

Stages	Condition	Mode*	Current	Voltage	LED Indication
Stage 1	Charging Pulse mode	Pulse mode	12A Pulsing	0.5V to 5.0V	LED 1:Green
Stage 2	Constant Current mode	CC mode	12A	5.0V to 28.8V	LED 2:Orange
Stage 3	Constant Voltage mode	CV mode	Reduces from 12A***	Holds at 28.8V	LED 2:Orange
Stage 4	Standby Voltage mode	Standby CV mode	Reduces to zero	Maintains 27.4V	LED 2:Green
	Recharging mode	CC mode	12A	27.4V	LED 2:Orange

\*CC mode: Constant current charge

\*CV mode: Constant voltage charge

\*\*\*See Stage 3 description below

Note: All voltage tolerances are at +/-0.3V and current tolerances at +/- 10%.

#### Stage 3: Constant Voltage Mode (CV): LED 2 Orange

In this stage the voltage of each cell in the battery is equalized. The charger holds the battery at 28.8V and the current slowly reduces. When the current reaches  $0.2CC \sim 0.3CC$  ( $CC=$ Constant Current), this point is called the Switching Point. The Switching Point is one of the greatest features of this battery charger whereby it can adjust current automatically according to battery capacity which other chargers are not able to adjust automatically.

If the battery voltage goes below 27.4V, the charger changes from any mode to Constant Current mode and restarts charging. The charging cycle will go through Stage 2 to Stage 4.

## 4. Safety & EMC

No.	Item	Standard ( or test condition )	Remark
1	Electric strength test	Input-output 1500Vac/10mA/1min	No breakdown
2	Isolation resistance	Input-ground $\geq 10\text{Mohm}@500\text{Vdc}$	
		Output-ground $\geq 10\text{Mohm}@500\text{Vdc}$	
3	Leakage current	$< 0.25\text{mA}$	$V_{in}=120\text{Vac}, 60 \text{ Hz.}$
4	Safety	Meets UL /cUL / CE/ ROHS requirements.	
5	EMC	EN55022:1998+A1:2000+A2:2003 EN55024:1998+A1:2001+A2:2003 (EN61000-4-2:1995+A1:1998+A2:2001	

		EN61000-4-3:2002 EN6100-4-4:1995+A1:2000+A2:2001 EN61000-4-5:1995+A1:2000 EN61000-4-6:2001 EN61000-4-11:2001)	
--	--	---	--

## 5. Environmental testing requirements

No.	Item	Technical specification	Remark
1	High temperature ambient operating	+40°C	Features ok
2	Low temperature ambient operating	-10°C	Features ok
3	High temperature storage	+70°C	Works normally after recovery under normal temperature for 2hours
4	Low temperature storage	-40°C	Works normally after recovery under normal temperature for 2hours
5	Random vibration	5Hz to 55Hz Acceleration 20m/s, 1 hour per each axis X/Y/Z	Pass functional test
6	Thermal shock	-35°C to 75°C, < 3min transition, 2.5hours dwell, 200cycle	No abnormality detected
7	Drop test	Charger dropped from 1.0m height to a 10mm pine board repeatedly for 4 times on each side	No damage to the charger
9	Humidity	Can operate at 10% - 95% RH	

## 6. Mechanical characteristics

6.1 Outline dimension: L\*W\*H=210\*106\*55 mm

6.2 Input AC cord: Can be supplied with US /Euro or any cords as required by customer; length 1.5m – 1.8m;

6.3 Output DC wire: Red: +ve; Black: -ve;.

DC wire length of 1.5m – 1.8 m. Output cable: AWG16#\*2; PVC.

DC connector is optional and will be supplied as per customer's requirement.

## 7. Packing, transportation & storage

7.1 Packing:

Well packed and protected in a cardboard carton box.

7.2 Transportation:

Suitable for transportation by truck, ship and plane, the products should be shielded from sunshine and rain, and loaded and unloaded carefully.

### 7.3 Storage:

Products should be stored in an enclosed package when not in use. Storage temperature should be -40~70°C and relative humidity 5~95%. In the warehouse, there should not be harmful gas, inflammable, explosive products, and corrosive chemical products, and strong mechanical vibration, shock and strong magnetic field force.

The packed box should be above ground at least 20cm height, and 50cm away from wall, thermal source, and vent. Under this requirement, the product has 2 years of storage period, and should be rechecked when not in use for over 2 years.

## 8. Reliability requirements

8.1 MTBF (standard, environmental temperature, load requirement)  $\geq 50K$  power on hours at tested value; testing condition: 25°C ambient temperature and at 80% of full load.

8.2 All chargers are burnt-in at an average DC load for a minimum of 4 hours with power on continuously.

## 9. Charger wiring

9.1 DC Red wire: +ve

9.2 DC Black wire: -ve

## 10. Inhibit function

10.1 The Inhibit function is optional and can be incorporated into the charger upon customer's request. The inhibit function can be low or high inhibit as required by the customer. In this case the charger will come with a third yellow inhibit wire. The inhibit function stops the mobility equipment (scooter, wheelchairs, patient lift etc.) from moving when the batteries are being charged. For this the equipment controller needs to have inhibit feature and the charger provides inhibit signal to the controller

10.2 For high inhibit, the charger comes with a third Yellow High Inhibit wire which provides a voltage of 24V and 1000mA current. Inhibit is needed so that when the batteries are being charged (charger is being used with AC on), the electrical vehicle motor cannot be used and hence prevents the vehicle from moving when charging the battery.

10.3 For low inhibit the charger also comes with a third Yellow Low Inhibit wire The low inhibit is output of a transistor which floats when AC is not connected and goes ground when AC is connected. The inhibit signal is an open circuit output, leakage less than 5 micro Amp, 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. This will prohibit the operation of the vehicle's motor controller whenever the charger is plugged to an AC source.

## 11. Label

All Soneil chargers come with a label clearly indicating the model name, input, output, LED charging indication, cautions and safety approvals.

## 12. Charging Curve:

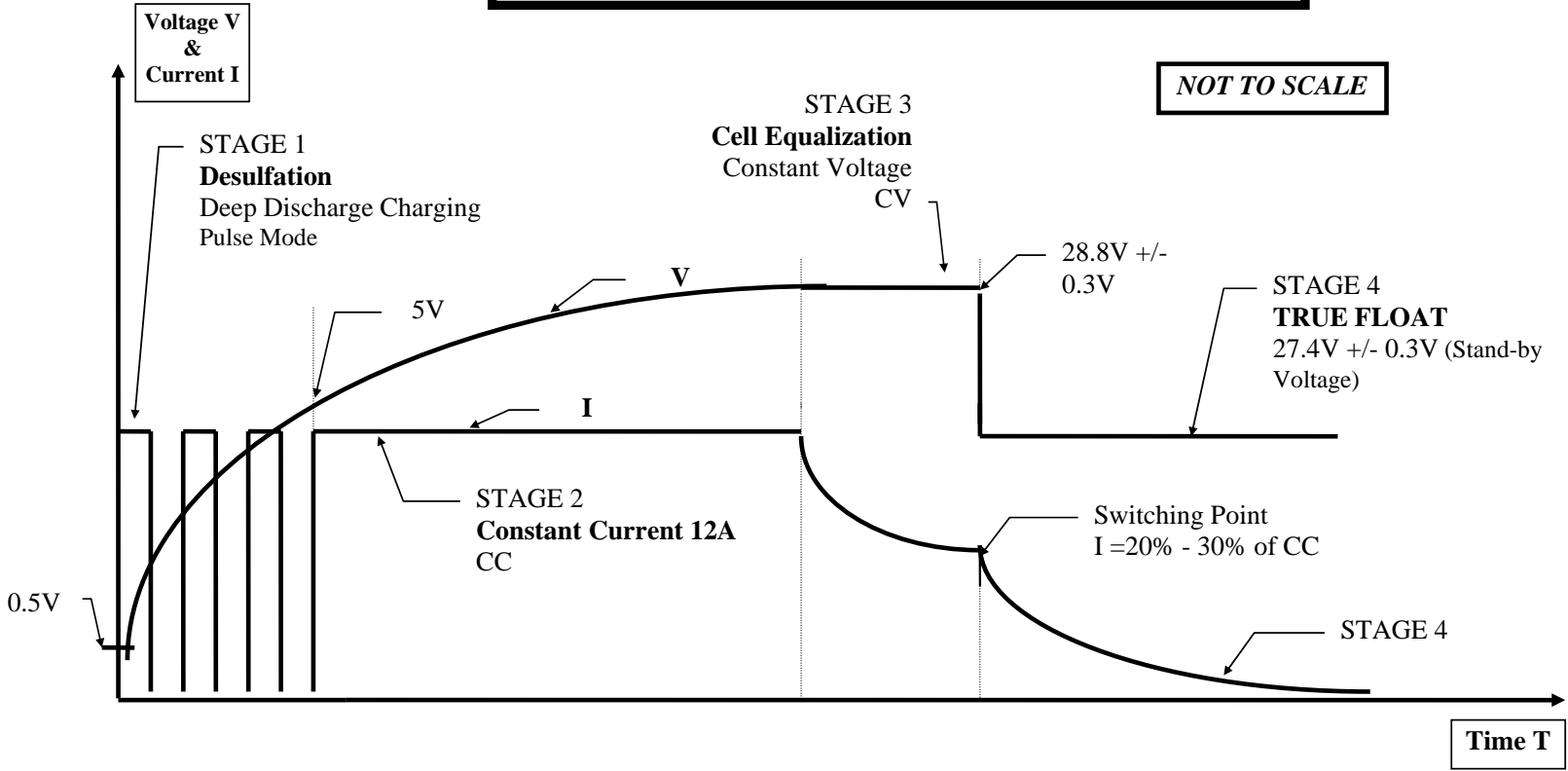
See separate attachment.

Note: Specification is subject to change without notice.

For more detail and accurate information on the charger contact Soneil by email or call via phone

# CHARGING CURVE MODEL 2424R

SONEIL 24V/12A CHARGER



Ref: Curve2424SR.13-Jun-08