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Specification of Soneil Battery Charger

MODEL: CS3603SR

36V1.2A BATTERY CHARGER



General

The CS3603SR model 36V1.2A charger is a fully automatic high frequency switch mode 4 – stage battery charger with battery de-sulfating mode, constant current , constant voltage and float voltage. It comes with a universal input VAC input selection. The 24V/1.2A battery charger can charge any gel, glass-matt (AGM), sealed, wet and any other type of lead acid batteries. This charger can also be used with lithium batteries (Contact Soneil for more information).

Summary:

- **36 Volts, 1.2Amp Constant Current** (equivalent to 2.4A tapered charger in charging time)
- **Universal Input 90VAC to 264VAC** - Suitable anywhere in the world.
- Automatic Cut-off and then true Float. Can be left connected indefinitely without harming the battery.
- **UL, CSA, TUV-GS,PSE,CE Listed.**
- BFP & RoHS compliant.
- Meets EMC standards
- Can also be used for On-board (internal) applications.
- Increases battery life by **de-sulphating the battery.**
- **Small size and light weight**

1. Main product specification

Max. output power	Input voltage	Output voltage	Output current
52W	90 VAC to 264 VAC	43.2 V*	1.2A

*Voltages are adjustable

2. Electrical characteristics

2.1 Input characteristics

No.	Item	Technical specification	Remark
1	Input voltage range	90 – 264 VAC	
2	AC input voltage frequency	50/60 Hz	
3	Max input current	0.5A 0.25A	At 115 VAC rated load input. At 230 VAC rated load input.

2.2 Output characteristics

No.	Item	Technical specification	Remark
1	Fast charge voltage	43.2V	
2	Floating voltage	40.5V	
3	Constant current	1.2 A +/- 10%	
4	Switching current	About 0.4A	30% of constant current of 1.2A
5	Power efficiency	85 %	At 230 VAC rated input voltage

2.3 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).

2.4 Charging explanation

The charging curve is attached.

Stages	Condition	Mode*	Current	Voltage	LED Indication
Stage 1	Charging Pulse mode	Battery de-sulfating mode	1.2A Pulsing	0.5V to 5.0V	LED: Orange
Stage 2	Constant Current mode	CC mode	1.2A	5.0V to 43.2V	LED: Orange
Stage 3	Constant Voltage mode	CV mode	Reduces from 1.2A***	43.2V	LED: Orange
Stage 4	Standby Voltage mode	Standby CV mode	Reduces to battery self discharge current	Maintains 40.5V	LED: Green
	Recharging mode	CC mode	1.2A	<40.5V	LED: 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 1: Deep Discharge Charging Pulse Mode: LED Flash Orange

The charger starts charging at 0.5V and give pulse current up to 5V. This has an effect of removing recently formed sulphation during deep discharge state of the battery.

State 2: Constant Current Mode (CC): LED Orange

The charger changes to constant current 1.2A. When the battery voltage reaches cut-off voltage, the charging stage changes form CC (Constant Current) to CV (Constant Voltage) mode.

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

In this stage the voltage of each cell in the battery is equalized. The charger holds the battery at cut-off voltage and the current slowly reduces. When the current reaches 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.

Stage 4: Standby Voltage Mode: LED Green

The charger maintains the battery voltage at float voltage and current slowly reduces to the discharge current of the

battery (almost zero). Charger can be left connected indefinitely without harming the battery.

If the battery voltage goes below 27.0V, the charger changes from any mode to Constant Current mode and restarts charging. The charging cycle will go through Stage 2 to Stage 4.

3. LED Indications

3.1 LED 1: Charging indication

Charging: ORANGE colour

Charged: GREEN colour

4. Safety & EMC

No.	Item		Standard (or test condition)	Remark
1	Dielectric strength test	Input-output	1500VAC /10mA /60 sec.	No breakdown
2	Isolation resistance	Input-ground	$\geq 50\text{Mohm}@500\text{Vdc}$	
		Output-ground	$\geq 50\text{Mohm}@500\text{Vdc}$	
3	Leakage current		$< 0.5\text{mA}$	$V_{in} = 230\text{VAC}, 50 \text{ Hz.}$
4	Safety		Certified to cTUVus, UL, cUL, CSA, CE	
5	EMC		Tested and certified to required EMC standards.	

5. Environmental

No.	Item	Technical specification	Remark
1	Operating temperature	0°C to 50°C	Ambient
2	Storage temperature	-20°C to 70°C	Ambient
3	Humidity	+0% ~ +99%	
4	Random vibration	10Hz to 300Hz sweep at constant, acceleration 1.0G (breadth: 3.5mm) for 1 hour per each axis X/Y/Z	Pass functional test without any damages.
5	Drop test	Charger dropped from 1.0m height to a 20mm pine board repeatedly for 2 times on each side	No damage to the charger with charger functioning properly.

6. Mechanical characteristics

6.1 Outline dimension: Metal enclosure: L*W*H= 115*68*40 mm (4.5 * 2.7* 1.6 in.)

- 6.2 Input AC cord: Comes with IEC320-C14 or direct-wired AC cord options; length 1.5m – 1.8m;
- 6.3 Output DC wire: Red: +ve; Black: -ve;. (or as indicated on the charger label)
- 6.4 Inhibit function. / Interlock function options
 - DC wire length of 1.5m – 1.8m.
 - DC connector will be supplied as per customer's requirement.

7. Reliability requirements

- 7.1 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.
- 7.2 All chargers are burnt-in at an average DC load for a minimum of 4 hours with power on continuously.

8. Charger DC Output Wiring

- 8.1 Red wire: +ve
- 8.2 Black wire: -ve
- 8.3 Green or Yellow wire: Inhibit / Interlock

9. Inhibit/Interlock Function

- 9.1 The Inhibit / interlock 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 green 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
- 9.2 For high inhibit, the charger comes with a third Green/Yellow High Inhibit wire which provides a voltage of around 36V and 10mA – 25mA 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.
- 9.3 For low inhibit the charger also comes with a third Green/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 microAmp, 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.
- 9.4 If Interlock is required the charger can also come with a third Green/Yellow Interlock wire. Interlock is needed so that when the batteries are being charged (charger is being used, AC on), the electrical vehicle motor, head lights etc. cannot be used. It is done by using signal from the interlock wire which is internally connected to a relay inside the charger.

10. Charging Curve

See separate attachment.

11. General Description of Switch-Mode Technology

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 CS3606SR is a light weight sophisticated electronic device.

Most of the battery chargers use linear technology, which convert the 115/230 VAC to 24 VDC at 60 or 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 (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.

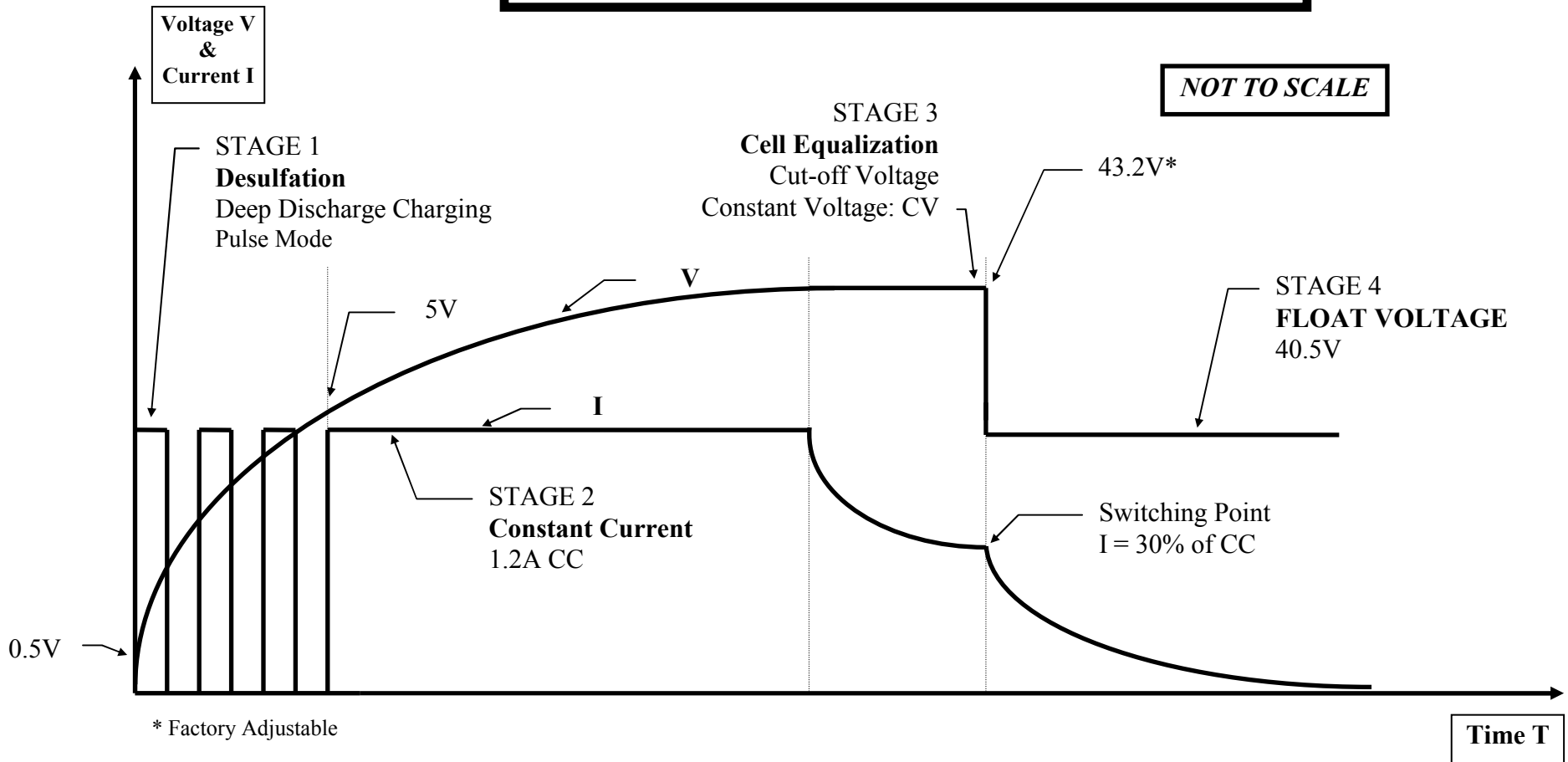
The CS3606SR uses sophisticated electronic circuitry with microchips. All present day computers use switch-mode technology.

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 CS33603SR

SONEIL 36V/1.2A CHARGER
(1.2A CONSTANT CURRENT)



Ref: Charging Curve CS3603SR.071912