



# SMARTCHARGER

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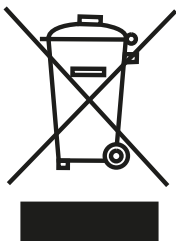
User manual



Valid for the following model

**SCS15**

## INSTRUCTIONS FOR THE PROPER DISPOSAL



This electronic device is subject to the European Directive 2012/19/EU. According to the local waste disposal rules, do not dispose of old products with normal household waste. The proper disposal of products that can no longer be used prevents potential negative consequences for the environment and for the population.





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# 1. INTRODUCTION

Easy to use, Automatic, Professional battery charger with advanced microcontroller and the whole New **OPTICHARGE** firmware algorithm.

**SMARTCHARGER** is perfect for daily battery charging and every technology, and maintenance in every application, including: Cars, Motorcycles, Nautical, Campers, Work vehicles, etc...

## SAFETY INSTRUCTIONS

- Child Safety: Keep the device Out of Reach.
- Carefully check the integrity of the device and connectors.
- To avoid overheating and possible fires do not install the device in a sealed environment, Always choose a well ventilated area.
- Do not place the device on highly flammable surfaces or environments (eg: paper, cloth, etc.).
- Do not cover the cooling slits on the side and the fan on the top.
- Do not install the device near wet batteries: they produce flammable, corrosive and explosive gas while working, and it can damage the product.
- Protect the device from sunlight or direct sources of heat.
- To avoid malfunctions, DO NOT install and use the device in very humid environments, in contact with water splashes, various liquids, or exposed to rain.
- To avoid risk of electric shock and/or fire, the vehicle's fuel system must be in good condition.
- In case of damaged connecting cables or inadequate section, immediately replace them with suitable cables as specified by this manual or by a qualified electrician.
- In case of anomalies in the conformity of the product do not use it! it is strictly forbidden to open the device. Repairs may only be carried out by

qualified technical personnel using original spare parts.

- Keep the instruction manual near the device for easy access to the essential safety, use and maintenance information.
- The information contained in this manual may be changed without notice. NDS Energy s.r.l. reserves the right to make changes and improvements to the product at any time without notice and without obligation to apply these changes to the devices previously distributed.
- The images of the products are purely indicative and may therefore not be fully representative of the characteristics of the product, differing in color, size or accessories.

## 2. CONTENTS OF THE PACK

Check the package contents:

- N°1 **SMARTCHARGER** with clamp connectors terminals, and power cable connector.

### 3. MAIN FEATURES

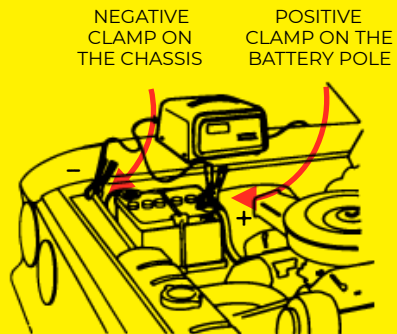
- Plug and play.
- **OPTICHARGE** the new firmware algorithm to check the battery status and optimize the charge.
- Specific Charging curve Ideal for every battery technology, lithium batteries included.
- Up to 9 charging steps.
- IP20 protection.

### 4. PRELIMINARY PROCESS

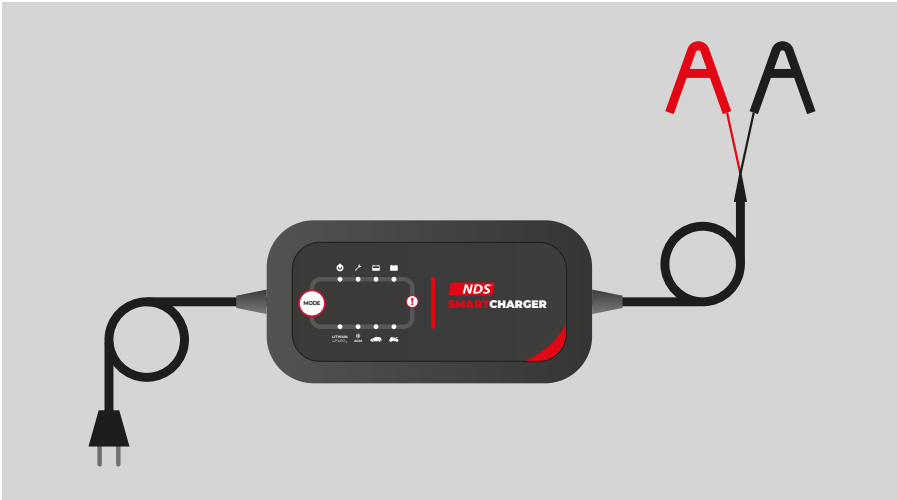
1. Remove battery from vehicle (if necessary).
2. Clean the terminals.
3. In case of lead acid Wet battery Add distilled water in each cell until battery acid reaches level specified by battery manufacturer. Do not overfill!
4. Before to start, always remove grounded connection from battery and Make sure all the appliances in the vehicle are off.
5. Be sure that the area around battery is well ventilated while battery is charging.

#### **CAUTION**

To charge an engine battery directly inside the vehicle connect the negative clamp to the vehicle chassis (usually connected to the battery negative pole), then the positive clamp to the battery positive pole.



## 5. INSTALLATION



### 1. CONNECT THE DEVICE CLAMP CONNECTORS TERMINALS TO THE BATTERY

The Red terminal to the positive battery pole and black terminal to the positive battery pole.

Switching the connection polarity on the battery poles will stop the charge and **SMARTCHARGER** will light up the error led!

### 2. CONNECT **SMARTCHARGER** TO AC POWER SOCKET.

### 3. IF POWER INDICATOR LED IS ON, **SMARTCHARGER** IS READY TO CHARGE.

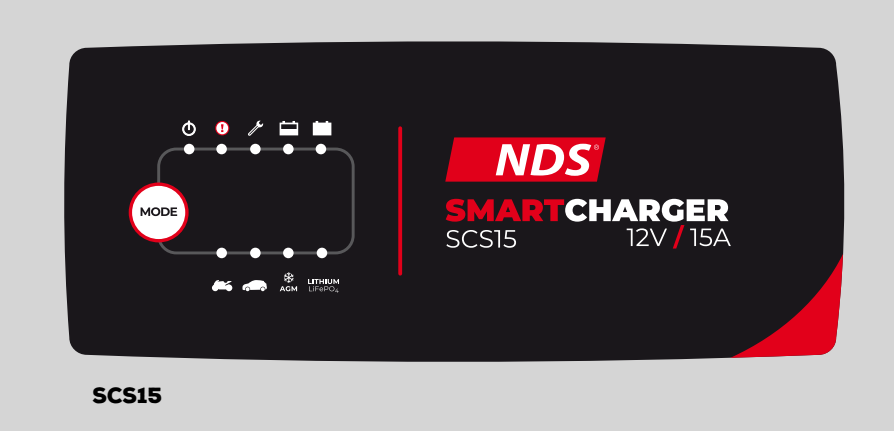
### 4. SET THE CORRECT CHARGING CURVE PRESSING THE MODE BUTTON

The Charging curve depends on battery technology and specifications.

*See the curve description at Page 9.*

# 6. START THE CHARGE

The **SMARTCHARGER** led menu let immediately understand the selected charging curve and the running charge step.



ICON	STATE OF CHARGE
MODE	Selection Button - Curve selection and reset during charge
	Power status Led
	Error Led - short circuit, reverse polarity, bad battery
	Rescue mode
	Battery is Charging
	Full charge / maintenance mode on
	Bike battery charging curve
	Car battery charging curve
 AGM	AGM batteries / Cold temperature charging curve
LITHIUM LiFePO <sub>4</sub>	Lithium (LiFePO <sub>4</sub> ) battery charging curve




See the charging curve full description (Page 9).

## Follow this steps to start the charge:

1. Connect the **SMARTCHARGER** to the battery (P.5), then plug the AC power socket. The power status led will turn on.



### NOTE

If the ac power socket is connected before connecting the clamps to the battery, the error led will be turned on .

Connect the clamps to the battery then push the mode selection button **MODE** to restart the process.

2. If everything is ok **SMARTCHARGER** will start charging directly.

Use the “**MODE**” selection button to switch between auto, motorcycle, AGM, Lithium, charging curve.



When a charging curve is selected the process will start.

3. **SMARTCHARGER** will check battery status before to start. If the battery is ok the charge will start normally (step 5), if not the device will try to recover the battery (step 4).
4. If there's something wrong with the battery **SMARTCHARGER** will try to recover it and the rescue led will light up.  
Rescue can take 30 to 120 minutes.



Charge will turn to normal charge (step 5) when the battery is recovered. If battery can't be recovered the error led will be light up



5. If everything is ok the charge will start and the charging led will light up.



6. The full charge / maintenance led will light up when the battery is fully charged and now is in trickle charge: If the voltage drops down **SMARTCHARGER** sends current to the battery. **SMARTCHARGER** can be connected for months without any trouble.



#### **NOTE**

If the Lithium battery ( $\text{LiFePO}_4$ ) is deeply discharged and the function **UVP** (under voltage protection) disconnects the battery to prevent damages, the **SMARTCHARGER** will be not able to charge. In fact this protection interrupts the connection between battery and chargers/appliances and the **SMARTCHARGER** will detect no battery.

To solve this problem press the "**MODE**" button for 5 seconds and release until the "**LITHIUM**  $\text{LiFePO}_4$ " led light will be turned on, after that the charge will start normally.

# 7. CHARGING CURVES



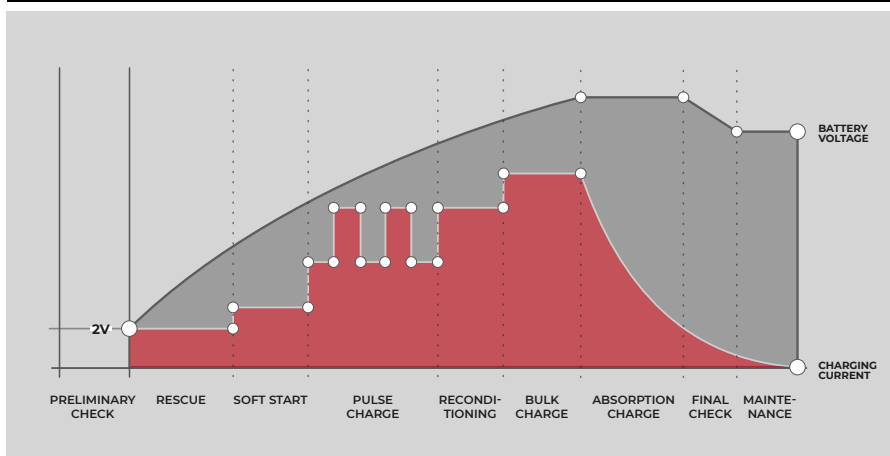
The new **“OPTICHARGE”** firmware engineered by NDS software team optimize the battery charge according to the battery technology using optimal charging parameters and constantly checking current and voltage levels to let you have always ready to go and healthy batteries.

With **OPTICHARGE** you will have the best charging experience ever created by NDS, the easiest way: just plug the device into the power socket, **SMARTCHARGER** will do the rest!

**SMARTCHARGER SCS15** - 4 different charging program: auto, moto, AGM, Lithium. Suitable for auto and motor vehicle, RV, marine, truck.

		 AGM	LITHIUM LiFePO <sub>4</sub>
14,4V / 2A	14,4V / 15A	14,7V / 15A	14,4V / 15A

## SCS15 - CHARGING CURVE



## SCS15 - PHASES DISCUSSION

<b>PRELIMINARY CHECK</b>	Battery status Check. Charge will not start with voltage under 2.0V and more then 15,5V
<b>RESCUE</b>	For deeply discharged battery: current will be 200-400mA at 16V for 5 seconds until voltage reduces to 14V (2 hours max timeout)
<b>SOFT START</b>	If battery voltage is between 2.0V-6.0V a limited current is delivered (1A) to re-activate the battery elements, until voltage rises above 6V (2 hours max timeout)
<b>PULSE CHARGE</b>	If battery voltage is between 6.0V-10.5V, current will be at 1A and 2A for 5 seconds alternately (4 hours max timeout)
<b>RECONDITIONING</b>	After Pulse charge, If battery voltage reaches 10.5V-12.0V smartcharger will constantly deliver 2A current to charge the battery until it has risen over 12.0V. This stage will not be carrying over 8 hours, otherwise the battery is classified as defected.
<b>BULK CHARGE</b>	If battery level has reached 12.0V-13.6V. A constant current will charge the battery until it has reached 80% of the capacity. SCS15: 2A (motorcycle mode), 15A (car mode), 15A (AGM mode).
<b>ABSORPTION CHARGE</b>	If battery level is between 13.6V-14.4V (14.7V for AGM), Smartcharger will switch to Constant voltage mode: output current will automatically adjust as according to the raise of battery voltage. The charge will stop at 14.4/14.7V. Smartcharger will turn on the Full charge icon led if the current reduces to: current <0.6A (motorcycle mode), current <1.2A (car mode), current <1.2A (AGM mode)
<b>FINAL CHECK</b>	Battery voltage is monitored for 1 minute. If voltage has a dramatic drop down under 12.2V, the battery will be classified as exhausted and the error led will turn on. If voltage can be retained at 1 minute, then the Maintenance mode will start.
<b>MAINTENANCE</b>	Battery maintained at 13,7V, a proper work level to be kept always ready to go. If voltage drops below 12V, smartcharger will restart from bulk charge





## SCS15 - LITHIUM PHASES DISCUSSION

<b>PRELIMINARY CHECK</b>	Battery status Check. Charge will not start with voltage under 2.0V and more then 14V
<b>RESCUE</b>	For deeply discharged battery: current will be 200-500mA at 13,8V until voltage will be >11,5V (2 hours max timeout)
<b>CHECK</b>	If battery voltage >10.8V, smartcharger move to next step
<b>BULK CHARGE</b>	If battery level has reached 13.8V. A constant current (15A) will charge the battery when the current reduces to 1A
<b>ABSORPTION CHARGE</b>	If battery level is between 13.8V-14.4V, Smartcharger will switch to Constant voltage mode: output current will automatically adjust as according to the raise of battery voltage. The charge will stop at 14.4V. Smartcharger will turn on the Full charge icon led if the current reduces to 1A
<b>FINAL CHECK</b>	Battery voltage is monitored for 1 minute. If voltage has a dramatic drop down under 12.2V, the battery will be classified as exhausted and the error led will turn on. If voltage can be retained at 1 minute, then the Maintenance mode will start
<b>MAINTENANCE</b>	Battery maintained at 13,8V to be kept always ready to go. Routine is: 2 minutes charge and 2 minutes pause for 12 hours, then stop. If voltage drops below 13,15V, the maintenance mode routine will restart. If voltage drops below 12V, the smartcharger will restart from bulk charge

### NOTE

THE red DOTTED box . . . . . underlines the whole rescue mode section that is activated only in case of battery low performances.

## 8. TECHNICAL FEATURES

SMARTCHARGER SCS15	
Input rated voltage	220-240V
Input rated current	1,8A
Output rated voltage	12V
Output charging current	2 - 15A
	14,4V / 2A
	14,4V / 15A
 <b>AGM</b>	14,7V / 15A
 <b>LITHIUM</b> LiFePO <sub>4</sub>	14,4V / 15A
Charging curves	AGM, Wet, Lithium
Charging method	9 steps
Activation voltage	2V
Battery charge capacity	10 - 250Ah
Battery maintenance	Up to 400Ah
Protection	IP20

# 9. WARRANTY



## WARRANTY COUPON (24 MONTHS)

MODEL \_\_\_\_\_

SERIAL NUMBER \_\_\_\_\_

PURCHASE DATE \_\_\_\_\_

STAMP AND SIGNATURE OF THE SELLER

**NDS ENERGY S.r.l.**

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