

# USER GUIDE

## Battery Charger

### **Smart 20**

for 1-20Ah lead-acid batteries

Please read this user guide carefully before using the charger  
Use protective eyewear when handling batteries

#### INTRODUCTION

**Thank you** for choosing a professional quality product from MODERNUM! This advanced and user-friendly battery charger will optimize performance and lifetime of your battery.

This intelligent and fully automatic charger can be used to charge any type of lead-acid batteries, including AGM and GEL types from 1 to 20Ah.

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#### GETTING STARTED

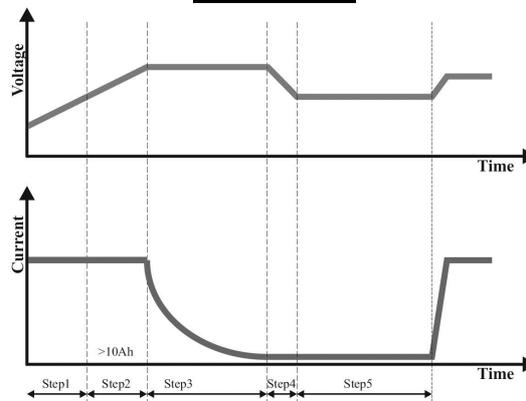
1. Connecting the charger: The battery terminal not connected to the chassis has to be connected first. The other connection is to be made to the chassis, remote from the battery and fuel line. The battery charger is then to be connected to the supply mains. The red clamp should connect to the positive (+) pole of the battery and the black clamp to the negative (-) pole.  
For stand-alone batteries: Connect the red clamp to the battery's positive (+) pole, and then the black clamp to the battery's negative (-) pole. Then connect the battery charger to the supply mains.
2. A constant green light means the battery is fully charged.
3. After charging is complete, the charger will switch to a maintenance mode to keep the battery fully charged as long as charger is plugged in to the mains.

#### INSTRUCTIONS

1. Connect the charger as explained in GETTING STARTED, point 1, above. After 1-5 seconds the charger will initialize  while the green light will flash 3 short, 3 long, 3 short . When it changes to short flashes , it is ready to charge.
2. Green long flashes indicate correct connection to the battery. If connection is wrong it will continue the short flashes (check polarity of clamps and that the connectors are firmly connected).  
 = No battery / wrong connection

3. Approximately 3 seconds after the battery is connected, the charging will start, indicated by long flashes every second.
4. If the battery is very empty and/or big, the indication will change, after a couple of hours, to long flashes every two seconds.
5. When battery is 50% charged, the flashes will change to two flashes every second.
6. When charging is complete the light will be constant green. After charging, disconnect the battery charger from the supply mains. Then remove the chassis connection and then the battery connection.  
For stand-alone batteries: After charging, disconnect the charger from the supply mains. Then remove the black clamp and then the red clamp.
7. By leaving the clamps on the battery after charging, and mains plugged in, the charger will automatically switch to 13.7V maintenance mode as long as it is connected to the mains.
8. To stop or interrupt charging, unplug the supply mains, at any time, and then remove clamps.

#### **CHARGING CURVE**



Reference charging time (hours) to 85 % capacity.  
Time varies with different batteries and conditions.  
1.2Ah: 1.5h 7Ah: 6h 12Ah: 9h 20Ah: 15h

Notes: min charge time is 6h. If left connected after step 5, it is programmed to restart from Step0 after 7 days, to refresh the battery.

#### **SAFETY**

- This charger is made for charging 12V lead-acid batteries. Do not use it for other purposes or with other battery types.
- Do not try to recharge non-rechargeable batteries.
- Do not use the charger if its casing, terminals, clamps or cables are damaged.

- If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.
- Use protective eyewear when handling batteries, and connecting or disconnecting it.
- Battery acid is corrosive. If it comes in contact with skin or eyes – rinse with plenty of water and contact a doctor immediately.
- During charge, a battery can emit explosive gases. Make sure there are not sparks or flames close to it, and ensure good ventilation.
- Never charge a battery that is frozen.
- Do not place the charger on top of the battery.
- Do not cover the charger.
- The charger is protected against overheating. If the ambient temperature is too high, the charging current is reduced.
- During the charge, the charger may intermittently provide a 15.5V charge voltage. Ensure that no equipment that may be damaged by this voltage level is connected to the battery during charging.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Make sure that the charger switched to maintenance mode after normal charging is completed, if you want to leave it unattended and connected for a long time. If it does not leave charge mode after maximum time, disconnect charger from the battery. See technical specifications below for info about time limit.
- All batteries will eventually fail. If that happens during charging, the charger will detect it, but there may be some rare faults in the battery, so do not leave it charging unattended for longer periods of time.
- Do not allow children to play with any part of this product.
- You need to have read and understood the full context of this user guide before you start using the battery charger.

#### **SPECIAL FEATURES**

**Temperature sensor:** The temperature affects the batteries ability to receive charge. This product has a sensor in the battery cable connector, which compensates for temperature variations to give optimal charge in cold as well as warm conditions, avoiding the common problem of insufficient charging in cold weather and over-charging at high temperatures.

**Storage and travel:** To make it easy to bring the charger with you, and for compact storage, you can wind the cables

around the charger's holders in the back and front, and then lock them together with the included strap.

#### **FAULTS INDICATIONS & TROUBLE-SHOOTING**

- Fault:** Charging does not start , i.e. green light does not change from quick to slow flashes, when battery is connected.

**Probable cause 1:** Reversed polarity.  
**Action:** disconnect charger from the mains, re-connect the clamps correctly, connect charger to mains again.

**Probable cause 2:** Clamps do not have good connection to battery.  
**Action:** Check that clamps are connected well to metal on both battery poles. Check that connector on the clamp cable is pushed all the way into connector on charger's connector.

**Probable cause 3:** The battery voltage is too low for the charger to detect it, and it will not start. This may be because the battery is worn or faulty or has been overly discharged.  
**Action:** You can try to connect another battery in parallel, like when using jump-start cables: Disconnect the charger, and then connect the batteries to each other by connecting their positive terminals (+) together using a jumper cable, and then connecting the negative terminals (-) using another jumper cable. Then connect the charger and retry the process. If charging starts, disconnect the jumper cables and let charging continue until battery is fully charged. If the charging does not begin the battery is probably defective and should be replaced.

#### **MAINTENANCE**

The charger is entirely maintenance-free. It has no user-serviceable parts. Opening the charger will void the warranty. The case may be cleaned using a soft, damp cloth. The charger must be disconnected from the mains when being cleaned.

#### **ACCESSORIES**

The charger comes with clamp cables and a set of ring terminal cables, which can be used for fixed installations. To change cables, press the unlock flange on the connector and pull it out. Connect the desired new cable. Push it all the way. The flange should lock it.

## TECHNICAL SPECIFICATIONS

Model:	Smart 20
Type:	switch mode charger, microprocessor controlled
For battery types (12V)	lead-acid (incl AGM,GEL)
For battery capacity	1 – 20Ah
Input voltage	220-240 VAC +/-10%
Input current	0.3A
Back current	≤1mA
Charging Voltage	13.7 – 15.5VDC
Charging current	Max 2A
Ripple voltage	Max 70mV
Ambient temperature	- 25 – +50°C
Cooling	Convection
Spark protection	Yes
Temperature sensor	Yes (≈0.3V/10°C)
Min charging time	6 hours (approx.)
Max charging time	24 hours (approx.)
Charging type	5 step
Battery DC cable length	1300 mm
Power cable 2x0.75 mm <sup>2</sup>	1000 mm
Dimensions (LxWxH)	157x33x34 mm
International Protection class	IP44
Weight	0.35 kg (net)

## CE MANUFACTURER DECLARATION

Made by SM Power Innovations AB  
Product: Battery charger Smart 20  
The manufacturer guarantees that the unit complies with the relevant standards. Tested and approved by Intertek.

## LIMITED WARRANTY

We guarantee the quality of this product. It is made to meet high industrial production standards for electronics. This limited warranty is made to the original purchaser of this product, and is valid from the date of purchase, meeting the mandatory warranty rights for the country of purchase. If the product has workmanship defects or damages relating to manufacturing or distribution, contact the store where you purchased the charger for warranty claims. The warranty is void if the unit has been damaged due to careless handling, abuse or unauthorized repair, or has been opened, or screws and/or labels have been removed. We are not responsible for any consequential costs, or shipping- or handling costs for the return to the place of purchase. Nor are we liable under any other warranty than this one. This warranty is not transferrable.

Note: Measurements such as time, %, lengths etc are approximates.