

-- User manual --

Cake-1000

Lithium-based battery charger



-- Li-Ion --

Version

14S 58.8V / 15A

1. Safety Rules and General Warnings

- Persons, which are not able to use the device in a safe way, because of their physical, sensory or mental competence, or because of their inexperience, should not use the charger without control or instruction of a skilled person.
- 100- 240 Volts alternating current, device is not suitable for children – Danger of life.
- Ensure for enough air ventilation while charging.
- The charger is exclusively designed for rechargeable Lithium-based batteries and must not be used for other purposes.
- Please consider the charging instructions from the battery manufacturer before charging.
- DO NOT OPEN the device. Repair work must only be accomplished by authorized companies or specialized technical staff.
- If the mains connection of the device is damaged, it must be replaced with an original wire which is available at the manufacturer or customer service.
- Never place the device on top of the battery while charging.
- Protect against direct solar radiation and temperatures over 40°C.
- In case of obvious damage or malfunction disconnect the device from mains supply and protect against unintended reconnection.
- The DC cable must not be cut, shortened or extended.
- The charger is not designed for higher environments as IP 20.

e-mail: hello@ridecake.com - www.ridecake.com

2. General Information

This microprocessor-based IP-65 Lithium Battery Charger was especially developed for the outdoor use and for situations where water may be present. It can be used to charge any Lithium- based battery.

With the 4-step charging program the battery will be charged safely in a fully automatic mode. The output of the charger is electronically protected against short circuit. The charger is able to recover deep-discharged batteries.

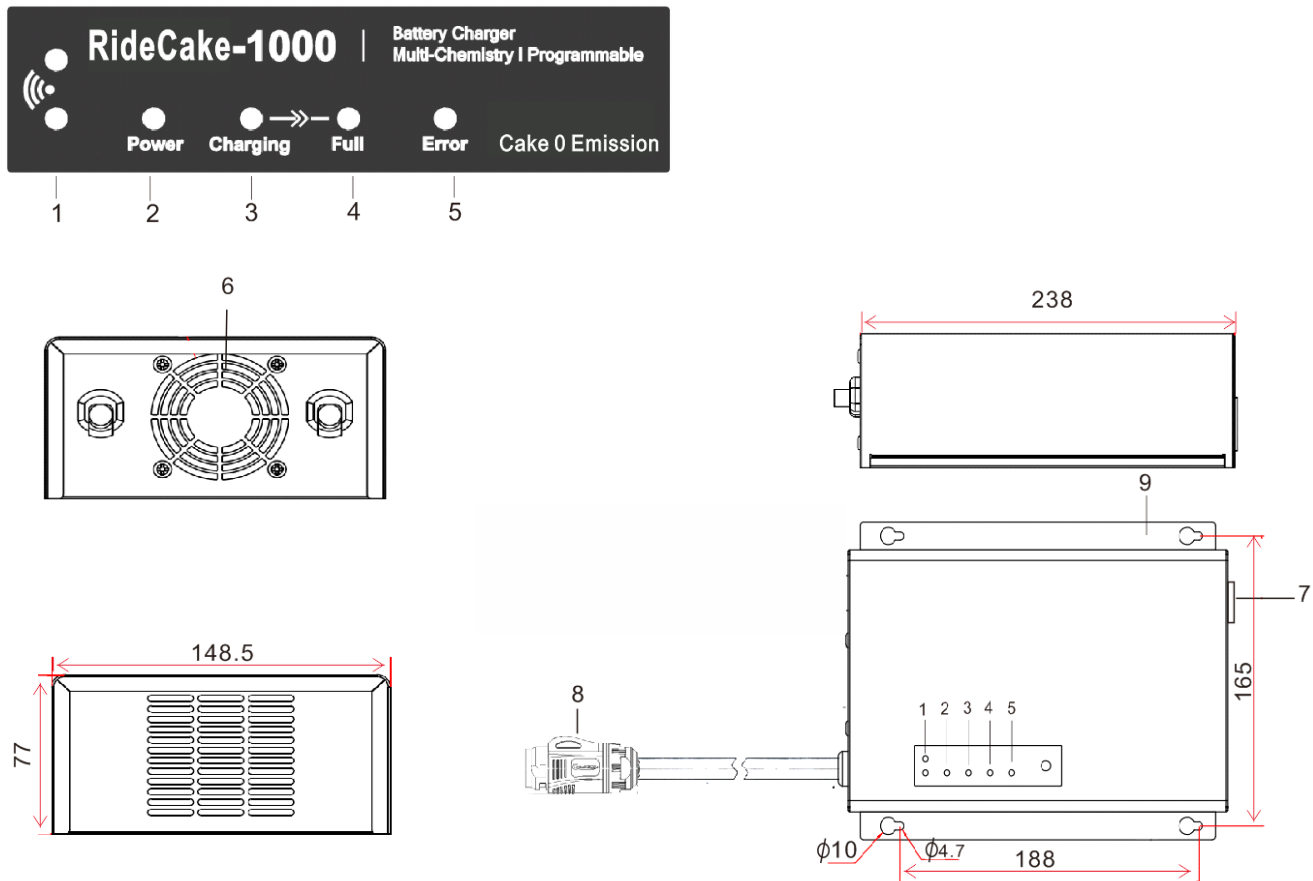
Colored LED's are used to indicate charging status and errors.

3. Special Features

- Short circuit protection
- LED's to indicate operation and charging status
- 4-Step charging technology with automatically restart charging
- Automatic shut-off at too high temperature
- Indicating a non-chargeable ('dead battery') condition

4. Product Figure

- | | | |
|-------------------------|--------------------|----------------|
| 1 IR LED's | 4 Full LED (green) | 7 IEC Socket |
| 2 Power LED (green) | 5 Error LED (red) | 8 DC plug |
| 3 Charging LED (yellow) | 6 Cooling fan | 9 Wall bracket |



5. Operation

ATTENTION:

The DC cable must not be cut, shortened or extended

Before operating please make sure that the power cable and the charger including the charging cable show no damages and make sure that the mains supply complies with the specification.

Please consider the charging instructions from the battery manufacturer before charging.

If you want to connect the charger to the battery, please have a look to the following points:

Make sure that the device is switched off and disconnected from the mains.

Make sure that the charger is connected to the battery.

Connect the charger to mains supply.

6. Charging the battery

The charging process starts automatically and runs through the following four charging phases:

1. charging phase: Auto Wake-Up

This charging step is indicated by blinking alternately of the Charge-LED (3) and Full-LED (4).

Explanation: The recharge phase starts automatically at deeply discharged batteries (where the BMS is off). During the pre-charge phase, the charger use controlled current pulses. That tries to reactivate the BMS and bring the battery in a voltage where it is possible to start the charging process.

2. charging phase: soft start

This charging step is indicated by constant lighting of the Charge-LED (3).

Explanation: During the soft start phase the charger reduces charging current, in order to extend battery lifetime.

3. charging phase: constant current

This charging step is indicated by blinking slowly of the Charge-LED (3).

Explanation: During the constant current phase, the battery is being charged to 80% of its capacity.

4. charging phase: constant voltage

This charging step is indicated by blinking quickly of the Charge-LED (3).

Explanation: During the constant voltage phase the battery is being charged to its maximum capacity.

If the Full-LED (4) is constant lighting, the battery has reached the full capacity. Should the battery stay connected to charger the auto- mastic restart, starts after 7 days or the battery voltage is under 4V/cell (Lion-Battery) or 3.4V/cell (LiFePo4-Battery).

Disconnect the charger from the battery:

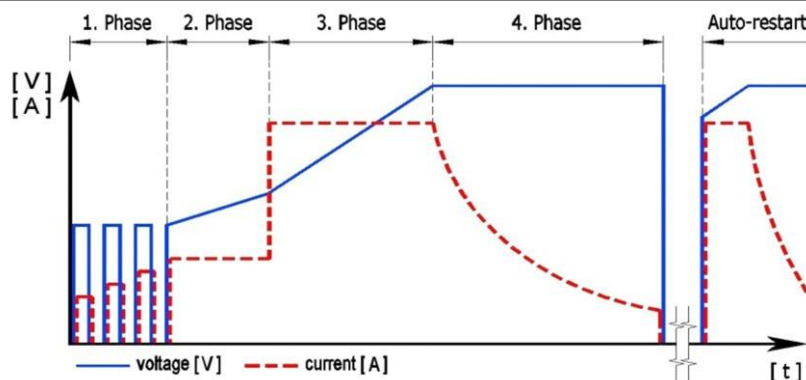
- a) Disconnect the charger from the mains supply;
- b) Disconnect the charger from the battery;

Charging advice:

If the charger will be disconnected from the battery during the charging process, the charge current will be interrupted momentarily. In that case please disconnect the charger from the mains supply. For starting a new charging process please comply with the relevant points.

For increasing the lifetimes of the battery please do not stop a charging process before the battery is fully charged. The charger will automatically stop the charging process

7. Charging Curve



	1. Phase (pulsing)	2. Phase (CC1)	3. Phase (CC2)	4. Phase (CV)	Auto restart
	Auto wake up	Soft start	Constant current	Constant voltage	Auto restart
Charge voltage max					Ub < 3.8 V/cell
Charge current max.	50% I _{max}	50% I _{max}	I _{max}	I _{max}	
Charge current min.	25% I _{max}	25% I _{max}	50% I _{max}	10% I _{max}	
Trigger criterion to next phase	U _{bat} ≥ 2.0V/cell	U _{bat} ≥ 3.0V/cell	U _{bat} ≥ U _{max}	I _b < I _{min}	

8. Errors and Troubleshooting

Table 1: General errors:

Error description	Solution
No LED lighting or blinking after connecting mains	Check if charger is connected to mains supply Check function of mains supply
Red Mains- LED is on, charger is connected to battery and the charging process doesn't start	Check connection to battery Check if battery is damaged or deeply discharged
Error-LED flashing (N x blinking / 2 sec pause)	Please see the table below for error description

Table 2: Error-LED blinking signals:

Blinking signal	Error description
1 x	Battery damaged
2 x	Battery voltage is too high or wrong battery connected
5 x	Charger temperature is too high as charging

9. Charger characteristics

DC output	14S
Charge voltage max	58.8V \pm 0.8%
Charge current max.*	15A \pm 2%
Battery voltage min.	28V
Recommended batteries**	20Ah - 250Ah
Efficiency	
Output power max.	
Ripple	<1%
Back current	<1mA
Output terminal	LINKO Plug brass contacts,3Pins

AC input

Input voltage	90...260VAC / 50...60Hz
Input power max.	1050W [12.0A @ 90VAC / 5.0A @ 240VAC]
Power cable & plug	1.0m \pm 0.1m IEC60320-C13 - CEE 7/7

Enclosure

Material	Metal housing, painted
Weight	NW 2.5kg
Indicators	4 LED's
Protection class	I
IP code	IP20
Operating temperature range	-20°C.....40°C
Cooling	Load dependent fan

Features

Charge characteristic	4 step charge profile for Li-Ion battery packs
Auto wake up	Automatic activation of the BMS through voltage pulses
Programming	Charge profile customization via IR-port
Device protection	
Certification	CE, acc. UL standard

10. Advice for Disposal



It is prohibited to dispose the charger into the house- and residual waste removal (WEEE-Richtlinie 2002/96/EG und EAG-VO) , it must be disposed at the according collection points. For the protection of our environment please inform yourself at your communal administrative agency about your nearest disposal point.

The charger equates to the RoHS-directive 2002/95/EG, for the restriction of the use of certain Hazardous substances in electrical and electronic equipment.



11. Disclaimer of Warranty

- The warranty period (see our GTC) starts with device being dispatched by the manufacturer.
- For damages caused by non-observance of the operating instructions, inappropriate start up or handling as well as reconstructions and modifications of the device, the warranty claim expires and MEC-Energietechnik GmbH assumes no liability for consequential damage to property or persons!

Subject to technical modifications. We assume no liability for misprints

Cake 0 Emissions AB
Hammarby Fabriksvag 43
120 33 Stockholm - Sweden
www.ridecake.com - hello@ridecake.com