



tbs electronics

Professional programmable battery chargers

- omnicharge OC12-40 (12V-40A)
- omnicharge OC12-60 (12V-60A)
- omnicharge OC24-20 (24V-20A)
- omnicharge OC24-30 (24V-30A)



Owner's manual

Thank you for purchasing a TBS Electronics professional programmable battery charger. Please read this owner's manual for information about using the product correctly and safely. Keep this owner's manual close to the charger for future reference.

TBS ELECTRONICS BV

De Marowijne 3, 1689AR, Zwaag, The Netherlands

<http://www.tbs-electronics.com>

Before proceeding with this owner's manual, please make sure you have carefully read the enclosed safety flyer and the installation guide on the backside of this paper!

1. Omnicarge display and control overview

Charge status bar
A rough indication of the charging progress.

- 100% full (ready)
- 80% full
- 50% full
- empty

"power on, off, forced float" switch
When in position "O" the charger is off ¹⁾. When switched to "I" the charger switches on in normal charging mode. When switched to "II" the charger operates in forced float mode. See chapter 5 for more details on the forced float mode.

"charger on" or "error" indicator

indicator mode :	description :
continuous green	power on, normal operation
flashing red (1 flash per sec.)	battery error ²⁾
flashing red (2 flashes per sec.)	charger overload
flashing red (3 flashes per sec.)	high charger temperature ³⁾
flashing red (4 flashes per sec.)	charger error (return for service)

note 1 : When the switch is in position "O", it does not interrupt any internal AC or DC sources. This means that there are still lethal voltages present inside the charger! In position "O", the charger will still consume a small amount of AC current.

note 2 : A battery error can appear for several reasons. These are : battery voltage is too low (too deeply discharged) or too high and battery temperature is too low or too high (only available when battery temperature sensor is connected). The charger will not restart automatically in battery error mode, except when this error was generated due to a too low battery voltage or a too low battery temperature.

note 3 : The charger automatically restarts when the temperature is below an acceptable level.

2. Dipswitch settings

During step 3 of the installation sequence, you can alter the factory settings of the dipswitches to change the charger's functionality on a few points. The following settings can be made :

1. LOC. / EXT. : Choose to configure the battery type locally (using dipswitch 2 and 3), or override these settings and setup the charger externally using the TBS Dashboard for Windows software.

- Setting ON : The local dipswitch settings of dipswitch 2 and 3 are ignored and configuration must be done externally.
- Setting OFF : The local dipswitch settings are used (factory default).

2 & 3. BATTERY TYPE : Select the type of lead-acid battery that you wish to charge. Each setting represents the best charging voltages for the given battery type listed below. If there are still other voltage levels or different charging programs needed for your battery, please use the TBS Dashboard software to create your own and store this as Custom setting inside the charger.

DS2	DS3	BATTERY TYPE (12V/24V)
		Flooded (factory default) absorption voltage 14.4V/28.8V, float voltage 13.5V/27.0V
		GEL absorption voltage 14.2V/28.4V, float voltage 13.5V/27.0V
		AGM absorption voltage 14.3V/28.6V, float voltage 13.3V/26.6V
		Custom not available when dipswitch 1 is set to OFF (LOC.)

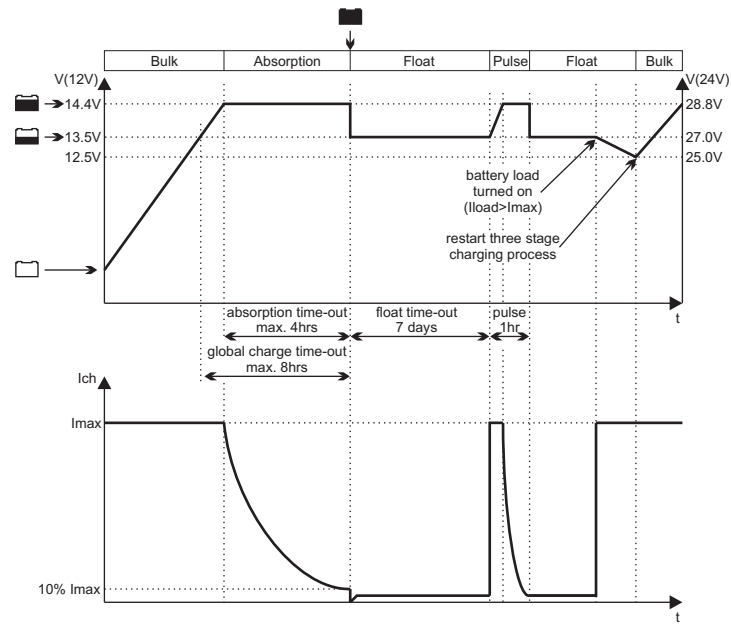
Invalid battery type settings can cause serious damage to your batteries and/or connected battery loads. Always consult your battery's documentation for the correct charge voltage settings.

4. BYPASS REMOTE : Bypasses the remote switch connection when no remote switch is connected.

- Setting ON : remote switch connection terminals are bypassed (factory default).
- Setting OFF : remote switch connection terminals are open. A remote switch must be connected and switched ON in order to activate the charger. The local on/off switch on the frontpanel always overrides the remote switch. So in order to use the remote switch, the local on/off switch must be in the 'power on' or 'forced float' position.

3. Charge programs

All standard selectable charge programs (using dipswitches 2 and 3), perform a four stage IUoUoP charging process comprising of a "Bulk", an "Absorption", a "Float" and a "Pulse" stage. The image below visualizes the four stage charging process :



In the Bulk stage, the charger delivers full output current and typically returns approximately 80% of charge back into the battery once the absorption voltage is reached. During this stage, indicators and will be lit depending on the Bulk charge progress. When the absorption voltage has been reached, the Absorption stage will be entered and indicator will be lit. This stage will return the final 20% of charge to the battery. The output voltage is kept at a constant level and the charge current decreases as a function of the battery's state of charge. When the charge current has dropped below a certain value or when the maximum absorption timer has been expired, the Float stage will be entered. Indicator will be lit and an acoustical message will sound, indicating that the battery is full. In this stage the battery voltage will be held constant at a safe level for the battery. It will maintain the battery in optimal condition for as long as the battery remains connected to the activated charger. Connected battery loads will be directly powered by the charger up to the charger's maximum output current level. When even more current is drawn, the battery must supply this which results in a declining battery voltage. At a certain battery voltage level, the charger jumps back to the Bulk stage and will finalize a complete three stage charging process again, once the battery load consumption has dropped below the charger's maximum output current level.

The fourth stage called "Pulse", will perform a short refresh charge of approximately 1 hour each 7 days while the charger operates in the Float stage. This will keep the battery in optimal condition while prolonging its lifetime. The battery can remain connected to the activated charger continuously, without risk of overcharging.

When the battery temperature sensor is installed, the charger automatically compensates the charge voltages against battery temperature. This means that the charge voltages are slightly increased at lower temperatures and decreased at higher temperatures (-30mV/°C at 12V chargers and -60mV/°C at 24V chargers). This way, overcharging is prevented which prolongs your battery's lifetime. A connected battery temperature sensor also enables the battery temperature protection, which stops the charging process when the battery's temperature is below -20°C or above +50°C.

When the standard selectable charging programs do not satisfy your requirements, or when different voltage- and current levels are needed, you can use the optional TBSLink communication kit and create your own charge programs using TBS Dashboard. Up to 8 different stages can be linked together and all individual stages can be configured extensively. Please contact your TBS equipment supplier for further information on the TBSLink communication kit.

The Auxiliary battery output always follows the charge process of the Main battery automatically. You can use this output to charge a second (smaller) battery, like a starter battery. It is not possible to use this output when the Main battery is not connected!

4. Charging batteries

Before you start to charge batteries, read all enclosed safety instructions and warnings while following all safety precautions about working with batteries.

The list below globally describes the steps to follow for charging batteries :

1. Push the charger switch in the "O" (Off) position and disconnect the AC supply to the charger
2. If possible disconnect or switch off all loads from the battery
3. Connect the battery to the charger
4. Switch on the AC supply and activate the charger by pushing the charger switch in the "I" (power on) position. After a two tone beep, the charger will start the charging process.
5. After charging is completed, push the charger switch in position "O" and switch off the AC supply again, before disconnecting the battery. Or, keep all connections and the charger switch position untouched and just re-connect all battery loads.

5. Forced float mode

The forced float mode can be activated by pushing the main switch into position "II". In this mode, the output voltage of the charger is set constantly to the float voltage (value is depending on selected battery type) while being able to deliver full rated output current. Since no automatic charging programs are activated in this mode, it can be used for constant voltage charging or operating the charger as a battery buffered power supply.

6. Equalizing a flooded battery

If you are using a flooded lead acid battery, an occasional equalization charge cycle may be recommended by the manufacturer. This might also be true when the flooded battery has been very deeply discharged or often charged inadequately. During equalization, the battery will be charged up to 15.5V (or 31V for 24V models) at a reduced output current level. Before starting an equalization charge cycle, the following caution statements must be read carefully :

- Equalization should only be performed on a flooded (wet) lead acid battery. Therefore the Omnicarge chargers only allow equalization when the battery type dipswitches are set to Flooded. Other battery types like GEL or AGM will be damaged by this process.
- Always follow the battery manufacturer's instructions when equalizing flooded batteries.
- During equalization, the battery generates explosive gasses. Follow all the battery safety precautions enclosed with your charger. Ventilate the area around the battery sufficiently and ensure that there are no sources of flames or sparks in the vicinity.
- Disconnect all loads connected to the battery during equalization. The voltage applied to the battery during this process may be above safe levels for some loads.
- The Omnicarge chargers cannot automatically determine when to stop the equalization of a battery. The user must monitor the battery's specific gravity throughout this process to determine the end of the equalization cycle. The internal 2 hours time-out timer of your charger is only intended as a safety feature, but may not be sufficiently short to prevent battery damage. Therefore, equalizing a battery is always a process that must continuously be supervised by the user.
- When equalizing the main battery, the smaller battery connected to the auxiliary battery output will be equalized as well. When this is not desirable, please disconnect this battery before starting the equalization cycle.

Since equalization is only allowed for flooded (wet-) lead acid batteries, the Omnicarge chargers will only allow this function to be available when the "Flooded" charging program is selected (see chapter 2). Besides this, the charger also needs to have a full charge cycle completed and is operating in the Float mode. When these two conditions are met, the equalization charge mode can be activated by pressing the recessed pushbutton on the bottom side of the charger (see installation guide step 4) for 3 seconds until all charge status indicators start flashing. The charger will allow a maximum equalization time of 2 hours before it automatically jumps back to Float mode. If the specific gravity of each cell does not match the battery manufacturer's specifications yet, you can initiate a new 2 hours equalization cycle by pressing the pushbutton for 3 seconds again. Always keep on checking the specific gravity of each cell repeatedly during the equalization process. When these values are correct, you can manually exit the equalization process by pressing the recessed pushbutton once. The charger will then return to the Float mode.

7. Alarm relay

This charger is equipped with a potential free alarm relay. This relay will be activated when the charger shuts down and jumps to an error mode as described in chapter 1. The alarm relay de-activates again when the error mode has been cleared and the charger is running in normal operating mode again. On pins 1,2 and 3 of the 5 pins screw terminal located in the connection compartment, both normally closed and normally open contacts are available. Please make sure not to exceed the maximum relay contact rating of 60V and 1A to avoid damaging the relay.

8. Warranty conditions

TBS Electronics (TBS) warrants this charger to be free from defects in workmanship or materials for 24 months from the date of purchase. During this period TBS will repair the defective charger free of charge. TBS is not responsible for any costs of the transport of this charger.

This warranty is void if the charger has suffered any physical damage or alteration, either internally or externally, and does not cover damage arising from improper use¹⁾, or from use in an unsuitable environment.

This warranty will not apply where the product has been misused, neglected, improperly installed or repaired by anyone other than TBS. TBS is not responsible for any loss, damage or costs arising from improper use, use in an unsuitable environment, improper installing of the charger and charger malfunctioning.

Since TBS cannot control the use and installation (according to local regulations) of their products, the customer is always responsible for the actual use of these products. TBS products are not designed for use as critical components in life support devices or systems, that can potentially harm humans and/or the environment. The customer is always responsible when implementing TBS products in these kind of applications. TBS does not accept any responsibility for any violation of patents or other rights of third parties, resulting from the use of the TBS product. TBS keeps the right to change product specifications without previous notice.

- ¹⁾ Examples of improper use are :
- Too high AC input voltage applied
 - Connecting wrong batteries (too high battery voltages)
 - Mechanical stressed enclosure or internals due to harsh handling and/or incorrect packaging
 - Contact with any liquids or oxidation caused by condensation

9. Declaration of conformity

MANUFACTURER : TBS Electronics BV

ADDRESS : De Marowijne 3
1689 AR Zwaag
The Netherlands



Declares that the following products :

PRODUCT TYPE : Professional programmable battery charger
MODELS : OC12-40, OC12-60, OC24-20, OC24-30

Conforms to the requirements of the following Directives of the European Union :
EMC Directive 2004/108/EC
Low Voltage Directive 2006/95/EC

The above product is in conformity with the following harmonized standards :
EN61000-6-3 : 2001 EMC - Generic Emissions Standard
EN61000-6-2 : 2005 EMC - Generic Immunity Standard
EN60335-1 : 1999 Generic safety standard
EN60335-2-29 : 2004 Safety requirements for battery chargers

GB INSTALLATION GUIDE

- Please read this document very carefully to avoid charger malfunction, shock and/or fire hazards!
- This document provides a brief overview of a stand alone charger installation. For long term safe and troublefree operation, it is very important to read the owner's manual on the rear side of this paper as well!
- Please follow the exact installation sequence as given below. Skipping one or more steps could result in charger malfunctioning or shock and/or fire hazards!

1 UNPACKING

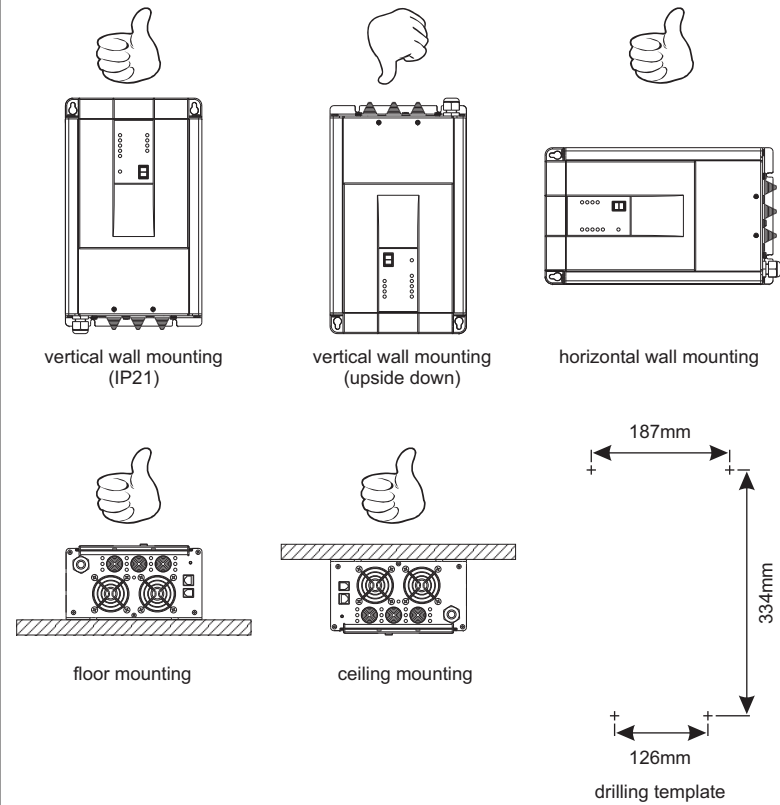
The charger package should contain the following items :

- Battery charger
- 5m temperature sensor
- This Installation guide / Owner's manual
- Safety flyer
- WEEE flyer
- 2x M8 crimp terminals.
- 4x Mounting screws.

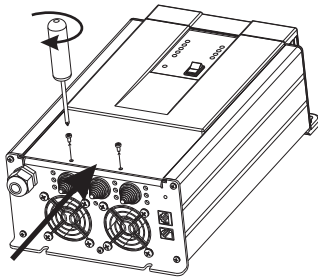
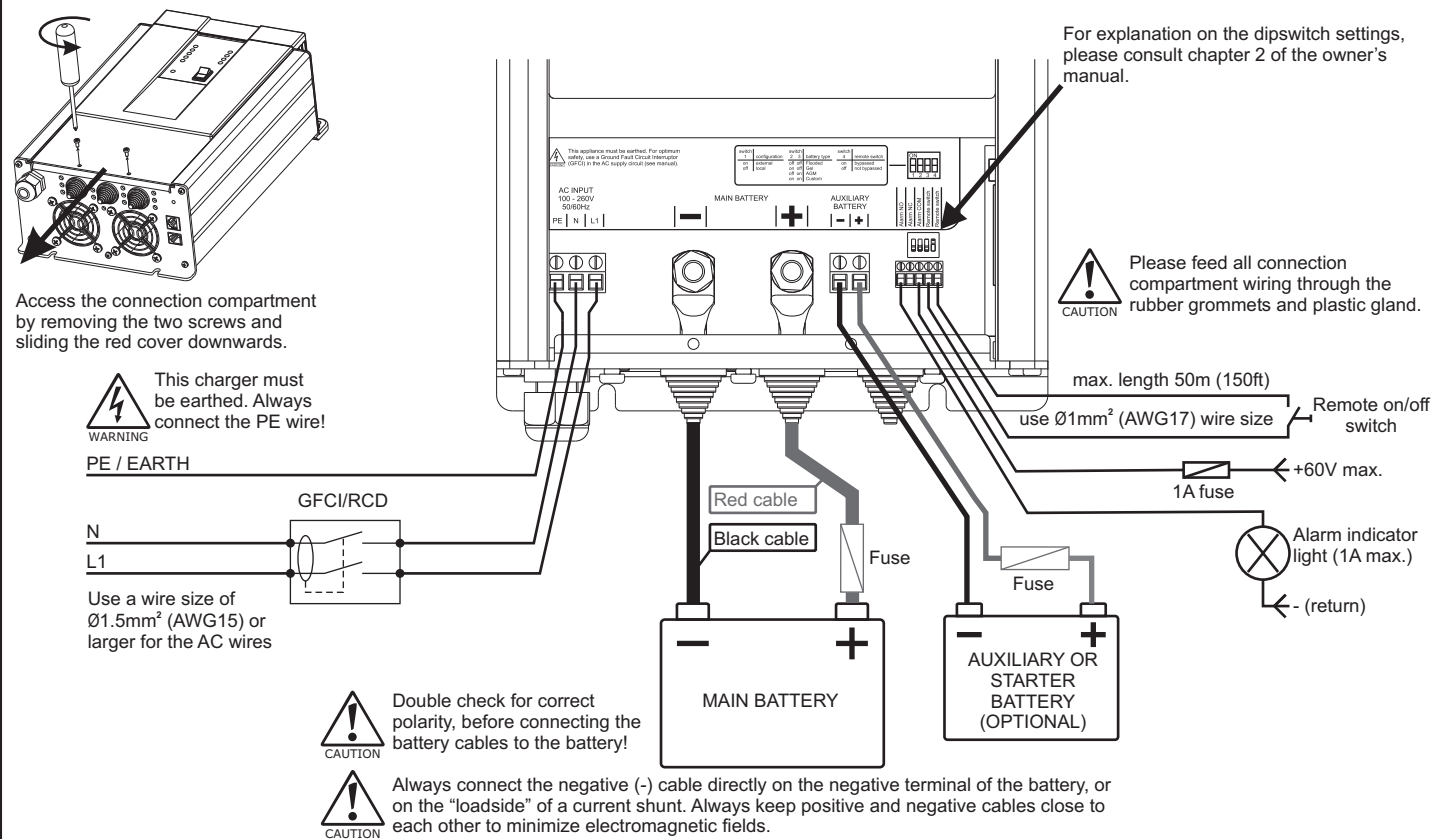
CAUTION After unpacking, check if the charger shows any mechanical damage. Never use the charger when the enclosure shows any visual damage caused by harsh handling, or when it has been dropped accidentally. Contact your local supplier for further information.

2 CHARGER MOUNTING

👍 = Approved
👎 = Not recommended



3 CONNECTION COMPARTMENT WIRING DETAILS



When all connections are made and double checked, slide the red connection compartment cover to its original position again and relocate the two screws.

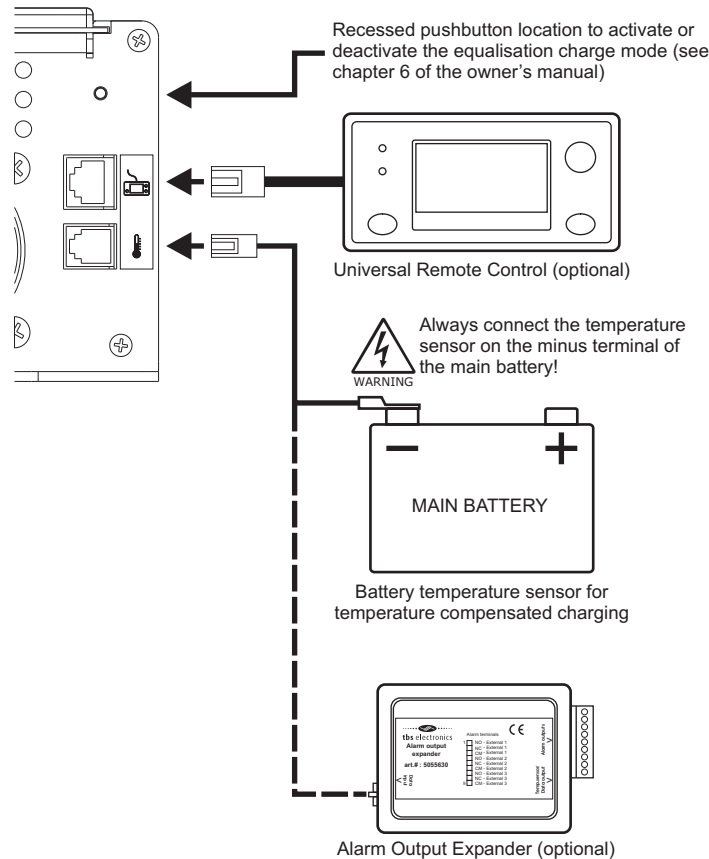
Main battery cable sizes :

Model	<3m(10ft) / 3-6m(10-20ft)
OC12-40 :	16mm ² (AWG5) / 25mm ² (AWG3)
OC12-60 :	25mm ² (AWG3) / 35mm ² (AWG2)
OC24-20 :	6mm ² (AWG9) / 10mm ² (AWG7)
OC24-30 :	10mm ² (AWG7) / 16mm ² (AWG5)

Auxiliary battery cable sizes :

Model	0-6m(0-20ft)
All :	2.5mm ² (AWG13)

4 BOTTOM SIDE CONNECTIONS



Troubleshooting guideline

Problem	Possible cause	Remedy
charger is not working (all indicators are off).	Power switch in OFF (0) position.	Push the power switch in the 'I' or 'II' position.
	No or too low AC input voltage.	Check AC wiring and input voltage level.
	Remote switch or remote control have deactivated the charger.	Activate the charger remotely or check dipswitch 4 for correct setting.
'Battery error' keeps on appearing.	Battery voltage is too low or too high.	Check the battery for damaged or shorted cell(s). Check if DC bus voltage is being pushed by another charging device. Check low or high battery voltage alarm settings using TBS 'Dashboard'.
	Battery temperature is too low or too high (only relevant when the battery temperature sensor is installed).	Check and try to correct the ambient temperature around the battery. Check if the temperature sensor is not damaged.
'Charger overload' or 'Battery error' keeps on appearing.	There is a short circuit on the charger output.	Check DC wiring. Check battery condition.
	Charger is being overloaded in 'Forced float' mode.	When the charger is used in 'Forced float' mode without a battery attached (not recommended), try to reduce the load.

Problem	Possible cause	Remedy
'High charger temperature error' keeps on appearing.	Airflow around the charger is obstructed.	Make sure there is at least 10 centimeters of clearance around the charger. Remove any items placed on or over the charger. Keep the charger away from direct sunlight or heat producing equipment.
	Too high ambient temperature.	Move the charger to a cooler environment or provide additional cooling by an external fan.
'Charger error' keeps on appearing.	An internal error is detected.	Please return the charger to your nearest dealer for service.
Charge voltage is too low.	The charge voltage is being compensated by the battery temperature sensor to protect your battery.	Do nothing or try to cool down the ambient temperature around the battery.
	Wrong charge program selected by the dipswitches or custom charge program needs to be re-adjusted.	Select the correct charge program or adjust the custom charge program using TBS 'Dashboard'.
	DC cables too thin.	Install larger DC cables. See the DC cable size table in the installation guide.
Charge current is too low.	Battery load current is higher than the charger's output current.	Reduce or remove the battery load.
	High ambient temperature.	Try to cool down the ambient temperature around the charger.
Charge current is too low.	Charger is operating in the absorption charging stage.	Do nothing. The battery is almost fully charged and consumes less current by itself.

Technical specifications

Parameter	OC12-40	OC12-60	OC24-20	OC24-30
Input voltage	100-260VAC / 47-63Hz / PF ≥ 0.95			
Full load consumption	700VA	1050VA	700VA	1050VA
AC input current (115V/230V)	6A/3A	9A/4.5A	6A/3A	9A/4.5A
Full load efficiency	88%	88%	91%	91%
Nominal output voltage ¹⁾	12V		24V	
Total output current ¹⁾⁴⁾ (Aux.)	40A(4A)	60A(4A)	20A(2.5A)	30A(2.5A)
Charge characteristic ²⁾	IUoUoP, intelligent 4-stage, temperature compensated			
Absorption voltage ²⁾	14.4V		28.8V	
Float voltage ²⁾	13.5V		27.0V	
Equalize voltage ²⁾	15.5V		31.0V	
Supported Battery types ²⁾	Flooded / GEL / AGM / Custom			
Recomm. battery capacity ³⁾	80-400Ah	120-600Ah	50-200Ah	70-300Ah
DC current draw (charger off)	≤ 5mA		≤ 4mA	
Operating temp. range ⁴⁾	-20°C ... +50°C (humidity max. 95% non condensing)			
Storage temp. range	-40°C ... +80°C (humidity max. 95% non condensing)			
Cooling	Variable speed fan controlled by temperature and load			
TBSLink enabled	Yes			
Protected against	Low AC voltage, output short circuit, high temperature, battery overcharging and reverse polarity (fuse)			
Indications	Power on, output current bar, state of charge bar, error			
DC output connections	M8 bolts (main output), Screw terminals (auxiliary output)			
AC input connections	Screw terminals			
Enclosure body size	351 x 210 x 114mm			
Total weight	5.8 kg			
Protection class	IP21 (mounted in upright position)			
Standards	CE marked meeting EMC directive 2004/108/EC and LVD 2006/95/EC complying with EN60335-1, EN60335-2-29			

Note: the given specifications are subject to change without notice.

¹⁾ Maximum output current tolerance is +/-3%. Maximum setpoint voltage deviations are +/- 0.1V for 12V and +/- 0.2V for 24V models. All setpoint voltages are temperature compensated when battery temperature sensor is connected.

²⁾ Value is programmable

³⁾ Always consult battery manufacturers specifications for maximum allowable charge current

⁴⁾ At higher ambient temperatures (>40°C), maximum output current may be reduced automatically