tbs electronics OCS 250-70 MPPT Solar Charge Controller Omnicharge Solar

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Product Information

The MPPT Solar Charge Controller Omnicharge Solar is a productmanufactured by TBS Electronics BV. It is available in two models: OCS 150-60 (150V/60A) and OCS 250-70 (250V/70A). The company is located at De Marowijne 3, 1689AR, Zwaag, The Netherlands. For more information, you can visit their website at **tbs-electronics.com**.

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TBS Electronics BV (TBS) provides documentation and product usage for the MPPT Solar Charge Controller Omnicharge Solar. Unless specifically agreed to in writing, TBS makes no warranty as to the accuracy, sufficiency, or suitability of any information provided
in the documentation or for product usage.

Document Information

The installation manual for the MPPT Solar Charge Controller Omnicharge Solar is named “OCS-60-70 Installation Manual Rev1endfs” and was last revised in August 2023. The part number is xxxxxx.

Safety Precautions

Before installing the product, please read the installation manual provided. It contains important safety information and instructions for correct and safe installation. Keep the installation manual and all other included documentation close to the product for future reference.

Installation Precautions

The installation instructions are intended for installers who have knowledge and experience in installing electrical equipment, knowledge of applicable installation codes, and awareness of the hazards involved in performing electrical work and how to reduce those hazards.

General Warnings

- Do not use the product in connection with life support systems or other medical equipment or devices.
- This battery charger is not to be used by persons with reduced physical or mental capabilities or lack of

knowledge and experience.

- Not to be operated or used by children.

Mounting

The Solar charger should be mounted with the connections pointing downwards. Mounting it in any other orientation may affect proper functionality and safety.

Wiring Details

The wiring order for the solar charger is as follows:

1. Battery positive cable
2. Battery negative cable
3. PV positive cable (Wait for 3 seconds for proper automatic battery voltage detection)
4. PV negative cable

Note: When a double pole switch is installed in the PV lines, both positive and negative cables can be switched on simultaneously.

TBS ELECTRONICS BV De Marowijne 3, 1689AR, Zwaag, The Netherlands **tbs-electronics.com**

Notice of Copyright

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   Document name, date and part number

“OCS-60-70 Installation Manual Rev1endfs”, August 2023, xxxxxx

SAFETY PRECAUTIONS

Thank you for purchasing a TBS Electronics (TBS) Omnicharge Solar MPPT Solar Charge Controller (hereinafter referred to as ‘product’ or ‘solar charger’). Please read this installation manual for information about installing the product correctly and safely. Keep this installation manual and all other included documentation close to the product for future reference. For the most recent manual revision, please check the downloads section of our website. The installation instructions are intended for installers that should have knowledge and experience in installing electrical equipment, knowledge of the applicable installation codes, and awareness of the hazards involved in performing electrical work and how to reduce those hazards. This chapter contains important safety information for this product. READ ALL instructions and cautionary markings on or provided with this product, and all appropriate sections of this guide. This product contains no user serviceable parts. Opening up the product will void product warranty.

GENERAL WARNINGS

- Do not cover or obstruct any air vent openings and/or install in a zero clearance compartment. Ensure that there is always sufficient free space around the product for ventilation.
- Shock hazard! Solar panel arrays may generate dangerously high open circuit voltages.
- Avoid moisture ingress. Never expose the unit to snow, water, etc.
- Explosion hazard! Do not use this product in the vicinity of flammable fumes or gases.
- After unpacking, check if the product shows any mechanical damage. Never use the product 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.
- Do not mount this product in a publicly accessible area. Keep away from children!
- When installing or servicing this product, always make sure that the solar panel input is de-energized by either opening the advised double pole circuit breaker in the PV line or by protecting the solar panels from light by covering these.
- Never touch uninsulated wire ends and always use insulated tools during installation and servicing of this product.
- Please use this product for the designated application only

BATTERY WARNINGS

- When working with electrical equipment or lead acid batteries, have someone nearby in case of an emergency.
- Study and follow all the battery manufacturer’s specific precautions when installing, using and servicing the battery connected to the charger.
- Wear eye protection and gloves.
- Avoid touching your eyes while using this unit.

- Keep fresh water and soap on hand in the event battery acid comes in contact with eyes. If this occurs, clean right away with soap and water for a minimum of 15 minutes and seek medical attention.
- Batteries can produce explosive gases. DO NOT smoke or have an open spark or fire near the system.
- Never attempt to re-charge a damaged, frozen or non-rechargeable battery.
- Avoid dropping any metal tool or object on the battery. Doing so could create a spark or short circuit which goes through the battery or another electrical tool that may create an explosion.

CAUTION

LIMITATIONS OF USE
Do not use in connection with life support systems or other medical equipment or devices.
This battery charger is not to be used by persons with reduced physical or mental capabilities or lack of knowledge and experience. Not to be operated or used by children.

INSTALLATION

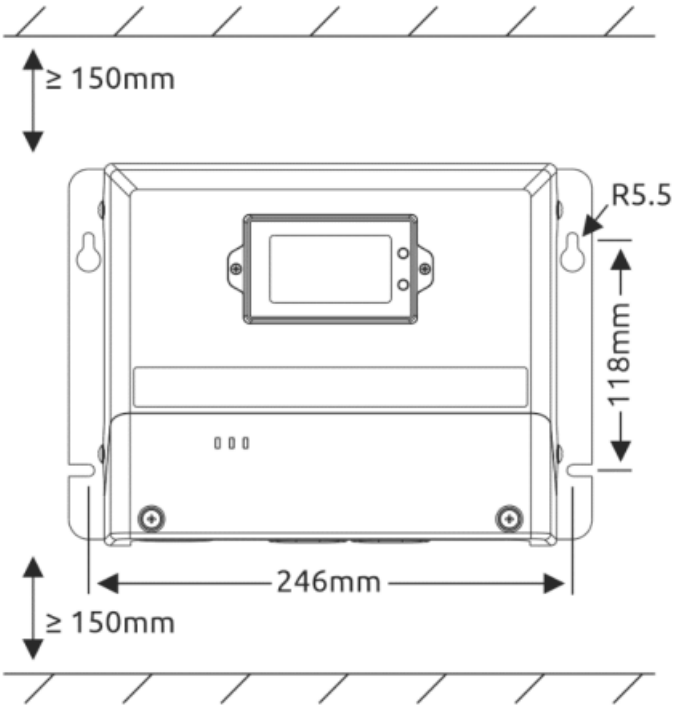
Installation precautions

WARNING

- The PV (solar panel) input of this product is not isolated from the battery output. Therefore the PV-, battery- and control circuits are considered hazardous and should not be user accessible.
- Keep at least 15cm of clear space available above and below the product
- Always protect the PV and battery connections against inadvertent contact. Install the product in a well ventilated enclosure or provide other means of protection.
- Always use flexible multistranded copper cables for the PV and battery connections. Using cables with a too low strand count will result in a higher contact resistance which eventually may result in fire hazards.
- Always provide a means of strain relief for all connected cables, in order to limit the amount of mechanical stress to the connections
- Make sure that the ambient temperature is between -35°C and +60°C. Above + 45°C the solar charger will automatically derate the output power. Do not expose the charger to any heat source (such as direct sunlight or heating). Also avoid charger exposure to excessive vibrations.

Mounting
Please see the image below for the basic mounting instructions:

Always mount the Solar charger in the orientation as shown on the left (connections pointing downwards). When mounted otherwise, proper functionality and safety cannot be guaranteed.



Wiring details

WARNING

- For user safety during installation, please make sure that the output of the supplying PV source is switched off (open circuit breaker in the PV supply lines or protect the solar panels from light by covering these). Also remove the fuse from the output battery positive line.
- The wiring example in this chapter is primarily intended as a functional one. Always check your local regulations, codes and requirements for installing a solar charger.
- Make sure that all PV and battery screw terminal connections are strongly tightened (2 – 2.5Nm)
- For detailed PV and solar charger grounding schemes and ground fault detection implementation, please follow your local electrical regulations.

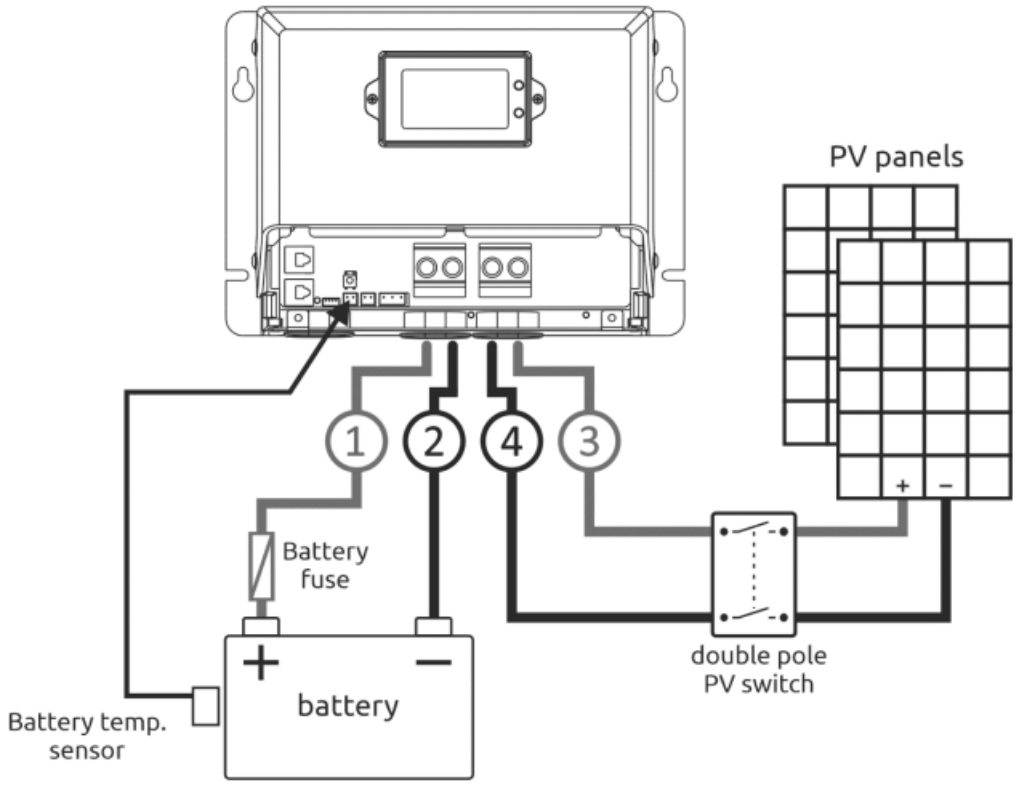
CAUTION

- To avoid solar charger damage, please check if the maximum open circuit voltage (Voc) of a series string of PV panels, does not exceed the maximum input voltage of the solar charger. Please take into account that Voc increases as the temperature decreases. Typically, Voc is 10% higher at 0°C compared to the often rated 25°C value. It can even rise to +25% at extremely low temperatures down to -40°C.
- Please double check if the battery voltage matches the specifications of the used charger model
- Please double check the polarity of the PV source as well as the battery. Long term reverse connection of the battery, may damage the solar charger.
- Ground the frames and mounting racks of your PV panels to reduce the chance of lightning damage. Do not connect the positive or negative PV wires to ground.

The image below shows a general wiring example of the solar charger. The main PV and battery connections are indicated by a number (1 to 4). It is very important to exactly follow this wiring order to avoid solar charger and/or battery damage. The wiring order is:

1. Battery positive cable
2. Battery negative cable

   Then wait 3 seconds for proper automatic battery voltage detection (see chapter 3.1)
3. PV positive cable1)
4. PV negative cable1)
    1. When a double pole switch is installed in the PV lines, both positive and negative cables are of course allowed to be switched on simultaneously.



Notes:

- The solar charger can be installed in a positive or in a negative grounded system. In a vehicle for example, always apply a short single ground connection, ideally close to the battery, to avoid ground loops that could cause system instabilities.
- Please check the table below for maximum PV and battery current levels plus advised minimum cable sizes:

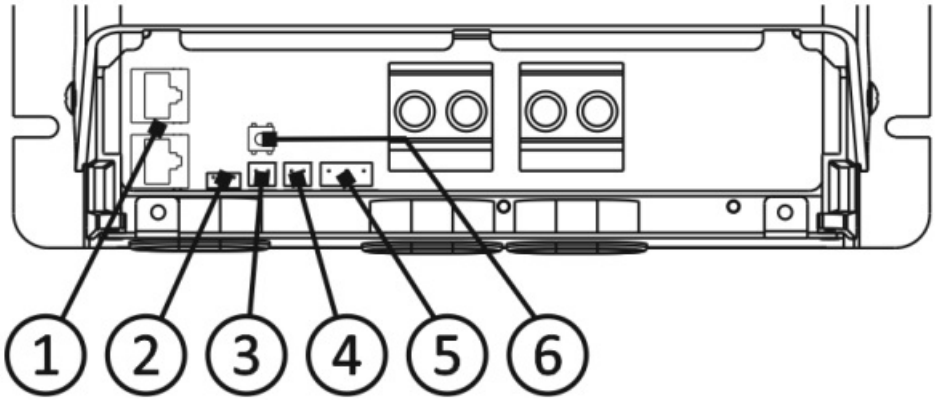
Charger model	**PV max. input current**	**Min.PV wire size**	**Battery max. charge current**	**Min. battery wire size**
OCS 150-60	50A	16mm^2	60A	16mm^2
OCS 250-70	40A	10mm^2	70A	16mm^2

- Please check the next table for battery fuse recommendations:

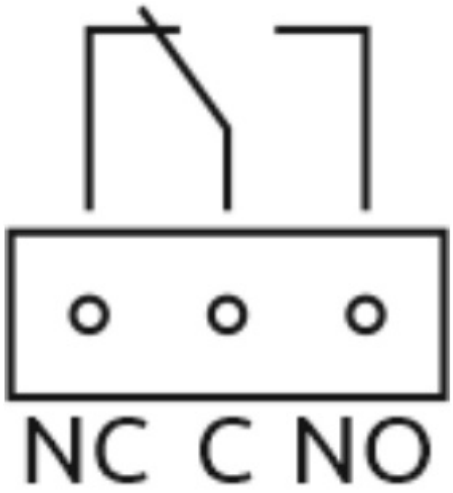
Charger model	Min. fuse rating	Max. fuse rating
OCS 150-60	70A	85A
OCS 250-70	85A	100A

- When the battery temperature sensor is connected to the solar charger to enable temperature compensated charging, please make sure that this sensor is located as close as possible to the battery. When no temperature sensor is connected to the solar charger, charge voltages will not be compensated against varying temperature.

Other connections
The solar chargers are equipped with a few additional in- and outputs, plus an internal setup button. Please see below for the locations and further information:



1. Intended for future use. Do not connect to any accessory or other device.
2. Expansion port, intended for future use. Do not connect to any accessory or other device.
3. Battery temperature sensor connector.
4. Intended for future use. Do not connect to any accessory or other device.
5. Connector for internal alarm relay. Please see below the contact order:
   The alarm relay will be triggered (C connects to NO) when a battery under- or overvoltage limit has been exceeded. When the battery voltage is in normal range, the relay contacts are in the position as indicated on the left (C connects to NC). The relay contact specifications are 10A @ 230Vac or 30Vdc.

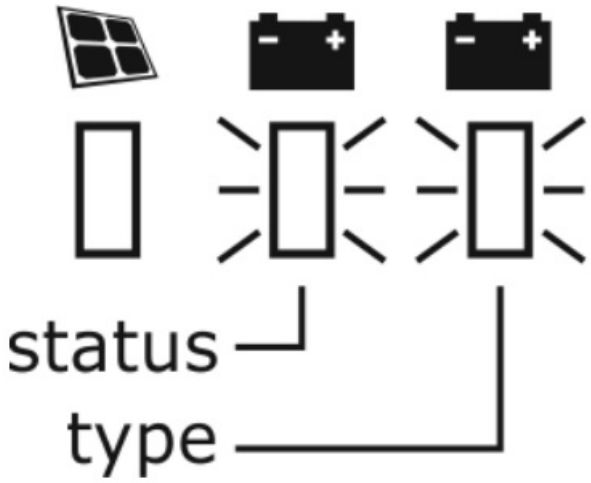


6. Setup button. This button can be used to select a different battery type, or to reset the solar charger back to factory default settings.

Detachable display for remote use
The display module attached to the front panel can be detached easily by removing the two screws. This allows the display module to act as a wired remote control. The interconnection cable between the solar charger and the display module is a straight wired (1:1) 9 pole DSUB9 male to DSUB9 female cable. This is a standard serial communication cable that is widely available. The maximum advised cable length is 10 meter.

COMMISSIONING

Connecting the battery
As explained in chapter 2.3, it is important to first connect the battery to the solar charger by placing the battery fuse or close the circuit breaker. When the battery is connected, the solar charger will automatically detect the battery's nominal voltage. After this, the battery status and battery type LEDs will be lit.



The battery status LED globally indicates the battery's condition. It can light in the following colors:

Battery status LED color	Indicator mode	Battery status
Green	Continuous	Battery full
Yellow	Continuous	Battery normal
Red	Continuous	Battery voltage below undervoltage alarm value
	Quickly flashing	Battery undervoltage, overvoltage or overtemperature alarm

The battery type LED indicates the selected battery type and its corresponding charge program. The factory default battery type setting is 'AGM (sealed)' which corresponds to a green battery type LED. The following alternative battery types are available:

Battery type LED color	Selected battery type
Red	Flooded (FLD) [1)]
Yellow	GEL[1)]
Green	AGM (SLD) [1)]
Blue	LiFePo4 (12V)[2)]
Purple	LiFePo4 (24V)[2)]
Orange	LiFePo4 (36V)[2)]
Cyan	LiFePo4 (48V)[2)]
White	Custom (user programmable)[3)]

1. For lead based batteries, the nominal voltage will be detected automatically
2. For LiFePo4 batteries, the nominal voltage has to be selected manually
3. The factory default parameters for the ‘Custom’ battery type are the same as the ‘AGM (Sealed)’ battery type
   Please see the table below for an overview of the main factory default parameter values of each battery type:

Battery type[1)]				
Parameter	AGM (SLD)	GEL	Flooded (FLD)	Lithium / LiFePo4 (LI)
Charge Voltage	14.6V	14.2V	14.4V	14.4V
Absorption Time	120 minutes	120 minutes	120 minutes	–
Float Voltage	13.6V	13.4V	13.4V	–
Restart Voltage	13.2V	13.2V	13.2V	13.2V
Auto Equalize Charge	–	–	30 days	–
Equalize Voltage	–	–	14.8V	–
Equalize Duration	–	–	120 minutes	–
Temperature Compensation	-3mV/°C/cell	-3mV/°C/cell	-3mV/°C/cell	–
Overvoltage Alarm	16.0V	16.0V	16.0V	16.0V
Undervoltage Alarm On Value	11.6V	11.6V	11.6V	12.0V
Undervoltage Alarm Relay Trigger	11.0V	11.0V	11.0V	11.4V
Undervoltage Alarm Off Value	12.4V	12.4V	12.4V	12.4V
Undervoltage Alarm Delay Time	6 seconds	6 seconds	6 seconds	6 seconds

1) Multiply all voltage values by a factor of 2, 3 or 4 for respectively 24V, 36V and 48V systems

When different charge program parameters are desired, the Custom (USE) battery type can be selected. For further parameter explanations or info on how to create a Custom charge program, please download the Omnicharge Solar user manual from our website.

CAUTION
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.

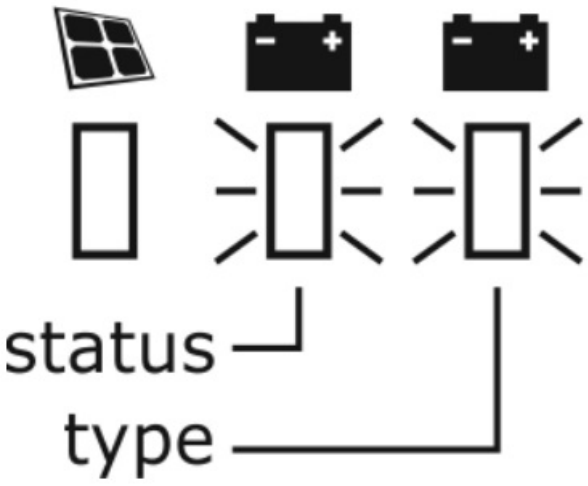
Battery type selection and solar charger reset

The battery type can be changed in three ways. This can be done using the setup button inside the connection compartment of the solar charger, by using the control display on the front panel or by using the TBS Dashboard Mobile app. In this installation manual we will only explain the setup button method. The two other methods will be explained in the Omnicharge Solar user manual that can be downloaded from our website.

WARNING
When using the internal setup button to change the battery type, please make sure that the PV array is completely disconnected from the solar charger.

To enter the battery type setup mode using the setup button, it must be pressed for at least 8 seconds. After this 8 seconds the battery type LED starts flashing and the setup button can be released. Each time the setup button is pressed again, the color of the battery type LED will change according to the table shown in chapter 3.1. Once the desired battery type color has been reached, the setup button must be pressed for 8 seconds again to save the new setting. This new setting is also saved automatically when the setup button has not been touched for more than 15 seconds.
The internal setup button can also be used to reset the solar charger completely to factory default settings. To do this, the setup button needs to be pressed for at least 20 seconds. A successful factory reset is confirmed once all three LEDs shortly start to flash in red. Then the setup button can be released.

Connecting the PV panels
When the battery connection and setup has been completed, it is time connect the PV panels to the solar charger (see chapter 2.3 for details). Provided that the PV panel array can supply and maintain a voltage that is at least 2V higher than the battery voltage, the solar charger will start the starting process. This process can be monitored by the PV array LED indicator (left side LED) which will now also be lit.



Please see the table below for various states of the PV array indicator LED:

PV array LED indicator mode	Charge state
 Steady on	MPPT charging (Bulk)
 Slow flashing	Absorption charging
 Single flashing	Float charging
 Quick flashing	Equalize charging
 Double flashing	Current limited charging (PV overpower)
Off	No charging

TECHNICAL SPECIFICATIONS

Parameter	OCS 150-60	OCS 250-70
System voltage	12Vdc / 24Vdc / 36Vdc / 48Vdc	
Maximum charge current[1)]	60A	70A
Self consumption	0.54W	
Battery voltage range	9.0 – 64.0Vdc	
Max. PV open circuit voltage	150Vdc	250Vdc
Max. PV short circuit current	50A	40A
MPPT voltage range	Vbatt + 2 up to 120Vdc	Vbatt + 2 up to 180Vdc
Max. PV input power 12V	800W	920W
24V	1600W	1840W
36V	2400W	2760W
48V	3200W	3680W
Charge characteristic	IUoUo, intelligent 3-stage, temp. compensated	
Supported battery types[2)]	Flooded / Gel / AGM / LiFePo4 / Custom (user defined)	
Maximum conversion efficiency	98%	
Maximum MPPT efficiency	99%	
LED indicators	Charge mode, Battery state and Battery type	
Display	Yes (detachable for remote use)	
Battery temperature sensor	Included	
Alarm relay	Yes (10A @ 230Vac or 30Vdc)	
Cooling	Natural convection (no fan)	

Protections	Battery and PV reverse polarity, output short circuit and over temperature
Operating temperature range	-35°C … +60°C
Storage temperature range	-40°C … +80°C
Communication	Through Dashboard Mobile app (iOS and Android)
Connections (PV + Battery)	Screw terminals (35mm^2 / 2 AWG)
Dimensions (HxWxD)	266x194x119mm
Weight	3.6kg
Protection class	IP32 (mounted in upright position)
Standards	EMC: 2014/30/EU, Safety: EN62109-1, Functionality EN62509-1 and RoHS: 2011/65/EU

1. Maximum output current tolerance is +/-5%. Automatic output current derating at Tambient > 45°C. Maximum output current is programmable via Dashboard Mobile app.
2. Selectable by setup button, display on solar charger or via Dashboard Mobile app

Please act according to your local rules and do not dispose of your old products with your normal household waste. The correct disposal of your old product will help prevent potential negative consequences for the environment and human health.

WARRANTY CONDITIONS

- TBS Electronics (TBS) warrants this product 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 product free of charge. TBS is not responsible for any costs of the transport of this product.
- This warranty is void if the product has suffered any physical damage or alteration, either internally or externally, and does not cover damage arising from improper use, 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 product and product 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.
- Examples of improper use are :
    - Too high PV input voltage applied
    - Reverse connection of PV or battery polarity

- Connecting wrong batteries (too high battery voltages)
- Mechanical stressed enclosure or internals due to harsh handling or incorrect packaging
- Contact with any liquids or oxidation caused by condensation

DECLARATION OF CONFORMITY

MANUFACTURER : TBS Electronics BV
ADDRESS : De Marowijne 3 1689 AR Zwaag The Netherlands

Declares that the following products :

- **PRODUCT TYPE :** MPPT Solar Charge Controller
- **MODELS :** OCS 150-60 and OCS 250-70

Conforms to the requirements of the following Directives of the European Union :

EMC Directive 2014/30/EU
Low voltage Directive 2014/35/EU
RoHS Directive 2011/65/EU

The above product is in conformity with the following harmonized standards :
EMC : EN61326-1:2021
Safety : EN62109-1:2010 and EN62509:2010

TBS Electronics BV De Marowijne 3 1689AR Zwaag The Netherlands OCS-60-70 Installation Manual Rev1endfs

Documents / Resources

	tbs electronics OCS 250-70 MPPT Solar Charge Controller Omnicharge Solar [pdf] OCS 150-60, OCS 250-70, OCS 250-70 MPPT Solar Charge Controller Omnicharge Solar, MP PT Solar Charge Controller Omnicharge Solar, Solar Charge Controller Omnicharge Solar, Cha rge Controller Omnicharge Solar, Omnicharge Solar, Solar

References

- Home - TBS Electronics EN
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