

Photonic Universe 20A MPPT solar charging kit set for 180W – 260W solar panels Instruction manual

Dear Customer,

Thank you very much for choosing **Photonic Universe** products. This manual will guide you through the installation of your solar kit and answer frequently asked questions. Please read this manual carefully before installing the kit.

Remember, any work should be carried out by an appropriately qualified person with all necessary precautions and safety measures taken.

Contents of the package

No	Item	Quantity
1	20A 12V/24V high efficiency MPPT solar charge controller with an LCD display	1
2	Plastic corner mounting brackets	4
3	Side mounting brackets	4
4	Waterproof double entry cable gland	1
5	5m single core solar extension cable 4.0mm ² cross section with MC4 connectors	2
6	5m double core battery cable 6.0mm ² cross section	1
7	Instruction manual for the kit	1

This Photonic Universe 20A MPPT solar charging kit set is suitable for 180W – 260W solar panels with the maximum power voltage between 30V and 100V and the open circuit voltage up to 100V.

The kit is designed for charging either one battery, or a battery bank connected in parallel for 12V (“+” to “+” to form a common positive, “-” to “-” to form a common negative) or a 24V battery bank (two 12V batteries connected in series “+” to “-”). For the purposes of this instruction manual, when we refer to a “battery”, we will either mean a single 12V battery, or a 12V/24V bank of several batteries.

Electrical installation of the solar kit

IMPORTANT: Please follow the order of installation carefully. Changing this order may result in false readings, incorrect wiring or damage to your equipment.

- Before you install the solar kit, please make sure that your battery is charged so that it generates at least 9V or more for a 12V system. For a 24V system, the voltage must be greater than 18V. This is required to enable the solar charge controller to work. If your battery is fully discharged, please charge it by other means first, otherwise the controller will not start.
- Connect the terminals of your battery to the solar controller battery terminals using the 6.0mm² double core battery cable included with the set. If the length of 5m cable is not enough, please use extra cable with an appropriate cross-section (6.0mm² or larger, depending on the length). On the controller end, use bare wires and fix them in screw terminals. On the battery end, use connectors suitable for your battery (ring terminals, battery clamps for studs etc).

Note: when you connect the battery to the solar controller, it will switch ON the LCD display. This means the controller has detected the battery and you can proceed with the installation. Do not continue if the LCD display on the controller does not turn ON, and follow the necessary steps in the Troubleshooting section of this manual.

- When connecting the solar panel to the charge controller, we recommend feeding the extension solar cable through the waterproof cable entry gland from outside-to-inside, and then attaching the solar panel cable via the MC4 connectors so that the MC4 connection point is outside of the cable gland. Make sure that the polarity of each cable is correct and attach additional polarity tags or coloured tape on the loose end of the solar extension cable. **Please ignore polarity signs on MC4 cable connectors and only follow polarity labels on the solar panel cables.** If the solar panel is

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exposed to bright light, we recommend putting some cover on it before connection (for example the carton box in which it came). Connect the solar panel cables to the solar terminals of the controller, and then remove the cover from the panel.

Note: after connecting the solar panel, and with the panel exposed to some light, the LCD display on the solar charge controller will show electricity flow from the solar panel to the battery. This means the controller has started charging your battery.

4. If your solar kit is installed in the vehicle or boat or another system with a negative common ground, **do not use any earthing or grounding** of the solar panel or load cables.
5. For other electrical installation details and information on how to operate and use the solar charge controller, please refer to the instruction manual for the solar charge controller.
6. This MPPT controller also has load terminals. Connecting a load (e.g. LED lights) is not necessary, but if you would like to connect it, please take note the following:
 - The load operating voltage should be the same as the battery voltage
 - Connection must be made via an in-line fuse with the current rating not higher than 20A
 - In addition to the manual setting mode for switching the load on/off, the controller can switch it automatically by timer settings. Please refer to the controller user manual for full details.
 - Under no circumstances should an inverter or other powerful appliance be connected to the load terminals of the solar charge controller.

To disconnect the system, the order of disconnection should be the reverse to connection. **You should disconnect the solar panel and loads from the controller first**, and then disconnect the battery. It is important that you follow this disconnection order if you need to remove or replace the battery.

Fitting the solar panel to your roof

1. Make sure all the components of your solar charging kit are disconnected when you start fitting the solar panel.
2. Choose a location for the solar panel where it will be exposed to maximum sunlight and minimum shading from nearby objects. Even a small shaded area can reduce the output significantly (e.g. leaves, shade from buildings etc.)
3. Drill holes in each of the corner and side plastic brackets in the designated places.
4. Attach the brackets to the solar panel frame (corners and sides) and mark corresponding holes on the frame.
5. Drill smaller holes in the solar panel frame, according to the diameter of self-tapping screws which you are planning to use (the drill size should be smaller than the screw diameter, so that screws grip well).
6. Using self-tapping screws, fix plastic brackets to the corners and sides of the solar panel frame.
7. Using an appropriate adhesive, bond the brackets with the solar panel to your roof (using the sand paper and cleaning the surfaces for better grip if needed). To ensure that the polarity of the wires is clear, mark the "+" solar panel lead so that it is visible from the outside.

Note: when choosing the adhesive / bonding agent for your installation, make sure it is suitable for outdoor use (e.g. suitable for a wide temperature range). For added strength, in addition to bonding the brackets to the roof, you can drill a small vertical hole in each bracket and fix the brackets by self-tapping screws (if the roof surface allows that). Sealant / adhesive should then be put on the top of the screws to make the area waterproof.

8. Feed the solar extension cables through the cable entry gland, the hole in your roof and then bond the gland to the roof. Tighten the cable gland nuts after the adhesive has dried.

Adding fuses to your system

Although the solar charge controller has battery protection functions, you can install fuses for the battery and the load, for additional protection against short circuits and wiring mistakes. They should be inline fuses between the solar charge controller and the battery, and between the controller and your load when

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using the load terminals.

The battery fuse should be installed **as close to the “+” battery terminal** as possible, but definitely not further than 15cm from the terminal. The battery fuse rating should be 15A if your solar kit came with 180W-210W solar panel or 20A if the kit came with 220W-260W solar panel (these ratings are given for a 12V battery system; for 24V battery system, the battery current will halve and fuse ratings should be adjusted accordingly). The load fuse rating should normally be marginally higher than the load current consumption, but not higher than 20A. Please refer to the solar charge controller user manual for more information about installing fuses.

Charging by the engine or another charger

In a vehicle or boat, it is possible that the battery connected to the solar charge controller will also be charged by an engine from time to time, or another charger such as a mains charger. In such cases, you don't have to disconnect the battery from the solar charge controller, but please note the following:

- When charging the battery by the engine or a mains charger, the voltage at the terminals of the battery will increase
- The solar charge controller will detect this increase in voltage and might treat it as if the battery was fully charged. So the controller might switch solar charging off temporarily.
- When you stop charging by another charger, the solar charge controller will resume charging the battery.

Frequently asked questions

Q. What type of batteries can be used with this kit?

A. Any sealed, gel or flooded 12V/24V lead acid battery normally used in caravans, motorhomes, cars, boats, motor cycles, or in off-grid power systems.

Q. Can the kit charge a bank of several batteries?

A. Yes. The batteries should be the same type, capacity and age. For example, it is possible to connect 2 x 12V batteries (wired in parallel, “+” to “+”, “-” to “-”) to the terminals of the solar controller for a 12V system.

Q. Can the kit charge 2 separate 12V batteries?

A. Yes, but not at the same time. This kit can only charge one battery or battery bank at a time. If the two batteries are isolated, then you would need to charge each battery one by one. Remember that the solar panel and load must be disconnected from the controller before swapping the batteries.

Q. Is there any risk that the solar kit will overcharge my battery?

A. The solar charge controller has a built-in overcharge protection – it will ensure that your battery is not overcharged, by reducing the charging current/voltage to the trickle charge level or stopping the charge completely when the battery is full. However it is your responsibility to make sure that your battery size and capacity can accept the maximum charging current from the solar panel, which can be up to 20A depending on the solar panel size.

Q. My battery recharges quickly but does not last very long. I think the solar kit undercharges it?

A. No, this is not a kit problem. Most likely your battery is at the end of its useful life so the capacity has shrunk. Consider replacing it with our special AGM or gel deep cycle batteries (see Appendix 2).

Q. Does the kit produce less power in the winter than in the summer?

A. Generally the output of the solar kit is proportional to the amount of light falling on the solar panel surface. If the daytime gets shorter in the winter, the total output of the solar kit will reduce proportionally. The kit would produce significantly less energy on a dark cloudy day compared to a bright sunny day. The output would also reduce if the sun is low in the sky, compared to when the sun is high in the sky.

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Q. Can I upgrade the solar kit to generate more power and charge my batteries faster?

A. The solar charge controller can work with solar panels with up to 260W (12V) or 520W (24V) combined power. Therefore, you can add another solar panel to your kit only if you are charging 24V batteries. If you are charging 12V batteries, you will need to upgrade the solar charge controller and cables before adding an extra panel. It is essential that the second solar panel is made of the same type solar cells from the same manufacturer, and it has the same power rating. If you need help with upgrading your solar kit please contact **Photonic Universe** for assistance using the contact details below.

Q. Can I run 240V AC household appliances directly from my 12V battery?

A. No, you can only run 12V DC appliances directly from your battery. If you also want to run 240V AC household appliances you need an off-grid pure sine wave power inverter (see Appendix 3 for more details).

Troubleshooting

It is important to remember that if your battery is not getting enough charge, it does not necessarily mean there is a problem with the solar charging kit. In most cases the power drain from the battery would simply be higher than the power generated by the solar charging kit (especially in the winter when you might have a noticeable reduction in solar energy output and an increase in the energy consumption at the same time). Another reason could be that there is a power leakage in your system. Only after disconnecting the battery from the system (e.g. vehicle / boat system) and from all your loads, and when you then left it charging for a considerable amount of time with no or little effect on the battery, should you use the following troubleshooting options:

- Disconnect and reconnect the system (solar panel should be disconnected first, then the load, and then the battery; connection in the reverse order: battery, load, and then the solar panel).
- If the controller does not recognise the battery (upon connection the battery light on the controller remains switched off), make sure that the battery generates at least 12.0V for troubleshooting purposes. If necessary, charge the battery by other means first. We recommend measuring the voltage directly from the battery terminals of the controller to make sure there is no broken link between the controller and the battery, and to ensure the polarity is correct.
- Disconnect the battery from your vehicle / boat / off-grid system (both “+” and “-”) so that there is no power drain or leakage.
- Check all connections to ensure they are secure and clean
- Check polarity of the battery connection and the solar panel connection
- Ensure the solar panel is exposed to sufficient light – ideally position it to face the sun directly
- For more information refer to the Troubleshooting section of the solar controller / display manual

Warranty

The solar charge controller included in this set is covered by 2 (two) year manufacturer warranty after purchase. Please refer to the warranty section of the solar charge controller manual for more information. The remote LCD display meter included in this set is covered by 1 (one) year warranty provided by Photonic Universe. We will repair or replace any products with defects at our discretion.

Disclaimer



Working with electricity and batteries can be dangerous. The information provided in this manual is for general guidance only. All work should follow the safety standards and should be carried out by an appropriately qualified person.

Photonic Universe Ltd is not responsible for any damage or injury caused by inappropriate installation or use of the product.

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You can easily add a

REMOTE LCD DISPLAY / METER

(MT50 series)

to your solar charging kit, to have advanced performance and monitoring details about your system in an easily accessible and visible place. The remote meter also allows you to programme many parameters on your solar charge controller, such as the battery charging voltage and more.



This remote meter simply plugs into your solar charge controller and starts working immediately. It doesn't require any separate power supply – it is only powered by the charge controller. The meter comes with 5m of cable so you can position it in a convenient location.

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Battery no longer able to hold a charge?

Choose 12V deep cycle AGM or GEL **Photonic Universe** batteries specially designed for solar charging kits and leisure applications



AGM Batteries

Best for large or powerful appliances such as fridges, pumps and inverters.

- ✓ Absorbed Glass Mat technology
- ✓ Completely sealed, non-spillable and maintenance free
- ✓ Low self-discharge
- ✓ 3-4 years design service life
- ✓ Better recovery from deep-discharge
- ✓ Faster charging up to 25A



Gel Batteries

Best for small appliances such as lighting, TV and phone charging.

- ✓ Electrolyte in gel form
- ✓ Completely sealed, non-spillable and maintenance free
- ✓ Very low self-discharge
- ✓ 4-7 years design service life
- ✓ Better recovery from deep discharge
- ✓ Suitable for outdoor installations and temperatures up to -10°C

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