Photonic Universe
www.photonicuniverse.com

10A solar charging kit set
for 40W – 120W Photonic Universe 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

№	Item	Quantity
1	10A solar charge controller	1
2	Plastic corner mounting brackets	4
3	Waterproof double entry cable gland	1
4	5m double core battery cable 2.5mm^2 cross section with 10A fuse, fuse holder and 8mm ring terminals	1
5	Pair of waterproof MC4 cable connectors	1
6	Instruction manual	1

This 10A solar charging kit set is suitable for 40W – 120W **Photonic Universe** solar panels with the maximum power voltage 17-22V and 5m cable with MC4 connectors attached to the solar panel. If the solar panel was supplied with a short 1m cable, you will also need a pair of solar extension cables in addition to this set.
The kit is designed for charging a 12V battery bank. For the purposes of this instruction manual, when we refer to a "battery", we will either mean a single 12V battery, or a 12V bank of several batteries connected in parallel ("+" to "+", "-" to "-").

Electrical installation of the solar kit

1. Before you install the solar kit, please make sure that the 12V battery is charged so that they generate at least 6V or more. This is required to enable the solar charge controller to work. If your batteries are fully discharged, please charge them by other means first, otherwise the controller will not start.
2. Connect the terminals of your 12V batteries to the solar controller battery terminals, following the order of connection stated in the solar controller manual. If the length of 5m cable is excessive you can shorten the cable.
   Note: when you connect the battery to the solar controller, the battery LED lights on the controller should light up. This means the controller has detected the batteries. You can find more information about this in the user manual of the solar charge controller under LED indicators.
3. When connecting the solar panel to the charge controller, we recommend installing additional MC4 connectors approximately 1m away from the solar panel for ease of connection, and also for feeding the solar panel cable through the waterproof cable entry gland. Follow the instructions below to install additional MC4 connectors:
   - If your solar panel was supplied with 5m cable with MC4 connectors, cut this cable approximately 1m from the solar panel (so that 1m cable remains attached to the solar panel and 4m cable with MC4 connectors becomes a separate piece of cable). Attach the pair of MC4 connectors supplied with the kit on the end of 1m solar panel cable (note the polarity printed on MC4 connectors: male should be attached on "+" lead, female on "-" lead). You may need pliers or a crimping tool to attach MC4 connectors.

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- Plug the MC4 end of 4m cable (which has been cut off from the solar panel) into the new MC4 connectors on 1m solar panel cable
- Connect bare ends of 4m cable to the solar controller. Make sure connection polarity is correct according to the original polarity labels on the solar panel cable: "+" to "+", "-" to "-".

Note: if you do not need this additional MC4 connectivity point, you can skip this step by simply cutting the existing MC4 connectors on the end of 5m solar panel cable off, and connecting the bare wires to the screw terminals of the solar charge controller.

Note: after connecting the solar panel to the controller, and with the panel exposed to some daylight / sunlight, solar panel (PV) LED on the controller should turn to constant ON to show connection. If the batteries can accept a charge then the solar panel (PV) LED will slowly flash around once a second. This means the controller has started charging your batteries. If the controller LEDs turn to ON constantly after a short period of flashing slowly, it might mean that the batteries are fully charged. Please check the battery voltage with a digital multimeter for confirmation. If the solar panel LED is flashing fast at around 5 times per second then the solar cable polarity may be incorrect and need reversing.

4. For maximum output from the solar panel make sure it is exposed to as much sunlight as possible and it is not shaded. Even a small shaded area can reduce the output significantly (e.g. leaves, shades from trees etc.)
5. For information on how to operate the controller, including choosing the battery type and load settings, please refer to the instruction manual for the solar charge controller.

To disconnect, the order should be the reverse to connection. **You should disconnect the solar panel from the controller first**, and then disconnect the battery. It is important that you follow this disconnection order if you need to change 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.
3. Drill holes in each of the plastic corner brackets in the designated places.
4. Attach the brackets to the solar panel frame 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 of the solar panel frame.
7. Using an appropriate adhesive, bond the brackets with the solar panel to your roof (using sand paper and cleaning the surfaces 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. it's 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 panel 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 in each of the battery circuits for additional protection against short circuits and wiring mistakes. They should be inline

fuses between the solar charge controller and each of the batteries. The size of fuses depends on the maximum charging current of the solar panel. Please check solar panel specifications for *Maximum power current* and choose a fuse with the next available rating higher than that (to a maximum of 10A).

Negative common ground of vehicles and boats

Most vehicles (including campervans and motorhomes) and boats typically have the common ground when a vehicle body or boat hull is used as a shared connection point by the engine, generator, battery, lights and other system components. When installing the solar kit on such vehicles / boats, please note the following:

- To avoid any short circuits or conflicts between you vehicle / boat system and the solar kit system, you should never ground the solar panel (i.e. never connect it to your vehicle body / boat hull). The solar panel cables should be fully electrically isolated from your vehicle body / boat hull and should be connected directly to the solar charge controller.
- This solar charge controller has a positive common ground design (which means that internally the positive terminals of the solar panel, battery and load are connected and the regulation happens through the negative terminals). Therefore any positive terminal of the controller (solar, load or battery) can be earth connected if required. NOTE: if your system is a negative common ground system (e.g. a vehicle or a boat), you can still use this solar charge controller in your system. However you must not use grounding of any of the positive terminals of the solar charge controller. You should not ground the negative terminals of the solar panel or the load either. The only terminal of the controller which can be connected to your 4 negative common ground is the negative battery terminal.

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 your engine or alternator from time to time (e.g. your starter or “engine” battery). Sometimes you might also need to charge your battery by a different charger e.g. a mains charger. In such cases you do not need to disconnect this battery from the solar charge controller, but please note the following:

- When you charge one of your batteries by the engine or a mains charger, the voltage at the terminals of this battery will increase
- The solar charge controller will detect this increase in voltage and treat it as if the battery was fully charged. So the controller might switch solar charging off temporarily for this particular battery to prevent overcharging.
- When you stop charging by another charger, the solar 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 DC battery normally used in caravans, motorhomes, cars, boats, motor cycles etc. Please note that battery type setting is set to **sealed** as default and battery type can only be changed from default using one of the communication methods listed in the user manual.

Q. Can this kit charge a 24V battery?

A. No, this kit is designed to charge 12V batteries. If you add another identical solar panel, the kit will be able to charge a 24V battery. Before you make any changes, you will need to contact **Photonic Universe** first for assistance and advice on the type of solar panel which can be used and the wiring.

Q. Can the kit charge a 12V battery bank?

A. Generally batteries in the same 12V battery bank should have the same type, capacity and age. In this case the kit can be used for charging such battery banks, and each 12V battery bank should be treated as

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a single battery for the purposes of connection. For example, it is possible to connect 2 x 12V batteries (wired in parallel, “+” to “+”,“-” to “-”) to the battery terminals of the solar controller.

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.

Q. My battery gets charged 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 1).

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

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

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 160W combined power. If the wattage of your solar panel allows it, you can add another solar panel to your kit so that the total combined power output is less than 160W. This second solar panel should be connected in parallel to your existing solar panel (“+” to “+”,“-” to “-”). It is essential that the second solar panel is made of solar cells from the same manufacturer.
If the wattage of your solar panel does not allow adding another solar panel (e.g. 150W solar panel), then you will need to upgrade the solar charge controller to 20A before adding another solar panel.
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 from my 12V battery?

A. You can run 12V DC appliances from your battery, but if you also want to run 240V AC household appliances you need an off-grid pure sine wave power inverter (see Appendix 2 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 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 of your vehicle / boat and from all your loads, and when you then left it charging for a considerable amount of time with no effect on the battery, should you use the following troubleshooting options:

- Disconnect and reconnect the system (solar panel should be disconnected first, then the battery; connection in the reverse order: battery, 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 11.5V for troubleshooting purposes. If necessary, charge the battery by other means first.
- Disconnect the battery from your vehicle / boat (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 manual

Warranty

The solar charge controller included in this set is covered by 1 (one) year warranty after purchase. The warranty is 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.

Photonic Universe Ltd ***- Bringing you the benefits of solar power -***

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Appendix 1

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 -10ºC

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Appendix 2

Need an inverter for your battery to run 240V household appliances?

Choose 12V DC pure sine wave off-grid power inverter from **Photonic Universe** with 240V AC mains power output

Visit our online store at **www.PhotonicUniverse.com** to find out more

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