Photonic Universe

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10A / 20A Waterproof Solar Charge Controller

PU1024WP / PU2024WP series

INSTRUCTION MANUAL

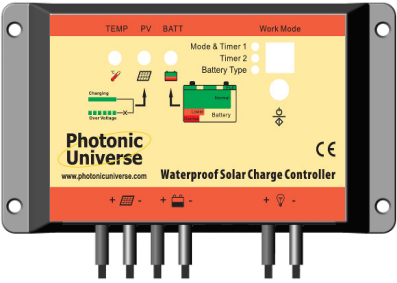
Dear Customer,

Thank you very much for choosing our product.
This manual contains important information about the installation and operations of your charge controller.

Please read this manual carefully **before installation** and pay special attention to the safety recommendations.

10A / 20A Waterproof Solar Charge Controller

PU1024WP / PU2024WP series



Specification Summary

Nominal system voltage	12 / 24VDC*
Maximum PV input voltage	50V
Nominal charge / discharge current	
PU1024WP	10A
PU2024WP	20A

*** The controller will determine the system rated voltage at start up. If the battery voltage is lower than 18V, it recognises the system as 12V. If the battery voltage is greater than 18V, it recognises the system as 24V.**

Contents

1. Important Safety Information

Read this carefully

This manual contains important information about the safe installation and operations of the charge controller.

The following signs are used throughout this manual to indicate potentially dangerous conditions or mark important safety recommendations. Please pay special attention when you see these signs:

WARNING: Indicates potentially dangerous conditions. Use extreme caution when performing this task.

CAUTION: Indicates a critical procedure for safe and proper operation of the controller.

NOTE: Indicates a procedure or function that is important for the safe and proper operation of the controller.

General Safety Information

- Read the full instruction manual before installing the solar charge controller.
- There are no parts serviceable by users. Do not disassemble or attempt to repair the controller.
- Install external fuses/breakers as required.
- Disconnect the solar module and fuse / breakers before installing or adjusting the controller.
- Confirm that power connections are tightened to avoid excessive heating from a loose connection.

2. General Information

2.1 Product Overview

Thank you for choosing this **Photonic Universe** waterproof solar charge controller, which uses advanced digital technologies and operates in a fully automated mode. One of the features of this controller is Pulse Width Modulation (PWM) battery charging technique which can increase the lifetime of your battery and improve performance of the solar system. Other features of this controller include:

- 12V / 24V automatic recognition.
- High efficiency Series PWM charging - extends the life of your battery and improves charge acceptance.
- Use of MOSFET as an electronic switch, without any mechanical switch.
- Automatic recognition of day and night.
- Digital LED menu, with only one key to select all settings.
- Intelligent timer function with 1-15 hours option.
- Unique dual timer function which makes the controller a perfect choice for solar lighting systems.
- Waterproof design, suitable for environments with high humidity or dust.
- Gel, Sealed and Flooded battery type options.
- Adopts temperature compensation, corrects the charging and discharging parameters automatically and extends battery life.
- Electronic protection from over charging, over discharging, overheating, overload, short circuit and reverse current.
- Reverse polarity protection: any combination of solar module and battery.

The controller is designed for off-grid solar systems, including solar lighting. It protects the battery from being over charged by the solar module and over discharged by the load. The charging process is optimised for long battery life and improved system performance. The comprehensive self-diagnostics and electronic protection functions

can prevent damage from installation mistakes or system faults.

Though the controller is easy to operate and use, please take your time to read this manual and become familiar with it. This will help you make full use of all the functions and improve performance of your solar PV system.

2.2 Product Features

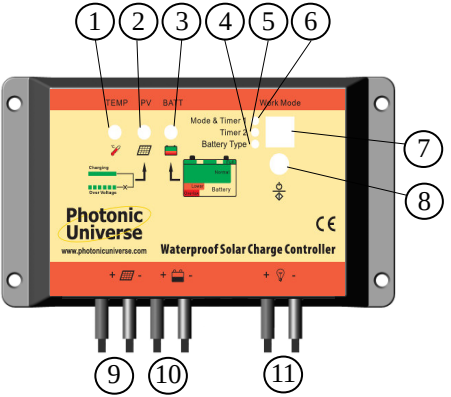


Figure 2-1 Solar Charge Controller features

1. Temperature sensor

Measures ambient temperature and makes temperature compensation for charging and discharging.

2. Charging status LED indicator

An LED indicator that shows charging status and also indicates when battery voltage is higher than battery over-voltage disconnect voltage.

3. Battery status LED indicator

An LED indicator that shows battery status and remaining charge.

4. Battery type setting indicator

The indicator will be on when you select the battery type.

5. Timer 2 setting indicator

The indicator will be on when you set timer 2.

6. Timer 1 setting indicator

The indicator will be on when you set timer 1.

7. LED digital display

Display the load work mode and status.

8. Setting button (in manual mode used for load ON/OFF)

Sets load work mode and selects battery type.

9. Solar module cables

Cables for connecting solar modules.

10. Battery cables

Cables for connecting battery or battery bank.

11. Load cables

Cables for connecting loads.

3. Installation Instructions

3.1 General Installation Notes

- Read through the entire installation section first before beginning the installation.
- Be very careful when working with batteries. Wear eye protection and gloves. Have fresh water available to wash with immediately and clean any contact with battery acid.
- Use insulated tools and avoid placing metal objects near the batteries.
- Batteries might produce some explosive gasses during charging. Make sure there is sufficient ventilation in the work area.
- Avoid letting the batteries be exposed to direct sunlight during outdoor installation.
- Loose power connections and/or corroded wires may result in

resistive connections that melt wire insulation, burn surrounding materials, or even cause fire. Ensure connections are tight and use cable clamps to secure cables and prevent them from swaying in mobile applications.

- Use with Gel, Sealed or Flooded batteries only.
- The battery connection may be wired to one battery or a bank of batteries. This manual refers to a single battery, but the battery connection can be a group of batteries in a battery bank.
- Select the system cables based on 3.5A / 1 mm^2 cable cross section.

3.2 Mounting

NOTE: When mounting the controller, ensure air can circulate through the controller heat sink. There should be at least 6 inches (150 mm) of clearance above and below the controller to allow for cooling. If mounted inside, ventilation is strongly recommended.

WARNING: Risk of explosion! Never install the controller in a sealed case with flooded batteries. Do not install in a confined area where battery gases can accumulate.

Step 1: Choose mounting location

Position the controller on a vertical surface protected from direct sunlight, high temperatures and water. Ensure there is adequate ventilation.

Step 2: Check for clearance

Place the controller where it will be mounted. Verify that there is sufficient room to run wires and clearance above and below the controller for air flow (see Figure 3-1).

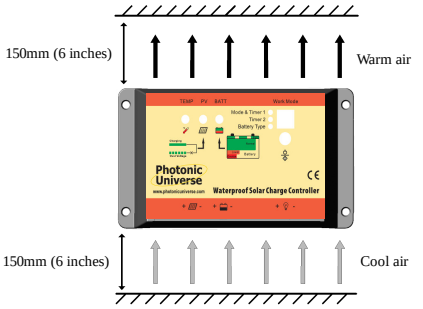


Figure 3-1 Mounting and cooling

Step 3: Mark holes

Use a pencil or pen to mark the four (4) mounting hole locations on the mounting surface.

Step 4: Drill holes

Remove the controller and drill holes in the marked locations.

Step 5: Secure controller

Place the controller on the surface and align the mounting holes with the drilled holes in step 4. Secure the controller in place using the mounting screws.

3.3 Wiring

NOTE: A recommended connection order has been provided for maximum safety during installation.

NOTE: The controller is a common positive ground controller. If your system (e.g. vehicle or boat) is a negative common ground system, you can still use the controller, but you SHOULD NOT use earthing of any "+" or "-" cables, even if it's shown on the diagrams below.

CAUTION: Do not connect the loads with surge power exceeding the rating of the controller.

CAUTION: For mobile applications, be sure to secure all wiring. Use cable clamps to prevent cables from swaying when the vehicle is in motion. Unsecured cables create loose and resistive connections, which may lead to excessive heating and/or fire.

Step 1: Battery wiring

WARNING: Risk of explosion or fire! Never short circuit battery positive (+) and negative (-) or cables.

Before the battery is connected, make sure the battery voltage is greater than 6V so as to start up the controller. If the system is 24V, make sure the battery voltage is not less than 18V. System voltage will be automatically recognised when the controller starts up for the first time.

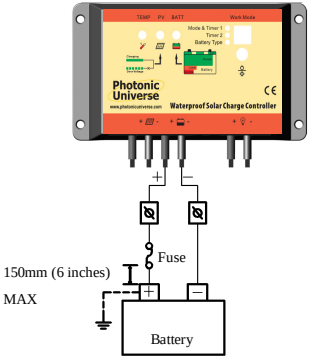


Figure 3-2 Battery connection

When installing the fuse, make sure that the distance between the fuse holder and the positive terminal of the battery is no more than 150mm. **Do not insert a fuse at this time**.

Step 2: Load wiring

The controller load cables can be connected to electrical equipment, such as lights, pumps, motors etc. which have the same working voltage as the battery.

Connect the positive (+) and negative (-) of loads to the controller load cables as shown in Figure 3-3.

An in-line fuse holder should be wired in series in the load positive (+) or negative (-) wire as shown in Figure 3-3. **Do not insert a fuse at this time**.

When wiring the load connection to a load distribution panel, each load circuit should be fused separately. The total load draw should not exceed the rated load current of controller.

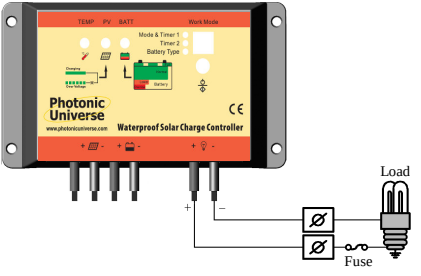


Figure 3-3 Load Wiring

It is unnecessary to connect any load to load cables of the charge controller if your system is intended for battery charging only. Load cables can be left unconnected, however they must be insulated to prevent short circuit.

Step 3: Solar wiring

WARNING: Risk of electric shock or sparks! Exercise caution when handling solar wiring. Cover the solar module(s) before wiring them to the charge controller.

The controller can accept 12V, 24V nominal off-grid solar module(s). Grid-tie solar module(s) may be used if their open circuit voltage does not exceed the maximum PV input voltage of the controller.

NOTE: the controller cannot work with non-PV sources of input power. For example, it is not suitable for wind turbines.

The working voltage of the solar module(s) must be equal to or greater than the system voltage. For example, it is not possible to use an 18V solar panel to charge a 24V battery – the controller will require the solar panel voltage to be 24V or higher.

Cover the solar module(s) before you link the battery circuit with a fuse.

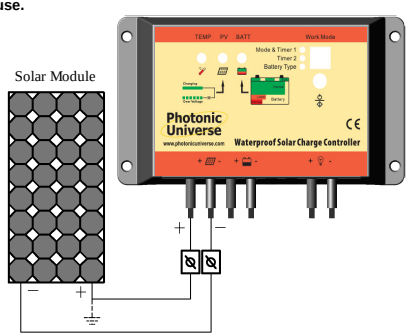


Figure 3-4 Solar wiring

Step 4: Check wiring

Double-check the wiring in steps 1 to 3. Confirm correct polarity at each connection. Verify that all connections are secure and tight.

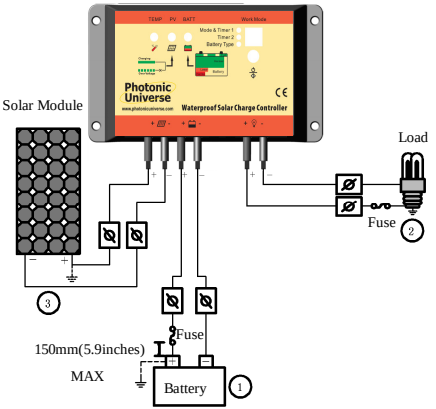


Figure 3-5 System wiring review

Step 5: Install fuses and remove cover from solar module(s)

Install a suitable fuse (fuse rating depends on the maximum solar and load current) in each fuse holder in the following order:

1. Battery circuit 2. Load circuit

Then remove the cover from the solar module(s).

Step 6: Confirm power on

When battery power is applied and the controller starts up, the battery LED indicator will turn to green. If the controller does not start up, or the battery status LED error appears, please refer to section 5 for troubleshooting. If you need to disconnect the system, follow the order reverse to connection (solar panel, load, battery).

4. Operation

4.1 PWM Technology (Series Pulse Width Modulation)

The controller adopts the advanced series pulse width modulation

(PWM) charging mode.

The operating principle of PWM charging mode is as follows:

Firstly, the battery is charged with pulse current. It then stops charging for a short period, and then it resumes again. It is repeated in this way several times until the battery is fully charged. Breaks allow some oxygen and hydrogen generated by chemical reaction to be chemically combined again and then absorbed, which can eliminate concentration polarization and ohm polarization naturally, and reduce the internal pressure of the battery. This makes subsequent charging smoother and more power is charged to the battery. Intermittent pulse current charging mode leaves the battery more time to react, which reduces the gas volume and improves the acceptance rate of charging current.

4.2 Battery Charging Information

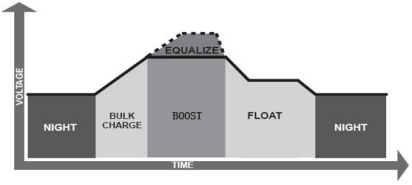


Figure 4-1 PWM Charging mode

- **Bulk charge**

In this stage, the battery voltage has not yet reached boost voltage and 100% of available solar power is used to charge the battery.

- **Boost charge**

When the battery has recharged to the Boost voltage set point, constant-current regulation is used to prevent heating and excessive battery gassing. The Boost stage lasts for 120 minutes and then passes to Float Charge.

- **Float charge**

After the battery is fully charged in Boost voltage stage, the controller reduces the battery voltage to the Float voltage set point. When the

battery is fully recharged, there will be no more chemical reactions and all the charge current becomes heat and gas. Then the controller reduces the voltage to the Float stage, charging with a smaller voltage and current. This reduces the temperature of the battery and prevents gassing, whilst also charging the battery slightly at the same time. The purpose of Float stage is to offset the power consumption caused by self-consumption and small loads in the whole system, while maintaining full battery storage capacity.

In Float stage, loads can continue drawing power from the battery. In the event that the system load(s) exceed the solar charge current, the controller will no longer be able to maintain the battery at the Float set point. Should the battery voltage remain below the boost reconnect charging voltage, the controller will exit Float stage and return to Bulk charge.

- **Equalise charge**

WARNING: Risk of explosion!

Equalizing flooded battery can produce explosive gases. Good ventilation around the battery is essential.

CAUTION: Equipment damage!

Equalisation may increase battery voltage to a level damaging to sensitive DC loads. Ensure that all load allowable input voltages are greater than the equalising charging set point voltage.

CAUTION: Equipment damage!

Over-charging and excessive gas precipitation may damage the battery plates and activate material shedding on them. Equalising charge may cause damage if it is too high or lasts too long. Please carefully review the specific requirements of the battery used in the system.

Certain types of batteries benefit from a periodic equalising charge, which can stir the electrolytes, balance battery voltage and complete chemical reactions. Equalising charge increases the battery voltage, higher than the standard complement voltage, which gasifies the battery electrolyte.

If the battery is being over-discharged, the solar controller will automatically turn to the equalise charging stage, which lasts for 120 minutes. To avoid excess gas precipitation or overheating of the battery the Equalise charge and Boost charge are not carried out constantly in a full charge process.

4.3 LED Indicators

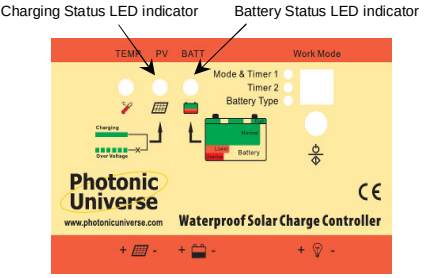


Figure 4-2 LED indicators

- **Charging status indicator**

GREEN (*ON*) - whenever sunlight is available for battery charging.

GREEN (*FAST FLASHING*) – system over-voltage.

Please refer to section 5 for troubleshooting.

Charging Status LED indicator Table 4-1

Colour	Indicator	Charging status
Green	On Continuous	Charging
Green	Fast Flashing	Battery over voltage

- **Battery status indicator**

GREEN (*ON*) - battery voltage within normal range.

GREEN (*SLOWLY FLASHING*) – battery is full.

ORANGE (*ON*) - battery under-voltage.

RED (*ON*) - battery over-discharged.

Please refer to section 5 for troubleshooting.

Battery status LED indicator — Table 4-2

Colour	Indicator	Battery status
Green	On Continuous	Normal
Green	Slowly Flashing	Full
Orange	On Continuous	Under voltage
Red	On Continuous	Over-discharged

- **Load status indicator**

When the load amp is 1.25 times the rated current for 60 seconds, or the load amp is 1.5 times the rated current for 5 seconds (overload); or load amp is more than 3.5 times of rated current (Short Circuit), the LED digital tube shows “L” with slow flashing. Please refer to section 5 for troubleshooting.

Load status LED indicator — Table 4-3

Colour	LED digital display	Load status
Red	“L”, slowly flashing	Overload or short circuit

- **Overheating protection indicator:**

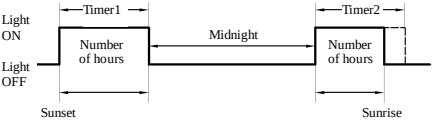
When the heat sink of the controller exceeds 85℃, the controller will automatically cut input and output circuit, with LED digital tube showing “H” slowly flashing. Please refer to section 5 for troubleshooting.

Overheating protection indicator Table 4-4

Colour	LED digital display	System status
Red	“H”, slowly flashing	Controller overheating

4.4 Setting Operation

Dual timer function



The default night length is 10 hours. The controller can learn the night length by referring to the previous night, so as to adapt to the different seasons. However, it will take some time to learn it.

NOTE: when the “OFF” time set on timer 2 is later than local sunrise time, the controller will turn off the load output at sunrise.

- **Load Control Settings**

1. ‘Dusk to Dawn’

When the solar module voltage goes below the point of NTTV (Night Time Threshold Voltage) at sunset, the controller will recognise the starting voltage and turn on the load after 10 minutes delay. When the solar module voltage goes above the point of DTTV (Day Time Threshold Voltage), the solar controller will recognise the starting voltage and turn off the load after a delay of 10 minutes.

2. Light ON + timer

When solar module voltage goes below the point of NTTV (Night Time Threshold Voltage) at sunset; the solar controller will recognize the starting voltage and turn on the load after a delay of 10 minutes. The load will be on for several hours; this period can be set by the user via Timer 1 (number of hours), and by switching Timer 2 off. Please refer to table 4-5 “Load Work Mode Setting”.

3. Test mode

This mode is the same as “Dusk to Dawn”, but without a 10 minute delay while the controller recognises the starting voltage. When below the starting voltage, the controller will turn the load on; if it is higher, it will turn off the load. The test mode makes it easy to check the system installation.

4. ON/OFF mode

This mode is to manually turn the load ON and OFF using the setting button.

- **Load Work Mode Setting**

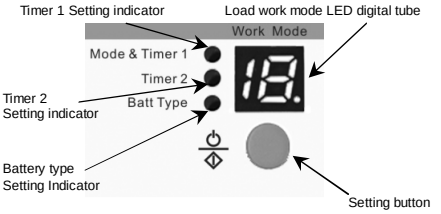


Figure 4-3 Indicators

Press the setting button once and the setting indicator will change from timer 1 to timer 2. Press it again and it will move to battery type, and then back to timer 1 as you press the button again.

When timer 1 setting indicator is illuminated, press and hold the setting button for at least 5 seconds until the LED digital display starts flashing. Then press and hold the setting button until the desired number appears according to table 4-5. Then leave the chosen number flashing until it stops and the controller records the setting. Set timer 2 in a similar way if needed according to table 4-6.

Load work mode setting Table 4-5

Timer 1	LED Digital No.
Disable	n
Dusk to Dawn, Load on all night	0
Load on for 1 hour after ten minute delay from sunset	1
Load on for 2 hours after ten minute delay from sunset	2
Load on for 3 hours after ten minute delay from sunset	3
Load on for 4 hours after ten minute delay from sunset	4
Load on for 5 hours after ten minute delay from sunset	5
Load on for 6 hours after ten minute delay from sunset	6
Load on for 7 hours after ten minute delay from sunset	7
Load on for 8 hours after ten minute delay from sunset	8
Load on for 9 hours after ten minute delay from sunset	9
Load on for 10 hours after ten minute delay from sunset	10
Load on for 11 hours after ten minute delay from sunset	11
Load on for 12 hours after ten minute delay from sunset	12
Load on for 13hours after ten minute delay from sunset	13
Load on for 14 hours after ten minutes delay from sunset	14
Load on for 15 hours after ten minutes delay from sunset	15
Test mode	16
ON/OFF mode	17

Load work mode Table 4-6

Timer 2	LED Digital No.
Disable	n
Load on for 1 hour before sunrise	1
Load on for 2 hours before sunrise	2
Load on for 3 hours before sunrise	3
Load on for 4 hours before sunrise	4
Load on for 5 hours before sunrise	5
Load on for 6 hours before sunrise	6
Load on for 7 hours before sunrise	7

Load on for 8 hours before sunrise	8
Load on for 9 hours before sunrise	9
Load on for 10 hours before sunrise	10
Load on for 11 hours before sunrise	11
Load on for 12 hours before sunrise	12
Load on for 13hours before sunrise	13
Load on for 14 hours before sunrise	14
Load on for 15 hours before sunrise	15

NOTE: If timer 1 is Dusk to Dawn (0), Test mode (16), or ON/OFF mode (17), timer 2 will be disabled and show 'n'.

- **Battery type setting**

When the battery type setting indicator is on, press and hold the setting button for at least 5 seconds until the LED digital display flashes. Then press the setting button until the desired number appears according to table 4-7. Then leave the chosen number flashing until it stops and the controller records the setting.

Battery type setting Table 4-7

Battery type	LED Digital No.
Sealed lead acid battery	1
Gel battery	2
Flooded battery	3

5. Protection, Troubleshooting and Maintenance

5.1 Protection

- **PV array short circuit**

If a PV array short circuit occurs, clear it to resume normal operation.

- **Load overload**

If the load current exceeds the maximum load current rating, the

controller will disconnect the load. Disconnect the system in the order reverse to connection, reduce the load and reconnect the system.

- **Load short circuit**

Fully protected against load wiring short-circuit. After one automatic load reconnect attempt, the fault must be cleared by reapplying power or pressing the setting button.

- **PV reverse polarity**

Full protection against PV reverse polarity, no damage to the controller as a result. Correct and rewire to resume normal operation.

- **Battery reverse polarity**

Full protection against battery reverse polarity, no damage to the controller as a result. Correct and rewire to resume normal operation.

- **Damaged local temperature sensor**

If the temperature sensor has short-circuited or is damaged, the controller will charge or discharge at the default temperature 25°C to prevent battery damage from overcharging or over discharging.

- **Overheating protection**

If the temperature of the controller heat sink exceeds 85°C, the controller will automatically start the overheating protection.

- **High voltage transients**

PV input is protected against transient high voltage. In lightning-prone areas, additional external suppression is recommended.

5.2 Troubleshooting

Troubleshooting Table 5-1

Faults	Possible reasons	Troubleshooting
Charging LED indicator off, even in sunny conditions	PV array disconnection or wrong polarity	Check that the PV and battery wire connections are correct (incl. polarity) and secure.

Green charging LED indicator is fast flashing	Battery voltage higher than over voltage disconnect (OVD) voltage	Check if battery voltage is too high. Disconnect the solar module.
Battery LED indicator is orange	Battery under voltage	The charging LED indicator will return to green automatically when the battery is charged.
Battery LED indicator is red and load not working	Battery over-discharged	The controller automatically cuts off the output. LED indicator will return to green automatically when the battery is charged.
Digital display shows "L", slowly flashing	Overload or short circuit	Overload: Reduce the load and press the button once - the controller will resume working after 3 seconds. Short circuit: When the first short-circuit occurs, the controller will automatically resume working after 10 seconds; if a second short-circuit occurs, press the button once - the controller will resume working after 3 seconds.
Digital display shows "H", (slowly flashing)	Temperature too high	If the heat sink exceeds 85℃, the controller will automatically cut input and output circuit. When the temperature falls below 75℃, the controller will resume working.

NOTE: If there is no LED indicator, measure the battery voltage with a multimeter. Min. 6V is needed to start up the controller.

NOTE: If the charging status LED indicator is not lit with normal connection, measure the input voltage of solar module - the input voltage must be higher than the battery voltage.

5.3 Maintenance

The following inspections and maintenance tasks are recommended at least twice a year for best controller performance.

- Check that the controller is securely mounted in a clean environment.
- Check that the airflow and ventilation around the controller is not blocked. Clear all dirt or fragments from the heat sink.
- Check all the wires to make sure insulation is not damaged from serious solarisation, frictional wear, dryness, insects or rats etc. Maintain or replace the wires if necessary.
- Tighten all the terminals. Inspect for loose, broken, or burnt wire connections.
- Check and confirm that the LED digital display is consistent with your requirements. Pay attention to any error messages and take the necessary corrective action.
- Confirm that all the system components are ground connected correctly and securely (**remember: no earthing in negative common ground systems**).
- Confirm that all the terminals have no corrosion, insulation damage, high temperature or burnt/discoloured signs, and tighten terminal screws to the suggested torque.
- Inspect for dirt, insects and corrosion. Tidy and clean if necessary.
- Check and confirm that the lightning arrester is in good condition. If required replace immediately to avoid damaging the controller and other equipment.

CAUTION: Danger - electric shock!
Make sure that the power is OFF when carrying out the above tasks.

6. Warranty

The Photonic Universe waterproof solar charge controller is guaranteed to be free from defects for a period of **one year** from the date of shipment to the original end user. We will either repair or replace defective products at our discretion.

- **Claim procedure**

Before requesting warranty services, check this Operation manual to be certain that there is a problem with the controller. Notify us about the defects by email / phone. If the problem cannot be solved remotely by our technical team, return the defective product to us with shipping charges prepaid. Provide proof of date and place of purchase. To obtain rapid service under this warranty, your information should include a detailed description of the failure, solar module and battery types, connection scheme, as well as load information (type, current, usage). This information is critical to help process your warranty claim.

This warranty does not apply under the following conditions:

1. Damage by accident, negligence, abuse or improper use.
2. PV or load current exceeding the ratings of product.
3. Unauthorised product modification or attempted repair.
4. Damage occurred during transit.
5. Damage as a result of natural disasters, lightning, extreme weather conditions.
6. Mechanical damage.

7. Technical specifications

Electrical Parameters Table 7-1

Description	Parameter
Nominal System Voltage	12 / 24VDC Auto work
Maximum Battery Voltage	32V
Rated Battery Current	PU1024WP 10A PU2024WP 20A
Charge Circuit Voltage Drop	≤0.26V
Discharge Circuit Voltage Drop	≤0.15V
Self-consumption	≤6mA

Threshold Voltage Parameters Table 7-2

Description	Parameter
NTTV (Night Time Threshold Voltage)	5V; x2/24V
DTTV (Day Time Threshold Voltage)	6V; x2/24V

Temperature Compensation Coefficient Table7-3

Description	Parameter
Temperature Compensation Coefficient(TEMPCO)*	-30mV/℃/12V（25℃ ref）

***Compensation of equalise, boost, float and low voltage disconnect voltage.**

Battery Voltage Parameters (temperature at 25℃) Table 7-4

Charging Parameters			
Battery charging setting	**Gel**	**Sealed**	**Flooded**
Over Voltage Disconnect Voltage	16V; x2/24V	16V; x2/24V	16V; x2/24V
Charging Limit Voltage	15.5V;x2/24 V	15.5V;x2/24 V	15.5V;x2/24 V
Over Voltage Reconnect Voltage	15V; x2/24V	15V; x2/24V	15V; x2/24V
Equalize Charging Voltage	-----	14.6V;x2/24 V	14.8V;x2/24 V
Boost Charging Voltage	14.2V;x2/24 V	14.4V;x2/24 V	14.6V;x2/24 V
Float Charging Voltage	13.8V;x2/24 V	13.8V;x2/24 V	13.8V;x2/24 V
Boost Reconnect Charging Voltage	13.2V;x2/24 V	13.2V;x2/24 V	13.2V;x2/24 V
Low Voltage Reconnect Voltage	12.6V;x2/24 V	12.6V;x2/24 V	12.6V;x2/24 V
Under voltage warning reconnect voltage	12.2V;x2/24 V	12.2V;x2/24 V	12.2V;x2/24 V
Under Voltage Warning Voltage	12V; x2/24V	12V; x2/24V	12V; x2/24V
Low Voltage Disconnect Voltage	11.1V;x2/24 V	11.1V;x2/24V	11.1V;x2/24 V
Discharging Limit Voltage	10.8V;x2/24 V	10.8V;x2/24 V	10.8V;x2/24 V
Equalize duration	-----	2 hours	2 hours
Boost duration	2 hours	2 hours	2 hours

Environmental parameters Table 7-5

Environmental parameters	Parameter
Working temperature	-35℃ to +55℃
Storage temperature	-35℃to +80℃
Enclosure	IP66

PU1024WP Mechanical parameters Table 7-6

Mechanical Parameter	Parameter
Overall dimension	145(5.71)x69(2.72)x31(1.22) mm/inches
Mounting dimension	135(5.31) x 49(1.93) mm/inches
Mounting hole size	Φ4.5
Pre-wired cable	4mm2
Net weight	0.3kg

PU2024WP Mechanical Parameters Table 7-7

Mechanical Parameter	Parameter
Overall dimension	144.6(5.69)x85(3.35)x34.3(1.35) mm/inches
Mounting dimension	135(5.31)x65(2.56) mm/inches
Mounting hole size	Φ4.5
Pre-wired cable	6mm2
Net weight	0.4kg

We reserve the right to change this manual at our discretion.

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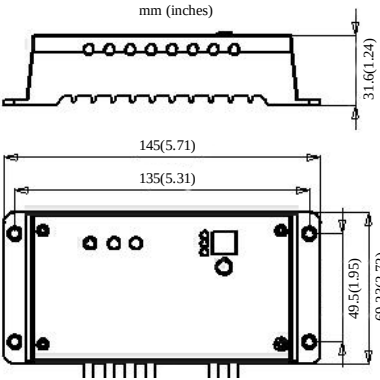

Figure 1-1 PU1024WP Dimensions

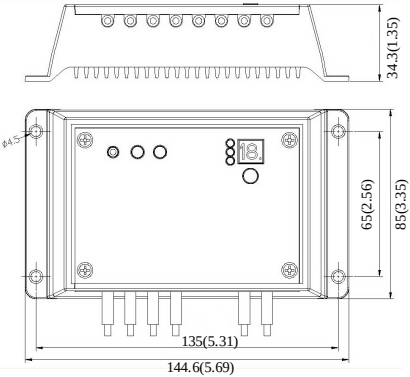

Figure 1-2 PU2024WP Dimensions

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