

USER MANUAL

60A DC-DC CHARGER



Please read this manual carefully before installation, and retain it for future reference.

V2.1

IMPORTANT SAFETY INSTRUCTIONS !

The following instructions detailed in this manual cannot cover all possible conditions and situations that may occur, so it is the user's responsibility to exercise common sense and caution.

General Safety

- This product is not intended for use by persons with reduced physical, sensory or mental capabilities, or lack of experience or knowledge. Children should be supervised to ensure that they DO NOT play with the product.
- Examine the charger regularly for damage. If the battery charger is damaged, it must not be used until it has been repaired.
- When working with electrical equipment or lead acid batteries, have someone nearby in case of an emergency.
- Wear personal protective equipment including eye protection (that protects eyes from all angles) and gloves.
- Prolonged contact to high heat or freezing temperatures will decrease the working life of the unit.
- DO NOT use in connection with life support systems or other medical equipment or devices.
- Disconnect the product from the battery each time before cleaning or before making changes to the circuit.
- Install and store the product in a dry and cool place. Keep away from liquids! DO NOT expose the product to heat sources such as direct sunlight or other heating elements.
- DO NOT use the product if physically damaged or with visibly cracked cables. Contact the manufacturer, customer service to prevent safety hazards.
- DO NOT disassemble this charger as such action will not only cause potential damage to you and your unit, but also void the warranty.
- Inadequate ventilation may lead to overheat and inefficient charging.
- This product can only be repaired by professional personnel.
- Disconnect the charger before maintenance or cleaning.
- DO NOT strike, throw the product.
- Firmly secure cables and connections.
- It is highly recommended to install a 80 Amp circuit breaker (not included) that should be installed near the starter battery.

Battery Safety

- The acid or fluid within a lead acid battery is corrosive and poisonous, which can produce flammable and toxic gases when recharged and will explode if ignited. When working with those batteries, ALWAYS wear goggles, gloves, or protective clothing, remove personal metal items (such as rings, bracelets, necklaces and watches) and ensure the area is well ventilated. If spilled it will cause severe burning to eyes and skin and corrode metals. Ensure that power is disconnected from any appliance in the vicinity of the spill and immediately wash any area that has been affected with water.
- Keep fresh water and soap on hand in the event battery acid comes in contact with eyes. If this occurs, cleanse right away with soap and water for a minimum of 15 minutes and seek medical attention.
- In very cold weather a discharged battery may freeze. NEVER charge a frozen battery. Gases may form, cracking the case, and spray out battery acid.
- Use only rechargeable deep cycle batteries. NEVER attempt to charge a known faulty, frozen, defective battery or non-rechargeable battery.
- Ensure batteries are mounted and stored in an area with good ventilation.
- ALWAYS check the batteries and charging system periodically to ensure no faults occur.
- DO NOT place tools on top of a battery or allow tools to fall on the battery to prevent the chance of a short circuit and sparks.
- DO NOT smoke or have an open spark or fire near the battery.
- Reverse protection is available for AGM, Gel, Calcium, and Lead Acid batteries, with the exception of LiFePO4 batteries.

Installation Safety

- DO NOT install this charger near heat sources such as fire or heaters or expose it to flammable chemicals, vapors, corrosive gases, liquids or materials.
- DO NOT mount the product in places where there is a risk of gas explosion.
- This product should be firmly fastened to prevent fall down or tip over.
- Ensure the area around the battery is well ventilated before and during charging process.
- It is recommended to mount this product as close as possible to your auxiliary battery. This will ensure maximum performance out of your charger.
- DO NOT lay AC and DC cable in the same conduit and DO NOT pull on the cables.
- When setting up the connection to the DCDC controller, please observe the following sequence: start by connecting the auxiliary battery and make sure its polarity is correct, and subsequently the input source.

Operation Safety

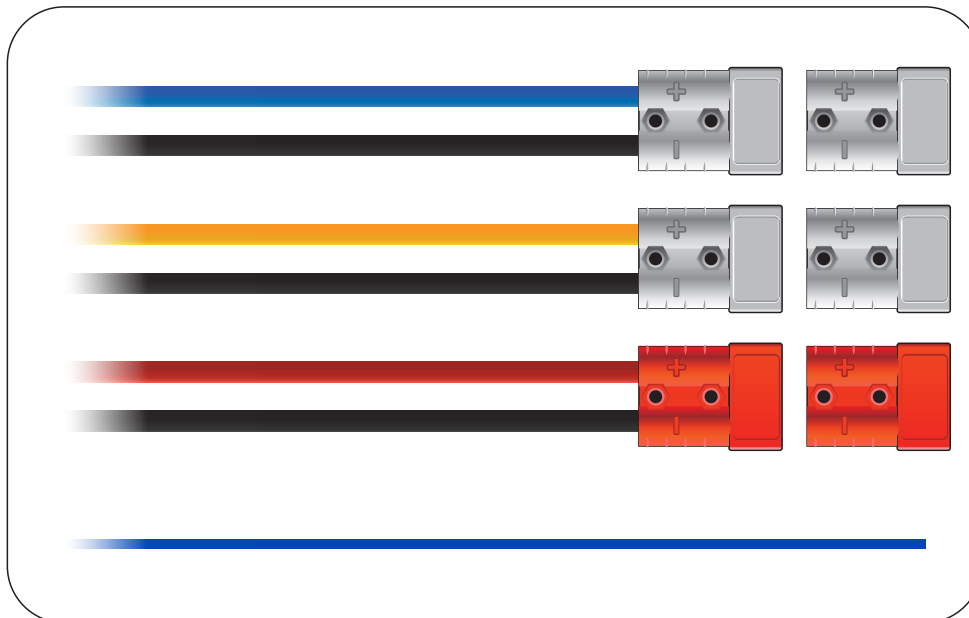
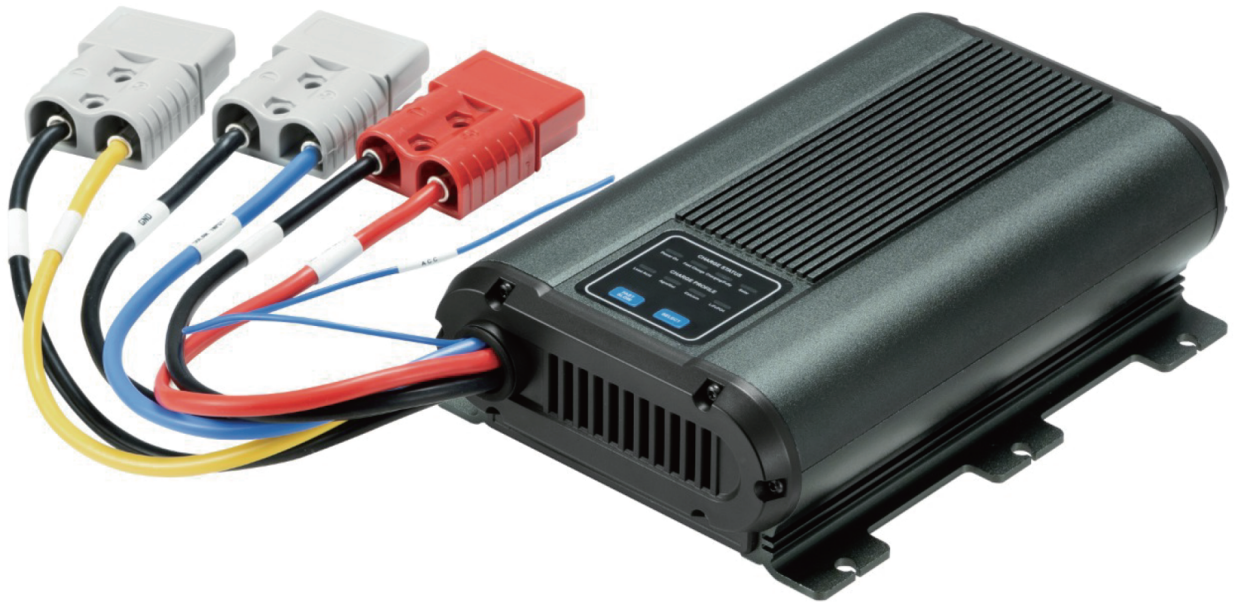
- Avoid dropping any metal tool or object on the battery. Doing so could create a spark or short circuit which goes through the battery or another electrical tool that may create an explosion.
- DO NOT operate in salty, wet, or damp environments; in the vicinity of corrosive fumes; in the vicinity of combustible material; in areas with risks of explosions.
- Please be aware that parts of this product may still produce voltage even after disconnected or activation of fuse.
- DO NOT disconnect cables while the product is operating.

IN THE KIT

1 PC(s) 60A DC-DC Charger with Anderson Style Plugs

3 PC(s) Anderson Style Plugs

1 PC(s) User Manual



Blue: Solar Input +

Black: GND

Yellow: Output +

Black: GND

Red: DC Input +

Black: GND

ACC Ignition Line

INSTALLATION

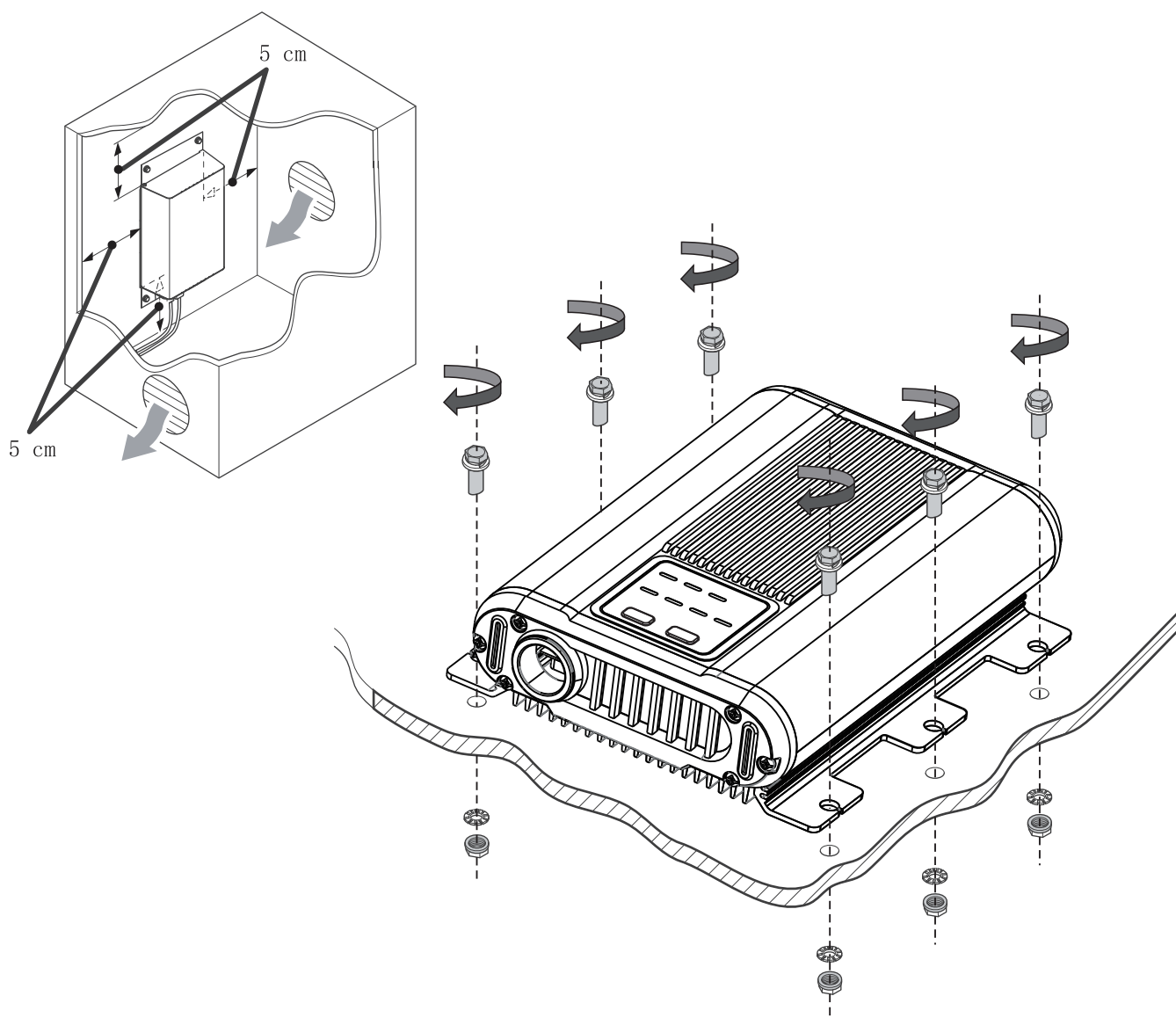
Location Considerations

When selecting a location for the DC-DC, make sure that the unit is as close as possible to the battery you will be charging (auxiliary battery). The charger may be mounted on the cabin of the vehicle, along a chassis rail, the inner guard of a vehicle, behind the grille or headlight or even on the side of the radiator. However, you want to make sure that the area is not susceptible to moisture or other substances as well as potentially high temperatures.

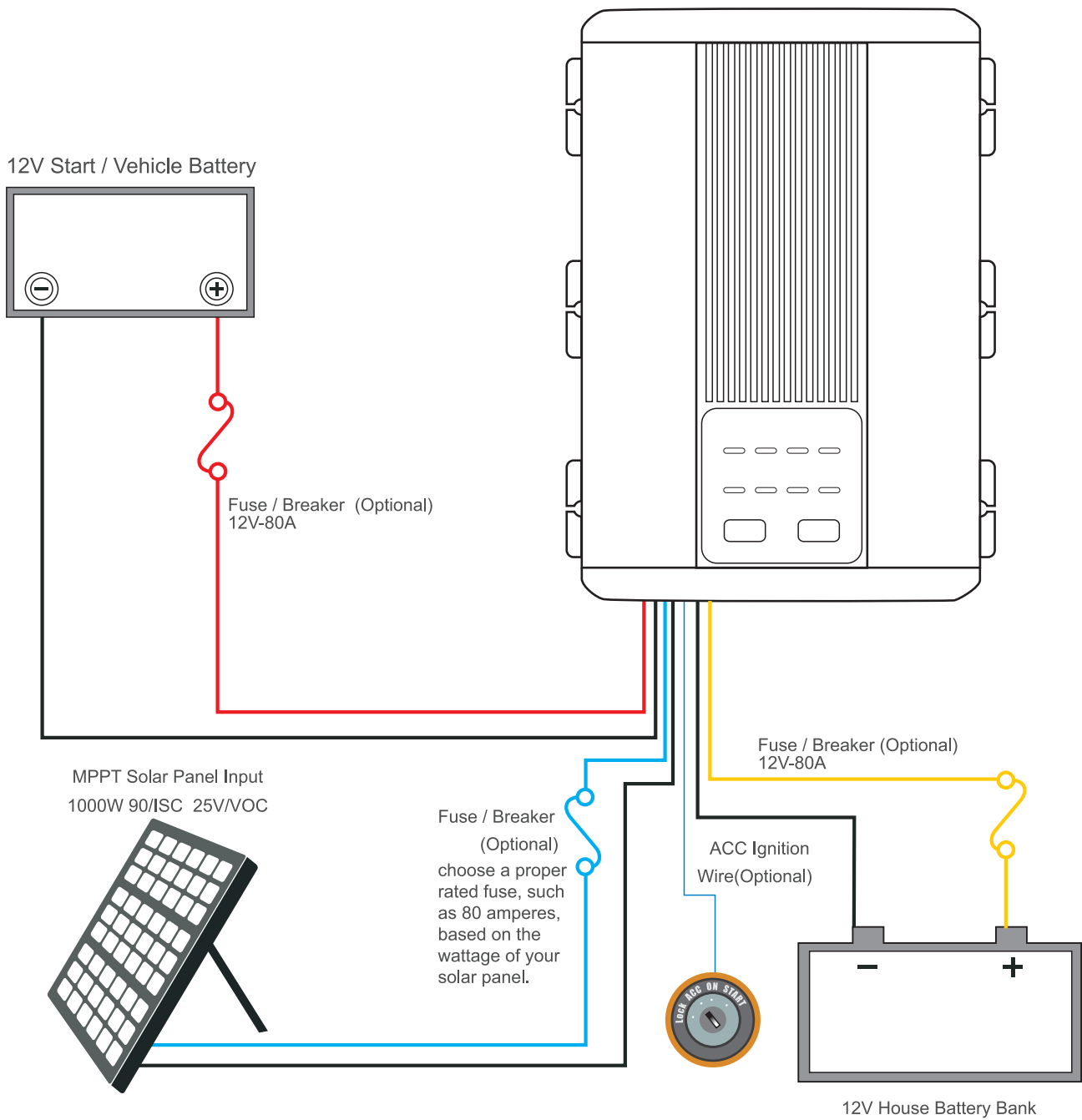
The charger can be installed both horizontally and vertically. Ensure it is placed on a flat and robust surface.

Mounting

Have at least 5cm of clearance from all areas and ensure some ventilation for best performance. Trace the mounting holes with a pencil/pen when placing the DC-DC against the desired area. Use 6 x screws to secure the DC-DC onto a surface.



WIRING



PREPARATION

Konw Your DC-DC Charger



Indication

Power On: This indicator shows that the charger is powered on. It illuminates when the solar panel or DC input meets the startup requirements.

Fast Charge: The indicator is on when the fast charging mode is engaged.

Charging/Fully: The indicator will blink slowly before fully charged, it'll stay steadily lit when fully charged, and flash quickly when it is activating LiFePO4 battery.

Solar: The indicator illuminates when powered by solar panels and goes off when using DC power.

Lead Acid, AGM/GEL, Calcium, LiFePO4: The corresponding indicator will illuminate when choosing your battery.

Fast/Slow: Hold down the 'Fast/Slow' button for 3 seconds to select between fast charging and slow charging. This includes a power-off memory function.

Select: Hold down the 'Select' button for 3 seconds to select between different batteries. This includes a power-off memory function.

OPERATION INSTRUCTIONS

Smart Dual Input:

When the DC input meets startup conditions and the solar panel voltage surpasses that of the DC input, both the solar panel and DC port can concurrently provide power to the charging battery. This substantially decreases fuel consumption during driving.

Lithium Reactivation:

When you select the Lion mode, if the battery voltage is not detected ($<3V$), it is considered that your lithium battery is in undervoltage protection and will be automatically activated. It is important to note that during activation, the load connected to the battery must be disconnected. The lithium battery activation supports both the DC and solar inputs. After the charger is powered on, automatic activation begins 3 minutes later. During activation, the charging indicator flashes rapidly. The activation initiation period is 100 seconds. The maximum output current for fast charge mode activation is 30A, and for slow charge mode activation, it is 15A.

Note: Ensure that there is no reverse connection at the battery connection port during lithium battery activation, as this may damage the controller.

Input Priority

When the startup conditions are met by both solar and DC inputs, but the solar voltage does not exceed the DC voltage, the charger will autonomously prioritize the DC input. Even in cases where solar input is selected for battery charging, the controller will continuously monitor whether the DC input meets the charging criteria and will seamlessly switch to DC supply upon meeting those requirements.

Solar Input

The charger will shift to solar charge mode when it is connected to the solar panel.

Charging begins when the output of solar panel is over 13V, and the panel will stop to charge when its output is below 12.7V.

This charger charges your battery via solar panels through its MPPT solar input section. Maximum Power Point Tracking (MPPT) allows it to optimise the electronics to ensure all of the watts available from the solar panels are extracted. This makes them operate at the most efficient voltage and ensures you get maximum solar energy supply.

STATUS	POWER ON	POWER OFF
Solar Input Voltage	$>13V$	$<12.7V$
Battery Voltage	$>7V$	/

DC Input

Start your vehicle and let it idle.

The charger will recognize that there is a charge being applied to the main starting battery.

It will charge your auxiliary battery when the main battery has reached 13V or when its voltage is or above 12V (ACC line connected).

The charger will continue to operate even after the vehicle has been switched off, however when the main starting battery falls below 12.7V (acc line not connected) or is less than 11.3V (acc line connected), the charger will stop charging.

During DC input charging, the controller will automatically reduce the charging current every 100 seconds to maintain the input voltage within acceptable parameters.

STATUS	POWER ON		POWER OFF		DERATING
ACC Voltage	>8.5V	<8V	>8.5V	<8V	/
DC Input Voltage	>12V	>13V	<11.3V	<12.7V	<11V
Battery Voltage	>7V	>7V	/	/	/

ACC Line

For vehicles with a smart alternator, you'll need to connect the ACC line to a switched ignition source (a point that supplies 12V only when the key is in the "ON" position and disconnects when the key is in the "OFF" position, for example) of your vehicle, usually it can be found in the vehicle's fuse box and a fuse tap can be used. Then the main battery will start charging your auxiliary battery.

Fans

After the charger is powered up, the fan runs for 5 seconds, acting as a test to confirm its normal operation. If any temperature sensor detects a temperature above 55°C, the fan is activated. It stays on until both temperature sensors indicate values below 50°C, at which time the fan stops operation.

PROTECTIONS

Input Reverse Protection

Both the solar panel and the DC input are equipped with reverse input protection. Charging is not activated in the event of reverse connection.

Output Reverse Protection

The output port (battery port) features reverse input protection. Charging is not activated in the event of reverse connection. This protection is deactivated when the lithium battery mode is activated. It is crucial to avoid reverse connecting the lithium battery!

Input Overvoltage Protection

When the voltage at the solar input exceeds 30V or the voltage at the DC input exceeds 24V, the buzzer emits an alarm sound for a duration of 3 minutes. Pressing any button stops the buzzer. The 'Power On' indicator blinks once, then pauses for 3 seconds.

Battery Overvoltage Protection

When the voltage at the battery input exceeds (fully charged voltage + 0.4V), the buzzer emits an alarm sound for a duration of 3 minutes. Pressing any button stops the buzzer. The battery type indicator blinks once, then pauses for 3 seconds.

Overtemperature Protection

When the circuit board temperature exceeds 70°C, the charging current is automatically reduced. If the circuit board temperature exceeds 80°C, charging will be halted. The buzzer emits an alarm sound for a duration of 3 minutes. Pressing any button stops the buzzer. Charging resumes once the temperature drops below 68°C. The 'Power On' indicator blinks twice, then pauses for 2 seconds.

Charging Timeout Protection

If the constant current charging stage exceeds 12 hours, charging is stopped, and the buzzer emits an alarm sound for a duration of 3 minutes. Pressing any button stops the buzzer. The battery type indicator blinks twice, then pauses for 2 seconds. To return to normal operation, a restart is required when the charger is locked.

TECHNICAL SPECIFICATIONS

MODEL	AP60DC
Product Dimensions	228x157x66mm
Product Weight	2kg
DC Input Voltage Range	11V~24V
Solar Input Voltage Range	12.7V~30V
Max. Input Current	33A(Slow Mode), 66A(Fast Mode)
Output Voltage	0~15.4V
Max. Output Power	462W(Slow Mode), 924W(Fast Mode)
Rated Output Current	30A(Slow Mode), 60A(Fast Mode)
Standby Current	<10mA
Charging Profile	4 Stages
Battery Compatibility	Lead Acid, AGM, Calcium, LiON (LiFePO4)
IP Rating	IP-20
Operational Temperature	-20°C~45°C
Storage Temperature	-40°C~60°C
Humidity	0%~90%

UNDERSTANDING THE ERROR CODES

PROBLEM	POSSIBLE CAUSE	SOLUTION
'Power On' Indicator Blinks 1 Time, Pauses for 3 Seconds	Abnormal connection of solar panel or DC source input (possibly overvoltage)	Reconnect solar panel and DC source correctly.
'Power On' Indicator Blinks 2 Times, Pauses for 2 Seconds	Charger in over-temperature state.	Install the charger in a well-ventilated environment.
'Power On' Indicator Blinks 3 Times, Pauses for 1 Second	Abnormality found during self-check	Restart the charger; if the issue persists, consider replacing the charger. This charger will be locked and requires a restart with the power turned off.
Battery Type Indicator Blinks 1 Time, Pauses for 3 Seconds	Battery connection abnormality (overvoltage, overcurrent)	Reconnect the battery correctly.
Battery Type Indicator Blinks 2 Times, Pauses for 2 Seconds	Excessive charging time	Check whether the battery capacity is too large or if the battery is abnormal. The charger will be locked and requires a restart with the power turned off.

MAINTENANCE

Regularly inspect the wiring and its terminals, and ensure that they are tight, clean and free of cracks or corrosion.

Ensure that DC-DC charger is free of dust or liquids, and is well-ventilated. Better ventilation improves its performance.

CHARGING STAGES

CHARGING STAGE	BATTERY VOLTAGE				CHARGING CURRENT	
	LEAD ACID	AGM/GEL	Calcium	LiON	FAST MODE	SLOW MODE
TRICKLE CHARGE	<10V	<10V	<10V	<10V	≤20A	≤10A
CC(Constant Current)	12V~14.4V	12V~14.7V	12V~15.4V	12V~14.4V	≤60A	≤30A
CV(Constant Voltage)	14.4V	14.7V	15.4V	14.4V	≤60A	≤30A
FULLY CHARGED	14.4V	14.7V	15.4V	14.4V	<6A(DC Input) <1A(Solar Input)	<3A(DC Input) <1A(Solar Input)
FLOATING CHARGE	13.6V	13.6V	13.6V	/	≤30A	≤15A
RECHARGING	13.2V	13.2V	13.2V	13.6V	≤60A(LiON Only)	≤30A(LiON Only)

WARRANTY



We (“Manufacturer”) warrant, to the original purchaser, (“User”) that our DC-DC charger, if purchased from Manufacturer or an authorized distributor or dealer, will be free of defects in material and/or workmanship under normal application, installation, use and maintenance conditions from the date sold and for the duration (the “Warranty Period”) of 1 YEAR. Within the Warranty Period, subject to the exclusions listed below, the Manufacturer will repair, replace the DC-DC charger or provide you with a refund at our discretion, if the unit in question are determined to be defective in material or workmanship. If the Manufacturer deems the charger to be not repairable, a new, similar product will be offered, or a refund will be issued. This Limited Warranty is to the original purchaser of the DC-DC charger and is not transferable to any other person or entity.

EXCLUSIONS:

This warranty does not cover defects that are caused by normal wear and tear, inadequate maintenance, transportation, storage or faulty repair, misuse, neglect, accident or abuse, modification, failure to observe installation and maintenance instructions or improper installation. It is recommended that the installation should be performed by suitably qualified technicians or the warranty will be voided. For further clarity, this warranty is also void if the DC-DC charger:

- is used for applications other than which it was designed and intended for,
- is disassembled, or repaired by someone other than an authorized Manufacturer's agent, or without our authorization,
- has been subject to adverse weather, extreme temperature or physical damage,
- has been damaged by force majeure (e.g. flash of lightning, overvoltage, storm, fire),
- selected by the user is not of the correct size or specification for the intended application,
- is damaged due to the non-observance of any of the instructions supplied by us, or defects resulting from any action of the purchaser including but not limited to mishandling or operation outside of design limits.

CLAIMS:

Request return authorization. No returns will be credited without an authorization. In the case of returned products, Manufacturer's exclusive liability for breach of any warranty on the product shall be to replace the DC-DC charger within the warranty period in accordance with the terms of this limited warranty. In no event shall Manufacturer be liable for any loss or damages of any other kind, whether direct, incidental, consequential including lost profits, exemplary, special or otherwise, including any lost profits or removal, shipping, or installation expenses.