



DAYTECH
— ENERGY —

**DT-BCON
Series
User Manual**

12/24 VDC MPPT Solar Battery Charger Range

1 Overview

Daytech Energy's high-performance DT-BCON Series of Solar Battery MPPT Charge Controllers offer a premium solution for your off-grid, stand-alone power or remote solar power system needs. With advanced MPPT (maximum power point tracking) control algorithm, has tracking efficiency greater than 99.5% and charging efficiency up to 98%. Used for solar power optimisation, with a die-cast aluminium housing design for maximum heat dissipation and battery charge control and protection features, the DT-BCON is reliable, safe, and practical.

The charge controller is usable for a wide variety of situations, allowing fast and accurate tracking for the best use of your photovoltaic array. You need a high-quality charge controller, to obtain the maximum solar energy to safely charge your 12V or 24V batteries within a shorter time period. The DT-BCON delivers on this promise, remarkably improving energy efficiency. The DT-BCON provides safety features and allows your batteries to last significantly longer.



With Modbus communication over RS485, it is convenient to expand and scale applications with multiple charge controllers for synchronisation and to integrate with external systems. Remotely or locally monitor your system with a local computer plugin interface, or another monitoring device, such as Daytech's IoT-SmartNode. All-round electronic fault detection, self-test and diagnostic function and enhanced electronic protection functions reduces the possibility of damages to the system components resulting from installation errors or system failures.

1.1 Features

- Maximum Power Point tracking with tracking efficiency greater than 99.5%.
- High charge conversion efficiency up to 98%
- Ultra-fast tracking speed and guaranteed tracking efficiency
- Accurately recognise and track multiple power points
- Reliable and automatic limit of maximum PV input power, ensuring no overloads
- Wide MPP operating voltage range
- Die-cast aluminium design
- 12 and 24V automatic system voltage or user-defined working voltage
- LED indicators for system status
- Multiple load controls: Manual and timer controlled
- 4 charging options: SLA, Gel, Flooded and User
- Battery temperature compensation function
- Real-time energy statistics function
- RS-485 communications interface with Modbus.
- Supports firmware upgrades

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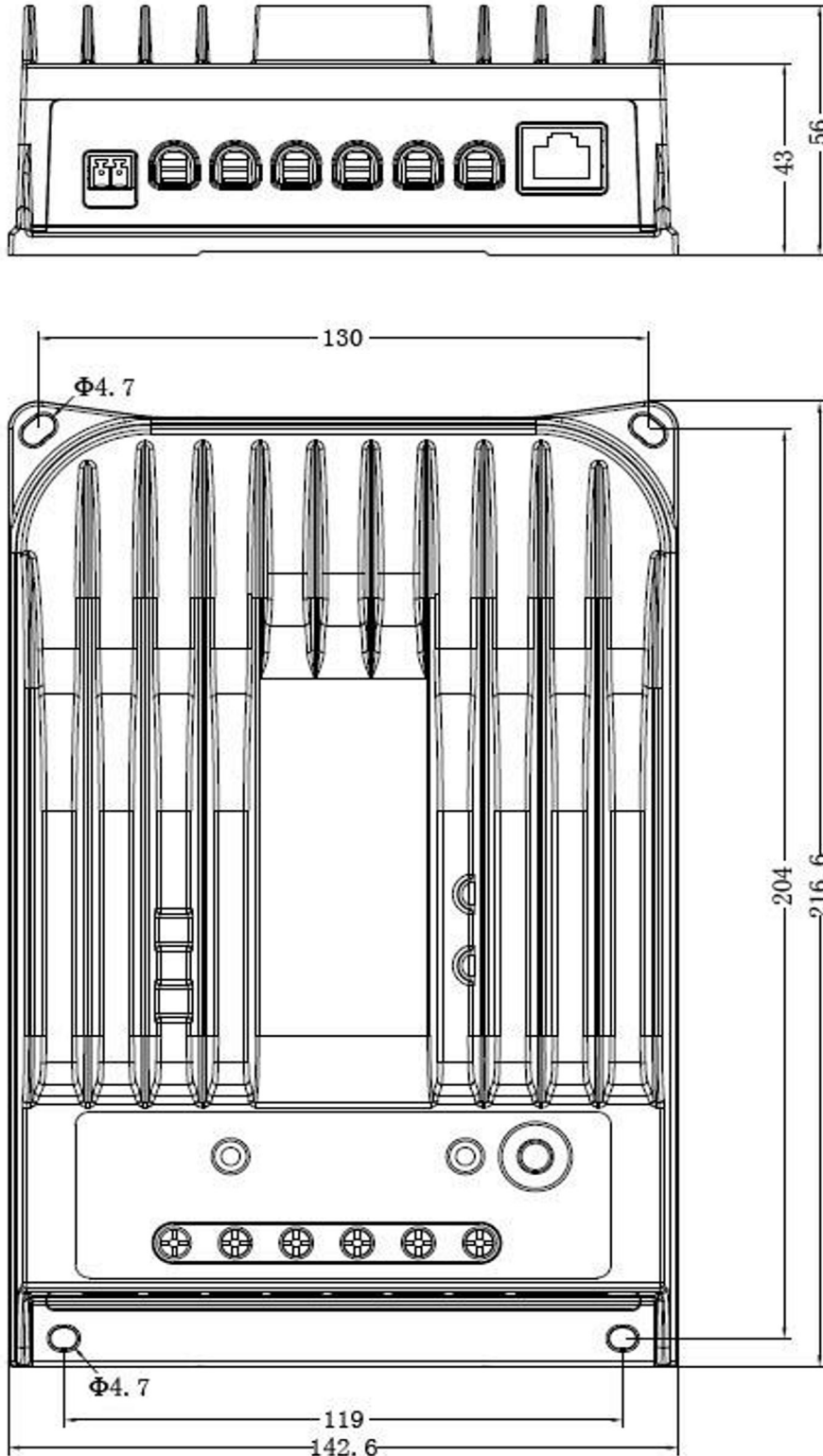
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2 Dimensions

2.1 DT-BCON-20A



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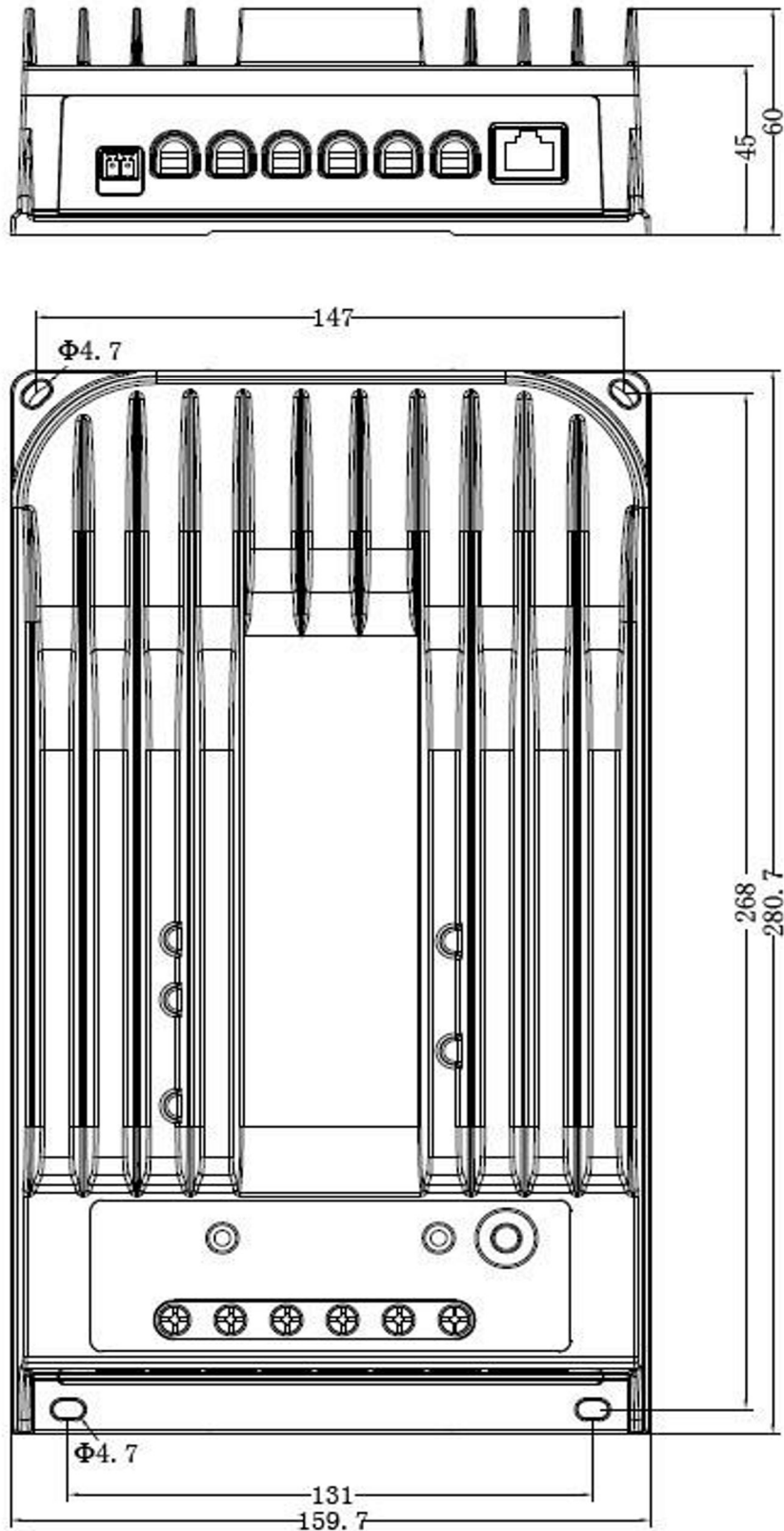
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2.2 DT-BCON-30A



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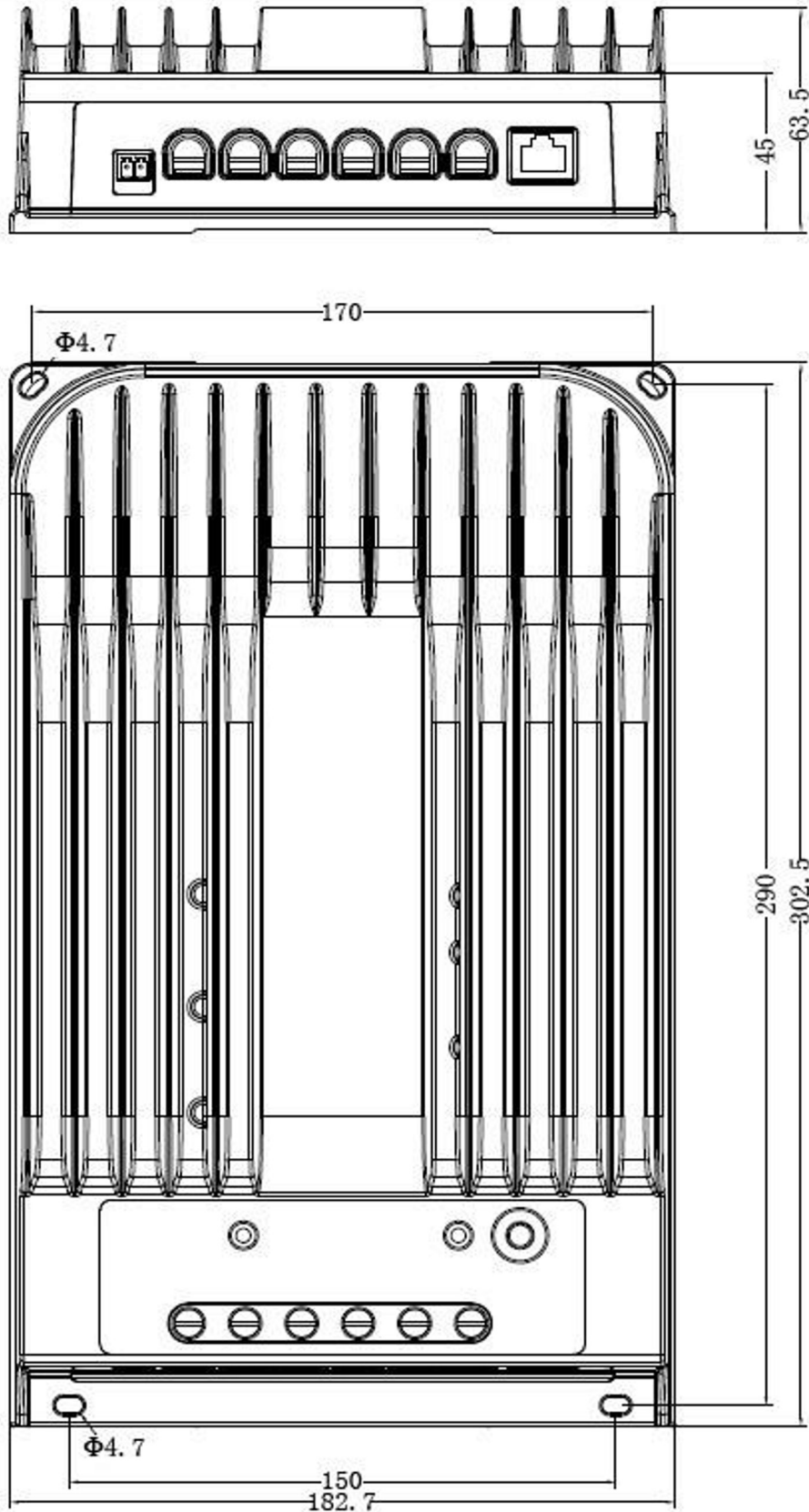
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2.3 DT-BCON-40A



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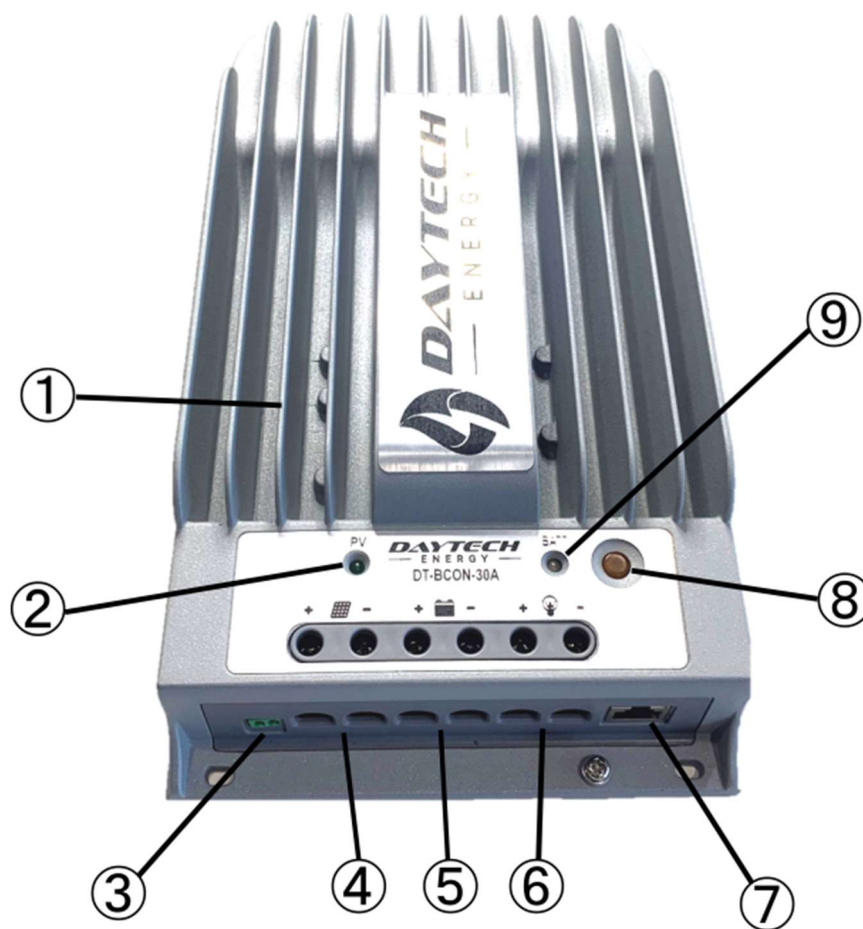
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3 User Interface Diagrams

Item	Name	Item	Name
1	Heat Sink	6	Load output terminals
2	Charging LED indicator	7	RS-485 port
3	RTS port	8	Button
4	Solar input terminals	9	Battery LED indicator
5	Battery terminals		



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4 Installation

CAUTION: Please read all instructions and precautions in this manual before installing the unit. Installation to be performed by qualified installers only.

4.1 Installation Notes

1. The solar charge controller can only be used in Photovoltaic (solar) systems in accordance with this user manual and within the specifications of other module manufacturers. No energy source other than a solar generator can be connected to the solar charge controller.
2. Before installing or adjustment of the controller, disconnect the solar modules and connection to the battery.
3. Never short circuit a battery **under any circumstances**. It is strongly recommended to install a fuse near or on the battery to prevent fire, or damage to equipment or persons.
4. Batteries can release flammable gas. Avoid sources of ignition around batteries. Ensure the battery is stored in a well-ventilated area.
5. Use insulated tools when working around batteries to prevent shorting the battery.
6. Wear eye protection when working around batteries.
7. Do not touch the battery terminals. Use insulated tools and keep your hands dry.
8. Keep the controller away from sources of water, heat, and direct sunlight.
9. After installation, ensure all connections are secure.

4.2 Mounting location

Do not mount the solar charge controller outdoors or in wet rooms. Do not subject the solar charge controller to direct sunshine or other sources of heat. Protect the solar charge controller from dirt and moisture. Mount upright on the wall on a non-flammable substrate. Maintain a minimum clearance of 15cm below and around the device to ensure unhindered air circulation. Mount the solar charge controller as close as possible to the batteries.

Mark the position of the solar charge controller fastening holes on the wall, drill 4 holes and insert dowels, fasten the solar charge controller to the wall with the cable openings facing downwards.

4.3 Wiring Specifications

Wiring and installation methods must comply with national and local electrical specifications. The wiring specifications of the solar, battery and loads must be selected according to rated currents. See the following table for wiring specifications:

Model	Rated Charging Current	Rated Discharge Current	Solar wire size	Battery wire size	Load wire size
DT-BCON-20A	20A	20A	5mm ² /10AWG	5mm ² /10AWG	5mm ² /10AWG
DT-BCON-30A	30A	20A	6mm ² /9AWG	6mm ² /9AWG	5mm ² /10AWG
DT-BCON-40A	40A	20A	10mm ² /8AWG	10mm ² /8AWG	5mm ² /10AWG

Note: This wiring size is only for reference. If there is a long distance between the PV array and the controller, it is recommended to increase the wire diameter to reduce voltage drop and improve efficiency.

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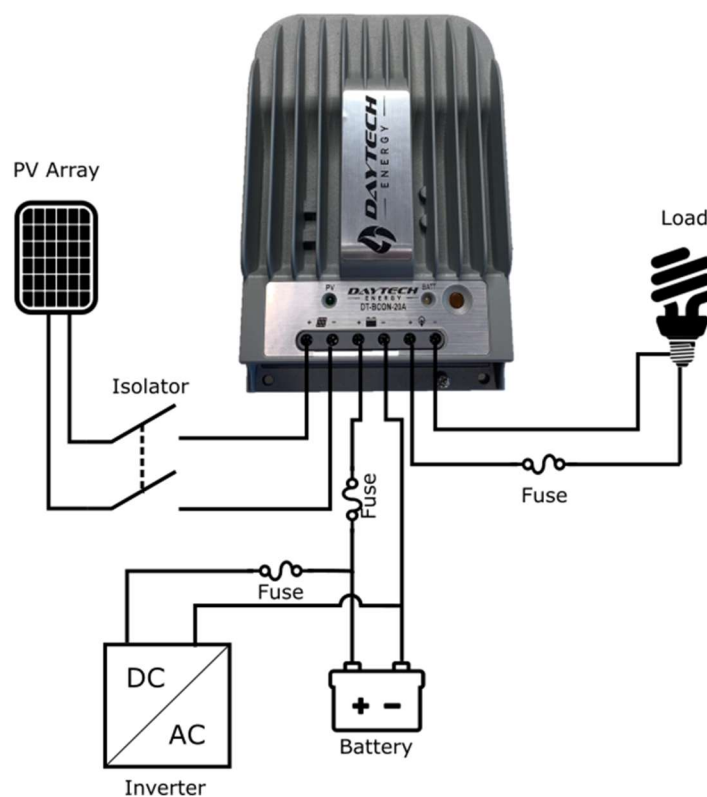
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4.4 Connection

We strongly recommend connecting a fuse directly to the battery to protect any short circuit at the battery wiring. Solar PV modules create current whenever light strikes them. The current created varies with the light intensity, but even in the case of low levels of light, full voltage is given by the modules. So, protect the solar modules from incident light during installation. Never touch uninsulated cable ends, use only insulated tools, and make sure that the wire diameter is in accordance with the expected currents of solar charge controller. Connections must always be made in the sequence described below.



WARNING: Risk of electric shock. Exercise caution when handling solar wiring. The open circuit voltage of a PV array in direct sunlight can exceed 100V.

CAUTION: If the temperature sensor on the controller is disconnected, the ambient temperature will be assumed to be 25°C.

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4.5 Procedure to install the Solar Charge Controller

1) Connect the battery

Connect the battery cable with the correct polarity to the middle pair of terminals on the solar charge controller (with the battery symbol). If the system is 12V, please make sure that the battery voltage is within 8.5V~15.5V. If the system is 24V, the battery voltage should be between 20V~30V.

2) Connect the PV array

Ensure that the solar module is not exposed to light. Ensure that the solar module does not exceed the maximum permissible input current. Connect the solar module connection cable to the correct polarity of the left pair of terminals on the solar charge controller (with the solar module symbol).

3) Connect the load

Connect the load cable to the correct polarity of the right pair of terminals on the solar charge controller (with the lamp symbol). To avoid any voltage on the wires, please connect the wire to the load before connecting to the controller.

4) Final step

Tighten all cables connected to the controller and remove all the debris around the controller (leaving a space of at least 15 cm).

4.6 Grounding

Be aware that the negative terminals of controller are interconnected and therefore have the same electrical potential. If any grounding is required, always do so on the negative wires.

CAUTION: For common-negative system, it is recommended to use a common-negative controller; but if in the common-negative system, some common-positive equipment are used, and the positive electrode is grounded, the controller may be damaged.

5 Operation

5.1 LED Status

LED Indicator	Colour	State	Status
PV LED	Green	On Solid	PV connection normal but low voltage from PV array. Not charging.
	Green	Slowly Flashing	Charging
	Off	Off	No PV voltage or PV disconnected
Battery LED	Green	On solid	Normal
	Green	Slow Flashing	Full
	Green	Fast Flashing	Over Voltage
	Orange	On Solid	Under voltage
	Red	On Solid	Over discharge
	Red	Flashing	Battery Overheating
Load Status	Red	On Solid	Load On
	Red	Off	Load Off
	Red	Fast flashing	Load short circuit
	Red	Slow flashing	Load overcurrent

6 Troubleshooting and Maintenance

6.1 Built in Protection

- PV Over Current
The controller will limit battery charging current to the maximum battery current rating. Therefore, an oversized solar array will not operate at peak power.
- PV Short Circuit
When the PV is short circuited, the controller will stop charging. Clear the fault to resume normal operation.
- PV Reverse Polarity
Full protection against PV reverse polarity. No damage to the controller will result. Correct the wiring error to resume operation.

WARNING: The controller will be damaged if the operating power of the PV array is 1.5 times greater than the rated charge power.

- Battery reverse polarity
Full protection against battery reverse polarity. No damage to the controller will result. Correct the wiring error to resume operation.

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- Battery over voltage
When the battery voltage exceeds the Over Voltage Disconnect set point, the controller will stop charging the battery to protect it.
- Battery over discharge
When the battery voltage reaches the Low Voltage Disconnect set point, the controller will stop discharging the battery to protect it.
- Battery overtemperature
The controller will sense the battery temperature through the external temperature sensor. If the battery temperature exceeds 65°C, the controller will automatically stop charging the battery to prevent damage, and will recover when the battery temperature falls below 50°C.
- Load overcurrent
If the load exceeds the maximum load current times 1.05, the controller will disconnect the load. Reduce the load and restart the controller.
- Load short circuit
The controller is fully protected against load short circuits. If the load shorts (4 times the rated current flows), short circuit protection will start automatically. After 5 reconnection attempts, the fault must be manually cleared by restarting the controller.
- Damaged remote temperature sensor
If the temperature sensor is short circuited or damaged, the controller will assume a default temperature of 25°C.
- Controller overheating
If the temperature of the controller's heat sink exceeds 85°C, the controller will start over temperature protection until the temperature falls below 75°C.
- High voltage transients
The PV input is protected against small high voltage surges. In lightning prone areas, additional external suppression is recommended.

6.2 Troubleshooting

Fault Description	Possible causes	Actions to take
Charge LED indicator off when PV array is in direct sunlight	<ol style="list-style-type: none"> 1. PV array disconnected 2. PV array reverse polarity 	Confirm the PV and battery wiring is correct and secure
Wire connection is correct, LED still off	<ol style="list-style-type: none"> 1. Battery voltage is less than 9V 	<ol style="list-style-type: none"> 1. Check the voltage of the battery. The battery needs to be at least 9V to activate the controller

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	2. PV voltage is less than battery voltage	2. Check the PV input voltage. It needs to be higher than the battery voltage
Battery LED indicator blinking quickly	Battery voltage too high (greater than Over Voltage Disconnect set point)	Check the battery voltage to confirm if it is too high. Disconnect the solar module
Battery LED indicator orange	Battery under voltage	Load output is normal. The battery LED will return to green when the battery is charged.
Battery LED indicator red	Battery low voltage disconnect	The controller will cut off the load automatically. The LED indicator will return to green when the battery is charged
All LEDs blinking. Battery indicator blinking orange	Controller temperature too high	When the heat sink of the controller exceeds 85°C, the controller will automatically cut the input until the temperature drops below 75°C.
All LEDs blinking. Battery indicator blinking red	System voltage error	Check the battery voltage is within the controller's working voltage. If necessary, change to a suitable battery or reset the working voltage. When the faults are removed, press the button to resume operation.
Load terminals have no output	Over load or short circuit protection	Remove or reduce the load and press the button. The controller will resume after 3 seconds.

6.3 Maintenance

WARNING: Risk of electric shock. Before performing maintenance, make sure the power is turned off.

The following inspections and maintenance tasks should be carried out at least two times a year.

- Make sure the controller is firmly installed and a clean and dry environment.
- Make sure the air flow to the controller is free and not blocked. Clean up any dirt and debris on the heatsink.
- Check all wires for damaged insulation, such as solarisation, friction wear, cracking, insect or rodent damage, etc. Replace the wire if necessary.
- Tighten all terminals. Inspect for loose, broken, or burned wires and connections.
- Confirm all LED indicators are not showing faults. Pay attention to any faults that may exist. Take corrective action if necessary.
- Confirm all system components are grounded and connected tightly.
- Confirm all terminals have no corrosion, damaged insulation, evidence of high temperature or burning. Tighten all screws to the recommended torque.
- Remove any dirt and nesting insects.
- Check the lightning arrester if installed.

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7 Technical specifications

Battery Charger Chemistry	Sealed, Gel, Flooded and User Defined – Can program for various chemistries, such as Li-ion, Lithium Iron Phosphate (LiFePO ₄), LTO, etc.
Nominal System Voltage	12VDC / 24VDC Auto Detect
Rated Charge Current	DT-BCON-20: 20A DT-BCON-30: 30A DT-BCON-40: 40A
Max. Discharge current	DT-BCON-20: 20A DT-BCON-30: 20A DT-BCON-40: 20A
Battery Voltage Range	9VDC ~ 32VDC
MPPT Voltage Range	Input Voltage: Battery Voltage + 2VDC to maximum 108VDC
Max PV Input Power	DT-BCON-20: 260W(12VDC) / 520W (24VDC) DT-BCON-30: 390W(12VDC) / 780W (24VDC) DT-BCON-40: 520W(12VDC) / 1040W (24VDC)
Self-Consumption	≤60mA(12VDC) / ≤30mA(24VDC)
Discharge Circuit Voltage Drop	≤0.15VDC
Communication Interface	RS485 (RJ45)
Grounding	Common Negative
Dimensions (mm)	DT-BCON-20: 216.6 x 142.6 x 56 DT-BCON-30: 280.7 x 159.7 x 60 DT-BCON-40: 302.5 x 182.7 x 63.5
Mounting Dimensions (mm) With 4.7mm mounting hole	DT-BCON-20: 130 x 204 DT-BCON-30: 147 x 268 DT-BCON-40: 170 x 290
Power Cabling	Use flex panel wire for higher Current Carrying Capacity. DT-BCON-20: 10mm ² DT-BCON-30: 16mm ² DT-BCON-40: 25mm ²
Weight	DT-BCON-20: 1.5kg DT-BCON-30: 2.2kg DT-BCON-40: 2.9kg
Temperature Range	Operating Temperature: -30 ~ +55°C Storage Temperature: -30 ~ +75°C
Humidity Range	≤95% (N.C.)
Package material	Cast Aluminium Housing, powder coated
IP Rating	IP30, requires enclosure for outdoor use.
Warranty	2 years Limited*

* Limited Warranty – Warranty applies for use within specified temperature, current and voltage parameters ONLY.

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