

600W Bidirectional DC-DC Converter range



CLAYTON
POWER

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1. GETTING STARTED

1.1 Product Box Contents

Quantity	Description
1	600W Bidirectional DC-DC Converter
1	M12 connector
3	M6 nut
3	16mm ² cable lug
4	16mm self-tapping mounting screws
1	Manual

1.2 Product Details

Connection overview		#	Description
<p>The image shows the front panel of the Clayton Power 600W Bidirectional DC-DC Converter. It features a central display area with the brand name 'CLAYTON POWER' and '600W BOOST' prominently displayed. Below this, it specifies 'Bidirectional DC-DC Converter 25A / 40A'. The panel includes a 'POWER' indicator (1), 'OUT' (2) and 'IN' (3) power direction indicators, a 'CHARGE' indicator, a 'JUMPSTART' button (5), and two '12V 24V' selection switches (8). At the bottom, there are four terminals labeled 'DATA' (9), 'OUT' (10), 'GND' (11), and 'IN' (12). A 'COMMUNICATION' indicator (6) is located on the left side, and an 'OUT voltage level indicator' (7) is on the right side.</p>		1	Power indicator
		2	Power direction OUT
		3	Power direction IN
		4	Jump start button
		5	Jumpstart indicator
		6	Communication indicator
		7	OUT voltage level indicator
		8	IN voltage level indicator
		9	M12 - Data/IO connector
		10	DC OUT terminal
		11	GND/Chassis terminal
		12	DC IN terminal

M12 - IO Pinout		
#	Function	Front view
1	Single Wire (Communication)	
2	I/O Signal / D+ Ignition Signal	
3	GND	
4	CAN High (Communication)	
5	CAN Low (Communication)	

LED behaviour			
LED	Behaviour	Indication	Description
Power	Green	Solid	Active - wakeup signal active
	Green	1 Flash	Standby - wakeup signal active
Charge IN or OUT	Green	Solid	Charging has finished - battery full
	Green	Flash 1Hz	Constant voltage - (Lead: >80%) - (Lithium: >95%)
	Green	Flash 4Hz	Constant current - (Lead: <80%) - (Lithium: <95%)
Charge IN & OUT	Red	1 Flash	Short circuit - restart to recover
	Red	2 Flash	Temperature too high - recovers automatically
	Red	3 Flash	All other failures
Jump start	Green	Solid	Jumpstart in final minute - Start the vehicle.
	Green	Flash 4 Hz	Jumpstart in progress - do not start the vehicle yet
	Red	Flash	Jumpstart not able to run.
Data	Green	Solid	CAN active - device controlled
	Green	Flash 1Hz	CAN active - unknown device
IN/OUT 12V	Green	Solid	12V functionality active
IN/OUT 24V	Green	Solid	24V functionality active
IN/OUT 12V & 24V	Green	Solid	Automatic selection is in process
IN/OUT 12V / 24V	Red	Flashing	Voltage is out of range.

2. PRODUCT USAGE

All installations must be carried out by trained and qualified installers.

This document is intended as a general guide for installations and not as a comprehensive, step-by-step manual.

Local rules and regulations must always be followed and take precedence over any instructions provided in this guide.

WARNING: Connecting the device with incorrect voltage or battery polarity will damage the device and is not covered by the warranty.

The 600W Bidirectional DC-DC Converter is a compact converter designed to provide charging for a variety of 12V and 24V DC applications. It comes with built-in:

- 12V/24V Input – Bidirectional DC-DC converter for 12V/24V applications like:
 - Vehicle jumpstart
 - Charging from alternator.
 - Capacity extension.
 - Super Charge.
- CAN bus communication and I/O interface for interaction with auxiliary equipment and remote control.

2.1 Charge Algorithm

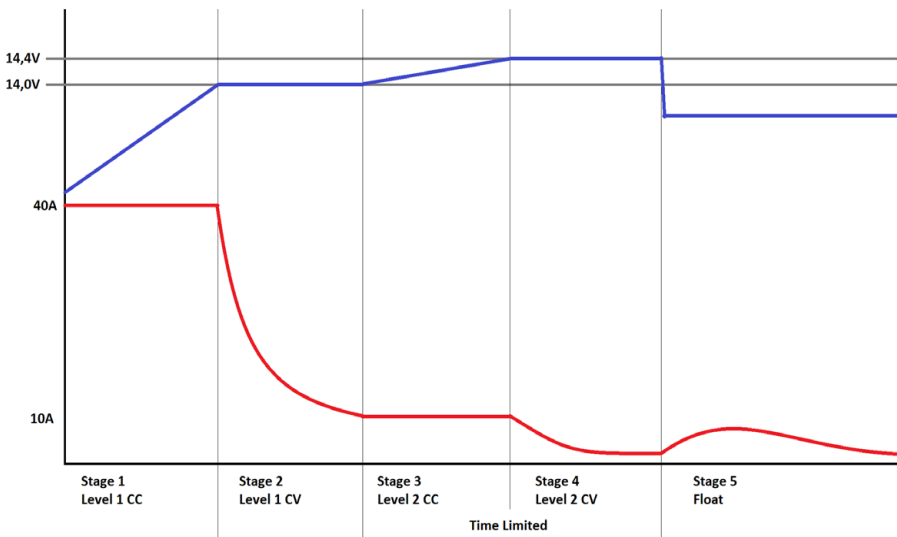
The Charge algorithm is a 5-stage charge cycle with three levels.

Level 1 charges the battery with high current allowing active loads to be in parallel.

Level 2 performs absorption charging at lower current avoiding gas voltage.

Level 2 state is time limited avoiding infinite charging if loads absorb the charge energy.

Float (Level 3) is when the battery is fully charged, a float charge will keep the battery full even if loads are active. Charging will restart if loads absorb more than allowed during float.

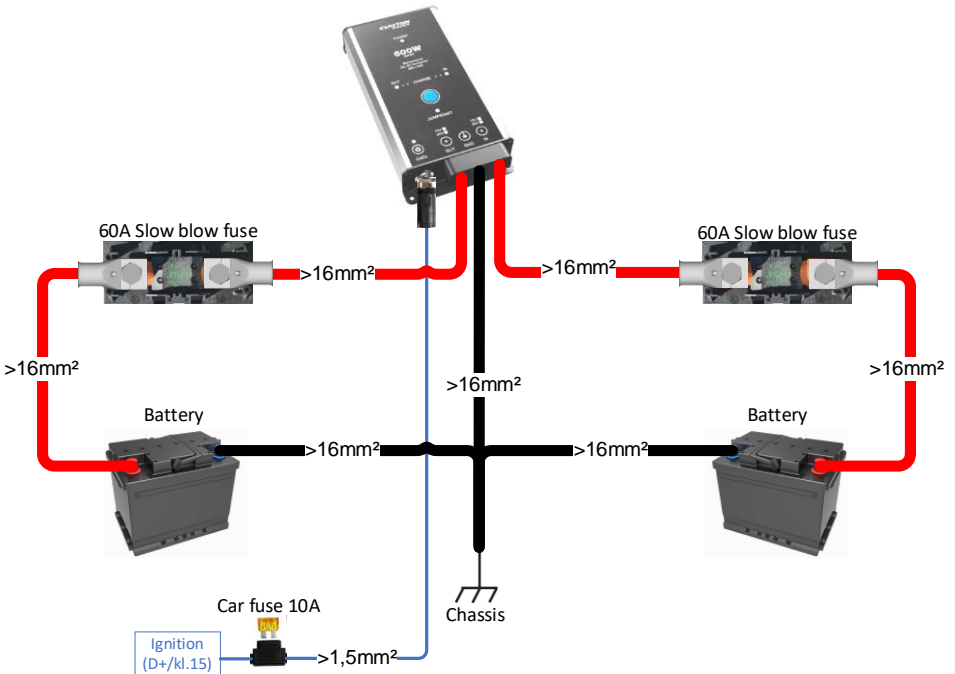


Charge algorithm			
Stage	Description	Value (12V)	Value (24V)
Stage 1	Level 1 Constant current	40A	20A
Stage 2	Level 2 Constant voltage	14,0V	28,0V
Stage 3	Level 1 Constant current ¹	10A	10A
Stage 4	Level 2 Constant voltage ¹	14,4V	28,8V
Stage 5	Float charge ²	13,5V	27,0V

- 1 - Level 2 stage is time limited to 8h and hereafter the battery is considered full.
- 2 - If the current overpass 10A during float charge charging is restarted at stage 1.

2.2 Ancillary to Starter Battery Installation

Configuration of the converter when used with different battery types and voltages, is only necessary in case of a battery that is deep discharged, as the converter is then not able to automatically detect the battery type and voltage.

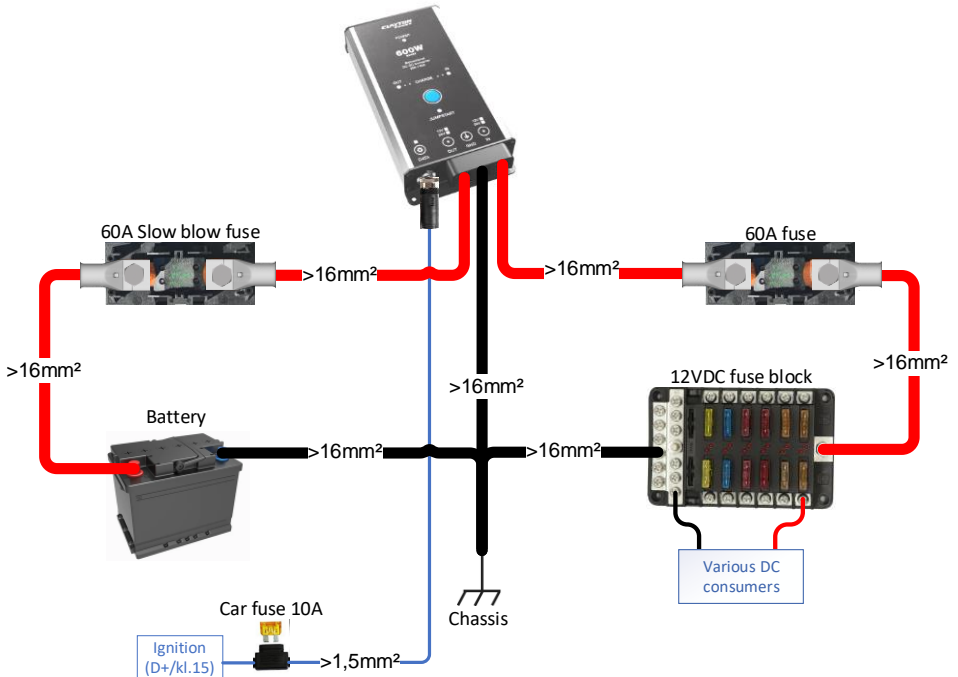


2.3 Battery to Open Output Installation

When using the converter in an Open Output setup it must be configured for correct voltage and output mode as open output and not charging a battery.

The following settings must be changed from default:

Setting Block	Setting	Value
Basic Settings	Output Mode	9 (Open Output CCCV 12V)
CCCV Output Levels	12V Range Output Voltage	12,0 V



2.4 Jump Start

The DC-DC Converter can provide reverse charge current into the starter battery giving the option of start aid.

The DC-DC Converter will reverse charge into the starter battery for 5 min. then the user should be able to start the vehicle.

To activate the Jumpstart function:

- Turn ignition on.
- Push 3 sec on the blue Jumpstart button on the DC-DC Converter.

This will activate reverse charging for 5 min.

Reverse charging can be terminated at any time by pushing the blue Jumpstart button again.

3. SPECIFICATIONS

Parameter	Value			
	General			
SKU no.	CD1802	CD1803	CD1804	CD1805
Cooling	Passive			
Operating temperature range	-20 - 50 °C			
IP classification	20			
Product weight	620 g			
Product size (L x W x H)	222 mm x 110.5 x 40 mm			
Pre-configured for output voltage	12V			24V
Pre-configured for battery type	Lead Acid	Lithium battery		
Pre-configured for install type	Charge	Charge	Capacity Expansion	Charge
	Electrical			
Supply Voltage	10.9V - 32V			
Input Current @ 12V	0-45A			
Input Current @ 24V	0-20A			
Output Voltage	14.4-28.8V			
Output Current @ 12V	0-40A			
Output Current @ 24V	0-20A			
Output Control	5 stage charge			
Power consumption (Idle)	<1.6W			
Power consumption (Sleep)	<1mW			
Connector type	Terminal – M6			
	I/O			
Input ports (Analog)	M12			
Input (Voltage – M12)	0 – 36V			
Output ports (Digital)	M12			
Output (Voltage)	0 or 12V			
Output (Current)	400 mA (overcurrent protected)			
Wakeup Input (Deactivate)	<3.0V			
Wakeup Input (Activate - Delayed 15sec)	>4.0V			
Connector type (M12)	Type A – 5-way			

3.1 DC Input Operation

Parameter	Value (12V)	Value (24V)
Undervoltage (1sec)	11.5V ¹	23.0V ¹
Undervoltage (30sec)	12.0V ¹	24.0V ¹
Undervoltage Recover	12.2V	25.6V
Overvoltage (1sec)	17.0V	34.0V
Overvoltage (30sec)	16.0V	32.0V
Overvoltage Recover	15.0V	32.0V

1 - Voltages are compensated by current coming into the DC-DC Converter with a predefined impedance of 15mΩ. (ex: 40A *15mΩ = 600mV Compensation).

4. CERTIFICATIONS AND COMPLIANCE

Low Voltage Directive 2014/35/EU

EN62368-1, EN62133

RoHS Directive 2011/65/EU

EN 63000

EMC 2014/30/EU

EN61000-6-2, EN61000-6-3

E-Marking

UN-ECE Regulation 10, E13 10R-05 14880

5. SAFETY

The following measures ensure the safe and secure operation of the electrical system. Not following these measures can result in dangerous situations causing harm to the user and the equipment.

5.1 Fuses

- All fuses must be installed as close to the power sources as possible.
- Measures must be taken to ensure the cable located between the fuse and the power source is laid out in a short-circuit-proof manner.
- Fuses should be clearly marked with their name and size.
- It is important to use fuses rated for DC voltages.
- MEGA fuses (recommended fuse type) should be mounted in holders.

5.2 Cables

- Cables need to be flexible.
 - Cables are rated in different classes related to flexibility.
 - Cables with classification 5 or 6 need to be used (This cable type is also referred to as HIGH-FLEX)
- Cables are dimensioned according to the fuse size.
- Always use the designated connection points in the vehicle for chassis and DC connections (if available/indicated).
- Always route cables the shortest way possible.
- Cables should always be secured along the routing to ensure that it does not move unintentionally.
- Cable must be kept away from moving parts.
- When passing through bulkheads or other surfaces the cable needs to be guarded against chamfering.
 - This can be done by grinding the hole to eliminate sharp edges, using a rubber grommet within the hole and using conduit or tubing to shield the cable.
- Cable terminals should be used for the right cable cross section as they are made for.
- It is important to choose cable terminals for the right cable classification.
 - This means that classification 5 cables need a classification 5 terminal.
- When connecting the cable remember to use the right torque.
 - 8Nm torque for M6 terminals.

6. STORAGE

The converter can be stored at temperatures between -20°C and 50°C.

7. WARRANTY

IMPORTANT AND WARNING:

DO NOT USE OR ATTEMPT TO USE THIS PRODUCT UNTIL YOU HAVE READ THE USER MANUAL IN ITS ENTIRETY. IMPROPER INSTALLATION OR USE OF THIS DEVICE MAY BE DANGEROUS AND MAY CAUSE DAMAGE TO OTHER ELECTRICAL EQUIPMENT AND WILL VOID THE WARRANTY.

Warranty. The company guarantees that products and associated services are free of significant defects in design, material and execution for 24 months after delivery.

Exceptions. The company's warranty does not include defects caused by: (i) ordinary wear and tear, (ii) storage, installation, use or maintenance against the company's instructions or ordinary practice, (iii) repair or change carried out by others than the company, and (iv) other conditions for which the company has no responsibility.

Examination. Within a reasonable period of time after receiving a complaint from the client about defects and examining the claim, the company will inform the client about whether or not the defects are covered by the warranty. After the request, the client must ship defect parts to the company.

The client covers the expenses and risks of the parts during transport to the company. The company covers the expenses and risks for return of parts during transport, only if the defects are covered by the warranty.

Register a complaint. If the client discovers defects within the period of warranty, which the client wishes to invoke, it must be communicated immediately in writing. If defects, which the client discovers or should have been discovered, are not immediately communicated to the company in writing, it cannot be effectuated at a later time. The client must provide the company the requested information about the registered defects.

Instructions for Obtaining Warranty Service for Clayton Power Devices

To obtain warranty service, contact the store where you have bought the product and provide the following:

- Sales receipt
- Device model number
- Device serial number
- Brief description of the application and problem, including any error codes displayed on the device.
- Obtain an authorisation number from the Clayton Power dealer before shipping the device. Carefully pack the device and ship it (freight paid) to the Clayton Power dealer.

Sales: sales@claytonpower.com

Service: service@claytonpower.com

Phone: +45 4698 5760

Address: Pakhusgaarden 42-48
DK-5000 Odense C



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