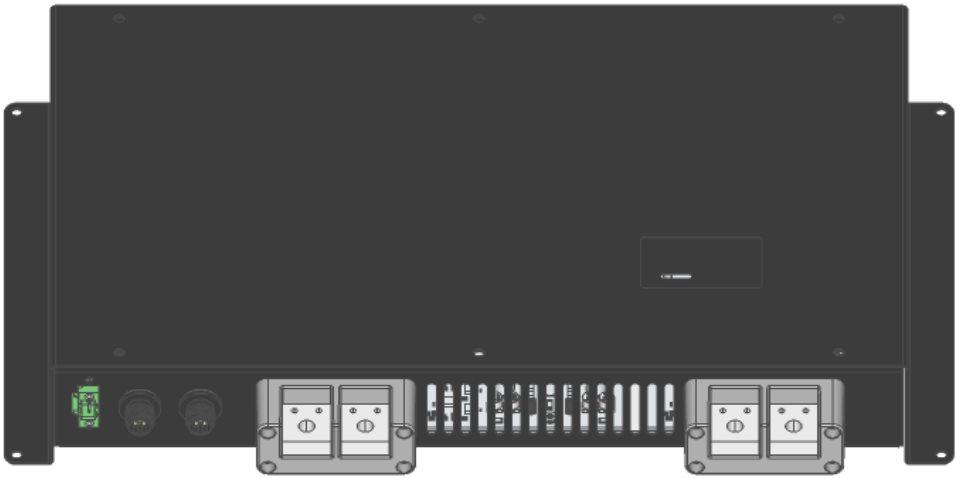
Manual and safety instructions | **English**
Revision 3.01
Release date 23/3/2026

1200W and 1800W Bidirectional DC-DC Converter range



CLAYTON POWER

CONTENT

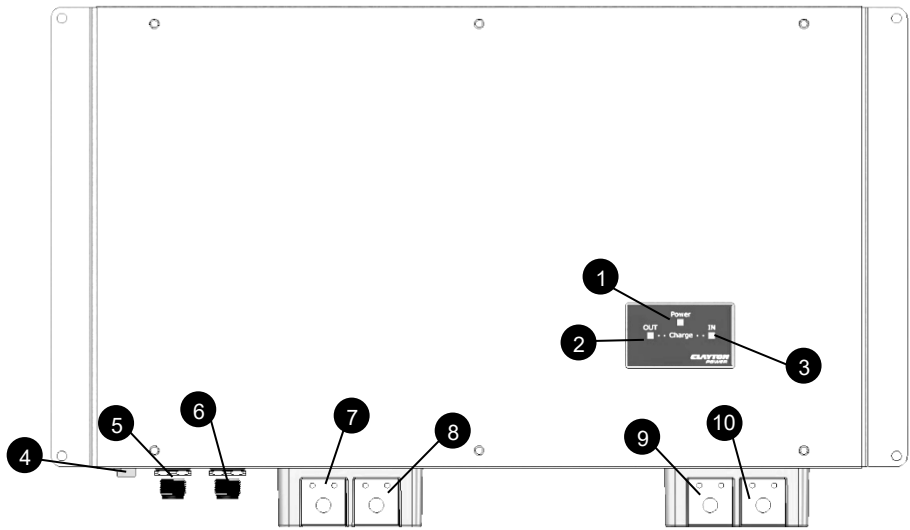
1. GETTING STARTED

1.1 Product Box Contents

Quantity	Description
1	Bidirectional DC-DC Converter
4	M8 bolt
4	Cap for M8 bolt
4	16 mm self-tapping mounting screws
1	M12 connector

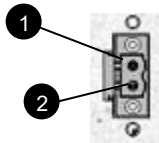
1.2 Product Details

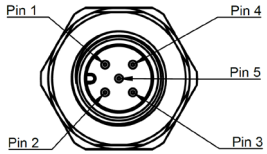
CONNECTION OVERVIEW

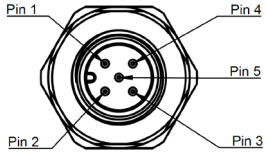


#	Description	#	Description
1	Power indicator	**6**	M12 – Data connector BATTERY (OUT)
2	Power direction OUT indicator	**7**	-DC terminal BATTERY (IN)
3	Power direction IN indicator	**8**	+DC terminal BATTERY (IN)
4	Terminal block – Input connector	**9**	+DC terminal E-GEN/LPS (OUT)
5	M12 – Data connector E-GEN/LPS (IN)	**10**	-DC terminal E-GEN/LPS (OUT)

TERMINAL BLOCK – IO PINOUT

#	Function	Front view
1	Input Signal / D+ Ignition Signal (reverse)	
2	Input Signal / D+ Ignition Signal (reverse)	

M12 (E-GEN/LPS/IN) - IO PINOUT		
#	**Function**	**Front view**
1	Input Signal / D+ Ignition Signal (reverse)	
2	Input Signal / D+ Ignition Signal (forward)	
3	GND	
4	CAN High (Communication)	
5	CAN Low (Communication)	

M12 (BATTERY/OUT) - IO PINOUT		
#	**Function**	**Front view**
1	Not connected	
2	Not connected	
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 1 Hz	Constant voltage
	Green	Flash 4 Hz	Constant current
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

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

- 12 V/24 V Input – Bidirectional DC-DC converter for 12 V/24 V 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

Standalone charging is always controlled through the left M12 I/O connector E-GEN/LPS (IN), with the following functionality.

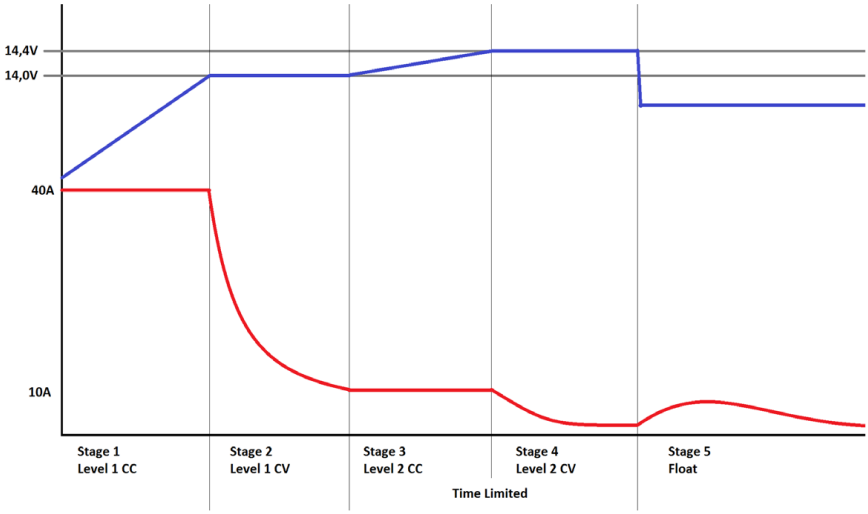
Pin 1 state	Pin 2 state	Function
High	High	**– DO NOT USED –**
High	Low	Power transfer from right E-GEN/LPS (OUT) power terminals to the left BATTERY (IN).
Low	High	Power transfer from left BATTERY (IN) power terminals to the right E-GEN/LPS (OUT).
Low	Low	No power transfer.

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

Level 1 charges the battery with high current allowing active loads.

Level 2 performs absorption charging at lower current avoiding gas voltage.
Level 2 state is time limited avoiding infinite charging due to active loads.

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.

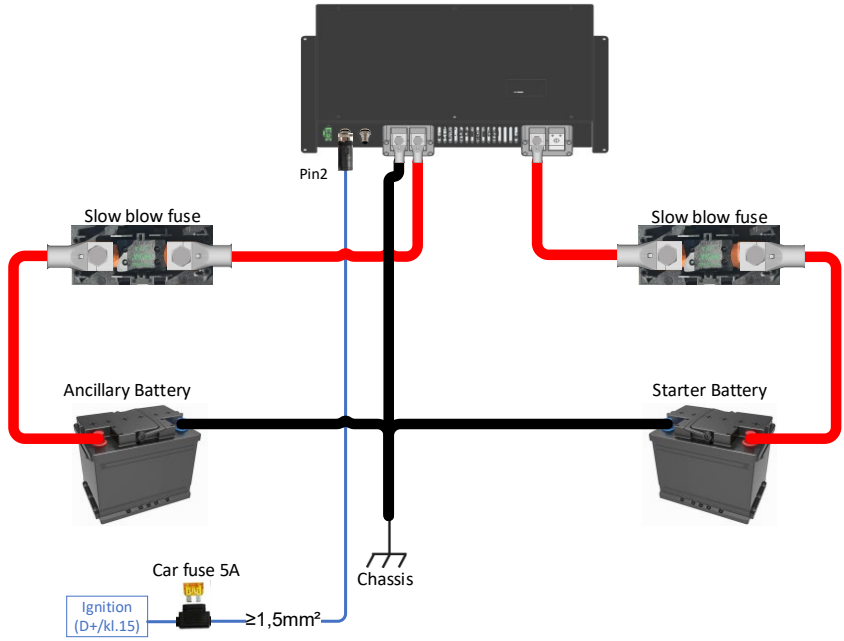


CHARGE ALGORITHM			
Stage	**Description**	**Value (12 V)**	**Value (24 V)**
Stage 1	Level 1 Constant current	40 A	20 A
Stage 2	Level 2 Constant voltage	14,0 V	28,0 V
Stage 3	Level 1 Constant current[1]	10 A	10 A
Stage 4	Level 2 Constant voltage[1]	14,4 V	28,8 V
Stage 5	Float charge[2]	13,5 V	27,0 V

1 - Level 2 stage is time limited to 8 h and hereafter the battery is considered full.
2 - If the current overpass 10 A 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 an old or worn-out battery that has a voltage significantly different from its nominal voltage, as the converter is then not able to automatically detect the battery type and voltage.



WARNING: Using the wrong cable size or a bad cable connection can cause overheating and a short circuit.

WARNING: Place fuses as close as possible to the power source to prevent high current short-circuits.

The following table shows the recommended cable and fuse size.

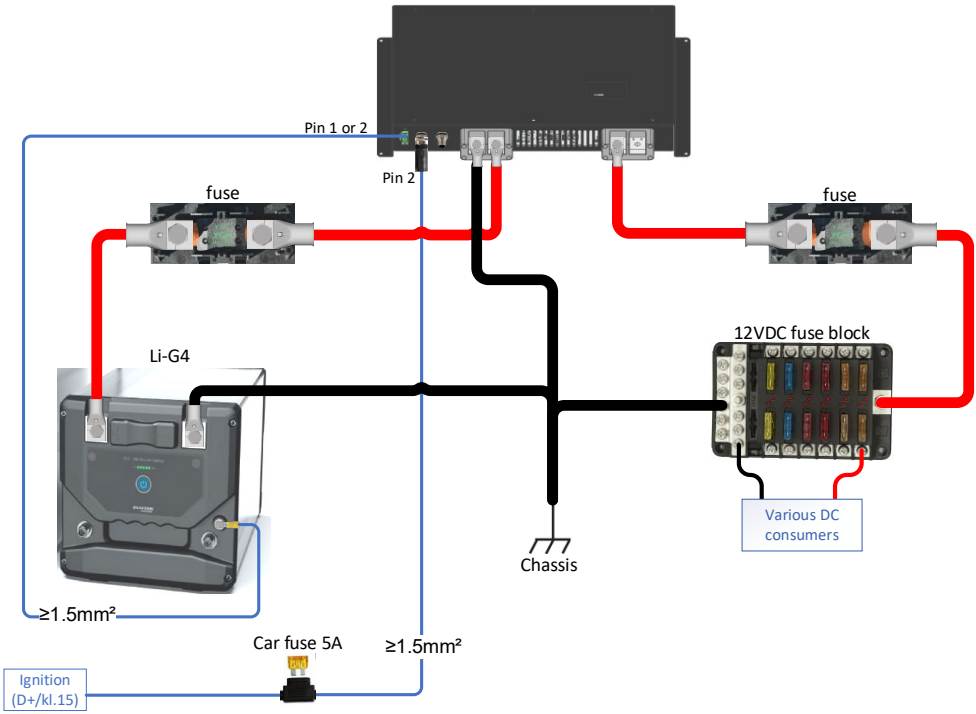
CABLE AND FUSE SIZE		
Parameter	**Value**	
SKU no.	CD2412	CD2413
Fuse rating	100 A	150 A
Cable gauge	25 mm^2	50 mm^2

NOTE: The two negative DC terminals are internally connected, so chassis connection can be done on either one.

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.
See configuration manual for a description of how to do this.
The following settings must be changed from default:

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



WARNING: Using the wrong cable size or a bad cable connection can cause overheating and a short circuit.

WARNING: Place fuses as close as possible to the power source to prevent high current short-circuits.

The following table shows the recommended cable and fuse size.

CABLE AND FUSE SIZE		
Parameter	**Value**	
SKU no.	CD2412	CD2413
Fuse rating	100 A	150 A
Cable gauge	25 mm²	50 mm²

NOTE: The two negative DC terminals are internally connected, so chassis connection can be done on either one.

3. SPECIFICATIONS

PARAMETER	1200W Bidirectional DC-DC Converter	1800W Bidirectional DC-DC Converter
General		
SKU no.	CD2412	CD2413
Cooling	Forced	
Operating temperature range	-20 – 50 °C	
IP classification	20	
Product weight	1200 g	1600 g
Product size (L x W x H)	238 x 393 x 59 mm	
Pre-configured for output voltage	12 V	
Pre-configured for battery type	Lithium battery	
Pre-configured for install type	Capacity extension	
Electrical		
Supply Voltage	9-34 V	
Input Current @ 12 V	0-90 A	0-135 A
Input Current @ 24 V	0-45 A	0-65 A
Output Voltage	0-34 V	
Output Current @ 12 V	0-80 A	0-120 A
Output Current @ 24 V	0-40 A	0-60 A
Output Control	5 stage charge	
Power consumption (Idle)	< 3.2 W	< 4.8 W
Power consumption (Sleep)	< 2 mW	< 3 mW
Connector type	Terminal – M8	
I/O		
M12 pin 1 and pin 2	0-32 V	
M12 pin 3	0 V	
M12 pin 4 and pin 5	SAEJ1939, 125kb	
DFK-MSTB terminal pin 1 and pin 2	0-32 V	
Overcurrent protection	400 mA	
Wakeup Input (Deactivate)	< 3.0 V	
Wakeup Input (Activate – delayed 15 s)	> 4.0 V	
Connector type	M12 type A – 5-way, DFK-MSTB terminal	

3.1 DC Operation

Parameter (Input)	Value (12 V)	Value (24 V)
Undervoltage (1 sec)	11.5 V[1]	23.0 V[1]
Undervoltage (30 sec)	12.0 V[1]	24.0 V[1]
Undervoltage Recover	12.2 V	25.6 V
Overvoltage (1 sec)	17.0 V	34.0 V
Overvoltage (30 sec)	16.0 V	32.0 V
Overvoltage Recover	15.0 V	30.0 V

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

4. CERTIFICATIONS AND COMPLIANCE

Low Voltage Directive 2014/35/EU
EN62368-1

RoHS Directive 2011/65/EU
EN 63000

EMC 2014/30/EU
EN61000-6-2, EN61000-6-3

E-Marking
UN-ECE Regulation 10, E5 10R06/03 0766 00

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 needs to be flexible.
    - Cables are rated in different classes related to flexibility.
    - Cables with classification 5 or 6 needs 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.
    - 12 Nm torque for M8 terminals.
- When connecting the cable remember to use both spring and straight washer.

6. STORAGE

The converter can be stored at temperatures between -40 ºC and 70 ºC.

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:

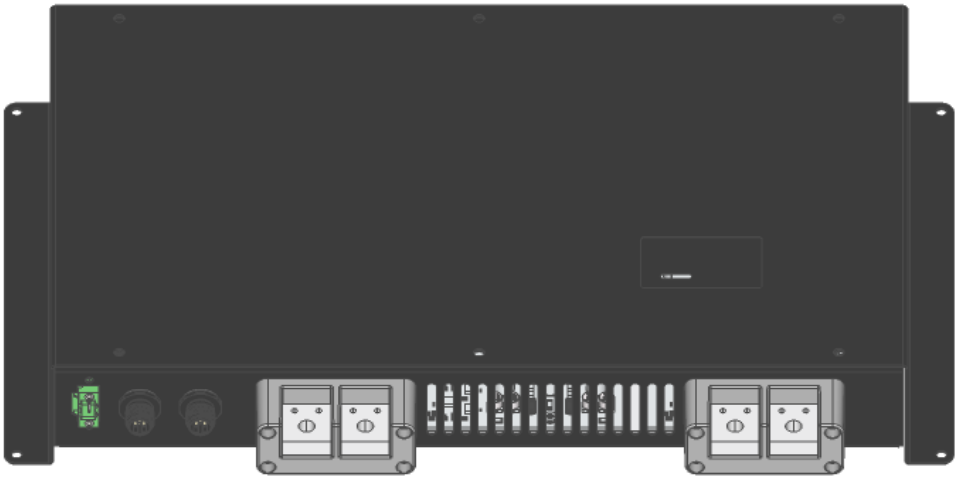
- Sales receipt
- Device model number
- Device serial number
- Brief description of the application and problem, including any error codes displayed on the device.
- Obtain an authorisation number from the Clayton Power dealer before shipping the device. Carefully pack the device and ship it (freight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



CLAYTON POWER