Manual and safety instructions | **English**
Revision 3.02

The LPS II range

CLAYTON POWER

SAFETY INSTRUCTIONS – UN3480

The Lithium Power Supply (LPS) is classified as Class 9 dangerous goods according to UN3480, a power source with high energy density and hazardous materials in a sealed metal cabinet.

Installation must follow national safety regulations in accordance with the requirements for enclosure, installation, creepage, clearance, marking and segregation requirements for the end-use application. We recommend that installations are performed by authorised professionals. Switch off the system and check for hazardous voltages before changing any connections!
The Lithium Power Supply must only be serviced by trained personnel.

The lowest ingress protection rating for specific LPS parts is IP20. Ensure that the installation of the Lithium Power Supply complies with IP20 requirements.

This is a Class I product. Connect only 230V AC from a source connected to protective electrical earth, including all extension cords between source and the device.

Observe the following:
When connected to 230V input, voltage is present at 230V output, even when the device is switched off.
Do not open the LPS.
Do not discharge a new LPS until it has been fully charged.
Charge only within the specified limits.
Make sure the LPS is switched off when it is moved and during installing.
Do not mount the LPS upside down or on its side.
Check if the LPS has been damaged during transport.
Do not series- or parallel-connect the 230V of the LPS.
Do not leave outside exposed to the elements.
Do not use at altitudes above 2000 metres (6562 feet)
Do not cover or block the fan or air intake to ensure that the battery does not overheat.
Do not allow children or animals to come in contact with the device or connected power supplies.

Solar Connection
Solar connection must not exceed the maximum voltage of 50V.

Danger in case of fire:
Danger of explosion with dust particles.
Decomposition due to fire or heat development emits toxic and corrosive gases.
Combustion gases which strongly irritate the eyes and respiratory organs.

General precautions the driver should observe if these hazards occur:
Switch off the motor.
Place a warning sign on the road to warn others.
Inform others of the dangers and advise them to stay away from the wind direction.
Contact the police and fire brigade immediately and inform them that there are lithium batteries (UN3480) onboard.

Instruction for fire extinguishing:
Extinguish fire with water. If possible, submerge the LPS completely in water.
Extinguishing with water produces fluoride, phosphate, fluoride-oxide and carbon monoxide.
Alternatively, extinguish with a CO_2 fire extinguisher.

NON-SPILL
LI-ION BATTERY

CONTENT

SAFETY INSTRUCTIONS – UN3480

CONTENT

UNIT MUST BE CHARGED EVERY 6 MONTHS IF NOT USED

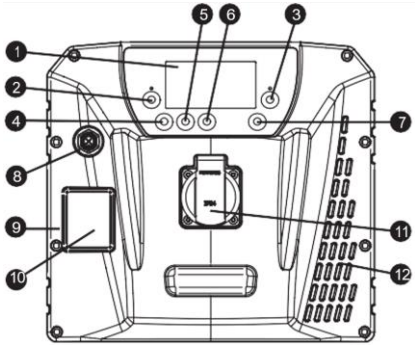
1. GETTING STARTED

1.1 Product Box Contents

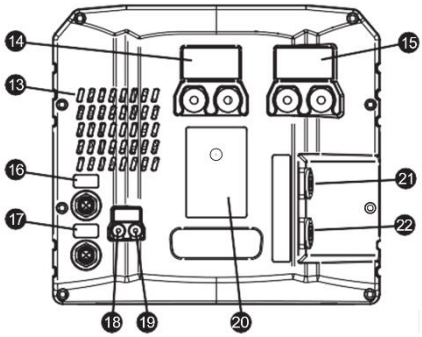
Quantity	Description
1	LPS II
1	AC charging cable (Neutrik – NAC3 FCA)
1	AC output connector (Neutrik – NAC3 FCB)
4	Cap for M8 bolt
4	M8 bolt
2	M4 bolt
4	Rubber foot
1	Installation guide

1.2 Product Details

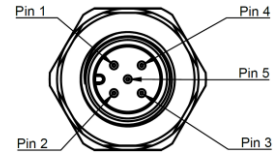
Front View



Rear View

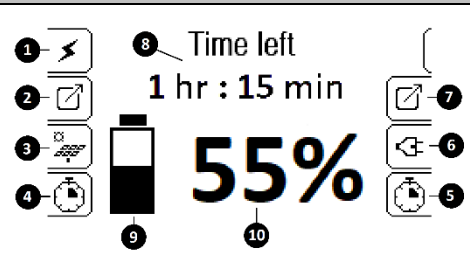


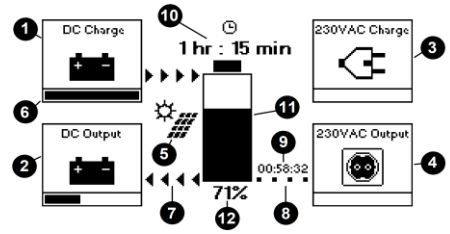
#	Description	#	Description
1	Display	**13**	Ventilation
2	12V DC button	**14**	DC output terminals
3	230V AC button	**15**	DC input terminals
4	Navigation button - Down	**16**	M12 – Data/Remote connector
5	Navigation button - Up	**17**	M12 – Data/IO connector
6	Navigation button - Ok	**18**	C1 (D+/Ignition Signal)
7	Navigation button - Return	**19**	C2 (Solar +) IO terminal
8	M12 – Data/IO connector	**20**	Type plate
9	Serial number	**21**	230V AC output port (NAC3 FCB)
10	RCBO	**22**	230V AC input port (NAC3 FCA)
11	230V AC output port		
12	Ventilation/Fan		

M12 - IO PINOUT		
#	Function	Front View
1	Single Wire (Communication)	
2	I/O Signal	
3	GND	
4	CAN High (Communication)	
5	CAN Low (Communication)	

NOTE: PIN 2 in the M12 connector labeled "REMOTE" is designed to supply power to the LPS Remote. The LPS Remote is not included and can be purchased separately.

The display features two home screens - a simple view and an advanced view. It is possible to switch between the screens using the UP and DOWN navigation buttons.

DISPLAY – SIMPLE VIEW		
#	Description	View
1	DC input active – Charging from DC source	
2	DC output active – I/O activated	
3	Solar input active – Charging from solar panel	
4	DC output energy saver timer active	
5	AC output energy saver timer active	
6	AC input active – Charging from grid	
7	AC output active – I/O activated	
8	Remaining operation time or time to charge	
9	Graphical indication of state-of-charge	
10	Numeric indication of state-of-charge	

DISPLAY - ADVANCED VIEW		
#	Description	View
1	DC input functionality	
2	DC output functionality	
3	AC input functionality	
4	AC output functionality	
5	Solar input active – Charging from solar panel	
6	Power bar for indicating utilization of function	
7	Functionality is active and a transfer of energy is in process	
8	Functionality is active but there is no energy transfer	
9	AC output energy saver timer active	
10	Remaining operation time or time to charge	
11	Graphical indication of state-of-charge	
12	Numeric indication of state-of-charge	

NOTE: Interface and product features might vary depending on the model.

The display provides information on the unit operation status and allows for advanced unit configuration.

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.

Warning: Do not connect the AC outputs in parallel or serial. It will damage the device and is not covered by the warranty.

Warning: Do not connect the output of a generator or AC mains to the output. It will damage the device and is not covered by the warranty.

It is recommended to perform a full battery cycle prior to the initial use.
To do this charge the LPS II fully, then do a full discharge and then charging it overnight using the 230V input.

The LPS II is a compact power supply designed to provide power for a variety of 230VAC and 12VDC applications. It comes with built-in:

- LiFePO4 battery.
- 230V AC Output – For supplying 230VAC applications.
- 230V AC Input – For charging from mains.
- 12V DC Output – High power DC output for supplying 12VDC applications.
- 12V/24V Input – Bidirectional DC-DC converter for 12V/24V applications like:
    - Vehicle jumpstart
    - Charging from alternator.
- Solar Charging – Integrated MPPT for charging from solar panel.
- CANbus communication and I/O interface for interaction with auxiliary equipment and remote control.

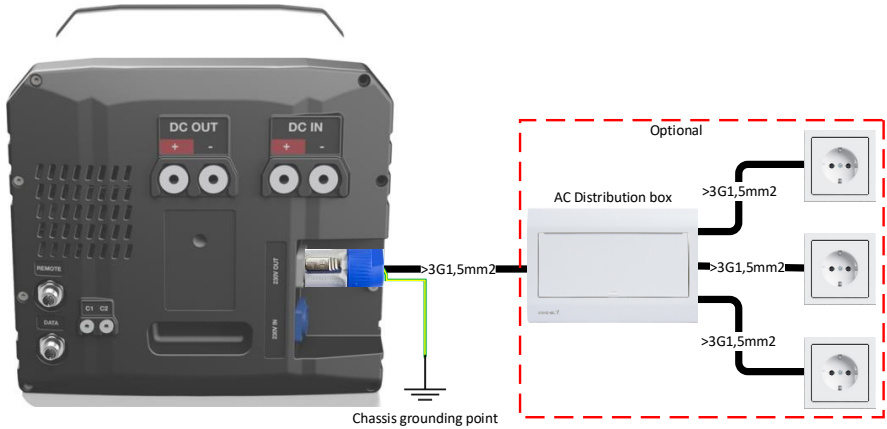
2.1 230V AC Output

The LPS II features two AC output ports, one on the front (CEE 7) and one on the back (NAC3 FCB), which can be used simultaneously. Both ports are protected against overload and short circuits and are equipped with RCDO for safety.

Press the 230V button to activate the AC output function. The green LED will light up to confirm activation. The output will automatically switch off after 1 hour if the power demand is below 20W (Default setting).

WARNING: A connection from the Neutrik 230VAC Out connector to Chassis MUST be made for protective grounding.

NOTE: If there is no 230V AC output when the output is turned ON, check RCBO.

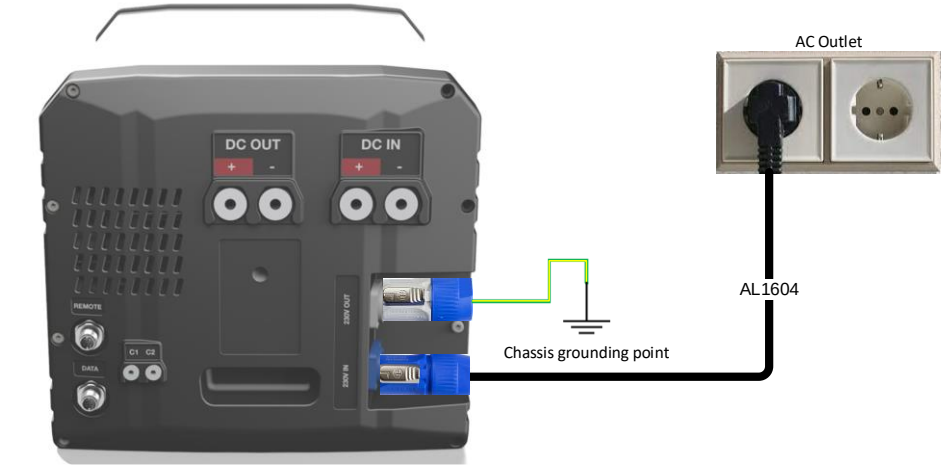


2.2 230V AC Charging

To charge the LPS II from a power outlet, use the provided power cord with the NAC3 FCA connector. When connected to mains, the unit will begin charging automatically and redirect the mains to the AC output ports. During charging, the green 230V LED will flash.

WARNING: 230VAC will always be present on the AC output ports during AC charging.

WARNING: A connection from the Neutrik 230VAC Out connector to Chassis MUST be made for protective grounding.



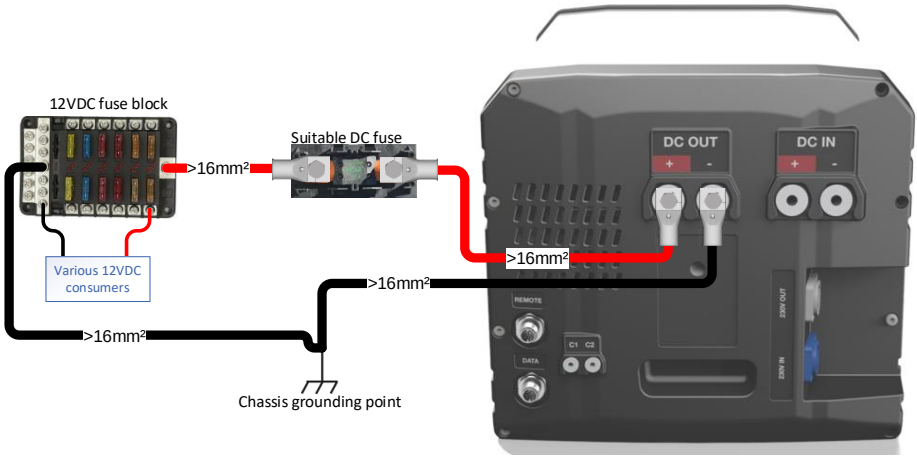
2.3 12V DC Output

The LPS II has a 12VDC port for providing power to DC applications. To activate the 12VDC output, press the "12V" button. A green LED will light up, indicating that the functionality is active.

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

WARNING: Place a correctly dimensioned fuse (max. 200A) as close as possible to the LPS to prevent high current short-circuits.

NOTE: The DC- connection on IN and OUT terminals are internally connected together. Therefore, the chassis earth point can be on either connection.



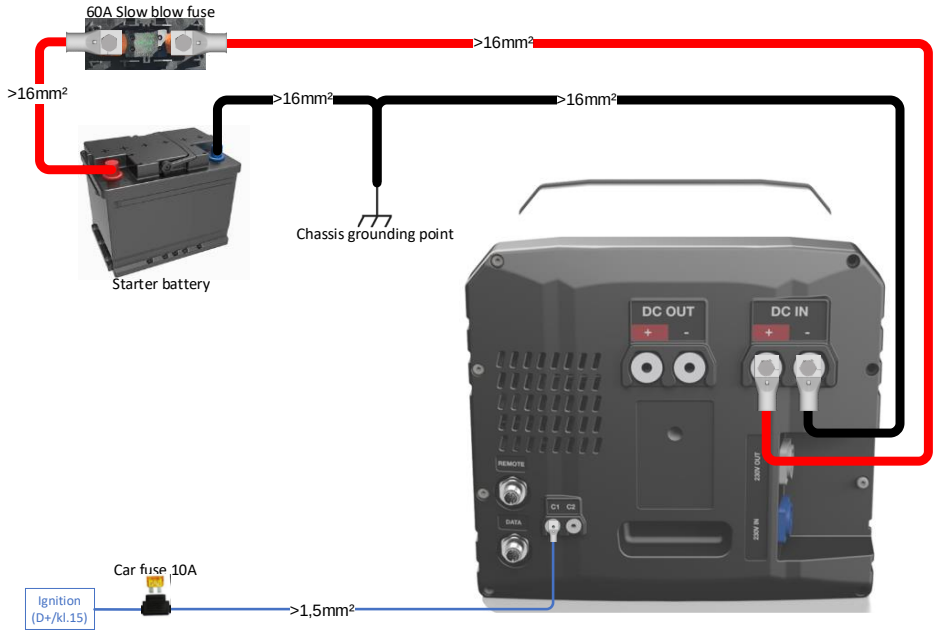
2.4 12V/24V DC Input

The LPS II can be charged using the built-in DC-DC converter when the DC IN port voltage is within the operational range and a wakeup signal is detected on C1.

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

WARNING: Place a fuse (max. 60A) as close as possible to the power source to prevent high current short-circuits.

NOTE: The DC- connection on IN and OUT terminals are internally connected together. Therefore, the chassis earth point can be on either connection.

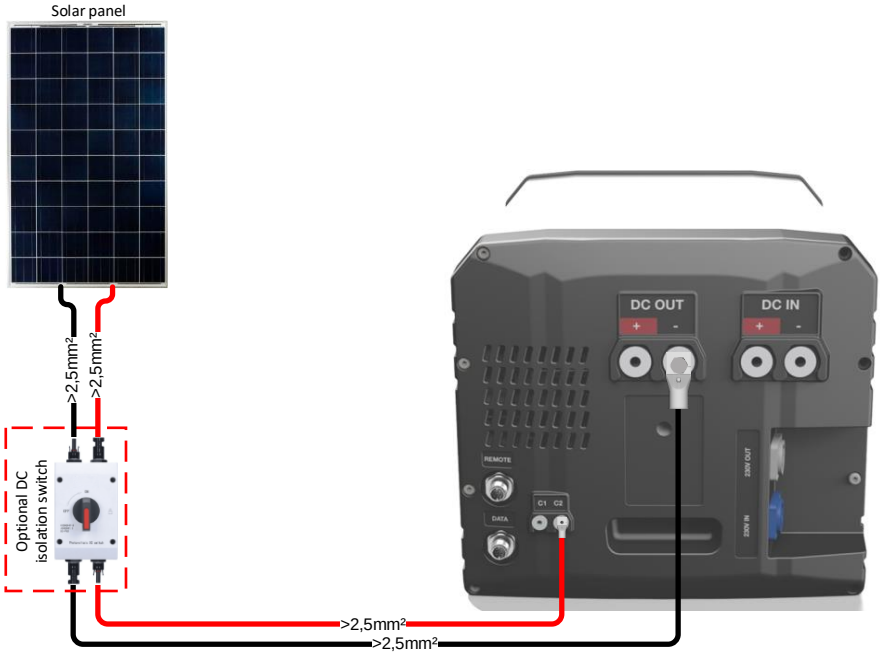


2.5 Solar Charging

If the solar panels generate enough power (> 5W), the LPS II will automatically charge using the integrated MPPT.

WARNING: Never exceed 50Voc between DC Input minus and C2 from solar. Exceeding may cause damage to the unit.

NOTE: Not available in LPS 1500 SE variant.



3. TIPS AND TRICKS

3.1 Limit AC/DC charging power

If the power source has limited output, the AC and DC charging can be limited. The below display menu setting will also limit the AC output in the LPS while connected to the mains.

LIMITING AC CHARGING POWER	
Menu Path	**Description**
Main Menu > 230VAC Charging > Maximum current	To set the maximum allowable current for AC charging, enter the menu and navigate using the up and down arrows. Press "OK" to confirm your selection. This setting will take effect immediately.

NOTE: If 230V charge is limited, the 230V output in the LPS is also limited while connected to the mains.

LIMITING DC CHARGING POWER	
Menu Path	**Description**
Main Menu > DC Charging > Set current	To set the maximum allowable current for DC charging, enter the menu and navigate using the up and down arrows. Press "OK" to confirm your selection. This setting will take effect immediately.

3.2 Activate Jumpstart

The LPS II has an integrated jumpstart feature that can charge the starter battery if depleted. To use this feature, the LPS must be connected to the starter battery via the DCIN terminal according to section 2.4.

The jumpstart is activated through the display menu or the remote. Once activated, the jumpstart will charge the starter battery for 5 min with 40A.

ACTIVATE JUMP-START	
Menu Path	**Description**
Main Menu > DC Charging > Jumpstart functionality	To activate the jumpstart function, enter the menu and use the up and down arrow to select "Active" and press "OK" to confirm.

3.3 Battery maintenance

To ensure optimal battery performance, fully recharge the battery every month (100%).

NOTE: If the battery has not been fully charged for a long period, maintenance charge can be prolonged to 3 days.

UNIT MUST BE CHARGED EVERY 6 MONTHS IF NOT USED

4. TROUBLESHOOTING

4.1 Error list

If the solutions provided below are unable to resolve the error or if the error code is not listed, contact your retailer.

ERROR	DESCRIPTION	SOLUTION
Product Temperature		
4, 5, 56, 57, 123	Unit temperature too low	Let the device warm up or move it to a place with a higher ambient temperature
6, 7, 58, 59	Unit temperature too high	Let the device cool down or move it to a place with a lower ambient temperature
I/O and Communication		
11, 12, 13	M12 connector is overloaded or has short circuited	Disconnect connector and check connector or cable for damage
14	IO Terminal is overloaded or has short circuited	Disconnect connector and check connector or cable for damage
121	Communication Error	Verify cable connections on M12 connectors
Battery		
51, 52, 53, 60	Battery/Cell voltage low	Recharge the battery
Solar		
70	Solar input voltage too high	Check the installation and max. voltage from solar panel (50V)
DC Input		
90, 92	The DC Input voltage too low	Provide a higher 12V DC or 24V DC voltage
91, 124, 125	The DC Input voltage too high	Provide a lower 12V DC or 24V DC voltage
DC Output		
96	DC Output charge current too high	Remove or adjust the power source
97	DC Output discharge current too high	The 12V DC Output load is drawing too much current. Remove the load
AC Output		
150, 151, 152, 203	230V AC Output is overloaded	Remove load on the 230V AC Output
AC Input		
206	230V AC mains is too low	Check supply cables or try another outlet socket
207	230V AC mains too high	Mains too high, verify outlet socket voltage

4.2 No 230V AC output

Make sure that the Residual Current Circuit Breaker with Overload protection (RCBO) is switched on (see section 1.2 - #10) and check your AC cables.

5. SPECIFICATIONS

PARAMETER	LPS II 1500 W 1 kWh SE	LPS II 2000 1 kWh	LPS II 2500 1 kWh	LPS II 3000 2 kWh
General				
Model no.	CL2204/CL2214	CL2205/CL2215	CL2102/CL2112	CL2103/CL2113
Cooling	Forced air			
Ambient temperature discharge	-20 - 50°C			
Ambient temperature charge	0 - 50°C			
IP classification	20			
Protection class	I			
Maximum altitude	2000m			
Product weight	22.5kg		23.5kg	27.5kg
Product size (H x W x L)	256 x 277 x 409mm			
Gross weight	25.5kg		26.5kg	30.5kg
Package size (H x W x L)	320 x 372 x 480mm			
Battery				
Type	Rechargeable Lion battery system			
Chemistry	LiFePO4			
Capacity	100Ah (1280Wh)			160Ah (2048Wh)
Available capacity	80Ah (1020Wh)			136Ah (1740Wh)
Cycles	2000			3500
Self-discharge rate per month	<5%			
Marking (IEC 61960)	4IFpP51/161/119			4IFpP55/175/154
Marking (IEC 62620)	IFpP/51/161/119/[4S]M/-20+60/90			IFpP/55/175/154/ [4S]M/-30+60/90
AC Input				
Voltage	207 - 253V			
Frequency	45 - 65Hz			
Power	550W	720W		
Connector type	NAC3 FCA			
AC Output				
Voltage (+- 10%)	230V pure sine wave			
Frequency	50Hz			
Power - continuous (@25°C)	1300W	1500W	2000W	2300W
Power - 10 min.	1500W	2000W	2500W	3000W
Power - peak	2600W	3000W	4000W	5000W
Power - AC in connected	2300W		3000W	
Efficiency (1,000 W)	94%			
Power factor	0.77			
Idle consumption	20W			
Fault current (rms)	30mA			
Connector type	NAC3 FCB, Schuko (none UK), BS1363 (UK)			
DC Input				
Voltage	11.5 - 32V			

Current	25A	45A
Jumpstart	25A/5min.	40A/5min.
Connector type	Terminal – M8	
DC Output		
Voltage	10 - 14.4V	
Discharge current - continuous	180A	
Discharge current - 1 min.	270A	
Idle consumption	<1W	
Charging current – continuous	90A	
Super charge support	No	
Connector type	Terminal – M8	
Solar (Input)		
Voltage	N/A	15 - 50V
Charging power (max.)	N/A	400W
Charging current (max.)	N/A	15A
Short circuit current (Isc)	N/A	30A
I/O		
Input ports (Analog)	C1, C2, M12	C1, C2, M12 x 3
Input (Voltage – M12)	0 – 36V	
Input (Voltage – C1, C2)	0 – 50V	
Output ports (Digital)	C2 and M12	C2 and M12 x 3
Output (Voltage)	0 or 12V	
Output (Current)	400mA (Overcurrent protected)	
Connector type (M12)	Type A – 5-way	
Connector type (C1/C2)	Terminal – M4	

6. 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, E5 10R – 06 0488

7. SAFETY AND FUSES

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.

7.1 Internal Measures

- 230VAC input protected with 16A fuse.
- 230VAC output protected by a Residual Current Circuit Breaker with Overload protection (RCBO) 30mA/13A.
- DC input protected with 50A fuse.
- L/N relay hardware protection against hazards.
- PE/N relay hardware protection against hazards.
- Solar panels 20A fuse.

Fuses cannot be replaced by the user and require service.

ATTENTION: The MPPT/Solar may be permanently damaged if the input voltage exceeds 50V.

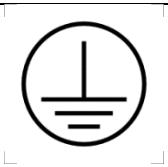
ATTENTION: The device is equipped with a Residual Current Circuit Breaker with Overload protection (RCBO). To ensure its proper operation, it is important to regularly test the RCBO.

Procedure:

- Ensure that 230VAC is present.
- Locate the button marked 'T' on the RCBO.
- Press the 'T' button.
- Observe the RCBO to ensure that it trips during the test.

If the RCBO becomes disabled, all 230AC output ports will be disconnected. This is a safety feature to protect the device and those using it. Regular testing of the RCBO ensures that it is functioning properly.

ATTENTION: Protective Earth - The device must have protective earth connected.



It is mandatory to install a Protective Earth (PE) connection in accordance with the requirements specified in IEC 62109-1. The PE connection provides a safe route for electrical fault current to flow, reducing the risk of electric shock and fire. Proper installation of the PE connection is essential for ensuring the safety of users and the equipment. Make sure that the PE connection is installed using appropriate materials and methods, in accordance with the relevant national and local regulations.

ATTENTION: Do not connect the CAN Bus to the vehicle's CAN communication system.

7.2 External Fuses

- All fuses must be installed as close to the power source 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.

7.3 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.
    - M8 bolts must be torqued to 12Nm
    - M4 bolts must be torqued to 2.5Nm

8. STORAGE

The battery can be stored at temperatures between -20ºC and 50ºC. For long term storage (>1 month), the battery should be fully charged and stored at temperatures between 0ºC and 35ºC. Do not store the battery upside down.

UNIT MUST BE CHARGED EVERY 6 MONTHS IF NOT USED

9. TRANSPORTATION

Lithium batteries are classified as Class 9 hazardous materials (UN3480) and must always be transported in compliance with all applicable local, national, and international regulations. Proper packaging is required during transportation, and packaging instructions (PI965) must be respected. The batteries should not be turned upside down during transportation.

10. DISPOSAL

To ensure proper disposal and reduce potential hazards, discharge the battery completely before placing it in a designated battery recycling bin. Improper disposal, such as throwing it in regular rubbish bins, is strictly prohibited as the product contains batteries with potentially harmful chemicals. Adhere to local laws and regulations for battery recycling and disposal.

11. 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 defective 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 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. Note that the device contains lithium batteries and must be shipped as dangerous goods according to UN3480 lithium-ion batteries' regulations.

Sales: sales@claytonpower.com

Service: service@claytonpower.com

Phone: +45 4698 5760

Address: Pakhusgaarden 42-48
DK-5000 Odense C

CLAYTON POWER