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1 About this Manual

Read this manual carefully and keep it in a safe place. This manual is intended for professionals in the automotive electrical field.

Throughout the manual, you will be alerted to warnings and safety notices about potential hazards associated with handling the device. The colours and signal words indicate the severity of the hazard:

Signal word	Meaning
 DANGER	Warns of imminent danger resulting in death or serious injury.
 WARNING	Warns of a potentially dangerous situation that can result in death or serious injury.
 CAUTION	Warns of a potentially dangerous situation that can result in moderate or minor injuries.
NOTICE	Warns of a potentially dangerous situation that can result in material and environmental damage.

In this manual you will find the following symbols:



Shows you useful tips and information about the device.



Indicates a mandatory requirement for the following instruction.



Shows the result of an instruction.

2 General Safety

This manual supports the safe handling of the device. Use the device solely in accordance with its intended use:

The G3 sine wave inverter with a lightweight and compact design has switching power supply technology and is suitable for mobile and stationary use. The G3 sine wave inverter converts DC voltage (12 V / 24 V) into sinusoidal AC voltage, with which sensitive consumers are supplied.

Any modifications to the device or its components are prohibited and do not conform to its intended use.

Observe the following safety instructions:

- Device defect due to incorrect installation: Install the device in a dry and cool location.
- Danger from damaged, frozen or deformed batteries:
Before operation, make sure that the battery is undamaged and the electrolyte is not frozen.
- When handling open batteries, wear acid-proof clothing.

3 Technical Specifications

Model	1012	1312	1512	2012
Output power				
Continuous power	1,000 W	1,300 W	1,500 W	2,000 W
Overload (1 s)	2,000 W	3,000 W	3,000 W	4,000 W
Overload (10 s)	1,500 W	1,800 W	2,000 W	2,800 W
Overload (15 min)	1,200 W	1,500 W	1,700 W	2,200 W
Degree of efficiency	90%			
Internal consumption				
Normal idling speed	10 W		15 W	
Idling with search mode	< 2 W			
Standby mode	< 5 mA			
Operating temperature				
Max. operating temperature	+50°C			
Min. operating temperature	-20°C			
Switch-off temperature	+80°C			
Output voltage (AC)				
Nominal voltage	230 V			
Voltage tolerance	-10% ... +5%			
Frequency	50 Hz			
Frequency form	Sine			
Max. distortion (THD)	3%			
Input voltage (DC)				
Nominal voltage of the battery	12 V			
Max. input voltage	15 V			
Switch-off voltage (Response time 3 s)	10.5 V			
Switch-off voltage (Response time < 10 s)	9 V			
Switch-on voltage (restart)	12.75 V			

Model	1012	1312	1512	2012
Output power				
Protection class	IP21			
Dimensions, housing (LxWxH)	299 x 198.2 x 116 mm		376 x 198.2 x 116 mm	
Dimension, housing with connections (LxWxH)	334 x 198.2 x 116 mm		412 x 198.2 x 116 mm	
Weight	6 kg		7.5 kg	

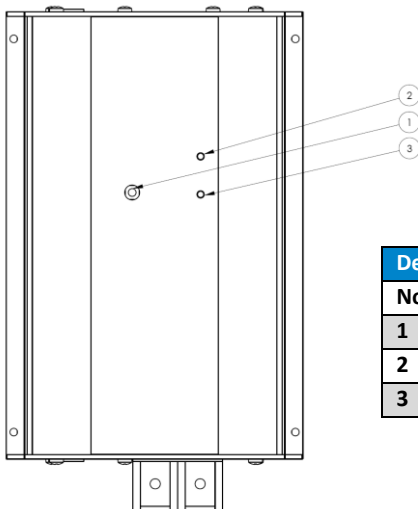
Model	1024	1524	2324
Output power			
Continuous power	1,000 W	1,500 W	2,300 W
Overload (1 s)	2,000 W	3,000 W	3,000 W
Overload (10 s)	1,500 W	1,800 W	3,000 W
Overload (15 min)	1,200 W	1,700 W	2,500 W
Degree of efficiency	90%		
Internal consumption			
Normal idling speed	10 W		15 W
Idling with search mode	< 2 W		
Standby mode	< 5 mA		
Operating temperature			
Max. operating temperature	+50°C		
Min. operating temperature	-20°C		
Switch-off temperature	+80°C		
Output voltage (AC)			
Nominal voltage	230 V		
Voltage tolerance	-10% ... +5%		
Frequency	50 Hz		
Frequency form	Sine		
Max. distortion (THD)	3%		
Input voltage (DC)			
Nominal voltage of the battery	24 V		
Max. input voltage	30 V		
Switch-off voltage (Response time 3 s)	21 V		

Model	1024	1524	2324
Input voltage (DC)			
Switch-off voltage (Response time < 10 s)	18 V		
Switch-on voltage (restart)	25.5 V		
Mechanical specification			
Protection class	IP21		
Dimensions, housing (LxWxH)	299 x 198.2 x 116 mm	376 x 198.2 x 116 mm	
Dimensions, housing with connections (LxWxH)	334 x 198.2 x 116 mm	412 x 198.2 x 116 mm	
Weight	6 kg	7.5 kg	

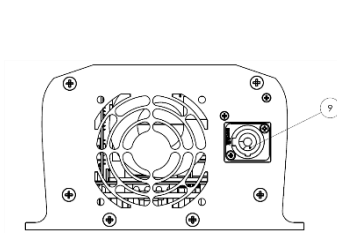
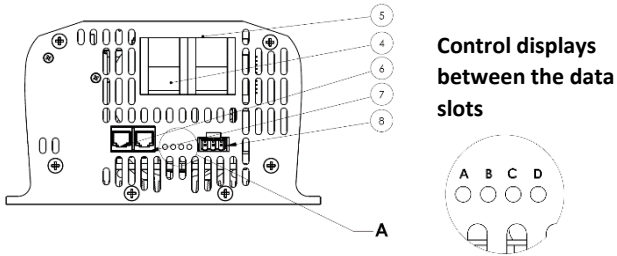
4 Package Contents

Package contents	
G3 sine wave inverter	x1
AC output plug, Neutrik NAC3FCB model – grey	x1
Phoenix plug, MSTB 2.5 / 3-ST-5.08 – green	x1
Manual	x1

5 About the Inverter



Details	
No.	Description
1	Inverter LED – blue
2	On/off button
3	Battery LED – red



Control displays		
Pos.	Colour	Function
A	Green	Illuminates when data connection is "high"
B	Yellow	Illuminates when data connection is "low"
C	Orange	Illuminates when remote switch is "on".
D		Not assigned

Details and connections	
No.	Description
4	Connection, positive terminal of the battery
5	Connection, negative terminal of the battery
6	Data connection, model RJ12 (6P6C)
7	Data connection, model RJ12 (6P6C)
8	Data connection, Phoenix model
9	AC inverter output, Neutrik model

6 Mounting

To mount the device, perform the following steps:

NOTICE

- Choose a cool, dry and well-ventilated mounting site. The device must be protected from dust and moisture.
- Do not mount the device directly next to or above batteries.



- Mount the device on a flat surface.
- Optimum cooling is achieved with vertical mounting.

1. Fasten the device with screws to the 4 lateral holes (5 mm Ø).



The device is mounted.

7 Installation

Determining the Cable Cross-section of the Input Lead (DC)

The following table shows the required cable cross-sections in relation to the respective cable length. Select the cross-sections so that the voltage drop to the inverter is no more than 250 mV.



To avoid voltage dips, select a higher cable cross-section for consumers with high starting currents (e.g. motors, compressors).

Cable Cross-section	Device model						
	1012	1312	1512	2012	1024	1524	2324
15 mm ²	-	-	-	-	1.5 m	-	-
25	1.5 m	-	-	-	2.5 m	1.5 m	-
35	2 m	1.5 m	1.5 m	-	3 m	2.5 m	1.5 m
50	3 m	2 m	2 m	1.5 m	-	3 m	2 m
70	-	3 m	2.5 m	2 m	-	-	3 m

Connecting the Battery (DC Cable)

To connect the battery, perform the following steps:

1. Connect one wire of the DC cable to the negative terminal of the inverter.
2. Connect one wire of the DC cable to the positive terminal of the inverter.
3. Connect the negative terminal of the inverter to the negative terminal of the battery.
4. Secure the positive cable as close as possible to the vehicle battery with a suitable fuse.

Model	Fuse
1012	125 A, slow-blow
1024	80 A, slow-blow
1312	175 A, slow-blow
1512	175 A, slow-blow
1524	100 A, slow-blow
2012	250 A, slow-blow
2324	150 A, slow-blow

5. Connect the positive terminal of the inverter to the positive terminal of the battery.



The battery is connected.

Connecting the Remote Switch

To connect an external remote switch, perform the following steps:

1. Connect an external on/off switch to the positive terminal of the battery (DC voltage min. 10 V, max. 30 V).
Notice: Secure the on/off switch with at least 1 A.
2. Connect the on/off switch to the remote pin of the inverter.



The remote switch is connected.

Connecting Consumers

To connect consumers, perform the following steps:

1. Insert the plug of the consumer into the Neutrik input (grey) of the device.



A Neutrik plug is included. You will find information on how to install the plug on p. 13.

2. Ensure that the consumers are protected with an adequate protective device.



The consumer is connected.

8 Normal Operation

The inverter converts the DC voltage supplied by a connected battery into sinusoidal AC voltage (230 V).

Switching on



The inverter is mounted and installed.

To switch on the device, perform the following steps:

1. Press the on/off button for 2 seconds.



- Red and blue LEDs illuminate.
- Red LED goes out.
- Blue LED illuminates and indicates the start process.
- Blue LED lights up continuously, AC voltage is activated.



The device is switched on.

Switching off

To switch off the device, perform the following steps:

1. Press the on/off button for 0.5 seconds.



- Blue LED goes out.
- Device switches off.



The device is switched off.

Standby Mode

If the AC voltage is not required continuously, a standby mode can be activated. In standby mode, the internal consumption is less than 2 W. In standby mode, the device generates a short pulse every 2 seconds.



- If the actual consumption is more than 10 W, the device switches on.
- If the consumer is switched off, the device switches to standby mode after 1 minute.
- The standby mode cannot be activated or deactivated via an external remote switch.
- The standby mode is not suitable for lithium batteries.

Activating the Standby Mode

To activate the standby mode, perform the following steps:



The device is switched off.

1. Press the on/off button until the blue and red LEDs illuminate.



The standby mode remains active until it is deactivated.



The standby mode is activated.

Deactivating the Standby Mode

To deactivate the standby mode, perform the following steps:



The device is switched off.

1. Press the on/off button until the blue and red LEDs flash.



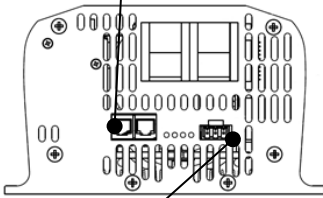
The standby mode is deactivated.

9 Connections



The pins for single wire communication are connected in parallel.

Plug, RJ12		
Pin	Signal	Description
1	-Temp X1	Temperature sensor (-)
2	Ground	Ground, consumer (fused)
3	+Temp X1	Temperature sensor (+)
4	Sync_In/Out	Not assigned
5	Data	Single wire communication (Clayton)
6	Remote	Connection for connecting an external on/off switch.



Plug, Phoenix Combicon		
Pin	Signal	Description
1	Data	Single wire communication (Clayton)
2	Remote	Connection for connecting an external on/off switch.
3		Not assigned

10 Control Displays and Error Descriptions

Blue LED	Description
Steady light	Inverter in operation
●.....●.....●.....●.....	Start mode – Load adjustment
●..●..●.....	Output overloaded
●●..●●..●●.....	Operating temperature too high (automatic cooling and restart)
●●●..●●●..●●●.....	Short-circuit at the inverter output
●●●●..●●●●..●●●●	Short-circuit in the power supply
●●●●●..●●●●●..●●●●●	Overload in the power supply during the start process

Red LED	Description
Off	Battery voltage OK
Steady light	Low battery voltage (to prevent battery draining, the device switches off after 1 minute)
●..●..●..●..●..●..●..●..	Battery voltage too high

Blue and red LED	Description
Flickering	Remote and mains switch on the device switched on at the same time
●..●..●.....	NTC error (internal temperature sensor)
●●..●●..●●.....	Overvoltage in the internal high-voltage DC connection
●●●..●●●..●●●.....	Defect in half of the bridge circuit
●●●●..●●●●..●●●●	Defect in the entire bridge circuit

11 Maintenance

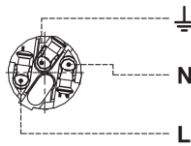
Maintain the inverter at regular intervals.

- Ensure that the wiring between the battery and the inverter is secure.
- To ensure the air supply, clean the ventilation grille of the inverter.

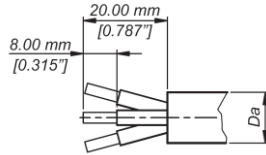
12 Mount Neutrik Plug

Use the following plug to connect the consumers:

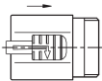
- AC output plug, type Neutrik NAC3FCB – grey



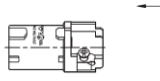
Connections



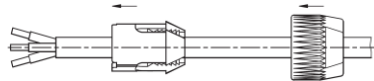
Cable preparation



Sleeve



Insert



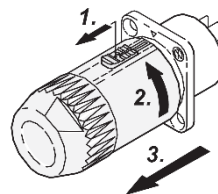
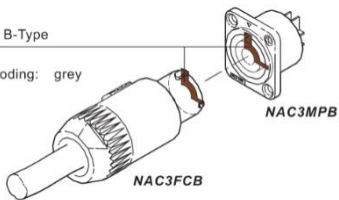
Clamp sleeve

Screw connection

Coding, type B (grey)

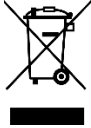
Coding B-Type

Color coding: grey



13 Disposal

Dispose of the device in accordance with the Waste Electrical and Electronic Equipment Regulations (WEEE).



The device must not be disposed of with household waste.
Take it to a recycling point or send it to your point of sale.

14 EU Declaration of Conformity

The **G3 sine wave inverter**

in models **1012, 1024, 1312,**
1512, 1524, 2012, 2324



complies with the requirements of the following directives:

2014/30/EC:	EMC
2014/35/EC:	LVD
2011/65/EC:	RoHS

The current and complete document is available on request from
techdoc@leab.eu.

Appendix: Use of Lead-acid Batteries

Selection of the Battery

Select a deep-cycle battery (e.g. lead-gel battery) as the power source for the inverter. These batteries are designed for higher continuous loads and cyclical discharges of up to 80% of their capacity without damaging the battery.

Starter batteries are not suitable for operating an inverter.

Size of the Battery

When selecting the battery size, take the following into account: The greater the battery capacity, the longer the inverter can be operated without having to recharge the batteries.

Undersized batteries are often drained too deeply. This reduces their efficiency and the service life of the batteries. The main causes of premature ageing and defects are insufficient capacity, insufficient charging and battery maintenance.

Wiring the Battery



- Only connect batteries of the same type and size to each other.
- Never combine open and sealed batteries.
- Clean the battery terminals with a brass wire brush.
- Carefully fit the connecting terminals and tighten the clamping screws.
- Grease the battery connections.
- Charge new batteries before use.

Connecting Batteries in Series

2 batteries connected in series provide double the supply voltage.

However, the total capacity does not increase.

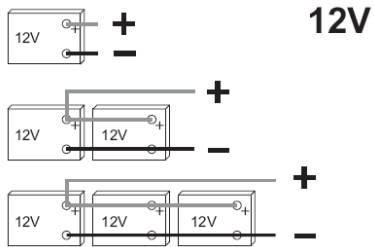


Example: 2 batteries 12 V / 100 Ah connected in series provide a supply voltage of 24 V with 100 Ah.

Connecting Batteries in Parallel

2 batteries connected in parallel provide double the battery capacity.

However, the supply voltage does not increase.



Example: 2 batteries 12 V / 100 Ah connected in parallel provide a supply voltage of 12 V with 200 Ah.

Maintenance of the Battery

Lead-acid batteries must be maintained at regular intervals. The battery must be maintained at least once a month in hot seasons and quarterly in cold seasons. Older batteries should be checked every 14 days.

Maintenance of Open Batteries

With open batteries, check the condition of the liquid and measure the acid density with an acid syphon.

To increase battery life, make sure the battery surface is clean and dry. Carefully remove dirt and acid stains with hot water and a soda solution. Remove the soda solution with fresh water and dry the battery. Ensure that the venting flaps are clean and correctly fitted. Then check the installation of the connecting terminals. Tighten the clamping screws if necessary.

Topping up Acid Level

Ensure that the cell grids are always covered with acid. Always use distilled water to top up the battery, never normal drinking or sea water. Follow the manufacturer's instructions when topping up the acid level.

Maintenance of Sealed Batteries

Sealed batteries require little maintenance. An inspection is limited to measuring the battery voltage.

Storing the Battery

- Store batteries in a cool, but frost-free and dry environment.
- To prevent the battery from freezing, ensure continuous trickle charging in cold conditions.
- Never store batteries in a discharged state.
- If stored for a long time, check the charge status regularly and recharge if necessary.

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