



All the Energy You Need!

## Installation and operation manual for the *3Lion* / 3Link LiFePO<sub>4</sub> battery system.



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### 1. SYSTEM COMPONENTS *of 3Lion + 3Link*

- *3Lion* LiFePO4 Battery
- *3Link* Controller
- *3Link* Display
  - Display connection cable
  - Use and maintenance manuals

The supplied items are designed exclusively for this system and are not compatible with other devices. The product pictures in this manual are for reference only and for purely explanatory purposes; the product you bought might be different. NDS Energy reserves the right to make changes to the product at any time without prior notice and without any obligation to apply these changes to the devices previously distributed.

Neither NDS Energy nor RoadPro Ltd is responsible for any malfunctions due to improper use of the product, any installation errors or mistakes present in this manual.



## 2. Safety Notes

This manual serves as a guide for the installation, use and maintenance of the *3Lion* + *3Link* system. Whether you are the installer or the end user, please read this manual carefully and follow the instructions closely.

- Keep the device out of the reach of children.
- Read this manual carefully and keep it handy, preferably near the *3Lion*, for any future consultation.
- The *3Link* unit must be installed with the *3Lion* battery to get the full advantage of the fast charging technology. However, a *3Lion* battery can also be installed as a direct replacement for a lead acid battery in a caravan for example.
- A *3Lion* battery can be installed with a maximum inclination of 90° compared to the normal position (i.e. with the poles facing up).
- Do not bump, puncture, disassemble or damage the *3Lion* and the *3link*. Do not attempt to open the *3Lion* battery.
- In the event of electrolyte leakage, do not touch the battery. In case of contact, immediately flush skin with warm water and seek medical advice immediately.
- Be careful when installing, so that the two poles of the *3Lion* do not come in contact with each other. Use isolated equipment and do not place and/or leave metal objects close to the product.
- Always dispose of the battery according to local laws.
- Protect the poles of the *3Lion* from any contact with electrically conductive objects.
- The *3Lion* must be protected from direct sunlight or direct heat sources to avoid overheating.
- Do not install the appliance in a sealed environment, otherwise it may overheat.
- Make sure that there is air circulation in the area where it is installed.
- To avoid the risk of electric shock and/or fire, make sure the power supply is in good condition.
- Do not use the appliance with damaged cables and/or of inadequate cross-section.
- Do not use the device in an environment with high humidity or direct contact with splashes of water and/or liquids or in the rain.
- Install the device using cables of the appropriate cross-section as recommended in the section "INSTALLATION INSTRUCTIONS"
- Fully charge the battery right after installing the system or after doing any maintenance on it. When it is fully charged, the display will show 100% on the battery state of charge (SOC).
- The rated voltage of the *3Lion* battery is 12 V. Do not use the system with devices that are not compatible with this voltage. The company is not responsible for any damage, either to the equipment or the vehicle caused by incorrect use of the entire system.

### 3. Introduction

*3Lion* is an innovative NDS battery and charging system, based on Lithium Ferro Phosphate Technology (LiFePO<sub>4</sub>). Combined with the integrated BMS and *3Link* system (BMS Manager), a *3Lion* battery reliably delivers the exceptional performance that is available from a LiFePO<sub>4</sub> battery.

Lithium technology provides significant advantages over traditional lead batteries (AGM, gel & wet lead acid). For example, a *3Lion* battery can withstand high charging currents which results in a much faster charging speed. It does not suffer from the typical sulphation of lead batteries, it has a very low self-discharge rate (less than 3% per month), and there's as much as a 60% weight reduction over a comparable lead-acid battery. With a large number of cycles (2,500+ depending on usage), it provides greater autonomy without the need for mains hook-up.

The *3Lion* battery works in conjunction with the *3Link*, which becomes the hub of the energy system. The engine battery, *3Lion* battery and all electrical equipment, are connected to the *3Link*. This allows the system to work efficiently and to achieve maximum charging - up to 75 Amps depending on the alternator - from the alternator when the engine is running. When the engine is turned off, the *3Lion* battery will deliver current for all on-board electrical equipment : lights, heating, coffee machines, etc.

The *3Link* unit communicates with the touch screen display and provides useful information about the state of the battery, the charging system and how much energy is being used at any given time.

The LiFePO<sub>4</sub> technology used for the *3Lion*, unlike other lithium batteries such as Li-Ion or LiPO, is extremely safe and reliable.

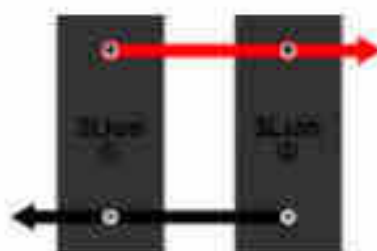
*3Lion* batteries can be used almost anywhere that a lead-acid leisure battery is being used and, in almost every case, a *3Lion* battery will give significant advantages. However, the fast charging and discharging abilities of the battery are dependent on the ability of the charging methods being used.

Before installing any LiFePO<sub>4</sub> battery, it's essential to check the output of the vehicle's alternator, 230V mains charger and, if used, the solar regulator, generator and fuel cell.

If any of these charge in a way that is not compatible with a LiFePO<sub>4</sub> battery, performance will be impaired and the battery could be damaged. In short, all charging methods must ensure that the battery is not charged at more than 14.5V, does not have a "maintenance" mode where the voltage is in excess of 13.8V or any "de-sulphation" mode.

If a LiFePO<sub>4</sub> charging option is available (on most Votronic products, Sterling battery chargers and NDS products for example) always select it. If a LiFePO<sub>4</sub> charging option is not available, selecting gel or AGM will also charge the battery without risk of damage but not to 100% state of charge.

When installing 2 *3Lion* batteries in parallel, use only one *3Link* and place the 2 *3Lion* batteries in parallel with cables of a cross-action of at least 35mm<sup>2</sup> and place them as close to each other as possible. Proceed with the installation as shown in the diagram below.



## 4.1 Installation of the 3Link hub

The *3Lion* / *3Link* system offers maximum performance when used with an alternator rated at 120 Amps or more and with a no-load voltage between 13.8V and 14.7V. No-load voltage is measured at the terminals of the engine battery, when the engine is on, the engine battery is fully charged, all the electrical equipment on the vehicle is off (lights, wipers, air-conditioner, etc.) and when the leisure battery is disconnected from the system.

Find a clean, dry, ventilated place to install the 3Link box, as close as possible to both the *3Lion* battery and the engine battery. Never install the 3Link in the engine compartment.

Remove the two screws in the front (highlighted in red in the photo), lift the cover and remove it to allow convenient access to the connection points. Attach the base of the *3Link* to a secure surface (horizontal or vertical) using 4 self-tapping screws in the appropriate holes on the bottom of the base (highlighted in yellow in the photo).



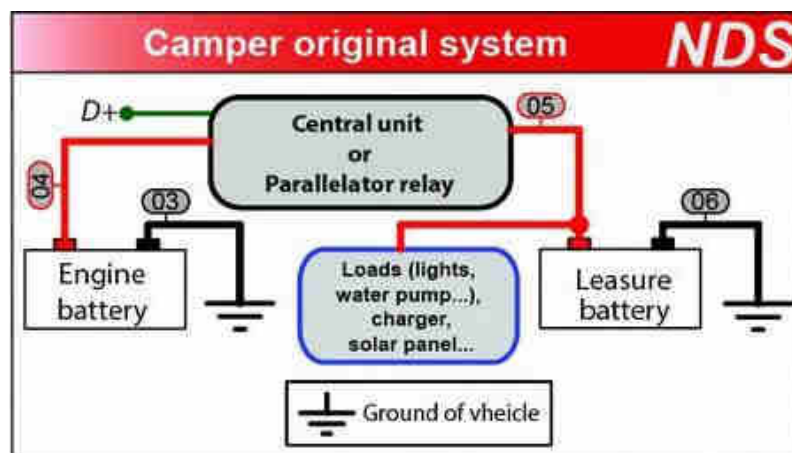
## 4.2 Connecting the cables to 3Link

Before installation, make sure that the vehicle engine and the battery charger are off. Do not make joins in the cables, always make direct connections.



TERMINAL	FUNCTION
1	M8 screw connector for engine battery positive terminal
2	M8 screw connector for electrical system common positive
3	M8 Screw Connector for <i>3Lion</i> battery positive terminal
4	2-way connector for ground connection
5	2 way connector for connection of existing electrical control box
6	Connection to display

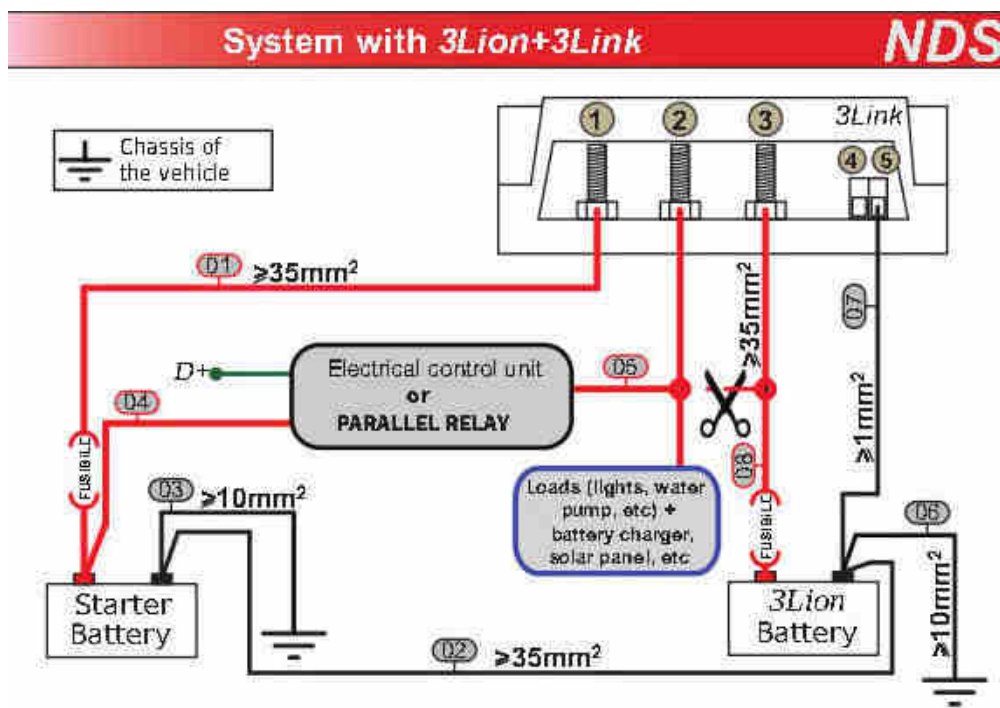
The original electrical system of the motorhome can be represented in a basic manner as a relay that connects the engine battery (and thus the alternator) to the leisure battery when the vehicle's engine is on (i.e. the alternator is in operation and signal D+ is active). As shown here:



The installation of the 3Lion + 3Link is very straightforward.

1. Identify the original cable that goes from the leisure battery's positive terminal to the split charge relay or the existing electrical control box - here shown as "Central unit or Parellator relay" with cable connection number 05.
2. Disconnect cable 05 from the leisure battery positive terminal, and connect it to terminal 2 of the 3Link.
3. Connect the engine battery's positive terminal to the 3Link terminal 1 with 35 mm<sup>2</sup> sq cable via a 200A fuse. If the vehicle has a battery-to-battery charger then connect the positive output of the charger to 3Link's terminal 1. (See note below on battery-to-battery chargers & smart alternators)
4. Connect the 3Lion battery's positive terminal to the 3Link's terminal 3 with 35 mm<sup>2</sup> cable.
5. Connect 3Link's terminal 5 to the chassis with 1mm<sup>2</sup> cable.
6. Connect the cable linking the 3Link to the display.
7. Lastly connect the 3Lion battery's negative terminal to the vehicle's chassis using 35mm<sup>2</sup> cable.

The diagram below shows the completed installation in a vehicle with a conventional alternator and without a battery-to-battery charger.



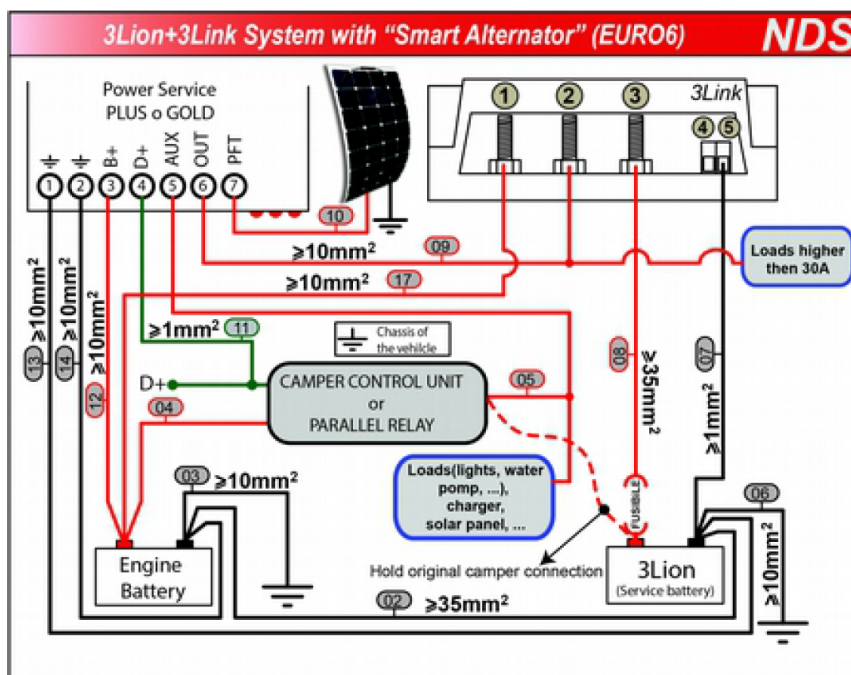


## NOTE !!

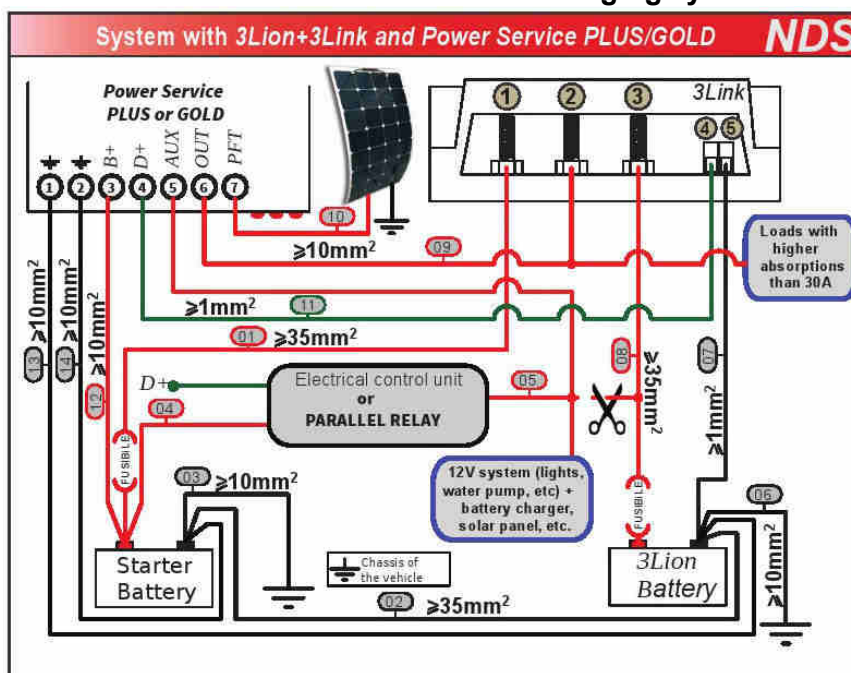
The 3Lion battery will work with any type of alternator including "smart" alternators. But, if your vehicle is equipped with one of these, you will have to install a battery-to-battery charger if the battery is to be charged efficiently. This is not a difficult job but, depending on which model you use, the connections to the 3Link may vary.

1. If your engine is fitted with a standard alternator (not smart) connect the cable from the positive terminal of the starter battery to the 3Link terminal 1.
2. If your engine is fitted with a smart alternator and you are using an NDS Power Service Gold unit as a battery-to-battery charger, connect the cable from terminal 6 of the Power Service Gold to terminal 2 of the 3Link. (See diagram below.)
3. If your engine is fitted with a smart alternator and you are using a battery-to-battery charger from CTEK, Sterling, Votronic or another manufacturer, connect the cable from the positive terminal of the starter battery to the 3Link terminal 2.
4. Note that, if your vehicle does not have a smart alternator but is already equipped with a battery-to-battery charger, to get the full benefit of a 3Lion battery you must remove the charger completely.

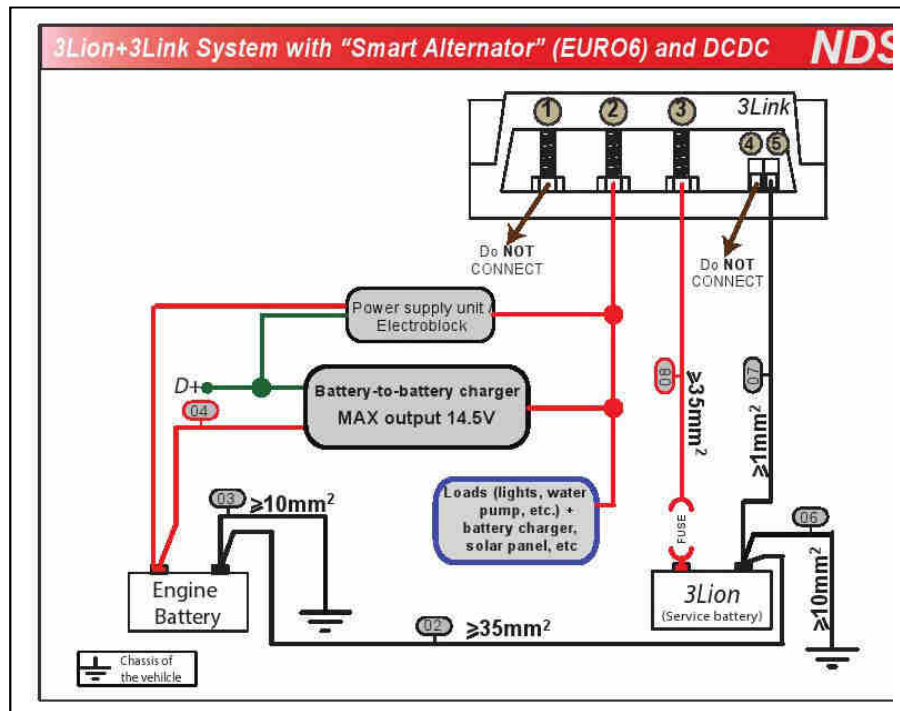
The diagram below shows the completed installation in a vehicle with a smart alternator and NDS Power Service Plus / Gold charging system.



The diagram below shows the completed installation in a vehicle with conventional alternator and NDS Power Service Plus / Gold charging system.



The diagram below shows the completed installation in a vehicle with a smart alternator and a battery-to-battery charging system such as those supplied Votronic, NDS & Sterling.



In all installations, for connections **01**, **02** and **08** it is recommended that you use 35mm<sup>2</sup> cross-section cables, if the length of the connexion is 1 meter or less. If the length of the connection cable exceeds 1 meter, cables with a cross-section of 50mm<sup>2</sup> should be used. It is also advisable to install a 200A fuse on cables **01** and **08**.

Connecting cables **03**, **04**, **05** and **06** are usually already present within the vehicle. If not present, or less than 10mm, it is recommended to use cables with a section of at least 10mm<sup>2</sup>.

Connection **07** can be made using cable with a cross-section of between 1mm<sup>2</sup> and 2.5mm<sup>2</sup>.

For connecting the cables to terminals 1, 2 and 3 of the 3Link, you must use ring terminals for M8 screws - as shown here - to ensure a perfect and secure connection between the cable and the contact of the 3link. **DO NOT** use the "fork" type of terminal.

Tighten the terminals firmly to screws 1, 2, and 3 of the 3Link, with the nuts and washers supplied.



As soon as the ground cable is connected to the 3Link, the system becomes operational.

Close the 3Link cover by threading the two tabs on the back into the appropriate base seats; tighten the 2 screws supplied into the holes at the front corners of the cover.



After installing the system, or doing any maintenance on it, discharge the 3Lion battery completely. Then fully charge it. When it is fully charged, the display will show 100% on the battery state of charge (SOC) display.

**If the LCD display shows that the 3Lion's battery has a voltage above 12.7V but the state of charge reads 0%, discharge it completely and then recharge it to 100%. This will allow the system to calibrate itself.**



### 4.3 DISPLAY INSTALLATION

The touch-screen display enables the user to see exactly how the *3Lion* battery is performing. It's simple to use and easy to install.



NUMBER	FUNCTION
1	Touch screen display
2	Hole for passage of communication cable
3	4 Holes for fixing the cover to the wall
4	System to fix the display frame to the cover

#### 1) Disassemble the display frame



A) Slide the display's frame upwards upwards away from the back plate.



B) Lift the lower part of the display frame.



C) Slide the frame downwards to release.

- 2) Position the back plate on the wall chosen for the installation. Mark the places where the holes for the fixing screws and the comms cable (minimum 7.2mm diameter) are to be made.



- 3) Drill the holes and screw the back plate to the wall using the supplied screws. Be careful that, once tightened, the screws do not protrude beyond the countersinks.
- 4) Pass the communication cable through the specially-drilled hole and insert it gently into the connector on the display circuit board.



### **DO NOT FORCE THE CONNECTOR!**

The connector can only be located in one way.



- 5) Attach the display to the back plate.



The *3Link* touch-screen display allows the user to easily interact with the *3Lion* system. To use the touch-screen, follow the instructions below:



Do not exert too much pressure on the surface of the display with your fingers and do not use sharp objects. Doing so may damage the device or cause it to malfunction.



Do not put the display in contact with other electrical devices. Electrostatic discharges can cause malfunctions.



Do not put the surface of the display in contact with water. The touch screen may not work properly in the presence of moisture or if exposed to water and other liquids.

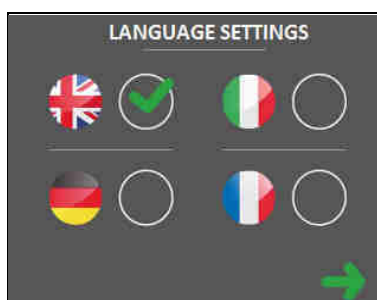
## 5) OPERATION OF THE DISPLAY

The *3Lion / 3Link* system allows for the automatic management and display of the battery status. By means of the display, you can interact with the system and see information such as voltage, current (charging with positive "+" sign, discharging with negative sign "-"), and state of charge. The state of charge (SOC) is indicated with coloured lines ranging from red, indicating that the battery is low, to green, indicating that the battery is charged.

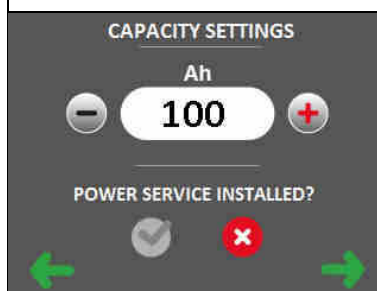
The advanced *3Link* BMS, when it becomes aware that the alternator is operating, activates the battery charge intelligently, obtaining maximum current up to 75A (depending on the alternator characteristics). This results in a reduction of charging times and, therefore, greater autonomy during stops - all without overloading the system.



The amount of current that can be charged to the battery is closely related to the type of alternator installed on the vehicle. The higher its power, the greater the amount of current that the *3Link* can draw from it. Alternator powers below 120A are not recommended, as the battery's fast charge capacity will not be fully exploited.



*Immediately after performing all connections, the system starts up and several screens for setting the system parameters appear on the display as shown below.*



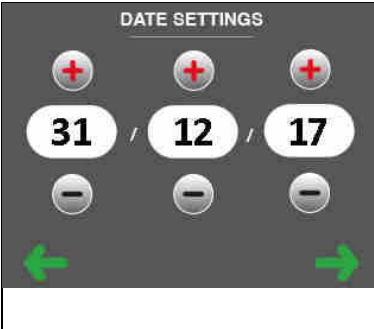




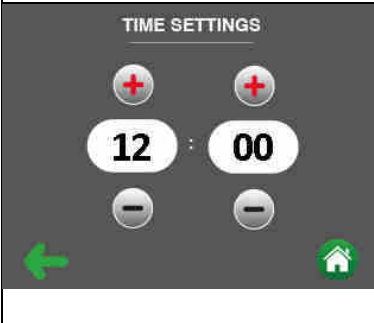




**Setting the language:** Click on the appropriate flag and then on the green arrow to confirm your choice.



**Setting the capacity:** The number in the Ah window indicates the Ah capacity setting of the battery. Click on the   keys until you reach the desired value. In the case of a battery pack (i.e. multiple *3Lion* batteries in parallel), enter the total capacity of the pack (200Ah / 300Ah / etc.)

The bottom of the screen allows you to select the presence of Power Service PLUS/GOLD. If one of these is installed, click on the tick  (which will turn green). If no Power Service unit is installed, click on .

Click on  to go back or  for the next screen.

<p><b>DATE SETTINGS</b></p> 	<p><b>Setting the date:</b> Click on the keys   until the desired value is reached, taking into account that the number on the left indicates the day, the central number indicates the month, and the number on the right indicates the last two digits of the year.</p> <p>Click on  to go back or  for the next screen.</p>
<p><b>TIME SETTINGS</b></p> 	<p><b>Setting the time:</b> Click on the keys   until the desired value is reached, taking into account that the number on the left indicates the hours and the number on the right indicates the minutes.</p> <p>To confirm your choices click  or  to go back.</p>

The system settings screen is displayed at start-up and each time you press and hold the “Setting” icon for at least 3 seconds.

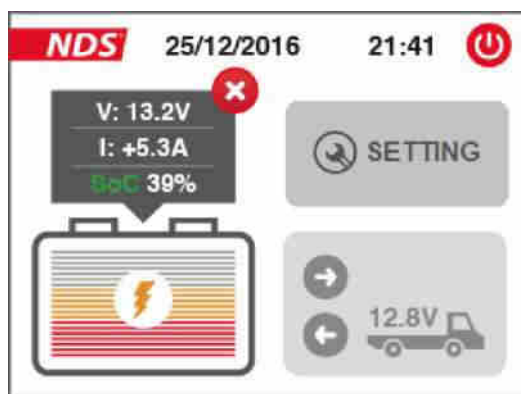
Once this has been done, the main screen appears as shown below.



The state of charge (or SOC) indication as soon as the system is installed is purely indicative and not an accurate figure. The display only becomes operational after a full charge of *3Lion* is performed. When it is fully charged, the display will show 100% on the battery state of charge (SOC) display.

In the lower left part of the screen, information about the *3Lion* battery is shown. Specifically, the battery’s state of charge is reported in 2 ways: textual, by means of the percent value of the SOC, and graphically by the colouring of the bars inside the battery symbol. The bars are coloured red, orange and green indicating respectively a fully discharged, a partially charged or a fully charged battery. When the *3Lion* is in the charging phase, a thunderbolt is displayed overlapping the coloured notches.

Pressing inside the battery symbol, the 3Lion battery display layout changes shape as shown in the following example.



The voltage and current values for the 3Lion are displayed. The current can show negative values that indicates battery discharging, and positive values which is battery charging. In the latter case, the thunderbolt symbol is displayed, overlapping the bars of the battery. You can keep this view active by clicking on the "Setting" button and then ticking the following phrase: *"Always show V and I"*.










The engine battery indicator always shows the voltage value of the battery and, if the system is being charged by the alternator, the arrow icon turns red.

**NOTE:** When you first use your 3Lion system, the display may show a false state of charge. For example, it may show 0% S.O.C. even though the voltage reads around 13V. This happens as a result of the 3Link learning about the battery so that it gives accurate readings. When you fully charge the battery, the display will show the correct S.O.C. This may happen 2 or 3 times but is nothing to worry about.

**NOTE:** If your charging system incorporates a battery-to-battery charger, the engine battery's voltage will not be displayed.

On the following page is a summary of the icons shown on the display:



ICON	MEANING AND FUNCTIONS
	Shuts off the screen. If the screen is off, just click on any part of it to turn it back on.
	Allows you to decrease the value of the parameter in use.
	Allows you to increase the value of the parameter in use
	When displayed, this symbol indicates that the <i>3Lion</i> battery is charging. If the icon does not become red then charging comes from a source other than the alternator (such as solar panels, mains chargers, etc).
	Indicates that the alternator is not charging the <i>3Lion</i> battery.
	Indicates that the alternator is charging the <i>3Lion</i> battery.
	Enables you to advance the system parameter setting sequence and/or to confirm your choices.
	Allows you to return to the previous step of the system parameter setting sequence.
	Allows you to change system settings. If you press it briefly, you can set the display mode. If you press it for a longer time, you can set the date, time, the Ah of the <i>3Lion battery</i> and language.

In order to save battery power, after 2 minutes of inactivity the display will decrease its brightness. After 15 minutes, it will shut off. Just touch it to turn it on and resume normal use.

The system is protected against excessive discharge or overload, however, it is recommended that the battery voltage does not fall below 10.5V and does not exceed 15V. If the *3Lion* voltage is less than 11.5V, charge the battery immediately.

Before storing the *3Lion*, it is recommended that you turn off the display. It is also recommended to leave the battery fully charged. If the *3Lion* is not used for a long time, even if the self-discharge is very low (less than 3%/month), it is advisable to check at least once every two months that the remaining amount of charge is greater than 90% and that the voltage is greater than 12.8 V. Otherwise, fully charge the battery.

## 6. Charging



To ensure maximum performance and the longest useful life, it's essential that your *3Lion* battery is charged correctly.

When charging from 230V, it is recommended to use a special LiFePO<sub>4</sub> lithium battery charger. However, you can use a mains battery charger for AGM/GEL batteries, as long as the maximum voltage supplied by it does not exceed 14.5 V. The charger must **NOT** perform any desulphation action. Do not use battery chargers which are set for flooded lead acid batteries. Although they can completely charge *3Lion* batteries, they can reduce their life.

When the battery is fully charged (the display shows 100%), it is recommended that you disconnect or turn off the charger. You should also ensure that a solar regulator (if fitted) has a LiFePO<sub>4</sub> setting. If it doesn't, it's recommended that the regulator is switched off to prevent overcharging. In the case of alternator charging, this is automatically managed by the *3Link*. *3Lion* batteries do not need to be kept on charge for maintenance like lead-acid batteries.

It is essential that your LiFePO<sub>4</sub> battery is not charged when the temperature of the battery is below 0°C: if it is, it may be damaged beyond repair. When the temperature of the battery is likely to be at 0°C, make sure that the battery is not being charged from the engine, 230V hook-up, a solar panel or any charging source that is not specifically designed for LiFePO<sub>4</sub>.

## 7. Discharging

For models: 3L-100, 3L-100B

**Do not connect equipment with power consumption greater than 100A. However, this limit may be exceeded, provided that the following limits are met:**

- Discharge at constant current of 100A: 50minutes maximum\*;**
- Discharge at constant current of 120A: 25 minutes maximum\*;**
- Discharge at constant current of 130A: 10 minutes maximum\*;**
- Discharge at constant current of 150A: 5 minutes maximum\*;**
- Discharge at constant current of 175A: 1 minute maximum\*;**
- Discharge at constant current of 200A: 10 seconds maximum\*;**

For models: 3L-100-P, 3L-150-P

**Do not connect equipment with power consumption greater than 150A. However, this limit may be exceeded, provided that the following limits are met:**

- Discharge at constant current of 120A: 40 minutes maximum\*;**
- Discharge at constant current of 150A: 20 minutes maximum\*;**
- Discharge at constant current of 175A: 2 minutes maximum\*;**
- Discharge at constant current of 200A: 20 seconds maximum\*;**

\*When conditions are at an ambient temperature of 20°C and starting temperature of the LiFePO<sub>4</sub> battery is 20°C.

## 8. Operation check

Once the system is installed, you can test its functionality by performing the following tests:

- 1) With the engine switched off, and with all the equipment powered off, check that the voltage shown on the display relative to the *3Lion* battery, is equal to the voltage measured with the tester positioned on the *3Link* poles (tolerance of  $\pm 0.15V$ ).
- 2) With the engine switched off, and with all the equipment powered off, check that the voltage shown on the display relative to the engine is equal to the voltage measured with the tester positioned on the engine battery poles (tolerance  $\pm 0.15V$ ).
- 3) With the engine switched off, turn on some pieces of equipment on the vehicle, and check that a negative current is displayed on the display. With the ammeter clamp, placing it on the wire out of pole 3 of the *3Link*, it is also possible to verify that the current shown on the display is the same as the current displayed on the instrument (tolerance  $\pm 10\%$ ).
- 4) With all equipment powered off, turn on the engine and verify that the engine battery voltage rises to between 13.8V and 14.8 V. If voltage remains below 13.8 V, the engine battery is likely to be discharged and/or the alternator has an abnormality or, if a positive current is shown on the display, it indicates that the *3Lion* battery is charging: in this case, skip to step 5.
- 5) If the *3Lion* battery is not fully charged, and if the check in step 4 has been successful, check the display for a positive current, and check that the arrow pointing to the engine battery turns red. With the ammeter clamp, placing it on the wire out of pole 3 of the *3Link*, it is also possible to verify that the current shown on the display is the same as the current displayed on the instrument (tolerance  $\pm 10\%$ ).

## 9. Fault Finding

If the *3Lion* battery has a voltage between 0 V and 10 V (this voltage also being detected on pins 2 and 3 of *3Link*), it may be possible that the BMS protection inside the battery has been activated. This protection self-activates for three main causes:

- 1) Battery voltage has fallen below 10V (e.g. due to excessive discharge).

In this case, provide the *3Lion* with a charging source (for example, via external charger, alternator, etc.).

- 2) The battery voltage has exceeded 15V (e.g. due to an anomaly of the charger, or because some piece of equipment in the system has produced a voltage greater than 15V).

As soon as the *3Lion* detects a voltage below 15V, it will resume working normally.

- 3) The battery is overheated.

In this case you have to wait for the internal temperature of *3Lion* to drop below the safety threshold. It is not possible to estimate the reactivation time, as it depends on external conditions and the degree of overheating.

The indication of the amount of available charge (SOC) does not seem to be accurate or has suddenly indicated a value of less than 5%.

In this case, fully charge the *3Lion battery*, where full charge means 100% shown on the battery state of charge (SOC) display.

## 10. Technical Specifications

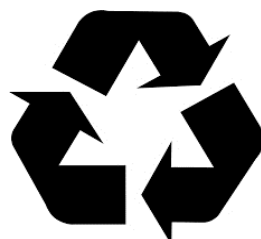
### Technical characteristics of the *3Lion battery*

Model	3L-100	3L-100B	3L-100-P	3L-150-P
Rated tension	12.8Vdc	12.8Vdc	12.8Vdc	12.8Vdc
Nominal capacity 25 °C	100Ah	100Ah	100Ah	150Ah
Nominal energy 25 °C	1280Wh	1280Wh	1280Wh	1920Wh
Cell number	4	4	4	4
Chemistry	LiFePo4	LiFePo4	LiFePo4	LiFePo4
Recommended maximum discharge current	100A	100A	150A	150A
End-of-discharge voltage	11V	11V	11V	11V
Maximum recommended charge current	50A	50A	75A	75A
End-of-charge voltage	14.4V	14.4V	14.4V	14.4V
Number of cycles estimated 80% DOD	2500*	2500*	2500*	2500*
Operating temperature	-20 °C/+60 °C	-20 °C/+60 °C	-20 °C/+60 °C	-20 °C/+60 °C
Storage temperature	-20 °C/+60 °C	-20 °C/+60 °C	-20 °C/+60 °C	-20 °C/+60 °C
Self-discharge	<3%/month	<3%/month	<3%/month	<3%/month
Humidity	Max 95%	Max 95%	Max 95%	Max 95%
Connection of poles	M8	M8	M8	M8
Battery-only weight	13.8Kg	13.3Kg	13.8Kg	20.7Kg
Battery-only dimensions	327x172h227mm	337x175h190mm	327x172h227mm	485x172h241mm
Weight with packaging	14.3Kg	13.8Kg	14.3Kg	20.2Kg
Dimensions with packaging	375x210h260mm	375x210h260mm	375x210h260mm	525x210h280mm

\* The number of cycles is purely indicative as it depends on various factors such as environmental conditions, discharge depth, discharge rate, charge/discharge current and so on.

## 11. Technical characteristics of the 3Link

Working voltage	12V (9V-18V)
Average consumption	3mA@12V@ active device, 1mA @ 12V @ device in standby mode
Maximum current supported	200A
Working temperatures	When discharging: -20°C/+65°C. When charging +1°C/+65°C.
Maximum current, AUX output	30mA
Current range	-200A/+ 200A $\pm$ 10%
Battery tolerance voltage Engine battery 3Lion	$\pm$ 5%
Dimensions	125x123x46mm
Weight	480g
3link box + display dimensions	175x135h67mm
Box weight including display and accessories	785g
Technical characteristics of the display	
Technology	TFT 2.83" 262k Colours with touch screen
Average consumption	76mA@12V maximum brightness. 7mA@12V standby
Type of connexion	7m cable with low profile connector
Operating temperature	-10°C/+70°C
Dimensions	100x80x11mm
Weight	55g





## 12. Warranty

The manufacturer assures proper operation of the *3Link* and the *3Lion* battery and undertakes to make free replacement of parts that deteriorate due to construction defects within 36 months of the purchase date, as evidenced by the validation information sheet (to be completed in each of its parts and returned to the manufacturer within 30 days of the date of purchase). Disadvantages resulting from incorrect installation and use, tampering, negligence, or failure to comply with the installation, use and storage requirements are excluded from the warranty. Furthermore, the manufacturer disclaims any liability for any direct or indirect damages.

The warranty becomes effective as of the date of sale or registration of the vehicle in the case of a first installation.

With the act of purchase or registration of the vehicle, together with the warranty card, the customer receives this certificate to be filled out in every part by the seller. The warranty certificate must be kept and filed for each dispute. Failure to submit the certificate and absence of or tampering on the *3Lion* and/or the *3Link* non detachable coupon with the serial number shall invalidate the warranty.

In the event of a *3Lion* and/or *3Link* failure, the customer may contact an Authorized Centre or contact NDS Energy S.r.l. directly. In case of replacement, the warranty period remains as the initial date indicated on the warranty certificate.

If the customer decides to make further verifications by third-party technicians, the customer shall bear the related costs without making any claims to NDS Energy S.r.l.

The returned product, although under warranty, must be shipped carriage paid and shall be returned carriage forward. The warranty certificate is valid only if accompanied by a payment receipt or delivery document.

Model 3L/on:		3Lion serial number:	
3Link serial number:		Display serial number:	
Purchase date:			
Surname:		Name	
Country:			
Street:			N°.
Town / City:			County:
Postcode:		Phone:	
Name & signature of the seller          Name & signature of the installer		I authorize the processing of my personal data under the Decree Law June 30, 2003 N° 196	
		(customer's signature)	

### For Sales and Service in the U.K.

This page must be completed and returned by post to:  
RoadPro Ltd, 3 Egerton Close, Daventry, NN11 8PE, UK

Or by email to:  
sales@roadpro.co.uk

For enquiries in other countries, please contact:  
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