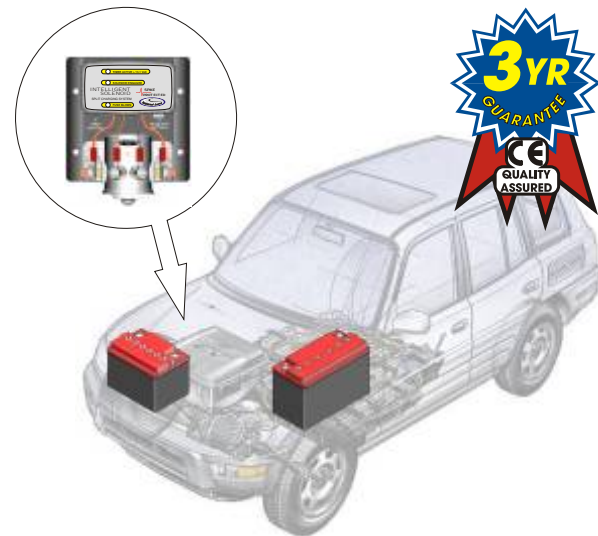


## Instruction Booklet



## Dual Battery Isolator

### Split-charge systems

Split-charge systems are designed to control charge to more than one battery, usually installed in a motor vehicle, boat or truck.

Split-charge systems vary in design and technique, but they all have a common task of ensuring an auxiliary battery receives charge.

Preferred split-charging systems allow an auxiliary battery to receive charge when a vehicles' engine is running. When the engine is stopped, the two batteries are automatically isolated. (This prevents the vehicle starting battery from being flattened).

## Intelligent Solenoid

The National Luna Intelligent Solenoid monitors voltage on the main battery. If the engine is started, the Intelligent Solenoid allows the main vehicle battery to recover charge first.

Once a 5-minute time-period has elapsed, the auxiliary battery is connected in parallel to the main battery. ( **At this point, charge will flow from the vehicle's alternator to both batteries.** )

When the engine is stopped, both batteries remain connected until their floating charge has dropped to 12.7V. Once this level is reached, the auxiliary battery is automatically disconnected.

## Battery Information

Batteries used in modern motor vehicles are typically lead-acid batteries. These batteries have been chosen for their high current supplying capabilities and their capacity. In order for a lead-acid battery to be able to maintain full capacity, it needs to be charged correctly.

In a single battery system, the vehicle's alternator supplies an appropriate voltage to the battery, allowing it to charge. This voltage ranges from 13.5 volts to 14.5 volts. If an auxiliary battery is installed, the load on the alternator will be increased.

For a typical lead-acid battery to charge correctly, a minimum voltage of 13.7 volts is recommended. A higher voltage such as 14.2 volts allows the battery to charge at a higher rate and to full capacity.

Some batteries (such as deep-cycle batteries) require this higher voltage in order to charge correctly.

**It is important to check whether your alternator can supply sufficient voltage under this high-load condition.**

Because battery voltage varies with temperature, battery testing is carried out at 25°C. (This is an international test standard)

## Before Installation

Before installing your split-charge system, it is recommended to check the vehicle charging system.

**Installing a second battery may affect the vehicle's charging system.**

**Checking the system :** Perform the following test to determine whether the charging system is capable of delivering charge to a second battery : (You will need a digital voltmeter)

1. Start the vehicles' engine and measure the voltage on the terminals of the main battery. (The standard voltage of most vehicle alternators should be between 13.7V and 14.5V)
2. **Testing the alternator under load:** With the engine running, turn on the headlights, air-conditioning, and any other loads (such as spot-lights). This will test the alternator under its standard load. Under this condition, the voltage at the main battery **should not** vary significantly from its original no-load voltage.

**If the voltage drops significantly with the standard vehicle load, it is recommended that the alternator and the vehicle charging system be inspected for proper operation.**

## Unique Features

1. The Intelligent solenoid is designed with a 5-minute time delay (before connecting the auxiliary battery) in order to ensure that the main battery has a sufficient recovery/charge period after starting.
2. The intelligent solenoid timer will automatically activate after the vehicle has started and the alternator is charging above 13.2V.

**Safety features :** The intelligent solenoid has been designed to detect and protect against fault conditions.

1. The solenoid will not engage in the case of the auxiliary battery being absent (not connected) or completely flat.
2. Should the auxiliary battery be incorrectly connected (i.e. reverse polarity), the solenoid will not engage.
3. If under a charging condition, the alternator (main battery) voltage collapses below 12.7V, the system will disconnect the auxiliary battery.

## Specifications

The National Luna Intelligent Solenoid uses voltage sensing and timing to automatically control multi/dual battery systems.

NOTE - Because battery voltage varies with temperature, the set-points listed may change.

The **Intelligent solenoid** is designed with the following specifications at 25°C.

Supply voltage	10.0Vdc to 15.0Vdc
Operating current	690mA @ 12.8Vdc
Standby current	19mA @12.8Vdc
Continuous current rating	85 Amps DC
Minimum ignition voltage	13.1 Vdc
Automatic cut-out voltage	12.7 Vdc
Timed connection >13.2V	5 minutes to connect

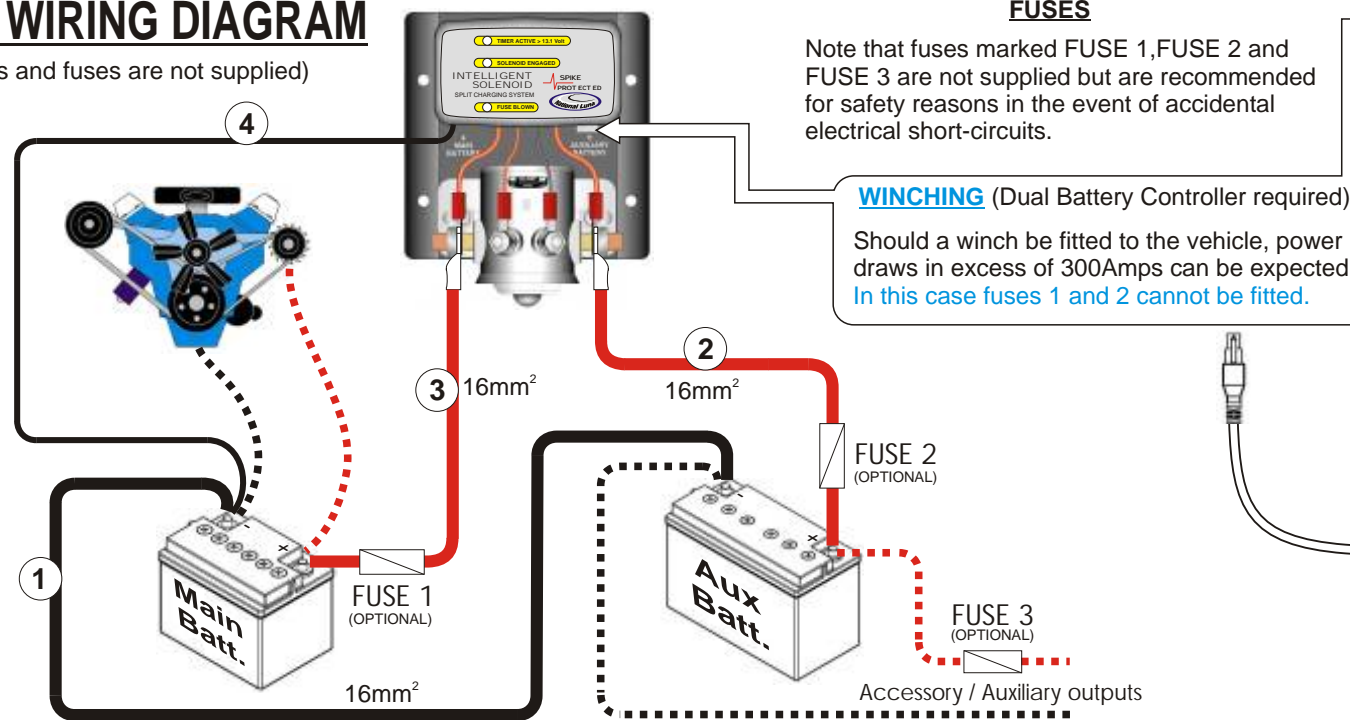
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## BASIC WIRING DIAGRAM

(Cables and fuses are not supplied)



## FUSES

Note that fuses marked FUSE 1, FUSE 2 and FUSE 3 are not supplied but are recommended for safety reasons in the event of accidental electrical short-circuits.

### WINCHING (Dual Battery Controller required)

Should a winch be fitted to the vehicle, power draws in excess of 300Amps can be expected. In this case fuses 1 and 2 cannot be fitted.

## Optional Accessories

The National Luna Dual Battery Controller / Monitor is compatible with the **Intelligent Solenoid**.

This monitor allows the user to observe the state of both main and auxiliary batteries while warning the user of overcharge and low-voltage conditions. The monitor also allows the user to "over-ride" the timer and force a connection at any time. This is useful for "jump-starting" the main battery or providing extra power from the auxiliary battery during winching applications.

The Intelligent Solenoid is designed to automatically disconnect the auxiliary battery if the main battery voltage drops below 12.7V. (Typical during winching)

By fitting the Dual Controller, the user can over-ride the 12.7V cut-out feature and force the two batteries to connect. (The timer/winch over-ride will remain active for 5 minutes).

The Dual Battery Controller is available with 3.5m or 6m cable.

National Luna can also supply an extensive range of cables, fuses, lugs, connectors and a range of battery monitors.

## Basic Installation

### Disconnect the main battery before installation.

Securely mount the Intelligent Solenoid in a convenient position. Make sure that it is installed upright.

### Connecting the negative electrical path

Using a minimum cable thickness of 16mm<sup>2</sup>, connect the negative ① of the main battery to the negative of the auxiliary battery.

### DO NOT USE THE VEHICLE CHASSIS AS AN EARTH PATH!!

### Connecting the positive electrical path

Using a minimum cable thickness of 16mm<sup>2</sup>, make a connection between the positive terminal of the auxiliary battery ② to the terminal marked "AUXILIARY BATTERY" on the Intelligent Solenoid.

Similarly, connect the positive of the main battery ③ to the terminal marked "MAIN BATTERY" on the Intelligent Solenoid.

Finally, connect the thin BLACK wire ④ from the Intelligent Solenoid unit directly to the negative terminal of the main battery.

### Check all connections and secure all cables.

**NB - Keep the unit and cables away from sources of heat (such as the exhaust manifold) and sources of mechanical movement (such as fan, fan belt or suspension components)**

## Safety considerations

The Intelligent Solenoid is a "FULL-POWER" device designed to optimise auxiliary battery charging.

It is highly recommended to install fuses (labeled "FUSE 1" & "FUSE 2") in the main current path. These fuses should be rated at the maximum expected current during normal operation (between 50A and 100A).

If an unexpected overload occurs, these fuses will isolate both batteries from the source of the fault.

The appropriate fuse (FUSE 3) rating, depending on the load from the auxiliary battery, should be selected.

**NOTE - Fuses are always fitted on the positive cable.**

## Cable considerations

Generally, thicker cable reduces voltage losses. This enables an auxiliary battery to receive optimum charge.

A minimum cable thickness of 16mm<sup>2</sup> is recommended for a typical installation of up to 7m. For installations where the total cable length exceeds 7m, 25mm<sup>2</sup> or 35mm<sup>2</sup> cable should be used.

**Double-check all connections and crimping!  
Poor connections will affect the performance of the system!**

## How it works !

The Intelligent Solenoid works by sensing voltages on both the main and auxiliary batteries.

When the vehicle engine is started, the voltage applied to the main battery rises as a result of alternator charging. If the applied voltage rises above 13.1V, the Intelligent Solenoid activates a 5-minute timer. During the timer phase, the GREEN light (TIMER ACTIVE > 13.1V) will flash.

Once the timer has expired, the Intelligent solenoid will connect the auxiliary battery. The GREEN light will stop flashing and the YELLOW light (SOLENOID ENGAGED) comes on.

The Intelligent Solenoid will not allow a connection if the auxiliary battery has reverse polarity, is short-circuited or does not exist.

The Intelligent Solenoid will stay connected until the main battery voltage drops below 12.7V. This happens when the engine is stopped and the battery float voltage drops. Both GREEN and YELLOW lights will go off once the solenoid has disengaged.

Note - The Intelligent Solenoid may stay connected for a short period after the engine is stopped. The duration of this period depends on the state of the batteries, temperature and load.