

**Optional Ignition Control/Storage Mode (red wire):**

Cut the end of the red looped wire (end closest to red dotted "Start Batt Positive +" stud) where it joins the PCB/potting connect the remaining tail to the ignition/start switch. With this feature selected the DVSR will only operate when the ignition key is in the "ON" position (i.e. engine running). With the ignition switch "OFF", current draw of the DVSR will be zero Amps.

**Optional Storage Mode :**

Cut the red looped wire (as detailed above in "Ignition Control") then connect to the output from an ON/OFF switch. Connect the input of the switch to a fused positive supply (+ 8-32V DC). With the switch in the ON position the DVSR will operate as normal. With the ON/OFF switch OFF, the DVSR will not operate and the DVSR current draw will be zero Amps.

**Optional Remote LED indicator output (Orange sticker on circuit board) :**

Cut silicon potting from above the orange sticker on the circuit board. Remove the orange sticker and solder a wire to solder-pad on the circuit board. Repair the potting with either silicon sealer, silicon grease, or marine grease. Connect the soldered wire to negative leg of LED, connect the LED positive leg to fused 12V positive supply. For 24V supply, use a 2.2K (1/4W) resistor on positive supply.

**DVSR Operation Explained - Charging:** The DVSR is connected between two battery banks. When the DVSR senses a charging voltage (13.4V DC or 26.8V DC) on either of the banks, it automatically activates and joins the two battery banks after a short delay (5 seconds), so they are charged as one battery bank.

**Isolation:** When the DVSR senses that batteries are not being charged (voltage drops to 12.75V DC or 25.35V DC) the DVSR deactivates following a 20 second delay, separating the combined battery banks into two isolated banks.

**Optional Storage Mode:** This can be used where the boat/vehicle is stored for long periods without any battery charging, but with the batteries still connected. Power consumption is zero when this is activated. Alternatively, the storage mode can be wired via the ignition switch, so the DVSR can only operate when the engine is running. This provides optimal protection of electronics from electrical spikes, zero power consumption when ignition is off, and acts like a single sensing VSR as DVSR will only activate when engine alternator is charging.

**IMPORTANT!** It is recommended that the DVSR is fitted by a qualified marine/automotive electrician. Please follow the installation instructions supplied. If installation is not correct, the unit may not perform to its designed potential. If in doubt, consult your local dealer. It is the installer's responsibility to install and use this product in a manner that will not cause accidents, personal injury or property damage.

Manufactured for HELLA by BEP Marine Limited

HELLA Part No: 3099

## DIGITAL VOLTAGE SENSITIVE RELAY



## Operation and Installation Instructions

### Dual battery charging made easy

Modern charging systems must be able to safely charge two or more different types of batteries from one engine. Now, thanks to the DVSR (Digital Voltage Sensitive Relay), 4WD, boat and caravan owners can enjoy the benefits of fully charged engine starting batteries and deep cycle house batteries with one easy-to-install charging system.

**Features and Benefits**

- Very low power consumption (<2mA)
- Multi-voltage, auto selects between 12VDC or 24VDC
- Digital technology for high efficiency and accuracy
- Dual battery bank voltage sensing
- Output for optional remote mounted status LED
- Optional switching circuit activates DVSR or switches it to zero power consumption storage mode
- Protects start batteries from becoming flat
- High capacity (140A) design allows full alternator charging of heavily discharged batteries
- Ignition protected

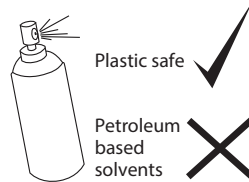
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### 12/24 Volt Selection, and First Powering:

When the DVSR is first powered, it will sample the power supply then decide whether to enter 12 volt (7-15.9 volts), or 24 volt (16 – 32 volts) mode. LED will flash rapidly while this occurs. Please double check voltage in case batteries are flat, or another power source (e.g. solar panel) is affecting the voltage. Once the 12 or 24 volt mode is selected, the DVSR will remain in this mode until power is disconnected.

### IMPORTANT!

**Read before installing.** Use only “plastic safe” corrosion inhibiting sprays. Do not wipe solvents/petrochemicals onto any plastic part of the DVSR. These units are fully sealed, so they do not require any other form of water proofing. The DVSR has been designed to be water resistant but is not designed to be partially or fully submerged. The main studs have been tinned to inhibit corrosion (petroleum base grease may be used on these for further protection, but should not be used on plastic parts).



### ALTERNATOR VS BATTERY BANK SIZE:

The charging alternator's amperage output should be between 20% and 35% of the battery bank size in Amp Hours. e.g. 220AH bank = 44 - 77A alternator

**NOTE: Alternator size must not exceed 140A, or 125A if alternator is “hot rated” with a 3 stage regulator**

**Start Batt Positive + (Large stud marked red):** Connects to the battery (Live) side of the Start Battery Isolator Switch

**House Batt Positive + (Large stud):** Connect to the battery (Live) side of the House Battery Isolator Switch

**Negative (Black wire):** Connect to battery negative (ensure both battery banks share common negative, see diagram)

### INSTALLATION

Remove base to expose studs and cables.

Connect the DVSR to the back of the battery isolating switches, ensuring that the battery cables are correctly sized. The LED on the front of the DVSR should be visible, as it will instantly show when it is in operation.

Use countersunk screws for fastening base down.

Use Pan head screws (supplied) for fastening the DVSR onto the base.

### LED codes:

**OFF:** DVSR is disengaged, battery banks are not connected

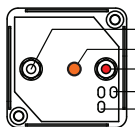
**ON:** The DVSR is engaged, battery banks are combined

**Brief flash every 5 seconds:** DVSR is disengaging

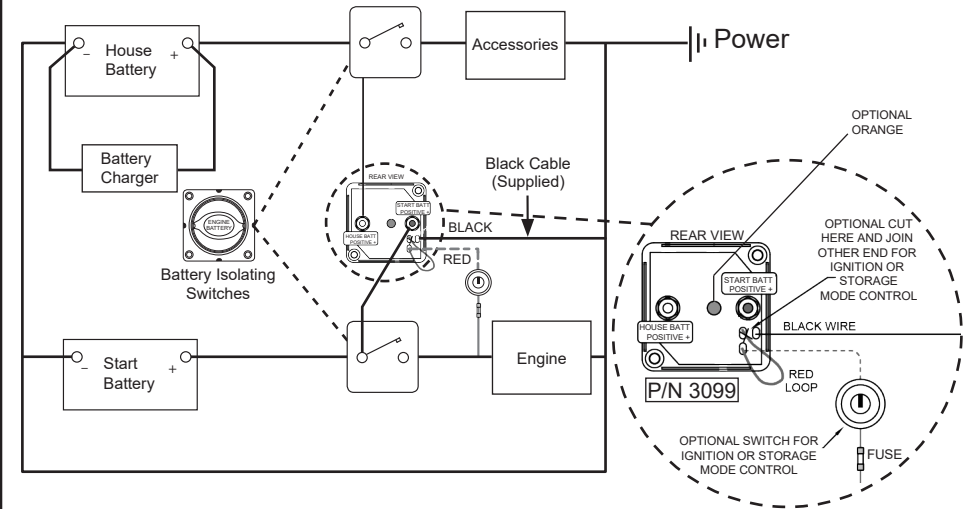
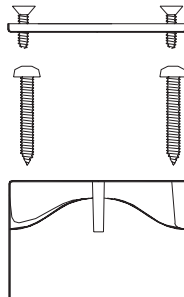
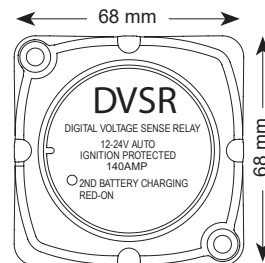
**Fast flash:** System voltage is either too high or too low, check electrical system

### Wiring Diagrams

#### DVSR Connections



**House Batt Positive +** (Tinned stud)  
**Orange sticker** (Remote LED connection point)  
**Start Batt Positive +** (Tinned stud)  
**Black wire -** (Negative)  
**Red wire** (Ignition control/Storage mode)



### SPECIFICATIONS

Current: 125 Amps Continuous, 140 Amps Intermittent

Ignition Protected UL 1107

Auto Voltage Sensing 12VDC or 24VDC (max 32VDC)

Power Consumption (Standby) 1.8mA (1.6mA at 24 VDC)

Power Consumption (Storage Mode) 0mA

Cut In/Cut Out Voltages 13.4V (26.80V) / 12.75V (25.35V)

**NOTE:** This diagram is a guide only showing DVSR connections and not intended as a full electrical systems wiring diagram.

**NOTE:** Both batteries must be the same voltage, either 12V or 24V DC.

### CONNECTIONS:

Locate DVSR to minimize cable lengths and ensure all cables are sized correctly for minimum voltage drop (see table below). Voltage drop will decrease effectiveness of the DVSR, reduce charge efficiency, and could damage the DVSR and surrounding devices through excessive heat build-up. Ensure all connections are tight and suitable for the installation. Use a neutral cure sealant to seal any cut cable ends.

### DVSR POWER SUPPLY :

The DVSR takes its power supply from the red paint marked stud (Start Batt Positive +) for standard installations. When the optional Ignition Control/Storage installation is chosen, the DVSR power supply is supplied via the fused secondary supply and switch, to the DVSR's red looped wire. With the switch (or ignition switch) turned off, the DVSR cannot activate.