



**SUMMARY:**

Thank you for purchasing a Merlin M-Power Voltage Sensitive Relay. Provided it is used and installed properly, it will provide years of dependable service. Please read this manual prior to installation, if in doubt contact Merlin Power on 01392 301714

We draw your attention to CAUTION and WARNING statements throughout this manual. CAUTION statements relate to practices that could lead to damage of your electrical system. WARNING statements relate to practices that could lead to serious injury or death.

**CAUTION & WARNING!** Read this manual before installation. We recommend that installation is completed by a qualified electrical engineer.

**USES:**

Your VSR can be used in a number of different configurations:

- 1) As a split charger
- 2) As a voltage sensitive switch

- 1) As a Split Charger - The VSR is designed to sit between two batteries. When either is charged (above the Connect Voltage), the VSR will close and allow the other battery to charge. When charge is removed, voltage will drop to the Disconnect Voltage and the VSR will open. M-Power VSR's are bi-directional - eg they will connect if either battery is being charged. Any number of VSR's can be used to provide charging between any number of battery banks.

2) The VSR can be used to switch on an appliance or load when, and only when the batteries are being charged. This is useful for items like onboard radio chargers that you would only want charged when the engine is running.

**LOCATION:**

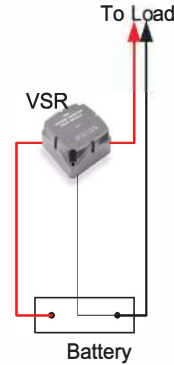
VSR's should be placed conveniently between battery banks. Keep battery cables as short as possible and ensure they are appropriately sized.

Merlin Power recommends protecting all battery cables with fuses/circuit breakers.

Your VSR can be installed under the hood/bonnet, engine compartment and on the inside of transoms for RIB's and other craft. The VSR is designed to be water resistant but should not be fully or regularly immersed.

**BEFORE WORK:**

**CAUTION & WARNING:** Ensure you observe good electrical practices of workmanship. Ensure batteries are disconnected before starting work. Observe battery CAUTION & WARNING notices. Remove all jewellery and tie long hair back. Ensure that you wear appropriate clothing, personal safety equipment and use the correct tool for the job in hand.



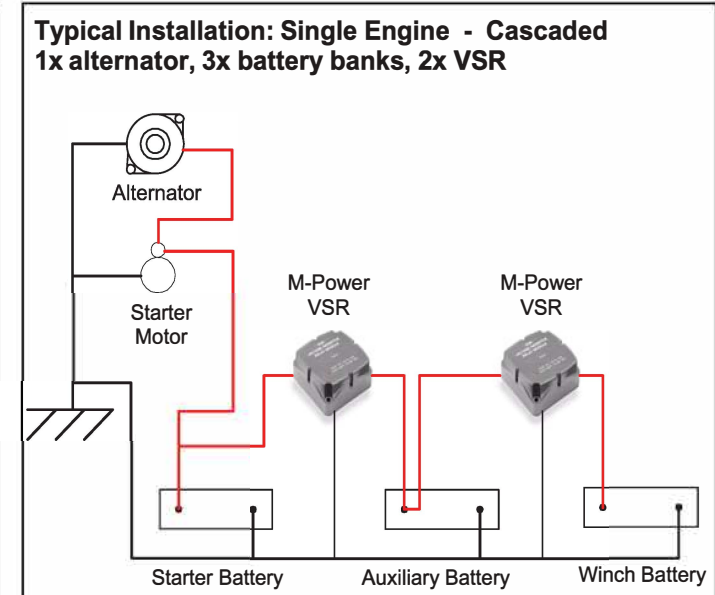
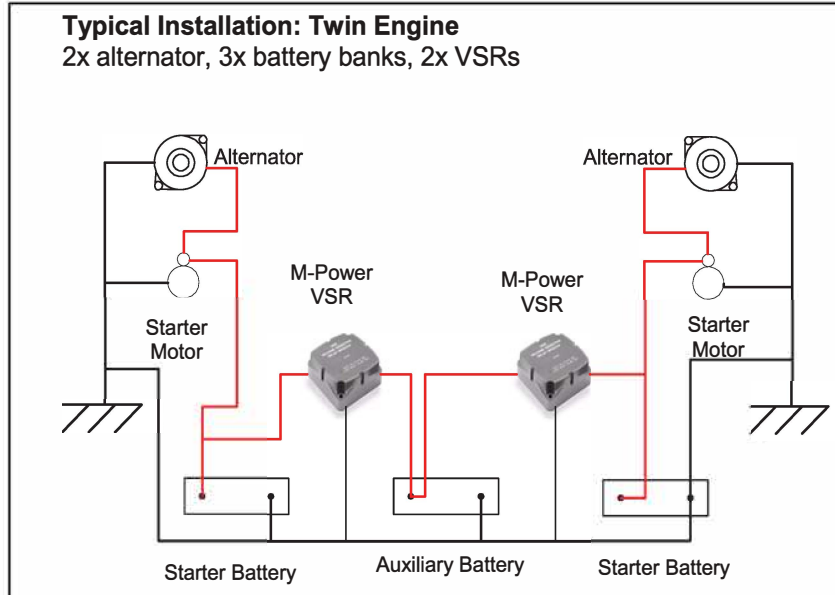
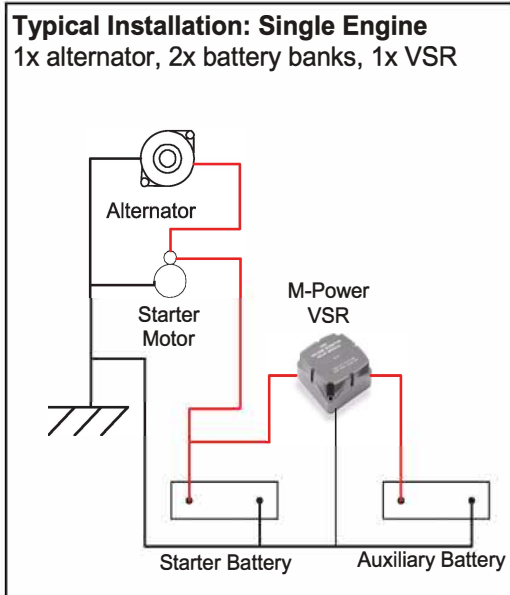
**SIZING THE VSR:**

The VSR will handle a maximum current of 140A for approximately five minutes. Use the table below to ensure that the VSR is suitable for the installation.

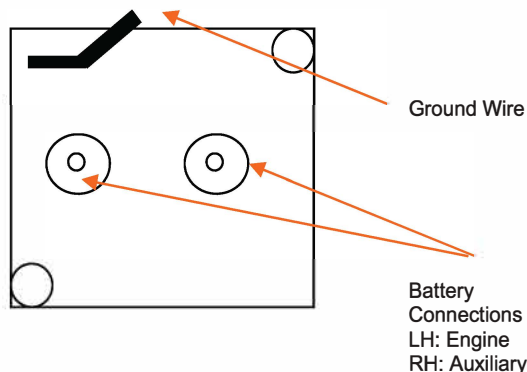
**CAUTION:** Do not overload the VSR.

If you need a larger VSR, Speak to Merlin Power or your local dealer.

	Charging Source (Amps)					
	20	50	80	100	120	150
50Ah	OK	OK	OK	OK	OK	OK
100Ah	OK	OK	OK	OK	OK	OK
150Ah	OK	OK	OK	OK	OK	
200Ah	OK	OK	OK	OK	OK	
250Ah	OK	OK	OK	OK	OK	
300Ah	OK	OK	OK	OK		
400Ah	OK	OK	OK			
>500Ah	OK	OK	OK			



## VSR - REAR VIEW



**CAUTION:** Connect battery connections first. Then connect ground to a common negative point or either battery negative.

The left hand battery connection is for the battery that receives the Primary Charge (typically the engine battery). The right hand connection is for the auxiliary battery.

**DO NOT FORGET TO CONNECT THE BLACK GROUND WIRE!**

## VSR - FIRST USE TESTS

1. Check the primary (engine) battery voltage using a multi meter. Note the voltage (typically 12.2-12.8V).
2. Note the second (auxiliary) battery voltage using a multi meter. Note the voltage (typically 12.2-12.8V)
3. Start the engine (or other charge source). Normally, the engine battery will replenish very quickly (sometimes in seconds). The Red "Connected" LED should illuminate on the VSR. If the engine battery is very low, it may take a while for the voltage to reach the VSR's connect voltage point.
4. Once the red LED is lit, use your multi Meter. Check the voltage on the second battery. It should be above that noted in Point 2 above.
5. If the VSR doesn't connect, check the voltage on the engine battery. It should be rising above the level you recorded in point 1 above. If it isn't, there is a fault with the alternator/charge source. If it is above the Connect Voltage of the VSR (13.3V), ensure that the Negative Ground Wire is properly connected.

## FREQUENTLY ASKED QUESTIONS:

**Q: My VSR isn't connecting. What Shall I Check?**

**A:** Verify that the voltage of the charging system is actually rising beyond the VSR's connect voltage (13.3V). If it is, check that the VSR's ground cable is properly connected.

**Q: The Red Connected LED stays on / The VSR isn't disconnecting. Help!**

**A:** The VSR will disconnect only when the system voltage (the mean voltage) between the engine and auxiliary battery reach 12.8V. Surface voltage (also known as phantom voltage) may mean that the voltage the VSR sees is around 13V for up to an hour after charging (prevalent on brand new and larger batteries). If you place a small load on the auxiliary battery, the VSR should disconnect shortly afterwards. Use a multi meter to check the voltage (of both batteries) if in doubt.

**Q: My VSR keeps "clicking"**

**A:** This is a normal function of a VSR. When the engine battery starts charging, voltage will rise. The VSR will cut in. If the auxiliary battery is very low, it will draw the overall system voltage down. The VSR will open again. The engine voltage starts to rise and the VSR reconnects (and continues to cycle on/off). It is quite normal for a few clicks over a 1-2 minute period (especially if the battery banks are low). If it continues for a lengthy period either a) the alternator (or other charge source) is significantly under powered for the battery bank size or b) the auxiliary battery bank is very large or c) the auxiliary battery is failing. If you are seeing continual VSR cycling (chatter), speak to a Merlin Power Engineer for help.

**Q: My VSR gets hot**

**A:** The VSR is designed to operate at an elevated temperature of ~50-60 degrees C. Ensure that the VSR has been sized properly according to the chart overleaf.

For any other questions, please call us, check our website or speak to your local M-Power dealer.

## WARRANTY:

Your VSR is warranted for two years from the date of purchase against defects in workmanship only. Either return your VSR to the point of purchase or log in directly to the Merlin Power warranty system at [www.merlin-power.com](http://www.merlin-power.com).

Please do not return any item to Merlin Power without obtaining an RMA number from our website. No responsibility or liability for goods will be accepted without an RMA number clearly attached to the returned product.

**MERLIN POWER  
CLYST COURT  
HILL BARTON INDUSTRIAL ESTATE  
EXETER, DEVON  
EX5 1SA**

**T: +44 (0) 1392 301714**

**[www.merlin-power.com](http://www.merlin-power.com)**