

The Smart Charging Regulator

Overview

The most important part of any engine with a battery is the charging system. Today modern batteries and electrical components, have higher performance but are more sensitive so for optimum extended life smart charging is needed.

When do I install the Smart Charging Regulator?

- When you replace a failed engine charging system regulator, replace it with a smart regulator.
- When you replace an engine battery don't forget to change out the old regulator to extend the life your new AGM battery
- Even when everything is running fine, swap out the old 1970s regulator design with a new updated Smart charger to get the benefits.
- If you change battery chemistries from flooded to maintenance free batteries the regulator must be replaced.

The Benefits:

- Extended battery life – minimise the high frequency charge discharge “over working”
- Higher voltage regulation accuracy – tighter more reliable microprocessor control
- Fault destruction prevention – automatic shut down before fire or system component secondary failure

What types of engines benefit?

- Recreation equipment: Motorcycles, ATVs & Snowmobiles
- Marine Engines: Outboard motors, Jet Skis
- Yard Equipment: Snow Blowers, riding lawn mowers
- Commercial Equipment: Tractors, Construction Equipment, Farm Machinery
- Vehicles: Rickshaws/tuk tuks/other small vehicles.

The Radical Electronics Performance voltage regulators have a number of advantages over the OEM (Original Equipment Manufacturer) parts. These are:

- The operating stress on the battery is significantly reduced. This extends the battery life from just a couple of years out to 6 to 8 years.
- The battery charging is more reliable. As batteries get older and their ESR goes up, they are less able to take a charge. This means that a battery that actually still has some life in it but will not be able to take a charge and will need to be replaced early. This regulator also goes through the various charging steps including the high voltage steps which breaks down sulphide crystals in the battery.
- We have models that support SLA* chemistries. The regulator needs to be changed if the battery type is changed. This is a good upgrade regulator if you are switching from a flooded lead acid battery to SLA.
- The battery charging is faster and the regulator is more efficient. This removes the need for heat sinks and the battery will charge with less use.
- The regulators are rugged. They are not damaged by boosting, charging with the battery connected, etc.
- For mechanics, there are only 3 different models of the regulator which means there are only 3 different models to stock if you want to cover a wide range of engines.
- Made in Canada for a variable climate. It is temperature compensated so it will properly charge an ATV battery in the desert or a snowmobile battery in the arctic.
- Reduction in the stress on the loads on the electrical system. Fewer burned out bulbs.
- Easy to install. Drill a couple of holes in a mounting plate and connect 5 wires.
- In most applications, the performance regulator will allow the engine to operate without the battery. This is useful if you are stranded with a dead battery.

*SLA chemistry batteries are marketed under many different descriptions. Some of these are maintenance free, AGM(Activated glass mat or absorbed glass mat), SLA(Sealed Lead Acid), VRLA (valve regulated lead acid) and others

The regulator on small engines needs to be replaced if you are changing the battery type in the vehicle or if the original regulator is damaged.

The 3 different sizes of regulator are:

VREG20 – This is designed for up to 20A electrical systems and is shown in Figure 1 and Figure 2. It is sufficient for most small engines. This would be for:

- Motorcycles
- ATV
- QUADs
- Yard equipment – Snow blowers, lawn tractors, etc
- Marine
- Snowmobiles

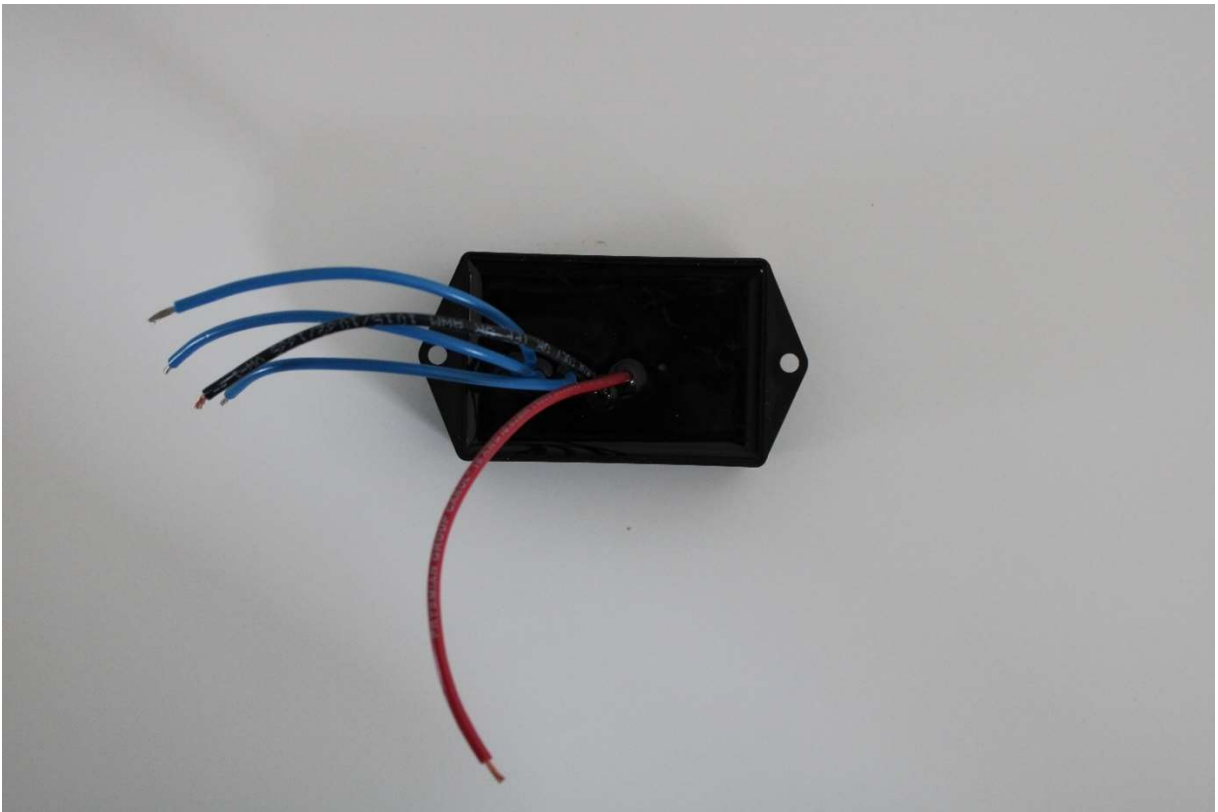


Figure 1 – VREG20 top view picture

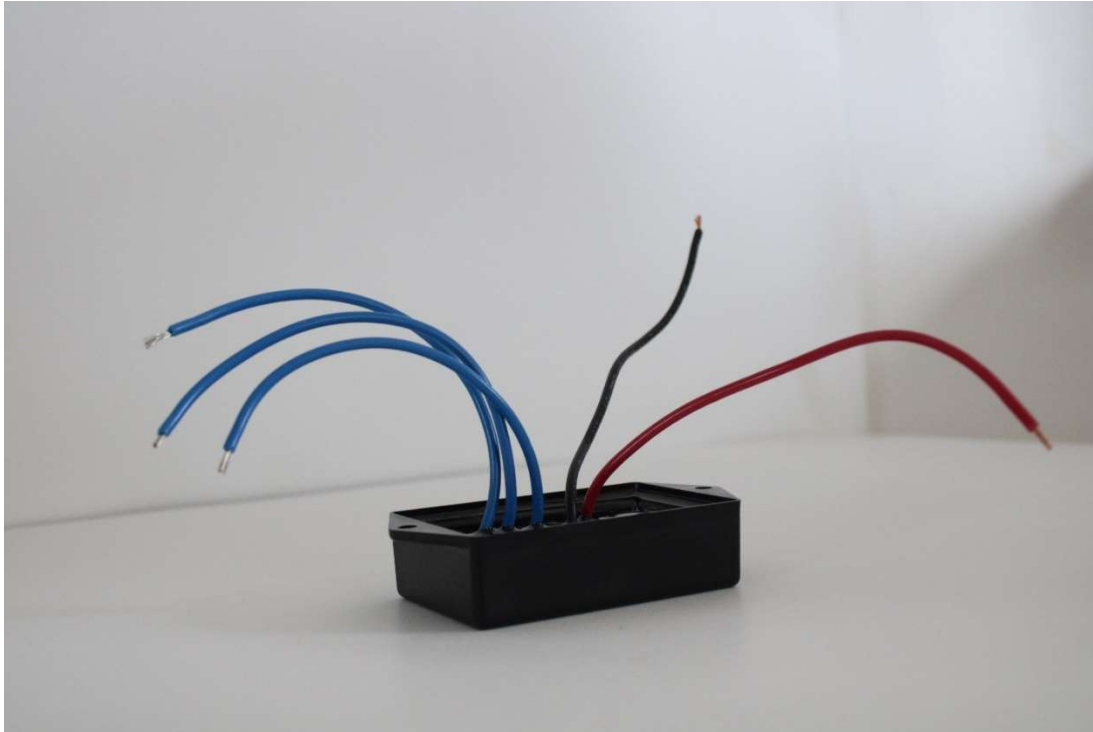


Figure 2 – VREG20 side view

VREG40 – This is designed for up to 40A. The engines this would tend to be used for are:

- Motorcycles with fuel injection or significant electrical loads (like stereos). This is usually the high end street bikes.
- Small vehicles (like auto rickshaws common in Asia)

VREG60 - This has only been seen on certain Harley Davidson motorcycles.

The higher power regulators will work in low power applications but there is a penalty in terms of cost, size and efficiency (efficiency will go down if the regulator is too lightly loaded). It is best to get the regulator that is the smallest yet can handle the load of the electrical system.

Specifications

Common

Temperature Range	-40C to +85C (Industrial Temperature Range)
Case Material	Plastic ABS
Potting Material	Epoxy
Wire Material	105Celcius (Oil, Water and Flame Resistant)
Reverse Leakage Current (maximum)	3mA
Battery voltage	12.6V nominal (6.3V available on special order)
Chemistry	SLA
Electromagnetic Compatibility	CISPR 25, EN50498

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Specification	VREG20	VREG40	VREG60
Dimensions (LxWxH)	2"x3"x1"	2"x3"x1.5"	3"x3"x1.5"
Footprint	2"x4"	2"x4"	3"x4"
Charge Current (amps)	20	40	60
Wire Size (AWG)	18	14	10
Power Dissipation(W)	6	TBD	TBD

What do I get with the regulator

The regulator kit contains the regulator, an aluminum interface plate and 2 nylock nuts.



Figure 3 – Regulator mounting plate kit (VREG20)

The wire connectors are not included as they are different for the different equipment and wiring harnesses. For OEM purchases, the wiring harnesses, connectors, and mechanical design can be customised.

Document Revision

Revision	Change
1.0	Initial release
2.0	Modified to be more concise. Moved part to “how do I tell which regulator” app note