Questions and Answers for Dual Rectifiers

1) Can I use two different batteries?

Absolutely. The dual rectifier has two, independent cathode outputs with each output isolated from the opposing output. Because of the absolute isolation, you may use two different battery sizes, different chemistry (like lead-acid on cathode A and AGM on cathode B), or batteries that differ in age. You *cannot* mix 12 volt and 24 volt batteries attached to the same dual rectifier. All sources and load must operate at the same voltage (all 12 volt or all 24 volt).

2) How do I know what size Dual Rectifier is needed for my application?

We're experts in a discipline called "high ratio geometry" where we determine how many MOSFET semiconductors must be arrayed in order to reliably handle a specific amount of current and voltage, within a specific temperature range. In a typical automotive application, the alternator's peak output is generally used to determine how much current may travel from the input to the output of the dual rectifier. We break devices into 50 amp increments and recommend you take the alternator's stated current rating, add 20% for short-term peak load conditions, and select the dual amperage rating above that number. For example, if the alternator is rated at 140 amps, add 20% which is roughly 170 amps during short-term peak loads. So the correct Dual Rectifier would be a 200 amp device for an alternator rated at 140 amps. When in doubt, error on the side of margin and round up.

3) How does the battery combine feature work?

When the battery combine option is activated by closing the combine wires, the default isolating firmware is overridden and the two MOSFET arrays are fully enhanced allowing current to flow in a bi-directional fashion between the two batteries. Physics dictates current will flow from the battery with a higher voltage potential to the battery with a lower voltage potential until the two batteries equalize. Combining the batteries using the on-board combine feature is no different than combining batteries using a mechanical connection like jumper cables; it's simply more elegant and faster.

4) Really? No heat sinks? How is that possible?

Aluminum heat sinks are expensive, bulky, and necessary if you must convey heat away your assembly for self preservation purposes. Our internationally patented MOSFET assemblies do not create heat of any significance and therefore radiating excess heat through convection is fundamentally unnecessary. . Efficient power transfer is what separates POWER-GATE from everything else.

5) Can I install the dual rectifier with only one battery in the vehicle?

You can install the Dual Rectifier with only the main battery connected to the "main battery" cathode and leave the auxiliary battery cathode disconnected without fear of damaging the POWER-GATE.

6) Why is it critical to join the two battery negative terminals with a common ground cable?

Just because a ground cable is connected to metal doesn't necessarily mean a good electrical ground is present. The alternator's regulator is designed to share a common ground with the battery that is being charged. If two batteries are installed, it's critical that each battery's ground is referenced to the regulator accurately. Dissimilar grounds can cause a charging imbalance which can lead to undercharging or overcharging of one or both batteries. The easiest way to insure an accurate, common ground between the alternator and each of the batteries is to physically run cabling between the grounds on all three components. Do not depend on frame or body grounds as they can be deceptively quality connections. If you run a ground cable from the alternator casing to battery A ground, and connect battery A ground to battery B ground, then the alternator and both batteries will be grounded at the same level.

7) What is the purpose of the alternator excitation trigger?

Internally regulated alternators derive their turn-on power for the regulator from the alternator output post which, in a normal electrical system, is connected to the battery positive. When a dual rectifier is installed, it is placed between the alternator and battery(s) which effectively creates an open circuit between the alternator and battery(s) when the vehicle is turned off. We use the excitation trigger signal to determine when the vehicle is being cranked so we know when to activate the temporary excitation circuit. When this circuit is activated, we convey downstream battery power to the upstream alternator so the regulator can turn on and start creating charging current for the batteries. Once excitation is achieved and the alternator is sensed to be creating charging output, the excitation circuit de-activates and normal charging and battery isolation continues.

8) What size high current fuses should I use and why are they necessary?

Anytime you have a battery that can discharge to ground, a protection fuse is used to disrupt current flow. The fuse(s) should be placed as close to battery positive as possible and fuse(s) should be rated sufficiently high enough to allow typical current to pass, but sufficiently low enough to blow open quickly in the case of an over-current or shorted condition. Remember that in a typical Dual Rectifier installation, the fuse(s) handle current flowing from the alternator to the battery(s), while accessories connected to the output of the battery(s) don't necessarily draw the same amount of current through the fuse. For example, your winch may draw 400 amps but if the alternator is rated at 130 amps, 400 amps of winch current won't pass through the fuse because the alternator can only create 130 to 150 amps to meet that 400 amp load. Remember that fuses are cheap insurance verses burning your vehicle to the ground. If you have questions about fusing, contact us for guidance.