POWER-GATE INSTALLATION INSTRUCTIONS
DR-Series Dual Rectifier Isolator v5.2

Congratulations on your POWER-GATE purchase! POWER-GATE is designed to provide years of trouble-free operation. Please read the instructions in their entirety prior to undertaking installation. Like any work performed around batteries, electrical circuits, vehicles, and moving parts, exercise caution to insure safe installation and use. If you are not familiar with batteries, electrical circuits, or basic auto/marine-electrical architecture, seek the assistance of a professional installer. Failure to install POWER-GATE correctly may cause poor performance, premature product failure, personal injury, or possibly damage to the vehicle or vehicle accessories.

The manufacturer is not responsible for damage incurred due to improper installation.

PRE-INSTALLATION

PACKING LIST:

- POWER-GATE Dual Rectifier and attached Ground lead
- Vinyl Post insulators (3)
- Brass nuts, 5/16-18 (3)
- Brass washers, 5/16 (3)
- Installation and Data sheets

WHAT YOU WILL NEED:

- Copper lugs for cable terminations
- Drill and appropriate bit for mounting holes
- Digital multi-meter
- 5/16 inch nut driver
- 5/16 end wrench
- 16 AWG black wire for ground extension
- Wire stripper
- Lug crimper
- Soldering torch, solder, and flux

INSTALLATION INSTRUCTIONS

Step 1 With engine off, remove all wires and cables from negative terminal of all batteries.

Step 2 Slip existing cable/wire off primary alternator post. Insulate with electrical tape and secure from rotating parts.

Step 3 Select desired location for POWER-GATE Dual Rectifier; keep the following points in mind:

- Distance between alternator, P-GATE, and batteries.
- Easy access to POWER-GATE
- Footprint doesn't conflict with other wires, cables, reservoirs, rotating parts etc…
- Adequate distance from high-heat sources like exhaust manifold

Step 4 Mount POWER-GATE using the three self-drilled mounting holes.

Step 5 **Connect POWER-GATE ground wire to good electrical ground (ex. battery negative terminal) before proceeding to Step 5**

Step 6 REMOVE original wires/cables connected to primary alternator output post. Insulate and secure from rotating parts. They will not be used. Install fresh piece of cable from alternator output post to POWER-GATE anode post.

Step 7 Connect cable(s) between alternator and batteries as shown in the diagram and insulate appropriately. Note that CATHODE "A" should be connected to vehicle's starting battery.

Step 8 When the **VIOLET** wire is connected per your configuration (see top next page) the alternator excitation trigger causes rectifier "A" to energize after a 4 second delay allowing many internally regulated alternators to energize and create output. After twenty seconds, the circuit de-activates. If present, the **YELLOW** LED will illuminate while the excite circuit is active.

Step 9 **BEFORE RECONNECTING BATTERIES**, verify that your installation matches the diagram.

CONNECTING LUGS TO CABLES

POWER-GATE™ is engineered to transfer electricity at peak performance levels approaching 99.9%. Unfortunately, most installers often overlook electrical joints between cables, lugs, and battery terminals. POWER-GATE™ is one part of a complete electrical *system*; cables and connection points require just as much attention as the connections to POWER-GATE™ itself.

- Cables should be flexible, free of oxidation, and coated with neoprene or some sort of insulation
- Cable cross-section should be appropriately sized for the distance and peak current being transferred.
- Lugs made of copper or silver-plated copper are good conductors.

Creating a good joint between cables and connectors insures efficient transfer of electricity. Lugs should be soldered to cables; hand crimping *does not* provide enough compression for a good joint. To properly connect cable to lug:

1. Strip cable's insulation material exposing copper strands of cable.
2. "Tin" copper strands by first covering with solder flux. Heat copper strands with torch until solder melts into copper strands. The goal is to pre-saturate or solder-pot the copper strands with solder.
3. Insert solder slugs into lug barrel followed by tinned cable.
4. Use torch to heat lug and cable. When the solder slugs melt, molten solder from tinned cable and solder slugs will combine while inserting cable into lug.
5. Remove heat and allow lug and cable to cool.
6. Once cool, use heat shrink wrap or electrical tape to create moisture barrier between cable insulation and lug.

This method should produce a sound electrical joint. Later, use a digital multi-meter to insure connection is efficient at elevated current.

CONNECTING CABLES TO POWER-GATE™

POWER-GATE™ does not use cooling fins commonly present on high-current switches. It is critical that cable connections to connection posts provide optimum surface area contact for two reasons: proper cooling and proper current conductivity.

AWG Size American Wire Gauge	Resistance in mΩ/ft	Voltage Drop @ 10 feet		
		@ 100 amps	@ 200 amps	@ 300 amps
00	0.078	0.078V	0.156V	0.234V
0	0.098	0.098V	0.196V	0.294V
1	0.124	0.124V	0.248V	0.372V
2	0.156	0.156V	0.312V	0.468V
3	0.197	0.197V	0.394V	0.591V
4	0.249	0.249V	0.498V	0.747V
6	0.395	0.395V	0.790V	1.185V
10	0.999	0.999V	1.998V	2.997V

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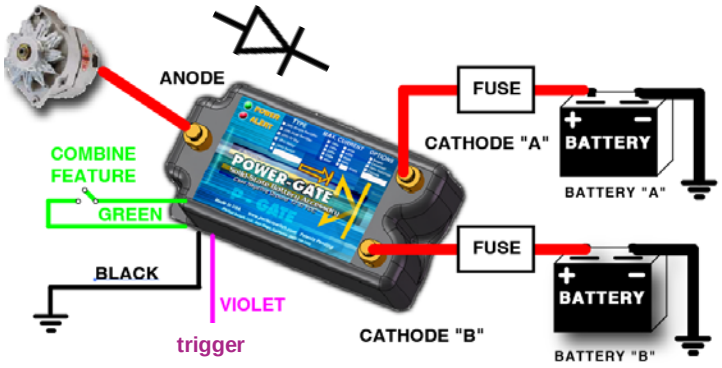
MADE IN THE USA

DUAL RECTIFIER DIAGRAM



STARTING BATTERY

AUXILIARY BATTERY

Violet Wire Information

The violet alternator excitation trigger was factory programmed for one of two configurations: switched system trigger (B) or momentary starter trigger (C). Once programmed, you must connect the violet wire to the correct trigger signal for the excitation circuit to operate properly. For option B (switched system trigger) the signal should apply system voltage continuously when the ignition is on or the vehicle is running, and de-power system voltage when the vehicle is not running and the ignition is in the "off" position. For option C (momentary start trigger) the signal should apply system voltage as a momentary pulse input such as a start trigger that applies signal while cranking, then signal is removed (minimum of 80 milliseconds. When the violet wire is triggered properly, first a 4 second delay occurs followed by the yellow LED turning on for 60 seconds indicating the alternator excite circuit within the POWER-GATE is active. During this 60 second window, the starting battery cathode is coupled to the alternator anode allowing the alternator's regulator to turn on and start charging. If option B is used, if the vehicle ignition is turned to the "on" position but the vehicle is not cranked within the 60 second "excite" window, user may have to turn the vehicle off, then turn the ignition "on" and re-crank the vehicle to cause the alternator to charge.

POST INSTALLATION CHECKOUT

Assumptions:

- Both AUXILIARY and MAIN batteries are connected and have a normal static voltage of 12 to 13 volts.
- Cables and connections are pristine and electrically sound, not poor, corroded, or high resistance.
- Alternator is in good working order and with the vehicle running, the output voltage is between 13 to 14.9 VDC (26 to 29.8 VDC for 24 volt vehicles)
- With the vehicle running, both green LEDS should be illuminated, provided the alternator is creating output. When the vehicle is turned-off, the green LEDS should extinguish.

Using your digital multi-meter, perform the following checks:

1. Read the DC voltage from the anode to ground. This should reflect the DC voltage of the alternator.
2. Read the DC voltage from the cathode "A" to ground. This should reflect the DC voltage of the MAIN battery.
3. Read the DC voltage from the cathode "B" to ground. This should reflect the DC voltage of the AUXILIARY battery.
4. With one probe on the anode and one probe on one cathode, the multi-meter will reflect the difference between these two points and should reflect less than 0.05 volts. If greater, shut the vehicle down and call support. There should never be more than 0.05 volts drop between the anode and cathode blades at **maximum rated current**.

HOW POWER-GATE™ FUNCTIONS

The POWER-GATE™ Dual Rectifier is an extremely efficient, one-way electrical valve. It provides electrical conduction from anode to cathode more efficiently than the cables attached to it. In normal operation, the alternator is supplying current to both the MAIN and AUXILIARY batteries. When the alternator is spinning, both rectifiers should be "on" and conducting current from anode to cathode as indicated by the **GREEN** LEDS and ultra-low voltage drop. POWER-GATE™ will allow the independent discharge of either battery. In other words, loads attached to AUXILIARY battery can discharge the AUXILIARY without affecting the MAIN battery, or visa-versa. When the vehicle is turned-off, the **GREEN** LEDS will not illuminate. When the vehicle is turned-on and the alternator is creating power, the **GREEN** LEDS will be illuminated indicating the current is being conducted from anode (alternator) to each respective battery.

POWER-GATE™ is always on; there's no on/off switch. It continuously draws 0.002 to 0.025 amps from the AUXILIARY battery (which is less than the power consumption of your vehicle's clock) in the process of protecting your batteries.

The **GREEN** LED indicates proper operation.
If the **GREEN** LED is <u>not</u> illuminated, it means the following:

- the voltage at the anode is less than the voltage at the cathode, as would be the condition if the vehicle is off, or if the alternator is not creating charging current/voltage.
- Under-voltage (less than 8 volts)

COMBINE BATTERY FEATURE

Joining the two **GREEN** wires together will enable the battery combine feature. When enabled, the **YELLOW** LED will illuminate, and current can flow from battery A to battery B, and battery B to battery A. The direction of current flow will depend on the state of charge of the batteries in the system. To disable the combine feature, open the connection between the **GREEN** wires. A switch can be fitted between the **GREEN** wires for convenience. The switch need only handle micro-amps so any single pole, single throw switch, or an on-off-(on momentary) DPDT switch will do. If left in the enable mode, battery isolation will NOT take place.

Many use this as a "self-jumping" feature. If the main battery is low and it's desirable to "join" the aux. battery during cranking, enabling the combiner will serve this purpose. The device requires a minimum of 7.5VDC to operate properly and damage to the device may occur if the combine feature is enabled when the batteries are in an unhealthy state.

DEVICE FAILURE

Should POWER-GATE cease to function correctly for any reason, it is important to remove the device from the electrical circuit. Like any component in an electrical distribution circuit, if it is not functioning correctly, the POWER-GATE will dissipate heat as current passes through it. If ignored, heat related damage could result if a faulty device is not removed. Perfect Switch, LLC cannot be responsible in any way for ancillary damage to the vehicle and equipment installed in, on, or about the vehicle. Electronic components can cease to function at any time. It is the operator's responsibility to frequently assess the health of the electrical system to insure a safe and reliable working environment.

POWER-GATE ONE-YEAR LIMITED WARRANTY

Perfect Switch, LLC. warrants the POWER-GATE against all defects in materials and workmanship for a period of one year from the date of the original purchase, subject to the following terms and conditions:
This warranty does not apply if the serial number or housing of the product has been removed or if the product has been subjected to physical abuse, improper installation, water damage, corrosion due to sea salt, road salts, or de-icing chemicals, transient voltage spikes, or modification.

To obtain warranty service, please contact the manufacturer for a Return Materials Authorization (RMA) number. The product must be returned, insured and shipping prepaid, to Perfect Switch, LLC at the address below, in its original packaging or a suitable equivalent, along with the purchaser's receipt and written description of the problem.

Perfect Switch, LLC's responsibility under this warranty is limited to repair or replacement of the product or refund of its purchase price, at the sole discretion of Perfect Switch, LLC. Perfect Switch, LLC. disclaims all other warranties, expressed or implied, including warranties of merchantability and fitness for any particular purposes whatsoever, and no other remedy shall be available including without limitation, incidental or consequential damages, loss of time, inconvenience, or commercial loss. In no event shall Perfect Switch, LLC's liability exceed the purchase price of the product in question.

Some states do not allow the exclusion or limitation of incidental or consequential damages of how long an implied warranty lasts, so the above limitations or exclusions may not apply to you.

This warranty gives you specific rights. You may have other legal rights which may vary from state to state. Perfect Switch, LLC. wants you to be satisfied with its products. Should you have any difficulties with the operation or performance of your POWER-GATE multi-battery accessory, please the manufacturer.

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