

*ENDURALAST*

# **EDL4MG**

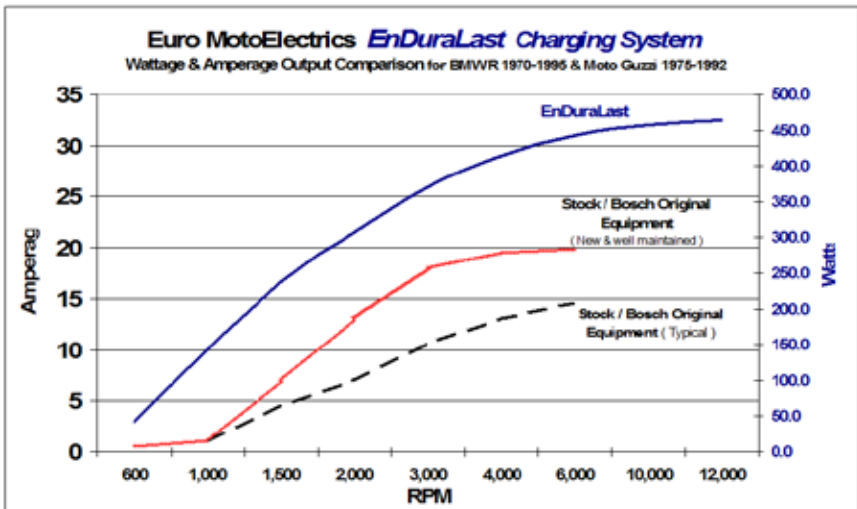
**450w Charging System  
Upgrade for Moto Guzzi  
Installation Guide**



# EDL4MG Alternator Kit Performance

29 Amps / 400 Watts @ 5000 RPM (450 Watts Total Max Rating)  
25 Amps / 350 Watts @ 3000 RPM  
20 Amps / 280 Watts @ 2000 RPM

- Increases power output by up to 80% over the stock Bosch system.
- Stable voltage production under all load conditions.
- Electronic voltage regulator/rectifier combination, replaces diode board rectifier & voltage regulator.
- High-tech permanent magnet rotor will never over-heat or short out.
- Brushless design eliminates worn out brush holder, rotor slip rings, and carbon brushes.
- Eliminates the *no charge* due to burnt out generator light, while retaining its function.
- Works with all Moto Guzzi's from 1973-95 with the BOSCH alternator.
- Designed and manufactured to modern OEM specifications.



## Theory of Operation

The original BOSCH alternator system used on Moto Guzzi's from 1973-1995 was designed in the late 1960's. The system is based on energizing the rotor with electricity from the diode board, through the generator light and voltage regulator. Once the rotor is electrically charged and spins inside the wire windings of the stator, AC current is generated and sent to the Diode board, or "Rectifier" to rectify or correct the AC current to DC current so it can be used to charge the battery. The Rectifier uses Diodes which are like electrical gate keepers, to change the electricity from AC to DC.

The EnDuraLast EDL4MG Alternator Kit is a significant upgrade to the original charging system. The major components are manufactured in Italy and the custom modifications done in the USA to the highest standards under ISO certifications.

It's beauty is in its simplicity. No longer is the complex wiring from the diode board, generator light, voltage regulator and brushes needed to energize the rotor because now the rotor is permanently magnetized. The brushless, permanent magnet rotor spins inside the stator and AC current is generated in the stator wire windings. The stator is very robust. Failures are rare, caused by excessive heat or physical impact damage.

The Regulator / Rectifier (R/R) then converts the AC current to DC current to charge the battery sending it via the RED wire. The BLACK wire on the R/R is the voltage sensing wire. The voltage supplied here from your bikes battery tells the R/R what to do. Once the battery no longer needs voltage it shunts the surplus to ground. It is a shunting style R/R. It is therefor extremely important the R/R has a solid connection from it's case to vehicle ground.

This alternator system can be envisioned as a stand alone system that will interact electrically with your bike at two points. It reads the battery voltage via the BLACK wire, and depending on the information provided to it, will deliver available voltage via the RED wire to the battery. All other electrical systems on your motorcycle including ignition are not impacted by this upgrade.

## Remove the Existing Charging Components

Remove the battery and place it on a charger so it is fully charged when the project is complete. Remove any fairings, fuel tank, and front alternator cover to access the engine front and top.

Remove the 3 fasteners that secure the alternator cover to the timing cover and remove the cover with the stator as one unit. Disconnect all the electrical connections to the alternator cover.

Remove the alternator rotor bolt. Place rotor removal tool into the rotor and tighten the tool.

Gently tapping the rotor with a rubber mallet after tightening the removal tool can assist in releasing the rotor from the crankshaft.

The rotor can “pop” off the end of the crankshaft, so be prepared! You may need to put the transmission in gear

keep the engine from turning over during this process.

Once the rotor is removed it is time to inspect the oil seal on the crankshaft. A replacement is included in the kit as this is the best time to replace it. Note the orientation and depth so you do not drive it in too far.

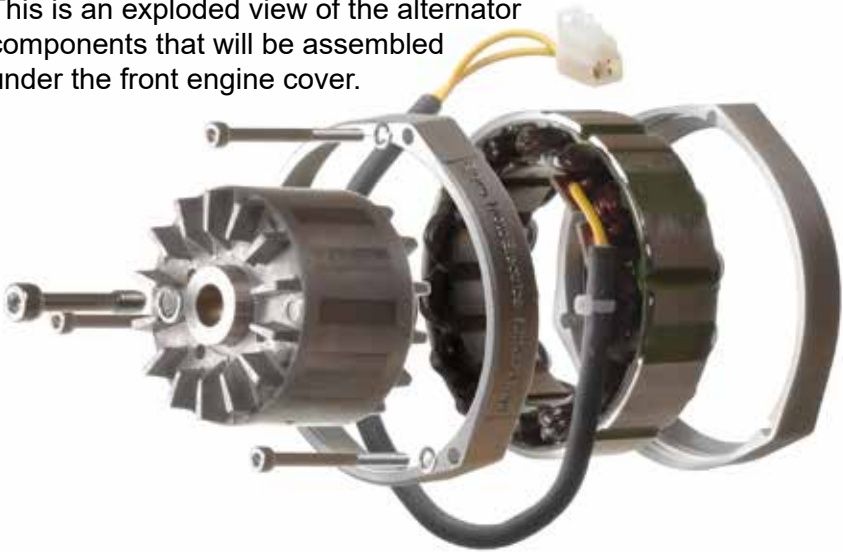


## Removing the Diode Board & Voltage Regulator.

The diode board is located next to the battery box. Disconnect all of the electrical connections to the diode board and remove it from the bike, especially the RED wire to prevent a short. It is no longer needed. Disconnect and remove the voltage regulator from the bike as it is also no longer needed. The wiring between these components can be stripped from the vehicle or secured out of the way.

## Assemble the Rotor and Stator

This is an exploded view of the alternator components that will be assembled under the front engine cover.



## Mount the Rotor

Now we are going to start assembly of our new high output alternator beginning with the rotor. Inspect and clean the nose of the crankshaft. Remove all remaining oil with alcohol and a clean cloth. Clean the inside of the alternator rotor of any remaining oil from the manufacturing process. *(The new rotor has a protective cap. Take care not to damage the lip of the arbor when removing it. You can easily blow it off with compressed air)* Now that both surfaces are clean and prepared, slide the new rotor onto the crankshaft. To confirm a clean interface, grasp the rotor and try

turning it. If the rotor slips on the crankshaft, remove and clean it again.

Secure the rotor in place with the included rotor bolt and lock washer with a torque setting of 14 foot pounds / 19 Newton meters.



## Mount the Stator

There are two stator rings included in the kit. One outer ring that is smooth and inner ring with a lip for mounting. The seating of the inner stator frame into machined groove is precise and tight! Be sure it is fully seated into the engine. Fit the stator and outer ring. Take note of the cutouts on the stator body to allow the mounting bolts to pass through. Note the stator wires are approximately in the 10:00 position.



Fit the outer stator ring aligning the screw holes and secure the entire assembly with the bolts and lock washers included. Take great care not to over tighten as you can strip the threads on your aluminum engine. It may be easier to install the stator with both rings as one pre-assembled unit.

## Mount the Regulator Rectifier

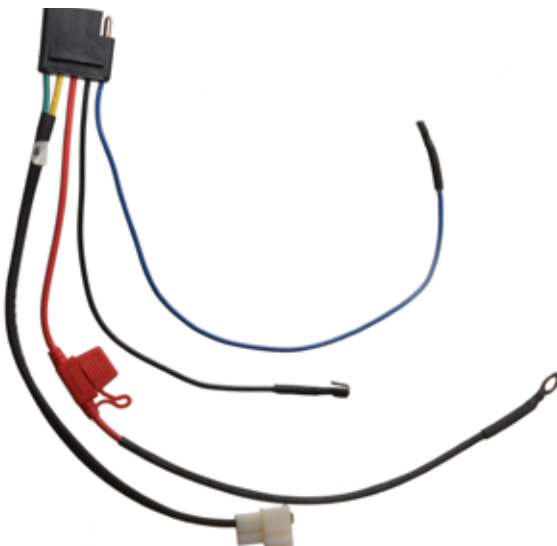
There are many possible locations to secure the R/R. You can certainly use your mechanical creativity! In most applications it is mounted on the front of the bike just below the steering head stem. This location is great as it will receive ample cooling and air flow. You may fit it where the original diode board was located.

Note when you are mounting the R/R, the case is its ground connection, so if you mount it on rubber bumpers for example, you will want to use the included ground wire. A poor ground connection can cause premature failure of the R/R. It is always a good idea to add your own additional ground strap to ensure the systems longevity

## Install Electrical Wiring

This kit includes a wiring harness originally designed for BMW Motorcycle applications, however this will aid with the installation on your motorcycle. Some modifications or additional wiring may be needed depending on your specific installation.

It is possible that your particular bike may have been modified and many not look exactly as described. You must use your judgment or contact a professional installer for assistance.



**CHARGING VOLTAGE**  
(Battery Positive or  
Starter Solenoid)

**STATOR  
PLUG**  
(AC Current)





The harness HAR-4A connects to the R/R as shown below. Lay the R/R and HAR-4A on a table and connect the cable as shown below. *Note the Black & White can only connect to the Black & Blue by virtue of the plug shape. Red to Red in the middle. Yellow & Yellow to Yellow & Green (the order doesn't matter on the two Yellow as they are both AC current from the Stator.)*



**“KEY ON”  
BATTERY VOLTAGE**  
(Piggyback Connector  
for Coil Positive)

**GEN LIGHT GROUND**  
(Light Blue wire to Generator light)  
*Not required to function*

## Final Reassembly

To ensure ease of future service, we highly recommend that all fasteners be thoroughly cleaned and that a good quality anti-seize paste be used during reassembly of parts. With the ignition switch still off and transmission in gear turn rear wheel while you watch the rotor to ensure that it runs true and straight inline with the stator without touching. Review all work done during the installation process. Ensure that all components are mounted correctly and securely. Check all wiring to make sure that the components are connected properly and that wires are routed appropriately to avoid pinching, binding, rubbing and are secured with the included cable ties.

Reinstall the front alternator cover, fuel tank, and all remaining components removed to restore the bike to operating condition. Reinstall the battery, and clean the terminals to ensure a solid connection to the battery cables.

Start the motorcycle. While the engine is running, connect the voltmeter across the battery terminals to check for charging voltage. Watch for voltage at the battery terminals to increase with RPM's.

After confirming correct operation of your new charging system, verify everything is reassembled properly and it is safe to ride.

## Trouble Shooting

If there is continuous high voltage (over 15 volts) the issue is a faulty ground or voltage lower than actual battery voltage supplied to the BLACK wire on the R/R. The black "voltage sensing" lead must be supplied a true and accurate key ON battery voltage; if not, the voltage regulator will automatically compensate for the lower voltage being sensed and produce constant and / or intermittent higher voltage. If the black wire is connected directly to the battery it will always be energized and be a parasitic draw on the battery.

With this new alternator, there are 4 possible failures.

1. The rotor is permanently magnetized, failure is rare.
2. The stator is very robust, failure is also rare, You can test for continuity between the two yellow leads on the stator, and

- verify there is no continuity to ground.
3. The R/R is the most susceptible component for failure. Each one is computer tested at the factory to ISO standards prior to shipping. The reason why this regulator would fail is because of heat. It is not to exceed 90°C / 194°F. Excessive heat is caused in 3 ways;
    - A. The battery used is aged and sulfated to the point it will not accept a charge. This added resistance presented to the R/R will cause it to heat up, much like a light bulb heats up.
    - B. The normal heat generated by the R/R cannot be dissipated because of it's physical location. Never mount this R/R under the front engine cover on a BMW where the original diode board was installed. Besides the engine heat, it will not receive adequate air flow to stay cool.
    - C. The R/R ground connection is not solid or intermittent. This is a case of resistance to ground needs to be as low as possible. A solid ground strap is a great preventative measure to ensure the R/R can shunt to ground safely.
  4. The battery is aged or sulfated and not able to accept a charge. We recommend having a load test performed to your battery at the start of every season. This system is very reliable however it cannot over compensate for an aged or sulfated battery.

Do not overload the system! Although you will have dramatically increased your power & amperage output, you must still observe the laws of physics and electromagnetism. Please review the power demands of all additional accessories before installation and use. To increase the reliability of the charging system, there should be a 10-20% buffer margin between demand and output capacity at your engine operating speed. (Refer to the charge system output chart on page 2) Total power demand should NEVER exceed the power capacity of the system.



***ENDURALAST***

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