INSTRUCTION SHEET

Gear Reduction Racing Starter

PowerMAX PLUS 9300 XS Torque 9513, 9523, 9533 Mastertorque 9613

We want to help! If you have any comments or difficulty with this product, please contact technical support at

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(630) 957-4019
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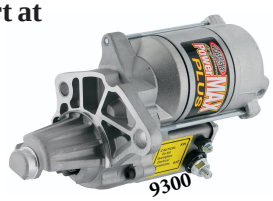

INSTALLATION

These instructions are provided as supplementary information to the factory service manual instructions for starter replacement.

DISCONNECT THE BATTERY.

MOUNT STARTER. Make sure the mounting surface of the bellhousing is smooth, flat and free of paint buildup. Torque the starter mounting bolts to the engine manufacturer's specifications, typically 32 ft. lbs.

ATTACH BATTERY CABLE AND SWITCH WIRE. Reconnect the original ignition switch wire to the IGN terminal on the Mastertorque starter. The switch wire should be capable of handling 50A intermittent and 10A continuous, typically a 12AWG wire. Reconnect the original battery cable to the Mastertorque starter. The battery cable must be the proper size for the length of the cable (see chart). All connections should be clean and tight and terminals should be soldered if possible. The ground cable is important and the best ground path is direct to the engine block. With steel frame vehicles the ground path can be to the frame. This ground cable should be the same size as the starter positive cable. Also, a ground strap should be installed from the frame to the engine.

DISTANCE	3'	5'	7'	10'	+10'
AWG	4	2	1	0	00

CONNECT THE BATTERY.

OPERATE THE STARTER. It should operate quietly. The cables and connectors themselves should be checked for voltage drop with a voltmeter. To check any wire or cable for voltage drop, connect one side of the voltmeter to one end of the cable and the other side of the voltmeter to the other end. OPERATE THE CIRCUIT and simultaneously measure the volt drop. It should be 0.5VDC or less. A high voltage drop indicates a bad connector or an undersized cable. The ground circuit can be checked in the same manner. Measure input voltage by connecting the positive probe of a voltmeter to the "MOTOR" terminal of the solenoid and connecting the negative to the starter housing. This should be 11V minimum while cranking.

ADDITIONAL NOTES ON INSTALLATION

1. ***A note about ring gears***. It is important for long starter life that the ring gear be round and true. Check the ring gear in at least six places verifying that the clearance for the starter is the same in all locations. If not remove the ring gear and make sure the mounting surface of the crankshaft is clean and free of paint buildup or rust. Reinstall the ring gear and properly torque the mounting bolts. If this does not correct the problem, replace the ring gear.
2. ***Disconnect switches in race cars and other off road vehicles***. The switch used for a battery disconnect is very important. All of the starter current will go across this switch during cranking which, depending on the starter, can be as high as 700A! After the engine is running, all of the current from the alternator will be running across this switch. Therefore make sure that the switch that is being used can handle these amounts of current. Switches are rated in intermittent amps and continuous amps. The intermittent rating should match or exceed the amount the starter will pull and the continuous rating should match or exceed the amount the alternator can produce. Using a switch that is too small will result in voltage loss and possible switch failure.

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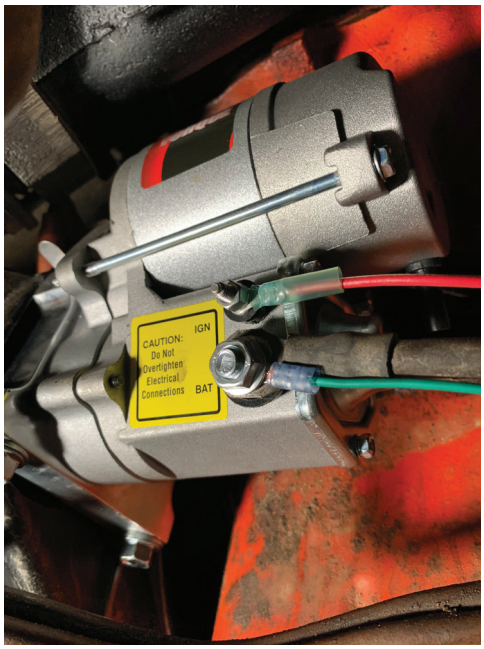
Checking Starter Supply Voltage

When it comes to starter performance issues, the most common cause is low voltage supply. If you're experiencing intermittent cranking, clicking, grinding or erratic operation, there is likely low voltage supply to one of the two starter circuits. Low voltage at either the battery connection or the smaller ignition terminal can lead to internal solenoid damage which also affects the clutch assembly that controls the pinion gear. Also, note that the ignition wire may go through a park/neutral switch or an OEM resistor causing a low voltage issue.



Low voltage supply can be caused by a weak battery, too small gauge of cable, internal cable corrosion and even poor quality crimps on the cable. Low voltage on the ignition terminal can be due to factory resistor wiring, excessive engine heat or how it is routed through a park/neutral switch.

The good news is that these can easily be checked and remedied. Two things you'll need for the test – a volt meter and a friend to help.

TEST PROCEDURE

The goal is to check the voltage with a digital volt meter at BOTH, the battery cable connection and the ignition terminal of the starter WHILE CRANKING the engine.

1. Make sure the battery is fully charged. The battery must be at least 12.6 volts before checking the voltage values at the starter terminals. If the battery does not read 12.6 or higher, charge it or replace it.

2. With the battery at full charge, connect your volt meter to the battery terminal of the starter. It should read the same at the starter as it did across the battery terminals. If not, there is an issue within the cable/terminals from the battery positive post to the starter terminal.

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3. If the voltage is the same at the battery as the starter, have your partner crank the engine for about 3-5 seconds and note the voltage on the battery terminal of the starter while cranking. It should stay above 11 volts.

4. Next, connect your volt meter to the small terminal of the starter (ignition) and to ground. Have your partner crank the starter for 3-5 seconds and note the voltage. It should also be over 11 volts.

If less than 11 volts:

1. For block mounted starters, ensure the engine block mount is clean of all paint. This is the ground source for hundreds of amps being used by the starter. A poor ground will affect the voltage values and performance of the starter.

2. Inspect the wiring. Original cables need to be replaced. Corrosion can build up inside an older cable which you'll never see. Also, the gauge may be too small to carry the current and voltage needed for a high torque starter. We recommend a high quality, multi-strand copper wire and remember that trunk mounted batteries require heavier gauge cables. You can't go too big on the battery cable!

3. Inspect the ring lug/terminals. Use the proper ring lugs and ensure they are crimped to the bare wire strands – not the insulation!

If you have any questions about checking the starter supply voltage or other starter concerns, please contact our tech team at 630-957-4019.

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