DENSO
HEAVY DUTY

P5.0 / P8.0 Heavy Duty Starter With ISS Option

Installation Instructions

Thank you for purchasing a DENSO P5.0 / P8.0 Heavy Duty Starter. This is an insulated ground, universal type starter. The drive end housing can be rotated to obtain a number of different solenoid positions in respect to the mounting holes.

Before installing this P5.0 / P8.0 Heavy Duty Starter, read these instructions completely.

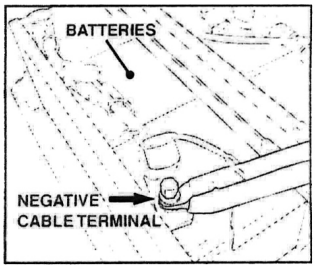
The DENSO P5.0 / P8.0 series starters have a planetary gear reduction design for increased torque and a soft start feature for increased ring gear durability. The soft start feature has a higher initial solenoid current draw than conventional starters.

NOTE: ***This starter is equipped with an ISS (Integrated Starter Switch) to ensure long starter life. The ISS compensates for O.E. starter relays that do not meet the higher initial solenoid current requirement.***

Definition of Terms

⚠ WARNING:	Describes precautions that should be observed in order to prevent injury or death to the user during installation.
CAUTION:	Describes precautions that should be observed to prevent damage to the vehicle or its components, which may occur during installation if sufficient care is not taken.
NOTE:	***Provides additional information that facilitates installation work.***

⚠ WARNING:
Disconnect the negative (-) or ground cable terminal from the battery(s). Failure to follow this step could result in personal injury and/or electrical system damage.

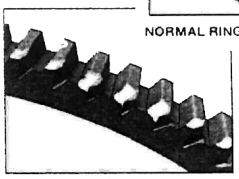


Ring Gear Inspection

- Inspect the ring gear for badly burred or damaged teeth. Rotate the engine with a pry bar or by other means to observe all the ring gear teeth.
- Replace any ring gear with extremely damaged or worn teeth.

NOTE: ***Use of a damaged ring gear may result in no starter pinion engagement or premature pinion wear.***


NORMAL RING GEAR


DAMAGED RING GEAR

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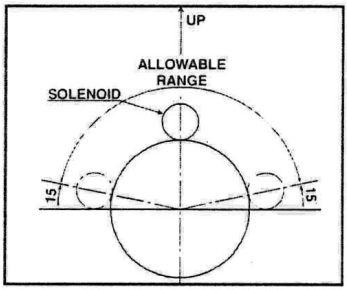
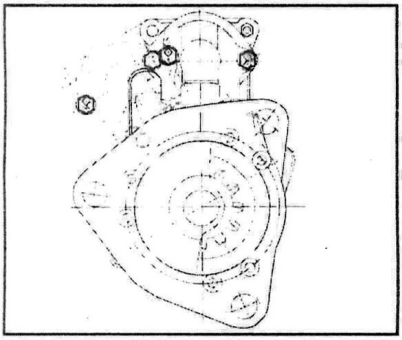
Drive End Housing / Solenoid Orientation



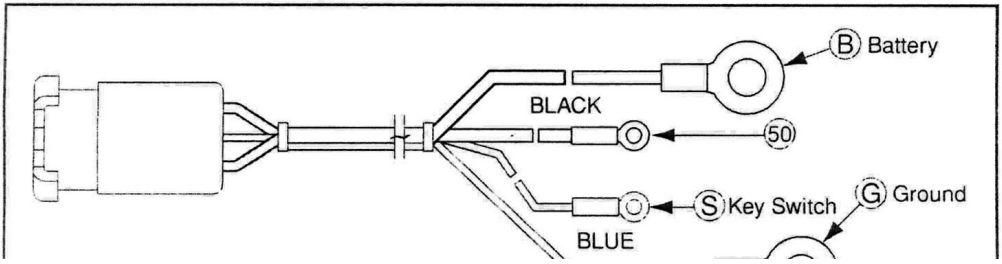
- Compare drive end housing / solenoid orientation of the new P5.0 starter to the original starter.
- If the orientation is the same, proceed with starter installation.
- If drive end housing rotation is necessary, follow the steps below.

NOTE: ***The solenoid should be mounted upward over 15 degrees of horizontal. Water, oil dust and other foreign material may enter the starter if the solenoid is not mounted properly. Starter operation failure will result over a period of time.***



- Remove the six allen (socket head) bolts using a 7/32 allen wrench. Rotate the drive end housing to the desired position.
- Install the six allen (socket head) bolts. Tighten the bolts to 18-26 N•m (13-19 lbf•ft) torque.

NOTE: ***It may be necessary to relocate the ISS to the opposite side of the starter solenoid housing to get the recommended clearance of starter to: engine, body, exhaust manifold. In this case, the ISS wiring may have to be re-routed under the solenoid. Refer to ISS Terminal Identification and Torque specs shown below.***



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Torque Specifications:

Description	Torque:
Solenoid Through Bolts	10.5 - 14.5 N•m (7.77 - 10.73 lbf•ft)
S-Terminal Nuts	2.94 - 4.7 N•m (2.20 - 3.5 lbf•ft)
50-Terminal Nuts	3.92 - 7.85 N•m (2.90 - 5.81 lbf•ft)
B (Battery), G (Ground)	20 - 30 N•m (15 - 22.2 lbf•ft)

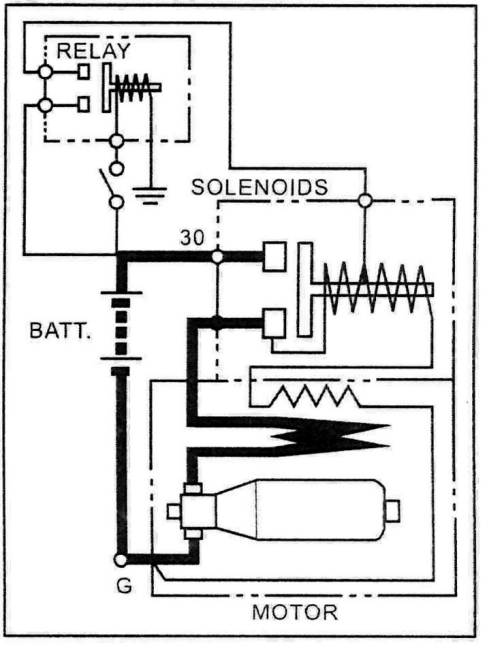
Starter Installation

- Slide the drive end housing into the fly wheel housing.
- Support the starter and install the three mounting bolts that secure the starter.
- Torque the mounting bolts to the specifications of the applicable OEM service manual.

NOTE: Check for recommended clearance of starter to: engine, body, exhaust manifold.

- Starter to engine and engine components: 4mm minimum
- Starter to body/frame: 6mm minimum
- Starter to exhaust: 15mm minimum

If the recommended clearances are not met, remove the starter and rotate the drive end housing to achieve the recommended clearances.



Cable / Wiring Connections

Prior to completing the wiring connections, clean the battery posts and terminals of all battery cables with a wire brush to shiny metal. Check the resistance of the wire cables. B+ battery cable: Battery post to starter solenoid battery terminal (main circuit), 2m max. Battery to solenoid key switch terminal lead (starter control circuit) 13m max.

NOTE: If the wiring harness resistance is higher than the above specification, starter engagement problems may occur.

Connect the starter motor cable and solenoid wiring terminals. Tighten the terminal nuts to the following torque specifications. Refer to the wiring schematic diagram to ensure proper connections.

- B+ (Terminal 30) 20 - 30 N•m (15 - 22 lbf•ft)
- Negative (Terminal G) 20 - 30 N•m (15 - 22 lbf•ft)
- Key switch (terminal S) 2.94 - 4.7 N•m (2.20 - 3.5 lbf•ft)

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OCP (Overcrank protection)

- Refer to the OCP bypass section if the vehicle is equipped with OCP. (see below)

Inspection After Installation

- Check the battery cable terminals for corrosion.
- Clean if necessary.
- Reconnect the negative cable to the battery(s).
- Confirm that the battery is fully charged.

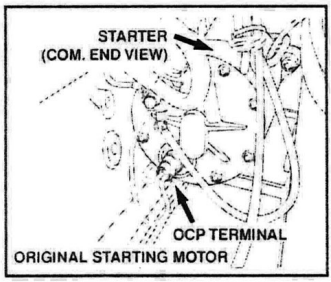
Operation Check

- Turn key- Start engine and check for proper operation.

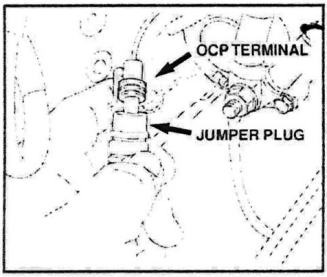
Starting Motor Overcrank Protection (OCP) Circuit Bypass

- The OCP circuit is an option used on many trucks. It utilizes a thermal switch to open the starter relay ground circuit when excessive starter temperatures are reached due to prolonged cranking of the starter motor. This is commonly called overcranking.
- The information below describes the procedure to bypass the OCP circuit when replacing an OCP equipped starter with a DENSO P5.0 or P8.0 starter.

•The presence of OCP can be identified by looking at the original starter (commutator end view). The OCP terminal comes out of the main wire harness and is plugged into the thermal switch at the rear of the starter.



- The DENSO P5.0 kW starter does not require or have an external OCP device.
- However, it is necessary to complete the relay ground circuit when installing a P5.0 kW in a vehicle originally equipped with this OCP device.
- This can be accomplished by installing a jumper plug into the OCP wiring harness connector.
- DENSO OCP Jumper Plug Part #053680-8010



- Tie off the OCP terminal and plug to the main wire harness to prevent separation due to vibration.

NOTE: ***An alternate method to complete the ground circuit is to cut the wires at the connector and install a butt connector joining the two wires. Care should be taken to ensure a good connection.***

△ WARNING: Failure to do so may result in starter control circuit failure.