

# Thunderstruck Gear Reduction

## Belt Drive

### 5KW to 10KW Kits

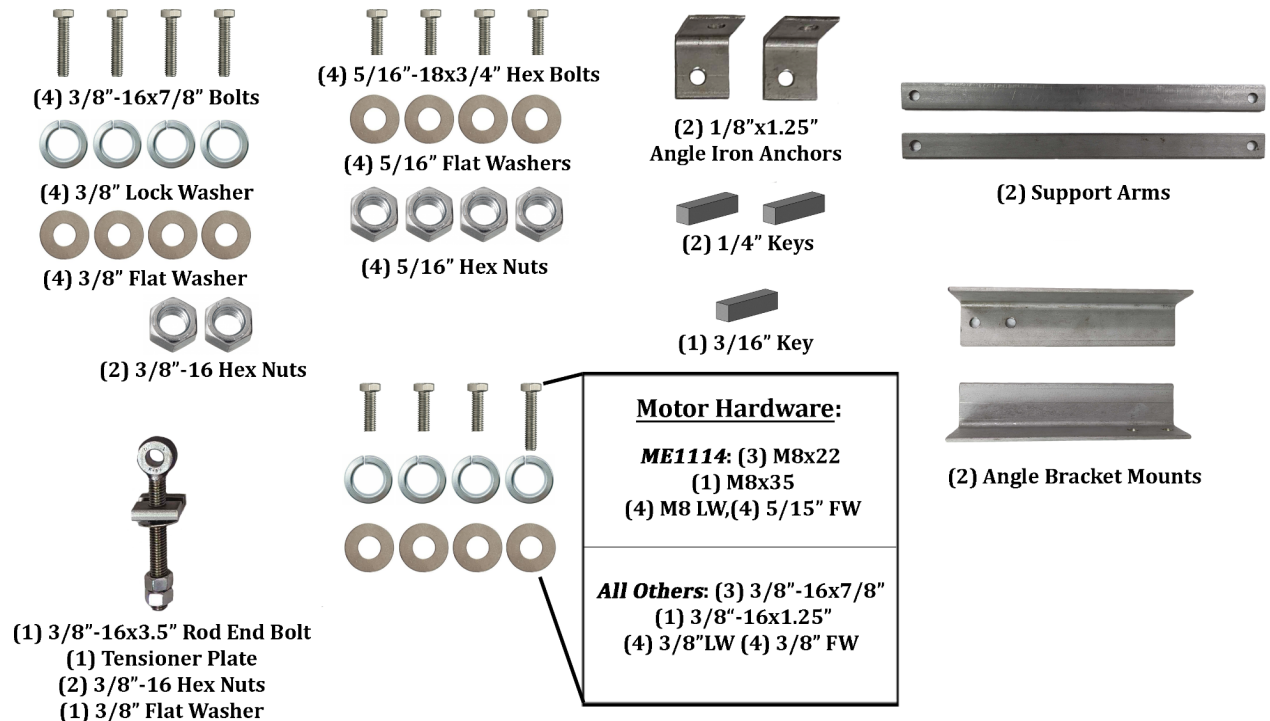
Congratulations on your purchase of a Thunderstruck Motors gear reduction. Please read these instructions thoroughly to make your installation as accurate and easy as possible. All included components are constructed of stainless steel, except for the prop shaft coupler, shaft keys and the thrust bearing housing.

## Parts List

- Gear Reduction Plate assembly (thrust bearing, drive pulley and 1" drive shaft)
- 2 angle bracket mounts (1½" stainless steel angle iron)
- 2 support arms
- Motor pulley and hub
- Prop shaft coupler
- Drive belt
- Hardware (see below): 1 tensioner bolt (longer bolt for top of plate), 3 motor bolts, 3 shaft keys (1 for motor, 2 for coupler), mounting hardware (4 sets of nuts and bolts to mount plate to angle mounts), angle anchors, tensioner assembly with rod end bolt.

*Note: Hardware to anchor the gear reduction assembly to your boat is not included.*

### ThunderStruck 5-10kW Gear Reduction Hardware



## Preparing for the Installation

This is a good time to replace your stuffing box and cutlass bearing before the motor is installed. If your cutlass bearing is worn out, your shaft may not be properly aligned, potentially causing noise and/or vibration while running.

Once installed, it is critical that the reduction drive shaft be correctly aligned with your existing prop shaft. *Before* removing the old engine, record where the shaft is, either by taking precise measurements, or by making an armature to hold the prop shaft in the original position. When initially positioning the motor plate, note that the tilt angle required to match the angle of the prop shaft is probably not vertical.

## Attaching the Reduction Plate

At the bottom of the plate are sets of holes on each side for attaching the 1 1/2" angle bracket mounts. These brackets will also be mounted onto your boat. The multiple pre-drilled holes will allow you to locate the plate at the right height, although you'll probably need to use some shims or washers to get the drive and prop shafts aligned.

Use a straightedge along the two shafts to confirm alignment (adjust your measurement if the two shafts have different diameters). Check along the top and side of the two shafts. Check again after mounting the motor as this may pull the plate to one side. Optionally, lay a straight section of angle iron on both shafts to verify alignment.

Position the reduction plate so that there is a 1/8" to 3/8" gap between the two shafts.

The best method for attaching the angle bracket mounts will depend on your available attach points. The simplest method is to drill a hole in the bottom of each angle bracket and attach with lag bolts directly into the old wooden engine blocks. For vibration isolation and better height adjustments, you may want to bolt the angle brackets to damped engine mounts.

**Note:** When drilling into stainless steel parts, drill steadily, use lubricant, and start with a small bit to get accurate hole placement. A good quality step drill can make this easier. You may choose to cut off any unused remaining length of the angle bracket mounts.

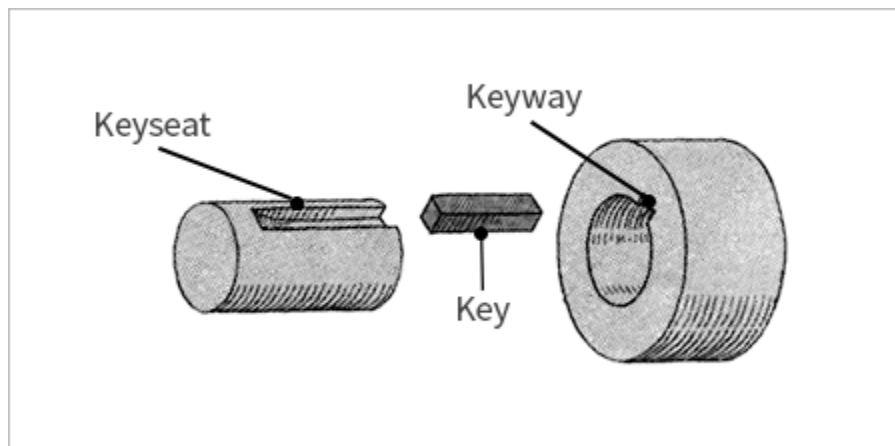
**Attaching the Support Arms:** At the top of the mounting plate are two blocks with 3/8" threaded holes. Attach the support arms to these blocks, using the provided brackets to anchor the other end of these supports to the hull structure. These arms will finalize the proper alignment angle.

After alignment tests, loosen mount bolts and support arms enough to install the prop shaft coupler onto the drive shaft. Tighten mount bolts for final alignment checks and coupler attachment.

## Aligning and Connecting the Drive Shaft to Prop Shaft

First, check that the prop shaft on your boat can be turned by hand. The double chain sprocket coupler connects the prop shaft to the reduction drive shaft, and allows for slight shaft misalignments.

With mounts and support arms tightened, verify alignment by sliding the coupler (without the keys) into position on both shafts. Rotate the prop shaft and coupler by hand to make sure everything turns easily and is lined up accurately. Turning difficulty or scraping indicates a misalignment, which can be corrected as discussed in the previous section.



The diagram above defines terms used while installing keys. Prop shafts with a keyseat will connect to the coupler with one setscrew over the key, and a second setscrew located 90 degrees from that point on the shaft. You must create a dimple in your prop shaft under the second setscrew. See the driveshaft we provide in the kit for an example. A drill bit can be used to create the dimple. File the shaft flat at the drill point so the drill will not slip off the shaft. The dimple will prevent the coupler from sliding fore and aft on the shaft.

If your shaft does not have a keyseat for a shaft key, an option is to drill a hole through the shaft and install a roll pin through both the coupler and shaft. To accomplish this, remove the coupler set screw and drill through the set screw hole into the shaft, all the way through. (This option requires precise drilling, and it can be difficult to drill through stainless steel).

Once the plate is mounted and supported, and the shafts are connected, installing the motor, pulley and belt is next.

## Installing the Motor, Pulley and Belt

**Installing the Motor:** First, loosely bolt the motor onto the mounting plate with motor hardware (4 bolts with lock and flat washers). Lock washers are placed onto the bolt first, and then the flat washers. The longer tensioner bolt runs through the eyelet in the tensioner assembly and is then hand tightened into the top motor attachment. Tighten the other 3 motor attachment bolts lightly to hold it in position and alignment.

**Mounting the Hub:** The pulley kit includes the hub, pulley and 3 hub bolts. Rotate the motor shaft so the keyseat is at the top, and lay the 3/16" key in the seat. Insert the bolts into back side of the *non-threaded* holes on the hub, then slide the hub onto your motor shaft with the key aligned with the keyway (**note:** it won't go on if you've already attached it to the pulley, which compresses the hub). If your hub is difficult to fit onto the shaft, try cleaning just the inside edge of the hub with a round file. **Do not** hammer the hub onto the shaft.

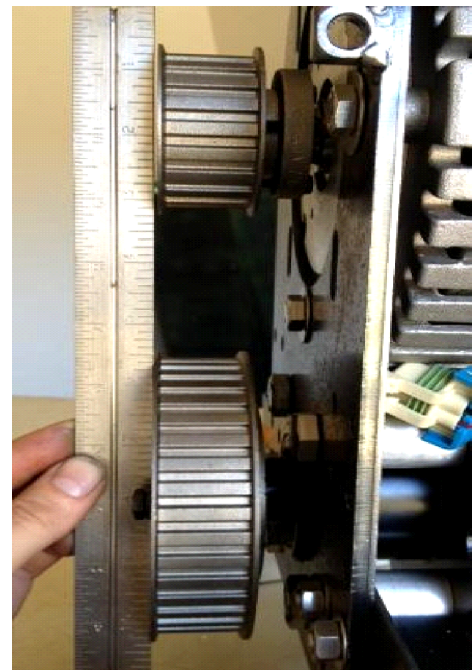
**Mounting the Pulley:** Next, mount the pulley onto the hub. Adjust the hub position so the motor pulley is lined up with the drive pulley (see image below). The 3 bolts will align with threaded holes in the pulley. The hub and bolt heads may be close to the motor face, so use a 7/16" open-end wrench to access the bolt heads.

Gently tighten the bolts to remove play in the assembly, and verify pulley position with a straightedge (image below). Note that the pulley will move a bit on the hub as it is tightened, but it does not need to compress all the way onto the hub. Tighten bolts about 1/4 turn at a time in sequence, so they all work together to pull the pulley onto the hub evenly. Each bolt is tightened several times since they loosen up as the others are tightened. The final torque is 36 in-lbs on all 3 bolts.

**Note:** If the 3 bolts are not tight enough, they may shear off from the twisting force between pulley and hub. Once tightened, the hub and pulley act as one and there is no twisting force on the bolts.

**Attaching the Belt:** Loosen the 4 motor attach bolts slightly so the motor can shift on the plate. Loosen the nut on the top of the tensioner and shift the motor down for belt installation. Slide the belt onto both pulleys.

To adjust, tighten the tensioner nut to lift the motor. Tighten the 4 motor attach bolts slightly and test belt tension by pushing on the belt halfway between the hub and pulley until you notice firm resistance. The proper tension will yield about 3/16" motion away from a straight line. With the correct tension, tighten the motor attach bolts to lock the motor in position.



## Removal and Reinstallation of the Lower Pulley

If you find it necessary to remove the lower pulley for a ratio change, *correct installation is critical.*

**Removal:** To remove the lower pulley, remove the three black screws and thread them into the other set of three holes, which will force the pulley off the hub. If also replacing the hub, remove the 5/16" end bolt and the set screw along the hub's circumference.

**Installation:** To reinstall, the hub should first be held on the shaft by the single 5/16" end bolt. Be aware of the rectangular machine key that's between the hub and shaft. Before installing the plate or motor, confirm that the lower bearing and shaft assembly is free spinning. A little resistance is okay. Take care not to over-tighten the end bolt to the point of compressing the bearings, as this will cause too much pressure on the bearings. There should be no wiggle in the shaft after the end bolt is snug. Next, tighten the set screw on this hub, then install the pulley and tighten the 3 taper lock screws, which will compress the hub onto the shaft (similar to installing the motor pulley and hub).

## After Installation is Complete - Maintenance Notes

When properly installed, all you should hear is a quiet hum of the motor. When first using your system, take note of any excessive noise, heat, vibration, or current draw. These can be signs of a misaligned or mispositioned shaft(s) or sprockets, or over-tightened bearings.

The lower bearing assembly comes pre-filled with grease, but there is a grease fitting which may need to be topped off periodically with NLGI #2 lithium complex grease if you notice any leaking over time. Be careful as over-filling will cause grease to come out of the hub near the pulley, which will need to be cleaned out.

The most common causes of belt slippage are misaligned pulleys and improper belt tension. We recommend periodic belt inspection to look for tears or fraying. Replace the belt if needed. Belt identification is printed on its external surface.

*We appreciate any feedback you have that will help us to improve our products or make the installation easier. Have fun and send us a photo of your completed boat kit!*

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