





Toughbox Micro Assembly Directions








Recommended Tool List

Component	Used On	Product Number	Product Photo
7/16 in. Nut Driver	8 mm Push On Retaining Ring	am-4438	
5/32 in. Hex Driver	10-32 Socked Head Cap Screws	am-2751	

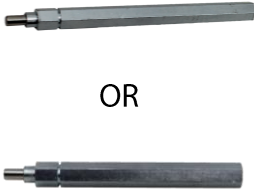

Common Toughbox Micro Components			
Component	Product Number	Qty	Product Photo
3/8 in. Round ID Flanged Shielded Bearing (FR6ZZ)	am-0028	1	
8 mm Push On Retaining Ring	am-0033	1	
14 Tooth 20 DP 8 mm Round Bore Steel Pinion Gear	am-0034	1	
50 Tooth 20 DP 0.375 in. Hex Bore Steel Gear	am-0149	1	
Toughbox Series 3/8 in. Hex Cluster Shaft	am-0152	1	
1/2 in. E-Clip	am-0206	1	
3/8 in. Round ID Shielded Bearing (R6ZZ)	am-0516	2	
8 mm Hardened Flat Washer	am-1009a	2	
10-32 Nylock Nut	am-1042	4	
10-32 x 0.75 in. Socket Head Cap Screw	am-1047	4	
10-32 x 0.625 in. Socket Head Cap Screw with Nylon Thread Lock Patch	am-1120	2	
2 x 2 x 10 mm Machine Key	am-1121	1	
Great Red Tacky Grease	am-2768	1	
Toughbox Micro Housing	am-3157	1	

Flat/Angle Plate Toughbox Micro Exclusive Components

Component	Product Number	Qty	Product Photo
1/2 in. Round ID Flanged Shielded Bearing (FR8ZZ)	am-0030	1	
Toughbox Series Short 1/2 in. Keyed Output Shaft with Magnet	am-0153a	1	
1/4 in. Flat Washer	am-1027	1	
1/4-20 x 0.5 in. Button Head Cap Screw	am-1039	1	
1/8 x 1/8 x 0.7 in. Machine Key	am-1043	1	
Toughbox Micro Angled Shaft Plate	am-3228	1	
OR	OR		OR
Toughbox Micro Flat Shaft Plate	am-3229		

Gearing Options Listed Below

No Plate Toughbox Micro Exclusive Components

Component	Product Number	Qty	Product Photo
Toughbox Series Long 1/2 in. Hex Steel Output Shaft with Magnet OR Toughbox Series 1/2 in. Hex Steel AM14U Family Output Shaft with Magnet	am-0801a OR am-2566a	1	
0.5 in. Hex ID 1.125 in. OD Shielded Flanged Bearing (FR8ZZ-HexHD)	am-2986	1	
Gearing Options Listed Below			

Toughbox Gear Pairs					
Ratio	Ratio Suffix	3/8 in. Hex Cluster Gear Product #	3/8 in. Hex Cluster Gear Description	1/2 in. Hex Output Gear Product #	1/2 in. Hex Output Gear Description
5.95:1	_595	am-0177	24 Tooth 20 DP 0.375 in. Hex Bore Steel Gear	am-0178	40 Tooth 20 DP 0.5 in. Hex Bore Steel Gear
7.31:1	_731	am-2564	21 Tooth 20 DP 0.375 in. Hex Bore Steel Gear	am-2565	43 Tooth 20 DP 0.5 in. Hex Bore Steel Gear
8.45:1	_845	am-0176	19 Tooth 20 DP 0.375 in. Hex Bore Steel Gear	am-0179	45 Tooth 20 DP 0.5 in. Hex Bore Steel Gear*
10.71:1	_107	am-0474	16 Tooth 20 DP 0.375 in. Hex Bore Steel Gear	am-0885	48 Tooth 20 DP 0.5 in. Hex Bore Steel Gear
12.75:1	_127	am-0151	14 Tooth 20 DP 0.375 in. Hex Bore Steel Gear	am-0150	50 Tooth 20 DP 0.5 in. Hex Bore Steel Gear*

* These gears have aluminum versions available for lighter weight options as am-2035 and am-0521 respectively. The large cluster gear am-0149 can also be replaced with an aluminum gear, am-0143.

STOP AND READ BEFORE ASSEMBLY:

There are five possible gear pairs to be made in a Toughbox Micro. These directions illustrate only the 10.71:1 version, however all of the gear related steps are the same. For that reason, gears in these directions are referenced by their location, not by the specific gear.

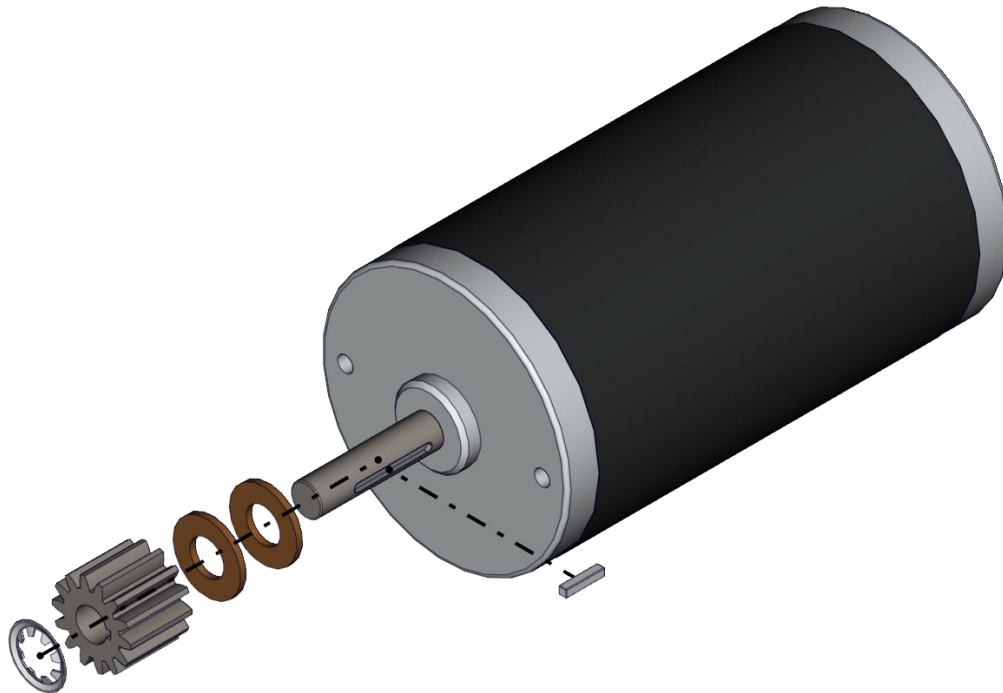
Some of these gears have optional aluminum replacements for those trying to reduce overall gearbox weight.

The gears in the Toughbox gearboxes have a protrusion, called a boss, on one side. These bosses will always point towards a bearing. If after assembly your gearbox has odd noises or spins less freely than expected, double check the bosses.

Motor Assembly

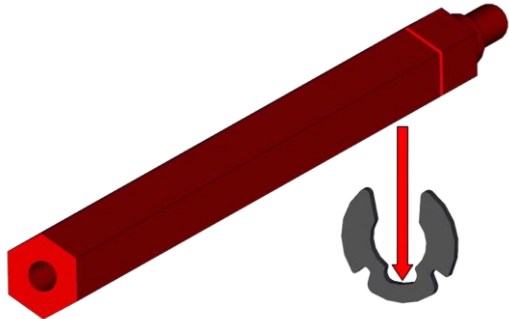
CIM Motors are the typical motor used in Toughbox Micro Gearboxes. NEO Brushless motors may also be installed, using the same motor hardware provided. Other motors will require additional and or different hardware.

CIM Motor Assembly: Place two 8 mm Hardened Flat Washers (am-1009a) onto the CIM shaft. Insert a 2 x 2 x 10 mm Machine Key (am-1121) into the keyway. Line the up with the 14 Tooth 20 DP 8 mm Round Bore Steel Pinion Gear (am-0034) with the key and slide it onto the motor shaft. Lastly, secure these components on the motor shaft by pressing the 8 mm Push On Retaining Ring (am-0033) onto the shaft with a 7/16 in. Nut Driver (am-4438).

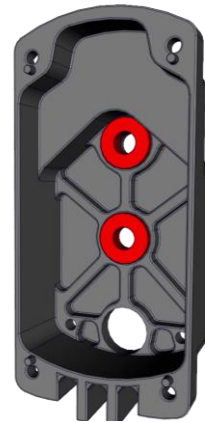


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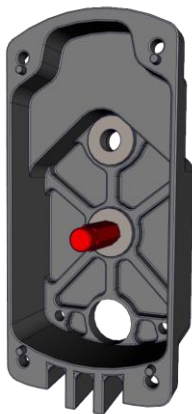
Step 1: Place 1/2 in. E-Clip Ring (am-0206) on a hard surface with the opening facing up. Set the groove of the output shaft onto the E-Clip and force the Clip around the shaft. A soft hammer may be used on the shaft. This step applies to any output shaft.



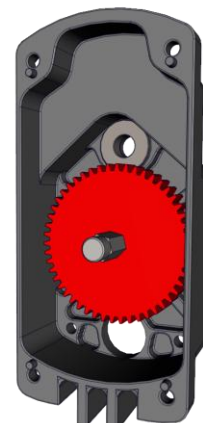
Step 2: Place two 3/8 in. Round ID Shielded Bearing (am-0516) into the small holes of the ToughBox Micro Housing (am-3157.)



Step 3: Insert the Toughbox Series 3/8 in. Hex Cluster Shaft (am-0152) into the bearing in the middle of the housing.



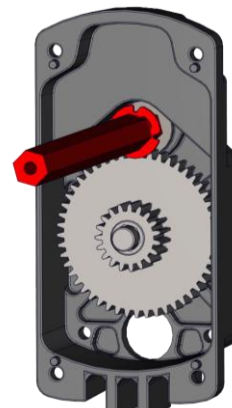
Step 4: Install 50 Tooth 20 DP 0.375 in. Hex Bore Steel Gear (am-0149) onto the shaft with the boss facing the bearing.



Step 5: Place the smaller 3/8 in. Hex Bore Gear onto the Toughbox Series 3/8 in. Hex Cluster Shaft with the boss facing .

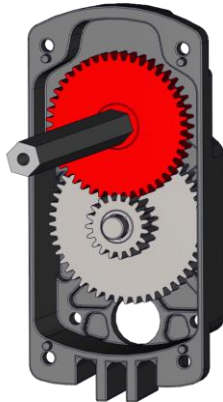


Step 6: Insert the Output Shaft-Clip Assembly into the unoccupied bearing hole.



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Step 7: Place the 1/2 in. Hex Bore gear onto the output shaft with the boss facing towards you.



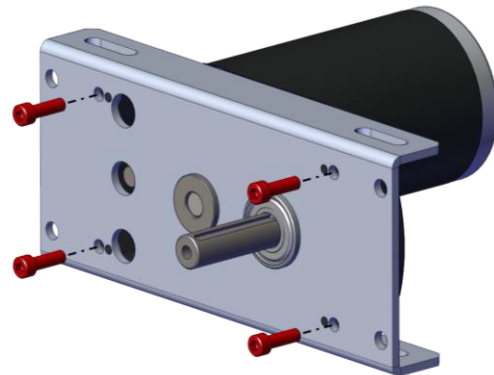
Step 8: Insert a Motor Assembly into the open hole, and secure it with two 10-32 x 0.625 in. Socket Head Cap Screws with Nylon Thread Lock Patch (am-1120).



Step 9: Insert the four 10-32 Nylock Nuts (am-1042) into the nut pockets in the Toughbox Micro Housing



Step 10: Use the four 10-32 x 0.75 in. Socket Head Cap Screws (am-1047) to secure the ToughBox Micro Assembly to an Angled Plate, Flat Plate, or AM14U3, U4, or U5 Inside Plate



Step 11: Run the motor for several minutes to break in the gear pairs. Remove the Toughbox Micro from the plate, grease all gears, and reattach the gearbox to its' plate.

