

WP0264

Dodge® Torque-Arm family: tie rods

Dodge Customer/Order Engineering

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When a gearbox is installed directly onto the driven shaft of a conveyor or bucket elevator, there must be something that prevents the whole gearbox from rotating around when the motor is started. One way to do this is with a tie rod assembly. It can also be referred to as a torque arm. This arrangement will assure that the output torque of the gearbox will drive the shaft it is mounted on, not cause the gearbox to spin around.

For TXT, TALI, and MTA reducers, the tie rod assembly will be made up of the following components (see **Figure 1**):

1. Housing Brackets – brackets bolted to the reducer that connect to the rod end
2. Bushing – bushing in eye of rod end that allows some reducer movement
3. Rod End – right handed threaded rod with eye that ties to mounting brackets
4. Turnbuckle with Tightening Nuts – provides up to 6” of take-up and connects rod end to extension, can also be used to tighten a V-belt drive in some setups
5. Extension – left handed threaded rod with eye that ties to fulcrum
6. Fulcrum – connection point to support structure
7. Additional Hardware – bolts, nuts, and washers to connect tie rod to fulcrum and to reducer

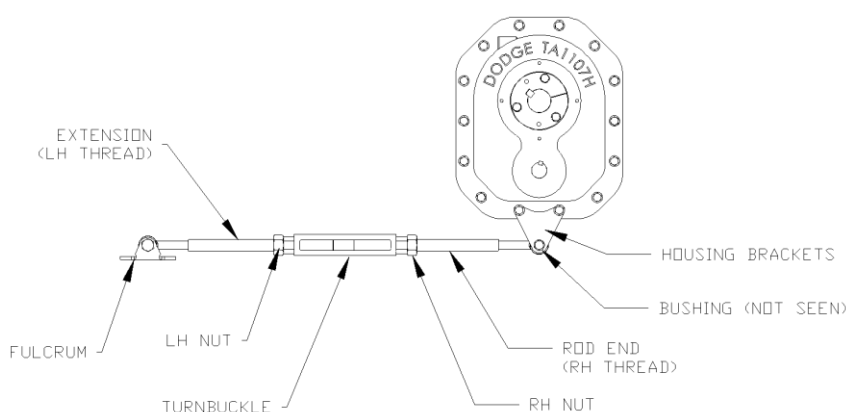


Figure 1. Tie Rod Components

Dodge tie rods can be mounted in either tension or compression. Tension is preferred so that the tie rod does not buckle under the resultant force. The way to determine if the tie rod is in either tension or compression is to first determine which way the output hub of the gearbox is rotating. The resultant reaction will want to turn the gearbox in the other direction. The way the tie rod is mounted will determine if it is in tension or compression. See **Figures 2 and 3** for examples.

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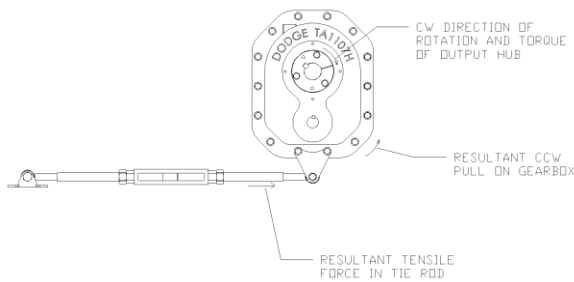


Figure 2. Tie Rod in Tension

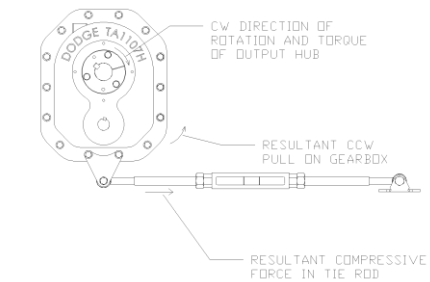
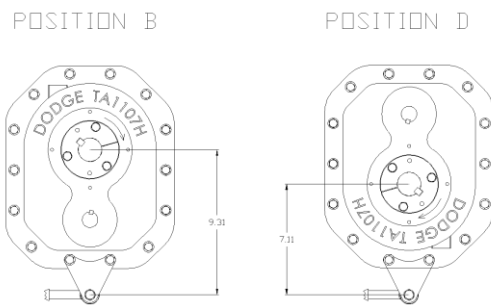


Figure 3. Tie Rod in Compression

The distance from the output hub to where the tie rod connects to the housing bracket is also important. The larger the distance this is, the lower the reaction force will be for the same amount of output torque. It is good practice to try and keep this distance as large as possible. To help with this, the reducer may need to be rotated (See **Figure 4**).



THE SHORTER DISTANCE FROM POSITION D RESULTS IN A 24% INCREASE IN REACTION LOAD OVER POSITION B.

Figure 4. Distance from Output Hub to Tie Rod Connection

Another factor that comes into play is the angle that is created by the tie rod centerline and an imaginary line from the output hub to the tie rod connection point on the housing brackets. This angle needs to be as close to 90 degrees as possible. The further you get away from 90 degrees, the larger the resultant force in the tie rod and bracket will be. Dodge does allow +/- 20 degrees from this angle on the Torque-Arm Family of reducers. See **Figure 5** for correct tie rod angles. **Figure 6** shows some incorrect tie rod angles.

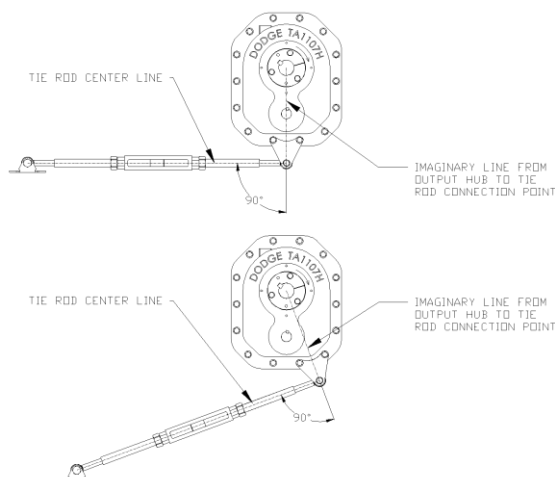


Figure 5. Correct Tie Rod Angles

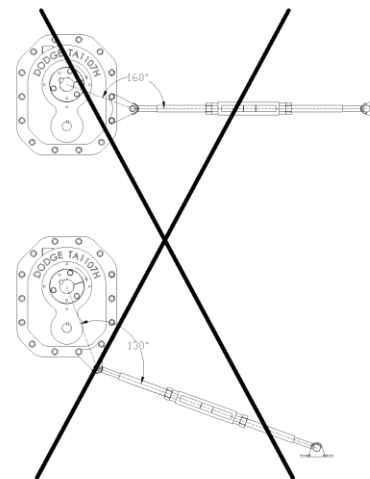


Figure 6. Incorrect Tie Rod Angles

As the gearbox size increases, its output torque capability increases. Therefore, the tie rod size must increase as well. **Table 1** shows the rod and extension thread sizes for the Torque-Arm family of products.

TIE ROD THREAD SIZE	TXT REDUCER SIZE	TAII REDUCER SIZE	MTA REDUCER SIZE
5/8 - 11UNC	TXT1	TA0107, TA1107	---
3/4 - 10UNC	TXT2, TXT3	TA2115, TA3203	MTA2115, MTA3203
7/8 - 9UNC	TXT4, TXT5, TXT6	TA4207, TA5215	MTA4207, MTA5215
1 - 8UNC	TXT7	TA6307	MTA6307
1 1/4 - 7UNC	TXT8, TXT9, TXT10	TA7315, TA8407	---
1 1/2 - 6UNC	TXT12, TDT13	TA9415, TA10507	MTA7315, MTA8407
1 3/4 - 5UNC	TDT14	TA12608	---
2 - 4.5UNC	TDT15	---	---

Table 1. Torque-Arm Family Tie Rod Thread Sizes