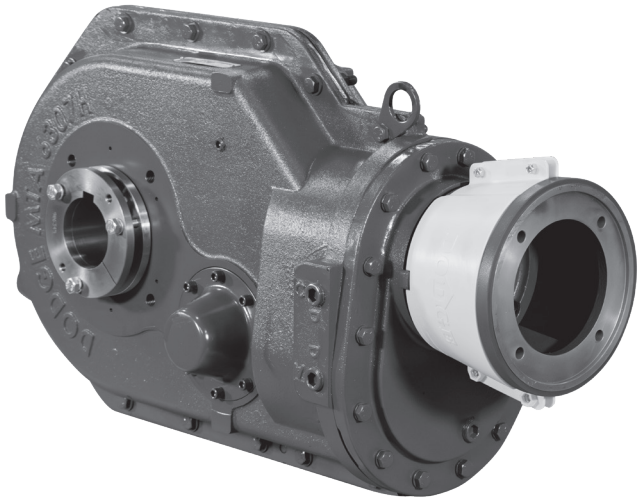
Motorized Torque-Arm II Speed Reducers
MTA2-MTA12 C-Faced Coupled
Instruction Manual

These instructions must be read thoroughly before installation or operation. This instruction manual was accurate at the time of printing. Please see **dodgeindustrial.com** for updated instruction manuals.

WARNING: To ensure the drive is not unexpectedly started, turn off and lock-out or tag-out power source before proceeding. Failure to observe these precautions could result in bodily injury.

NOTE: This reducer is compatible with Dodge® sensors, that can be installed in the adapter plug. The plug and sensor can be moved to different locations as required by mounting position.



WARNING: Because of the possible danger to person(s) or property from accidents which may result from the improper use of products, it is important that correct procedures be followed. Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions in the instruction manuals must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. Proper guards and other suitable safety devices or procedures as may be desirable or as may be specified in safety codes should be provided, and are neither provided by Dodge nor are the responsibility of Dodge. This unit and its associated equipment must be installed, adjusted and maintained by qualified personnel who are familiar with the construction and operation of all equipment in the system and the potential hazards involved. When risk to persons or property may be involved, a holding device must be an integral part of the driven equipment beyond the speed reducer output shaft.

WARNING: All products over 55 lb (25 kg) are noted on the shipping package. Proper lifting practices are required for these products.

INSTALLATION OF OPEN MOTOR ADAPTER AND WRAP COUPLING (NEMA 180TC-405TC)

1. Use lifting bracket(s) to lift reducer onto worktable and secure reducer to prevent movement.
2. Inspect coupling components and remove any protective coatings/lubricants from bored, mating surfaces, and fasteners.
3. Install the reducer hub with the key so that the main body of the hub is flush with the end of the reducer shaft and tighten the two set screws per Table 2.
   NOTE: The NEMA 360TC–405TC motor adapters will attach to the reducer first, followed by the reducer coupling hub (steps 5,7-8 followed by steps 2-4,6). All other NEMA frame sizes will follow the steps in order below.
4. Inspect the motor adapter and reducer to ensure there are no burrs or debris present on the contact surfaces of each part.
5. Install the gasket between the reducer and motor adapter. To help prevent pinching the gasket, place and align the gasket onto the motor adapter face. A small amount of grease or other suitable product can be placed on the gasket in two or four locations to temporarily hold the gasket in place.
6. Install the coupling cover over the coupling hub.
7. Lift the motor adapter using lift-assist equipment and position the motor adapter onto the reducer and secure using the supplied hardware.
   NOTE: The NEMA 180TC–280TC motor adapters attach to the reducer using four bolts and four lock washers, and the NEMA 320TC–405TC motor adapters attach to the reducer using eight bolts and eight lock washers.
8. Torque motor adapter to reducer bolts per Table 1a or 1b.

Table 1a – Motor Adapter to Reducer Tightening Torque – NEMA

Motor Adapter	Fastener Size	Bolt Tightening Torque
All NEMA Sizes	1/2—13	75 lb-ft (102 N-m)

Table 1b – Motor Adapter to Reducer Tightening Torque – IEC

Motor Adapter	Fastener Size	Bolt Tightening Torque
90—225S	1/2—13	75 lb-ft (102 N-m)
250—280S	5/8—11	115 lb-ft (156 N-m)

Table 2 – Reducer Wrap Coupling Set Screw Tightening Torque

Reducer Case Size	Set Screw Size	Bolt Tightening Torque
2115H—3203H	1/4-20NC	87 lb-in (9.8 N-m)
4207H—6307H	5/16-18NC	165 lb-in (19 N-m)
7315H—10507H	3/8-16NC	290 lb-in (33 N-m)
12608H	1/2-13NC	620 lb-in (70 N-m)

9. Install the coupling cover over the coupling hub.
10. Install the motor hub with the key. Do not tighten set screw(s). For 210TC and 360TC use the key provided with the input adapter kit. For 210TC, 250TC,320TC, 360TC, and 405TC make sure the key is flush with the main body of the hub.
11. Install the gasket between the motor and motor adapterflange. To help prevent pinching the gasket, place and align the gasket onto the motor adapter face. A small amount of grease or other suitable product can be placed on the gasket in two or four locations to temporarily hold the gasket in place.
12. Lift the motor using lift-assist equipment and position the motor adapter onto the reducer and secure using the supplied hardware.
13. Install and tighten the motor bolts. Torque motor bolts per Table 4a.
14. Set clearance between coupling hubs at 0.078 in and tighten the two set screws per Table 3.

Table 3 – Motor Wrap Coupling Set Screw Tightening Torque

Motor Size	Set Screw Size	Bolt Tightening Torque
180TC	5/16-18NC	165 lb-in (19 N-m)
210TC-280TSC	3/8-16NC	290 lb-in (33 N-m)
280TC-405TSC	1/2-13NC	620 lb-in (70 N-m)
405TC	5/8-11NC	1325 lb-in (150 N-m)

15. Rotate the hubs so that the teeth of both hubs are aligned. Spread apart the element so that it will fit over the hub teethand “wrap” the element between the two hubs.
16. Install the coupling cover with screws in line with the holes in the element and tighten two coupling cover screws. For nylon covers, install fasteners until “snug tight” only. For steel covers, install fasteners until “snug tight” plus 1/8 turn.
17. Install two bolts into the two halves of the motor adapter cover.
18. Install two halves of the motor adapter cover onto the motor adapter. Align the notches in the cover halves with the alignment tabs on the motor adapter. See Figure 2. Install and hand tighten the four lock nuts onto the bolts.

Table 4a – Motor Bolt Tightening Torque – NEMA

NEMA Motor Frame	Motor Bolt	Bolt Tightening Torque
56C—140TC	3/8—16	26 lb-ft (36 N-m)
180TC—280TC	1/2—13	75 lb-ft (102 N-m)
320TC—405TC	5/8—11	115 lb-ft (156 N-m)

Table 4b – Motor Bolt Tightening Torque – IEC

IEC Motor Frame	Motor Bolt	Bolt Tightening Torque
90	M10	39 lb-ft (53 N-m)
100—132	M12	68 lb-ft (92—90 N-m)
160—280S	M16	158 lb-ft (214 N-m)

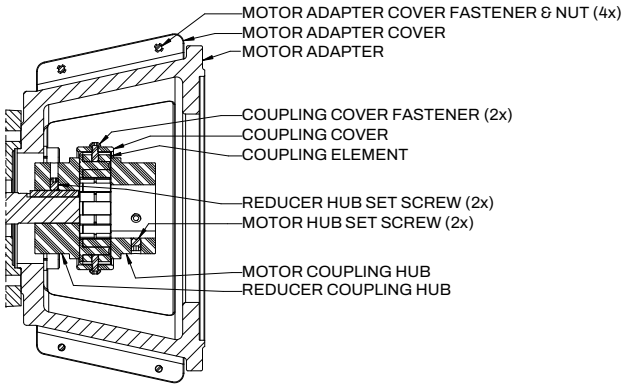


Figure 1 - Motor/Reducer Coupling Assembly

Figure 2 - Cover Notch Aligned with Adapter Tab

19. Carefully tighten the nuts until the rubber gaskets are compressed and the plastic covers fully contact the motor adapter. Be careful not to over-tighten the bolts as it could possibly damage the cover.

INSTALLATION OF CLOSED MOTOR ADAPTER AND 3-PIECE COUPLING (NEMA 56C–250TC, IEC 90–180)

1. Use lifting bracket to lift reducer onto worktable and secure reducer to prevent movement.
2. Inspect coupling components and remove any protective coatings/lubricants from bores, mating surfaces, and fasteners.
3. Install the reducer hub with the key so that the main body of the hub is flush with the end of the reducer shaft and tighten the set screw(s) using Table 5a/5b. Please note that some sizes utilize two set screws to hold the hub to the shaft.

Table 5a – Three-Piece Coupling Set Screw Tightening Torque – NEMA (lb-in)

	Reducer Case Size		
Motor Adapter	2115H–3203H	4207H–6307H	7315H–12608H
56C—140TC	225	-	-
180TC—280TC	225	260	260
320TSC—360TSC	-	260	260
320TC—360TC	-	540	540
405TSC—405TC	-	-	540

Table 5b – Three-Piece Coupling Set Screw Tightening Torque – IEC (N-m)

Motor Adapter	Reducer Case Size	
	2115H–3203H	5215H–8407H
90	25	-
100, 112, 132, 160	25	29
180	-	29
200, 225, 225S	-	61
250, 250S, 280, 280S	-	31

4. Inspect the motor adapter and reducer to ensure there are no burrs or debris present on the contact surfaces of each part.
5. Install the gasket between the reducer and motor adapter. To help prevent pinching the gasket, place and align the gasket onto the motor adapter face. A small amount of grease or other suitable product can be placed on the gasket in two or four locations to temporarily hold the gasket in place.
6. Position motor adapter onto the reducer and secure using the supplied hardware.

   NOTE: The NEMA 56C–250TC and IEC 90–180 motor adapters attach to the reducer using four bolts and four lock washers.
7. Torque motor adapter to reducer bolts per Table 1a/1b.
8. Install the motor hub with the key so that the main body of the hub is flush with the end of the motor shaft. Do not tighten set screw(s).
9. Insert the elastomeric center element into the reducer coupling hub.
10. Install the gasket between the motor and motor adapter flange. To help prevent pinching the gasket, place and align the gasket onto the motor adapter face. A small amount of grease or other suitable product can be placed on the gasket in two or four locations to temporarily hold the gasket in place.
11. Lift the motor using lift-assist equipment and align the jaws of both coupling hubs so that they will interlock when the motor is installed.
12. Lift the motor using lift-assist equipment and align the jaws of both coupling hubs so that they will interlock when the motor is installed.
13. Install the motor by aligning the motor tenon and reducer tenon and sliding the motor forward until it stops against the reducer flange.
14. Install and tighten the motor bolts. Torque motor bolts per Table 4a/4b.
15. Look through the access hole on the motor adapter and verify that the coupling faces are in full contact with the elastomeric element—without any preload on the element.
16. Tighten the motor-half set screw. Torque set screw(s) per Table 5a/5b.

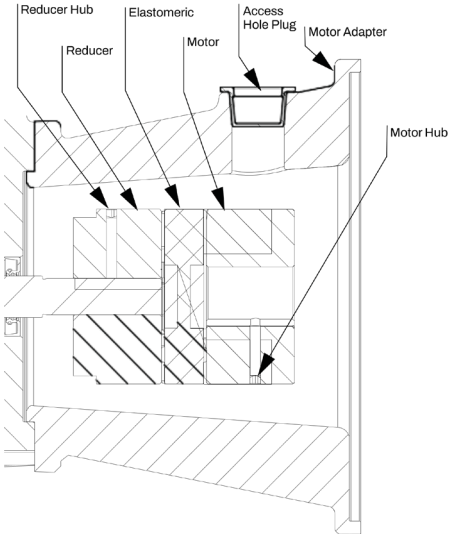


Figure 3 - Closed Motor Adapter and 3-Piece Coupling Assembly (NEMA 56-NEMA 140, IEC 90-280S)

17. Install the access hole plug(s) into motor adapter.

INSTALLATION OF CLOSED MOTOR ADAPTER AND 3-PIECE COUPLING (NEMA 280TC–405TC, IEC 200–280)

1. Use a lifting bracket to lift reducer onto worktable and secure reducer to prevent movement.
2. Inspect the motor adapter and reducer to ensure there are no burrs or debris present on the contact surfaces of each part.
3. Install the gasket between the reducer and motor adapter. To help prevent pinching the gasket, place and align the gasket onto the motor adapter face. A small amount of grease or other suitable product can be placed on the gasket in two or four locations to temporarily hold the gasket in place.
4. Position the motor adapter onto the reducer and secure using the supplied hardware.

   NOTE: The NEMA 280TC motor adapter attaches to the reducer using four bolts and four lock-washers, and the NEMA 320TC–405TC and IEC 200–280 motor adapters attach to the reducer using eight bolts and eight lock washers.
5. Torque motor adapter to reducer bolts per Table 1a/1b.
6. Inspect coupling components and remove any protective coatings/lubricants from bores, mating surfaces, and fasteners.
7. Install the reducer hub with the key so that the main body of the hub is flush with the end of the reducer shaft and tighten the set screw(s) using Table 5a/5b. Please note that some sizes utilize two set screws to hold the hub to the shaft.
8. Install the motor hub with the key so that the main body of the hub is flush with the end of the motor shaft. Do not tighten set screw(s).
9. Insert the elastomeric center element into the reducer hub.
10. Install the gasket between the motor and motor adapter flange. To help prevent pinching the gasket, place and align the gasket onto the motor adapter face. A small amount of grease or other suitable product can be placed on the gasket in two or four locations to temporarily hold the gasket in place.
11. Lift the motor using lift-assist equipment and align the jaws of both coupling hubs so that they will interlock when the motor is installed.
12. Install the motor by aligning the motor tenon and reducer tenon and sliding the motor forward until it stops against the

reducer flange.

13. Install and tighten the motor bolts. Torque motor bolts per Table 4a/4b.
14. Look through the access hole on the motor adapter and verify that the coupling faces are in full contact with the elastomeric element—without any preload on the element.
15. Tighten the motor-half set screw(s). Torque set screw(s) per Table 5a/5b.
16. Install the access hole plug(s) into motor adapter.

INSTALLATION

1. Use a lifting bracket to lift reducer.
2. Determine the running positions of the reducer. Although the reducer may be operated in any position, the preferred mounting position is with the motor in the horizontal position (Position C) as shown in Figure 4. Position B is not recommended. Note that the reducer is supplied with seven plugs: four around the sides for horizontal installations, two plugs on the front face, and one plug on the back face for vertical installations. These plugs must be arranged relative to the running positions as follows:

   Horizontal Installations—Due to the many positions the MTA reducer may be oriented, the factory-installed positions of the magnetic plug and breather may need to be relocated. The proper location for the magnetic plug is the hole closest to the bottom of the reducer. The filter breather is to be installed in the uppermost hole. Of the two remaining plugs on the sides of the reducer, the highest plug is the minimum oil level plug as shown in Figure 4.

   In Position D a Position D Breather Kit (part number 472300) and a Motor Drip Cover (consult motor manufacturer) must be used.

   Vertical Installations—Install the filter breather plug in the hole provided in the upper face of the reducer housing. If space is restricted, the breather should be installed in the highest hole on the side of the reducer. Install a non-magnetic plug in the hole in the bottom face of the reducer. Do not install the magnetic plug in the bottom face. The magnetic plug should be located in the lowest level side hole. The highest level side plug is to be the minimum oil level plug.

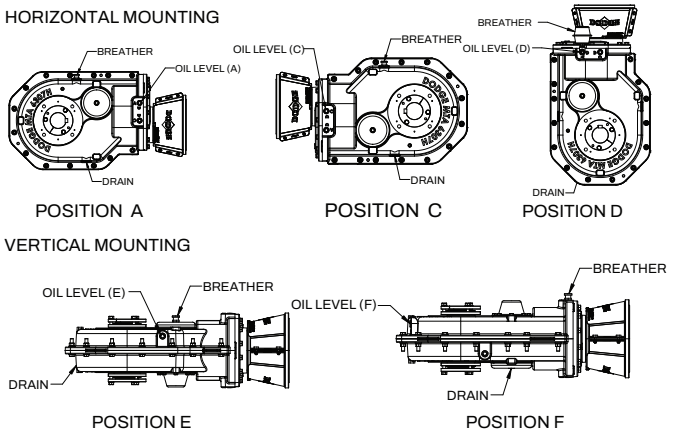


Figure 4 - Mounting Positions, C-Face

3. Mount the reducer on the driven shaft per instruction in the bushing installation manual.
4. Mount the tie rod as follows:
   MTA 2–8: Reusing the existing reducer bolts, install the adapter plates in any suitable location on the flange of the reducer. Mount the rod assembly with the hardware included with the rod kit.
   MTA 9–12: Assemble the tie rod extension beam to the reducer per instruction in the tie rod support beam installation section of this manual.
5. Install the Torque-Arm fulcrum on a flat and rigid support so that the torque arm will be approximately at right angles to the centerline through the driven shaft and the torque arm anchor screw, as shown in Figure 5.

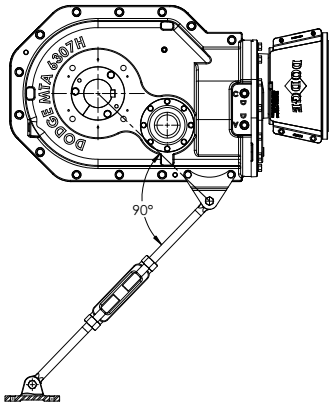


Figure 5 - Tie Rod Mount

CAUTION: Unit is shipped without oil. Add the proper amount of recommended lubricant before operating. Failure to observe this precaution could result in damage to or destruction of the equipment.

MOTORIZED TORQUE-ARM II TIE ROD SUPPORT BEAM INSTALLATION

Motorized Torque-Arm II reducer sizes 9, 10, and 12 are designed to be used with a tie rod support beam that extends to a location further from the driven shaft that would have been possible with a standard flange-mounted tie rod. The increased mounting distance reduces system reaction forces on the driven shaft. Use of a flange-mounted tie rod for sizes 9, 10, and 12 is not recommended.

BEAM SUPPORTED TIE ROD INSTALLATION

1. To install the beam to the reducer, use appropriate lifting equipment properly designed to safely lift the beam into position. The beam should extend toward the motor end of the reducer, Figure 7. Improper mounting direction (Figure 8) will result in increased forces on the driven shaft and may result in damage to the gearbox or the driven equipment.
2. Assemble the beam to the reducer as shown in Figure 6 using the hardware specified in Table 6, tightening each bolt lightly.
3. Align the beam with the housing flange and torque the bolts to the values shown in Table 6.
4. Install one torque-arm fulcrum to the end of the beam using the appropriate hardware and torque values as specified in Table 6.
5. Install the other torque arm fulcrum to a flat and rigid support. The torque arm should be vertical and perpendicular to the support beam. Failure to follow these guidelines may result in damage to the gearbox or the driven equipment.

Table 6 – Tie Rod Beam Bolt Tightening Torque

Joint	Fastener Size	Torque (lb-ft)
Reducer	1 ¼ - 7 x 3.25	840
Torque-Arm Fulcrum	M20-2.5 x 80	240

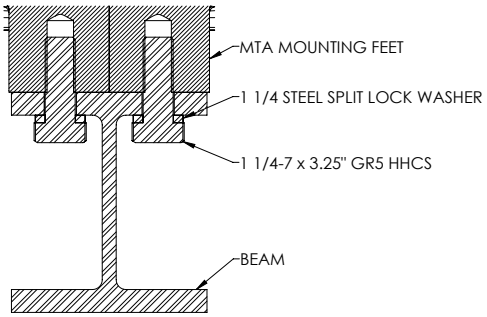
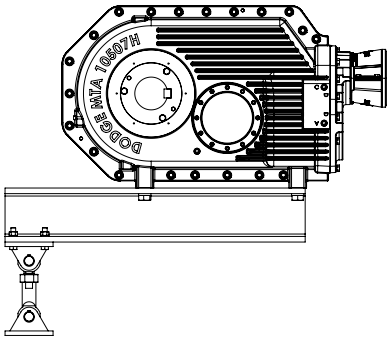
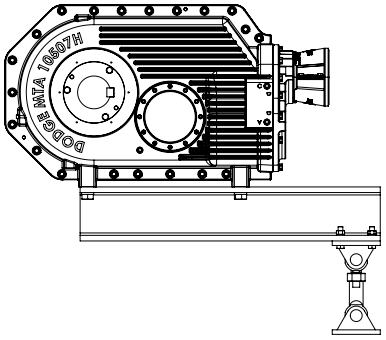


Figure 6 - Beam to Reducer Assembly Hardware





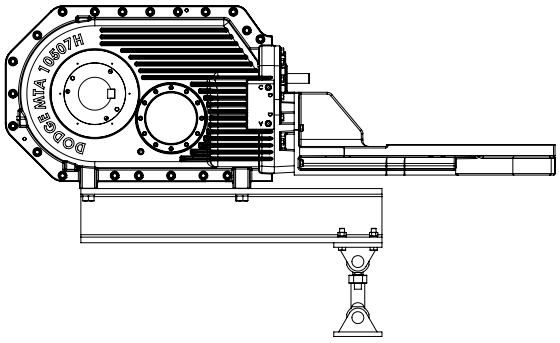


Figure 7 - Beam Mounted Correctly

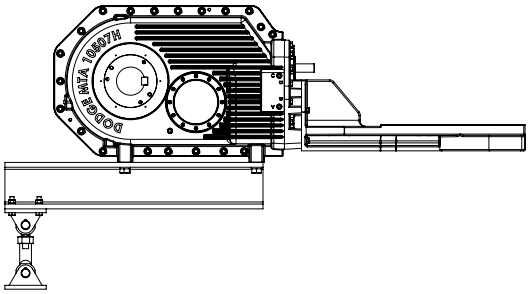


Figure 8 - Beam Mounted Incorrectly

LUBRICATION

NOTE: Because the reducer is shipped without oil, it is necessary to add the proper amount of oil before operating the reducer. Use a high-grade petroleum base rust and oxidation inhibited (R&O) gear oil–see tables. Follow instructions on reducer warning tags, and in the installation manual.

Under average industrial operating conditions, the lubricant should be changed every 2,500 hours of operation or every six months, whichever occurs first. Drain reducer and flush with kerosene, clean magnetic drain plug, and refill to the proper level with new lubricant.

After an initial operation of about two weeks, the oil should be changed. If desired, this oil may be filtered and reused. Very often, small metal particles will show up in the oil due to the wearing-in process. After the initial break-in period, the lubricant should be drained, the magnetic drain plug cleaned, and the gear case flushed and refilled every 2,500 hours of operation under average industrial conditions.

CAUTION: Too much oil will cause overheating and too little will result in gear failure. Check the oil level regularly. Failure to observe this precaution could result in damage to the reducer.

Under extreme operating conditions, such as the rapid rise and fall of temperature, dust, dirt, chemical particles, chemical fumes, or oil sump temperatures above 200 °F (90 ºC), the oil should be changed every one to three months, depending on the severity of conditions.

Table 7 - Approximate Oil Volumes

Case Size	Oil Volume in Quarts ①②③④⑤⑥						Oil Volume in Liters ①②③④⑤⑥					
	Horizontal				Vertical		Horizontal				Vertical	
	A	B	C	D	E (Up)	F (Down)	A	B	C	D	E (Up)	F (Down)
MTA2115H	4-1/4	⑤	3-5/8	7	5-3/8	5-5/8	3-3/4	⑤	3-1/2	6-5/8	5	5-3/8
MTA3203H	6-3/8	⑤	4-3/8	9-3/4	7-3/8	7-5/8	6	⑤	4-1/8	9-1/4	7	7-1/8
MTA4207H	8-1/4	⑤	6-3/4	13-1/8	9-1/4	9-5/8	7-7/8	⑤	6-3/8	12-3/8	8-7/8	9-1/8
MTA5215H	14	⑤	10-1/8	21	16	16-7/8	13-1/4	⑤	9-5/8	20	15-1/8	16
MTA6307H	18-3/8	⑤	15-3/8	30-1/8	23-1/2	24-7/8	17-3/8	⑤	14-1/2	28-1/2	22-1/4	23-1/2
MTA7315H	25	⑤	19-5/8	38-1/4	23-1/4	26-1/2	23-5/8	⑤	18-1/2	36-1/2	22	25-1/8
MTA8407H	29-1/8	⑤	22-5/8	52	31-3/4	31-3/4	27-5/8	⑤	21-3/8	49-1/4	30	30
MTA9415H	46	⑤	36	65	56	53-5/8	43-1/2	⑤	34	61-1/2	53	50-3/4
MTA10507H	59-5/8	⑤	50-1/2	105	63	61-1/4	56-1/2	⑤	47-3/4	99-3/8	59-5/8	58
MTA12608H	99 5/8	⑤	90	143-1/4	104	99-1/8	94-1/4	⑤	67-3/4	136	98-3/8	93-3/4

① Refer to Figure 4 for mounting positions.
② Oil quantity is approximate. Service with lubricant until oil runs out of the oil level hole as indicated per drawings in Figure 4.
③ US measure: 1 quart = 32 fluid ounces = 0.95 liters
④ Below 15 RPM output speed, the oil level must be adjusted to reach the highest oil level plug. If the reducer position is to vary from those shown in Figure 4, either more or less oil may be required. Consult Dodge Gearing Application Engineering.
⑤ Position B is not shown OR recommended, check with the factory.
⑥ Position D breather kit (Part Number 472300) configuration should be used for best lubrication and oil level results.

Table 8 - Oil Recommendations

ISO Grades For Ambient Temperatures of 50 °F to 125 °F (10 °C to 52 °C)							
Output RPM	Torque-Arm II Reducer Size						
	MTA2115H	MTA3203H	MTA4207H	MTA5215H	MTA6307H	MTA7315H	MTA8407H
151 – 200	320	220	220	220	220	220	220
126 – 150	320	220	220	220	220	220	220
101 – 125	320	320	220	220	220	220	220
81 – 100	320	320	320	220	220	220	220
41 – 80	320	320	320	220	220	220	220
11 – 40	320	320	320	320	320	320	320
1 – 10	320	320	320	320	320	320	320

ISO Grades For Ambient Temperatures of 15 °F to 60 °F (-9 °C to 16 °C)							
Output RPM	Torque-Arm II Reducer Size						
	MTA2115H	MTA3203H	MTA4207H	MTA5215H	MTA6307H	MTA7315H	MTA8407H
151 – 200	220	150	150	150	150	150	150
126 – 150	220	150	150	150	150	150	150
101 – 125	220	220	150	150	150	150	150
81 – 100	220	220	220	150	150	150	150
41 – 80	220	220	220	150	150	150	150
11 – 40	220	220	220	220	220	220	220
1 – 10	220	220	220	220	220	220	220

Notes:
1. Assumes auxiliary cooling where recommended in the catalog.
2. Pour point of lubricant selected should be at least 10°F (6°C) lower than expected minimum ambient starting temperature.
3. Extreme pressure (EP) lubricants are not necessary for average operating conditions. When properly selected for specific applications, Torque-Arm II backstops are suitable for use with EP lubricants.
4. Special lubricants may be required for food and drug industry applications where contact with the product being manufactured may occur. Consult a lubrication manufacturer's representative for his recommendations.
5. For reducers operating in ambient temperatures between -22 °F (-30 °C) and 20 °F (–6.6 °C) use a synthetic hydrocarbon lubricant, 100 ISO grade or AGMA 3 grade (for example, Mobil SHC 627). Above 125°F (51 °C), consult Dodge Gear Application Engineering (864) 288-9050 for lubrication recommendation.
6. Mobil SHC 630 Series oil is recommended for high ambient temperatures.

STARTUP

CAUTION: Do not operate the unit with caps, covers, or guards missing

After the installation of the Motorized Torque-Arm II drive unit is completed, check the following to ensure safe operation of each Motorized Torque-Arm II drive.

1. Check the couplings connecting the drive motor to the Motorized Torque-Arm II for proper alignment.
2. Check all mounting bolts, nuts, and screws to be sure they are tight.
3. Check the direction of rotation of all components.
4. Ensure that the breather, access covers, and coupling guards are in place and secured.
5. Check that the oil is up to the correct oil level hole.
6. If equipped, operate the Motorized Torque-Arm II cooling pump to circulate lubricating/cooling oil through the system. Purge air from the pump housing volute by loosening the plug at the top portion of the volute. Check the oil level again to be sure the oil is at the correct level with the pump running.

IMPORTANT: Lubricant level checks should be done with the reducer not running, the reducer cool and the cooling pump running, if equipped.

7. If the Motorized Torque-Arm II has an external backstop, check that the direction of rotation of the backstop and output drive shaft is the same.

PREVENTIVE MAINTENANCE

All maintenance and repair work should be carried out by trained personnel. Perform the following maintenance at the recommended intervals.

First day of operation

- Check oil temperature - Sump temperature will *vary* based on operating conditions and cooling method. The gearbox is designed for a maximum oil sump temperature of 200 °F (93 °C). For water-cooled heat exchangers, the water flow rate can be adjusted to obtain the desired temperature. Flow rates in the higher range will reduce the oil sump temperature. Check with the cooler manufacturer to determine the allowable flow rates through the cooler.
- Check for changes in noise level
- Check for oil leaks

After the first two weeks or 300 hours of operation

- Check oil for water content

- Change oil
- Check mounting hardware is tight
- Check for oil leaks
- Clean and reinstall the magnetic drain plugs

Monthly
- Check oil level
- Change oil for water content
- Check for leakage
- Check oil temperature for changes
- Check for changes in noise level
- Check for dust/dirt build-up on exterior surfaces

Every 6 months or 2,500 hours of operation
- Check oil for water content
- Change oil (Synthetic oil *every* 18 months or 8,000 hours)
- Check mounting hardware is tight
- Check for oil leaks
- Clean and reinstall the magnetic drain plugs
- Check the cooling system

Every 18 months or 8,000 hours of operation for synthetic lubricant
- Check oil for water content
- Change oil
- Check mounting hardware is torqued
- Check for oil leaks
- Clean and reinstall the magnetic drain plugs
- Check the cooling system

Oil Analysis Program
Oil change intervals can be extended provided an oil analysis program is in effect. Increased contaminate values would indicate internal component wear is beginning to occur. The reducer should be monitored more frequently and may need to be removed from service for repair.

GUIDELINES FOR MOTORIZED TORQUE-ARM II REDUCER LONG-TERM STORAGE

During periods of long storage, or when waiting for delivery or installation of other equipment, special care should be taken to protect a gear reducer to have it ready to be in the best condition when placed into service.

By taking special precautions, problems such as seal leakage and reducer failure due to lack of lubrication, improper lubrication quantity, or contamination can be avoided. The following precautions will protect gear reducers during periods of extended storage.

Preparation

1. Drain oil from the unit. Add a vapor phase corrosion inhibiting oil (VCI-105 oil by Daubert Chemical Co.) in accordance with Table 9.
2. Seal the unit airtight. Replace the vent plug with a standard pipe plug and wire the vent to the unit.
3. Cover all unpainted exterior parts with a waxy rust preventative compound that will keep oxygen away from the bare metal (Non-Rust X-110 by Daubert Chemical Co. or equivalent).
4. The instruction manuals and lubrication tags are paper and must be kept dry. Either remove these documents and store them inside, or cover the unit with a durable waterproof cover which can keep moisture away.
5. Protect reducer from dust, moisture, and other contaminants by storing the unit in a dry area.
6. In damp environments, the reducer should be packed inside a moisture-proof container or an envelope of polyethylene containing a desiccant material. If the reducer is to be stored outdoors, cover the entire exterior with a rust preventative.

When Placing the Reducer into Service

1. Fill the unit to the proper oil level using a recommended lubricant. The VCI oil will not affect the new lubricant.
2. Clean the shaft extensions with petroleum solvents.
3. Assemble the vent plug into the proper hole.
4. Follow the installation instructions provided in this manual.

Table 9 - Quantities of VCI #105 Oil

Reducer Size	Quantity (Ounces / Milliliter
MTA2115H	1 / 30
MTA3203H	1 / 30
MTA4207H	1 / 30
MTA5215H	2 / 59
MTA6307H	2 / 59
MTA7315H	3 / 89
MTA8407H	3 / 89
MTA9415H	4/118
MTA10507H	6/177
MTA12608H	8/237

VCI #105 and #10 are interchangeable.
VCI #105 is more readily available.

REPLACEMENT OF PARTS

NOTE: Using tools normally found in a maintenance department, a Motorized Torque-Arm II speed reducer can be disassembled and reassembled by careful attention to the following instructions.

Cleanliness is very important to prevent the introduction of dirt into the bearings and other parts of the reducer. A tank of clean solvent, an arbor press, and equipment for heating bearings and gears (for shrinking these parts on shafts) should be available.

Our factory is prepared to repair reducers for customers who do not have proper facilities or who, for any reason, desire factory service.

The oil seals are contact lip seals. Considerable care should be used during disassembly and reassembly to avoid damage to the surface on which the seals rub.

Any sharp edges on the output hub should be covered with tape or paper before disassembly or reassembly. Also, be careful to remove any burrs or nicks on surfaces of the input shaft or output hub before disassembly or reassembly.

Ordering Parts: When ordering parts for reducer, specify reducer size number, reducer model number, part name, part number, and quantity.

It is strongly recommended that, when a pinion or gear is replaced, the mating pinion or gear is replaced also. If the large gear on the output hub must be replaced, it is recommended that an output hub assembly consisting of a gear assembled on a hub be ordered to ensure undamaged surfaces on the output hub where the output seals rub. However, if it is desired to use the old output hub, press the gear and bearing off and examine the rubbing surface under the oil seal carefully for possible scratching or other damage resulting from the pressing operation. To prevent oil leakage at the shaft oil seals, the smooth surface of the output hub must not be damaged.

If any parts must be pressed from a shaft or from the output hub, this should be done before ordering parts to make sure that none of the bearings or other parts are damaged in removal. Do not press against rollers or cage of any bearing.

Because old shaft oil seals may be damaged in disassembly, it is advisable to order replacements for these parts.

REMOVING REDUCER FROM SHAFT

Removal of Tapered Bushings and Reducer

1. Disconnect and remove torque arm rod from reducer adapter.
2. Remove bushing screws from bushings.
3. Place the screws in the threaded holes provided in the bushing flanges. Tighten the screws alternately and evenly until the bushings are free on the shaft. For ease of tightening screws, make sure screw threads and threaded holes in bushing flanges are clean. A tap can be used to clean out the threads. Use caution to use the proper size tap to prevent damage to the threads.
4. Remove the outside bushing, the reducer, and then the inboard bushing.

Disassembly

1. Drain all oil from the reducer.
2. Position the reducer on its side and remove the motor assembly, front cover, and all housing bolts. Drive dowel pins from housing. Using the three pry slots around the periphery of the flange, gently separate the housing halves. Open housing evenly to prevent damage to the parts inside.
3. Lift input shaft, all gear assemblies, and bearing assemblies from housing. Remove all bolts retaining the bevel cartridge assembly and remove from housing.
4. Remove input gear from bevel pinion cartridge assembly.
5. Disassemble bevel pinion cartridge.
6. Remove all seals from housing.
7. Remove all bearings from shafts, hubs, and bevel pinion. Be careful not to scratch or damage any assembly or seal area during bearing removal. The hub assembly can be disassembled for gear replacement but if scratching or grooving occurs on the hub, seal leakage will occur and the hub will need to be replaced.

Reassembly

1. **Output Hub Assembly:** Heat gear to 325 °F to 350 °F (162 ºC to 176 ºC) to shrink onto hub. Heat bearings to 270 °F to 290 °F (132 ºC to 143 ºC) to shrink onto hub. Any damage to the hub surfaces where the oil seals rub will cause leakage, making it necessary to use a new hub.
2. **Countershaft and Bevel Gear Assembly:** Countershaft and pinion are integral. Press bevel gear and bearings on shaft. Press against inner race (not cage or rollers) of bearings.
3. **Input Shaft Assembly:** Shaft and pinion are integral. Press bearings on shaft. Press against inner race (not cage or rollers) of bearings.
4. **Bevel Bearing Cartridge Assembly:** Install the bearing cups into cartridge housing making sure bearing cups are fully seated against the bearing shoulders.
   a. Heat bearing cone to 270 °F to 290 °F (132 ºC to 143 ºC) to shrink onto the bevel pinion shaft adjacent to the bevel pinion teeth. The bevel shaft and pinion are integral. If pressing is required, press against inner race (not cage or rollers) of bearing.
   b. Slide the bevel pinion and bearing cone assembly into the bearing cartridge and set the cartridge assembly into a press with the pinion teeth facing down.
   c. Using press, install outer bearing cone onto bevel pinion shaft using pressure per Table 10. The pressure listed is required to set correct preload. Do not press against the bevel pinion teeth as damage may occur. Press against flat surface on end of pinion only. The bevel pinion assembly should now have a slight preload.
   d. Remove from press and install snap ring. At this time bevel assembly should be tight with no bearing end play.
   e. Measure gap between snap ring and bearing.
   f. Remove snap ring and add shim equal to the measured gap minus 0.0015” (0.04mm) and reinstall snap ring.
   g. Using a rubber hammer, slightly tap the end of the pinion. The bearings will slightly loosen. Verify the bearing end play setting per Table 10.
5. Place reducer housing with bevel cartridge provision on blocks to allow for protruding end of output hub during reassembly.
6. Drive the two dowel pins into place in the housing.
7. Install bearing cup for bevel gear countershaft assembly into the housing bore and install bevel gear assembly. Install the bevel pinion cartridge assembly into housing.

8. Lifting vertically upward on the bevel gear countershaft assembly, measure the movement of the countershaft assembly until the bevel gear locates tightly against the bevel pinion. Remove the bevel pinion cartridge from the housing and add shim under the bevel gear countershaft assembly per Table 10. This is the backlash setting for the bevel pinion and gear.
9. Reinstall bevel pinion cartridge assembly. Install first reduction gear and snap ring.
10. Install bearing cup on upper side of bevel gear countershaft assembly and set upper reducer housing in place. Measure and shim end play per Table 10.
11. Remove upper reducer housing and lightly coat the bevel pinion with red lead or suitable coating to check contact pattern on bevel gear.
12. Reinstall upper reducer housing and rotate input pinion 20-30 revolutions. This will transfer the red lead from the pinion to the gear teeth. Remove upper reducer housing and check tooth contact. If contact pattern is not correct, shim the bevel pinion cartridge until an acceptable pattern is achieved. This process may need to be repeated several times until correct pattern is obtained.
13. Install input shaft assembly in the housing and set input cover in place. Shim input assembly per Table 10.
14. Install remaining bearing cups into housing.
15. Install and mesh output hub gear and bevel gear countershaft assembly together and set in place in housing. Make sure bearing rollers (cones) are properly seated in their cups. Set bearing cups for opposite side housing in place on their rollers.
16. Making sure both reducer housings are clean, set opposite side housing into position onto the dowel pins and tap with a soft hammer (rawhide, not lead hammer) until housing bolts can be used to draw housing together. Make sure reducer shafts do not bind while tightening housing bolts.
17. Rotate the input pinion shaft and seat all remaining bearings with a soft hammer. Using a magnetic base and indicator, measure and record the end play of the output hub assembly. Remove upper housing and shim behind the bearing cup as required to achieve the correct bearing end play or preload per Table 10. Repeat this process and check end play until proper endplay is obtained. Note that the output shaft is preloaded. After endplay is determined, add the correct shim thickness to the end play reading to obtain the correct preload.
18. Remove upper reducer housing. Clean the flange surfaces on both housings, making sure not to nick or scratch flange face. Place a ⅛" (3mm) bead of Dow RTV732 sealant or equivalent on flange face (make sure RTV is placed around bolt holes and inside of flange face). Place opposite side housing into position onto the dowel pins and tap with a soft hammer (rawhide, not lead hammer) until housing bolts can be used to draw both housings together. Torque housing bolts per torque values listed in Table 11.
19. Install input, output, and auxiliary seals. Extreme care should be used when installing seals to avoid damage due to contact with sharp edges on the output hub. The possibility of damage and consequent oil leakage can be decreased by covering all sharp edges with tape prior to seal installation. Lightly coat the seal lips with Mobilith AW2 All-Purpose grease or equivalent. Seals should be pressed or tapped with a soft hammer evenly into place in the reducer housing, applying pressure only on the outer edge of the seals. A slight oil leakage at the seals may be evident during initial running, but should disappear unless seals have been damaged.
20. Install bushing backup plates and snap rings on taper bushed reducers.

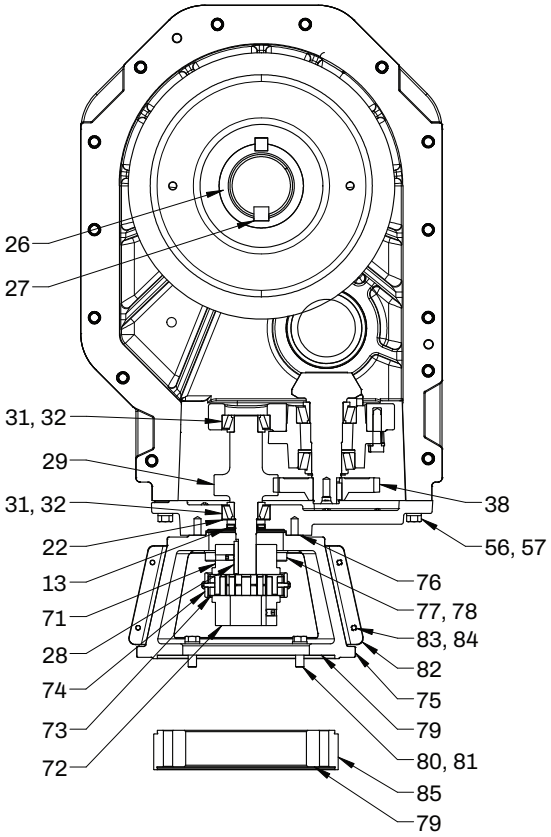
Table 10 - Bearing Adjustment Tolerance & Backlash Setting

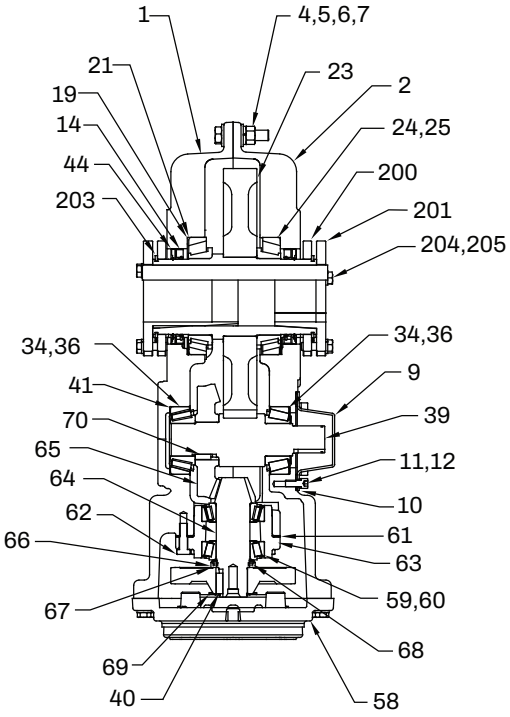
Reducer Size	Bearing Endplay Values Inch (mm)			
	Input	Countershaft	Output	Bevel
MTA2115H	0.001-0.003 (0.025-0.076) Loose	0.0005-0.002.5 (0.013-0.064) Loose	0.002-0.004 (0.050-0.101) Preload	0.0005-0.0015 (0.013-0.038) Loose
MTA3203H	0.001-0.003 (0.025-0.076) Loose	0.0005-0.0025 (0.013-0.064) Loose	0.002-0.004 (0.050-0.101) Preload	0.0005-0.0015 (0.013-0.038) Loose
MTA4207H	0.001-0.003 (0.025-0.076) Loose	0.0005-0.0025 (0.013-0.064) Loose	0.002-0.004 (0.050-0.101) Preload	0.0005-0.0015 (0.013-0.038) Loose
MTA5215H	0.001-0.003 (0.025-0.076) Loose	0.0005-0.0025 (0.013-0.064) Loose	0.006-0.008 (0.152-0.203) Preload	0.0005-0.0015 (0.013-0.038) Loose
MTA6307H	0.001-0.003 (0.025-0.076) Loose	0.0005-0.0025 (0.013-0.064) Loose	0.006-0.008 (0.152-0.203) Preload	0.0005-0.0015 (0.013-0.038) Loose
MTA7315H	0.001-0.003 (0.025-0.076) Loose	0.0005-0.0025 (0.013-0.064) Loose	0.006-0.008 (0.152-0.203) Preload	0.0005-0.0015 (0.013-0.038) Loose
MTA8407H	0.001-0.003 (0.025-0.076) Loose	0.0005-0.0025 (0.013-0.064) Loose	0.006-0.008 (0.152-0.203) Preload	0.0005-0.0015 (0.013-0.038) Loose
MTA9415H	0.001-0.003 (0.025-0.076) Loose	0.0005-0.0025 (0.013-0.064) Loose	0.006-0.008 (0.152-0.203) Preload	0.0005-0.0015 (0.013-0.038) Loose
MTA10507H	0.001-0.003 (0.025-0.076) Loose	0.0005-0.0025 (0.013-0.064) Loose	0.006-0.008 (0.152-0.203) Preload	0.0005-0.0015 (0.013-0.038) Loose
MTA12608H	0.001-0.003 (0.025-0.076) Loose	0.0005-0.0025 (0.013-0.064) Loose	0.006-0.008 (0.152-0.203) Preload	0.0005-0.0015 (0.013-0.038) Loose

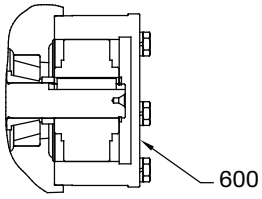
Table 11 - Recommended Bolt Torque Values

Housing Bolt Recommended Torque Values		
Reducer Size	Fastener Size	Torque in ft-lbs (N-m)
MTA2115H	3/8-16	30–27 (41–37)
MTA3203H	3/8-16	30–27 (41–37)
MTA4207H	1-2/13	75–70 (102–95)
MTA5215H	1-2/13	75–70 (102–95)
MTA6307H	1/2-13	75–70 (102–95)
MTA7315H	5/8-11	115–110 (156–149)
MTA8407H	5/8-11	115–110 (156–149)
MTA9415H	5/8-11	115–110 (156–149)
MTA10507H	3/4-10	205–200 (277–271)
MTA12608H	3/4-10	205–200 (277–271)

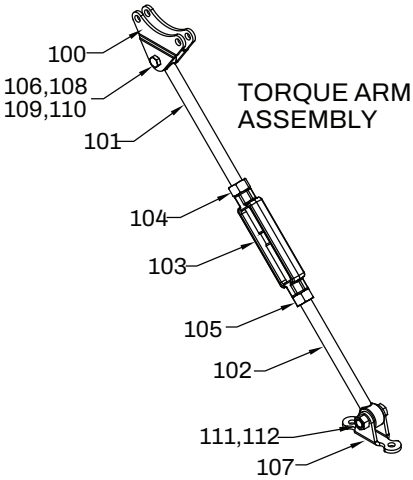
Parts for MTA2115H through MTA8407H Taper Bushed C-Face Reducers



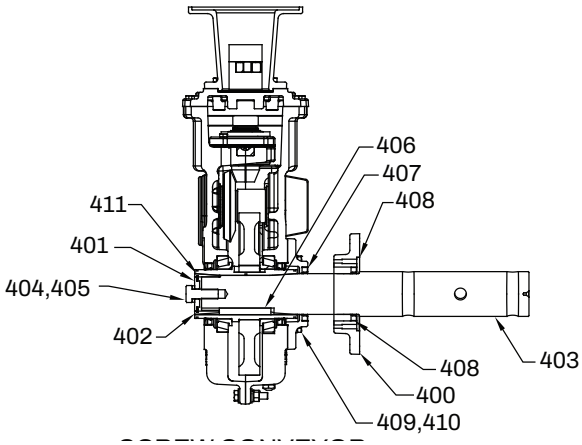


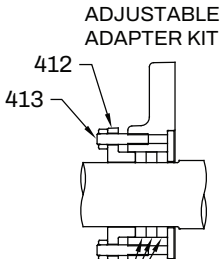


OPTIONAL BACKSTOP ASSEMBLY



TORQUE ARM ASSEMBLY





Parts for MTA2115H through MTA8407H Taper Bushed C-Face Reducers

Ref	Description	Qty
1	Housing-LH	1
2	Housing-RH	1
①	RTV Sealant, Tube	1
4	Housing Bolt	-
5	Flat Washer	-
6	Nut	-
7	Lock Washer	-
8①	Dowel Pin	2
9	Backstop Shaft Cover	1
10	Backstop Cover Gasket	1
11	Backstop Cover Screw	-
12	Backstop Lock Washer	-
13	Input Oil Seal	
14	Output Oil Seal	2
15①	Air Vent	1
16①	Bushing	1
17①	Oil Plug	-
17	Sensor Adapter	1
18①	Magnetic Oil Plug	1
19	Bearing Spacer	1
21	Output Bearing Shim - As Required	-
22	Input Bearing Shim - As Required	-
23	Output Gear	1
24	Output Bearing Cup	2
25	Output Bearing Cone	2
26	Output Hub	1
27	Output Gear Key	1
28	Input Pinion Key	1
29	Input Pinion ⑤	1
31	Input Bearing Cup	2
32	Input Bearing Cone	2
34	Countershaft Bearing Cup (LH)	1
	Countershaft Bearing Cup (RH)	1
36	Countershaft Bearing Cone (LH)	1
	Countershaft Bearing Cone (RH)	1
38	First Stage Gear ④	1
39	Counter-Shaft Pinion	1
40	First Stage Gear Key	1
41	Countershaft Bearing Shim (As Required)	-
44	Auxiliary Output Seal	2
56	Bolt, Cover - Hex Head	8–19
56	Bolt, Cover - Socket Head	0–6
57	Lock Washer, Cover	8–19
58	Cover	1
59	Bevel Pinion Bearing Cup - Inner	1
	Bevel Pinion Bearing Cup - Outer	1
	Bevel Pinion Bearing Assembly-Inner	1
60	Bevel Pinion Bearing Cone - Inner	1
	Bevel Pinion Bearing Cone - Outer	1
	Bevel Pinion Bearing Assembly-Outer	1
61	Bevel Cartridge Shim - As Required	-
62	Bevel Cartridge Bolt	5 or 6
62	Bevel Cartridge Washer	5 or 6
63	Bevel Cartridge	1
64	Pinion, Bevel ④	1
65	Gear, Bevel ④	1
66	Bevel Pinion Shim (As Required)	1

Ref	Description	Qty
67	Washer, Bevel Pinion	1
68	Retaining Ring	1
69	Retaining Ring	1
70	Bevel Gear Key	1
71	Coupling Hub (Reducer)	1
72	Coupling Hub (Motor)	1
73	Coupling Element	1
74	Coupling Cover	1
75	Motor Adapter	1
76	Motor Adapter Gasket (Reducer)	1
77	Bolt (Adapter to Reducer)	4 or 8
78	Washer (Adapter to Reducer)	4 or 8
79	Motor Adapter Gasket (Motor)	1 or 2
80	Bolt (Adapter to Motor)	4 or 8
81	Washer (Adapter to Motor)	4 or 8
82	Motor Adapter Cover	2
83	Bolt (Adapter Cover)	4
84	Nut (Adapter Cover)	4
85	Motor Adapter Plate	0 or 1
100	Torque-Arm Adapter Bracket	2
	Torque-Arm Rod Kit	1
101	Torque-Arm Rod End	1
102	Torque-Arm Extension	1
103	Torque-Arm Turnbuckle	1
104	Nut (RH)	1
105	Nut (RH)	1
106	Torque-Arm Bushing	1
107	Torque-Arm Fulcrum	1
108	Torque-Arm Bolt	1
109	Torque-Arm Lock-Washer	1
110	Torque-Arm Nut	1
111	Torque-Arm Bolt	1
112	Torque-Arm Nut	1
113	Lock-Washer (Not Shown)	1
	Items 106 and 108-113 are in Kit	1
200	Back-Up Plate (Included in Bushing Kit)	2
201	Bushing Kit Assembly - Standard Shaft	1
203	Retaining Ring (Included In Bushing Kit)	2
204	Cap Screw (Included In Bushing Kit)	6
205	Lock-Washer (Included In Bushing Kit)	6
600	Backstop Assembly	1

① Not shown on the drawing.

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