



LUBRICATION, INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS FOR STAINLESS STEEL CONE DRIVE SPEED REDUCERS

Cone Drive double-enveloping worm gear speed reducers are used throughout industry to provide smooth and quiet

speed reduction. When properly selected, applied and maintained, they will provide optimum performance.

IMPORTANT: In any applications of Cone Drive Products where breakage, damage, disconnection, any other malfunction of any drive train component, or excessive wear could result in personal injury or property damage,

a fail safe device capable of stopping and holding the load in the event of such an occurrence must be incorporated after the drive train.

THE FOLLOWING INFORMATION IS FOR YOUR PROTECTION. PLEASE READ CAREFULLY.

1. Do not attempt to install or operate this reducer until all of these instructions are read and thoroughly understood. If you have any questions, please contact Cone Drive.
2. The horsepower or output torque capacity of this reducer and the service factor (maximum allowable operating cycle) are documented in the product catalog. These values are not to be exceeded as overloading can result in reducer failure. Exceeding the rating and duty cycle will void the warranty. Please contact Cone Drive with any questions regarding rating and service factors.
3. Do not alter the reducer without approval from Cone Drive.
4. This reducer has moving mechanical components and connected electrical devices, operating under high voltage to achieve its intended purpose. Operation and repair should only be done by qualified personnel.
5. Before servicing a speed reducer, the main electrical disconnect must be moved to and locked in the off-position. The person performing the work should post on that disconnect a warning to others not to turn on the power.
6. It is normal for the reducer to operate at a housing temperature of up to 200°F. To prevent burns, proper guards or shields should be provided by the purchaser or user to prevent personnel from touching the reducer.
7. Cone Drive products are furnished without guard covers. It is the responsibility of the purchaser or user to provide guards for all exposed shafting, couplings, sprockets, sheaves, belts, chains, clutches, and any other moving parts in accordance with current local, state and federal requirements.
8. Failure to follow the instructions contained in this bulletin may result in unit failure, property damage or personal injury.

INSTALLATION

1. The speed reducer must be securely mounted to a rigid foundation or base plate, flat enough to mate with the underside of the reducer housing, so as to not create an unsanitary trap.
2. Bolt the reducer to the foundation or mounting base using metric bolts that correspond to the threaded holes in the reducer housing. Be sure to use a bolt in all available threaded mounting holes. Mount the reducer using bolts of minimum SAE Grade A2, Property Class 70, 304 Stainless Steel.
3. Couplings, sheaves and sprockets should be mounted on the reducer shafts carefully. Do not pound or hammer them onto the shafts as this will damage bearings and oil seals. Angular and axial alignment of the output shaft to the rotating machine interface is critical to prevent premature output seal leaks.
4. Sprockets and sheaves should be mounted as close to the reducer as possible and “V” belts and chains adjusted to the proper tension to keep bearing loading and shaft deflection to a minimum. Too much tension in belts and improper location of sheaves and sprockets will lead to excessive chain pull, bearing wear and shaft deflection. For specific information on chain pull capacity, shaft stress and bearing life please contact Cone Drive.
5. Before starting motor review motor rotation, reducer rotation and required direction of driven machine to ensure that the motor is wired for proper direction of rotation. In many instances a machine must run in one direction and failure to wire the motor properly can result in damage to the driven machine
6. **Note: only use the approved lubricants if oil level top-off is necessary, as the factory filled PAG oil is not compatible with other oil types.** Stainless steel speed reducers ship factory filled with oil and grease. For lubrication guidelines, see the Approved Lubricants and Lubrication Quantities tables in the maintenance section.
7. The speed reducer must be securely mounted to a rigid flat foundation or base plate, either directly to the speed reducer or via the provided mounting feet. **Note: stainless steel speed reducers are built for universal mounting, ready to mount in any position.**

START-UP

1. After the reducer has been properly mounted, aligned and lubricated, it is ready for start-up.
2. Make sure driven machine is clear of all obstructions and all safety guards and covers are in place, according to appropriate local, state and federal requirements. If possible, turn motor shaft by hand to confirm drive system is operating freely and in correct direction of rotation.
3. Jog motor to confirm proper rotation.
4. Operate reducer with minimum load for approximately 15 minutes (in both directions if applicable) to seat gears, bearings, and oil seals

OPERATION

1. All reducers require a few hours of “run-in” under load to achieve optimum efficiency. During this initial run-in the reducer will probably run warmer than normal and draw more current than after the run-in period. Reducers operating at a very low load or speed will take much longer to run-in and even if operated continuously at low load or speed may never achieve the efficiency that they would if operated at or near their catalog rating.
2. **IMPORTANT:** Normal reducer operating temperature measured at the oil sump area of the housing should not exceed 200°F. Excessive oil sump temperature is indicative of overloading, misalignment, or improper or marginal lubrication. Continuous operation of the reducer with the oil sump temperature above 200°F will result in premature breakdown of the oil and reduce the useful life of the reducer or result in premature failure.

MAINTENANCE

1. All reducers and foundation bolts should be checked for tightness after three (3) months of service and annually thereafter.
2. If a reducer is to be repaired, contact Cone Drive for detailed instructions, drawings, parts lists, etc. If it is necessary field service is available.
3. If a reducer is to be returned, contact Cone Drive for instructions and a return material authorization (CASE) number.

LUBRICATION

Stainless steel reducers are factory filled with a high quality food Grade synthetic lubricant. They are "Lubricated for Life" and require no routine maintenance in service. In the event of a major overhaul involving strip-down and reassembly of the gear unit, refer to Table 1 for a list of approved lubricants. Lubricant quantities are given in Tables 2 & 3.

If switching to the alternative lubricant, care should be taken to thoroughly flush out all of the old lubricant before filling with new lubricant. Mixing of different lubricants can result in degraded performance or failure.

Table 1 Approved Lubricants

These Polyalkylene Glycol based synthetic lubricants are suitable for ambient temperatures of -10°F to 200°F (-23°C to 93°C); outside of this, please contact our Application Engineers.

SUPPLIER	OIL SUPPLIERS' CORRESPONDING DESIGNATIONS	ISO VISCOSITY GRADE/POUR POINT
Kluber Lubrication	Klubersynth Synthetic UH1 6-460	460 (-22°F, -30°C)
Exxon Mobil Corporation	Synthetic Glygoyle 460	460 (-27°F, -33°C)

Table 2 Lubricant Quantities

Conversion Table

Liters to US gallons = liters x 0.26 Liters to Imperial gallons = liters x 0.22

Applicable for any mounting position:

MOTORIZED or REDUCER		SIZE									
		F039		F044		F050		F060		F076	
Ratio		<60:1	>60:1	<60:1	>60:1	<60:1	>60:1	<60:1	>60:1	<60:1	>60:1
Oil Capacity	Quarts	0.28	0.41	0.32	0.56	0.39	0.59	0.46	0.76	1.04	1.69
	Liters	0.26	0.39	0.30	0.53	0.37	0.56	0.44	0.72	0.98	1.59

STORAGE RECOMMENDATIONS FOR CONE DRIVE SPEED REDUCERS

Cone Drive stainless steel speed reducers are fully corrosion resistant with an electro-polished coating which does not require a rust inhibitor. For extended storage periods of up to one year, rotate the worm and gearshaft every 90 days to keep the seals from sticking to the shaft. For storage periods exceeding one year, purchase a spare set of oil seals to have on hand in case of leaking at start-up.

Lubrication is very important for successful operation of Cone Drive gearsets and speed reducers. Please review these lubrication recommendations and maintenance guidelines, as inadequate lubrication can result in increased power consumption, added maintenance, and gearset failure. Cone Drive recommends only the listed lubricants as the use of other lubricants can result in gearset failure food grade standards.

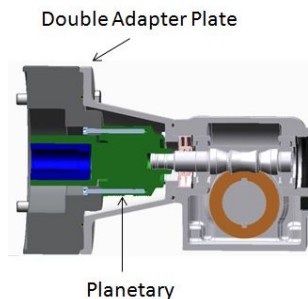
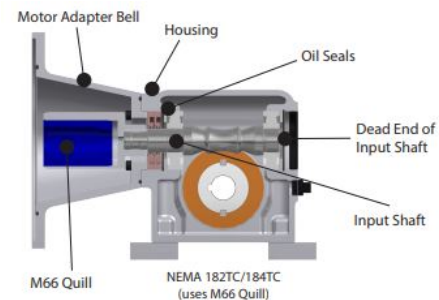
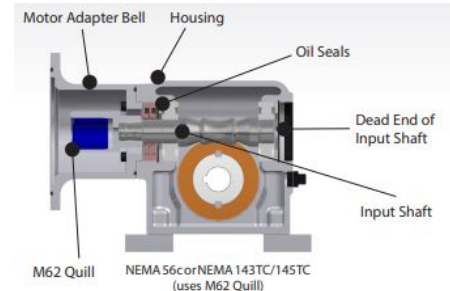
AMBIENT TEMPERATURE

The oils shown in the Approved Lubricants table are for use in an ambient temperature range of approximately -10°F to 200°F with the low end of the range depending on the pour point of the specific oil used. If the ambient temperature will be below or above this range, please contact Cone Drive for specific recommendations on proper lubricant as well as proper oil seal materials.

OIL SEAL REPLACEMENT INSTRUCTIONS

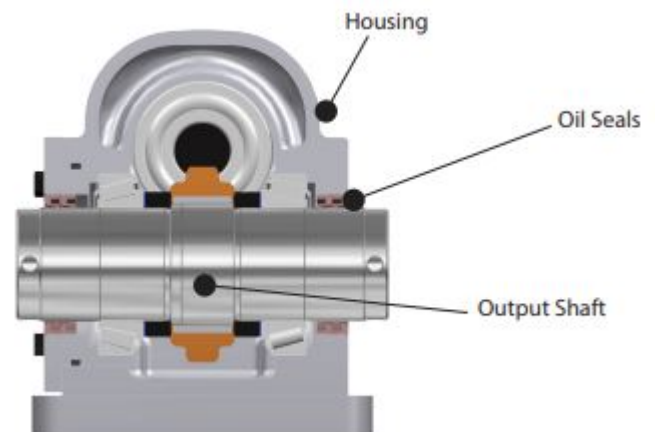
IF THE INPUT OIL SEALS REQUIRE REPLACEMENT:

- UNINSTALL REDUCER
- DRAIN LUBRICANT FROM REDUCER
- REMOVE EXTERIOR COMPONENTS (MOTOR, ADAPTER PLATE, MOTOR BELL, ETC.)
 - » Adapter plate removal (All Motors)
 - Tap each side of adapter plate using a brass hammer. Leave planetary connected to adapter plate
 - Detach motor adapter bell
 - » M62 quill removal (56C-143/145TC)
 - Detach motor adapter bell
 - Use 2/3 Jaw Gear Puller to remove quill
 - » M66 quill removal (182/184 TC)
 - Use 2/3 Jaw Gear Puller to remove quill
 - Detach motor adapter bell
- REMOVE SEALS
 - » Be careful not to scratch housing or shaft, or create fragments that could enter reducer as damage or penetration could result in potential leaks and failure
- INSTALL REPLACEMENT SEALS
 - » Press-up seals evenly and carefully to avoid damage to the seal and reducer components
- RE-PRESS QUILL ONTO INPUT SHAFT (SINGLE REDUCTION ONLY)
 - » Dead end of shaft must be reacted to avoid damage to reducer components
 - » For single-extended shafts the bore plug must be removed to support the shaft, then reinstalled
- DOUBLE REDUCTION, RE-INSTALL ADAPTER PLATE WITH PLANETARY
- FLUSH AND REFILL THE REDUCER WITH AN APPROVED LUBRICANT (SEE TABLE 1 AND 2)
- REATTACH MOTOR ADAPTER BELL
- REINSTALL REDUCER



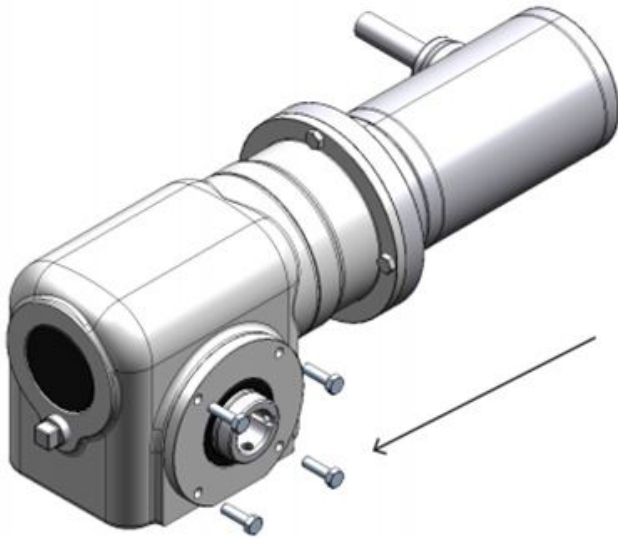
IF THE OUTPUT OIL SEALS REQUIRE REPLACEMENT:

- UNINSTALL REDUCER
- DRAIN LUBRICANT
- REMOVE EXTERIOR COMPONENTS (OUTPUT FLANGE)
- REMOVE SEALS
 - » Be careful not to scratch housing or shaft, or create fragments that could enter reducer as damage or penetration could result in potential leaks and failure
- INSTALL REPLACEMENT SEALS
 - » Press-up seals evenly and carefully to avoid damage to the seal and reducer components
- FLUSH AND REFILL THE REDUCER WITH AN APPROVED LUBRICANT (SEE TABLE 1 AND 2)
- REATTACH EXTERIOR COMPONENTS
- REINSTALL REDUCER



SHRINK DISC / HOLLOW SHAFT COVER ASSEMBLY

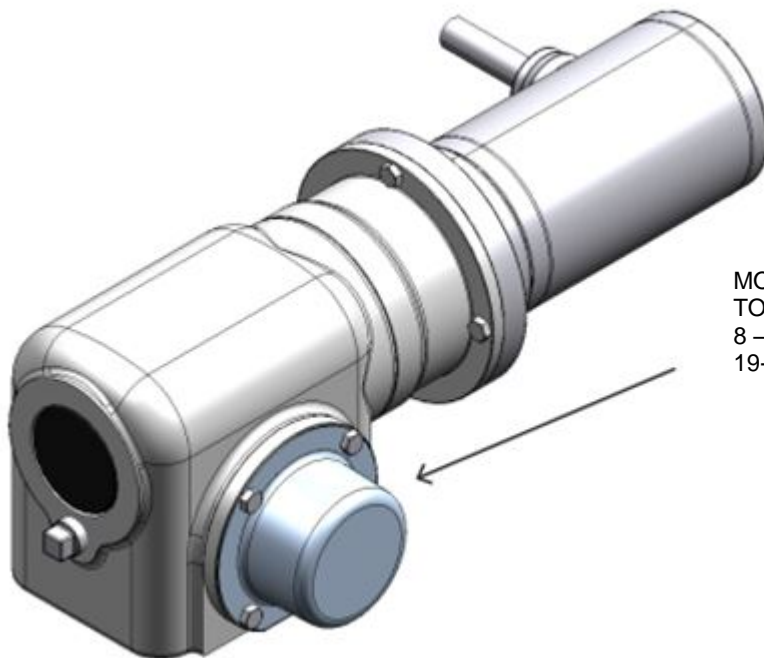
THE SHRINK DISC / HOLLOW SHAFT COVER IS SHIPPED LOOSE, TO BE ASSEMBLED AFTER THE REDUCER IS MOUNTED AND THE CUSTOMER'S SHAFT (AND SHRINK DISC, IF USED) IS ASSEMBLED.



REMOVE THE FOUR CARRIER BOLTS. WHEN UNBOLTED, THE CARRIER WILL BE HELD IN PLACE BY THE FRICTION OF AN INTERNAL O-RING, BUT TAKE CARE THAT THE CARRIER STAYS IN PLACE.

APPLY A LIGHT BEAD OF NSF 51 LIST, SPACE FILLING SEALER SUCH AS DOW CORNING 732 SEALANT* INSIDE THE COVER'S FLANGE. APPLY SO THAT SEALANT WON'T MIGRATE ONTO THE SHAFT'S OIL SEAL SURFACE WHEN ASSEMBLED.

*IT IS THE RESPONSIBILITY OF THE USER TO SELECT SEALANT THAT IS SUITABLE FOR THE OPERATING CONDITIONS.

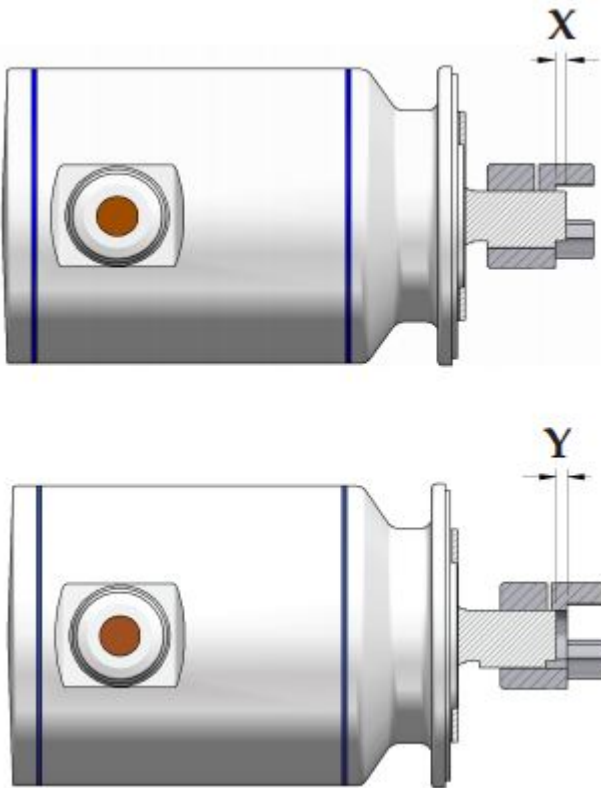


MOUNT THE COVER. REINSTALL THE CARRIER BOLTS. TORQUE IN ALTERNATING PATTERN TO:
8 – 9.6 Nm (SIZE 39, 44, 50, 60)
19-23 Nm (SIZE 76)

SERVO MOTOR INSTALLATION

THE COUPLING'S THREE PIECE DESIGN ALLOWS THE HUBS TO BE INSTALLED ON EACH INDIVIDUAL SHAFT, THEN JOINED AXIALLY.

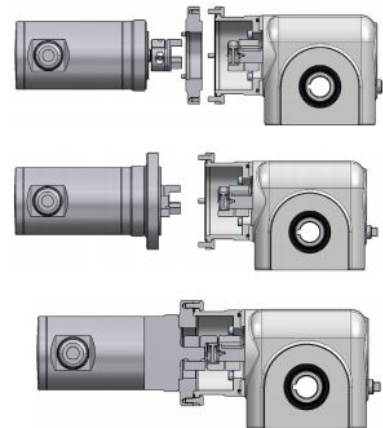
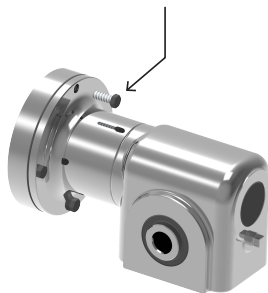
MOUNT THE MOTOR'S COUPLING HALF ON THE MOTOR SHAFT. POSITION TO THE DIMENSION SHOWN FOR THE APPROPRIATE ASSEMBLY.



Reducer Size	Kollmorgen	Allen-Bradley	"X" Shaft protrudes beyond coupling hub (mm)	"Y" coupling Hub extends beyond shaft (mm)	Setscrew Torque Nm	
39, 44, 50	AKMH3 - All faces			0.6	13.0	
	AKMH4-BK, BN, DK, DN			0.3	13.0	
	AKMH4-AC, AN, CC, CN			6.5	13.0	
	AKMH5-AC, AN			1.1	13.0	
	AKMH5-BK, BN, DK, DN			2.5	13.0	
		MPS-A/B 330P		6.5	13.0	
60	AKMH4-BK, BN, DK, DN		0.8		13.0	
	AKMH4-AC, AN, CC, CN			5.5	13.0	
	AKMH5-AC, AN			1.1	13.0	
	AKMH5-BK, BN, DK, DN			2.5	13.0	
	AKMH6-AC, AN, CC, CN				4.6	27.0
	AKMH6-DK, DN				4.6	13.0
			MPS-A/B 4540F		1.1	13.0
		MPS-A/B 560F		4.6	13.0	
76	AKMH4-BK, BN, DK, DN		1.9		13.0	
	AKMH4-AC, AN, CC, CN			4.3	13.0	
	AKMH5-AC, AN			0.9	13.0	
	AKMH5-BK, BN, DK, DN			2.7	13.0	
	AKMH6-AC, AN, CC, CN				4.4	27.0
	AKMH6-DK, DN				3.4	27.0
			MPS-A/B 4540F		0.9	13.0
			MPS-A/B 560F		3.4	27.0

FOR SOME MOTORS (PARTICULARLY FACE-MOUNT MOTORS), IT WILL BE NECESSARY TO REMOVE THE MOTOR PLATE FROM THE MOTOR ADAPTER, FASTEN THE PLATE TO THE MOTOR, THEN MOUNT THE MOTOR AND PLATE BACK TO THE REDUCER.

ADD APPROPRIATE SEALANT TO UNDERSIDE OF ADAPTER BOLT HEAD PRIOR TO INSTALLATION



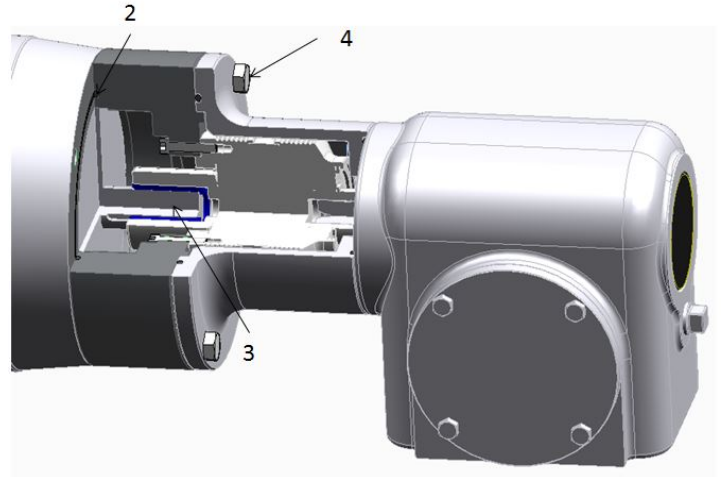
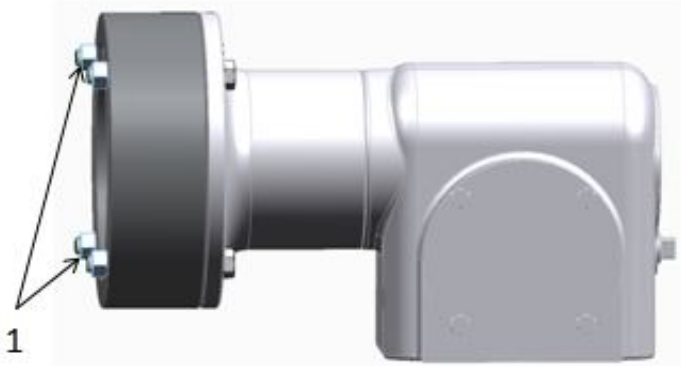
SCREW TORQUES (Nm):

M6	8–9.6
M8	24–30
M10	38–46
5/16-18	24–29
3/8-16	27–40

MOUNT THE MOTOR'S COUPLING HALF ON THE MOTOR SHAFT. POSITION TO THE DIMENSION SHOWN FOR THE APPROPRIATE ASSEMBLY.

DOUBLE REDUCTION NEMA MOTOR INSTALLATION

1. REMOVE THE NUTS BUT KEEP THE BOLTS THAT ARE BETWEEN THE MOTOR ADAPTER AND MOTOR BELL
2. INSERT O-RING OR APPLY GASKET (182/184TC ONLY) TO MOTOR ADAPTER FACE
3. ALIGN MOTOR SHAFT AND KEY WITH BLUE BUSHING AND INSERT THE MOTOR
4. TIGHTEN BOLTS

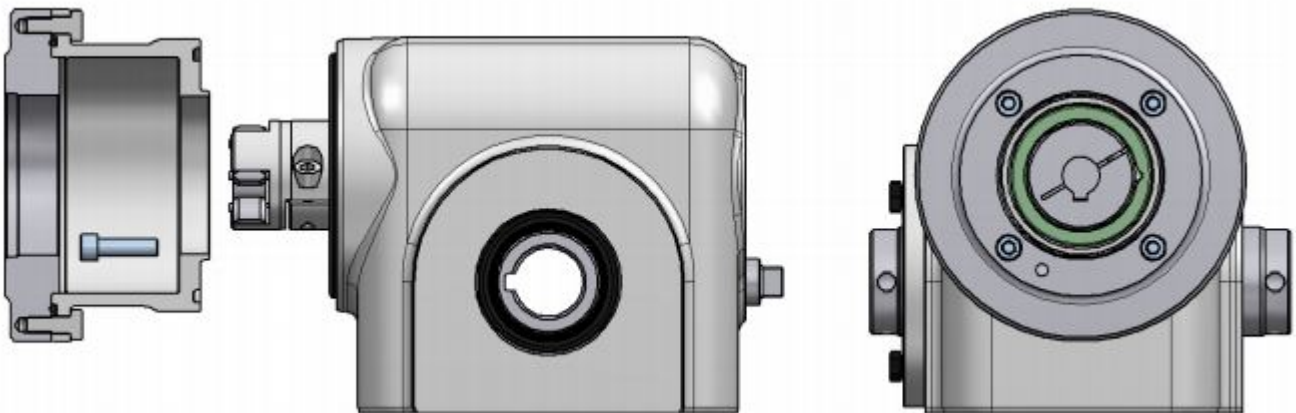


Servo Motor Installation

IF NECESSARY TO REPOSITION THE COUPLING HALF MOUNTED TO THE GEARBOX

1. REMOVE THE (4) M6 SOCKET CAP SCREWS.
2. REMOVE THE MOTOR ADAPTER.
3. LOOSEN AND REPOSITION COUPLING AS REQUIRED.
4. TIGHTEN THE COUPLING SETSCREW.
5. REPLACE THE MOTOR ADAPTER; TIGHTEN SCREWS

SCREW TORQUES (Nm)	
M5	9.5-12
M6	16-20
3/8-16	33-54
1/2-13	61-94



INTERFACE FLANGE SEALING

END USER IS RESPONSIBLE FOR SEALING THE MOTOR AND OUTPUT FLANGE INTERFACES. FOR FLANGES WITH O-RING GROOVES THE REDUCER WILL BE SUPPLIED WITH O-RINGS THAT ARE SHIPPED LOOSE. INSTALL THE O-RING IN MOTOR ADAPTER GROOVE OR OUTPUT FLANGE GROOVE PRIOR TO MOUNTING THE MOTOR /REDUCER. CARE SHOULD BE TAKEN TO AVOID DAMAGING TO THE O-RING.

NEMA 182/184TC MOTOR FLANGES AND SOME SERVO MOTOR ADAPTERS ARE SUPPLIED WITHOUT O-RING GROOVES. FOR THESE, THE END USER MUST USE A SUITABLE LIQUID GASKET. THE GASKET SHALL BE APPLIED AS SHOWN BELOW (IN RED) AROUND THE BOLT HOLES AND PILOT FACE PRIOR TO INSTALLING THE MOTOR.

