

Reducer Seals and Input Shaft Replacement Kits

311597G

EN

*To replace the gear reducer seals and/or the input shaft on E-Flo[®] 4-Ball Piston Pumps.
For professional use only.*



Important Safety Instructions

Read all warnings and instructions in this manual and in E-Flo Repair-Parts manual 311594. Save these instructions.

Kit 15H871, Gear Reducer Seals Replacement

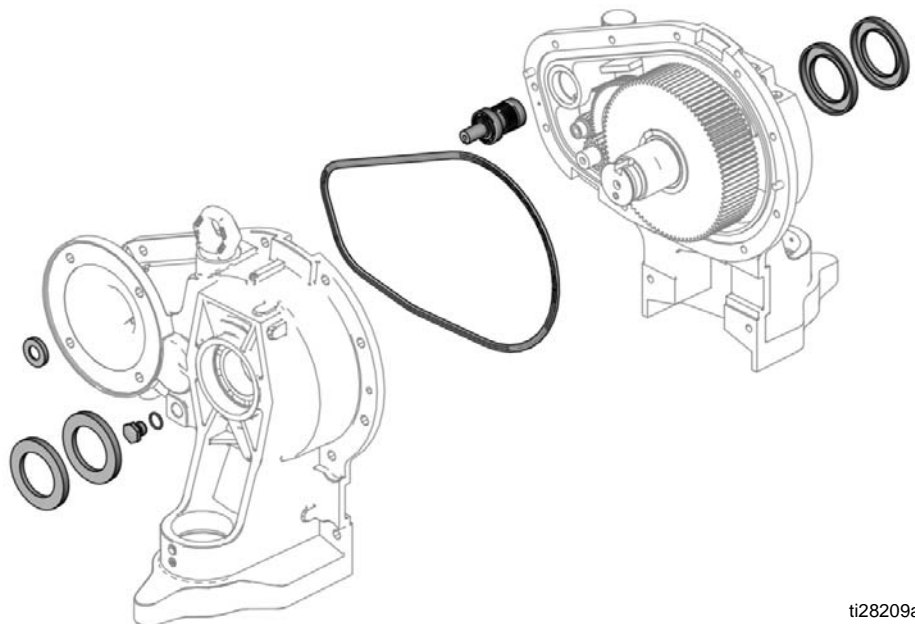
Includes seals.

Kit 26A023, Input Shaft Replacement

Includes input shaft, necessary tools, and Kit 15H871 seals.

Kit 24Y510, Gear Replacement

Use with Kit 26A023 to replace the input shaft and all three gears (see Step 9 on page 6).



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Kit Parts

Gear Reducer Seals Replacement Kit 15H871

This kit includes parts to replace all gear reducer seals. Use all parts in the kit. Output Shaft Seal Tool Kit 15J926 is available for removal and installation of the output shaft seals.

Ref. No.	Part No.	Description	Qty
5	n/a	SCREW, cap, socket-head; 5/8-11 x 3 in. (76 mm)	4
12	116719	SCREW, 8-32 hex washer head	4
31	100664	SCREW, set, socket-head; 1/4-20 x 1/2 in. (13 mm)	2
109	n/a	SEAL, input shaft	1
116	n/a	SEAL, output	4
118	15H432	PLUG, oil drain, with gasket	1

Parts designated n/a are not available separately.

Input Shaft Replacement Kit 26A023

This kit includes the input shaft, gear reducer seals, fasteners, and necessary specialized tools. Use all the new parts in the kit.

Ref. No.	Part No.	Description	Qty
5	n/a	SCREW, cap, socket-head; 5/8-11 x 3 in. (76 mm)	4
12	116719	SCREW, 8-32 hex washer head	4
31	100664	SCREW, set, socket-head; 1/4-20 x 1/2 in. (13 mm)	2
109	n/a	SEAL, input shaft	1
116	n/a	SEAL, output	4
118	15H432	PLUG, oil drain, with gasket	1
201	n/a	SCREW, cap, socket-head; 1/2-13 x 3/4 in. (19 mm)	2
202	n/a	WASHER, spring	2
203	288001	SHAFT, input	1
204	n/a	SCREW, hex head, flange; 1/4-20 x 1.75 in (44 mm)	3
205	n/a	SCREW, drywall; 8-18 x 2.5 in. (63 mm)	3
206	15H271	SEAL, gearbox	1
207	n/a	TOOL; included in Kit 15J926	1
208	n/a	TOOL; included in Kit 15J926	1
209	n/a	TOOL; included in Kit 15J926	1

Parts designated n/a are not available separately.

Pressure Relief Procedure

WARNING

System pressure can cause the pump to cycle unexpectedly, which could result in serious injury from splashing or moving parts. Follow the Pressure Relief Procedure before servicing the equipment.

1. Set START/STOP switch to STOP.
2. Push in SECURE DISABLE switch.
3. Open the back pressure regulator and all fluid drain valves in the system, having a waste container ready to catch drainage. Leave open until you are ready to pressurize system again.
4. Check that the pressure gauges on fluid supply and return lines read zero. If gauges do not read zero, determine cause and carefully relieve pressure by VERY SLOWLY loosening a fitting. Clear obstruction before pressurizing the system again.

Remove the Motor and Coupler

WARNING


To avoid injury from splashing fluid or moving parts, follow the pressure relief procedure, wear appropriate protective equipment, and keep fingers clear of pinch points.

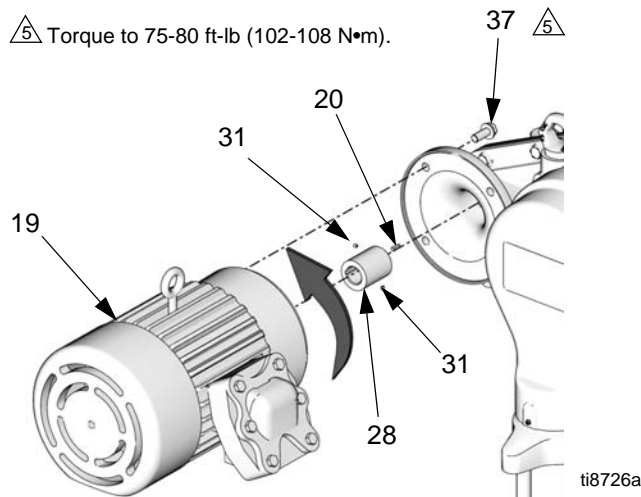
1. Jog the motor to bring the motor-side pump to the bottom of its stroke.
2. Follow the Pressure Relief Procedure, preceding section.
3. Shut off electrical power to the unit.
4. Remove the motor and coupler as follows:

NOTE: See FIG. 1 for all NEMA 182/184 TC Frame electric motors. See FIG. 2 for IEC 112M/B5 and 100L/B5 Frame electric motors.

- a. While one person supports the motor (19), remove the screws (37). Pull the motor away from the gear reducer.


NOTE: If the motor does not come off the gear reducer easily, **stop immediately**. See **Motor/Coupler is Difficult to Remove**, in your E-Flo Repair-Parts manual.

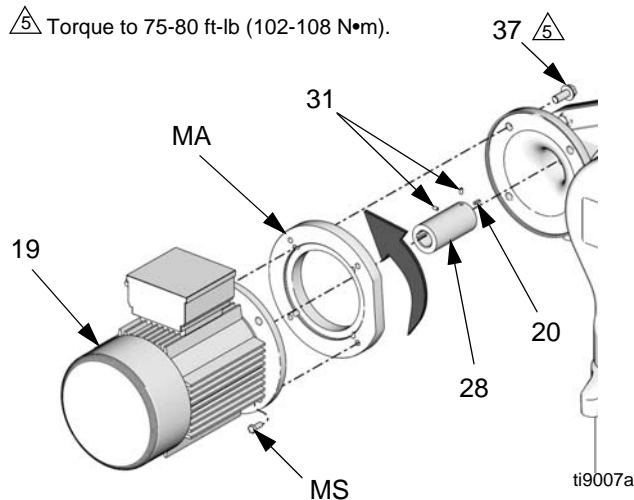
 Torque to 75-80 ft-lb (102-108 N•m).



Motor Rotation
(counter-clockwise as viewed from fan end)

FIG. 1. NEMA 184/182 TC Frame Electric Motors

 Torque to 75-80 ft-lb (102-108 N•m).



Motor Rotation
(counter-clockwise as viewed from fan end)

FIG. 2. IEC 112M/B5 or 100L/B5 Frame Electric Motors

- b. See FIG. 3. Loosen both setscrews (31). Insert the coupler removal tool (T) into the coupler (28). Turn nut clockwise until tight, then pull the

coupler off the gear reducer input shaft (105) by turning hex-head screw (HS) clockwise.

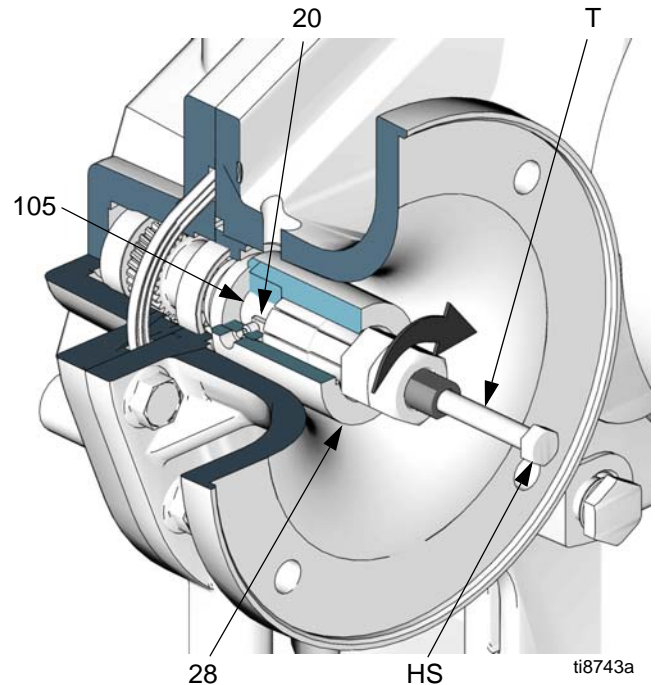


FIG. 3. Motor Coupler Removal

NOTE: A faint clicking may be heard while the motor is running. This is normal and is due to necessary clearances between the coupler (28), motor shaft, and motor key. If the intensity increases significantly over time, it could indicate the coupler is wearing and should be replaced. **Do not open the gear reducer.** The gear reducer is not normally field serviceable beyond the maintenance recommended in this manual.

Opening the gear reducer voids the warranty. Graco has included instructions to **Replace the Input Shaft**, page 5, for those who choose this option.

Remove the Reducer Seals



WARNING





To avoid injury from moving parts, keep fingers clear of pinch points. Wear appropriate personal protective equipment.

Repair the motor side seals first, as follows.

1. Remove four screws (12) and both covers (21, 32). FIG. 5 shows the cover (32) on the side opposite from the motor; the motor side cover is (21).
2. See FIG. 4. On the motor side of the gear reducer, unscrew the oil drain plug (118) with gasket. Pierce the input seal (109) with a hardened sheet metal screw and pull it out.

 Pack cavity with grease before installing seal.

 Insert until 109 contacts shoulder.

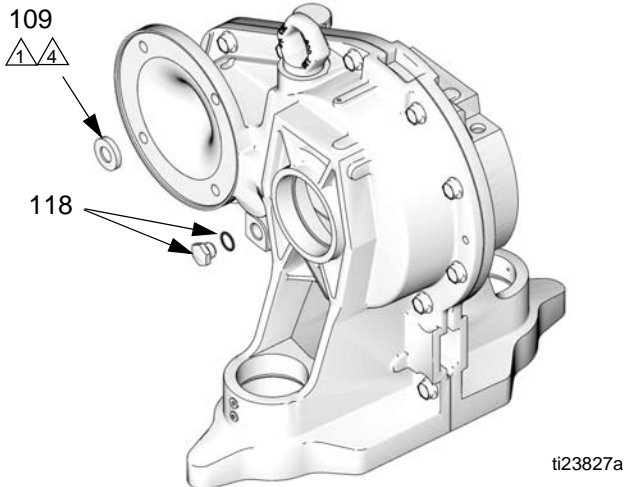




FIG. 4. Gear Reducer Seals

3. Disconnect the crank arm as follows:
 - a. Place a clean rag over the top of the slider cylinder (2) to prevent debris from falling into the slider assembly during disassembly.
 - b. Remove the 2-piece shield (72) by inserting a screwdriver straight into the slot, and using it as a lever to release the tab. Repeat for all tabs. **Do not** use the screwdriver to pry the shields apart.

- c. Place a 3/4 in. wrench on the slider piston (9) flats (just above the coupling nut), to keep the slider piston/connecting rod from turning when you are loosening the coupling nut (14). Orient the wrench so it is braced against one of the tie rods (3). Applying excessive force to the slider piston/connecting rod can shorten the life of the lower pin bearing.

 Place clean rag over slider cylinder (2).

 Hold slider piston (9) flats with 3/4 in. wrench, and brace against tie rod (3).

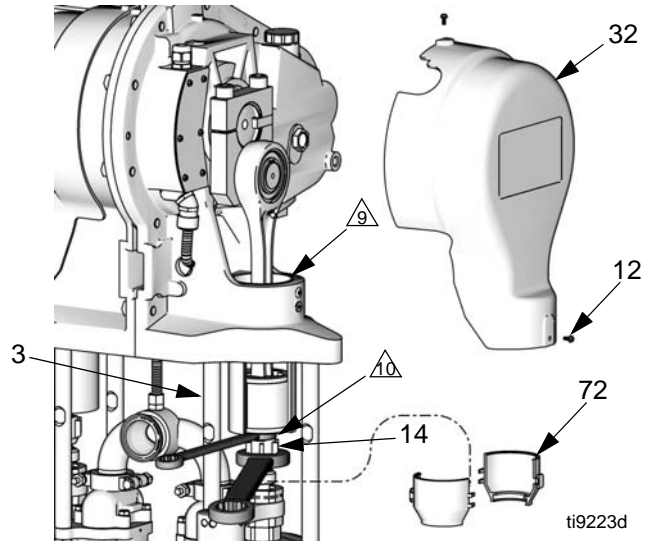


FIG. 5. Remove Coupling Nut

- d. Using a 1-5/8 in. open-end wrench, unscrew the coupling nut (14) from the slider piston (9) and let it slide down onto the pump piston rod. Be careful not to lose the collars (13).
- e. See FIG. 6. Using a 1/2 in. hex driver, unscrew the two cap screws (5). Remove the crank arm cap (38) and key (39). If necessary, use a plastic hammer to break these parts loose.
- f. See FIG. 7. Rotate the crank arm (4) to allow it to be removed from the output shaft (OS).

9 Place clean rag over slider cylinder (2).

12 Apply antiseize lubricant (LPS®-04110 or equivalent) to screw (5) threads. Torque key-side screw to 210-230 ft-lb (283-310 N•m) first, then torque gap side screw to 210-230 ft-lb (283-310 N•m). Torque screws an additional 2-3 times each, or until they stop turning when torqued to 210-230 ft-lb (283-310 N•m).

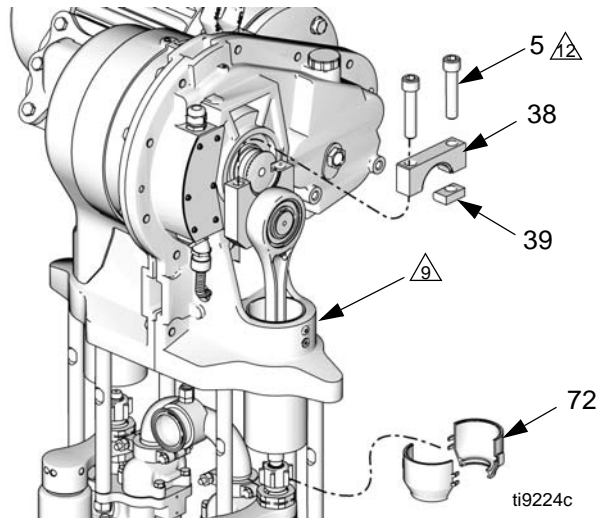


FIG. 6. Remove Crank Arm Cap

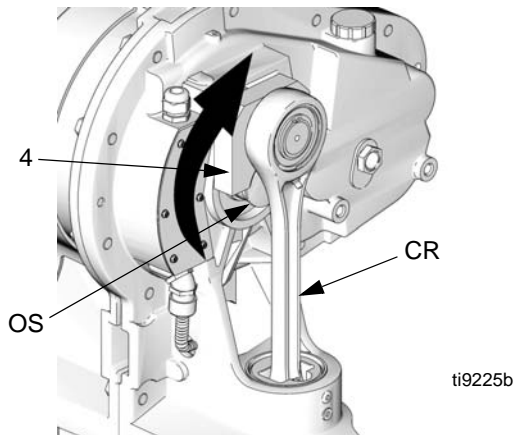


FIG. 7. Rotate Crank Arm

4. Remove the two output seals (116) as follows:
 - a. See FIG. 8. Align the tool (C) with the output shaft (OS). Hold it in place.
 - b. Drill 7/64 in. (2.8 mm) diameter pilot holes in the seals (116), using the holes for the sheet metal screws (D) as a template. Install the sheet metal screws (D) through the tool and into the seals (116).

c. Tighten screws (D) evenly to pull both seals out.

NOTICE

Do not use a drill to tighten the screws, damage may occur.

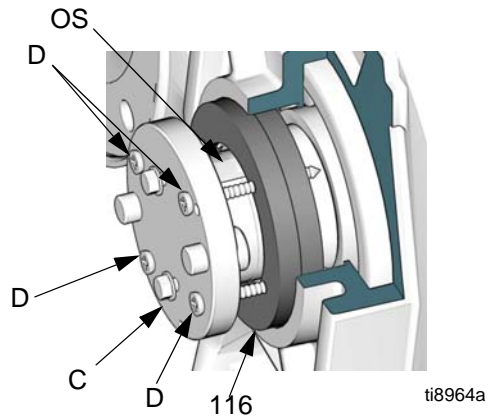


FIG. 8. Remove Output Shaft Seals

Replace the Input Shaft

If you are not replacing the input shaft, go to **Reinstall the Reducer Seals**, page 7. If you choose to replace the input shaft, note that opening the gear reducer voids the Graco warranty.

! WARNING



To avoid injury from moving parts, keep fingers clear of pinch points. Wear appropriate personal protective equipment.

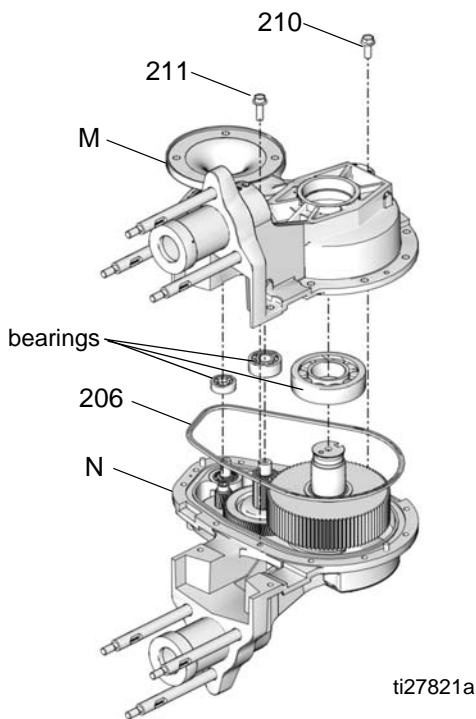
1. Follow the directions in the E-Flo pump manual to remove and set aside the fluid section.
2. Use a lift capable of supporting at least 600 lb (272 kg) to carefully lay the gear reducer flat with the non-motor side on the bench.
3. Connect two straps to the motor side of the gear reducer.
4. Remove the eleven regular cap screws (210) and the one locking screw (211).

- Use a flathead screw driver to work around the housing to pry apart the two halves while using the lift and two straps to apply separation force.

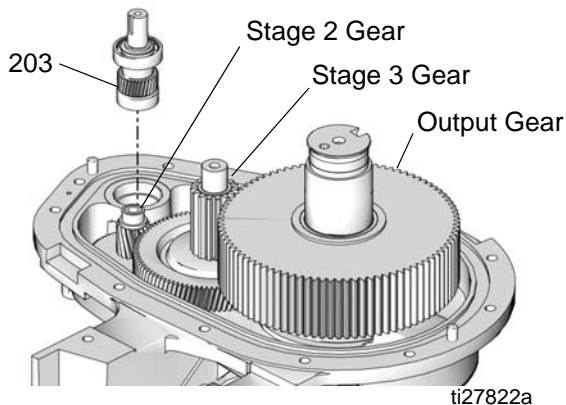
NOTICE

To avoid damage, keep the two halves of the gear reducer parallel during separation.

- Use a lift to remove the motor side (M) of the gear-box housing. To prevent damage, be sure to contain any bearings that fall out.
- Remove the gearbox seal (206).



- Remove the input shaft (203). If necessary, use the coupler as a puller. Keep the shaft level and remove it straight up.



- Do not remove the Stage 2, Stage 3, or Output gear or shaft, unless damaged.

If all gears must be replaced, purchase Kit 24Y510. Kit 24Y510 must be used with Kit 26A023. It is not a stand-alone product.

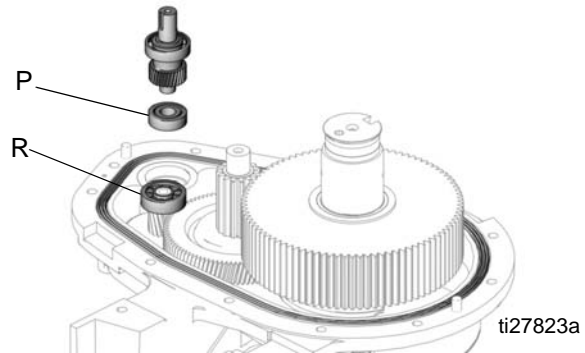
If only the input shaft must be replaced, skip to step 10.

- Secure two straps to the output gear and remove it, followed by the Stage 3 gear, then the Stage 2 gear, then the input shaft.
- Remove and replace the spring washers on gear Stages 2, 3 and Output. For Stage 2, orient the washers so that the open portions are not directly above one another.
- Install the new gears in reverse order, using a lift and straps. Start with Stage 2, then Stage 3, and end with the Output Stage.

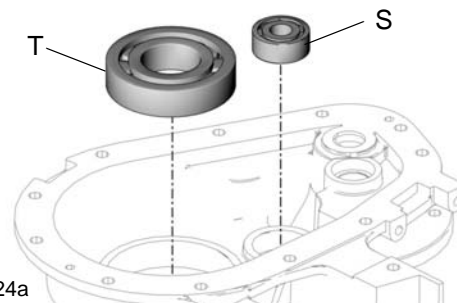
- If the rear bearing (P) on the input shaft remains in the housing, use 2 screw drivers to slowly pry it out. If the Stage 2, Stage 3 and Output Shaft bearings remain in the housing, leave them installed.

- Grease and install the input shaft bearing (P) and the Stage 2 bearing (R, if removed from housing).

- Grease the bearings on the new input shaft (203). Install it so that the shaft is fully seated and the top bearing is flush with the housing.



- Then, grease and install the Stage 3 bearing (S) and Output Shaft bearing (T), if they were removed from the housing. Make sure that these bearings are fully re-seated in the housing.



- Use a strap to lift the motor side of the gearbox housing. The two halves must be exactly parallel. Adjust the strap as needed.

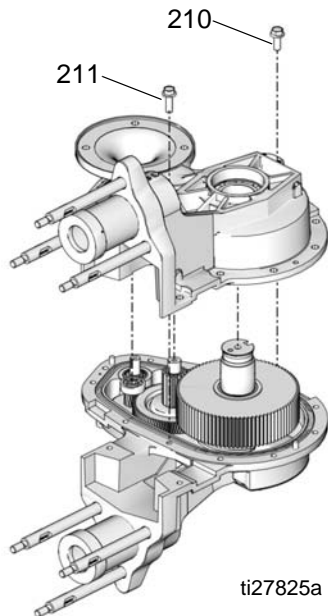
It is critical to successful reassembly that the two halves of the gear reducer be exactly parallel before fitting them together.

- The two halves should go together smoothly and easily. Use small taps and do not force.

NOTICE

To avoid damage, do not force the two halves of the gear reducer together.

- Be sure that the input shaft turns freely. To test, turn the input shaft by hand or with a drill many turns, until the Stage 3 shaft turns one complete rotation.
- Replace the screws (210). One locking bolt (211) goes in the center. It is the longer one, with a hole. Torque to 70-80 ft.-lb (95-108 N•m).



Reinstall the Reducer Seals


- Place tape over the input shaft keyway, to prevent damage to the new seal. Pack the input shaft seal cavity with Part No. 107411 Grease. Install the input seal (109*) with the lip facing in, until the seal contacts the shoulder of the gear reducer housing. Remove the tape.
- Ensure that the included gasket is on the oil drain plug (118), then screw the plug into the gear reducer. Tighten to 25 ft-lb (34 N•m).
- Install the two output seals (116) as follows:
 - Place tape over the output shaft keyway, to prevent damage to the new seals.
 - Pack the output shaft seal cavity with Part No. 107411 Grease.


NOTICE

The keyway is sharp and will damage new seals if not taped over.

- See FIG. 9. Place **one** output seal (116) over the output shaft (OS), with the lips facing in.
- Remove the sheet metal screws (D) from the tool (C). Place the tool (C) onto the output shaft (OS), fitting one screw (A) into the slot of the shaft. Turn the tool 90°. Tighten the screws (G) to lock it onto the shaft.
- Place the installation tool (E) against the seal (116) as shown.
- Install the tool cover (F) and evenly tighten the screws (J) to seat the seal on the output shaft (OS). Turn each screw 1-1/2 to 2 turns, working in a circular pattern. Stop when the tool is about 1/8 in. (3.2 mm) from the outside of the housing and you feel the seal seat on the housing.
- Remove the tools.

- h. Repeat for the second seal (116). Stop when the seal is flush with the housing. The seal will be 0.120 in (3 mm) in from the casting. The step on the tool will measure 15/32 in. (12mm). Take three measurements 120° apart, from the surface of the seal to the face of the housing (H). The three measurements must be within .020 in. (0.5 mm). If not, repeat steps d through f. Remove the tape.

 Pack cavity with grease before installing seal.

 Insert until 116 contacts shoulder.

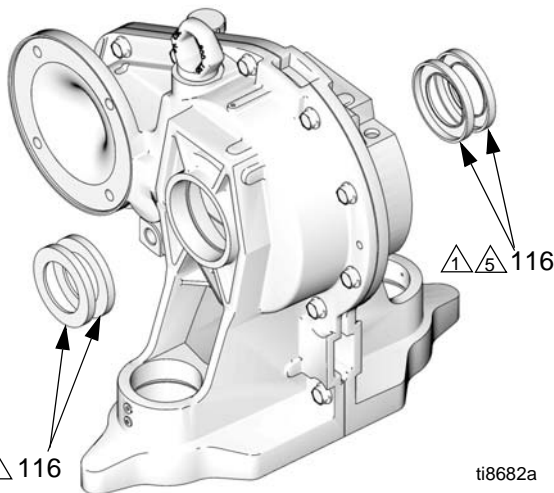
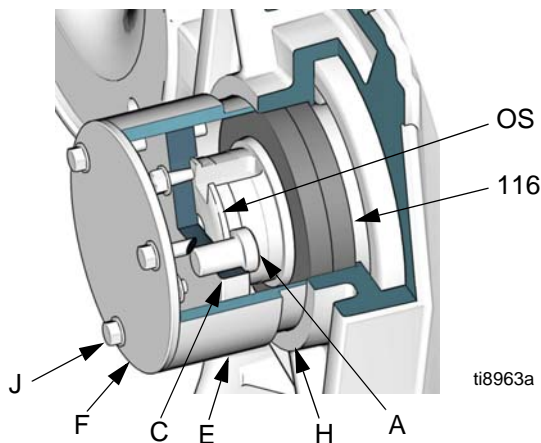


FIG. 9: Gear Reducer Seal Kit

Reconnect the Crank Arm and Shaft

1. Position the crank arm (4) to engage the output shaft (OS), and rotate it to the bottom of the output shaft.
2. Place a clean rag over the top of the slider cylinder (2) to prevent debris from falling into the slider assembly during reassembly.
3. See FIG. 6. Apply antiseize lubricant (LPS[®]-04110 or equivalent) to the threads of the cap screws (5). Install the key (39), crank arm cap (38), and cap screws (5), oriented as shown. While the gap-side screw is still loose, torque the key-side screw to 210-230 ft-lb (283-310 N•m). Then torque the gap-side screw to 210-230 ft-lb (283-310 N•m). Torque screws an additional 2-3 times each, or until they stop turning when torqued to 210-230 ft-lb (283-310 N•m).
4. Ensure that the collars (13) are in place in the coupling nut (14).
5. Place a 3/4 in. wrench on the flats of the slider piston (9), to keep it from turning when you are tightening the coupling nut (14). Orient the wrench so it is braced against one of the tie rods (3) or the pump stand. Tighten the coupling nut (14) onto the slider piston (9) and torque to 75-80 ft-lb (102-108 N•m).
6. Install the shields (72) by engaging the bottom lips with the groove in the wet-cup cap. Snap the two shields together.

Reinstall the Coupler and Motor

NOTE: A NEMA 182/184 TC Frame is required to mate with the gear reducer. See your E-Flo Repair-Parts manual for information about coupler kits and mounting kits which are required for other motor configurations.


1. Thoroughly clean the input shaft and motor shaft, removing any debris. This ensures proper clearance and fit for the coupler.
2. See FIG. 10. Assemble the key (20) in the input shaft (105) keyway. Assemble the two setscrews (31) in the coupler (28), ensuring that they do not encroach on the keyway or the input shaft bore of the coupler.

- Slide the coupler into the gear reducer so the key and input shaft mate with the coupler. Slide on until coupler bottoms out on the tapered step of the shaft.

NOTICE

Ensure that neither the input key (20) or the end of the coupler (28) motor shaft bore extend past the end of the input shaft (105). This could cause the motor shaft to bottom out on the coupler, causing excessive heat and bearing damage.

- Tighten setscrews to 66-78 in-lb (7.4-8.8 N•m).
Apply antiseize lubricant (LPS[®]-04110 or equivalent) to bore of coupling.

 Apply antiseize lubricant (LPS[®]-04110 or equivalent) to bore of coupling (28).

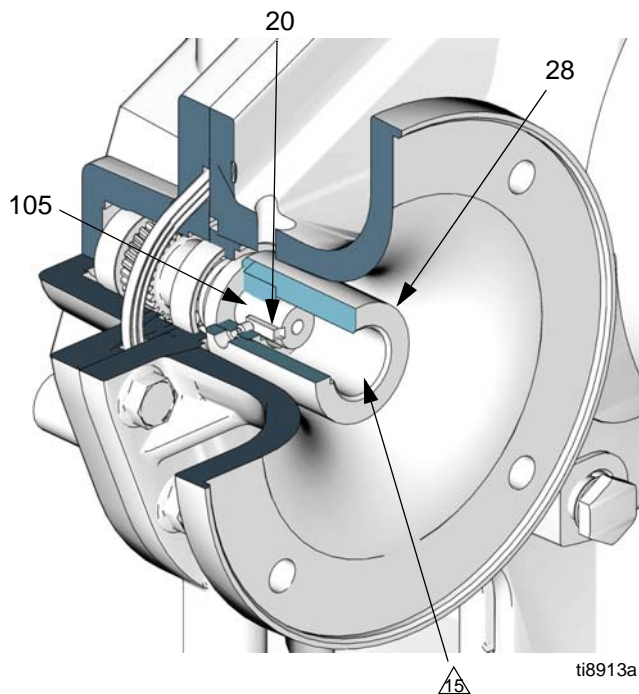


FIG. 10. Motor Coupler Installation

When installing an IEC 112M/B5 or 100L/B5 Frame electric motor, ensure that the motor adapter (MA) and screws (MS) are in place before mounting the motor on the gear reducer. See FIG. 2.

NOTICE

When installing the electric motor, always ensure that the motor shaft key cannot move out of position. If the key works loose it could cause excessive heat and equipment damage.

- Lift the motor (19) into position. Align the key on the motor shaft with the mating slot of the motor coupler, and the four mounting holes with the holes in the gear reducer (1). Slide the motor into place.
- While one person supports the motor (19), install the screws (37). Torque to 75-80 ft-lb (102-108 N•m).
- Turn on electrical power to the unit.
- Jog the motor to bring the side opposite from the motor to the bottom of its stroke.
- Shut off electrical power to the unit.
- Repeat 3, page 7, to replace the output seals on the side opposite from the motor.
- Reinstall the covers (21, 32) and screws (12).
- Refill with gear oil.

Graco Information

For the latest information about Graco products, visit www.graco.com.

For patent information, see www.graco.com/patents.

TO PLACE AN ORDER, contact your Graco distributor or call to identify the nearest distributor.
Phone: 612-623-6921 **or Toll Free:** 1-800-328-0211 **Fax:** 612-378-3505

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Graco reserves the right to make changes at any time without notice.*

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