

# Gear Reducer Replacement Kit

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ENG

To replace the gear reducer assembly on E-Flo® 4-Ball Piston Pumps.  
For professional use only.

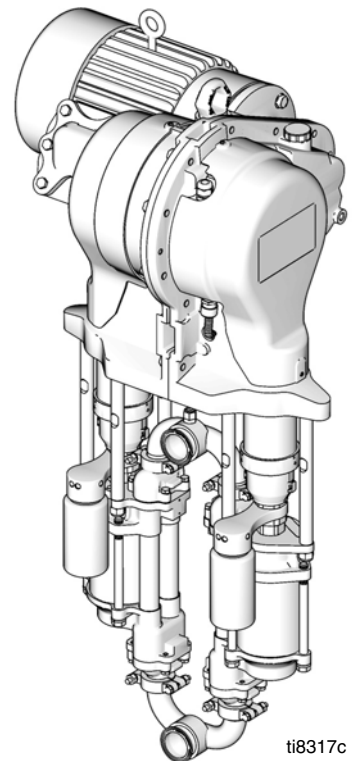
**Part No. 15H886, for E-Flo 2000/3000/4000 Pumps**

**Part No. 289550, for E-Flo 1500 Pumps**

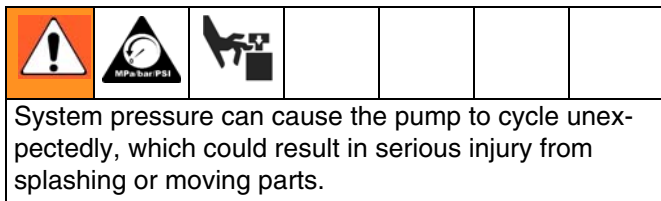


**Important Safety Instructions**

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



# Pressure Relief Procedure



1. Set START/STOP switch (ST) to STOP.
2. Push in SECURE DISABLE (SD) 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 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 system again.

## Kit Parts

**NOTE:** The Gear Reducer Kit includes parts to replace the entire gear reducer. Parts included in the kit are marked with an asterisk, for example (5\*). Use all the new parts in the kit.

Ref. No.	Part No.	Description	Qty
1*	n/a	GEAR REDUCER, 75:1	1
5*	n/a	SCREW, cap, socket-head; 5/8-11 x 3 in. (76 mm)	4
12*	116719	SCREW, 8-32 hex washer head	14
15*	108683	NUT, lock, hex	6
20*	n/a	KEY, square; Kit 15H886 only	1
24*	100049	SCREW, cap, hex-head; 1/2-13 x 1.0 in. (25 mm); not shown-for mounting to pump stand	4
27*	n/a	PLUG, TDC sensor port	1
28a*	n/a	MOTOR COUPLER; Kit 15H886 only	1
31*	100664	SCREW, set, socket-head; 1/4-20 x 1/2 in. (13 mm)	4
33*	n/a	GASKET, circuit board	1
37*	n/a	SCREW, cap, flange-head; 1/2-13 x 1.25 in. (31 mm)	4

*Parts designated n/a are not available separately.*

# Kit Installation

## Disassembly



1. Jog the motor to bring the stand side lower to the bottom of its stroke. This provides access to the coupling nut (14).
2. Relieve pressure, page 2.
3. Shut off electrical power to the unit.
4. Remove the screws (12) and both covers. FIG. 1 shows the cover (32) on the stand side; the motor side cover is (21).
5. Place a clean rag over the top of the slider cylinder (2) to prevent debris from falling into the slider assembly during disassembly.

Place clean rag over slider cylinder (2).

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

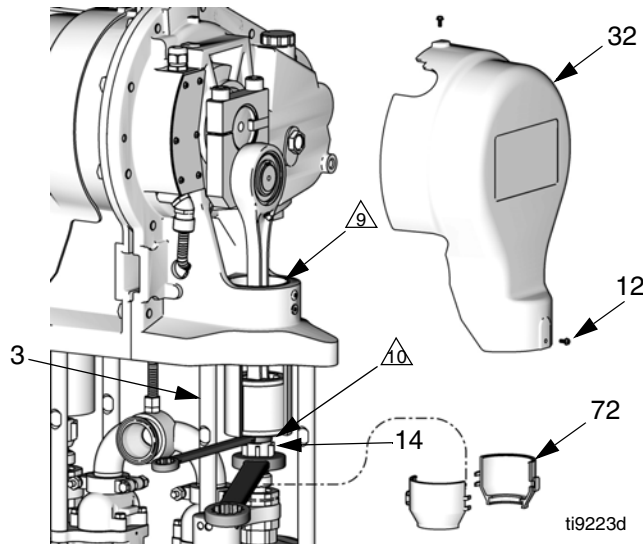


FIG. 1. Remove Coupling Nut

6. 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.

7. 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.
8. 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).
9. See FIG. 2. 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.
10. See FIG. 3. Rotate the crank arm (4) to allow it to be removed from the output shaft (OS).
11. Pull the crank arm/connecting rod/slider piston assembly (CR) up and out of the cylinder.

Place clean rag over slider cylinder (2).

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).

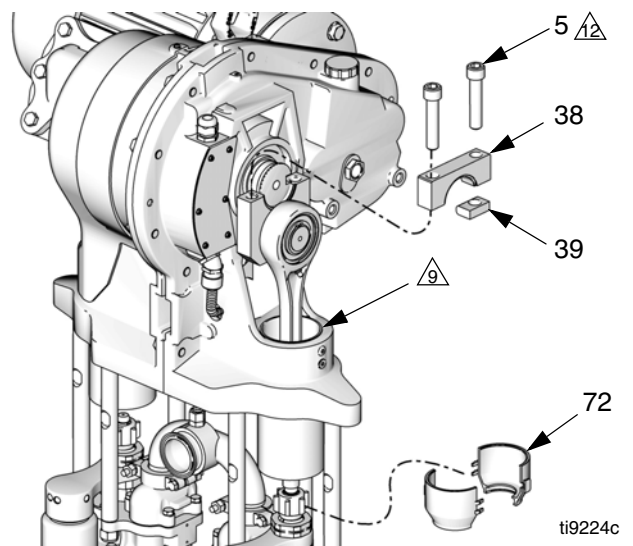
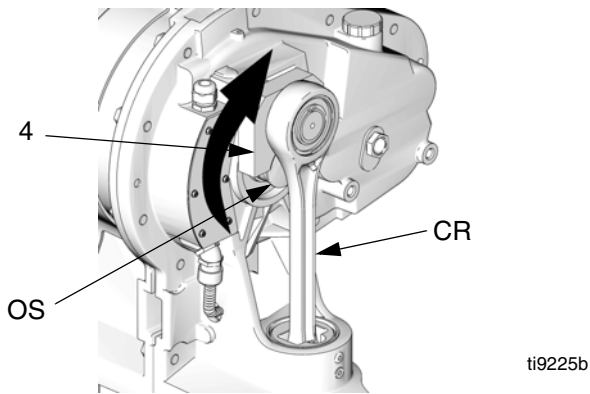


FIG. 2. Remove Crank Arm Cap

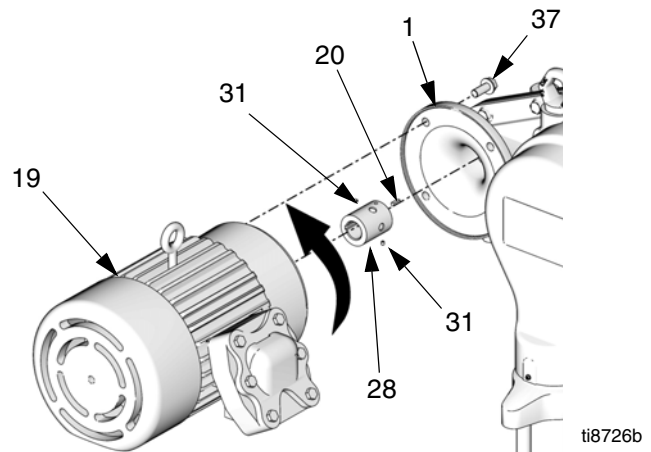


**FIG. 3. Rotate Crank Arm**

12. Turn on power and jog the motor to bring the motor side lower to the bottom of its stroke.
13. Shut off electrical power to the unit. Repeat the procedure for the motor side lower.
14. Disconnect the fluid inlet and outlet lines from the pump and plug the ends to prevent fluid contamination.
15. See FIG. 4 for NEMA 182/184 TC Frame electric motors. See FIG. 5 for IEC 112M/B5 and 100L/B5 Frame electric motors. While one person supports the motor (19), remove the screws (37). Pull the motor away from the gear reducer.

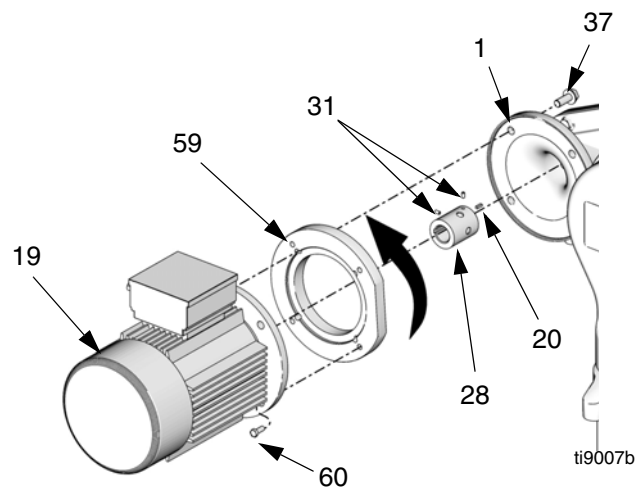
**NOTE:** If the motor does not come off the gear reducer easily, **stop immediately**. See Motor/Coupler is Difficult to Remove in your E-Flo Repair-Parts manual.

**NOTE:** Do not open the gear reducer. Opening the gear reducer voids the warranty. The gear reducer is not field serviceable beyond the maintenance recommended in this manual.



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

**FIG. 4. All NEMA 182/184 TC Frame Electric Motors**



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

**FIG. 5. IEC 112M/B5 and 100L/B5 Frame Electric Motors**

16. See FIG. 6. Remove the screws (12), circuit board cover (34), and gasket (33). Retain the cover and screws. Discard the gasket.

**NOTE:** Step 17 applies to pumps with the sensor circuit option. If your pump does not have the sensor circuit, go to step 18.

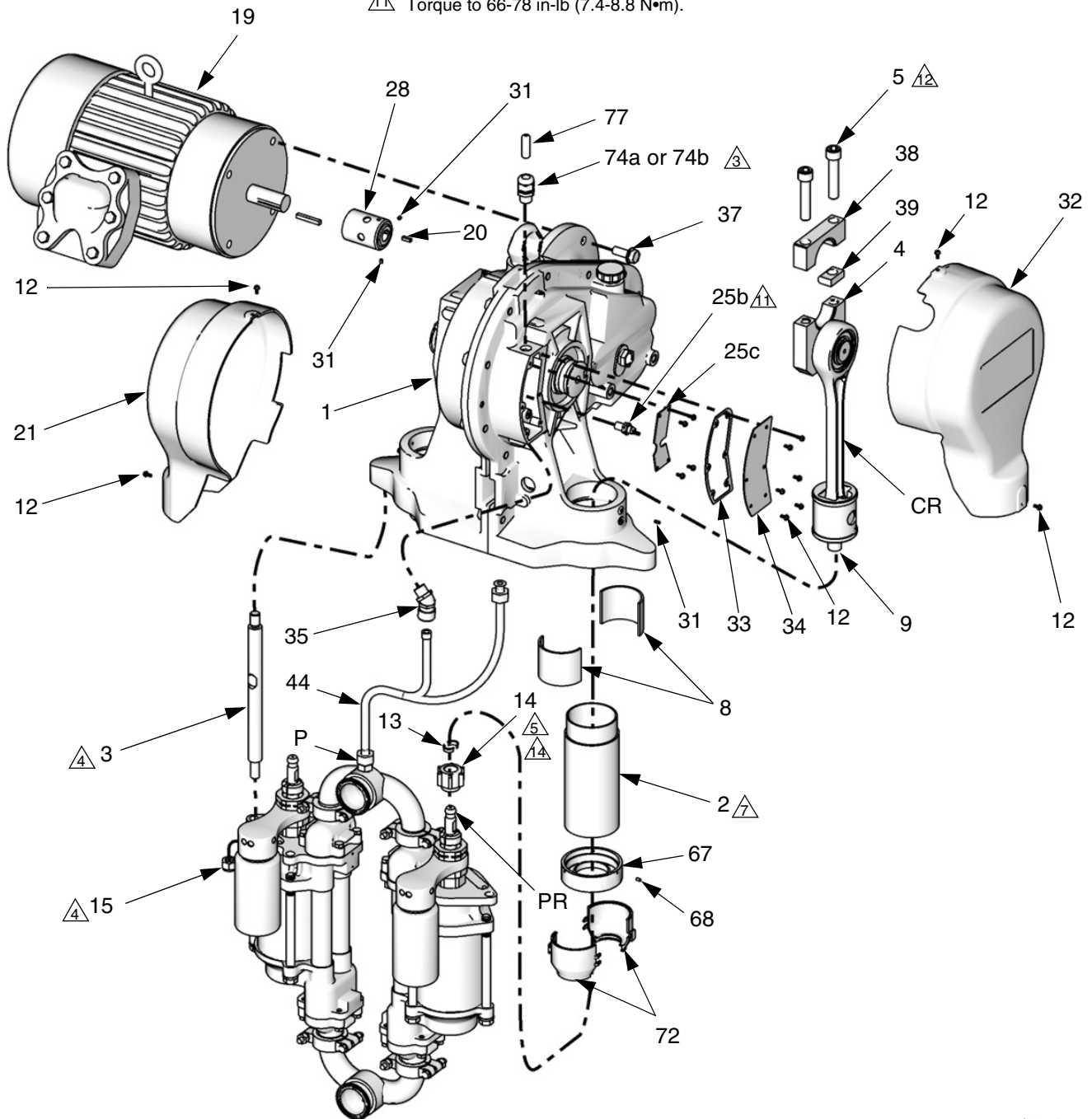
17. On pumps with the sensor circuit:

- a. See FIG. 9. Disconnect the transducer cable (25a) from J1 on the circuit board (25c). Remove and retain the ferrite (76).
- b. Disconnect the TDC sensor wires (25b) from J2 on the circuit board (25c).
- c. Disconnect the IS circuit field wires from J2 and J3 on the circuit board, and from the two terminal blocks (46). Disconnect the position sensor wires from the two terminal blocks. Retain the terminal blocks.
- d. Remove and retain the circuit board (25c) and TDC sensor (25b).
- e. Unscrew the conductive strain reliefs (74a and 35) from the gear housing. Pull the 45° strain relief (35) and the transducer conduit out of the housing. Do not disconnect the transducer from the outlet port (P).
- f. The position sensor (if present) is located on the underside of the gear housing, on the opposite side of the housing from the circuit board. Loosen the nut (M) on the conduit (44) and unscrew the sleeve (79) from the position sensor adapter (78). Remove the position sensor (80) from the port. Remove and retain the position sensor adapter (78).

18. Unscrew the locknuts (15) from the tie rods (3). Remove the entire fluid section. Unscrew the tie rods (3) from the gear housing.
19. Remove the setscrew (31). Unscrew the slider cylinder (2) from the gear reducer.

- △3 Units with a sensor circuit **must** use the conductive strain relief (74a) to ensure proper grounding of the IS field wire. See page 10.
- △4 Torque to 50-60 ft-lb (68-80 N•m).
- △5 Torque to 75-80 ft-lb (102-108 N•m).
- △7 Torque to 15-20 ft-lb (21-27 N•m).
- △11 Torque to 66-78 in-lb (7.4-8.8 N•m).

- △12 Apply antiseize lubricant 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).
- △14 Apply lithium grease.



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FIG. 6: Gear Reducer Replacement

## Reassembly

**NOTE:** Kit 15H886 includes a motor coupler (28), already installed in the gear reducer. The coupler fits all NEMA 182/184 TC Frame electric motors.

**NOTE:** To install an IEC 112M/B5 or 100L/B5 Frame electric motor, order a Motor Adapter Kit. See TABLE 1 below, and manual 311605.

**Table 1: Motor Adapter Kits**

Kit No.	Description
15H880	Coupler Kit for NEMA 182/184 TC Frame 3 or 5 HP motors. See manual 311605.
15J893	Mounts IEC 112M/B5 or 100L/B5 Frame 3 or 5 HP motors to gear reducer. See manual 311605.

1. See FIG. 7. 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.
2. 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.


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

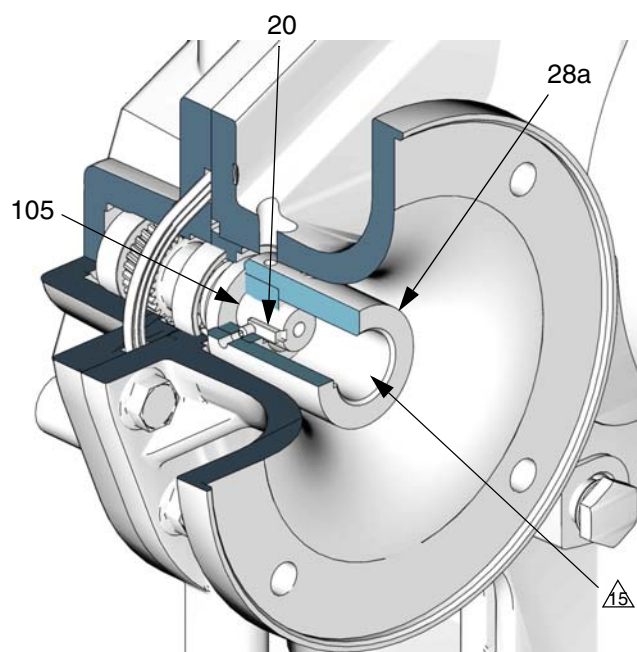
**NOTE:** When installing an IEC 112M/B5 or 100L/B5 Frame electric motor, ensure that the motor adapter (59) and screws (60) are in place before mounting the motor on the gear reducer. See FIG. 5.

### 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.

4. Lift the motor (19) into position. Align the key (36) 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.
5. While one person supports the motor (19), install the screws (37). Torque to 75-80 ft-lb (102-108 N•m).

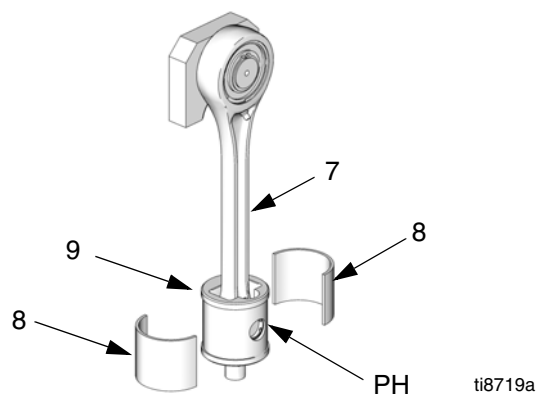
 Apply antiseize lubricant (LPS®-04110 or equivalent) to bore of coupler (28).



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**FIG. 7. Motor Coupler Installation**

6. See FIG. 6. Screw the slider cylinders (2) into the new gear reducer (1). Torque to 15-20 ft-lb (21-27 N•m). Install the setscrews (31). Torque to 30-35 in-lb (3.4-3.9 N•m).
7. Screw the tie rods (3) into the gear housing. Torque to 50-60 ft-lb (68-80 N•m).
8. Orient the lowers (22) to the gear reducer (1) as shown. Position the lowers on the tie rods (3). Screw the tie rod locknuts (15\*) onto the tie rods. Torque the locknuts to 50-60 ft-lb (68-80 N•m).
9. See FIG. 8. Ensure that the joints between the slider bearings (8) align with the pin hole (PH) in the slider piston (9).
10. Slide the piston (9) and connecting rod (7) into the cylinder (2).



**FIG. 8. Slider Bearings**

11. Position the crank arm (4) to engage the output shaft (OS), and rotate it to the bottom of the output shaft.
12. Place a clean rag over the top of the slider cylinder (2) to prevent debris from falling into the slider assembly during reassembly.
13. 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).
14. Ensure that the collars (13) are in place in the coupling nut (14).
15. 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).
16. Remove the rag from the slider cylinder.
17. Turn on power and jog the motor to bring the other drive to the bottom of its stroke. Repeat procedure to connect the other lower.

**NOTE:** Step 18 applies to pumps with the sensor circuit option. If your pump does not have the sensor circuit, go to step 19.

18. On pumps with the sensor circuit:

- a. See FIG. 9. Remove the plug from the TDC sensor port at the back of the circuit board cavity. Clean any excess sealant from the area.
- b. Apply pipe sealant and screw the TDC sensor (25b) into the port. Torque to 66-78 in-lb (7.4-8.8 N•m).

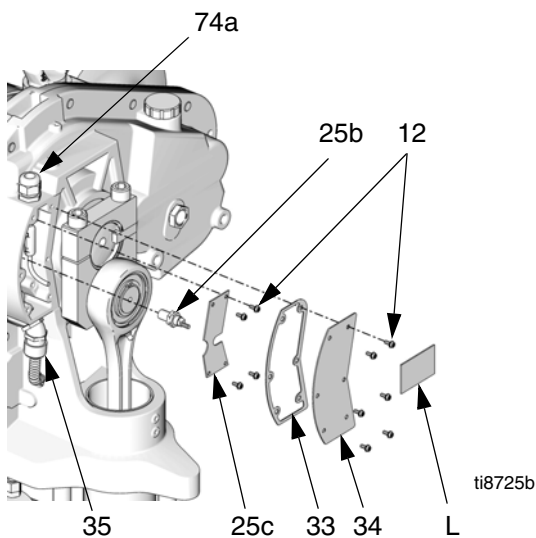
**NOTE:** TDC sensor nuts are locked in place to ensure correct positioning. Do not adjust.

- c. Install the circuit board (25c) and four screws (12).
- d. Connect the TDC sensor (25b) to J2 on the circuit board (25c).
- e. Apply thread lubricant to the position sensor adapter (78) and screw the adapter into the position sensor port on the underside of the gear housing, on the opposite side of the housing from the circuit board. Torque to 75-80 ft-lb (102-108 N•m).
- f. Install the position sensor (80\*) into the adapter (78\*) and secure with the sleeve (79\*).

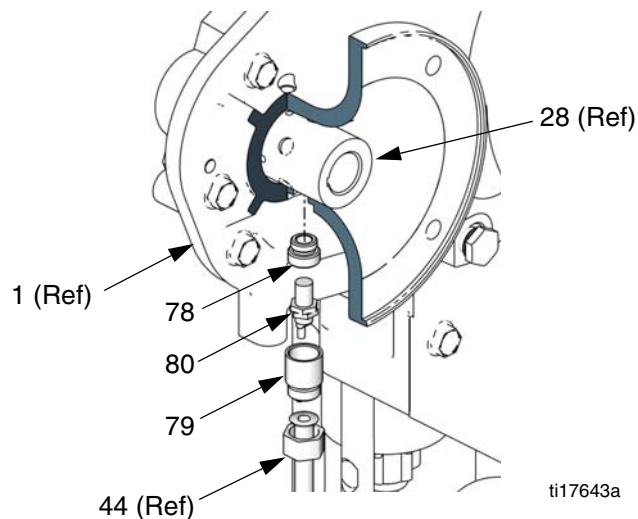
**NOTE:** The Position Sensor nuts are locked in place to ensure correct positioning. Do not adjust.

- g. Secure the conduit (44) to the position sensor sleeve (79) with the nut (M). Torque to 15-20 ft-lb (21-27 N•m).
- h. Ensure that the conductive strain relief (35) is screwed tightly into the housing.
- i. Connect the transducer's cable to J1 on the circuit board (25c). Install the ferrite (76) around the transducer leadwires.
- j. Tighten the nut (N) on the conductive strain relief (35) securely to ensure that the ground wire (G) has firm metal-to-metal contact between the nut and bushing (B).

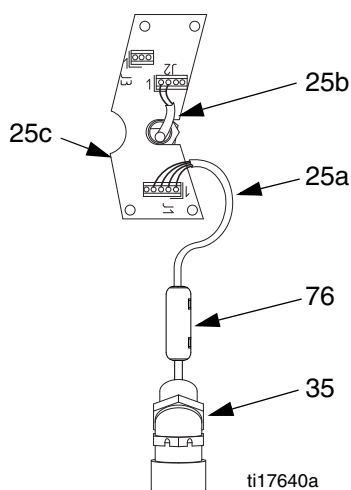




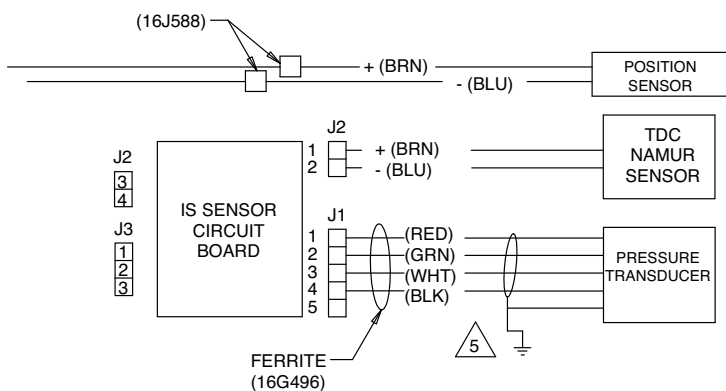
**Circuit Board Location**



**Position Sensor Parts and Location**

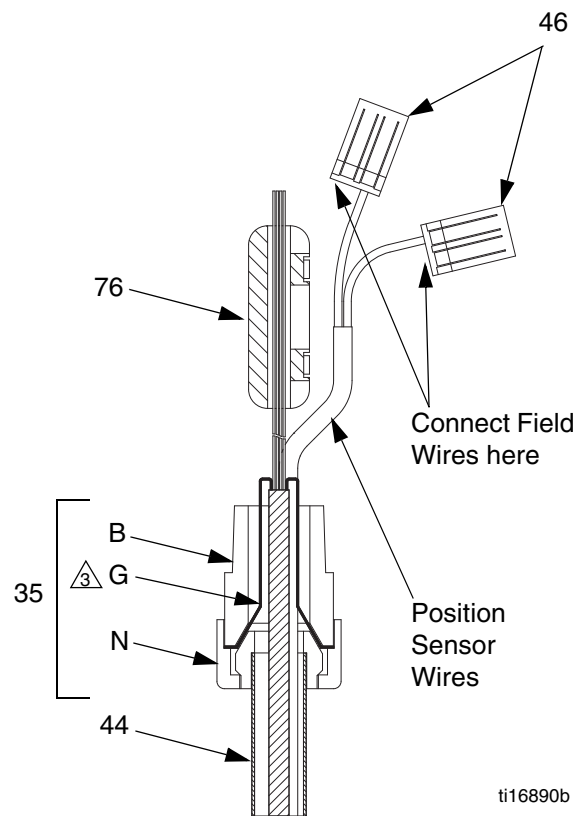


**Circuit Board Wire Connections**



△ Land shield drain and foil to conductive strain relief.

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**Pressure Transducer Grounding Schematic, and Position Sensor Terminals**

△ Tighten nut (N) securely to ensure that the shield and drain wire (G) has firm metal-to-metal contact between the nut and bushing (B).

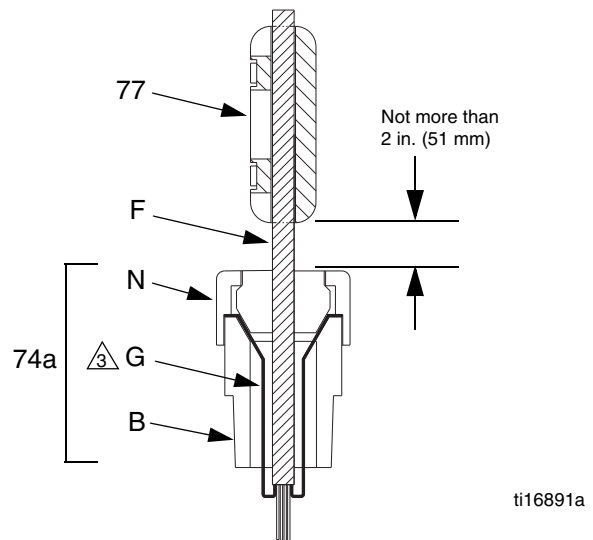
**FIG. 9. Sensor Circuit Installation**

- k. Ensure that the conductive strain relief (74a) is screwed tightly into the housing. Units with a sensor circuit **must** use the conductive strain relief to ensure proper grounding of the IS field wire.
- l. Thread the IS field wire through the conductive strain relief (74a). Connect the TDC wires to J2, the transducer wires to J3, and the position sensor wires to the two terminal blocks (46). See FIG. 9 and Electrical Diagrams in the E-Flo Repair-Parts Manual 311594.
- m. See FIG. 10. Tighten the nut (N) on the conductive strain relief (74a) securely to ensure that the ground wire (G) has firm metal-to-metal contact between the nut and bushing (B). Install the fer-rite (77) on the field wire (F), not more than 2 in. (51 mm) from the top of the conductive strain relief (74a).

19. Install the new gasket (33), the cover (34), and six screws (12).

20. Reinstall the covers (32 and 21) and screws (12).

21. Add 2 quarts of gear oil, Part No. 288414.



**IS Field Wire  
Grounding Schematic**

⚠ Tighten nut (N) securely to ensure that ground wire (G) has firm metal-to-metal contact between the nut and bushing (B).

**FIG. 10. IS Circuit Field Wire**

[illegible]

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Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

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This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

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