

APD20 Advanced Precision Driver

3A6482C

EN

Electric driver for the supply and application of sealant and adhesive materials. For professional use only.

Not approved for use in explosive atmospheres or hazardous locations.

Model 25N519

Vertical driver for E-Flo[®] SP Electric Supply Pumps

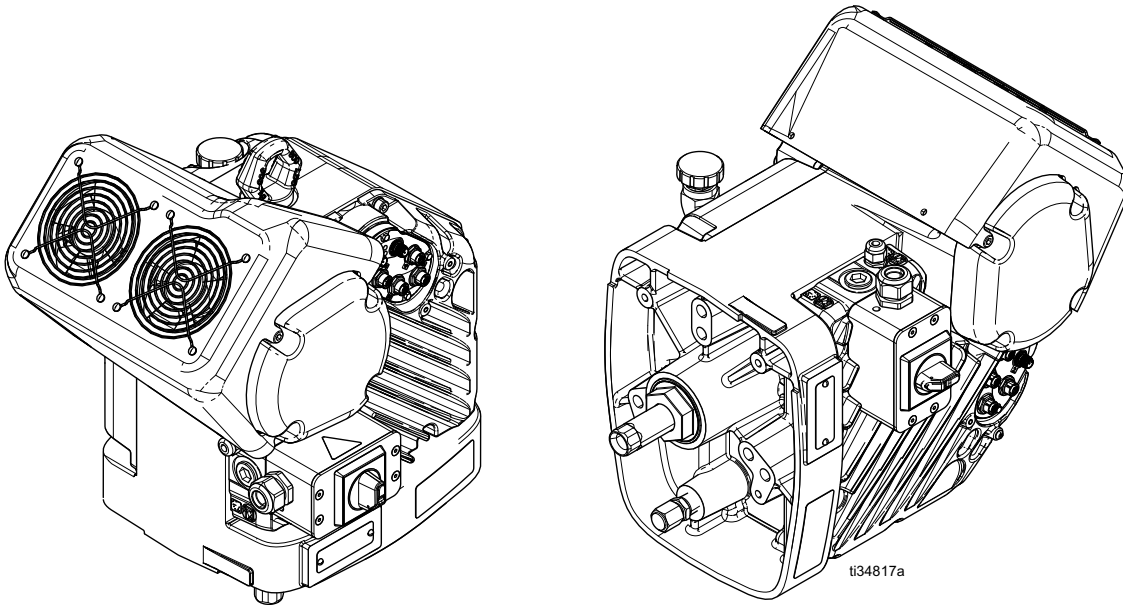
Model 25N520

Horizontal driver for EFR Electric Fixed Ratio Proportioner



Important Safety Instructions

Read all warnings and instructions in this manual and all related manuals before using the equipment. Save all instructions.



RECOGNIZED
COMPONENT



9902471



PROVEN QUALITY. LEADING TECHNOLOGY.

Conforms to UL 73
Certified to CSA C22.2 No. 68

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Related Manuals

Manuals are available at www.graco.com.

| Manual in English | Description |
|-------------------|---------------------------------------|
| 3A6165 | EFR Electric Fixed Ratio Proportioner |
| 3A6586 | E-Flo [®] SP Electric Pump |
| 3A6331 | E-Flo [®] SP Supply Systems |
| 3A6724 | E-Flo [®] SP Software |

Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbols refer to procedure-specific risks. When these symbols appear in the body of this manual or on warning labels, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

|  <h1 style="margin: 0;">WARNING</h1> | |
|---|---|
|   | <p>ELECTRIC SHOCK HAZARD</p> <p>This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock.</p> <ul style="list-style-type: none"> • Turn off and disconnect power at main switch before disconnecting any cables and before servicing or installing equipment. • Connect only to grounded power source. • All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations. |
|     | <p>FIRE AND EXPLOSION HAZARD</p> <p>Flammable fumes, such as solvent and paint fumes, in work area can ignite or explode. Paint or solvent flowing through the equipment can cause static sparking. To help prevent fire and explosion:</p> <ul style="list-style-type: none"> • Use equipment only in well-ventilated area. • Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static sparking). • Ground all equipment in the work area. See Grounding instructions. • Never spray or flush solvent at high pressure. • Keep work area free of debris, including solvent, rags and gasoline. • Do not plug or unplug power cords, or turn power or light switches on or off when flammable fumes are present. • Use only grounded hoses. • Hold gun firmly to side of grounded pail when triggering into pail. Do not use pail liners unless they are anti-static or conductive. • Stop operation immediately if static sparking occurs or you feel a shock. Do not use equipment until you identify and correct the problem. • Keep a working fire extinguisher in the work area. |

WARNING



EQUIPMENT MISUSE HAZARD

Misuse can cause death or serious injury.



- Do not operate the unit when fatigued or under the influence of drugs or alcohol.
- Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See **Technical Specifications** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See **Technical Specifications** in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request Safety Data Sheets (SDSs) from distributor or retailer.
- Do not leave the work area while equipment is energized or under pressure.
- Turn off all equipment and follow the **Pressure Relief Procedure** when equipment is not in use.
- Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.
- Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.
- Make sure all equipment is rated and approved for the environment in which you are using it.
- Use equipment only for its intended purpose. Call your distributor for information.
- Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not kink or over bend hoses or use hoses to pull equipment.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.



MOVING PARTS HAZARD

Moving parts can pinch, cut or amputate fingers and other body parts.



- Keep clear of moving parts.
- Do not operate equipment with protective guards or covers removed.
- Equipment can start without warning. Before checking, moving, or servicing equipment, follow the **Pressure Relief Procedure** and disconnect all power sources.



PERSONAL PROTECTIVE EQUIPMENT

Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. Protective equipment includes but is not limited to:

- Protective eyewear, and hearing protection.
- Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.

Component Identification

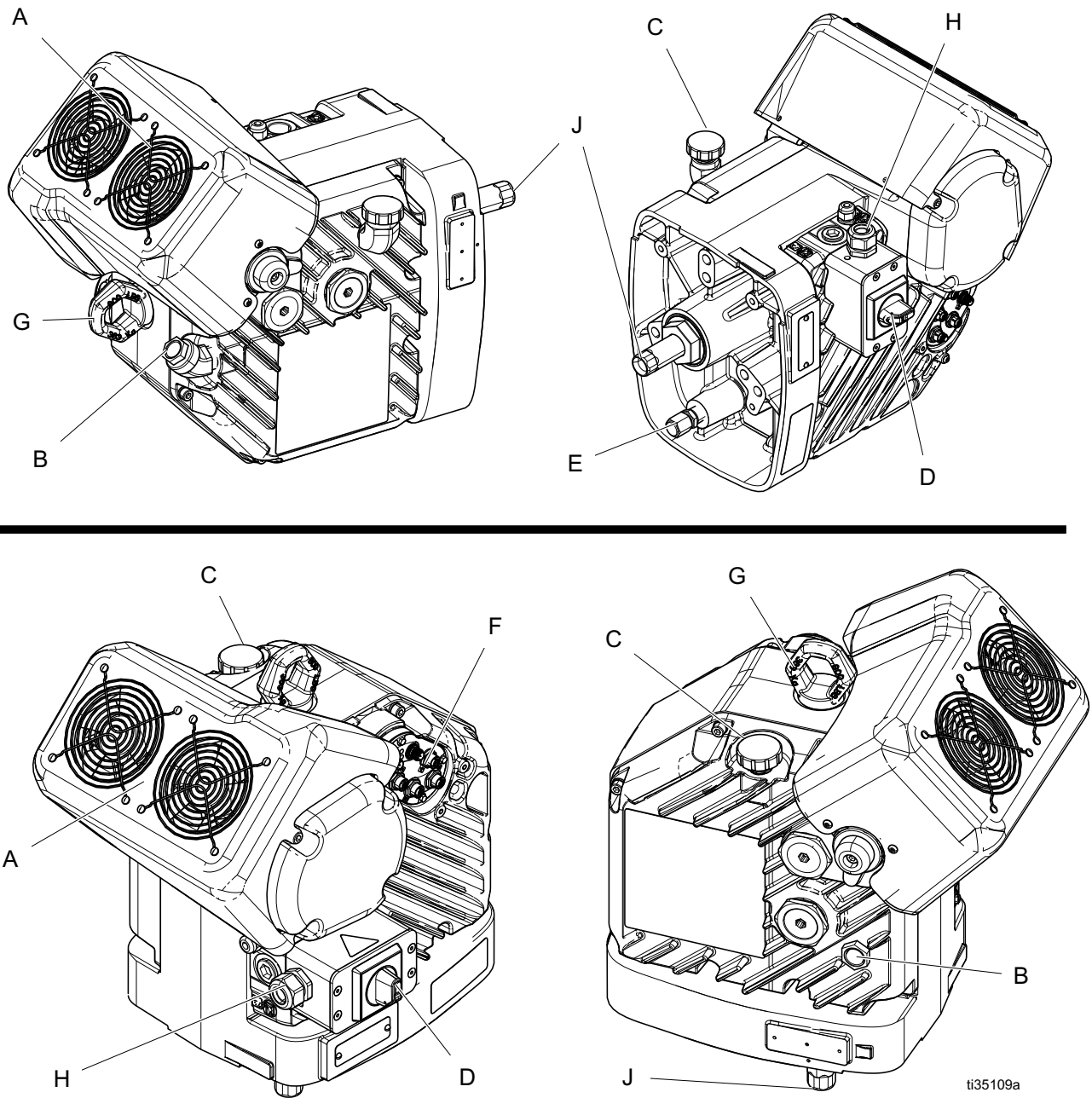



FIG. 1: Horizontal Driver (Top) and Vertical Driver (Bottom)

| Ref. | Description |
|------|---------------------------|
| A | Cooling Fan Assembly |
| B | Gearbox Oil Sight Glass |
| C | Gearbox Oil Breather Plug |
| D | Power Disconnect Switch |
| E | Gearbox Oil Drain Plug |

| Ref. | Description |
|------|----------------------------|
| F | Communication Ports |
| G | Lift Ring |
| H | Incoming Power Connections |
| J | Output Shaft |

Installation



All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.

Power Requirements

The system requires a dedicated circuit protected with a circuit breaker.

| Voltage | Phase | Hz | Current |
|-------------|-------|-------|---------|
| 200-240 VAC | 1 | 50/60 | 20 A |

Connect Power

1. Cut the power cord wires to the following lengths:

- Ground wire - 6.5 in. (16.5 cm)
- Power wires - 3.0 in. (7.6 cm)
- Add ferrules as necessary

NOTE: The power cord is not supplied with the driver.

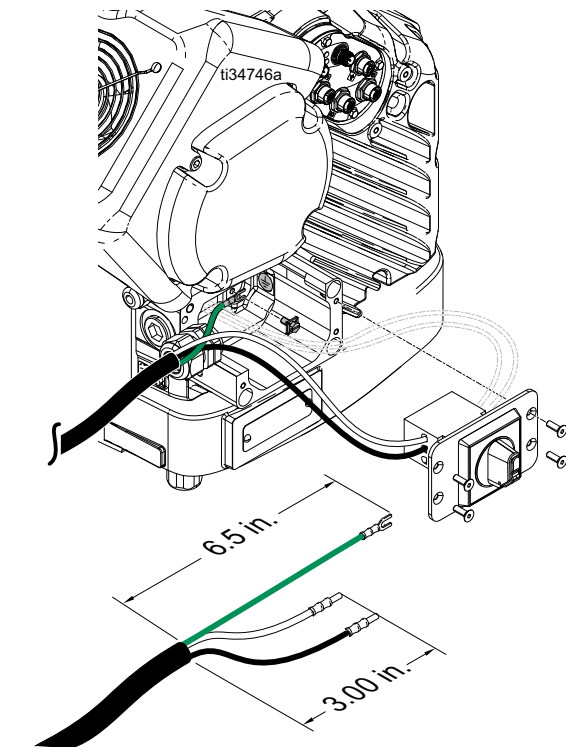


FIG. 2: Power Cord

2. Bring the cord to the unit. Remove four screws to separate the junction box cover (DA) and the attached power disconnect switch (D) from the junction box (DB).

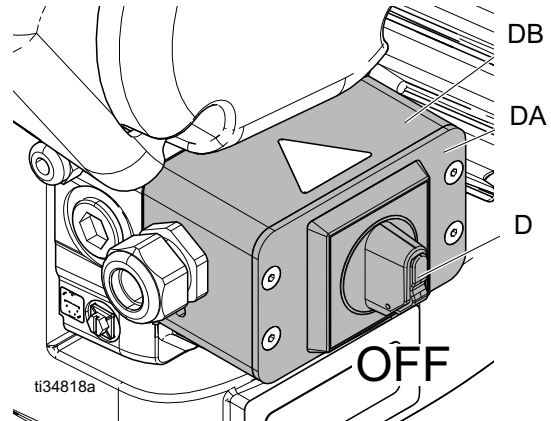


FIG. 3: Power Disconnect Switch

3. With the power disconnect switch (D) and the junction box cover (DA) detached from the driver, verify that the wires inside the junction box are installed as seen in FIG. 4.

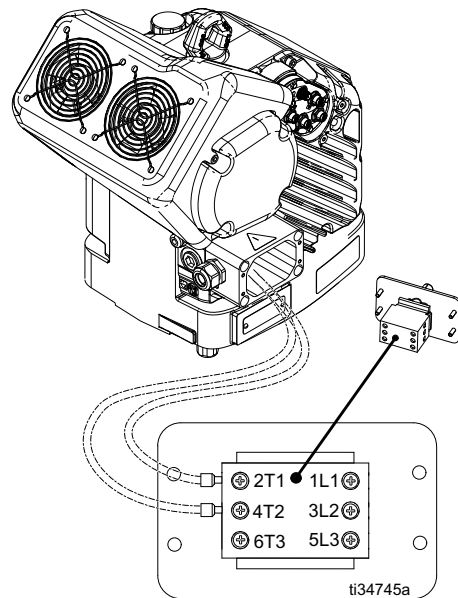


FIG. 4: Terminal Connections

4. Insert power cord (from step 1) through the cord grip and into the junction box.
 5. Install power wires into terminals 1L1 and 3L2. See FIG. 4.

- Attach the ground wire to the ground terminal inside of the junction box.

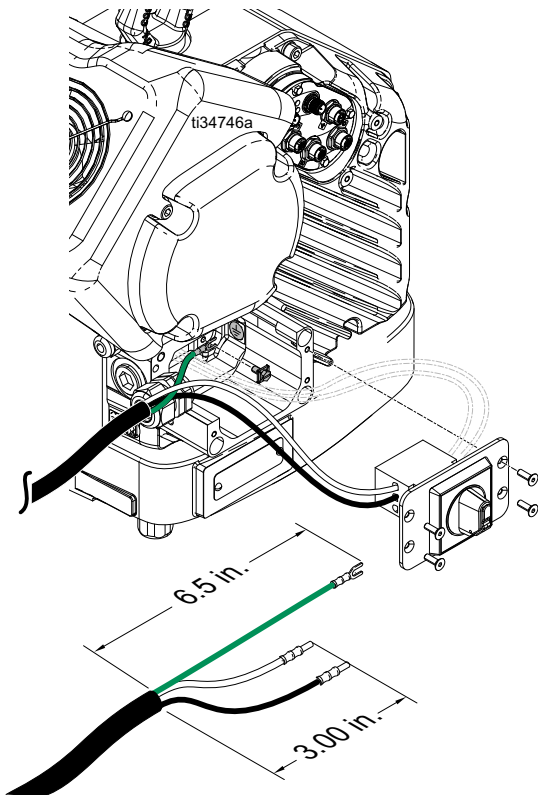


FIG. 5: Ground Wire and Ground Terminal

- Place the wires into the open area on either side of the disconnect block, as space permits. Reinstall the junction box cover.

NOTICE

If wires are pinched during screw installation, damage to wires will occur. Damaged wires may prevent the connected components from functioning properly. Make sure all wires are routed correctly before installation.

- Replace the junction box screws. Tighten the cord grip to securely hold the power cord in the junction box.

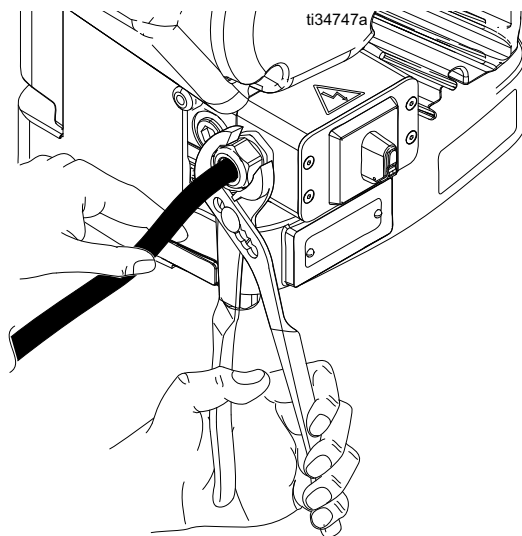


FIG. 6: Junction Box Screws and Strain Relief

Grounding

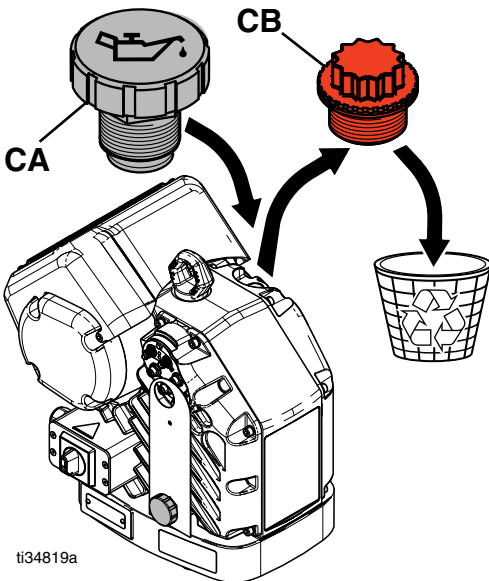
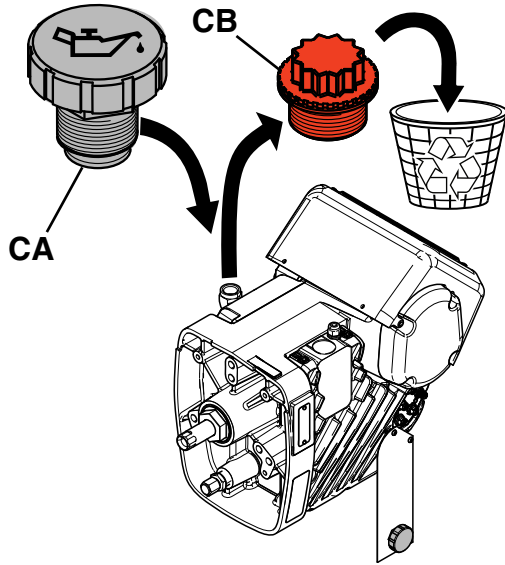


The equipment must be grounded to reduce the risk of static sparking and electric shock. Electric or static sparking can cause fumes to ignite or explode. Improper grounding can cause electric shock. Grounding provides an escape wire for the electric current.

Driver: the driver is grounded through the power cord.

Install Vented Oil Cap Before Using Equipment

The driver gear-box is shipped from the factory pre-filled with oil. The temporary unvented cap (CB) prevents oil leaks during shipment. This temporary cap must be replaced with the vented oil cap (CA), supplied with the equipment, before use.



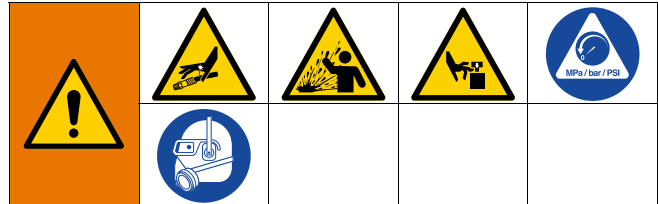
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FIG. 7: Unvented and Vented Oil Caps

Pressure Relief Procedure



Follow the Pressure Relief Procedure whenever you see this symbol.



This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as skin injection, splashing fluid and moving parts, follow the Pressure Relief Procedure when you stop spraying and before cleaning, checking, or servicing the equipment.

1. Turn the power disconnect switch (D) to off to remove power to the electric driver.
2. Relieve all fluid pressure. Follow the Pressure Relief Procedure in your separate system manual.

NOTE: Turning off the electric driver does not relieve pressure in connected pumps.

Operation

Refer to your system manual for operating instructions.

NOTE: The APD20 electric driver is operated using external electronic controls.

Maintenance

NOTICE

Do not open or remove the gear cover. The gear side is not intended to be serviced. Opening the gear cover may alter the factory-set bearing pre-load and may reduce the product life.

Preventive Maintenance Schedule

The operating conditions of your particular system determine how often maintenance is required. Establish a preventative maintenance schedule by recording when and what kind of maintenance is needed, and then determine a regular schedule for checking your system.

Check the Oil Level

Check the oil level in the sight glass (B). The oil level should be near the halfway point of the sight glass when the sprayer is not running. If the oil is low, open the fill cap (C) and add Graco Part No. 16W645, ISO 220 silicone-free synthetic EP gear oil. Reinstall the fill cap.

NOTE: The oil capacity for vertical models is approximately 1.0-1.2 quarts (0.9-1.1 L). The oil capacity for horizontal models is 2.0-2.2 quarts (1.9-2.1 L). Do not overfill.

NOTICE

Only use oil with Graco part number 16W645. Any other oil may not lubricate properly and can cause damage to the drive train.

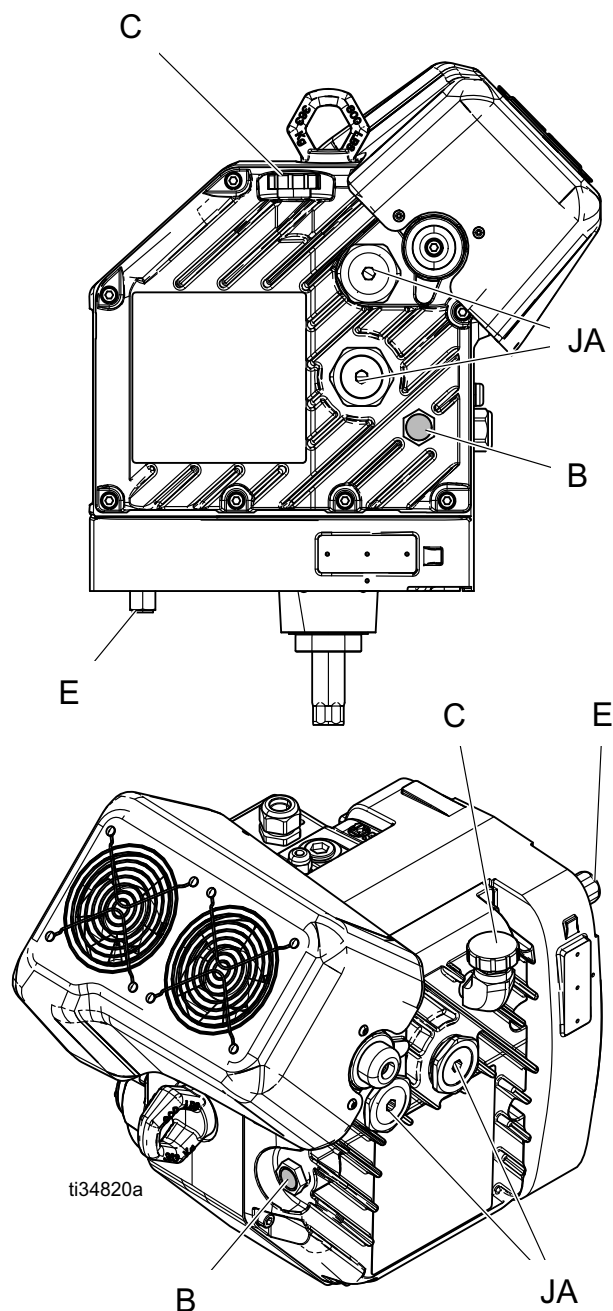


FIG. 8: Sight Glass and Oil Fill Cap

Change the Oil

NOTE: Change the oil after a break-in period of 200,000 to 300,000 cycles. After the break-in period, change the oil once per year.

1. Place a minimum 2 quart (1.9 L) container under the oil drain port. Remove the oil drain plug (E). See FIG. 8. Allow all oil to drain from the driver.
2. Reinstall the oil drain plug (E). Torque to 18-23 ft-lb (25-30 N•m).
3. Open the fill cap (C) and add Graco Part 16W645, ISO 220 silicone-free synthetic EP gear oil. Check the oil level in the sight glass (B). Fill until the oil level is near the halfway point of the sight glass. Do not overfill.

NOTE: The oil capacity for vertical models is approximately 1.0-1.2 quarts (0.9-1.1 L). The oil capacity for horizontal models is 2.0-2.2 quarts (1.9-2.1 L).

4. Reinstall the fill cap.

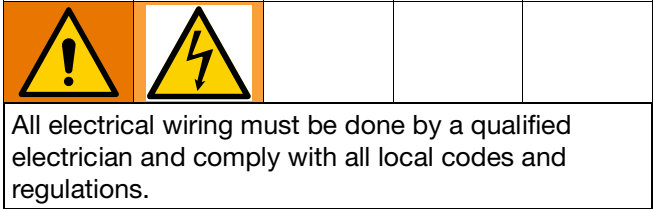
Bearing Pre-Load

See FIG. 8. The bearing pre-loads (JA) are factory-set.

NOTICE

Only adjust the bearing pre-load if a gear stage has been replaced. Improper adjustment of the bearing pre-load may cause premature failure of the gear or housing. See **Replace Gear and Output Shaft**, page 15.

Repair



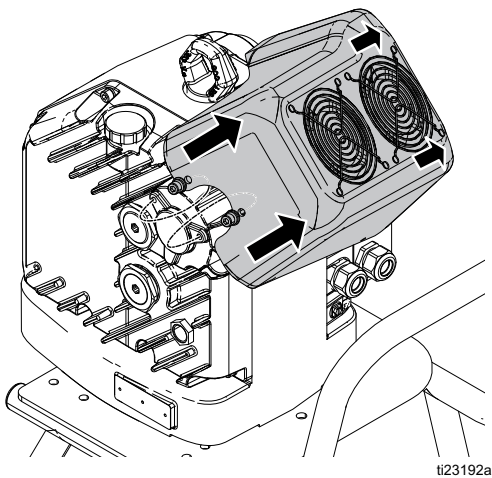
Replace Fan Assembly



NOTE: The replacement fan assembly kit (26B025) must be purchased separately.

Tools required:

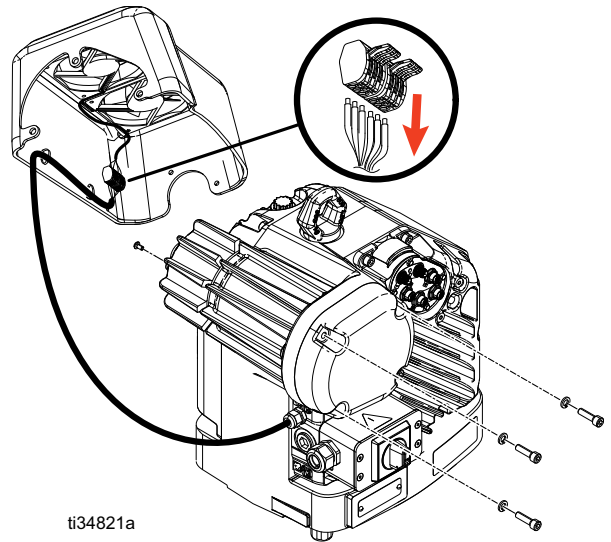
- 3 mm hex wrench
 - 6 mm hex wrench
 - 15 ft-lb (20 N•m) torque wrench
 - Medium (blue) thread-locking compound
1. Relieve pressure. Perform the **Pressure Relief Procedure**, page 8.
 2. Verify that the driver power disconnect switch (D) is turned off. Disconnect the unit from the power source.
 3. Remove the screws that attach the fan assembly to the driver. Pull up on the end farthest from the junction box. Slide the assembly toward the junction box to remove.



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FIG. 9: Remove Fan Assembly

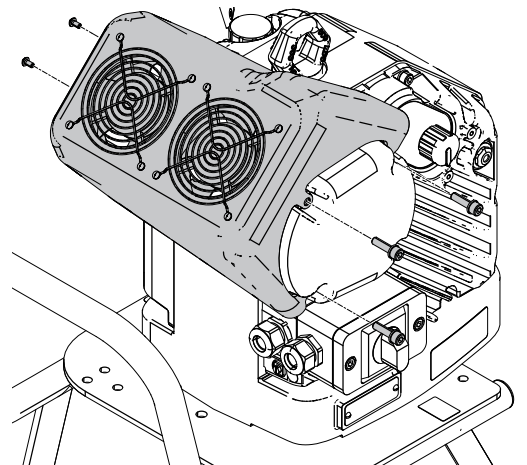
4. Underneath the fan shroud, disconnect the fan cable using the two lever-lock connectors.



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FIG. 10: Remove Wires

5. Remove the fan cable from the old fan assembly.
6. Connect the fan cable to the new fan assembly using the two lever-lock connectors. Connect the red leads into one lever-lock connector. Connect the black leads into the other connector. Secure the fan cable along the inside of the fan shroud.
7. Install the new fan assembly. To attach the new fan assembly, slide the cover tabs into the slots on the junction box side. Gently push down the far end. Apply thread locker and install the supplied fasteners and washers. Torque to 15 ft-lb (20 N•m).



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FIG. 11: Install Fan Assembly

Replace Electronics Cover



Remove Electronics Cover

Tools required:

- 3 mm hex wrench
- 6 mm hex wrench
- 15 ft-lb (20 N•m) torque wrench

1. Relieve pressure. Perform the **Pressure Relief Procedure**, page 8.
2. Verify that the driver power disconnect switch (D) is turned off. Disconnect the unit from the power source.
3. Disconnect the lower from the driver. Refer to your system manual.

NOTE: You must remove the lower from the driver in order to calibrate the driver.

4. Remove four screws. Remove the junction box cover.

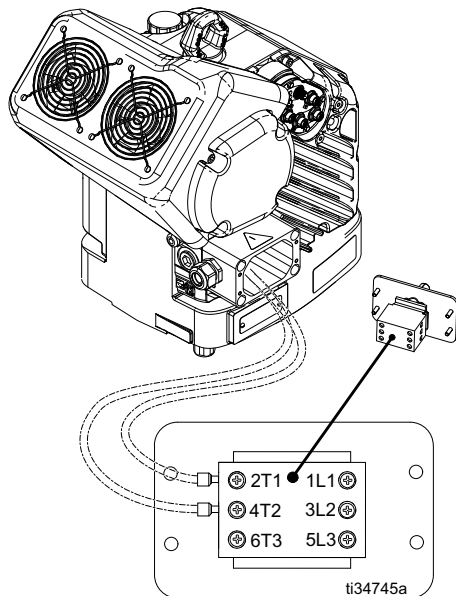


FIG. 12: Junction Box Cover

5. Loosen the cord screws on the disconnect block. Disconnect wires from 2T1 and 4T2.

NOTE: Power cord cables (except for the ground wire) may remain attached.

6. Remove four bolts, four washers, and the junction box sleeve.

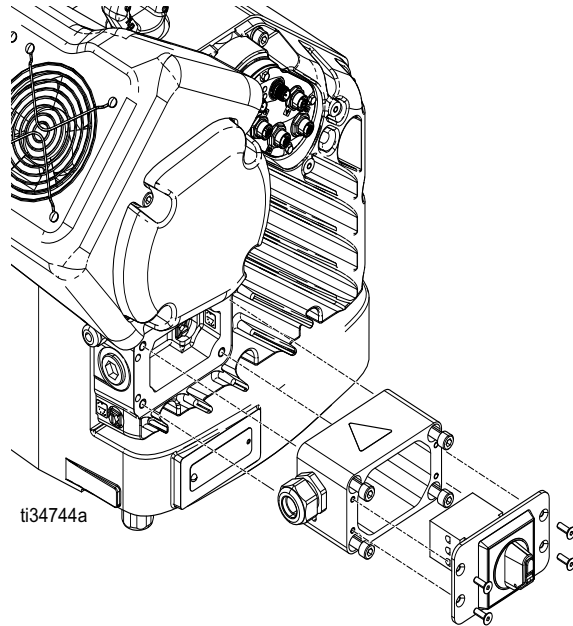


FIG. 13: Junction Box Sleeve

7. Remove six screws and washers from the electronics cover.

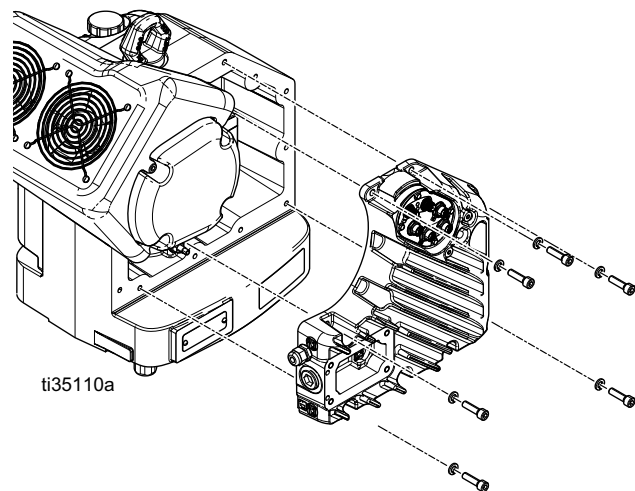
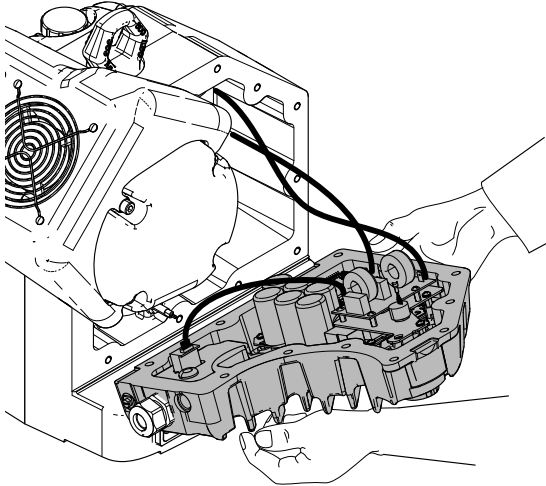


FIG. 14: Remove Electronics Cover

8. Carefully tilt the electronics cover down.

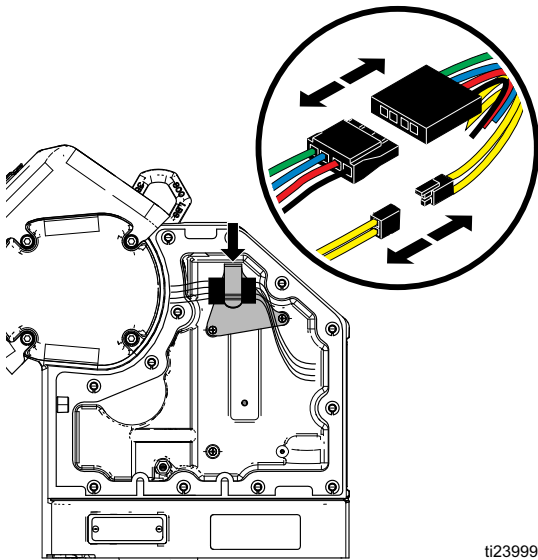
NOTICE
All wires must be disconnected before the cover is completely removed. To avoid damaging the wires and connections, hold the cover in place or let the cover rest on a work surface while disconnecting wires.



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FIG. 15: Tilt Electronics Cover

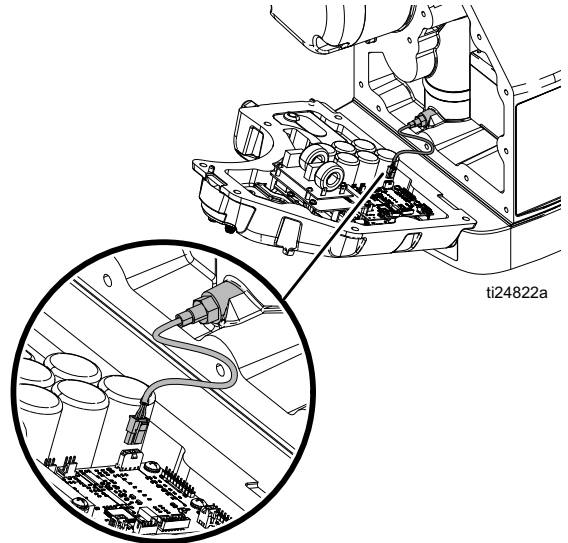
9. Pull the wire connectors out. Disconnect the motor power and motor temperature wires.



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FIG. 16: Motor Power and Motor Temperature Wires

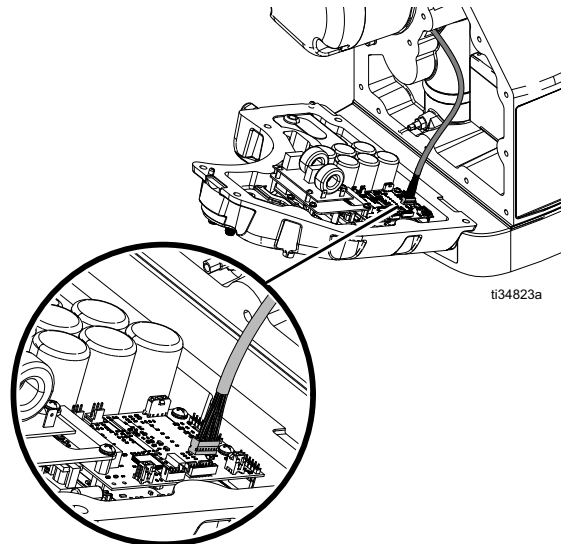
10. Disconnect the stroke position sensor wire.



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FIG. 17: Stroke Position Sensor Wire

11. Disconnect the encoder wire.



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FIG. 18: Encoder Wire

12. Discard the electronics cover.

Install Electronics Cover

1. Connect the encoder wire and stroke position sensor wire to the new electronics cover.
2. Connect the motor power and motor temperature wires.
3. Install the electronics cover and 6 screws. Torque the screws to 15 ft-lb (20 N•m).

NOTICE

If wires are pinched during screw installation, damage to wires will occur. Damaged wires may prevent the connected components from functioning properly. Make sure all wires are routed correctly before installation.

4. Install the junction box sleeve. Tighten the four bolts.
5. Install the junction box cover. Tighten the four screws.
6. Install the power leads from the electronics cover into the power disconnect switch. Install the brown lead into terminal 2T1 and the blue lead into terminal 4T2.

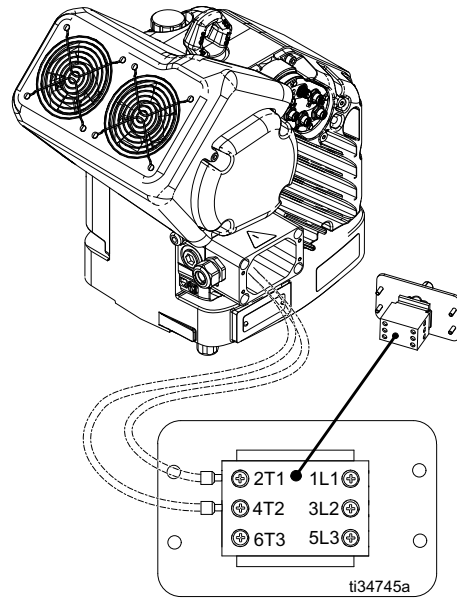


FIG. 19: Install Wires

7. Connect the power cord.
8. Turn the power disconnect switch to ON.
9. Update the electric driver software. See **Update Software**, page 22.
10. **Calibrate the Electric Driver.** See page 15.

Calibrate the Electric Driver



1. Perform the **Pressure Relief Procedure**. See page 8.
2. Disconnect the lower from the driver. Refer to your system manual.

NOTE: The lower must be removed from the system in order to calibrate correctly. The calibration stroke length is longer than the operating stroke. Leaving the lower attached will allow the driver rod to contact the lower rod and cause incorrect calibration.

3. Cycle power to the driver. Turn the power disconnect switch to OFF, then turn the power disconnect switch to ON.
4. Begin calibration. Refer to your system manual for instructions.
5. Wait for the calibration process to finish.
 - a. The driver output shaft (18) will run up and down slowly over the course of several minutes.
 - b. Midway through the auto-calibration process, the driver output shaft will pause as it moves to the next step.
 - c. The driver output shaft will move up and down five to six times at a faster pace.
6. Verify that the auto-calibration process is complete before returning to normal operation.

NOTE: The system display will indicate the success or failure of the auto-calibration process.

Replace Gear and Output Shaft



In the event of a gear train failure, including any gear or the rack, it is highly recommended that the mating component is also replaced. It is possible that the failed component may have damaged its mating component and therefore may reduce the life of both components. It is also recommended to inspect the entire gear train at this time for any other damage. Replace any components which look excessively worn or damaged.

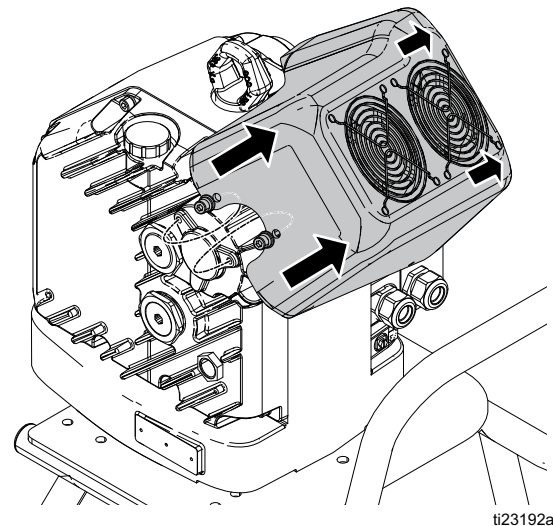
NOTE: The replacement gear kit (26A398) and the replacement output shaft kit (26A399) must be purchased separately.

Tools required:

- 3 mm hex wrench
- 4 mm hex wrench
- 6 mm hex wrench
- 1/4 in. hex wrench
- 2 in. open-ended wrench
- 175 ft-lb (240 N•m) torque wrench
- 150 in-lb (17 N•m) torque wrench
- Medium (blue) thread-locking compound
- Grease

Remove the Fan and Gear Cover

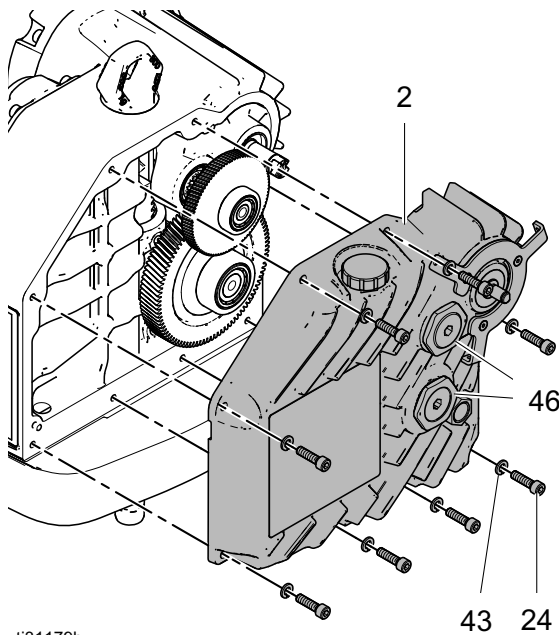
1. Follow steps 1-4 in **Replace Fan Assembly**, page 11.



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FIG. 20: Remove Fan Assembly

2. Drain oil from the gear box. Follow steps 1 and 2 of **Change the Oil** (page 10).
3. Using a 2 in. wrench, loosen the gear jam nuts (46) on the outside of the gear cover for later removal. See FIG. 21.
4. Remove the eight 6 mm hex screws (24) and washers (43) from the gear cover (2).
5. The gear cover is mounted on two dowels. Pull the cover straight out to remove the cover.



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FIG. 21: Remove Gear Cover

Remove the First Stage Gear

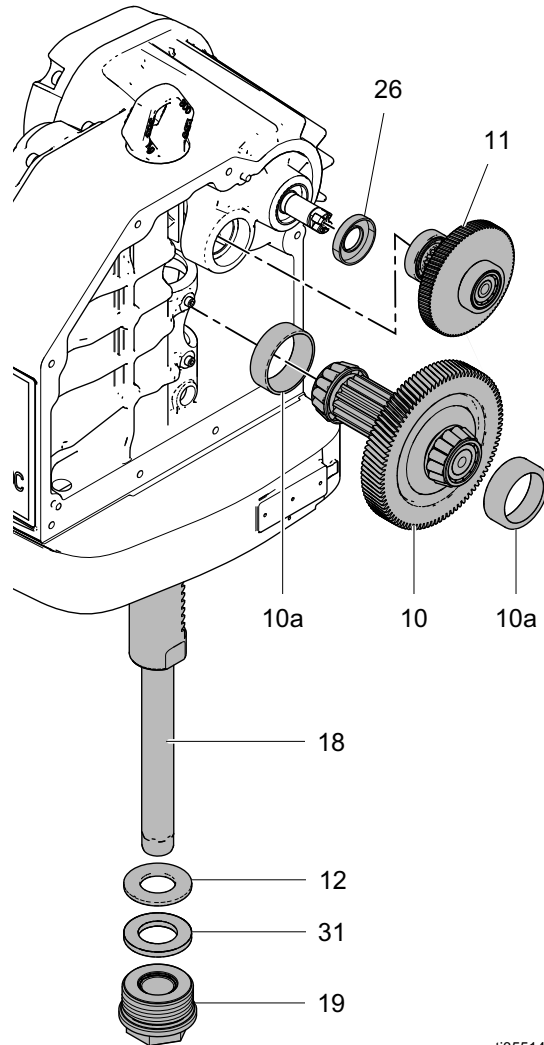
Pull out the first stage gear (11).

NOTE: As necessary, push the second stage gear (10) aside to release the first stage gear.

Remove the Second Stage Gear and Output Shaft

1. Turn the second stage gear (10) clockwise so the output shaft (18) is as high as possible in the motor housing.
2. Using a 2 in. wrench, loosen the output shaft bearing (19).
3. While holding the gear in place, remove the bearing, lower bumper (31), and support washer (32) from the output shaft.

4. To remove the output shaft, grasp the shaft while rotating the second stage gear (10) counterclockwise.
5. Remove the output shaft and second stage gear at the same time.



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FIG. 22: Remove Output Shaft and Gear

Replace the Rotor Shaft Seal

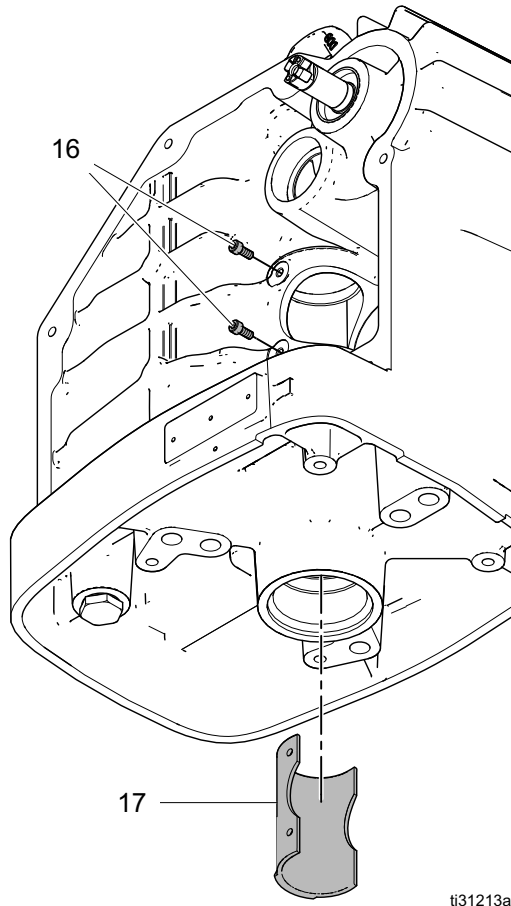
1. If necessary, remove the input shaft seal (26) from the gear side of the motor housing.
2. Install the new seal.

Replace the Bearing Race

Remove the second stage gear bearing race (10a) from the motor housing. Replace with gear bearing race with a new race from the replacement kit.

Remove the Rack Bearing

Remove the two 4 mm hex screws (16) holding the rack bearing (17) in place. To remove the bearing, slide it sideways to release the snap feature. Then slide the bearing down through the bottom of the output shaft.



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FIG. 23: Remove Rack Bearing

Install the Rack Bearing

1. Put gear grease on the back of the rack bearing. Slide the bearing into the motor housing until the lip on the bottom of the bearing snaps into place.
2. Line up the holes in the rack bearing with the holes in the motor housing.
3. Apply blue thread-locking compound to the rack bearing screws (16). Insert the screws through the motor housing holes and into the bearing. Torque to 10 in-lbs (3 N•m).

Install the Output Shaft and Second Stage Gear

1. Grease the threads and o-ring of the output shaft bearing (19).
2. Apply gear oil or grease to the back of the output shaft (18). Insert the output shaft into the motor housing (1).
3. Hold the output shaft while inserting the second stage gear (10). Line up the gears of the shaft and gear so they mesh.
4. Turn the gear clockwise until the output shaft has risen as high as possible. Hold the gear in place.
5. Slide the support washer (32), bumper (31), and output shaft bearing (19) onto the output shaft (18) as far as possible. Hand tighten, then torque to 175 ft-lb (240 N•m).

Install the First Stage Gear

1. Slide the first stage gear and bearings (11) into the motor housing (1).
2. Line up the first stage gear with the second stage gear (10) to allow the gears mesh together.

Replace the Bearing Adjuster O-Rings

1. Remove the loosened jam nuts (46) from the outside of the gear cover.
2. Using a 1/4 in. hex wrench, remove the gear adjusters (15, 44) from the inside of the gear cover.
3. Remove the o-rings (37, 45). Clean the bearing adjuster threads.
4. Put the new o-rings (37, 45) on the bearing adjusters.
5. Grease the o-ring area of both bearing adjusters.
6. Apply thread sealant on the threads of the adjusters.
7. Use a 1/4 in. hex wrench to install each adjuster into the appropriate hole.

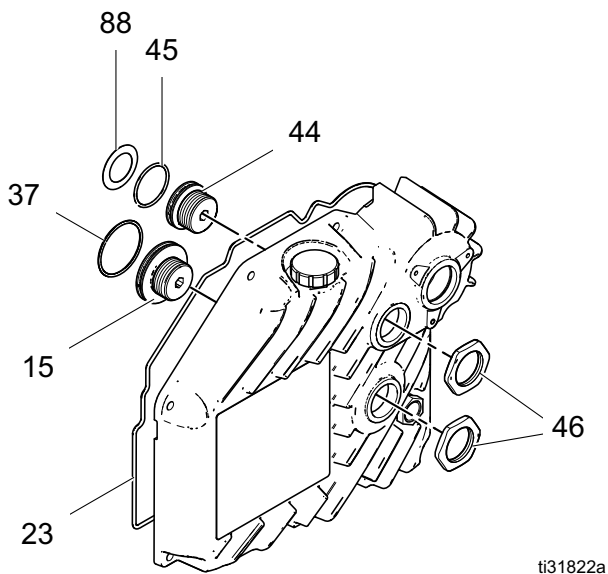
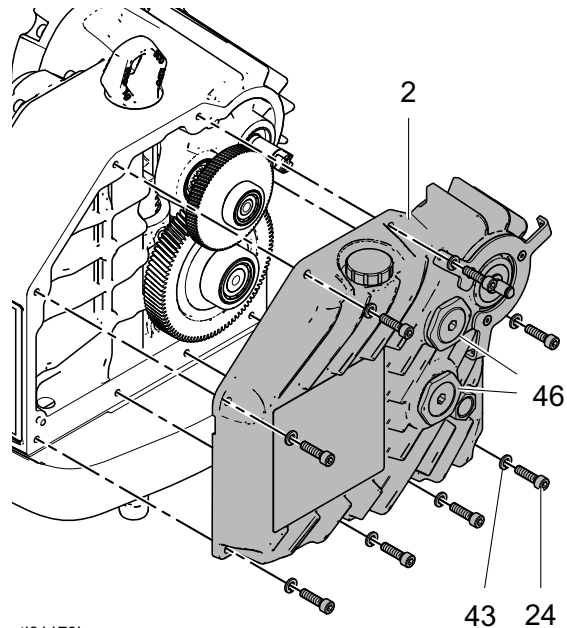


FIG. 24: Gear Cover

Install the Gear Cover

1. Remove and replace the gear cover gasket (23). Before pressing the gasket into place, grease three or four places on the gasket groove of the gear cover.
2. Place the gear cover (2) on the motor housing. Secure the gear cover with either 6 mm hex screws (24) and washers (43). Torque to 15 ft-lb (20 N•m).



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FIG. 25: Install Gear Cover

3. Torque the second stage adjuster (15) clockwise to 150 in-lbs (17 Nm). Back off several turns counterclockwise, and then torque the second stage adjuster clockwise to 100 in-lbs (11 Nm).
4. Torque the first stage adjuster (44) clockwise to 100 in-lbs (11 Nm). Back off several turns counterclockwise, and then torque the first stage adjuster clockwise to 70 in-lbs (8 Nm).
5. With a 2 in. open-ended wrench, screw the jam nuts into the outside of the gear cover. Torque to 40 ft-lbs (54 Nm).
6. Fill the gear box with oil. Follow steps 3 and 4 of **Change the Oil**. See page 10.

Install the Fan

Follow step 6 and 7 of **Replace Fan Assembly**, page 11.

Replace the Shaft Bearing Assembly

NOTE: The replacement shaft bearing assembly kit (25C164) must be purchased separately.

Tools required:

- 2 in. open-ended wrench
 - 175 ft-lb (240 N•m) torque wrench
1. Stop the pump at the bottom of its stroke. Turn the power disconnect switch to OFF.
 2. Perform the **Pressure Relief Procedure**, page 8.
 3. Disconnect the lower from the driver. Refer to your system manual for instructions.
 4. Drain the oil from the driver. See steps 1-2 of **Change the Oil**, page 10.
 5. Unscrew the shaft bearing assembly (19) from the driver. See FIG. 22, page 16.
 6. Install the new shaft bearing assembly. Torque to 175 ft-lb (240 N•m).
 7. Fill the driver with oil. See steps 3-4 of **Change the Oil**, page 10.
 8. Reconnect the lower to the driver. Refer to your system manual for instructions.
 9. Turn the power disconnect switch to ON and resume operation.

Replace the Motor Rotor and Encoder



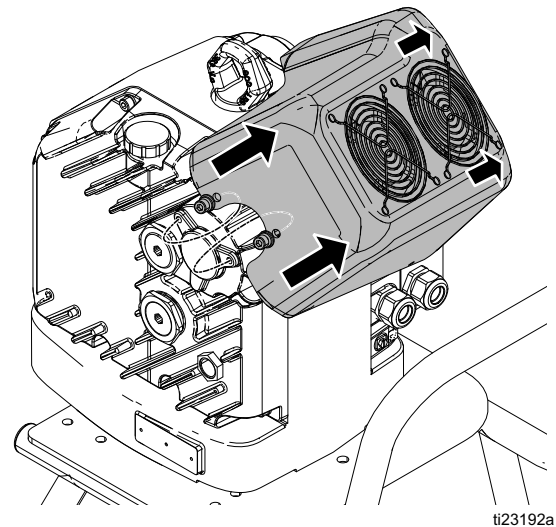
NOTE: The replacement motor rotor kit (26C547) and the replacement encoder kit (26C548) must be purchased separately.

Tools required:

- 4 mm hex wrench
- 6 mm hex wrench
- 1/2 in. or 13 mm socket or open-ended wrench
- 0.050 in. hex wrench
- #1 phillips screwdriver
- 15-20 ft-lb (20-27 N•m) torque wrench
- 100 in-lb (11 N•m) torque wrench
- Medium (blue) thread-locking compound
- 16W645 gear oil or compatible grease

Remove the Fan and the Motor Cover

1. Follow steps 1-4 of **Replace Fan Assembly**. See page 11. Set aside the fan assembly.

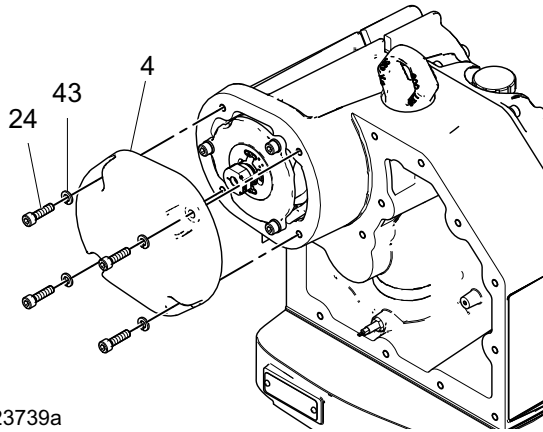


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FIG. 26: Remove the Fan Assembly

2. Use a 6 mm hex wrench to remove the four bolts (24) and washers (43) that secure the motor cover (4). See FIG. 27, page 20.

3. Remove the motor cover (4).

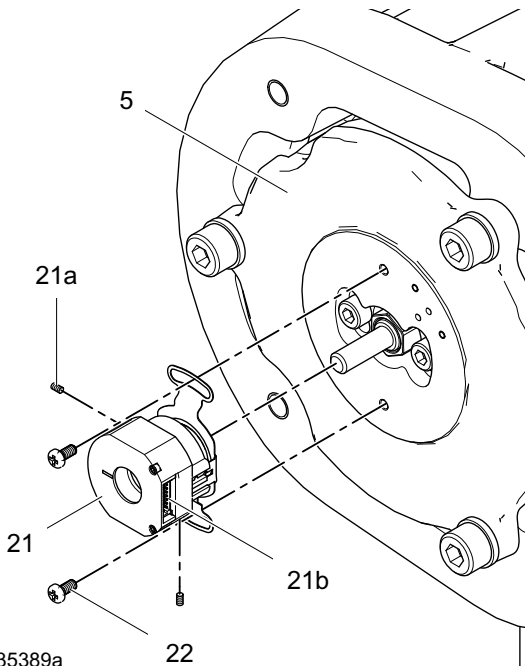


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FIG. 27: Remove the Motor Cover

Remove the Encoder

1. Unplug the cable from the encoder (21).
2. Use a 0.050 in. hex wrench to loosen the two hub set screws (21a) on the sides of the encoder. Do not remove the screws.



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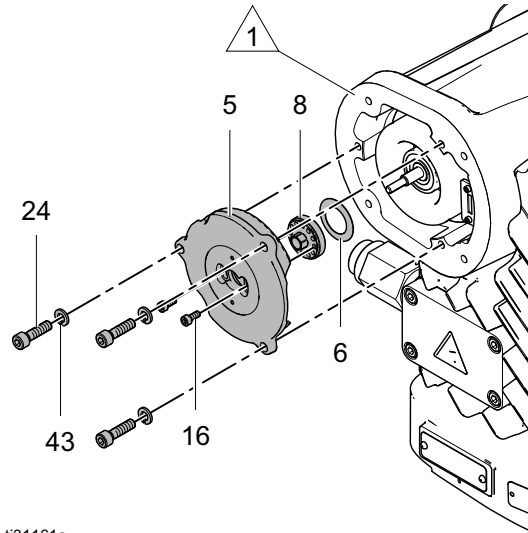
FIG. 28: Encoder

3. Use a phillips head screwdriver to remove the two encoder mounting screws (22).
4. Pull the encoder off of the rotor support (5).

NOTE: If only the encoder needs to be replaced, see **Install the Encoder**, page 21.

Remove the Rotor

1. Use a 6 mm wrench to remove three screws (24) and washers (43) from the rotor support (5). Be careful not to scratch any surfaces.



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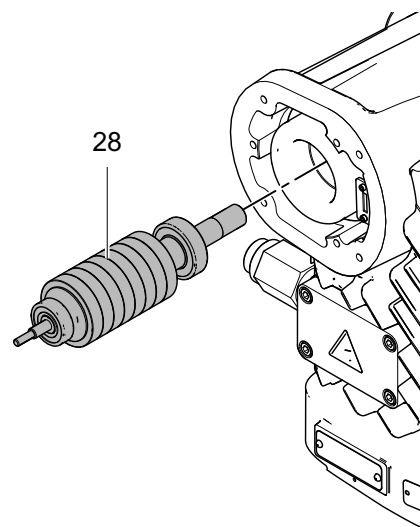
FIG. 29: Remove the Rotor Support

1 Do not damage the surface.

2. Manually pull the rotor (28) out of the stator.

NOTICE

The rotor is a very strong magnet. Keep it away from sensitive equipment such as cell phones, cameras, credit cards, and so on.



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FIG. 30: Remove the Rotor

Install the Rotor

- Grease the shaft of the rotor (28).

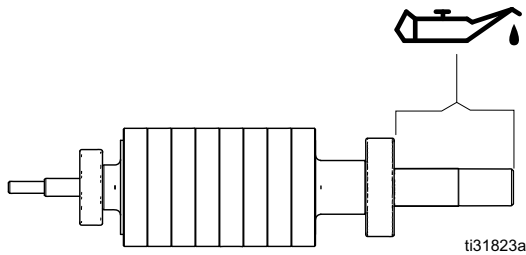
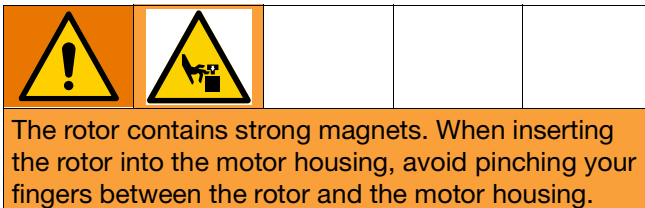


FIG. 31: Grease the Rotor Shaft



- Insert the rotor into the motor housing by holding the bearing. The rotor will pull itself into place due to the strength of the magnets.

NOTICE

Make sure the rotor seats properly and does not impact the motor housing or stator during insertion. Improper rotor installation may cause gear failure or damage to the rotor.

- Remove the two 4 mm locking screws (16) that secure the rotor adjuster (8) to the rotor support (5). Keep the rotor adjuster in place in the rotor support.
- Place a 1/2 in. or 13 mm socket or open-ended wrench in the outside center hole of the rotor support. Turn the wrench clockwise to loosen the position of the rotor adjuster.

- Place the spring disc (6) on the rotor shaft. See FIG. 32.

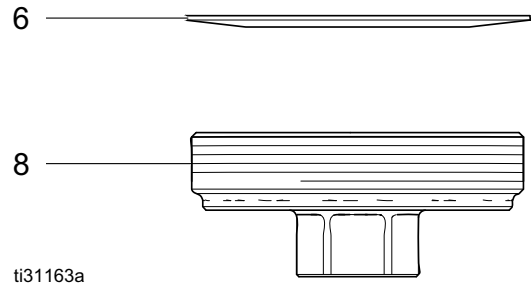


FIG. 32: Place Spring Disc on Rotor Shaft

- Replace the rotor support (5). Install the three screws (24) and washers (43). Torque to 15 ft-lb (20 N•m).
- To set the rotor, tighten the rotor adjuster to 100 in-lbs (11 N•m) in the clockwise direction. Back out several turns counterclockwise, then tighten the rotor adjuster to 15 in-lbs (1.5 N•m).
- Install the two locking screws (16). Torque to 30 in-lbs (3 N•m).

Install the Encoder

- If necessary, replace the encoder cable:
 - Follow steps 1-8 of **Remove Electronics Cover** (page 12).
 - Disconnect both ends of the existing encoder cable. Discard the existing cable.
- Route the encoder cable (21c) through the lower port of the motor housing (1).

NOTE: The replacement encoder cable is supplied with the replacement encoder.

NOTE: The encoder connector is the smaller of the two connections.

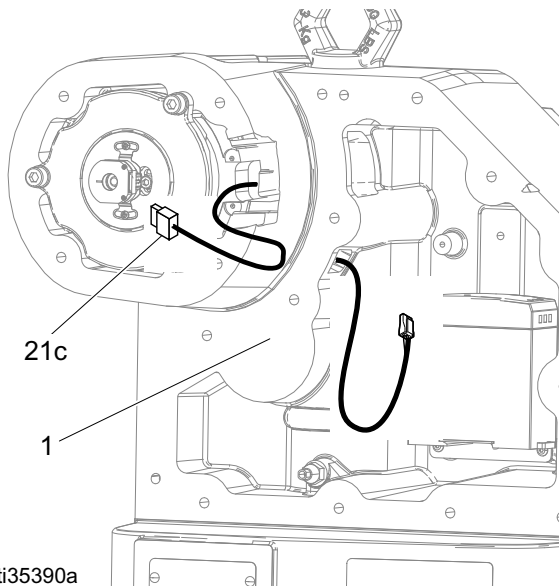


FIG. 33: Route Encoder Cable

2. Use a 6 mm hex wrench to install the four bolts (24) and washers (43) that hold the motor cover in place. Torque the bolts to 15 ft-lb (20 N•m).
3. Install the fan assembly. See steps 6 and 7 of **Replace Fan Assembly**, page 11.
4. **Calibrate the Electric Driver.** See page 15.
5. Re-connect the lower to the electric driver. Refer to your system manual for instructions.

Update Software

Refer to your system or system software manual for the software update procedure.

NOTE: Software updates require a Graco electronic display or control, such as an ADM (Advanced Display Module).

3. Slide the new encoder onto the rotor shaft.
4. Apply a small amount of medium (blue) thread locker to the two phillips head mounting screws (22). Secure the encoder to the rotor support (5).
5. Use the 0.050 in. hex wrench to remove the two set screws (21a) from the encoder hub.
6. Apply a small amount of medium (blue) thread locker to the set screws (21a). Install the screws into the encoder.
7. Tighten the screws by hand.
8. Plug the encoder cable into the encoder and the control board. See **Wiring Diagram**, page 31.
9. If the electronics cover was removed, re-install the electronics cover. See **Install Electronics Cover**, page 14.
10. **Install the Motor Cover.** See page 22.

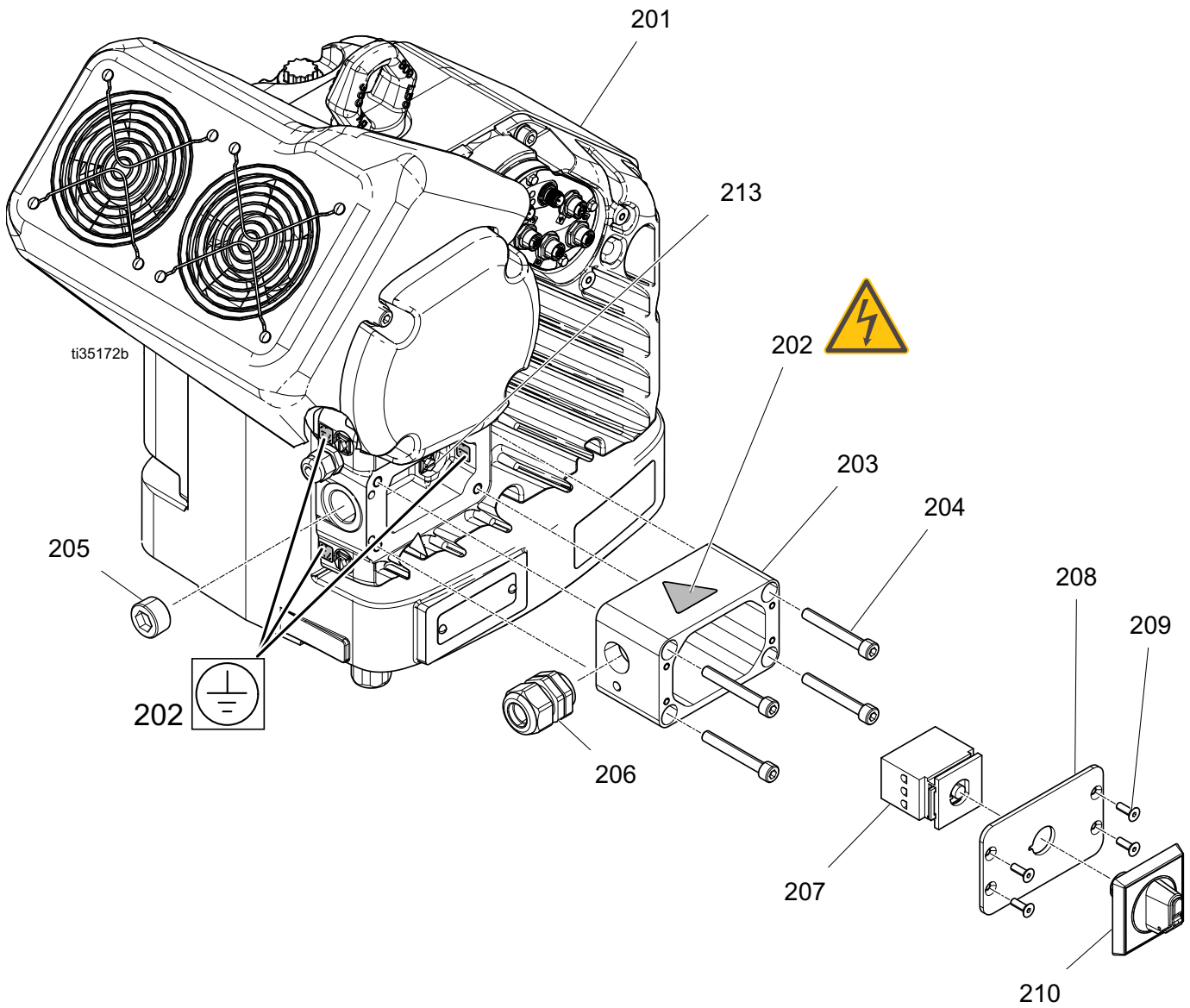
Install the Motor Cover

1. Install the motor cover (4) onto the motor housing. See FIG. 27, page 20.

Parts

Vertical Electric Driver (25D519)

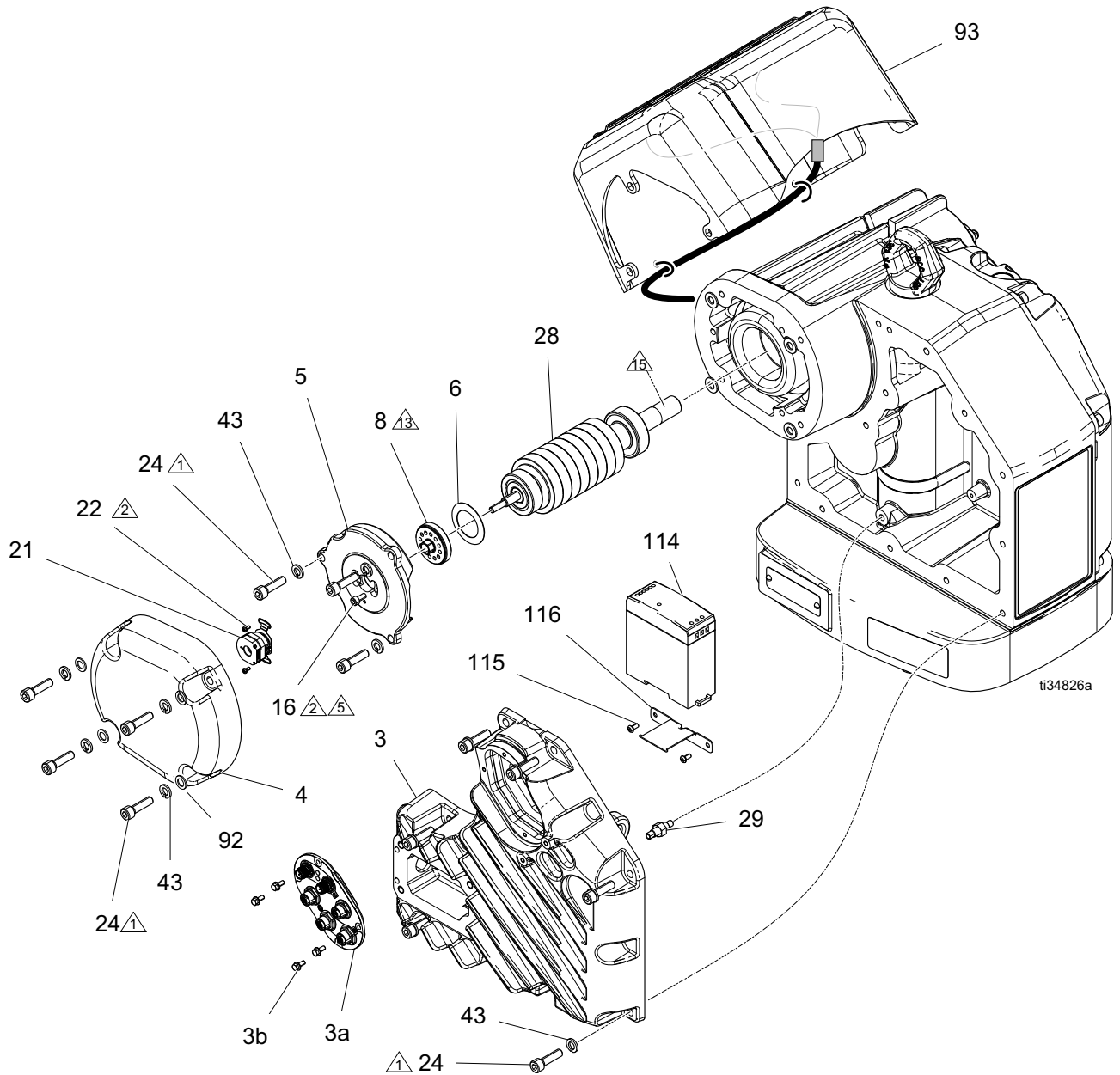
Horizontal Electric Driver (25D520)








| Ref. | Part | Description | Qty. | |
|------|--------|----------------------------------|--------|--------|
| | | | 25N519 | 25N520 |
| 201 | ----- | DRIVER, APD20, horizontal | | 1 |
| | ----- | DRIVER, APD20, vertical | 1 | |
| 202▲ | 16T764 | LABEL, warning | 1 | 1 |
| 203 | 17X387 | BOX, junction, power, motor, APD | 1 | 1 |
| 204 | 117080 | SCREW, socket head, m8 x 60 | 4 | 4 |
| 205 | 102726 | PLUG, pipe headless | 1 | 1 |
| 206 | 121171 | GRIP, cord, 0.35-0.63, 3/4 | 1 | 1 |
| 207 | 123970 | SWITCH, disconnect, 40 A | 1 | 1 |
| 208 | 130692 | COVER, junction box, APD motor | 1 | 1 |
| 209 | 113768 | SCREW, socket, flat head | 4 | 4 |
| 210 | 130729 | KNOB, disconnect, panel, black | 1 | 1 |
| 213 | 116343 | SCREW, ground | 4 | 4 |

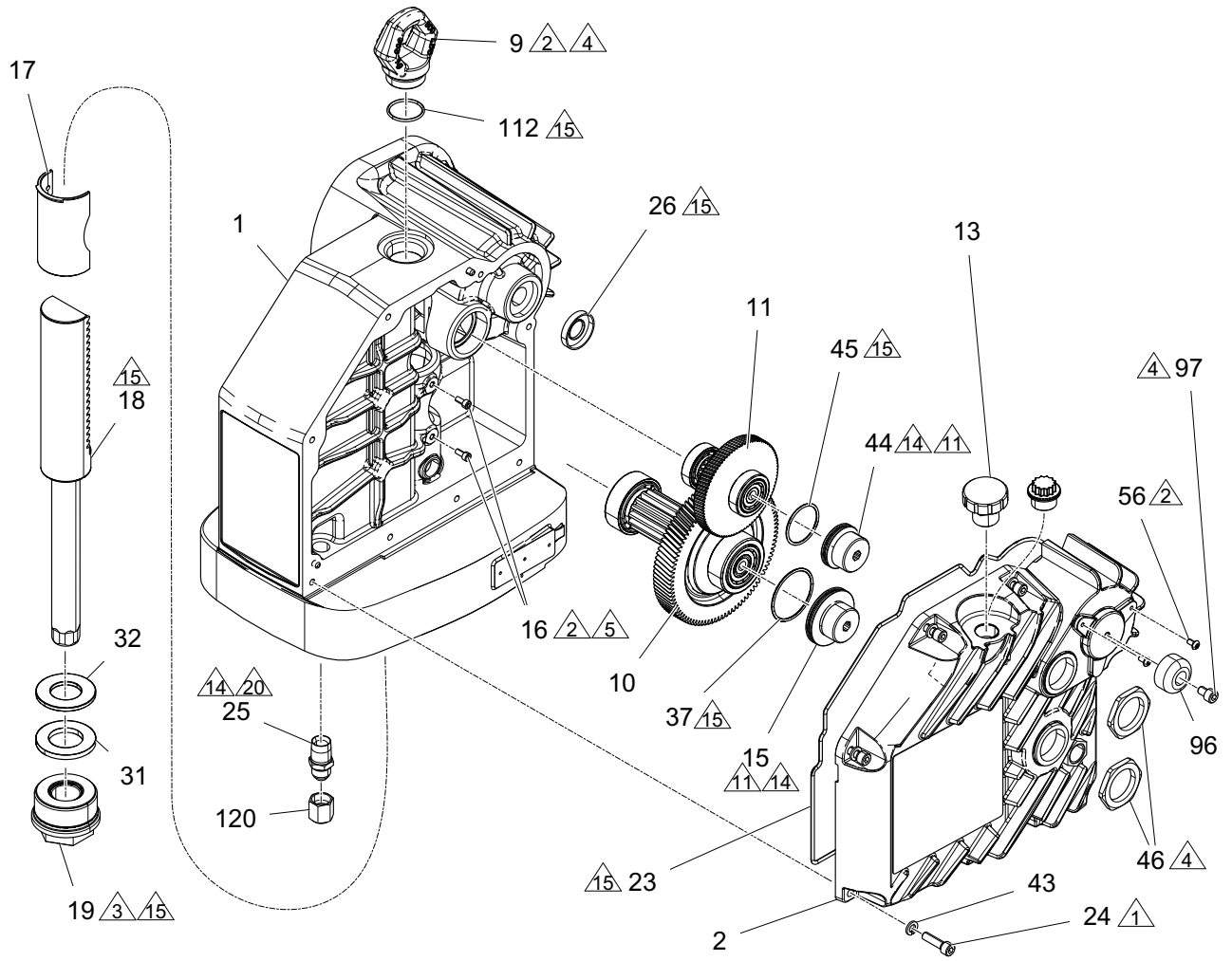
▲ Replacement safety labels, tags, and cards are available at no cost.

Electrical Enclosure

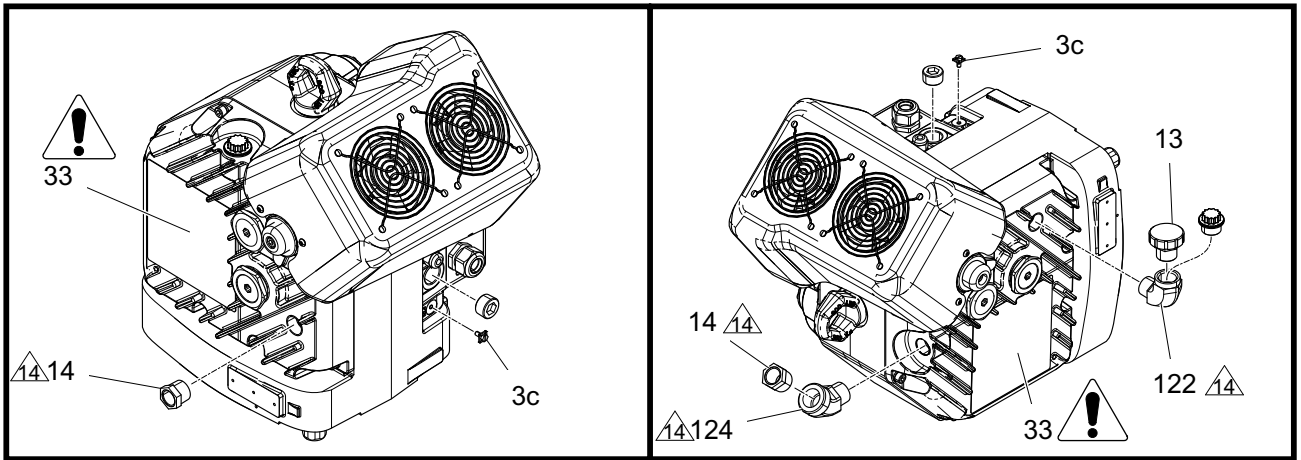


-  Torque to 15-20 ft-lb (20-27 N•m).
-  Apply serviceable medium (blue) thread-locker to threads.
-  Torque to 30-40 in-lb (3.4-4.5 N•m).
-  Torque to 100 in-lb (11 Nm). Back off and torque to 14-18 in-lb (1.6-2.0 N•m).
-  Lubricate with gear oil or compatible grease.

Gear Box



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Parts

1 Torque to 15-20 ft-lb (20-27 N•m).

2 Apply serviceable medium (blue) thread-locker to threads.

3 Torque to 175-200 ft-lb (240-280 N•m).

4 After the gear train is assembled, torque both lock nuts to 40-50 ft-lb (240-280 N•m).

5 Torque to 30-40 in-lb (3.4-4.5 N•m).

11 After the gear cover (2) is installed, torque the adjuster (15) to 150 in-lb (17 N•m). Back off and torque to 100-120 in-lb (11-12 N•m). Then torque adjuster (44) to 100 in-lb (11 N•m). Back off and torque to 70-80 in-lb (8-9 N•m).

14 Torque to 100 in-lb (11 Nm). Back off and torque to 14-18 in-lb (1.6-2.0 N•m).

15 Lubricate with gear oil or compatible grease.

| Ref. | Part | Description | Qty. | |
|-------|--------|---|--------|--------|
| | | | 25N519 | 25N520 |
| 1 | ---- | HOUSING, main | 1 | 1 |
| 2★✓ | ---- | COVER, gear | 1 | 1 |
| 3 | 26B024 | COVER, electronics, assembly, APD20, horizontal | | 1 |
| | 26B023 | COVER, electronics, assembly, APD20, vertical | 1 | |
| 3a | 26C545 | BOARD, communication | 1 | 1 |
| 3b | 125856 | SCREW, 8-32, flange head | 4 | 4 |
| 3c | 116343 | SCREW, ground | 4 | 4 |
| 4 | 17X343 | COVER, motor | 1 | 1 |
| 5* | ---- | SUPPORT, rotor | 1 | 1 |
| 6* | ---- | SPRING, disc | 1 | 1 |
| 8* | ---- | ADJUSTER, rotor | 1 | 1 |
| 9 | 15F931 | RING, lift, sst 1 9/16 thread | 1 | 1 |
| 10† | ---- | GEAR, assembly, second stage | 1 | 1 |
| 11† | ---- | GEAR, assembly, first stage, tapered | 1 | 1 |
| 13★✓ | 15H525 | CAP, fill | 1 | 1 |
| 14★✓ | 24E315 | SIGHTGLASS | 1 | 1 |
| 15★✓ | ---- | ADJUSTER, bearing, second stage | 1 | 1 |
| 16 | 107100 | SCREW, cap, socket head | 4 | 4 |
| 17‡ | ---- | BEARING, rack | 1 | 1 |
| 18‡ | ---- | RACK, assembly | 1 | 1 |
| 19◆ | ---- | BEARING, shaft, assembly | 1 | 1 |
| 21❖ | ---- | ENCODER, | 1 | 1 |
| 22❖ | ---- | SCREW, machined, pan head, 4x.25 | 2 | 2 |
| 23†★✓ | ---- | GASKET, housing, gear | 1 | 1 |
| 24+ | 109114 | SCREW, cap, socket head | 24 | 24 |
| 25 | 121319 | FITTING, adapter, npt x jic | 1 | 1 |
| 26† | 25C182 | SEAL, input shaft | 1 | 1 |
| 28* | ---- | ROTOR | 1 | 1 |
| 29 | 24W120 | SENSOR, stroke position | 1 | 1 |
| 31◆ | 25C163 | BUMPER, lower | 1 | 1 |
| 32◆ | 25C162 | WASHER, support | 1 | 1 |

| Ref. | Part | Description | Qty. | |
|-------|--------|--------------------------------------|--------|--------|
| | | | 25N519 | 25N520 |
| 33▲★✓ | 17Y723 | LABEL, safety, warning, horizontal | | 1 |
| | 17J476 | LABEL, safety, warning, vertical | 1 | |
| 37†★✓ | ----- | PACKING, o-ring | 1 | 1 |
| 43‡ | 104572 | WASHER, lock spring | 24 | 24 |
| 44★✓ | ----- | ADJUSTER, 1st stage roller bearing | 1 | 1 |
| 45†★✓ | ----- | PACKING, o-ring | 1 | 1 |
| 46★✓ | ----- | NUT, jam | 2 | 2 |
| 56 | 124165 | SCREW, button head, m5-0.8x10, ss | 3 | 4 |
| 61 | 108860 | SCREW, machined, pan head, phillips | 1 | 1 |
| 92 | 108788 | WASHER, flat | 4 | 4 |
| 93 | 26B025 | COVER, fan, 24 Vdc, assembly, silver | 1 | 1 |
| 96 | 127721 | KNOB, impact, preventer | 1 | 1 |
| 97 | 127463 | SCREW, cap, socket head | 1 | 1 |
| 112 | C20987 | PACKING, o-ring | 1 | 1 |
| 114 | 126453 | POWER SUPPLY, 24 V | 1 | 1 |
| 115 | ----- | SCREW, machined, #8-32 x 0.375 | 2 | 2 |
| 116 | 130685 | BRACKET, 24 V supply, APD motor | 1 | 1 |
| 117✘ | ----- | HARNESS, power supply, 24 V, APD | 1 | 1 |
| 119✘ | ----- | HARNESS, power supply, 240 V, APD | 1 | 1 |
| 120 | 120112 | FITTING, cap nut, -8 JIC | 1 | 1 |
| 122✓ | ----- | FITTING, street elbow, 3/4 npt | | 1 |
| 124✓ | ----- | FITTING, elbow, street | | 1 |

▲ Replacement safety labels, tags, and cards are available at no cost.

* Parts included in Rotor Kit 26C547 (purchase separately).

† Parts included in Gear Kit 26A398 (purchase separately).

‡ Parts included in Output Shaft Kit 26A399 (purchase separately).

◆ Parts included in Shaft Cartridge Kit 25C164 (purchase separately).

❖ Parts included in Encoder Kit 26C548 (purchase separately).

‡ Parts included in Bolt Kit 26A537 as pack of 10 (purchase separately).

✘ Parts included in Harness Kit 18A109 (purchase separately).

★ Parts included in Gear Cover Kit 26C566 (for E-Flo SP vertical driver). Purchase separately.

✓ Parts included in Gear Cover Kit 26C567 (for EFR proportioner horizontal driver). Purchase separately.

NOTE: The driver gear box is pre-filled with oil. Additional silicone-free, ISO 220-compliant, synthetic gear oil included in 16W645 (purchase separately).

Repair Kits and Accessories

| Motor Part No. | Description | Kits | Kit Description |
|---------------------------|--|--------|---|
| All motors in this manual | APD20 Drivers | 26A398 | Gear kit |
| | | 26A399 | Output shaft kit |
| | | 25C164 | Shaft cartridge kit |
| | | 26C547 | Motor rotor kit |
| | | 26C548 | Motor encoder kit |
| | | 26A537 | Bolt kit |
| | | 18A109 | Power supply harness kit |
| | | 26B025 | Fan assembly |
| | | 26C545 | Communication board |
| | | 16W645 | ISO 220, silicone-free synthetic gear oil, 1 quart (0.95 L) |
| 25N519 | Vertical Driver for E-Flo SP | 26B023 | Electronics cover for E-Flo SP |
| | | 26C566 | Gear box cover for E-Flo SP |
| 25N520 | Horizontal Driver for EFR Proportioner | 26B024 | Electronics cover for EFR Proportioner |
| | | 25C567 | Gear box cover for EFR Proportioner |

Wiring Diagram

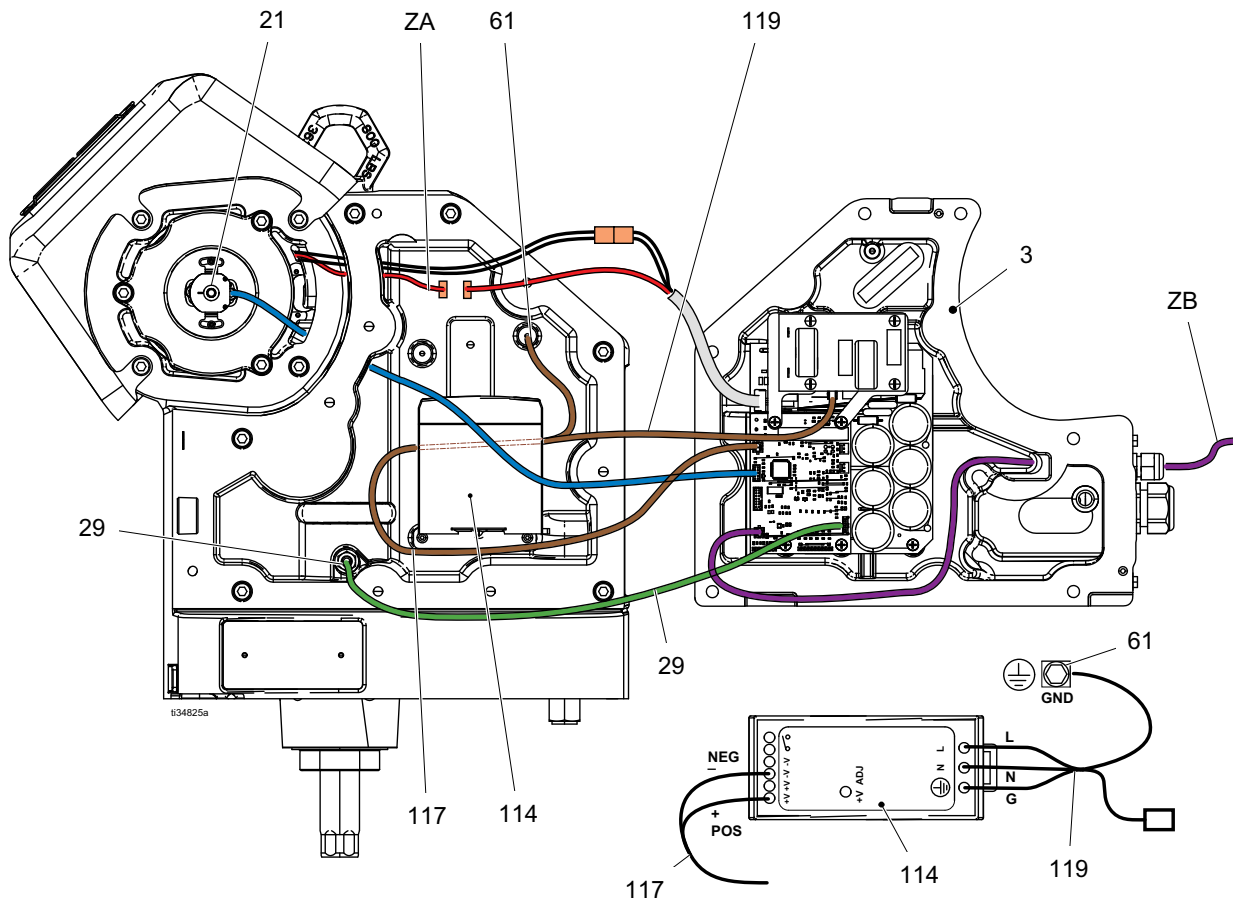


FIG. 34: Electric Driver Internal Wiring

| Ref. | Part | Description |
|------|--------|---|
| 3 | 26B023 | Electronics cover, vertical |
| | 26B024 | Electronics cover, horizontal |
| 21* | ----- | Motor encoder (includes harness) |
| 29 | 24W120 | Stroke position sensor (includes harness) |
| 61 | 108860 | Power supply ground screw |
| 114 | 126453 | 24 V power supply |
| 117† | ----- | Harness, power supply, 24 V DC |
| 119† | ----- | Harness, power supply, 240 VAC |
| ZA | ----- | Harness, motor leads |
| ZB‡ | 17E597 | Fan cable |

* Parts included in Encoder Kit 26C548 (purchase separately).

† Parts included in Harness Kit 18A109 (purchase separately).

‡ Part pre-assembled with electronics cover.

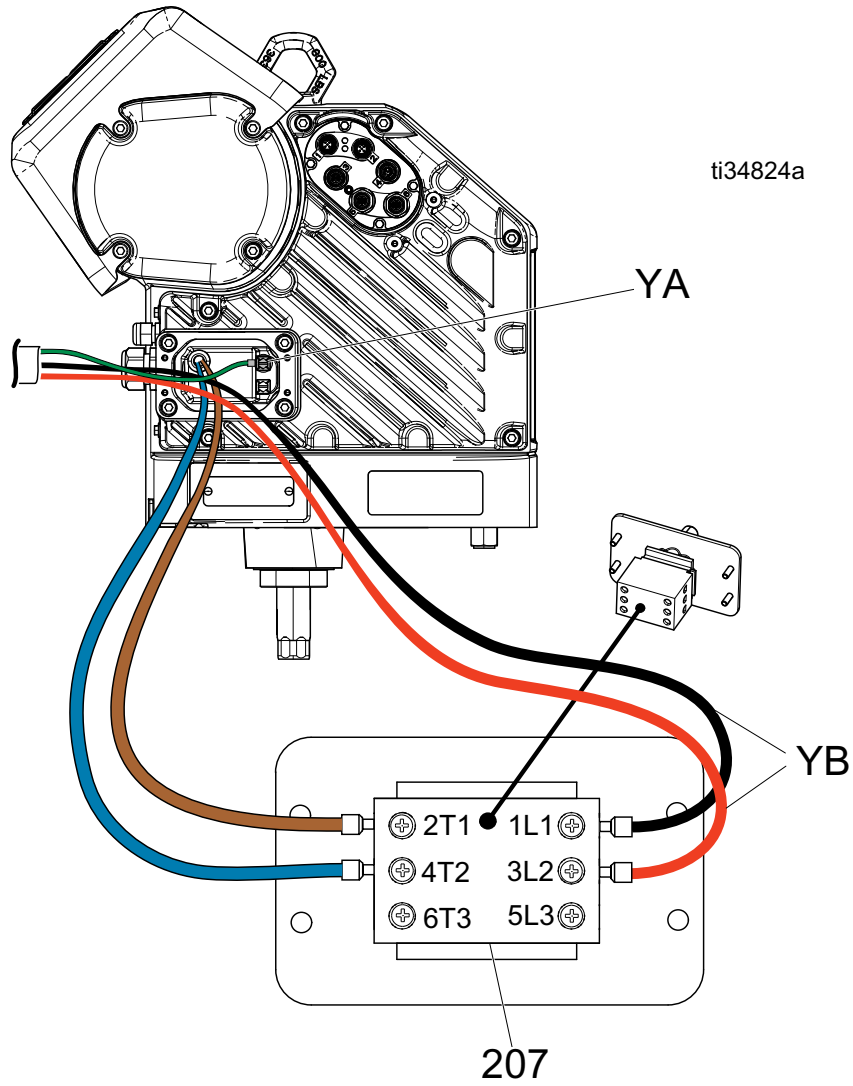


FIG. 35: Incoming Power Connections

| Ref. | Description |
|------|-------------------|
| YA | Ground connection |
| YB | Power connections |
| 207 | Disconnect switch |

Mounting Hole Pattern

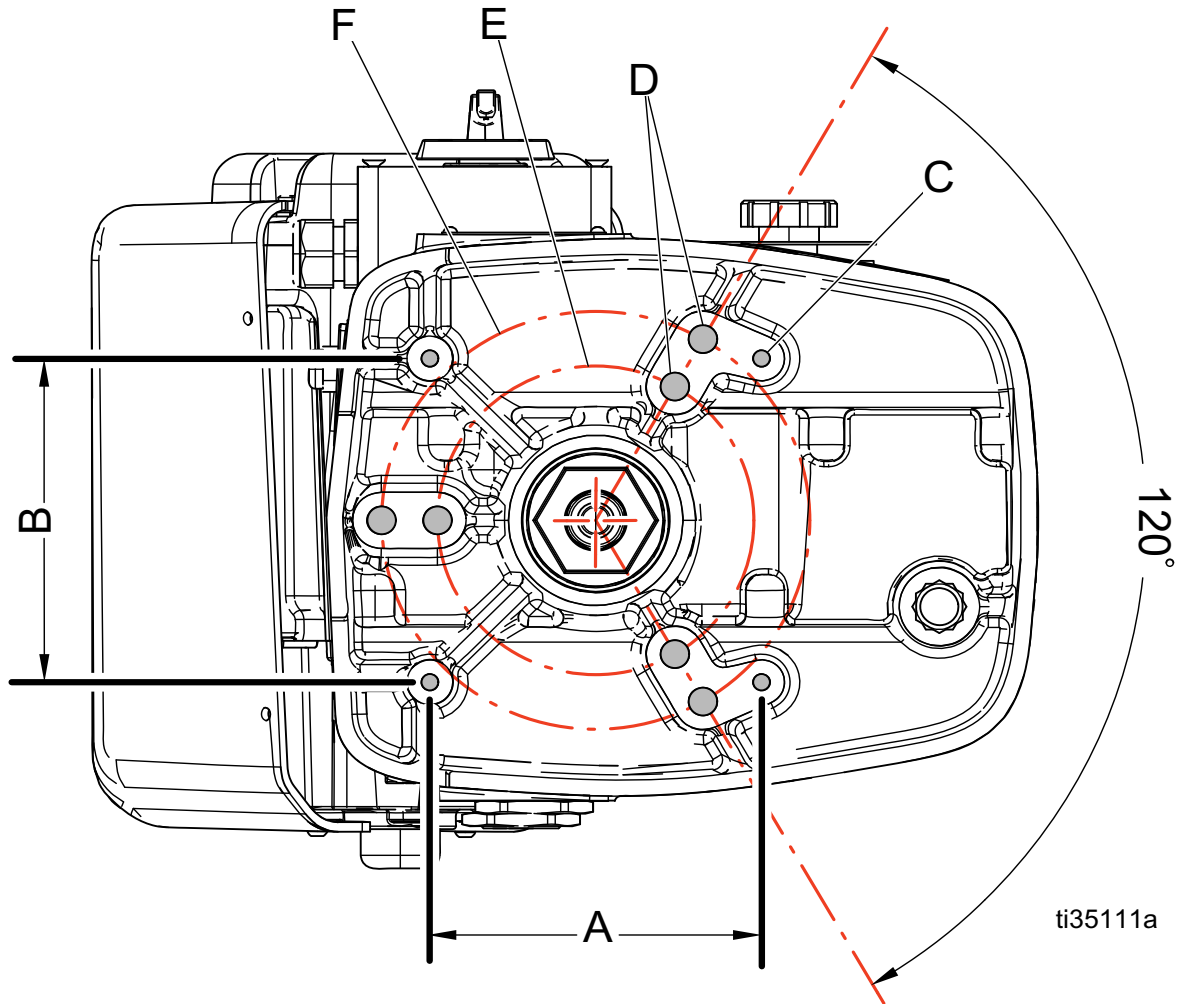


FIG. 36: Mounting Hole Pattern

| Mounting Hole | Dimensions |
|---------------|------------------------------|
| A | 6.2 in. (157 mm) |
| B | 6.2 in. (157 mm) |
| C | Four 3/8-16 mounting holes |
| D | 5/8-11 tie rod holes |
| E | 5.9 in. (150 mm) bolt circle |
| F | 8.0 in. (203 mm) bolt circle |

Dimensions

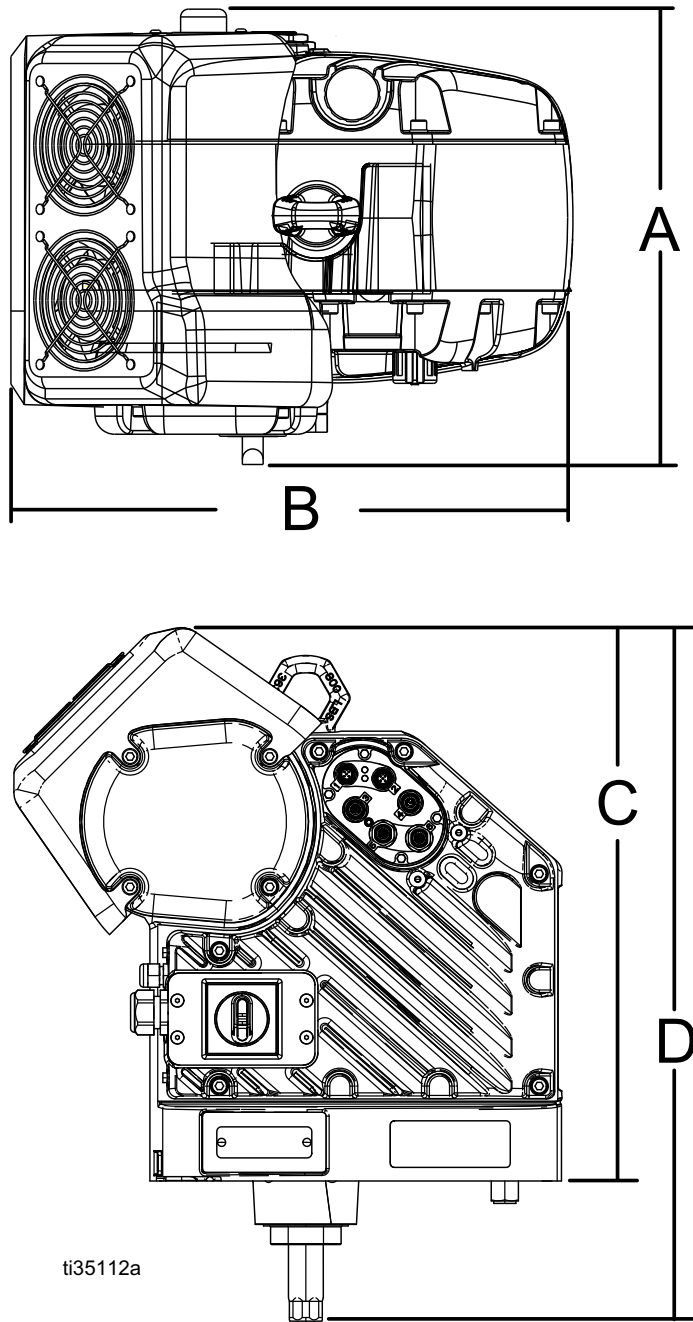


FIG. 37: Dimensions

| Driver Dimensions | |
|------------------------------|--------------------|
| A (width) | 14.9 in (0.378 m) |
| B (depth) | 18.3 in. (0.465 m) |
| C (mounted height) | 18.3 in. (0.465 m) |
| D (total height, as shipped) | 21.5 in. (0.545 m) |

Technical Specifications

| APD20 Advanced Precision Driver | | |
|--|---|---------------|
| | US | Metric |
| Operating temperature range | 23° to 120° F | -5° to 50° C |
| Input voltage | 200-240 VAC, single phase, 50/60 Hz | |
| Maximum input current | 20 A | |
| Oil specification | Graco Part No. 16W645 ISO 220 silicone-free synthetic EP gear oil* | |
| Maximum force | 4840 lb | 21.5 kN |
| Maximum continuous cycle rate | | |
| Maximum continuous cycle rate | 26 cycles per minute | |
| <i>To prevent premature pump wear, do not exceed the maximum recommended speed of the fluid pump.</i> | | |
| Oil capacity* | | |
| Vertical model (25N519) | 1.5 quarts | 1.4 L |
| Horizontal model (25N520) | 2.2 quarts | 2.1 L |
| Weight | | |
| All models | 115 lb | 52 kg |
| Notes | | |
| * <i>The driver gear box is shipped from the factory pre-filled with oil. Additional oil must be purchased separately.</i> | | |
| All trademarks or registered trademarks are the property of their respective owners. | | |

California Proposition 65

CALIFORNIA RESIDENTS

 **WARNING:** Cancer and reproductive harm – www.P65warnings.ca.gov.

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Original instructions. This manual contains English. MM 3A6482

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