

Dyna-Star[®] HP and HF Pump

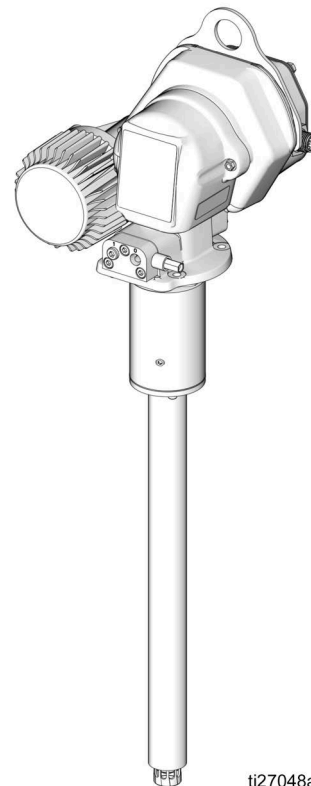
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EN

**Provides lubricant flow and pressure to operate a single line automatic lubrication system.
For automatic lubrication systems only. For professional use only.
Not approved for use in explosive atmospheres or hazardous locations.**



Important Safety Instructions
Read all warnings and instructions in
this manual. Save these instructions.

Models: Page 2; Series C



ti27048a








Models








Pump Models	Tube in Tube	HP Pump	HF Pump	Vent Valve	Compatible Reservoirs			Maximum Working Pressure	
					35/60 Pound	90/120 Pound	400 Pound	3500 psi 24.1 MPa, 241 bar	5000 psi 34.47 MPa, 344 bar
77X000		X			X				X
77X001	X	X			X				X
77X002	X	X				X			X
77X003	X	X					X		X
77X011	X	X		X	X			X	
77X012	X	X		X		X		X	
77X013	X	X		X			X	X	
77X014			X		X			X	
77X015			X			X		X	
77X016			X				X	X	

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.

 WARNING	
	<p>FIRE AND EXPLOSION HAZARD</p> <p>When flammable fluids are present in the work area, such as gasoline and windshield wiper fluid, be aware that flammable fumes can ignite or explode. 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 cigarettes and portable electric lamps. • Keep work area free of debris, including rags and spilled or open containers of solvent and gasoline. • Do not plug or unplug power cords or turn lights on or off when flammable fumes are present. • Ground all equipment in the work area. • Use only grounded hoses. • 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.
  	<p>SKIN INJECTION HAZARD</p> <p>High-pressure fluid from dispensing device, hose leaks, or ruptured components will pierce skin. This may look like just a cut, but it is a serious injury that can result in amputation. Get immediate surgical treatment.</p> <ul style="list-style-type: none"> • Do not point dispensing device at anyone or at any part of the body. • Do not put your hand over the fluid outlet. • Do not stop or deflect leaks with your hand, body, glove, or rag. • Follow the Pressure Relief Procedure when you stop dispensing and before cleaning, checking, or servicing equipment. • Tighten all fluid connections before operating the equipment. • Check hoses and couplings daily. Replace worn or damaged parts immediately.

! WARNING

 	<p>PRESSURIZED EQUIPMENT HAZARD</p> <p>Over-pressurization can result in equipment rupture and serious injury.</p> <ul style="list-style-type: none"> • A pressure relief valve is required at each pump outlet. • Follow Pressure Relief Procedure in this manual before servicing.
	<p>PRESSURIZED ALUMINUM PARTS HAZARD</p> <p>Use of fluids that are incompatible with aluminum in pressurized equipment can cause serious chemical reaction and equipment rupture. Failure to follow this warning can result in death, serious injury, or property damage.</p> <ul style="list-style-type: none"> • Do not use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents. • Many other fluids may contain chemicals that can react with aluminum. Contact your material supplier for compatibility.
 	<p>EQUIPMENT MISUSE HAZARD</p> <p>Misuse can cause death or serious injury.</p> <ul style="list-style-type: none"> • 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 Data in all equipment manuals. • Use fluids and solvents that are compatible with equipment wetted parts. See Technical Data in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request MSDS from distributor or retailer. • 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.
 	<p>MOVING PARTS HAZARD</p> <p>Moving parts can pinch, cut or amputate fingers and other body parts.</p> <ul style="list-style-type: none"> • Keep clear of moving parts. • Do not operate equipment with protective guards or covers removed. • Pressurized equipment can start without warning. Before checking, moving, or servicing equipment, follow the Pressure Relief Procedure and disconnect all power sources.

 **WARNING****BURN HAZARD**

Equipment surfaces and fluid that's heated can become very hot during operation. To avoid severe burns:

- Do not touch hot fluid or equipment.

**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. This 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 manufacturers.

Typical Installation: Injector System

The installation shown in below is only a guide for selecting and installing system components. Contact your Graco distributor for assistance in planning a system to suit your needs.

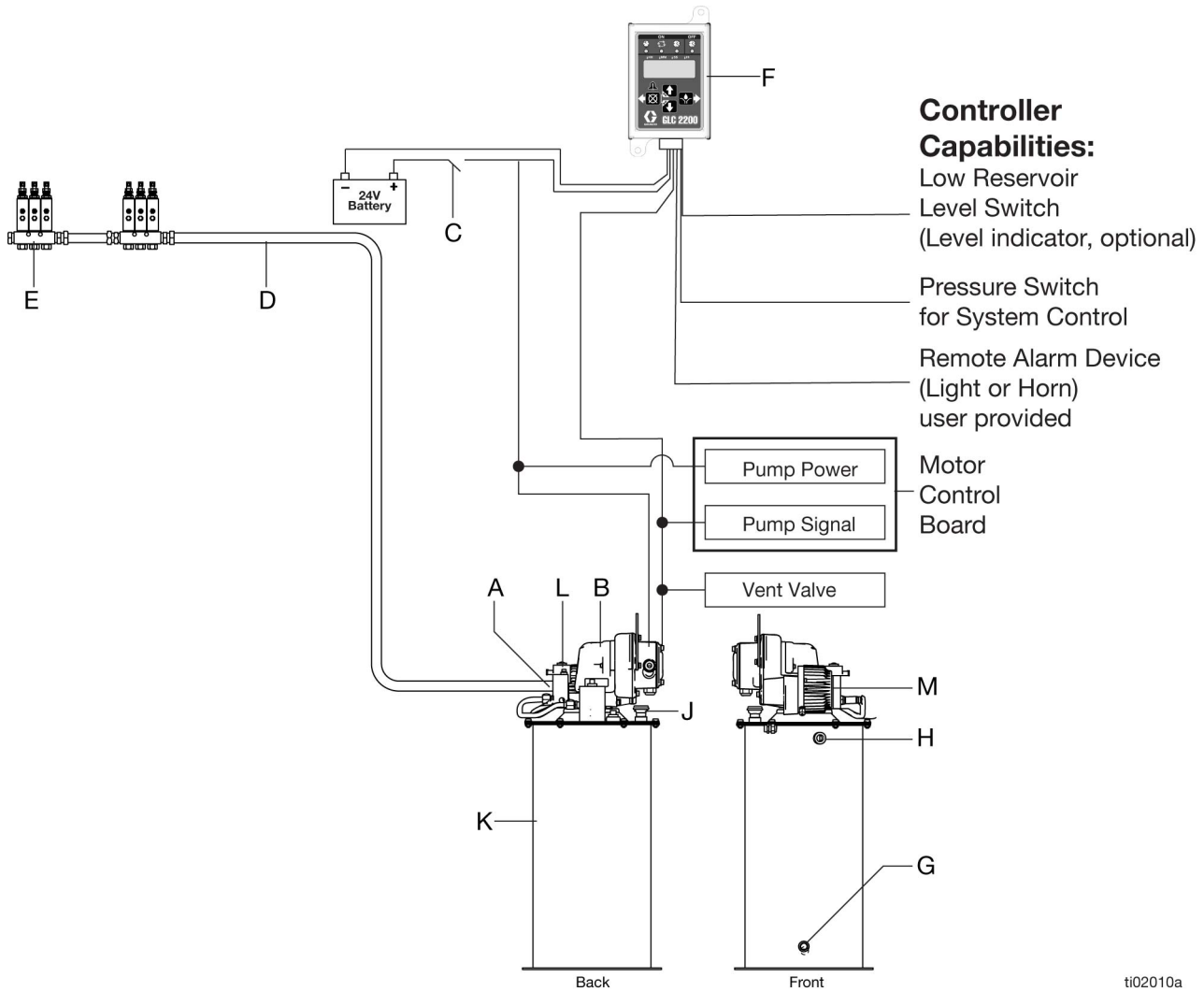


FIG. 1

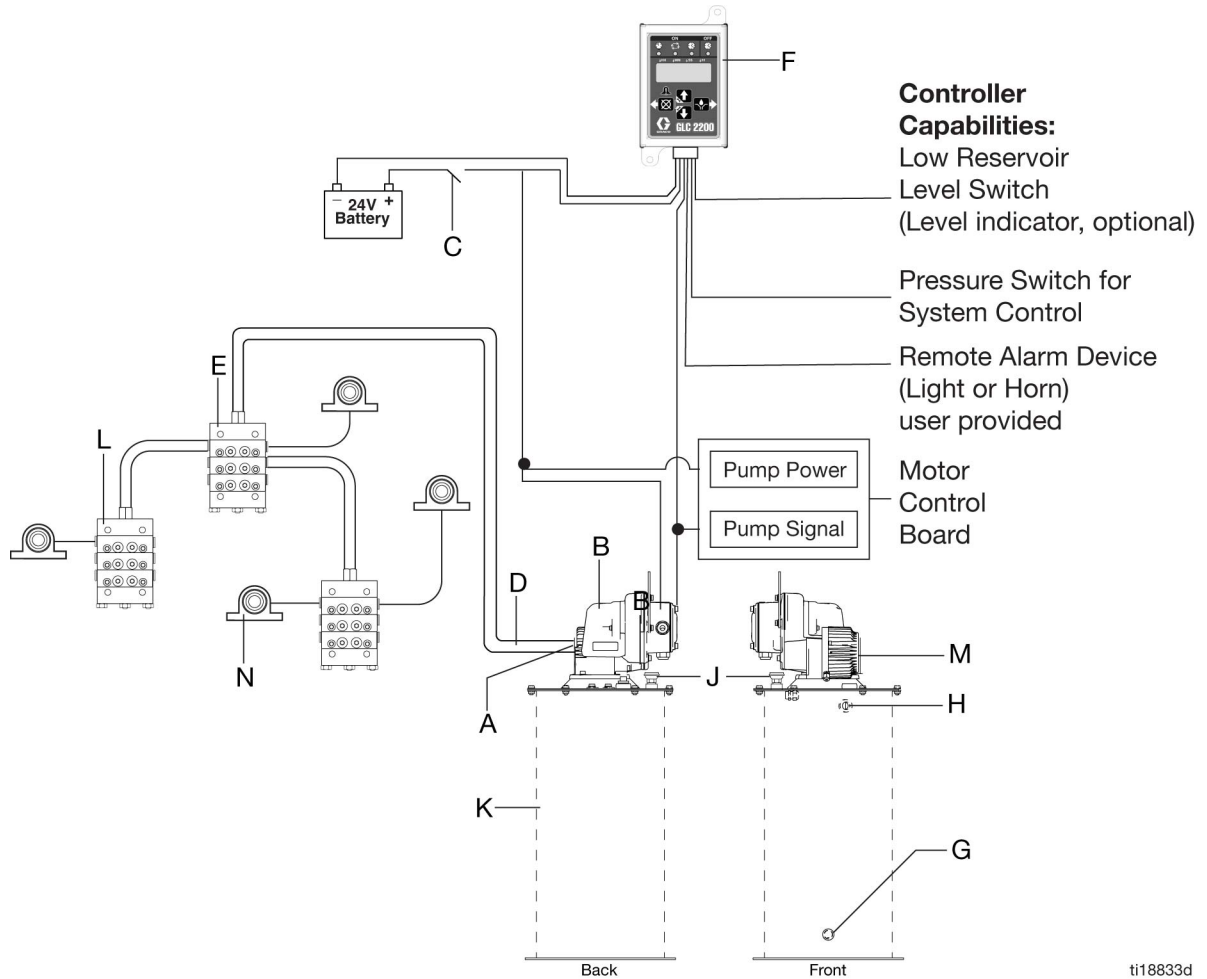
Key:

- A Lubricant output connection
- B Pump
- C Ignition switch*
- D High-pressure lubricant supply lines*
- E Injector banks*
- F Lubrication controller*
- G Fill port (for reference only; non-tube-in-tube models only)
- H Overflow port (for reference only)
- J Breather (for reference only)
- K Reservoir
- L Vent Valve (for reference only)
- M Motor

*User provided

Typical Installation: Series Progressive System

The installation shown below is only a guide for selecting and installing system components. Contact your Graco distributor for assistance in planning a system to suit your needs.



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FIG. 2

Key:

- A Lubricant output connection
- B Pump
- C Ignition switch*
- D High-pressure lubricant supply lines*
- E Primary metering device*
- F Lubrication controller*
- G Fill port (for reference only; non-tube-in-tube models only)
- H Overflow port (for reference only)
- J Breather (for reference only)
- K Reservoir (for reference only)
- L Secondary metering device
- M Motor
- N Bearing

*User provided

Installation

Pressure Relief



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 dispensing and before cleaning, checking, or servicing the equipment.

To relieve pressure in the system, use two wrenches working in opposite directions on the pump outlet fitting to **slowly loosen the fitting only** until the fitting is loose and no more lubricant or air is leaking from fitting (see FIG. 3).

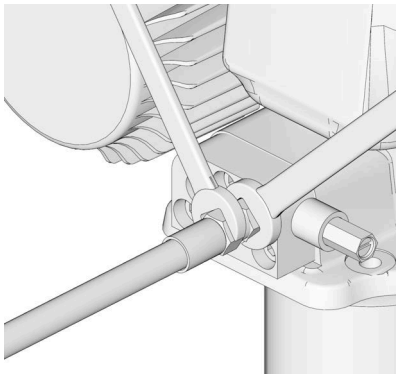


FIG. 3

Pump Module

Reference numbers used in the following instructions refer to *Parts*, page 35. Upper case reference letters used in the following instructions refer to *Typical Installation Drawings* provided on pages 6 and 7.

NOTE:

- Reservoir covers and reservoirs are available from Graco. Contact your Graco Distributor or Graco Customer Service for assistance ordering these parts. See *Parts*, page 38 for a complete list of accessories.
- Before installing the pump on the reservoir, use the bolts to secure the reservoir to the installation location.

- Install the reservoir cover on the reservoir. Tighten the screws to secure the cover to the reservoir.
1. Remove the pump mounting screws (a) and washers (b) from the reservoir cover. Save these parts for reassembly. The gasket (c) should not be removed from the cover.

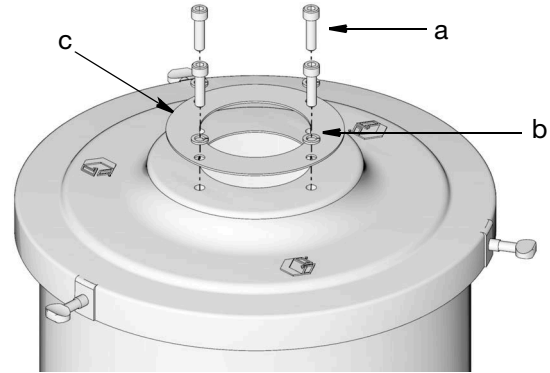


FIG. 4: 120 Pound Cover Shown

2. Loosen the bolts (128) and remove the cover (126) from Dyna-Star pump (FIG. 5).

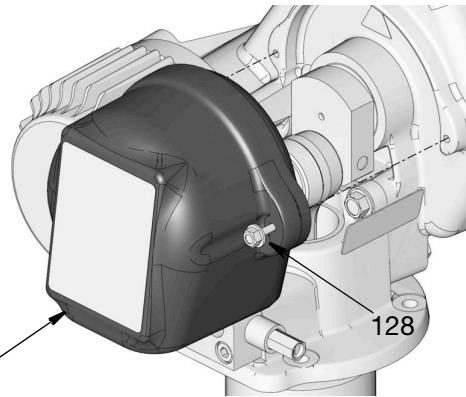


FIG. 5

- Remove the protective cap (d) from the pump down-tube (208) (FIG. 6). Discard the cap.

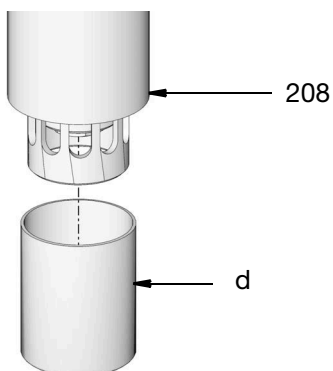


FIG. 6

- Verify the gasket (c) is in place on top of the reservoir cover, laying flat, and that the holes (e) in the gasket align with the holes in the cover (FIG. 7).

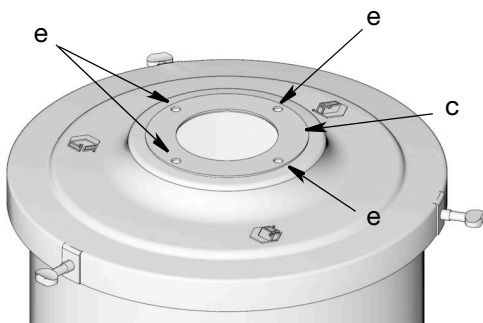


FIG. 7



HEAVY EQUIPMENT HAZARD

Lifting or moving heavy equipment incorrectly can cause serious injury. To avoid serious injuries, such as muscle strain or back injuries, when moving pump always use a lifting aid secured to the pump lift ring. See Technical Data, included in the pump instruction manual for pump weight information.

- Install the pump down-tube through the opening in the center of the gasket and reservoir cover and into the reservoir.
- Align holes in the pump base with holes in the reservoir cover (FIG. 8). Securely fasten the pump to the reservoir cover using screws (a) and washers (b) removed in Step 1, page 8, torque to 28 +/- 3 ft-lb (37.96 N•m) (+/-4.1 N•m).

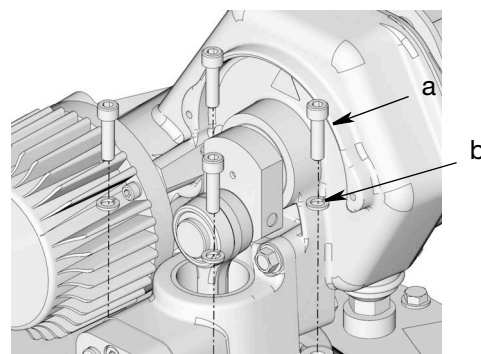


FIG. 8

NOTE: When the pump is correctly installed on the reservoir, the breather (J) will be below the control box (115), as shown in FIG. 9.

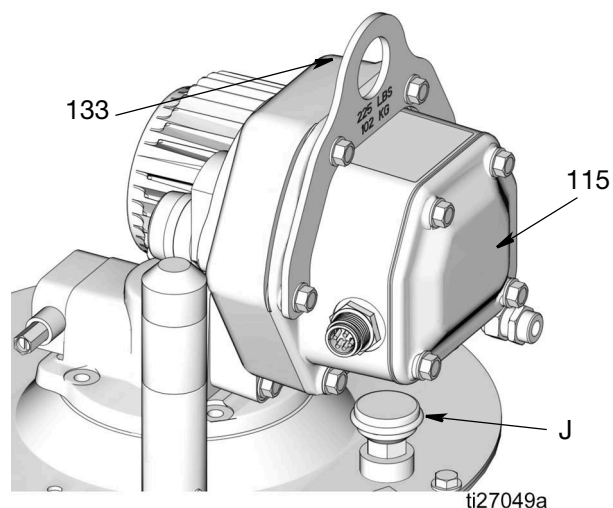


FIG. 9

NOTICE

To prevent damage to the unit:

- Check breather (J) vent for proper operation before filling reservoir.
- Open overflow port (H) before filling reservoir to visually inspect lubrication level.
- Do not fill reservoir beyond overflow port (H).
- Do not use breather vent as a port to fill reservoir.

7. Reinstall the cover (126) using the bolts (128). Use a wrench to tighten bolts securely (FIG. 10).

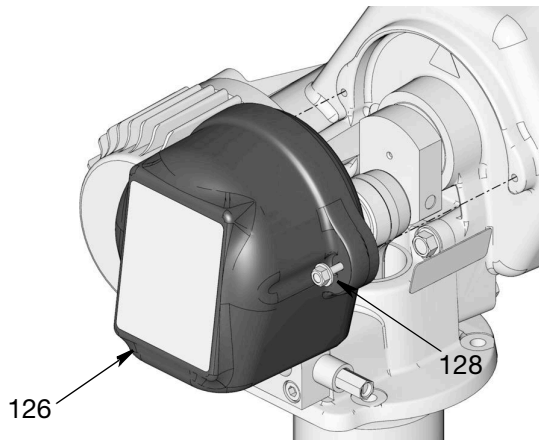


FIG. 10

8. Connect the timer/controller (F) (user supplied, if used).
9. Connect High pressure lubricant supply line (D) to the lubricant output connection (O) (FIG. 11) on the vent valve or manifold.

NOTE: The high pressure lubricant supply line (D) is disconnected from the lubricant output connection (O) during **Priming**, page 15.

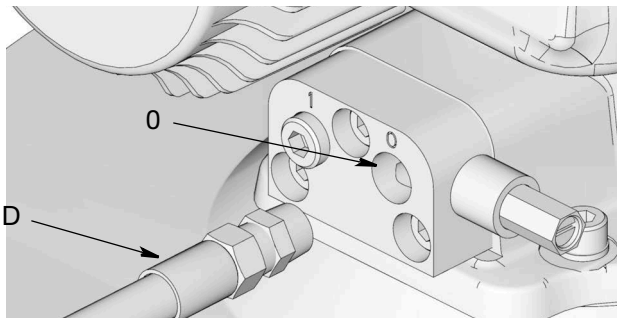


FIG. 11: Lubricant Outlet Connection

Wiring Grounding

Fuses

⚠	⚡	⏚				
<p>The equipment must be bonded (grounded) directly to the truck. Grounding reduces the risk of static shock due to static build up on the equipment.</p>						

NOTICE
<p>Fuses (user supplied) are required on all models. To avoid equipment damage:</p> <ul style="list-style-type: none"> Never operate the Dyna-Star Pump models without a fuse installed. A fuse of the correct voltage and amperage must be installed in line with the power entry to the system. Graco recommends using 35A fuses.

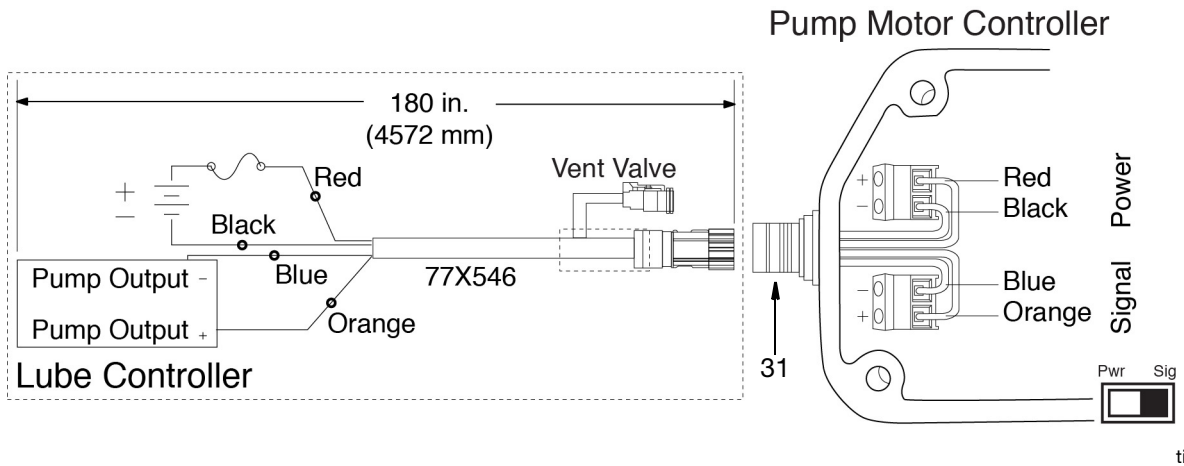
System Configuration and Wiring

NOTE: The pump is equipped with a 6-pin (4 pins are used), M23 connector (31) for use with Graco cable wiring harness kits 77X545 and 77X546. See **Cable Harness Kits**, page 38.

FIG. 12 shows the pump connections when used with Graco Wire Harness 77X545 or 77X546. See pages 12 and 13 for connection details when a customer/user supplied wiring harness is used.

NOTICE

To avoid equipment damage, remove power before switching modes from signal to power or power to signal.

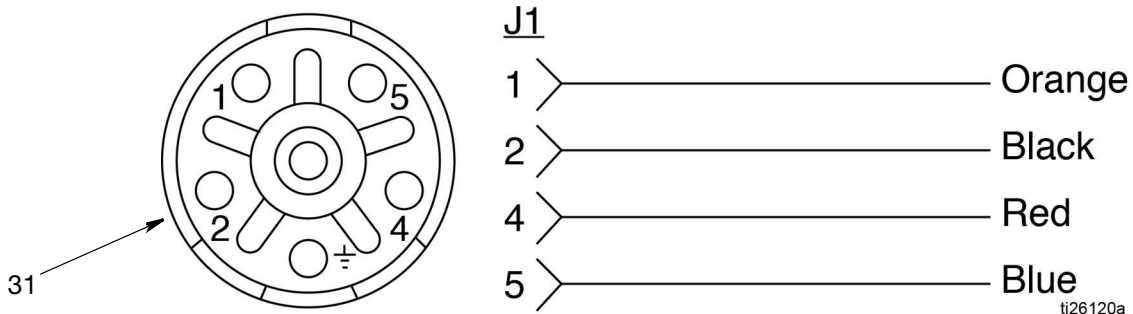


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FIG. 12

Wire Connection Table

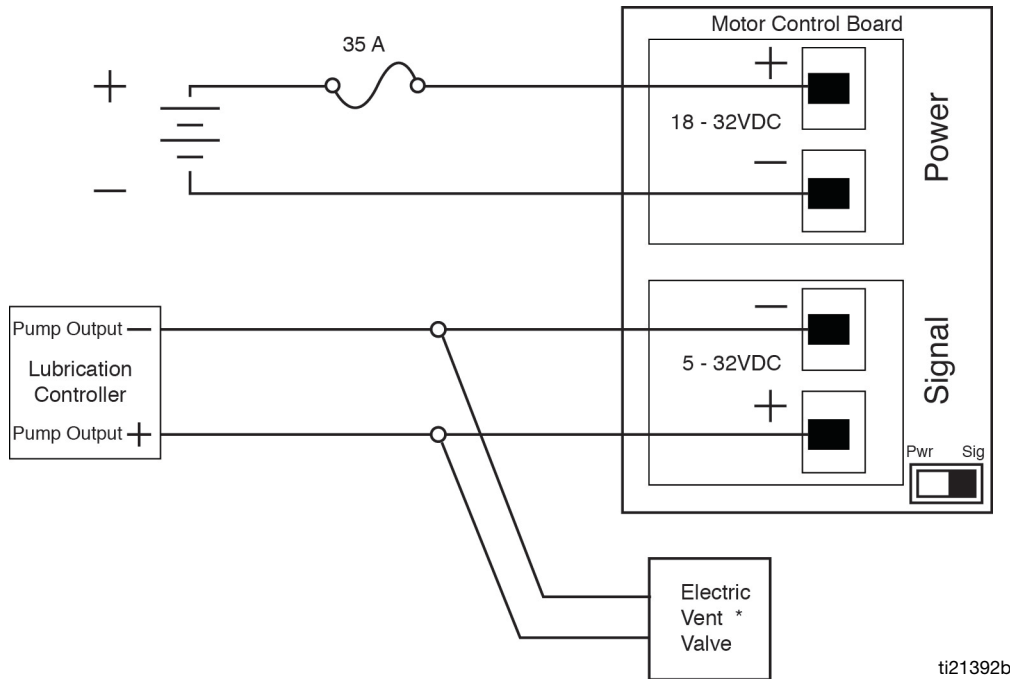
Pin	Wire Color	Connection
1	Orange	Signal +
2	Black	Power -
4	Red	Power +
5	Blue	Signal -



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FIG. 13

24 VDC With Signal Input

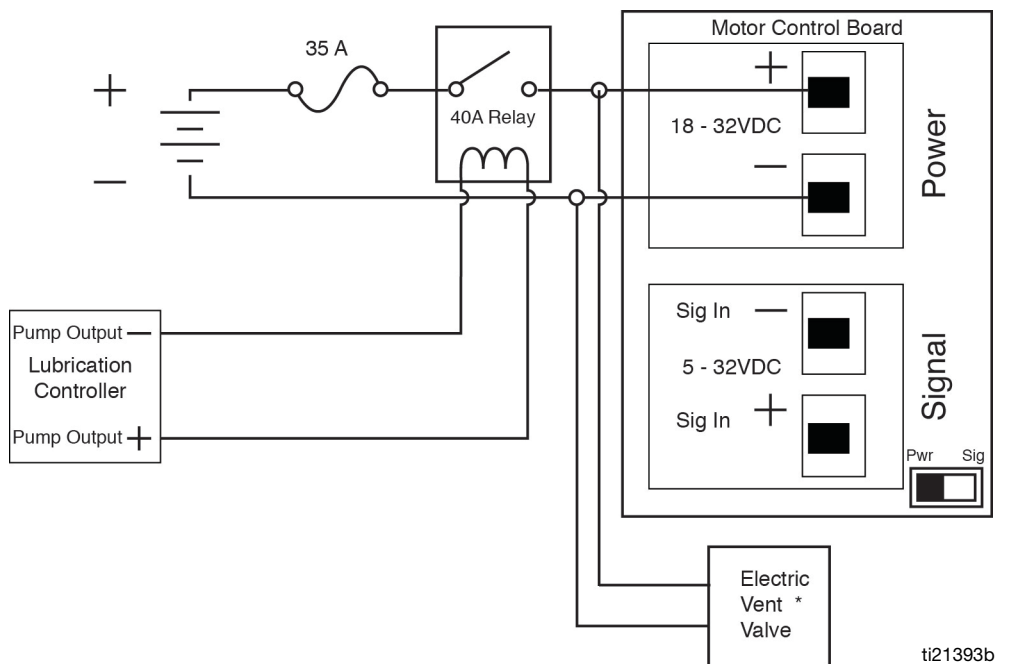


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FIG. 14: Pump control switch shown in signal mode

**A Vent Valve is only used in an injector-based system.*

24 VDC With External Relay



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FIG. 15: Pump controls switch shown in power mode

**A Vent Valve is only used in an injector-based system.*

DC Models - Motor Control Board

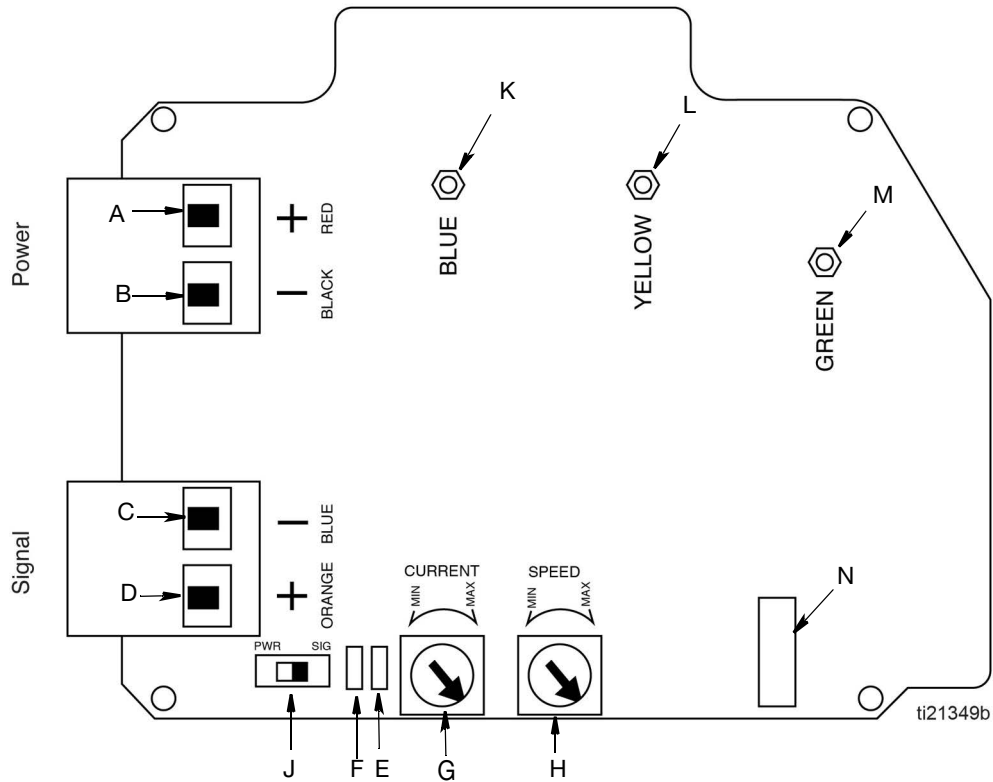


FIG. 16

Key

- A + (Positive) Power Input
- B - (Negative) Power Input
- C Turn On Signal -
- D Turn On Signal +
- E Red (Fault) LED - Blinks type of fault (See Fault Table)
- F Green (Power) LED -
 - Blinks: Power ON, Pump running
 - Solid: Power/Pump OFF
- G Current Control Potentiometer (Minimum: Turn Knob Counter-Clockwise / Maximum: Turn Knob Clockwise)
- H Flow Control Potentiometer (Minimum: Turn Knob Counter-Clockwise / Maximum: Turn Knob Clockwise)
- J Pump Control Switch*
 - PWR - Turns pump on when power is applied
 - SIG - Turns pump on when voltage is applied to:
 - SIG IN -
 - SIG IN +
- K Blue Motor Wire Connection
- L Yellow Motor Wire Connection
- M Green Motor Wire Connection
- N J5 Connector - Motor Hall Cable Connector

***NOTE:** Make sure that the power to the pump is OFF before switching between PWR and SIG modes.

Fault Table: Red LED (E)

Fault	Blinks
Over Current	1
Locked Rotor	2
Low or High Voltage	3
High Motor temp	4
Missing Temp Sensor	5
High Board Temp	6
Bad Hall Cable	7

Pump Control Operation

- When the pump control switch is set in signal mode, the motor/pump runs when voltage is applied to the signal and power connectors.
- When the pump control switch is set in power mode, the motor/pump runs when voltage is applied to the power connectors. The signal connectors do not require voltage.

Current Control and Flow Motor Control Settings

Current and Flow Control Adjustment

Reference numbers used in the following instructions refer to Parts, page 36.

1. Remove the screws (116), cover (120), and gasket (119) to access the control board (FIG. 17).

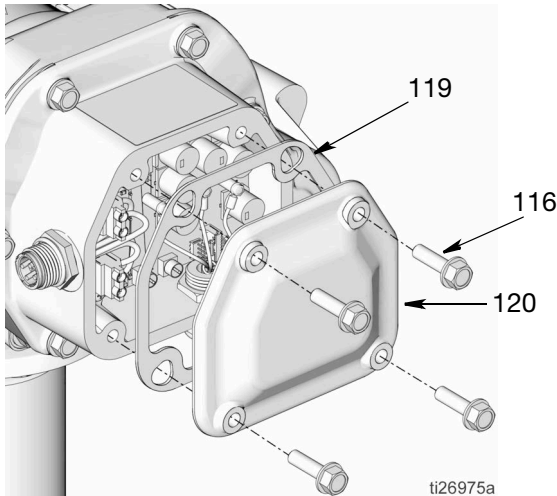
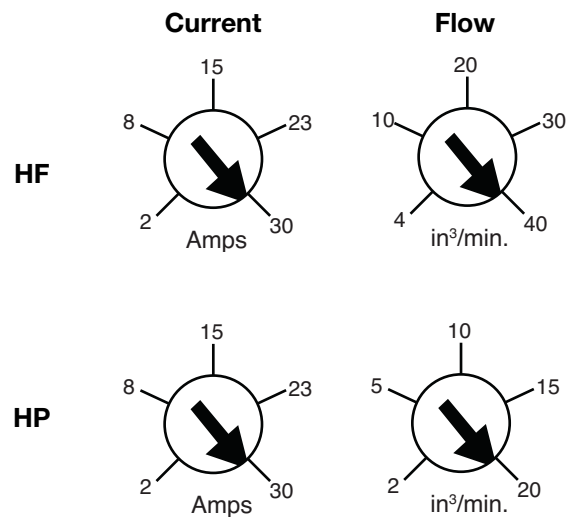


FIG. 17

2. Current and flow (speed) control are adjusted on the motor control board using the current control potentiometer knob (G) and the flow control potentiometer knob (H) (page 13).
 - The current control knob (G) manages the flow of electricity (amps).
 - The flow (speed) control knob (H) governs the flow rate of the fluid being pumped.
 - If the pump is drawing more amps than the current setting, fluid will only be pumped as fast as the current setting allows, regardless of the flow rate setting.
 - Both of the potentiometer knobs can cause the pump to slow down and reduce the fluid flow rate.
 - If the board is in a current limiting mode - flow (speed) control is disabled.

See **Performance Charts**, page 41 for Flow Rate and Current information.

- Turn the knob clockwise to increase setting value.
- Turn the knob counter-clockwise to decrease setting value.







NOTE: Values are based on lab test conditions at ambient temperature 72°F (22°C) with an input voltage of 24V. Actual results may vary and should be verified in the application.

3. Replace the gasket (119), cover (120), and screws (116), being careful not to pinch any wires. Tighten the bolts securely. Torque bolts to 17 to 19 ft.-lb (23 to 26 N•m).

Operation



Upper case letters used in the following instructions refer to Typical Installation provided on page 6 or 7.

						
<ul style="list-style-type: none"> • Be sure unit is securely mounted and grounded before operation. • Do not lift pressurized equipment. 						





Priming

1. After reservoir is completely filled, remove the high pressure lubricant supply line (D) from the outlet.
2. Connect power to the pump.
3. Start the pump and run until all of the air has been expelled and the fluid flow is continuous.
4. Reconnect the high pressure lubricant supply line (D) to the outlet.

Fill Reservoir

						
Do not insert finger into the overflow port while filling a reservoir equipped with a follower plate. Injury or amputation could result.						

NOTICE						
To prevent damage to the unit:						
<ul style="list-style-type: none"> • Check breather (J) vent for proper operation before filling reservoir. • Open overflow port (H) before filling reservoir to visually inspect lubrication level. • Do not fill reservoir beyond overflow port (H). • Do not use breather vent as a port to fill reservoir. 						

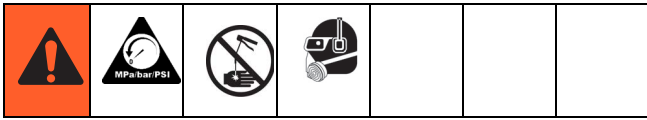
						
COMPONENT RUPTURE HAZARD						
The maximum working pressure of each component in the system may not be the same. Over pressurizing any component can result in rupture, fire, explosion, property damage and serious injury.						
To reduce the risk of over pressurizing any component in the system, be sure you know the maximum working pressure of each component. Never exceed the maximum working pressure of the lowest rated component in the system.						
Regulate pressure to the pump so that no fluid line, component or accessory is over pressurized.						

NOTICE	
Never allow pump to run dry of the fluid being pumped. Running a pump dry can damage the pump.	

Shutdown

For normal system shut down, disconnect power to lubricator controller (F) and pump (B) to control board.

Troubleshooting



Problem	Cause	Solution	
Pump not powering ON, green LED is not ON	Wiring not done correctly, polarity is wrong or loose wire(s)	Check wire connections. Verify they are all tight. Correct polarity.	
	Fuse not in place or fuse is faulty	Check fuse rating. If incorrect fuse is used, install fuse of the correct amperage.	
	Lubrication controller is in OFF mode	Set lubrication controller to correct lube cycle.	
Pump is powered on, green LED is ON but pump is not cycling	Motor is not wired properly to control board	Connect wires to correct color terminals.	
Pump is powered on, green LED is blinking, pump cycles continuously instead of turning OFF	Pump control switch (J) is set to PWR mode. Pump cycling is not controlled by signal output	Change pump control switch (J) to signal mode (SIG).	
Pump is cycling but there is no lubricant output from the outlet	Lubricant level in tank/reservoir is too low	Refill tank/reservoir.	
	Damaged tank or reservoir	Replace tank/reservoir.	
	Pump is cavitating		Shake tank/reservoir to redistribute grease.
			Install a follower plate to help distribute grease during pump operation.
Pump is cycling slow	Pump seals are worn or damaged	Replace pump seals. See Seal Replacement instructions, page 19.	
	Current Control Potentiometer Knob (G) on motor control board is set too low	Increase the current limit by turning the Current Control Potentiometer Knob (G), clockwise.	
Pump is cycling, there is output of fluid at the outlet, pump pressure is not building	Flow Control Potentiometer Knob (H) on motor control board is set too low	Increase the flow limit by turning the Flow Control Potentiometer Knob (H), clockwise.	
	Leakage in a lubrication line	Check lubrication line for leakage. Replace any lines that are leaking and/or damaged.	
	Pump seals are worn or damaged	Replace pump seals. See Seal Replacement instructions, page 19.	

Problem	Cause	Solution
Red fault LED (E) on control board, blinking		
Over current fault - 1 blink	System pressure too high	Reduce system pressure by installing larger diameter lubrication tubes
	Current Control Potentiometer Knob (G) on motor control board is set too low	Increase the current limit by turning the Current Control Potentiometer Knob (G), clockwise.
Locked rotor - 2 blinks	System pressure too high	Reduce system pressure by installing larger diameter lubrication tubes
	Current Control Potentiometer Knob (G) on motor control board is set too low	Increase the current limit by turning the Current Control Potentiometer Knob (G), clockwise.
	Motor is damaged	Separate motor from pump and run motor. If motor is damaged, replace motor. See Motor Replacement instructions, page 28.
	Pump lower is plugged	Follow Seal Replacement instructions to disassemble pump lower. Inspect and clean parts as needed prior to using them for reassembly. Replace all damaged and worn parts. See Seal Replacement instructions, page 19.
Low or high voltage - 3 blinks	Faulty input line voltage	Use a multi-meter to check input line voltage measure 18-32 volts DC.
Motor temperature is high - 4 blinks	System pressure too high	Reduce system pressure by installing larger diameter lubrication tubes.
	Current Control Potentiometer Knob (G) on control board is set too low	Increase the current limit by turning the Current Control Potentiometer Knob (G), clockwise.
	Motor is damaged	Separate motor from pump and run motor. If motor is damaged, replace motor. See Motor Replacement instructions, page 28.
	Motor control switch (J) is set to PWR mode. Pump cycling is controlled by signal output and pump is running continuously	Change motor control switch (J) to signal mode (SIG).
	High duty cycle	Reduce duty cycle.

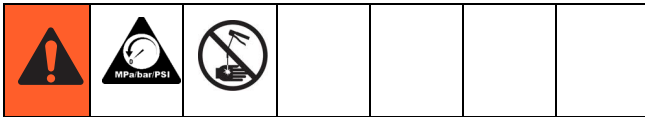
Problem	Cause	Solution
Missing temperature sensor - blinks - 5 blinks	Loose or damaged HALL sensor cable	Verify HALL sensor cable is securely attached. Tighten connection. Replace damaged cable.
	Motor is damaged	Separate motor from pump and run motor. If motor is damaged, replace motor. See Motor Replacement instructions, page 28.
Control board temperature is high - 6 blinks	System pressure too high	Reduce system pressure by installing larger diameter lubrication tubes.
	Current Control Potentiometer Knob (G) on control board is set too low	Increase the current limit by turning the Current Control Potentiometer Knob (G), clockwise.
	Motor is damaged	Separate motor from pump and run motor. If motor is damaged, replace motor. See Motor Replacement instructions, page 28.
	Motor control switch (J) is set to PWR mode. Pump cycling is not controlled by signal output and pump is running continuously	Change motor control switch (J) to signal mode (SIG).
	High duty cycle	Reduce duty cycle.
Loose or damaged HALL sensor cable - 7 blinks	HALL sensor cable not securely attached	Verify HALL sensor cable is securely attached. Tighten connection.
	Damaged HALL sensor cable	Replace motor.
Motor runs but pump does not	Motor shaft/gears are stripped or damaged	Gear box is damaged. Replace pump.
Control board LED's blink erratically	Damaged control board	Replace motor control board. See Motor Control Board Replacement instructions, page 31.
Flow (Speed) Control Potentiometer Knob not controlling	Current Control Potentiometer Knob set too low and pump is limiting current, thereby disabling flow control	After determining the maximum amperage rating for the equipment/application, then increase the current limit accordingly by turning the Current Control Potentiometer Knob clockwise.

Repair

Seal Replacement

Kits 24T860 - HP Models or 24T861 - HF Models

- Reference numbers used in the following instructions refer to **Parts List**, beginning on page 35.
- Upper case letters used in the following instructions refer to *Typical Installation* provided on page 6 or 7.
- Lower case letters used in the following instructions refer to component parts or user provided parts.
- Unless otherwise noted, keep all parts for reassembly. Inspect and clean parts as needed prior to reassembly.
- Use all of the new parts included in the kit for reassembly.



Disassembly

1. Disconnect Dyna-Star pump from the main power source.
2. Relieve pressure. Follow **Pressure Relief**, page 8.
3. Disconnect the timer/controller (F) (user supplied, if used).
4. Disconnect the high pressure lubricant supply line (D) to the lubricant output connection (O) (FIG. 11) on the vent valve or manifold.

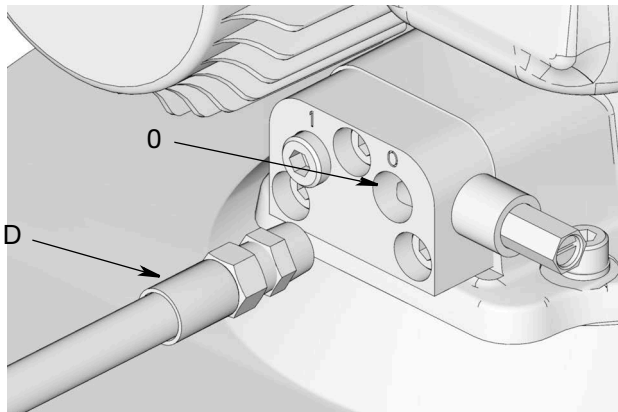


FIG. 18: Lubricant Outlet Connection

5. Loosen the bolts (128) and remove the cover (126) from Dyna-Star pump (FIG. 19).

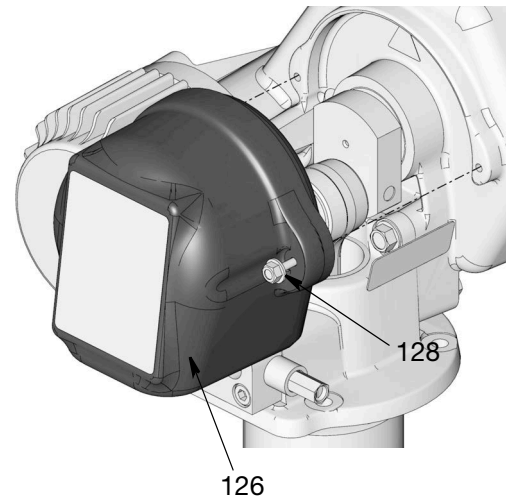


FIG. 19

6. Remove the screws (a) and washers (b) holding the pump to the cover and remove the pump from the cover (FIG. 20). Place the pump on a workbench, or table top, protected with a drop cloth.

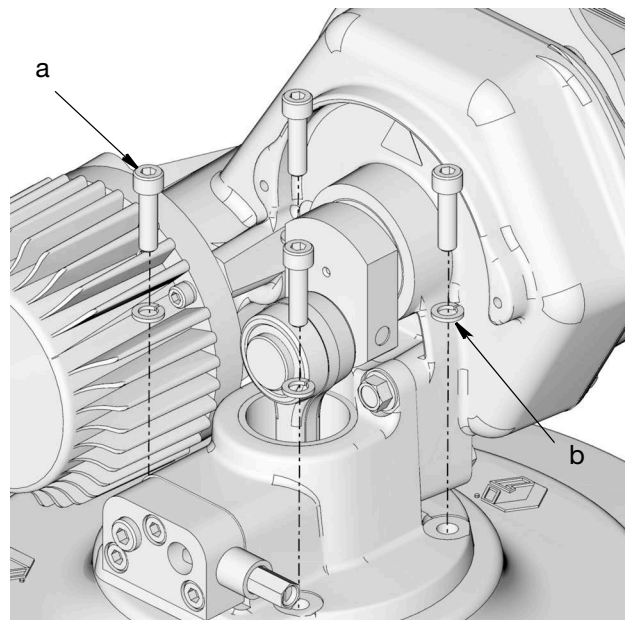


FIG. 20

7. **For Tube-In-Tube models only:** Remove the bolts (4) holding the tube (3) to the pump adapter (2). Remove the tube and gasket (5) and set aside to for reassembly (FIG. 21).

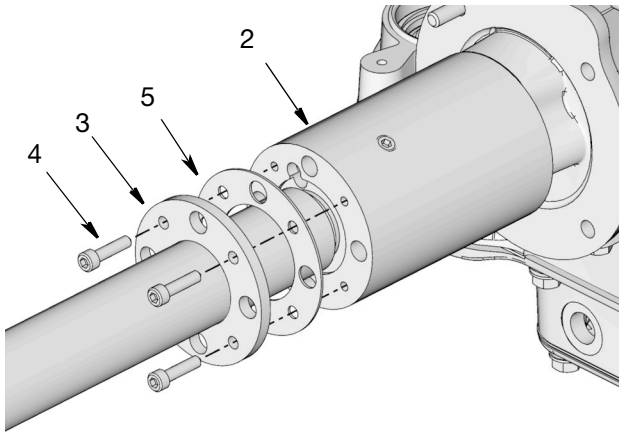


FIG. 21

8. Observe the location of the priming rod (215) and the shovel piston (216) inside of the shovel cylinder (208) (See **Pump Lower Parts**, page 38). If the piston is not located in the lowest position inside of the cylinder:
 - a. Remove the screws (125) and washers (124) holding the motor (123) to the gear box housing (101) (FIG. 22).
 - b. Remove the motor.

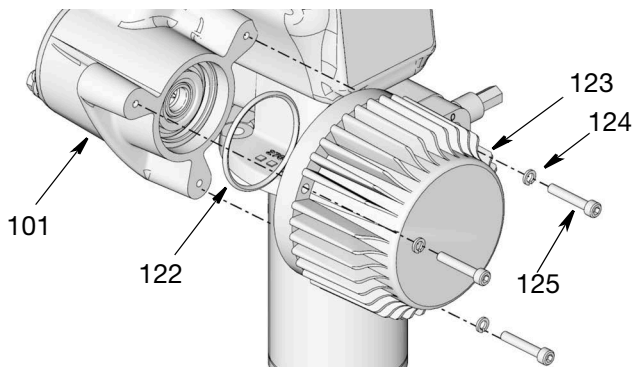


FIG. 22

- c. Use a screw driver to turn the motor shaft clockwise until the shovel piston (216) is seated in the lowest position inside of the shovel cylinder (208).

NOTICE

The pump has a one way clutch. Do not use a power screwdriver to turn the shaft or not turn shaft counter-clockwise. These actions could damage the pump/motor.

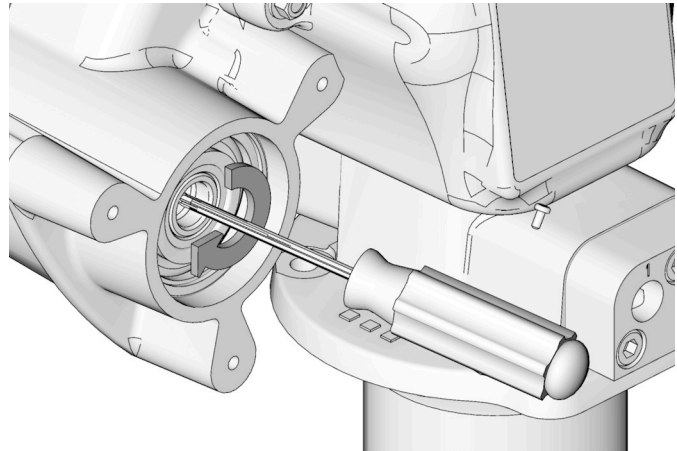


FIG. 23

- d. Verify the o-ring (122) is still in place and correctly seated in the motor (123) (FIG. 22).
 - e. Reinstall the motor (123) to the gear housing box (101) using the screws (125) and washers (124). Use a wrench to tighten screws securely. Torque to 12 to 14 ft-lb (16 to 19 N•m) (FIG. 22).
9. Remove the screws (6) from the pump adapter (2) (FIG. 24).

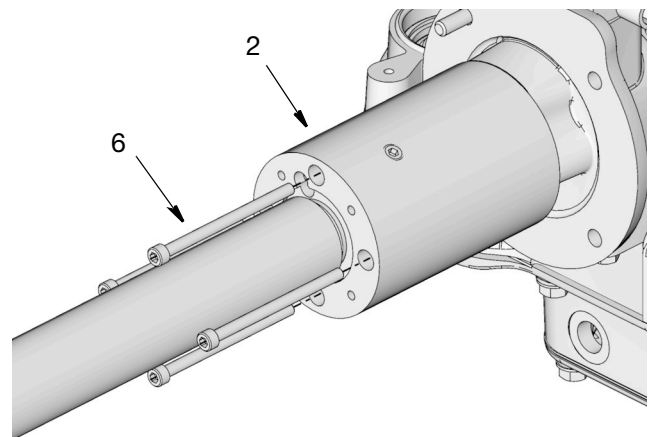


FIG. 24

10. Pull the pump adapter (2) down to access the retaining spring (8) (FIG. 25).

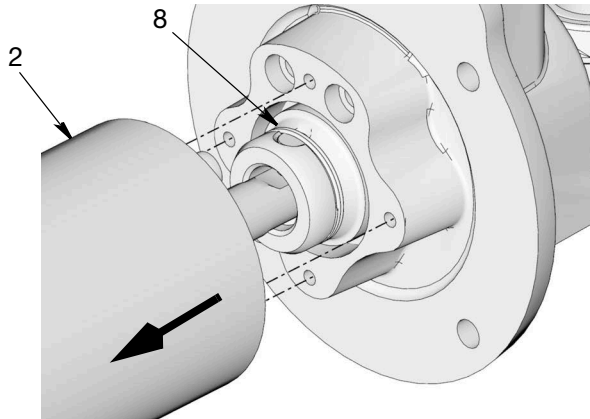


FIG. 25

11. Slide the spring (8) out of the groove (102a) in the connecting rod (102) to expose the pump pin (7) (FIG. 26). Push or tap the pump pin (7) out of the hole.

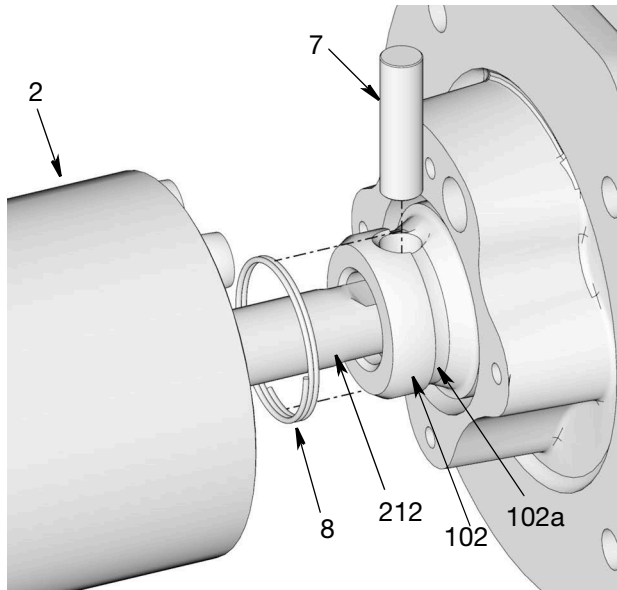


FIG. 26

12. Separate the displacement rod (212) from the connecting rod (102). Put the section (102) in a safe place, it is needed for reassembly. (FIG. 27).

NOTE: Be careful when pulling these sections apart that the spring (8) is not lost.

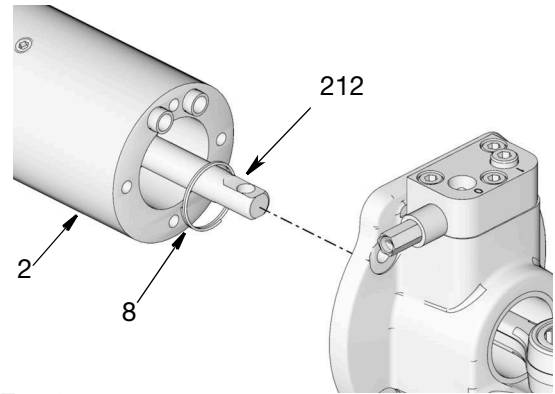


FIG. 27

13. Remove the spring (8) and the two seals (9). Put the spring in a safe place for reassembly. Discard the seals (9). Use the new seals included in the kit for reassembly (FIG. 28).

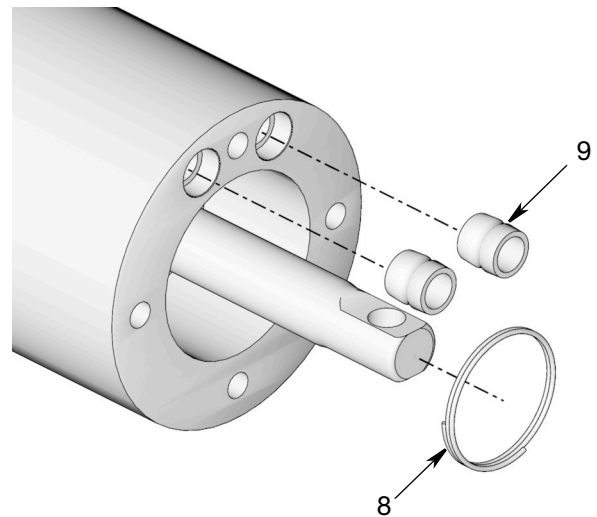


FIG. 28

14. Secure the pump adapter (2) section in a brass vise.

NOTE: To protect the outside surface of the pump, place a rag around the pump body before placing the pump in the vise jaws.

15. The pump cylinder is comprised of three separate sections. First separate the shovel cylinder section (208) from the pump cylinder (204) using two pipe wrenches, working in opposite directions to loosen the shovel cylinder. When cylinder (208) is loose enough, use your hands to unscrew and remove it from the other sections (FIG. 29).

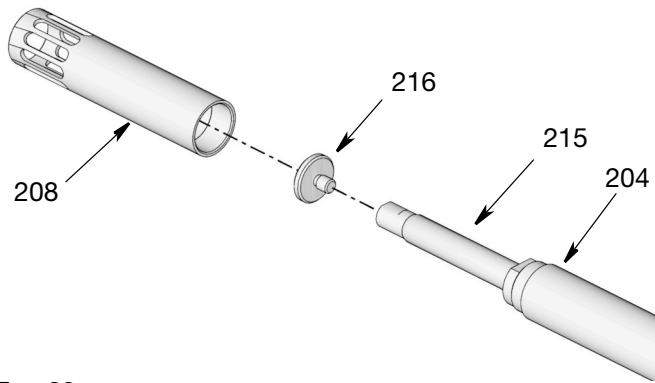


FIG. 29

16.

HP Pump: Use wrench on the flats of the priming rod (215) and socket to loosen and remove the shovel piston (216) (FIG. 29).

HF Pump:

- a. Use wrench on the flats of the priming rod (215). Remove the hex nut (219).
- b. Unscrew the shovel (216) and remove it from the priming rod (215).

17. Use a wrench on the flats (211a) of the seal retainer (211) and a strap wrench working in the opposite direction, on the pump cylinder (204), to loosen and remove the adapter and o-ring (209) from the pump cylinder (204) (FIG. 30). Discard o-ring. Use the new o-ring included in the kit for reassembly.

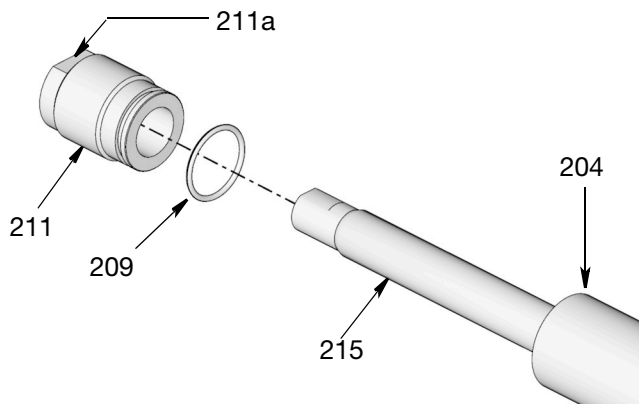


FIG. 30

18. Separate the pump cylinder (204) from the spacer cylinder (205) using two strap wrenches, working in opposite directions to loosen spacer cylinder. When cylinder (204) is loose enough, use your hand to unscrew and remove it from the other section (FIG. 31).

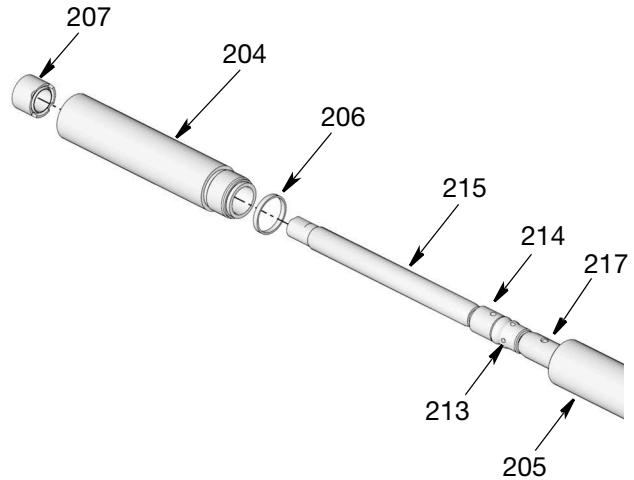


FIG. 31

19. Remove the intake seal (207), seal (206) and discard. Use new parts included in the kit for reassembly.
20. Use a hammer or rubber mallet to tap the rod assembly out of the pump adapter (2) in the direction shown in FIG. 32.

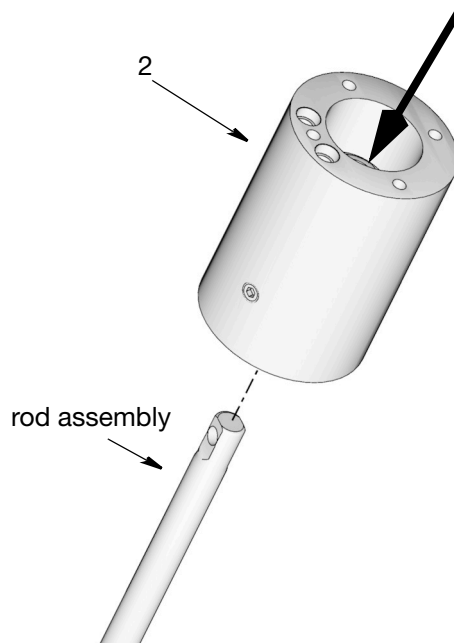


FIG. 32

21. Use a punch and hammer to tap out the pins (217) holding the rod sections together (FIG. 33). Use your hands to unscrew the shovel rod (215) and spacer rod (212) from the piston (213).

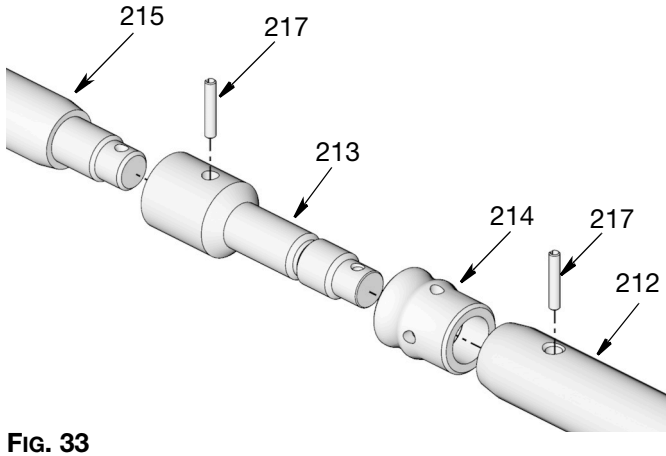


FIG. 33

22. Remove the piston seal (214) from the piston (213), and discard the piston seal (214) and pins (217). New replacement parts are included in the kit.
23. Visually inspect the rod sections and the inside surface of the pump cylinder (204) to verify they are not bent or damaged following disassembly. A pump with bent or damaged parts will not hold pressure or operate efficiently.
24. Separate the spacer cylinder (205) from the pump adapter (2) using a strap wrench to loosen cylinder. When the cylinder (205) is loose, use your hands to unscrew and remove it from the pump.
25. Remove the gasket seal (206) from inside the pump adapter (2), if it did not come out with the spacer cylinder (205). Discard the gasket seal. Use the gasket seal included in the kit for reassembly.
26. Use a socket to loosen and remove the hex nut (201) from the pump adapter (2) (FIG. 34).

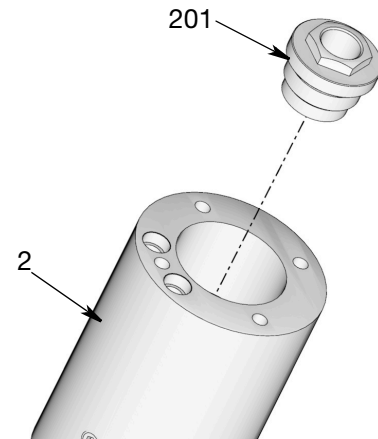


FIG. 34

27. Use the displacement rod (212) to push the packing u-cup (202) out of the pump adapter (2) in the direction shown in FIG. 35. Discard u-cup (202). A new one is included in the kit.

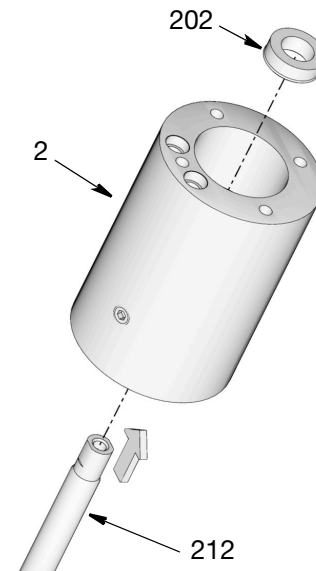


FIG. 35

Reassembly

NOTE:

- Before reassembly carefully clean and inspect all parts and pump surfaces for scratches and damage. A pump with damaged parts will not hold pressure or operate efficiently.

- Use all new parts included in kit for reassembly.

1. Apply a thin layer of grease to the packing u-cup (202).
2. Use a flat, blunt-end tool to seat u-cup (202), with the lips facing down, into the pump adapter (2) (FIG. 36).

NOTE: Do not damage u-cup seal on threads during installation.

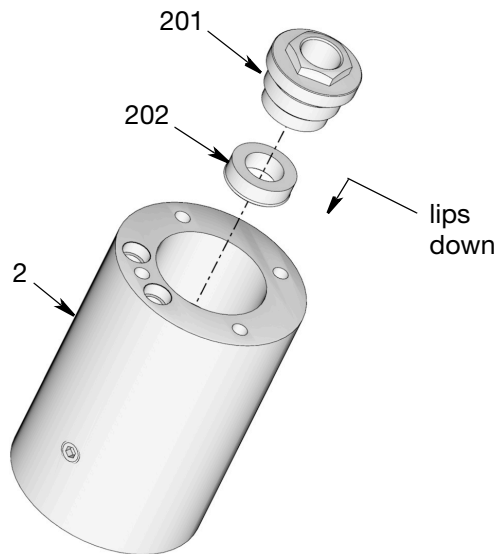


FIG. 36

3. Install hex nut (201) inside pump adapter (2). Use a wrench to tighten nut securely (FIG. 36). Torque to 18-22 ft-lb (24-30 N•m)
4. Apply a thin layer of grease to the surface of the displacement rod (212). Slide the rod into the pump adapter (2) in the direction shown in FIG. 37 only.

NOTICE

Sliding displacement rod (212) into the pump adapter from the other side of the pump adapter (2) could damage the throat seal (201), resulting in a poor seal and fluid leakage during operation.

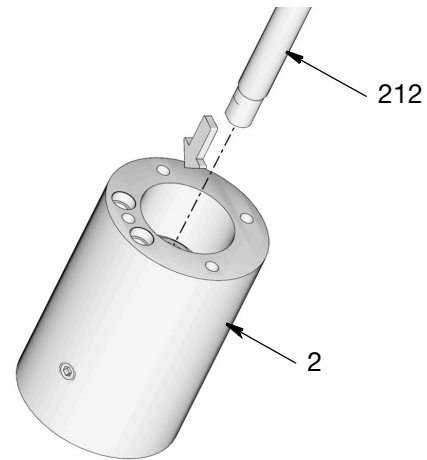


FIG. 37

5. Slide together the piston rod (213) and the piston seal (214) (FIG. 38).

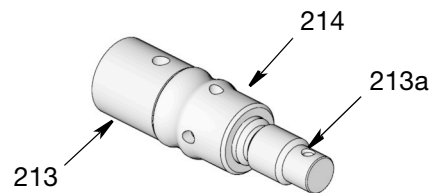


FIG. 38

6. Thread the piston rod (213) into end of the displacement rod (212). Hand tighten the two pieces together securely, ending with hole (213a) (FIG. 38) aligned with hole (212a) (FIG. 39).

- Install the pin (217) through the aligned holes (213a) (FIG. 38) and (212a) (FIG. 39). Support the rods (212 and 213) as needed to ensure that the rods do not bend. Use a pick and hammer to seat the pin inside the rods.

NOTE: Be sure the pin is centered in the hole. A pin that is not entirely seated could scratch the bore of the pump cylinder (204) during pump operation, preventing pressure from building and causing fluid to leak.

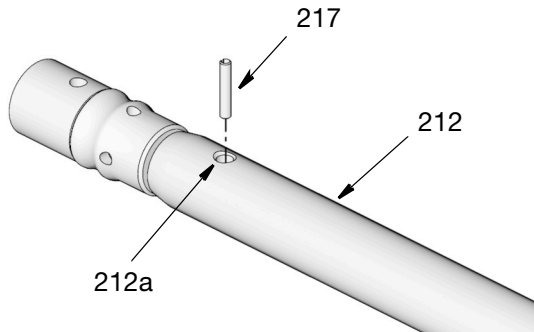


FIG. 39

- Thread the priming rod (215) into the end of the piston rod (213). Hand tighten the two pieces together securely, ending with hole (215a) aligned with hole (213b) (FIG. 40).
- Install the pin (217) through the aligned holes (215a) and (213b) (FIG. 40). Support the rods (215 and 213), as needed, to ensure the rods do not bend. Use a pick and hammer to seat the pin inside the rods.

NOTE: Be sure the pin is centered in the hole. A pin that is not entirely seated could scratch the bore of the pump cylinder (204) during pump operation, preventing pressure from building and causing fluid to leak.

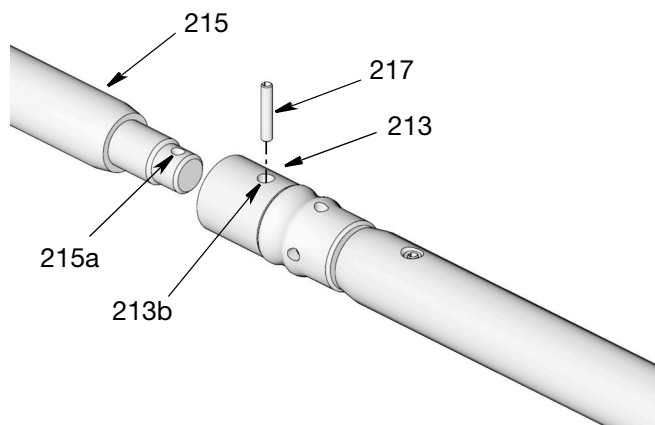


FIG. 40

- Apply a thin layer of grease around gasket (206). Install gasket over end of spacer cylinder (205). Slide cylinder over rod assembly as shown in FIG. 41. Thread end of cylinder into bottom of pump adapter (2). Use a pipe wrench to turn cylinder until tightened securely. Torque to 45-55 ft-lb (61-74 N•m).

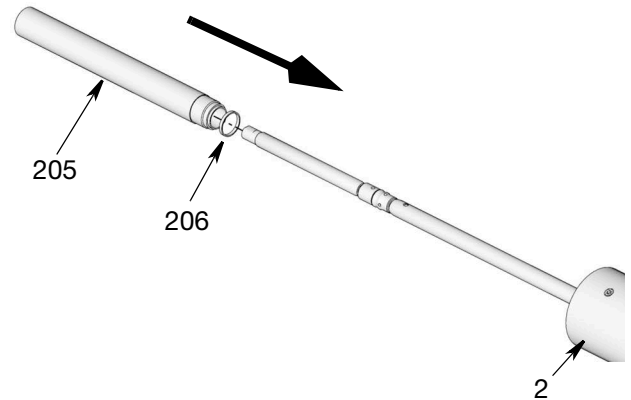


FIG. 41

- Apply a thin layer grease to seal (206) and install around pump cylinder (204) (FIG. 42).
- Apply a thin layer of grease to piston seal (214).
- Thread pump cylinder (204) to spacer cylinder (205). Use a wrench to tighten securely. Torque to 45-55 ft-lb (61-74 N•m).
- Apply a thin layer of grease to intake seal (207) and install seal with lips facing up inside pump cylinder (204) as shown in FIG. 42.

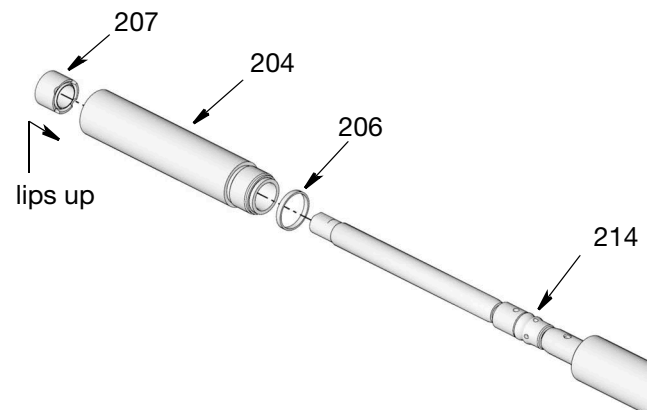


FIG. 42

15. Apply a thin layer of grease to the o-ring (209) and install around the seal retainer (211) (FIG. 43).
16. Thread the seal retainer (211) to the pump cylinder (204) with the seal end installed inside of the pump cylinder, as shown in FIG. 43. Use a wrench on the nut (211a) to tighten the adapter nut securely. Torque to 18-22 ft-lb (24-30 N•m).

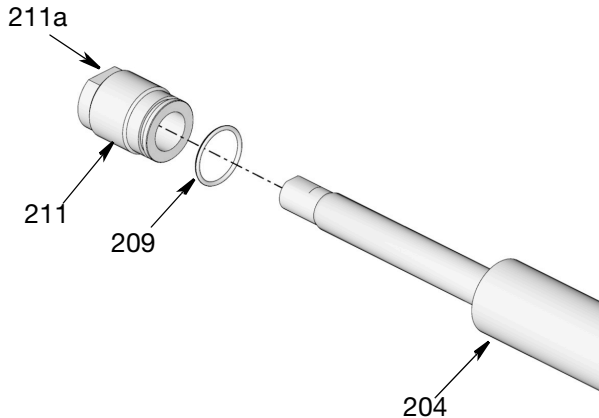


FIG. 43

HP Pump: Thread the shovel piston (216) to the end of the priming rod (215). Use a socket wrench on the piston (216) and a wrench on the flats of the priming rod (215) to securely tighten the shovel piston (FIG. 44). Torque to 145 to 155 in-lb (16 to 17 N•m).

NOTE: Be careful when tightening the nut that the rod assembly does not twist and break the support pins (217), or bend any of the rod sections.

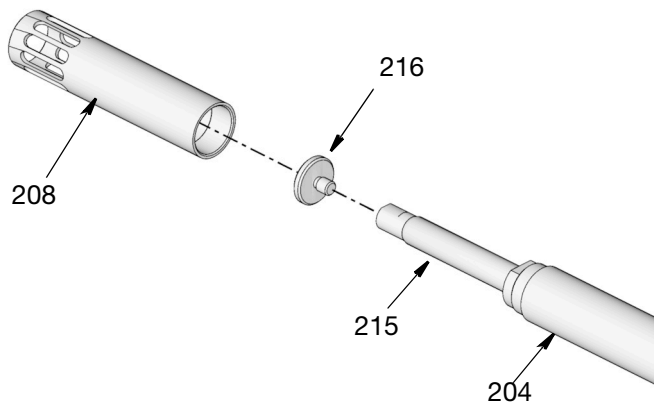


FIG. 44

HF Pump:

- a. Thread the shovel piston (216) to the end of the priming rod (215). Hand tighten.
 - b. Tighten the nut using a socket wrench on the nut (219) and a second wrench on the flats of the priming rod (215), turning in the opposite direction.
17. Thread the shovel cylinder (208) to the pump cylinder (204) (FIG. 44). Use a wrench to tighten securely.
 18. Push the displacement rod assembly up until the displacement rod (212) is extending out the top of the pump adapter (2), as shown in FIG. 45.
 19. Apply a thin layer of grease to the gasket seals (9). Install the seals in the pump adapter (2), as shown in FIG. 45

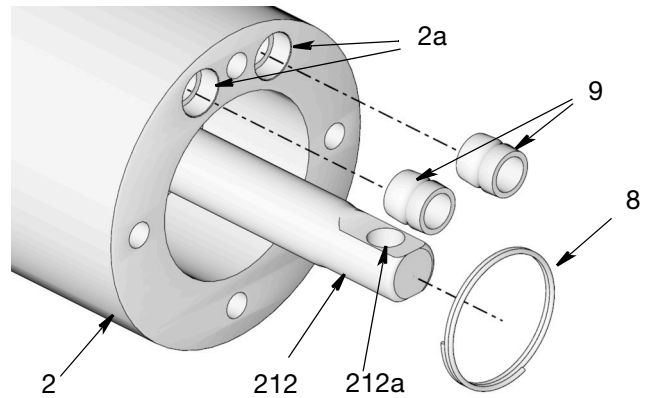


FIG. 45

20. Place the spring (8) over the end of the displacement rod (212), as shown in FIG. 46.

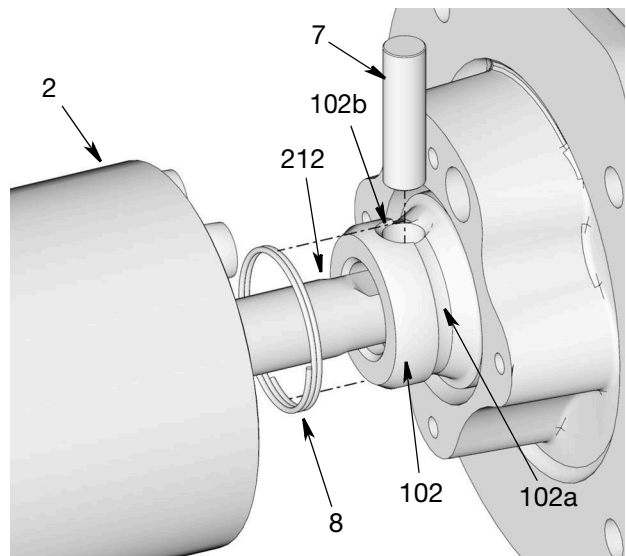


FIG. 46

21. Remove the pump assembly from the vise. Align the hole (212a) in the displacement rod (212) (FIG. 45) with the connecting rod hole (102b) (FIG. 46). Insert the pin (7) through the hole.
22. Slide the spring (8) over the pin (7) to secure the pin in place. Seat the spring in the groove (102a) in the connecting rod (102) to prevent moving during pump operation.
23. Align the two gasket seals (9) in the pump adapter (2) with the two holes (103b) in the gear box pump bracket (103). Push the pump lower and the pump assembly together (FIG. 47).

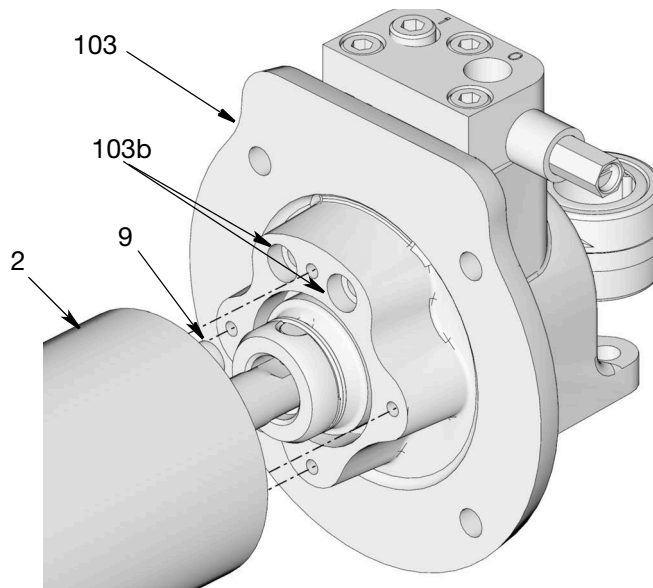


FIG. 47

24. Secure the pump adapter (2) to the pump upper (pu) using screws (6). Use a socket to tighten the screws securely (FIG. 48). Torque to 7 to 9 ft-lb (9 to 12 N•m).

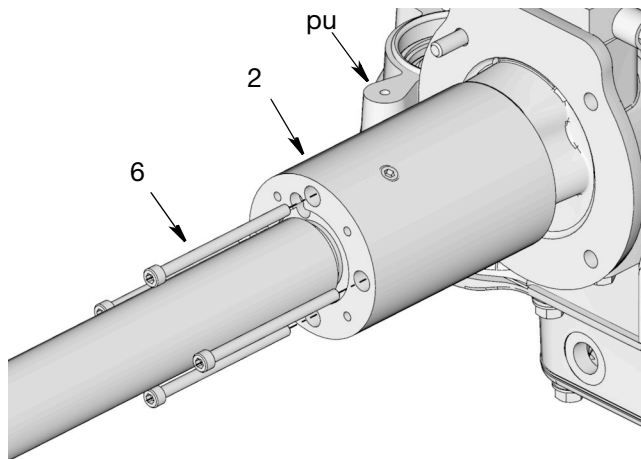


FIG. 48

25. **For Tube-In-Tube models only:** Install the gasket (5) and Tube-In-Tube (3). Secure Tube-In-Tube to the pump adapter (2) using the screws (4). Use a socket to tighten the bolts securely (FIG. 49). Torque to 7 to 9 ft-lb (9 to 12 N•m).

NOTE: Tube-In-Tube Replacement Kits 24T863 for 60 pound pumps, 24T864 for 90 pound pumps, and 24T865 for 400 pound pumps are available from Graco. See Parts, page 38 for information about ordering these kits or contact your Graco Distributor or Graco Customer Service.

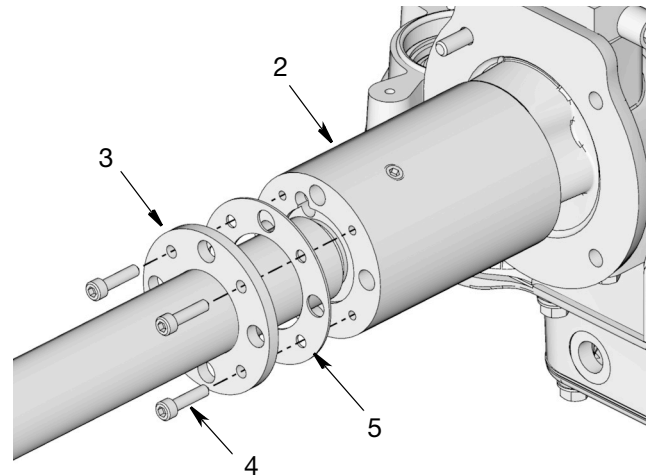


FIG. 49

26. Align the holes in the pump base with the holes in the reservoir cover. Securely fasten pump to the reservoir cover using the screws (a) and washers (b) (FIG. 50).

NOTICE

Be careful when installing the pump to the base that the wire harness to motor is not caught between the pump and the hole on top of the reservoir. If the wire harness is caught between the pump and reservoir, the wires could be damaged.

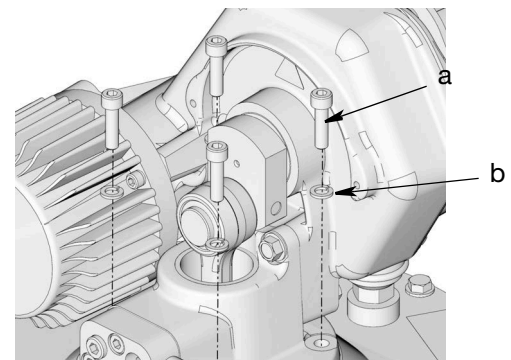


FIG. 50

NOTE: When the pump is correctly installed, the breather (J) will be below the control box (115), as shown in FIG. 51.

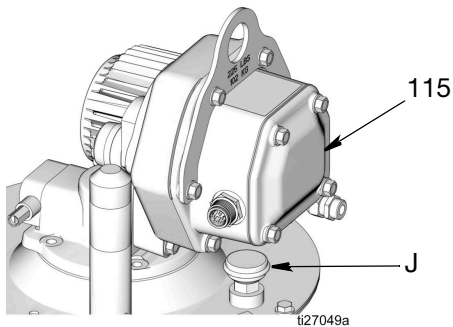


FIG. 51

27. Reinstall the cover (126) using the bolts (128). Use a wrench to tighten the bolts securely (FIG. 52).

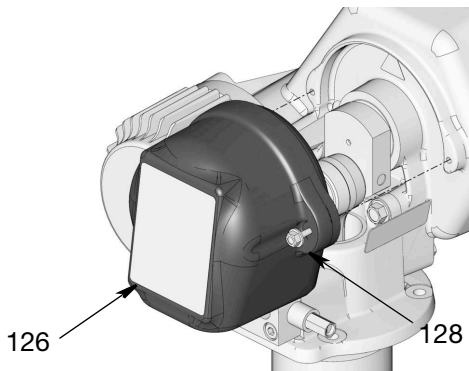


FIG. 52

28. Connect the timer/controller (F) (user supplied, if used).

29. Connect the high pressure lubricant supply line (D) to the lubricant output connection (O) (FIG. 53) on the vent valve or manifold.

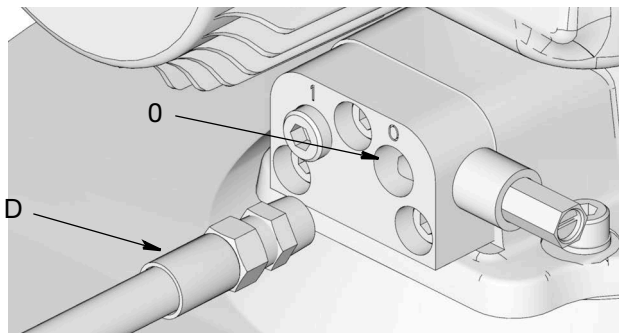


FIG. 53: Lubricant Outlet Connection

30. Connect the power to the pump.

31. For pump priming and reservoir filling see instructions, **Operation**, page 15.

Motor Replacement: Kit 24T862

- Reference numbers used in the following instructions refer to Parts pages beginning on page 35.
- Upper case letters used in the following instructions refer to Typical Installation provided on page 6 or 7.
- Lower case letters used in the following instructions refer to component parts or user provided parts.
- Unless otherwise noted, keep all parts for reassembly. Inspect and clean parts as needed prior to using them for reassembly.
- Use all new parts included in kit for reassembly.



Disassembly

1. Disconnect Dyna-Star pump from main power source.
2. Relieve pressure. Follow **Pressure Relief**, page 8.
3. Disconnect Timer/Controller (F) (user supplied, if used).
4. Disconnect high pressure lubricant supply line (D) to the lubricant output connection (O) (FIG. 54) on the vent valve or manifold.

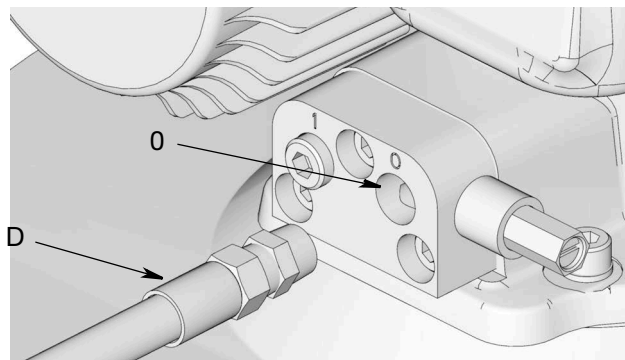


FIG. 54: Lubricant Outlet Connection

- Remove the screws (116) from the motor control box cover (120) and remove the cover and gasket (119) (FIG. 55).

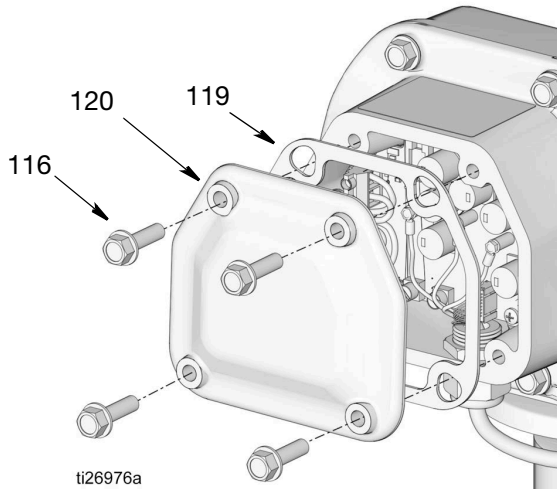


FIG. 55

- Remove the nuts (134), as shown in FIG. 56. Remove the washers (135) and the motor wires from the terminals. Save these parts for reassembly.

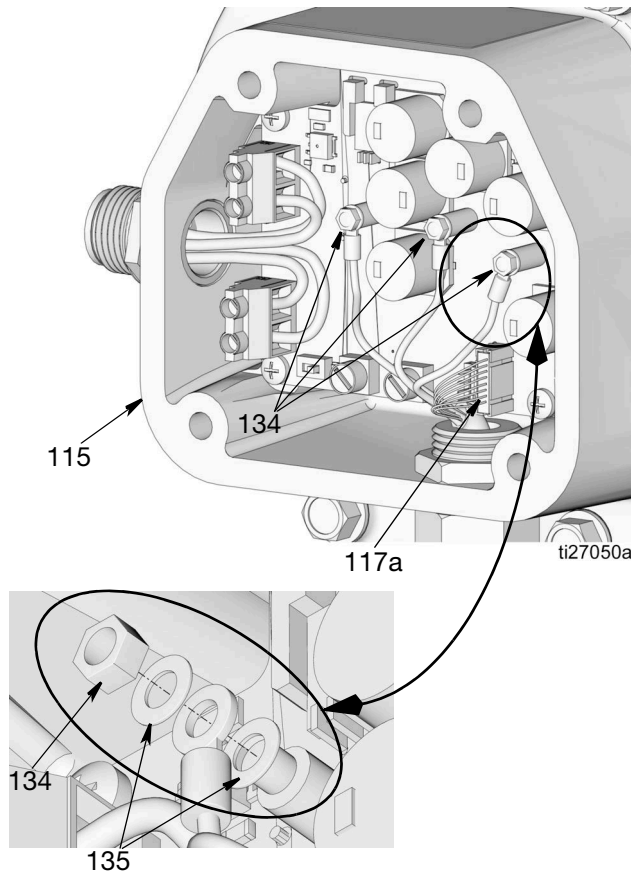


FIG. 56

- Disconnect the sensor cable (117a) from the motor control board (FIG. 56).
- Use a wrench to loosen the strain relief (a) and remove the wiring harness from the housing (FIG. 57).

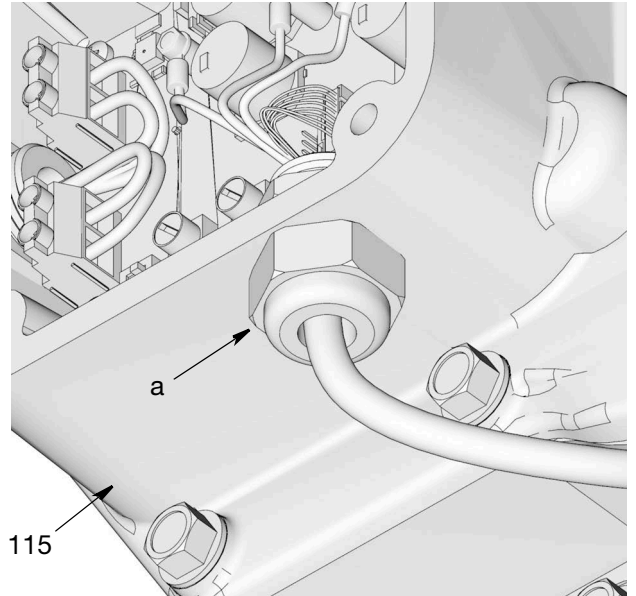


FIG. 57

- Remove the screws (125) and the washers (124) holding the motor (123) to the gear box housing (101). Remove motor. Verify the o-ring (122) was removed with motor. (FIG. 58)

If the o-ring (122) is still inside of the gear box housing (101), remove it.

Discard these parts in accordance with all safety regulations.

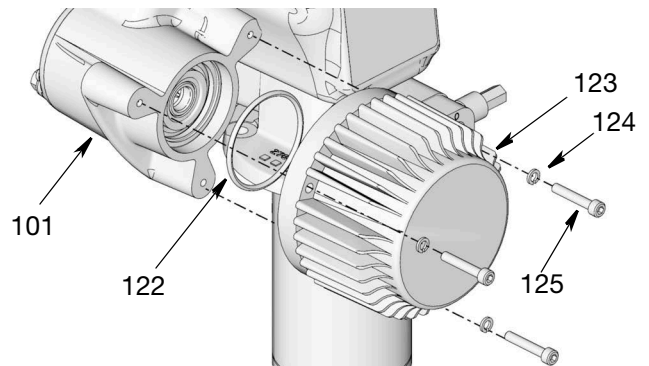


FIG. 58

Reassembly

NOTE:

- Use all new parts included in the kit for reassembly.
1. Apply a thin coating of Gleitmo 585K grease to the shaft of the new motor.
 2. Apply a thin layer of grease to the o-ring (122). Install o-ring in the motor (123) (FIG. 59).

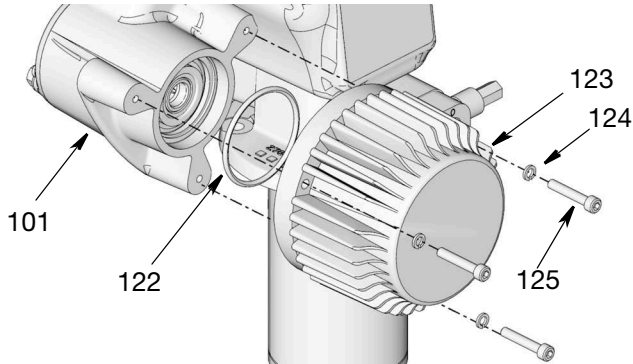


FIG. 59

3. Install the new motor (123) using the screws (125) and washers (124) (FIG. 59). Use a wrench to tighten the screws securely. Torque to 17-19 ft-lb (23 - 25 N•m).
4. Feed the motor wire harness (a) through the strain relief opening (115a) in the housing (115) (FIG. 60).

Thread the strain relief body (SR) into the opening (115a). Tighten to 3.5 ft-lb (4.7 N•m). Tighten the coupling nut (CN) to 2.0 ft-lb (2.7 N•m).

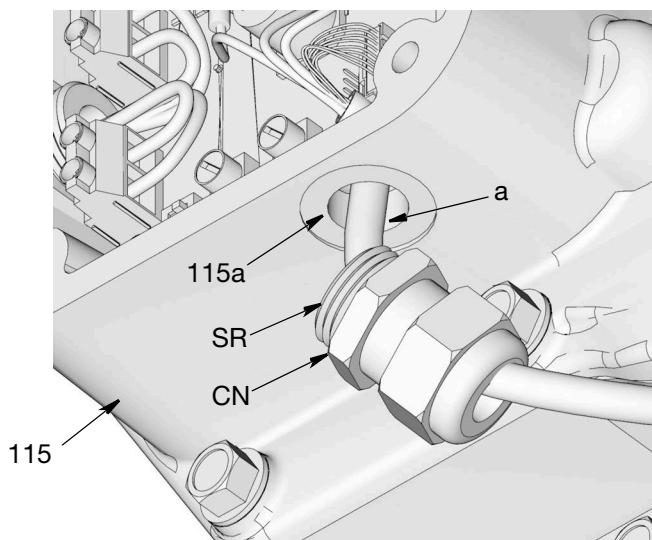


FIG. 60

5. Match the green, yellow, and blue wires to the terminals of the same color (written on the motor control board). Secure the wires to the terminals using the washers and nuts (134 and 135) (FIG. 61). Torque to 8-10 in-lb (0.9 - 1.1 N•m).
6. Connect the sensor cable (117a) (FIG. 61).

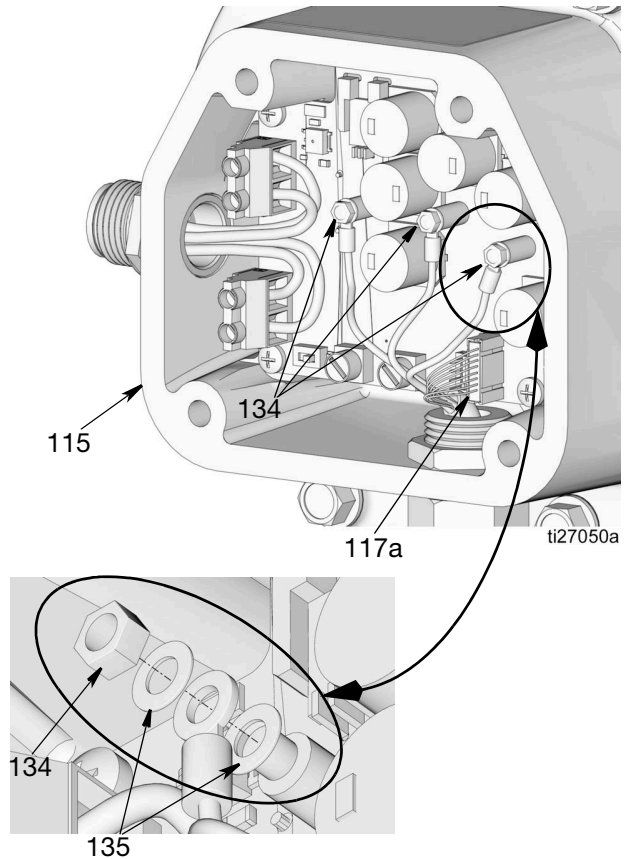


FIG. 61

- Replace the control board gasket (119) and the cover (120) with the screws (116) being careful not to pinch any wires. Tighten the screws securely. Torque to 17-19 ft-lb (23 -25 N•m).

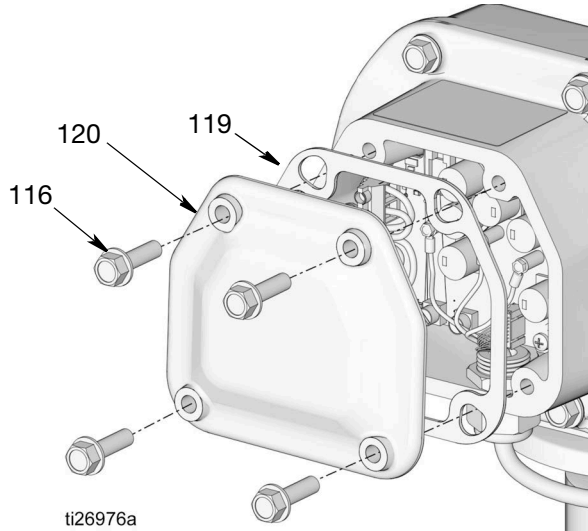


FIG. 62

- Connect the timer/controller (F) (user supplied, if used).
- Connect high pressure lubricant supply line (D) to the lubricant output connection (O) (FIG. 63) on the vent valve or manifold.

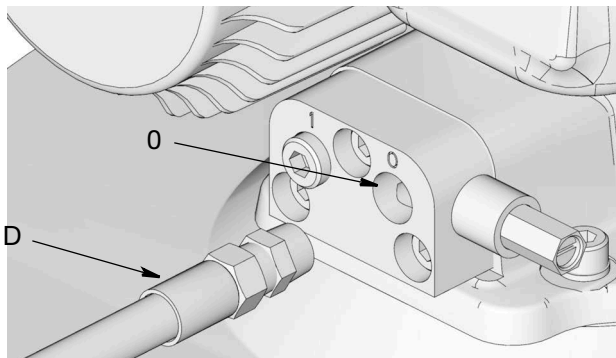


FIG. 63: Lubricant Outlet Connection

- Connect the power to the pump.
- For pump priming and reservoir filling see instructions, **Operation**, page 15.

Motor Control Board Replacement: Kit 24T867

- Reference numbers used in the following instructions refer to Parts pages beginning on page 35.
- Upper case letters used in the following instructions refer to Typical Installation provided on page 6 or 7.
- Lower case letters used in the following instructions refer to component parts or user provided parts.
- Unless otherwise noted, keep all parts for reassembly. Inspect and clean parts as needed prior to using them for reassembly.
- Use all new parts included in kit for reassembly.



Disassembly

- Disconnect the Dyna-Star pump from the main power source.
- Relieve pressure. Follow **Pressure Relief**, page 8.
- Disconnect Timer/Controller (F) (user supplied, if used).
- Disconnect high pressure lubricant supply line (D) to the lubricant output connection (O) (FIG. 64) on the vent valve or manifold.

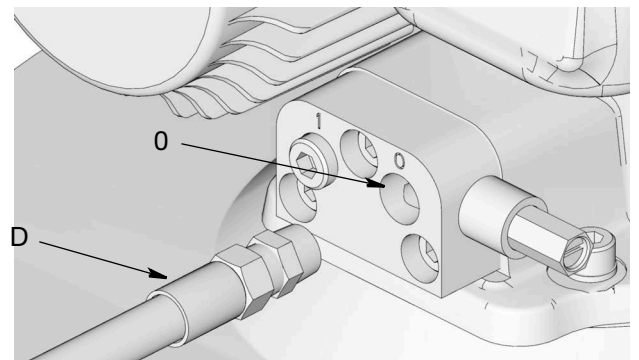


FIG. 64: Lubricant Outlet Connection

Repair

5. Remove the screws (116) from the motor control box cover (120), and remove the cover and gasket (119) (FIG. 65).

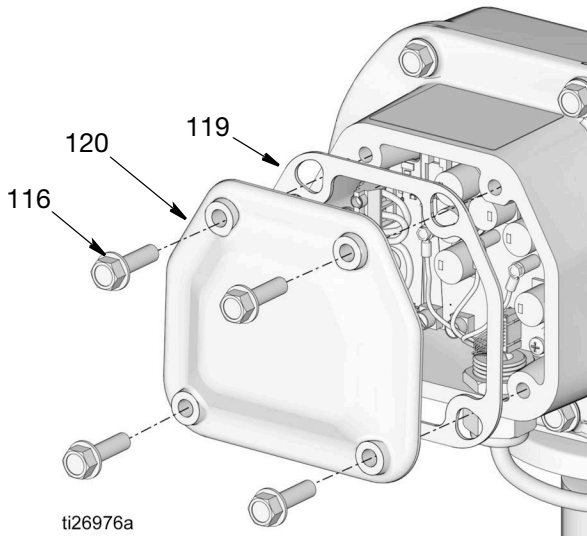


FIG. 65

6. Remove the nuts (134), as shown in FIG. 66. Remove the washers (135) and the motor wires from the terminals.

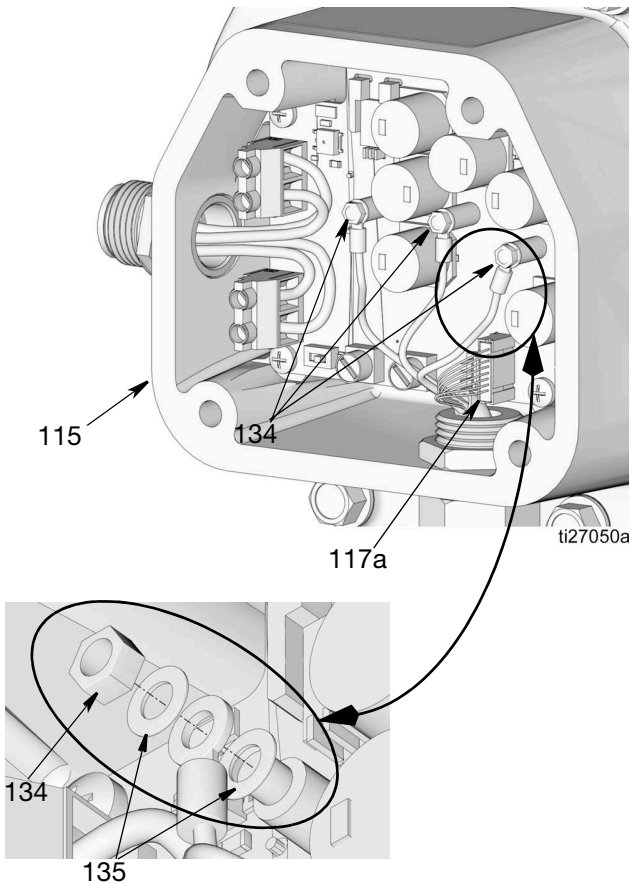


FIG. 66

7. Disconnect the sensor cable (117a) from the motor control board (FIG. 67).
8. Disconnect the source to the power input (A and B) and the pump control connections (C and D) (See FIG. 67 and Control Panel, page 13).

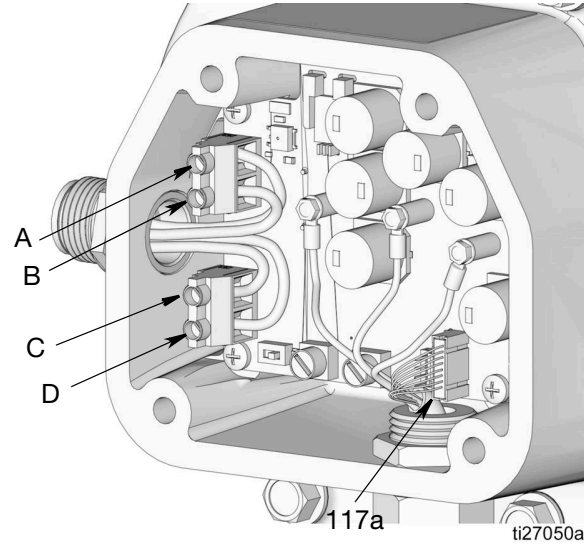


FIG. 67

9. Remove the screws (118) securing the motor control board (117) to the housing (115) (FIG. 68).

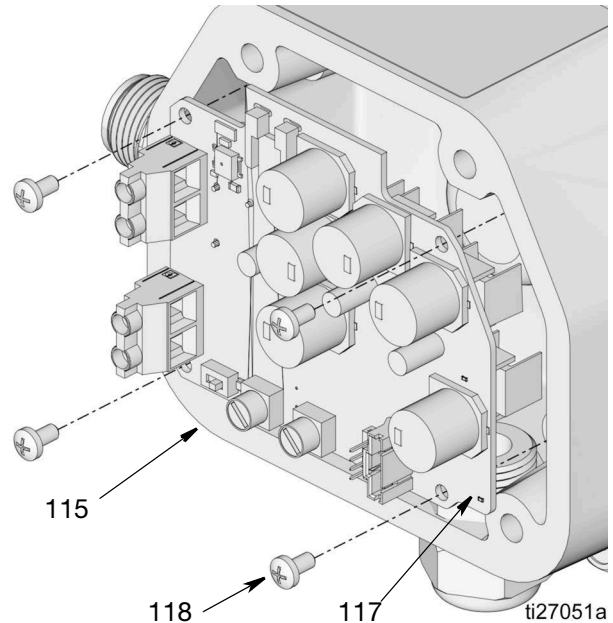


FIG. 68

10. Remove the motor control board from the housing and dispose in accordance with all safety regulations.

Reassembly

NOTE:

- Use all new parts included in kit for reassembly.
1. Install the new motor control board (117) in the housing (115) using the screws (118) and washers (136), with the washers between the board and the housing (FIG. 69). Torque to 18 - 22 in-lb (2.0 - 2.5 N•m).

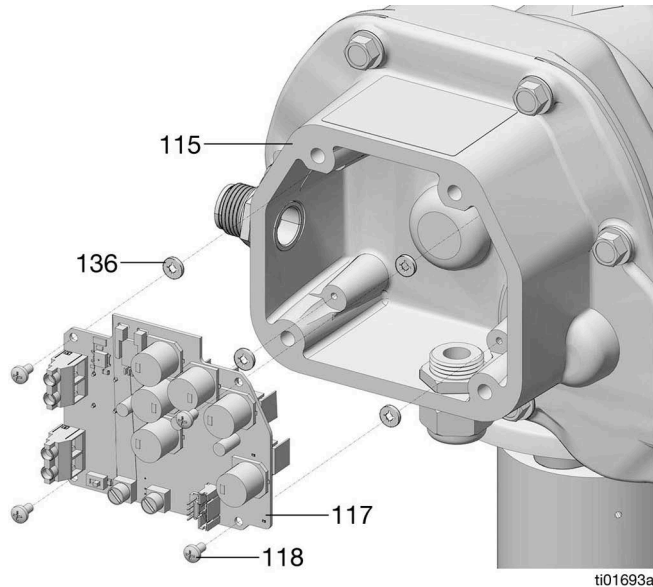


FIG. 69

2. Connect source to the power input (A and B) and the pump signal connections (C and D) (FIG. 67 and A,B,C,D, page 13). Torque to 5.5 - 7 in-lb (0.62 - 0.79 N•m).

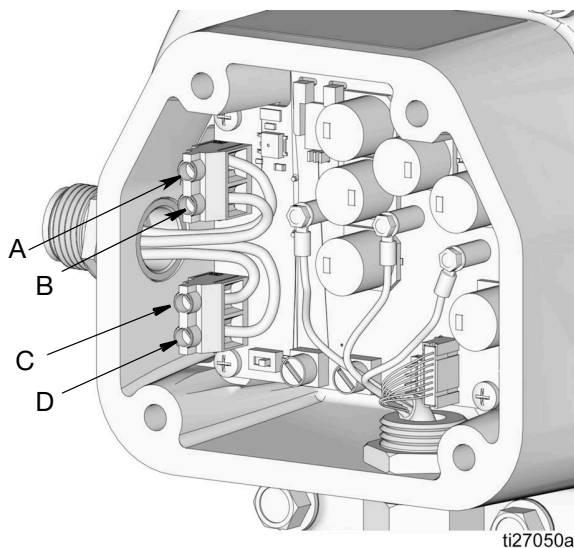


FIG. 70

3. Match the green, yellow and blue wires of the motor to the terminals of the same color (written on the control board). Secure the wires to the terminals using the washers (135) and nuts (134) (FIG. 61). Torque to 8 - 10 in-lb (0.9 - 1.1 N•m).
4. Connect sensor cable (117a) (FIG. 71).

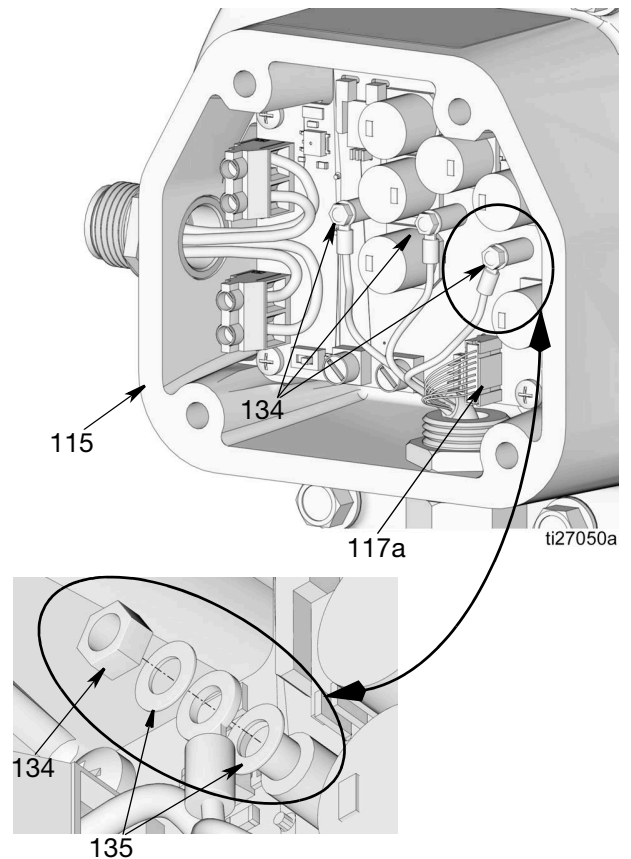


FIG. 71

Repair

5. Replace the motor control board gasket (119) and the cover (120) with the screws (116) (FIG. 72), being careful not to pinch any wires. Tighten the screws securely. Torque to 17 - 19 ft-lb (23 - 25 N•m).

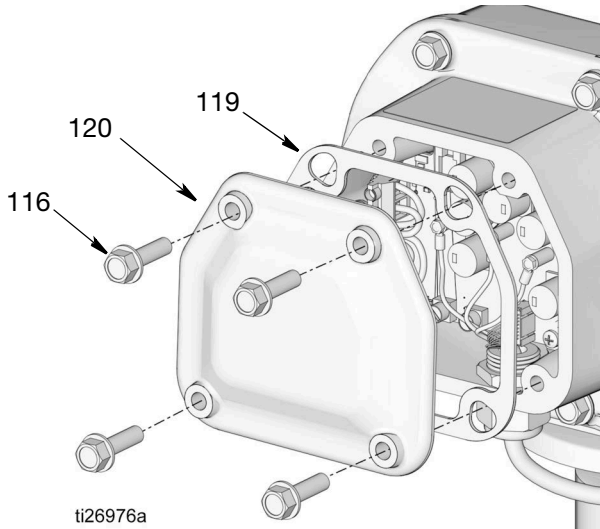


FIG. 72

6. Connect the timer/controller (F) (user supplied, if used).
7. Connect the high pressure lubricant supply line (D) to the lubricant output connection (O) (FIG. 73) on the vent valve or manifold.

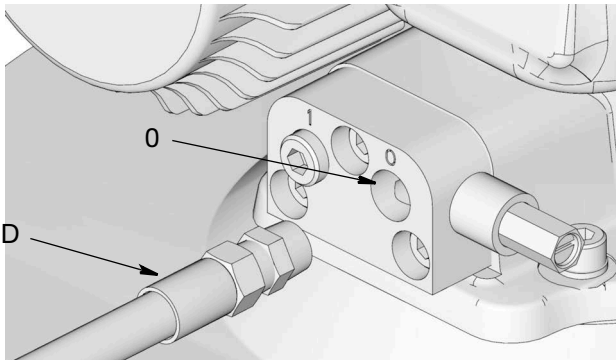


FIG. 73: Lubricant Outlet Connection

8. Connect power to the pump.
9. For pump priming and reservoir filling see instructions, **Operation**, page 15.

Parts List

Main Assembly All Models

Ref. No.	Part No.	Description	Qty
1		BOX, gear, model (page 36)	1
2	24T897	KIT, adapter, pump, HP models	1
	24T898	KIT, adapter, pump, HF models	1
3	★	TUBE-IN-TUBE, 60#, includes 4, model 77X001, 77X011	1
	★	TUBE-IN-TUBE, 120#, includes 4, model 77X002, 77X012	1
	★	TUBE-IN-TUBE, 400#, includes 4, model 77X003, 77X013	1
4	★	SCREW, shcs M6 x 25, models 77X001, 77X002 and 77X003	4
5	★	GASKET, fill tube flange, models 77X001, 77X002, 77X003, 77X011, 77X012, 77X013	1
6		SCREW, shcs, M6-1.0X90 SST	4
7	15F856	PIN, pump	1
8	119778	SPRING, retaining	1
9	◆†	GASKET, seal	2
11	✱	ADAPTER, outlet, models 77X000, 77X001, 77X002, 77X003, 77X014, 77X015, 77X016	1
12	✱@	O-RING, -014 FKM 75 Duro	2
13	✱	SCREW, cap, models 77X000, 77X001, 77X002, 77X003, 77X014, 77X015, 77X016	3
	@	SCREW, cap, models 77X011, 77X012, 77X013, included in kit 77X540	3
14		LABEL, name, serial	1
15	✱@	PLUG, pipe	1
16	16V999	VALVE, pressure relief, 5000 psi (34.47 MPa, 344 bar), models 77X000, 77X001, 77X002, 77X003,	1
	115122 @	VALVE, pressure relief, 4000 psi (27.6 MPa, 276 bar), models 77X011, 77X012, 77X013, 77X014, 77X015, 77X016	1
18	77X540	KIT, vent valve, also includes 12, 13, 15, 16, 17; included with models 77X011, 77X012, 77X013 only. Can be added to other models	1
19	24T862	KIT, motor replacement	1
29▲	16U728	LABEL, safety, warning	1
30▲	15H108	LABEL, safety, pinch	2
31	77X551	KIT, connector, front mount	1
33		ASSEMBLY, pump lower (see page 37 and 38)	1

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

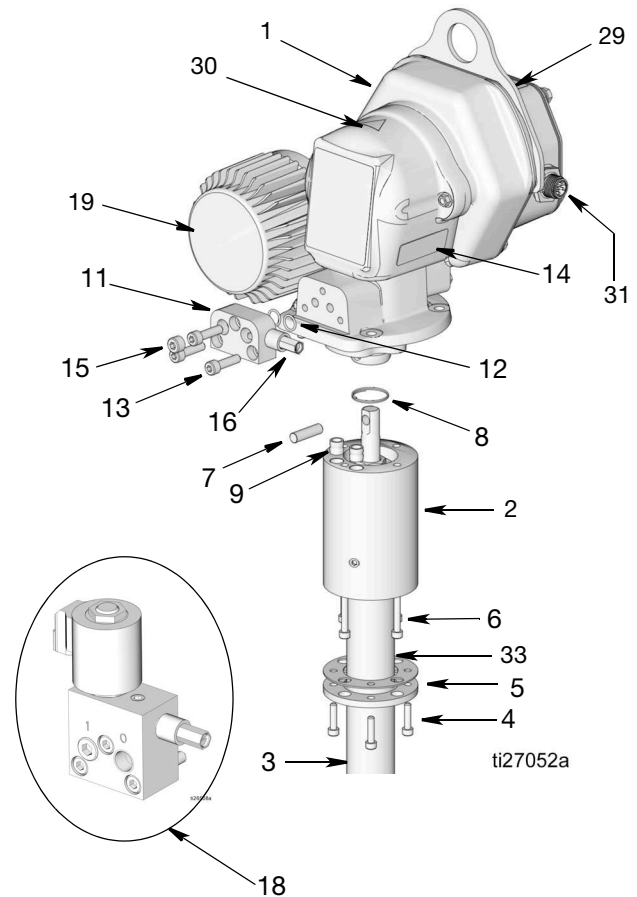
★ Included in Tube-In-Tube Kit 24T863 (60 pound), 24T864 (90 pound), 24T865 (400 pound).

◆ Included in Seal Kit 24T860.

† Included in Seal Kit 24T861.

✱ Included in Outlet Manifold Kit 16X171.

@Included in Vent Valve Kit 77X540.



Gear Box

Ref. No.	Part No.	Description	Qty
29▲	16U728	LABEL, safety, warning	1
30▲	15H108	LABEL, safety, pinch	2
31	77X551	KIT, connector, front mount	1
101		HOUSING, gear box	1
102		ROD, connecting	1
103		BRACKET, gear box to pump	1
104		SCREW, M8	2
105		BOLT, M8	2
112		PACKING, o-ring	1
113		GEAR, first stage, w bearing	1
114		RING, retaining, internal	1
115		HOUSING, gear	1
116	\$	SCREWS, M8	11
117	*	BOARD, control	1
118	*	SCREW, machine, phillips pan head	4
119	\$	SEAL, control box cover	1

120	\$	COVER, control box	1
122	162841✓	PACKING, o-ring	1
123	✓	MOTOR, 24VDC	1
124	✓	WASHER, lock	3
125	✓	SCREW, cap, hex head	3
126	❖	COVER, shroud	1
128	❖	BOLT, M6	2
133		RING, lift plate	1
134	*	NUT	3
135	*	WASHER	6
136	*	WASHER, retaining	4

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

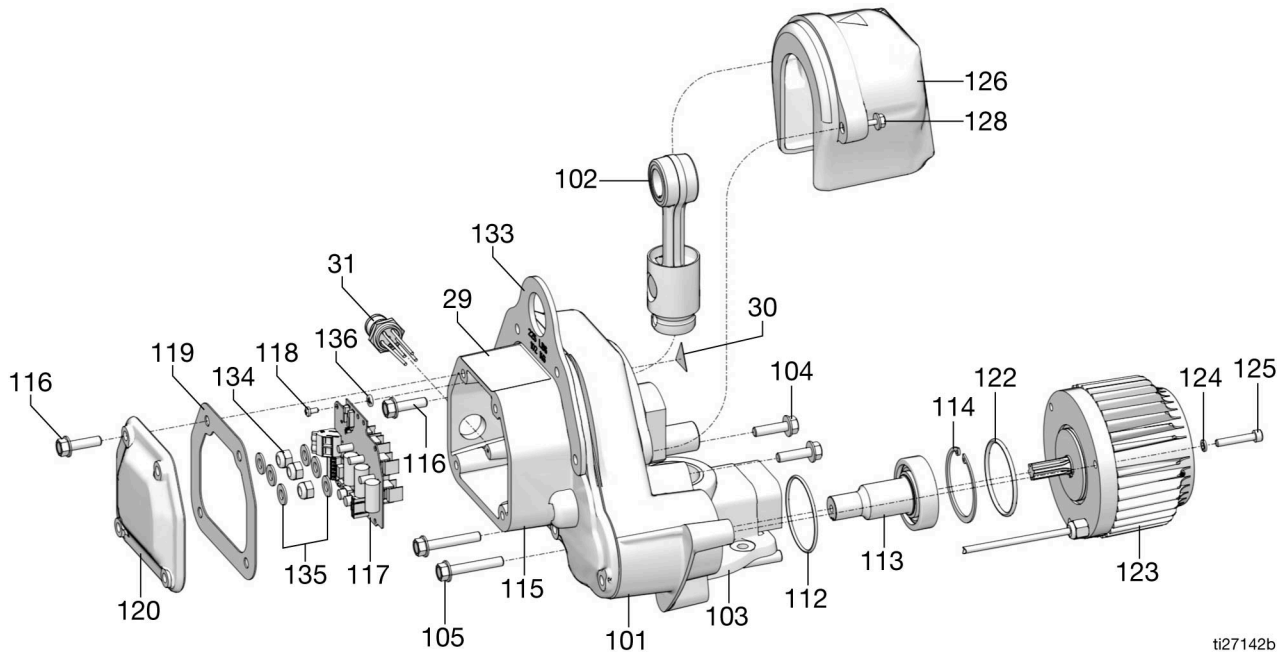
* Included in Control Board Kit 24T867.

❖ Included in Shroud Kit 24T866.

✓ Included in Motor Kit 24T862

\$ Included in Motor Control Board Seal Kit 17H538

NOTE: Kit 17H538 only includes quantity 4 - #116 Screws.



ti27142b

HP Model Pump Lower

Ref. No.	Part No.	Description	Qty
2	24T897	KIT, adapter, pump	1
201	15C530	NUT, retainer	1
202	◆	PACKING, u-cup, throat, hp	1
204	15C537	CYLINDER, pump	1
205	16N718	CYLINDER, spacer, 35/60#	1
	16N686	CYLINDER, spacer, 90/120#	1
	16T753	CYLINDER, spacer, 400#	1
206	◆	GASKET, seal	2
207	◆	SEAL, intake	1
208	192539	CYLINDER, shovel	1
209	◆	O-RING	1
211	◆	SEAL, retainer	1
212	16N719	ROD, displacement, 35/60#	1
	16N687	ROD, displacement, 90/120#	1
	16T754	ROD, displacement, 400#	1
213	15G098	ROD, piston	1
214	◆	SEAL, piston	1
215	15F296	ROD, shovel, 225, hp	1
216	16W24 9	PISTON, shovel, 50:1 hp	1
217	◆	PIN, straight	2

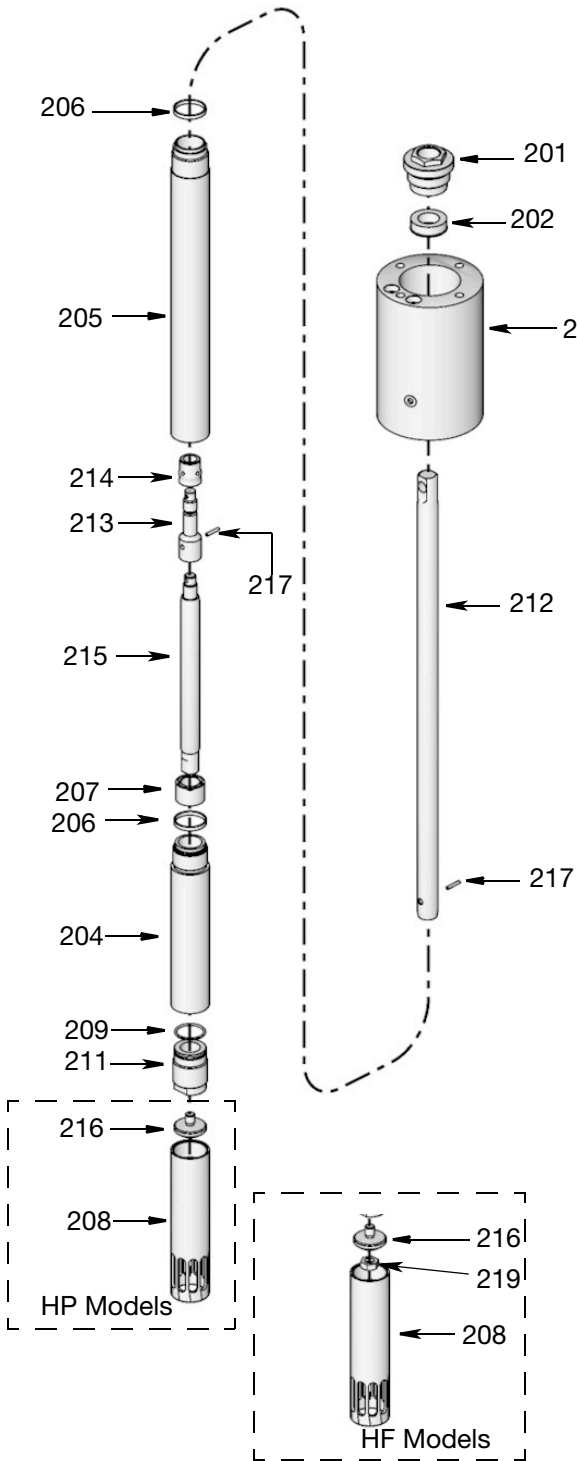
◆ Included in Seal Kit 24T860.

HF Model Pump Lower

Ref. No.	Part No.	Description	Qty
2	24T898	KIT, adapter, pump	1
201	16F947	NUT, retainer	1
202	†	PACKING, u-cup	1
204	16F774	CYLINDER, pump	1
205	16T704	CYLINDER, 90/120#, spacer	1
	16T818	CYLINDER, spacer, 400#	1
	16T819	CYLINDER, spacer, 35/60#	1
206	†	GASKET	2
207	†	SEAL, intake	1
208	16F775	CYLINDER, shovel	1
209	†	O-RING	1
211	†	SEAL, retainer	1
212	16T703	ROD, displacement, 90/120#	
	16T810	ROD, displacement, 400#	1
	16T811	ROD, displacement, 35/60#	1
213	16F771	ROD, piston, 50:1	1
214	†	SEAL, piston	1
215	16F943	ROD, priming	1
216	16F944	PISTON, shovel, 50:1 hp	1
217	†	PIN, straight	2
219	16C022	NUT, hex	1

† Included in Seal Kit 24T861.

Pump Lower Parts



Cable Harness Kits

Part No.	Description
77X545	CABLE, power, straight, 15 feet. Use with 77X551
77X546	CABLE, power, straight, 15 feet, with vent valve. Use with 77X551
24N402	CABLE, 6 ft, vent valve, 2 pin for vent valve control
77X551	KIT, connector, front mount

Repair Kits

Part No.	Description
24T860	KIT, seal, HP models
24T861	KIT, seal, HF models
24T862	KIT, motor replacement
24T863	KIT, tube-in-tube, 60 pound
24T864	KIT, tube-in-tube, 90 pound
24T865	KIT, tube-in-tube, 400 pound
24T866	KIT, shroud
24T867	KIT, control board replacement
24T897	KIT, adapter, pump, HP models
24T898	KIT, adapter, pump, HF models
17H538	KIT, motor control board seal

Accessories

Part No.	Description	Related Manual
77X522	Low Level and Dipstick	332515
77X511	Follower Plate, 120# tank / reservoir	312738
77X512	Follower Plate, 400# tank / reservoir	312738
77X514	Cover, 120# tank / reservoir	312738
77X515	Cover, 400# tank / reservoir	312738
77X500	Follower Plate - 60# Tank	332517
77X513	Mounting Bracket for 35# Bucket	332517
77X510	Follower Plate, 35# Bucket	332517
77X530	Dip Stick, 90#	332515
77X531	Dip Stick, 60#	332515
77X540	Vent Valve, pump mounted	332519
77X535	60 lb Tank	332540
77X536	90 lb Tank	332540
16X171	KIT, outlet manifold	NA
16V999	VALVE, pressure relief, 5000 psi (34.47 MPa, 344.7 bar)	NA
115122	VALVE, pressure relief, 4000 psi (27.6 MPa, 276 bar)	NA

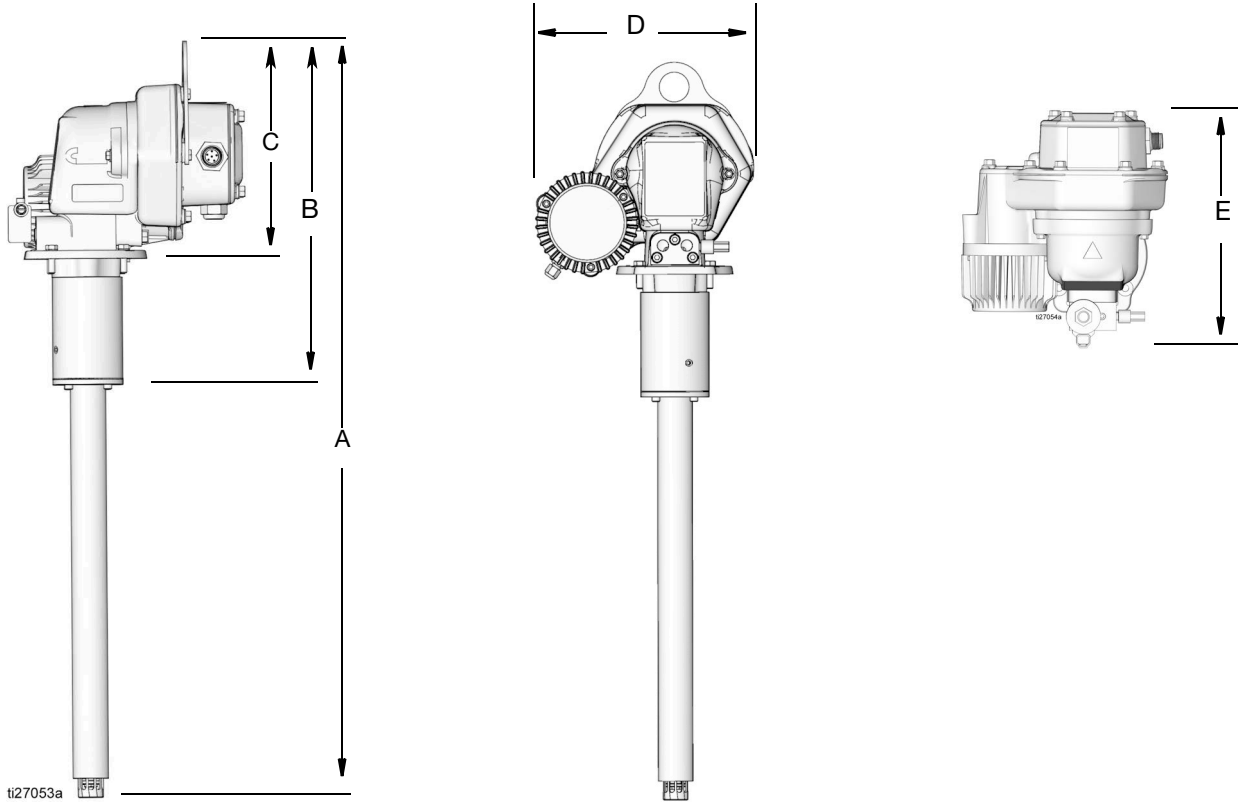
Technical Specifications

Dyna-Star HP or HF Lubrication Pump		
	US	Metric
Maximum Working Pressure		
HF Models	3500 psi	24.1 MPa, 241 bar
HP Models	5000 psi	34.47 MPa, 344 bar
Electrical Requirements		
All Models	24VDC	
Wire Terminal AWG Size for Control Board	24 to 10 AWG	
Input Voltage Range		
24 VDC	18 to 32 VDC	
ON/OFF Signal Voltage Range and Current		
Voltage Range	5 to 32 VDC	
Drive Resistance	1.1K	
Peak Operating Current		
24 VDC	35A	
Peak Power		
24 VDC	720W	
Pump Output		
HF Models	See Performance Charts, beginning on page 41	
HP Models		
Weight - Pump Only		
35 - 60 lb Tank / Reservoir	50 lb.	22.7 kg
90 - 120 lb Tank / Reservoir	55 lb.	25.0 kg
400 lb Tank / Reservoir	60 lb.	27.2 kg
Wetted Parts		
Pump Wetted Parts	steel, polyurethane, acetal, buna-N, aluminum, polyester elastomer	
Operating Temperature		
HP Models	-40° to 149°F	-40° to 65°C
HF Models	14° to 149°F	-10° to 65°C
Storage Temperature HP and HF Models	-40° to 149°F	-40° to 65°C
Humidity Level	90%	
IP Rating	IP69K**	
Audible Sound Pressure*		
1000 psi (6.89 MPa, 58.95 bar) Models	70.7 dB(A)	
2000 psi (13.79 MPa, 137.9 bar) Models	71.4 dB(A)	
3000 psi (20.68 MPa, 206.84 bar) Models	71.4 dB(A)	
4000 psi (27.58 MPa, 275.79 bar) Models	71.2 dB(A)	
5000 psi (34.47 MPa, 374.74 bar) Models	70.6 dB(A)	
Connector		
Front mount connector	M23, see page 11	

*Sound power was measured per ISO-9614-2.

**IP69K specifies no ingress of high pressure water at 1150-1500 psi at 4 - 6 in. away.

Dimensions



Ref	60 Pound Models		90 lb Models		400 lb Models	
	US (inch)	Metric (mm)	US (inch)	Metric (mm)	US (inch)	Metric (mm)
A	29	737	36.5	927	44.3	1125
B	16.8	427	16.8	427	16.8	427
C	10.6	268	10.6	268	10.6	268
D	11.0	279	11.0	279	11	279
E	11.1	283	11.1	283	11.1	283

Performance Charts

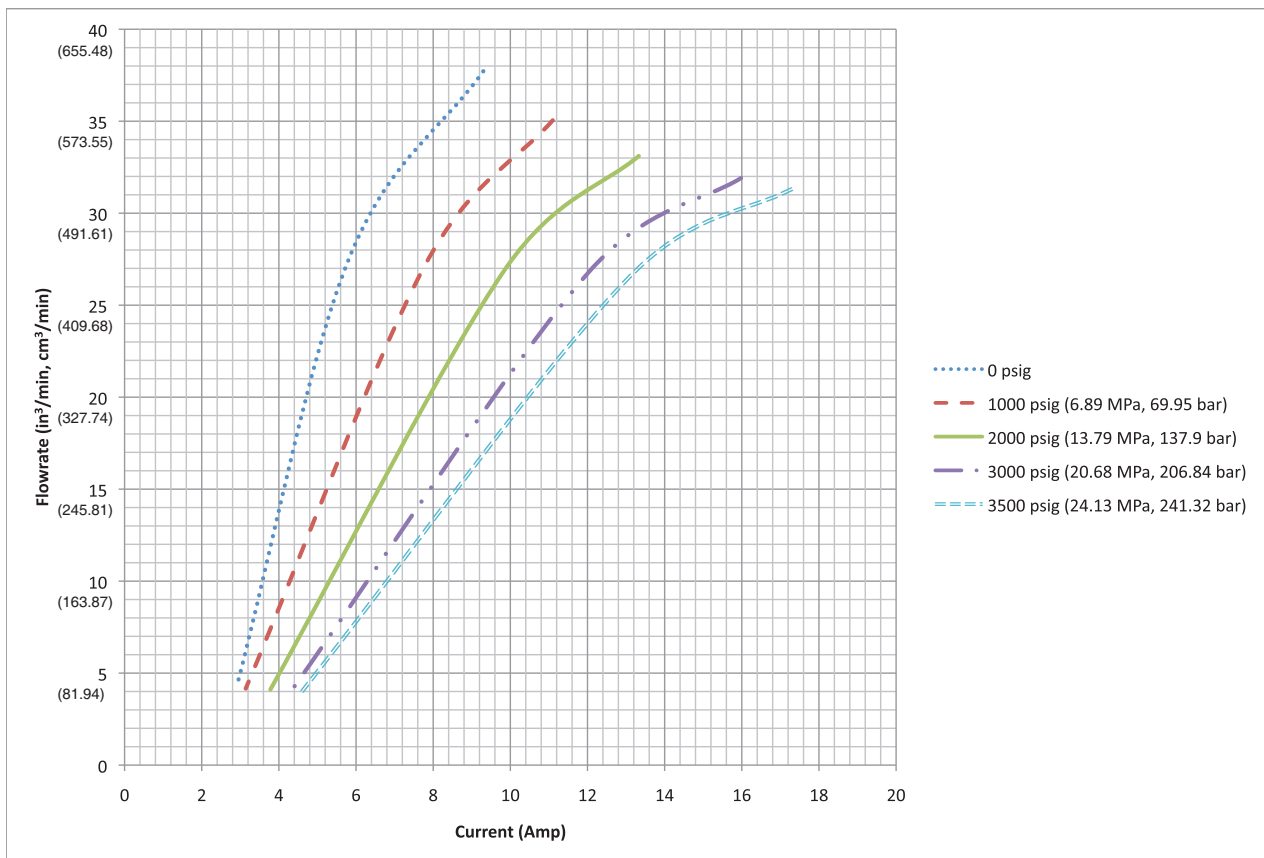
To find the Current (Amp) at a specified Flow Rate (in³/min.):

1. Locate the specified Flow Rate on the vertical axis.
2. Follow the horizontal line to the intersection with the System Operating Pressure.
3. Follow the vertical line down to determine the average current required.

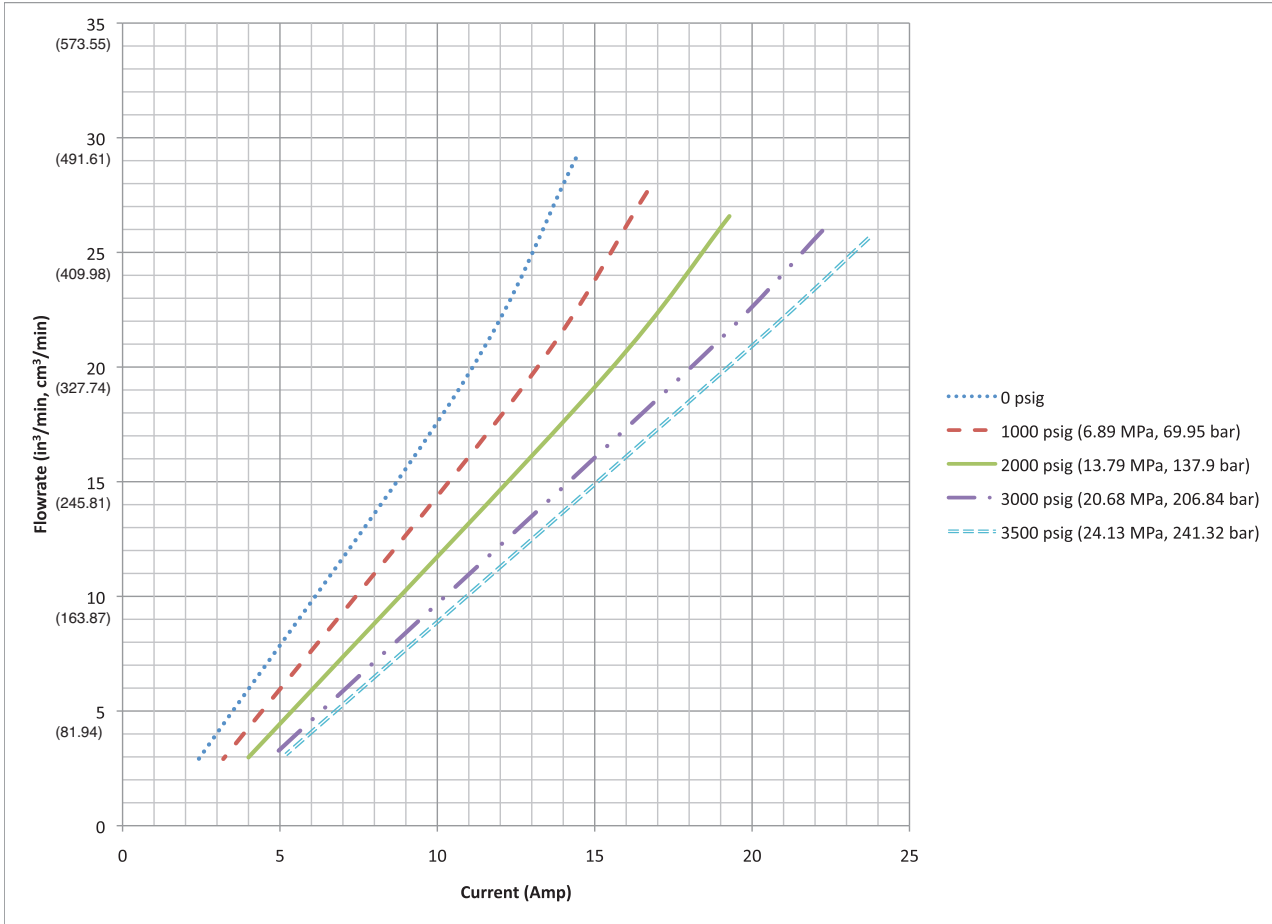
To find the Flow Rate (in³/min.) at a specified current (Amp):

1. Locate the specified Current on the horizontal axis.
2. Follow the vertical line up to the intersection with the System Operating Pressure.
3. Follow the horizontal line across to determine the Flow Rate.

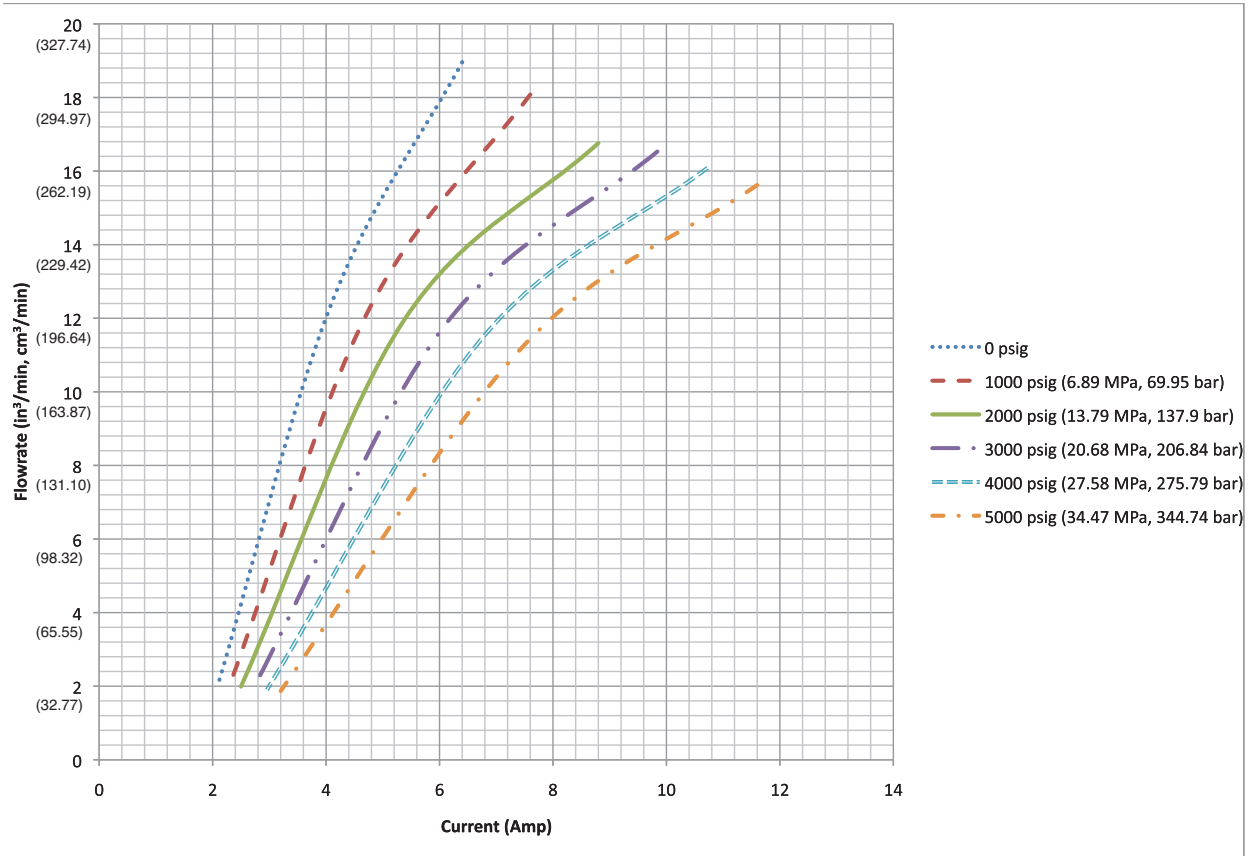
Graph 1: HF Model at Ambient Temperature



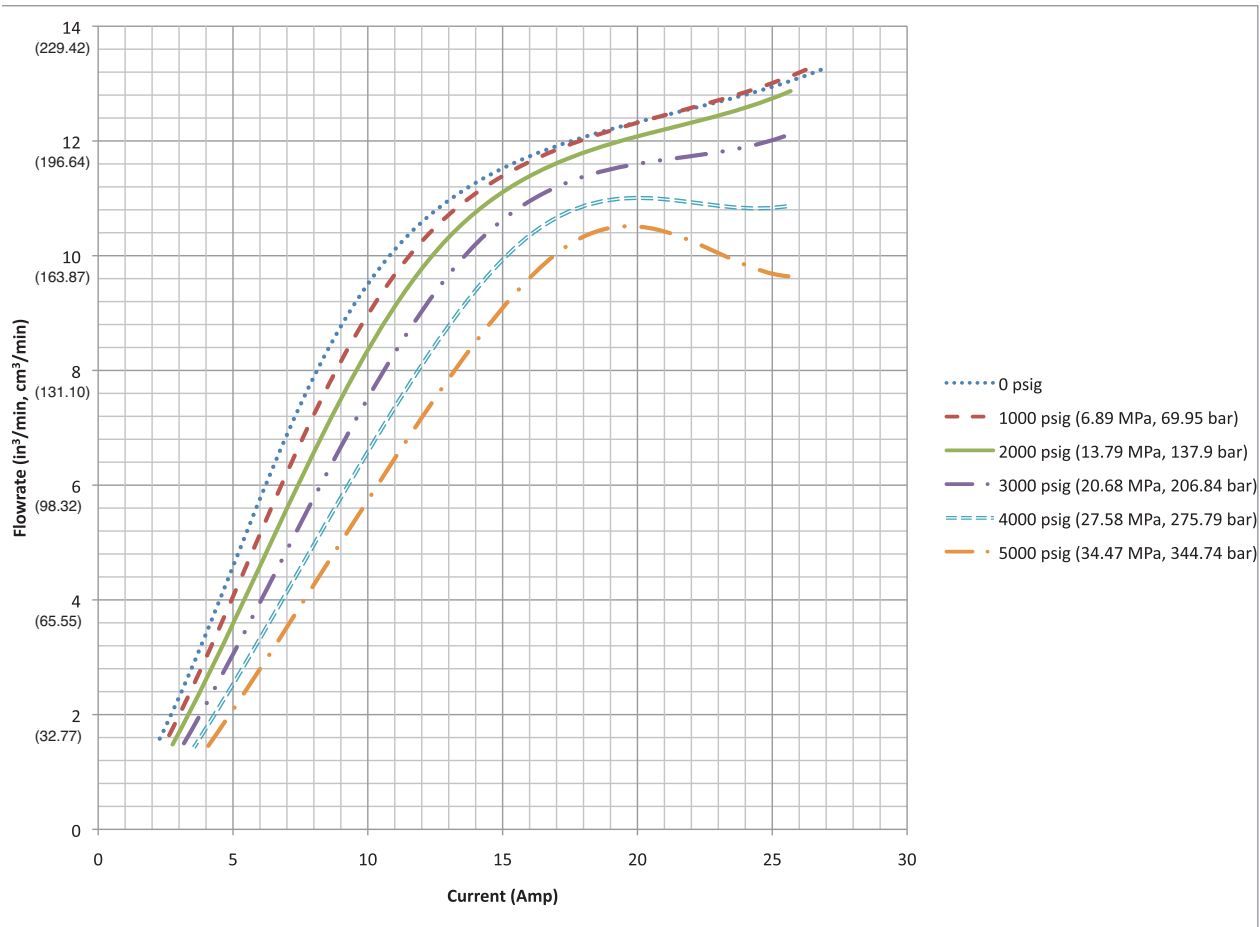
Graph 2: HF Model at 14°F (-10°C)



Graph 3: HP Model at Ambient Temperature



Graph 4: HP Model at -40°F (-40°C)



California Proposition 65

CALIFORNIA RESIDENTS

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

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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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Original instructions. This manual contains English. MM 332514

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