

Z-Pump S1, S3, and S4 Series

3A0019ZAE

EN

For pumping plural component materials. For professional use only.

Not for use in explosive atmospheres.

3500 psi (24 MPa, 241 bar) Maximum Working Pressure

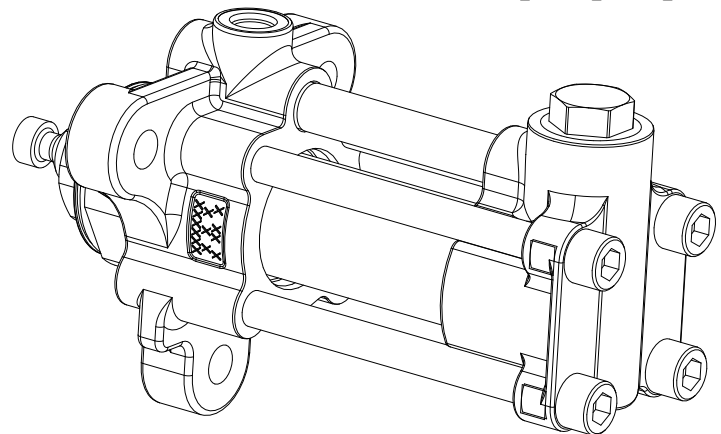
See page 3 for model information, including maximum working pressure and approvals.



Important Safety Instructions

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

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Related Manuals

Manual in English	Description
313997	HFR, Setup - Operation
3A1961	HFR for NVH Foam - Modular, Setup - Operation
3A6165	EFR, Instructions - parts

Models

Model	Pump Size	System Used On
*L005S1	5cc	HFR
L010S1	10cc	HFR
L015S1	15cc	HFR
L020S1	20cc	HFR
L025S1	25cc	HFR
L030S1	30cc	HFR
L035S1	35cc	HFR
L040S1	40cc	HFR
L045S1	45cc	HFR
L050S1	50cc	HFR
L060S1	60cc	HFR
L065S1	65cc	HFR
L070S1	70cc	HFR
L075S1	75cc	HFR
L080S1	80cc	HFR
L086S1	86cc	HFR
L090S1	90cc	HFR
L100S1	100cc	HFR
L105S1	105cc	HFR
L120S1	120cc	HFR
L140S1	140cc	HFR
L150S1	150cc	HFR
L160S1	160cc	HFR
**L010S3	10cc	NVH
**L020S3	20cc	NVH
*L005S4	5cc	EFR
L010S4	10cc	EFR
L015S4	15cc	EFR
L020S4	20cc	EFR
L025S4	25cc	EFR
L030S4	30cc	EFR
L035S4	35cc	EFR
L040S4	40cc	EFR
L045S4	45cc	EFR
L050S4	50cc	EFR
L060S4	60cc	EFR
L055S4	65cc	EFR









Model	Pump Size	System Used On
L070S4	70cc	EFR
L075S4	75cc	EFR
L080S4	80cc	EFR
L086S4	86cc	EFR
L090S4	90cc	EFR
L100S4	100cc	EFR
L105S4	105cc	EFR
L120S4	120cc	EFR
L140S4	140cc	EFR
L150S4	150cc	EFR
L160S4	160cc	EFR

* Due to a small seal cross-section, use unfilled catalysts to achieve the best seal life results.






** S3 pump models are for NVH system use only.

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 symbol refers to procedure-specific risk. Refer back to these warnings. Additional, product-specific warnings may be found throughout the body of this manual where applicable.

 <h1 style="margin: 0;">WARNING</h1>	
   	<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. • 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.
    	<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>EQUIPMENT MISUSE HAZARD 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 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.
 	<p>MOVING PARTS HAZARD 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. • Equipment can start without warning. Before checking, moving, or servicing equipment, follow the Pressure Relief Procedure and disconnect all power sources.
	<p>BURN HAZARD Equipment surfaces and fluid that is heated can become very hot during operation. To avoid severe burns:</p> <ul style="list-style-type: none"> • Do not touch hot fluid or equipment.

WARNING



TOXIC FLUID OR FUMES HAZARD

Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled or swallowed.

- Read Safety Data Sheets (SDSs) for handling instructions and to know the specific hazards of the fluids you are using, including the effects of long-term exposure.
- When spraying, servicing equipment, or when in the work area, always keep work area well-ventilated and always wear appropriate personal protective equipment. See **Personal Protective Equipment** warnings in this manual.
- Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.







PERSONAL PROTECTIVE EQUIPMENT

Always wear appropriate personal protective equipment and cover all skin when spraying, servicing equipment, or when in the work area. Protective equipment helps prevent serious injury, including long-term exposure; inhalation of toxic fumes, mists or vapors; allergic reaction; burns; eye injury and hearing loss. This protective equipment includes but is not limited to:

- A properly fitting respirator, which may include a supplied-air respirator, chemically impermeable gloves, protective clothing and foot coverings as recommended by the fluid manufacturer and local regulatory authority.
- Protective eyewear and hearing protection.




Important Isocyanate (ISO) Information

Isocyanate Conditions


				
<p>Spraying or dispensing fluids that contain isocyanates creates potentially harmful mists, vapors, and atomized particulates.</p>				

- Read and understand the fluid manufacturer’s warnings and Safety Data Sheets (SDSs) to know specific hazards and precautions related to isocyanates.
- Use of isocyanates involves potentially hazardous procedures. Do not spray with this equipment unless you are trained, qualified, and have read and understood the information in this manual and in the fluid manufacturer’s application instructions and SDSs.
- Use of incorrectly maintained or mis-adjusted equipment may result in improperly cured material. Equipment must be carefully maintained and adjusted according to instructions in the manual.
- To prevent inhalation of isocyanate mists, vapors, and atomized particulates, everyone in the work area must wear appropriate respiratory protection. Always wear a properly fitting respirator, which may include a supplied-air respirator. Ventilate the work area according to instructions in the fluid manufacturer’s SDSs.
- Avoid all skin contact with isocyanates. Everyone in the work area must wear chemically impermeable gloves, protective clothing and foot coverings as recommended by the fluid manufacturer and local regulatory authority. Follow all fluid manufacturer recommendations, including those regarding handling of contaminated clothing. After spraying, wash hands and face before eating or drinking.

Keep Components A and B Separate

				
<p>Cross-contamination can result in cured material in fluid lines which could cause serious injury or damage equipment. To prevent cross-contamination:</p> <ul style="list-style-type: none"> • Never interchange component A and component B wetted parts. • Never use solvent on one side if it has been contaminated from the other side. 				

Material Self Ignition

				
<p>Some materials may become self-igniting if applied too thickly.. Read material manufacture’s warnings and material MSDS.</p>				

Moisture Sensitivity of Isocyanates

Isocyanates (ISO) are catalysts used in two component foam and polyurea coatings. ISO will react with moisture (such as humidity) to form small, hard, abrasive crystals, which become suspended in the fluid. Eventually a film will form on the surface and the ISO will begin to gel, increasing in viscosity. If used, this partially cured ISO will reduce performance and the life of all wetted parts.

The amount of film formation and rate of crystallization varies depending on the blend of ISO, the humidity, and the temperature.

Keep Components A and B Separate

To prevent exposing ISO to moisture:

- Always use a sealed container with a desiccant dryer in the vent, or a nitrogen atmosphere. Never store ISO in an open container.
- Keep the ISO lube pump reservoir (if installed) filled with Graco Throat Seal Liquid (TSL™), Part 206995. The lubricant creates a barrier between the ISO and the atmosphere.
- Use moisture-proof hoses specifically designed for ISO, such as those supplied with your system.
- Never use reclaimed solvents, which may contain moisture. Always keep solvent containers closed when not in use.
- Never use solvent on one side if it has been contaminated from the other side.
- Always lubricate threaded parts with ISO pump oil or grease when reassembling.

Keep Components A and B Separate

To prevent cross-contamination of the equipment's wetted parts, never interchange component A (isocyanate) and component B (resin) parts.

Foam Resins with 245 fa Blowing Agents

Some foam blowing agents will froth at temperatures above 90°F (33°C) when not under pressure, especially if agitated. To reduce frothing, minimize preheating in a circulation system.

Changing Materials

- When changing materials, flush the equipment multiple times to ensure it is thoroughly clean.
- Always clean the fluid inlet strainers after flushing.
- Check with your material manufacturer for chemical compatibility.
- Most materials use ISO on the A side, but some use ISO on the B side.
- Epoxies often have amines on the B (hardener) side. Polyureas often have amines on the B (resin) side.

Component Identification

40cc pump shown

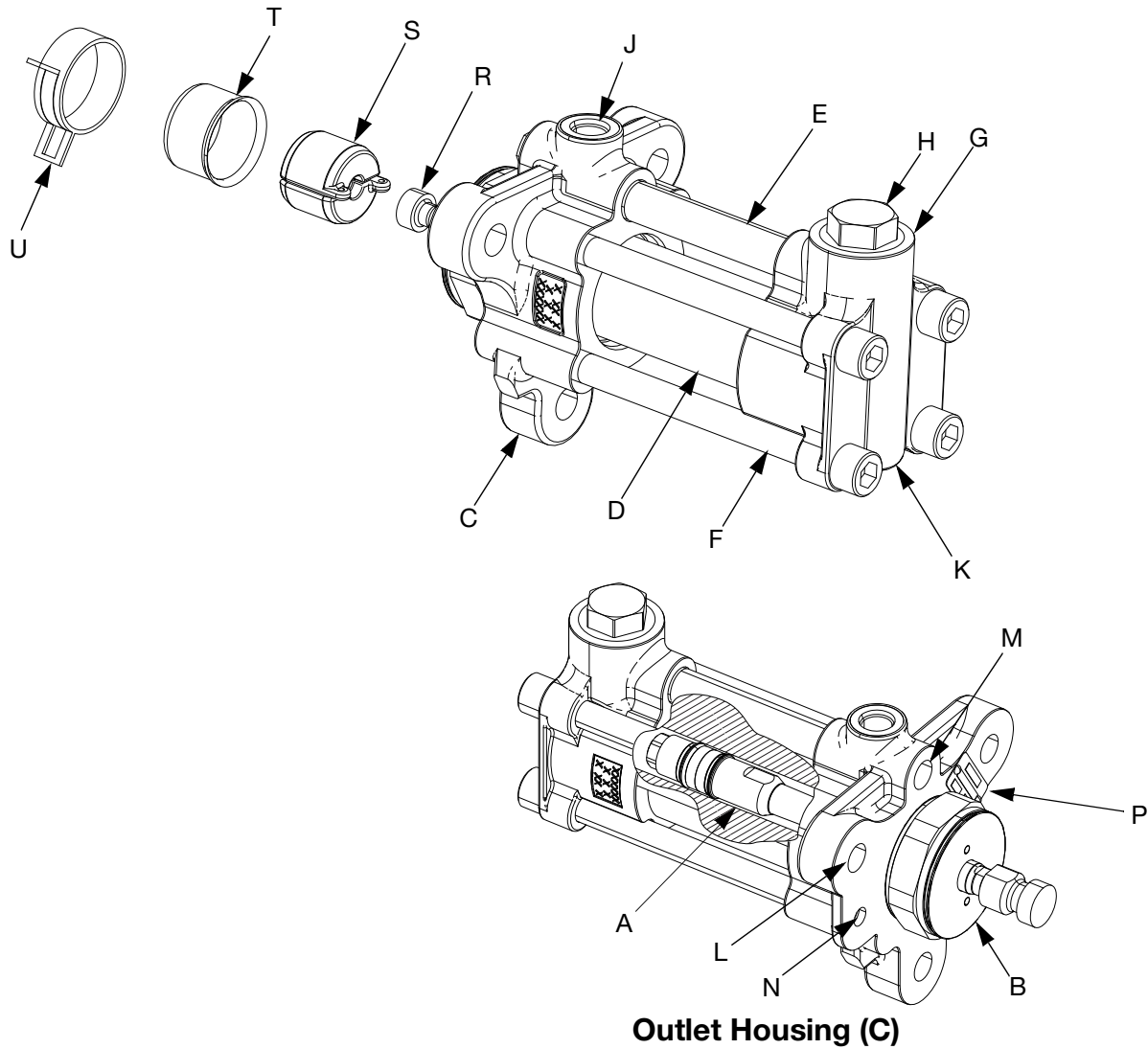


FIG. 1: Component Identification

Key:

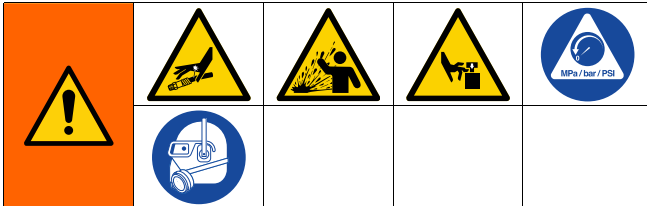
- | | | | |
|---|---|---|---------------------------------|
| A | Displacement Rod (inside main cylinder) | M | Pressure Transducer Port |
| B | Throat Cartridge/Retainer | N | Linear Transducer Mounting Hole |
| C | Outlet Housing | P | Identification Tag |
| D | Main Cylinder | R | Rod Adapter (not on all models) |
| E | Crossover Tube | S | Pump Coupler |
| F | Tie Bolt | T | Coupler Cover |
| G | Inlet Housing | U | Coupler Clamp |
| H | Inlet Cap | | |
| J | Fluid Outlet | | |
| K | Fluid Inlet (bottom of inlet housing) | | |
| L | Pump Mounting Holes | | |

Operation


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. Press the enable/disable key on the ADM  to disable the EFR/HFR, and verify it is inactive.
2. Relieve pressure and shut off the supply systems. See your appropriate supply system manual.
3. Turn the PRESSURE RELIEF/DISPENSE valves to PRESSURE RELIEF/CIRCULATION. Route the fluid to grounded waste containers or supply tanks.
4. For models with a dispense valve with a safety lock, engage the dispense valve safety lock.

Flushing



To avoid fire and explosion, always ground equipment and waste container. To avoid static sparking and injury from splashing, always flush at the lowest possible pressure.

Hot solvent may ignite. To avoid fire and explosion:

- Flush equipment only in a well-ventilated area
 - Ensure main power is off and the heater is cool before flushing
 - Do not turn on heater until fluid lines are clear of solvent
- Flush out old fluid with new fluid, or flush out old fluid with a compatible solvent before introducing new fluid.
 - Flush at the lowest pressure possible. Check connectors for leaks and tighten as necessary.

- Flush with a fluid that is compatible with the fluid being dispensed and the equipment wetted parts

Maintenance

Grease Cup Maintenance

NOTE: For pumps with grease fittings.

Frequency of greasing intervals is dependent on material being pumped. As a basic schedule, lubricate pump with grease after 250 gallons of material (five of fifty five gallon drums) has been passed through the pump.

If the grease has become hardened, remove the materials or grease, and shorten the intervals between greasing the pump.

If the grease remains clear and free of material, intervals between greasing the pump can be increased.

To Grease the Pump

1. Remove the M5 hex socket plug (D) to permit grease to circulate through the throat cartridge (119) correctly.
2. Attach grease gun to the grease fitting (C). Pump new grease into the pump until fresh grease is observed from grease relief hole (E).
3. Replace and re-tighten the M5 hex socket plug (D). See FIG. 2.

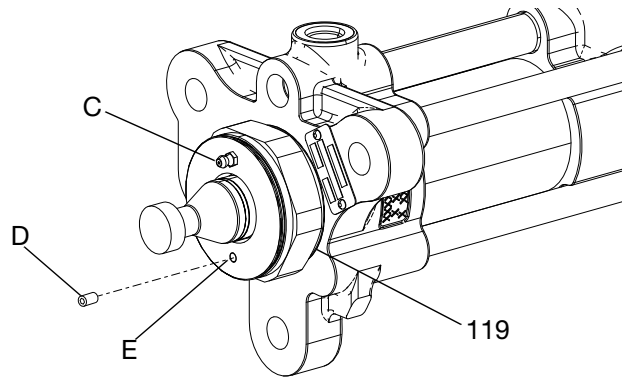
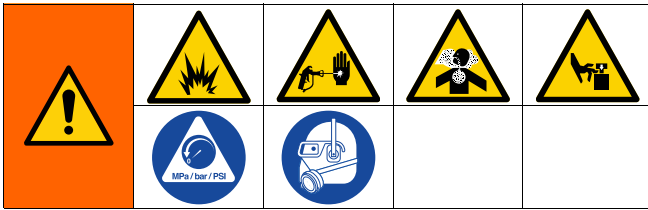


FIG. 2

Repair



Required Tools

- Large vise
- Set of adjustable wrenches
- 1 in. wrench (S4 only)
- 1 1/4 in. Allen hex wrench.
- 3/8 in. Allen hex wrench (S4 only)
- 1 1/4 in. wrench (S4 only)
- 1 1/8 in. crowfoot wrench (S4 only)
- O-ring pick
- Rubber mallet
- Torque wrench
- 2 1/4 in. and 3 in. hex sockets
- Anti-seize lubricant
- Removable strength thread locker
- Grease (compatible with the material being dispensed)

Inlet Housing Disassembly

Models S1 and S3 Pumps

S1 and S3 models can be identified by the hex head (not square) on the inlet valve cap (113), or the model number on the I.D. plate.

1. Relieve pressure and flush system. See **Pressure Relief Procedure** and **Flushing**, page 10.
2. Remove inlet hose and drain inlet housing (106).
3. Remove inlet valve cap (113) from inlet housing (106), and remove O-ring (108). See FIG. 3.

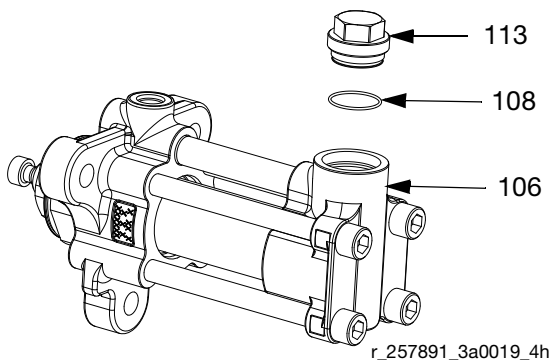


FIG. 3

4. Remove upper ball cage housing (112), ball check spring (111), SST ball (110), O-ring (108) and carbide seat (109).
5. Press lower SST ball (110) off carbide seat (109) from fluid inlet and drain the inlet housing (106).
6. Remove O-ring (108), lower ball cage housing (112), ball check spring (111), SST ball (110), carbide seat (109), and O-ring (108). See FIG. 4.

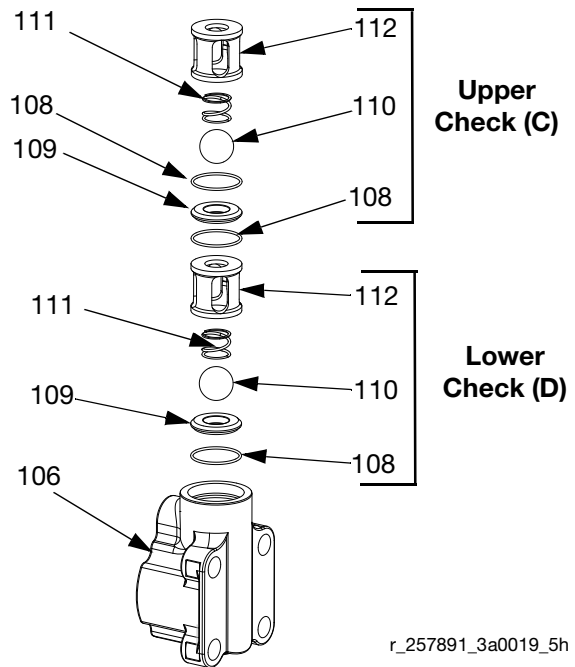


FIG. 4

7. Clean all parts in a compatible solvent. Lay them in order for easier reassembly. Inspect each ball and seat for nicks or scratches; replace as required.

Model S4 Pumps

NOTE: S4 models can be identified by the square head (not hex) on the inlet cap (136) being square, or the model number on the I.D. plate.

1. Relieve pressure and flush system. See **Pressure Relief Procedure** and **Flushing**, page 10.

Repair

2. Remove inlet hose and drain inlet housing (106). See FIG. 5.
3. Remove inlet valve cap (136) from inlet housing (106), and remove O-ring (108).
6. Clean all parts in a compatible solvent. Lay them in order for easier reassembly. Inspect each ball and seat for nicks or scratches; replace as required.
7. It is recommended to replace all O-rings (108 and 143) after cleaning.

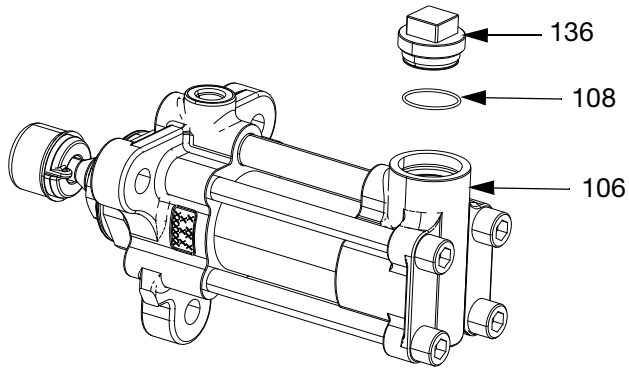


FIG. 5

4. Remove parts shown for the Upper Check (A). This includes the spring retainer (137), ball cage housing (138), ball check spring (139), housing ball retainer (140), silicone ball (141), ball seat (142), O-ring (143), and check retainer (144).
5. Remove lower check (B), including the spring retainer (137), ball cage housing (138), ball check spring (139), housing ball retainer (140), silicone ball (141), ball seat (142), O-ring (143), and check retainer (144). See FIG. 6.

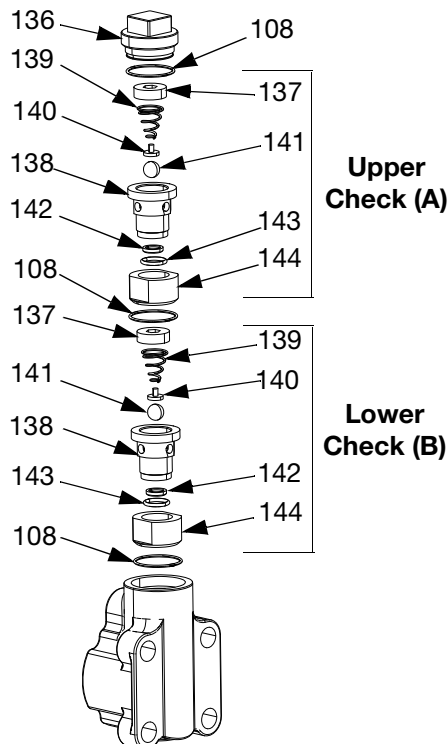


FIG. 6

Inlet Housing Assembly

Models S1 and S3 Pumps

1. Apply anti-seize lubricant to the threads of inlet valve cap (113) and install O-ring (108) into the groove.
2. Assemble lower check assembly (D) FIG. 4, page 11. Install O-ring (108) into inlet housing (106) followed by the carbide seat (109).
3. Place the ball (110) onto the carbide seat (109) followed by the ball check spring (111) and the ball cage housing (112).

NOTE: Confirm the orientation of the ball cage prior to installing. The end with the larger opening must face the spring. See FIG. 7.

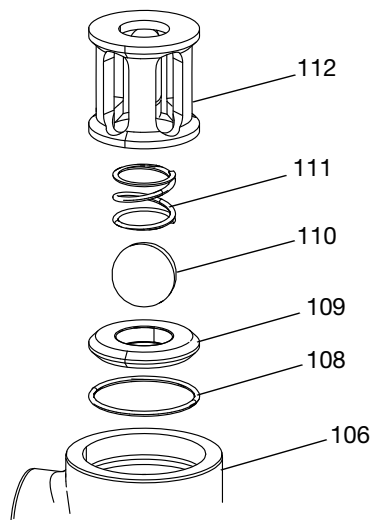


FIG. 7

4. Assemble upper check assembly (C) FIG. 4, page 11. Repeat step 2 and 3 above to install the upper

check assembly (C) on top of the lower check assembly (D).

5. Install the inlet valve cap (113) compressing both check assemblies together into the inlet housing. Torque the inlet valve cap to 70 ft-lbs. (95 N•m).

Model S4 Pumps

1. Apply anti-seize lubricant to the ball cage housing (138) and retainers (137 and 144).
2. Install ball seat (142) and check O-ring (143) into the check retainer (144). Attach to the ball cage housing (138) and torque to 50 ft-lbs (67.5 N•m).

NOTE: The radius of the ball seat (142) must face the silicone ball (141).

3. Install the silicone ball (141), ball retainer (140) and ball check spring (139) into the ball cage housing (138).
4. Install the spring retainer (137) cup side down into the ball cage housing (138) to trap the ball check spring (139) until the spring retainer bottoms out into the ball cage housing. Torque to 30 ft-lbs (41 N•m).
5. Install the O-ring (108) into the inlet housing (106).
6. Install lower check (B) assembly into the inlet housing (106) in the orientation shown.
7. Install the O-ring (108) into the inlet housing (106).
8. Install upper check (A) into the housing (106) in the orientation shown.
9. Install O-ring (108) on inlet valve cap (113) and apply anti-seize lubricant to inlet valve cap (113) threads. Tighten inlet valve cap to 70 ft-lbs. (95 N•m).

Pump Disassembly

1. Relieve pressure and flush system. Follow **Pressure Relief Procedure** and **Flushing**, page 10.
2. Remove inlet hose and drain inlet housing (106).
3. Using a bench vice, horizontally clamp the pump on outlet housing (107). Use a 1/2 in. hex bit socket to loosen all four tie bolts (105) from inlet housing (106).
4. For 20cc - 40cc pumps only: Use wrench to remove rod adapter (121). See FIG. 8.

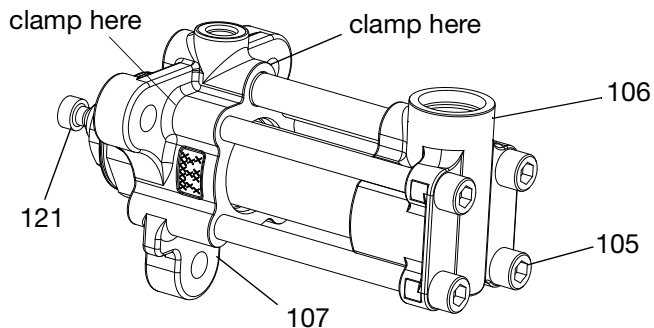


FIG. 8

5. Remove pump assembly from vise and lay on a flat surface with towels or in catch pan.
6. Completely remove the tie bolts (105). See FIG. 9.

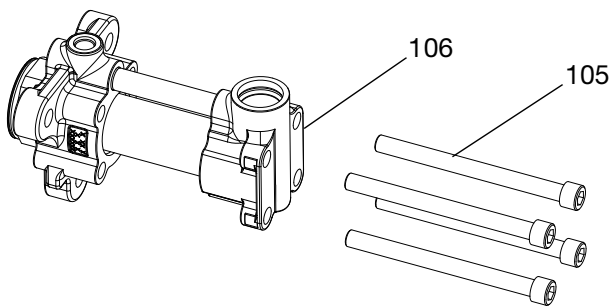


FIG. 9

7. Remove inlet housing (106) from pump cylinder (103). Remove pump crossover tube (104) and o-rings (102). See FIG. 10.

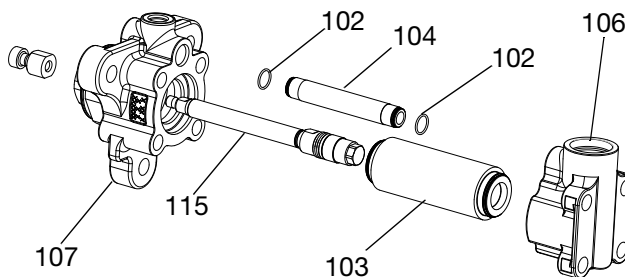


FIG. 10

8. Pull pump cylinder (103) and displacement rod (115) away from outlet housing (107).

Be careful not to scratch the displacement rod (115); place it on a smooth working surface. Damage to the displacement rod will shorten pump life.

9. Remove displacement rod (115) from pump cylinder (103). See FIG. 11.

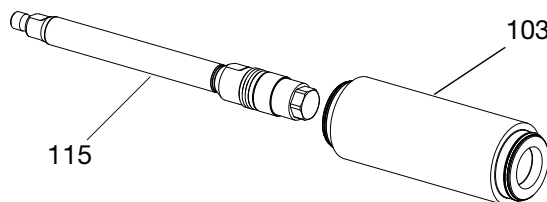


FIG. 11

10. Remove two o-rings (101) from pump cylinder (103). See FIG. 12.

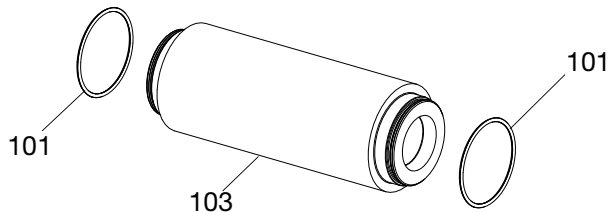


FIG. 12

11. Place outlet housing (107) in vise so throat cartridge (118) is facing up.

12. Remove the throat cartridge (119).
13. Use O-ring pick and remove O-ring (145) and two throat seals (126) out of the throat cartridge (119). see FIG. 13.
14. Remove throat retainer (118) and throat retainer O-rings (120) and (125). See FIG. 13.

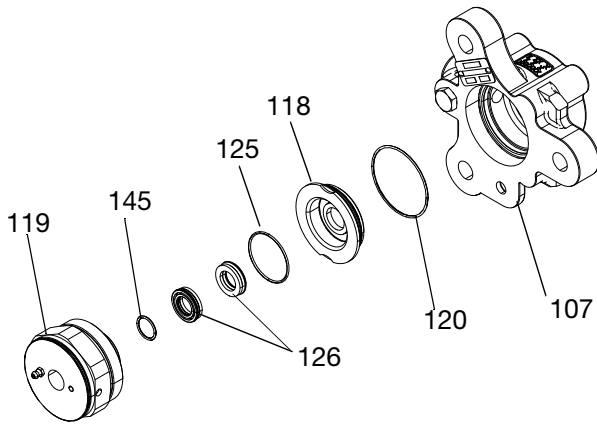


FIG. 13

15. Clamp flats on seal end of displacement rod (115) in vise. Remove piston retainer (114), piston bearing (116), and piston seal (117). See FIG. 14, FIG. 15, and FIG. 16.

For 5cc, 10cc, and 15cc S1, S3, and S4 Pumps

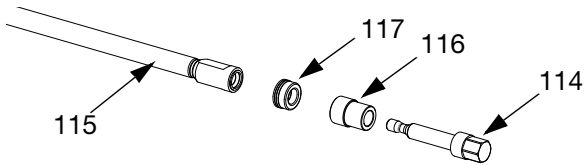


FIG. 14

For 20cc-50cc S1, S3, and S4 Pumps

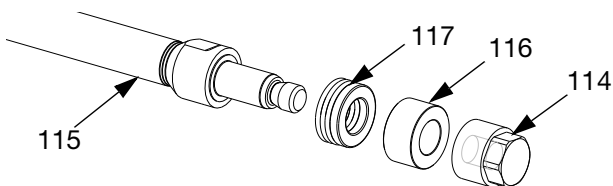


FIG. 15

For 60cc-160cc S1, S3, and S4 Pumps

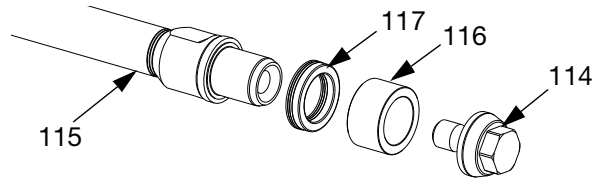


FIG. 16

16. If the displacement rod (115) shows damage or wear on the surface below the piston seals (117) it should be replaced to prevent damage to new seals.
17. Thoroughly clean all metal parts in a compatible solvent.

Displacement Rod Assembly

NOTICE

To prevent cross-contamination of the equipment's wetted parts, never interchange component A (isocyanate) and component B (resin) parts.

NOTICE

To prevent damage to seals always use seal installation tool (152) and rod installation tool (153) from repair kit when assembling the piston seals and displacement rod.

NOTE: Rod installation tool is not needed for 10cc-30cc pump sizes. For rod installation tool used on other pump sizes see various pump repair kits starting on page 33.

1. Install piston seal installation tool (152) on displacement rod (115). Hand tighten.
2. Apply grease to seal and bearing surface of displacement rod (115).
3. Install piston seal (117) and piston bearing (116). Ensure piston seal springs face displacement rod. Remove piston seal installation tool (152).
4. For 20cc-50cc pumps: Apply one stripe of removable strength thread locker to displacement rod (115) male threads and install piston retainer (114). See FIG. 17.

NOTICE

Specification sheets and Graco testing indicate that anaerobic sealant requires three days to fully cure. Failure to allow three days for full cure may result in parts coming loose during operation.

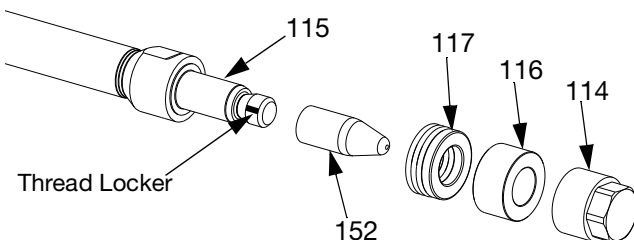


FIG. 17

5. For 5cc, 10cc, 15cc, and 60cc-160cc pumps: Apply one stripe of removable strength thread locker to piston retainer (114) threads and assemble. See FIG. 18.

NOTICE

Specification sheets and Graco testing indicate that anaerobic sealant requires three days to fully cure. Failure to allow three days for full cure may result in parts coming loose during operation.

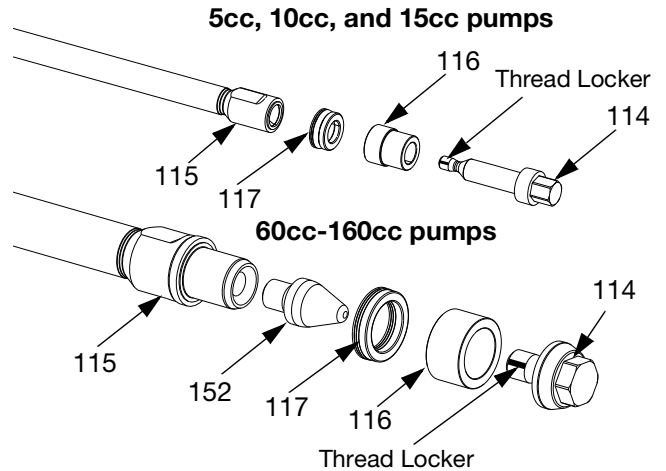


FIG. 18

NOTICE

To prevent displacement rod damage, do not clamp directly onto displacement rod surface.

6. Clamp flats on seal end of displacement rod (115) in vise. Torque piston retainer to displacement rod using **Piston Retainer (114) Torque Specifications:** page 17 for torque values according to pump size.

Piston Retainer (114) Torque Specifications:

Pump Size	Torque
5cc	3.2 ft-lbs (4.3 N•m)
10cc	5.5 ft-lbs (7.4 N•m)
15cc	5.5 ft-lbs (7.4 N•m)
20cc	30 ft-lbs (40.8 N•m)
25cc	30 ft-lbs (40.8 N•m)
30cc	30 ft-lbs (40.8 N•m)
35cc	30 ft-lbs (40.8 N•m)
40cc	50 ft-lbs (67.5 N•m)
45cc	50 ft-lbs (67.5 N•m)
50cc	50 ft-lbs (67.5 N•m)
60cc	80 ft-lbs (108 N•m)
65cc	80 ft-lbs (108 N•m)
70cc	80 ft-lbs (108 N•m)
75cc	80 ft-lbs (108 N•m)
80cc	160 ft-lbs (216 N•m)
86cc	160 ft-lbs (216 N•m)
90cc	160 ft-lbs (216 N•m)
100cc	160 ft-lbs (216 N•m)
105cc	160 ft-lbs (216 N•m)
120cc	160 ft-lbs (216 N•m)
140cc	160 ft-lbs (216 N•m)
160cc	160 ft-lbs (216 N•m)

into the throat cartridge until it contacts the first throat seal. See FIG. 19.

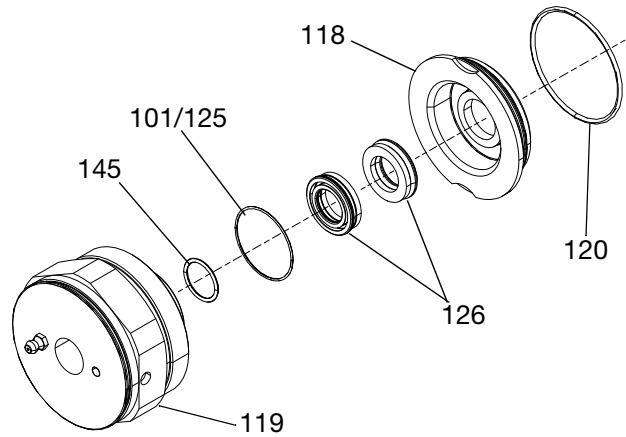


FIG. 19

10. With the outlet housing (107) mounted securely in a vice, install the throat retainer O-ring (120) onto the throat retainer (118). Place the retainer into the outlet housing.
11. Apply anti-seize to the threads on the throat retainer (119) and thread it into the outlet housing (107). When fully threaded together torque the throat retainer to 200 ft-lbs. (271 N•m). See FIG. 20.

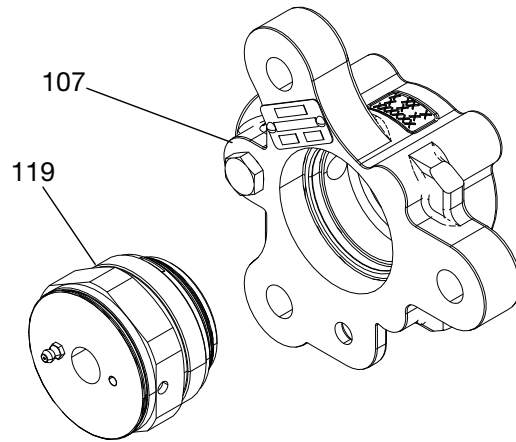


FIG. 20

7. Apply grease to the O-ring (145) and the two throat seals (126). Install the O-ring into the upper most groove of the throat cartridge (119). Slide O-ring (101 or 125 depending on pump model) over the boss end of the throat cartridge.
8. Place first throat seal (126) into the throat cartridge (119) and ensure seal spring faces towards the bottom of the throat cartridge. Using a suitable size socket or dowel, press the throat seal to the bottom of the throat cartridge.
9. Place the second throat seal (126) into the throat cartridge (119) ensuring the spring side faces up toward the throat retainer (118). Using a suitable size socket or dowel, press the second throat seal

12. Install cylinder O-rings (101) on pump cylinder (103) and crossover tube O-rings (102) on crossover pump tube (104). Lubricate o-rings with grease. See FIG. 21 page 18.

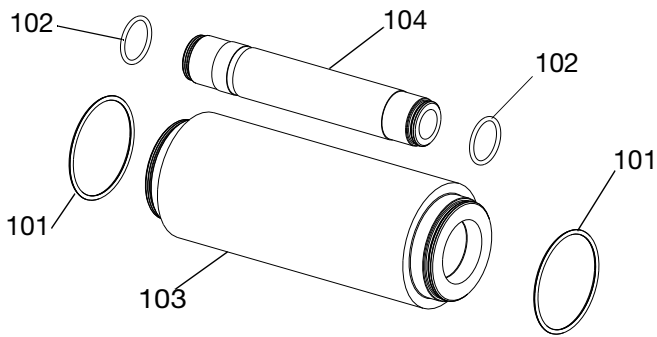


FIG. 21

13. Install pump cylinder (103) and pump crossover tube (104) in outlet housing (107) with a rubber mallet. See FIG. 22 page 18.

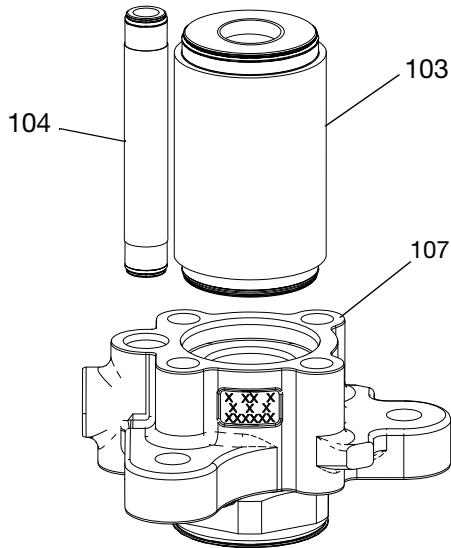


FIG. 22

14. Lubricate piston seal (117), and piston bearing (116) with grease.

NOTE: For 160cc pumps, place the cylinder installation tool (150) over the end of the pump cylinder (103) and lubricate with grease. This will help guide the displacement rod (151) during installation. See FIG. 23.

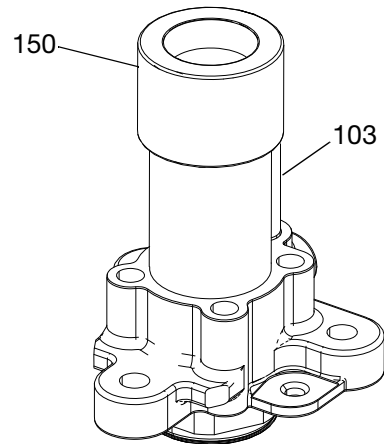


FIG. 23

15. Install displacement rod (151) in pump cylinder (103) and into throat cartridge (118). Gently tap displacement rod with a rubber mallet until the hex surface of the piston retainer (114) is flush or below the surface of the pump cylinder. See FIG. 24.

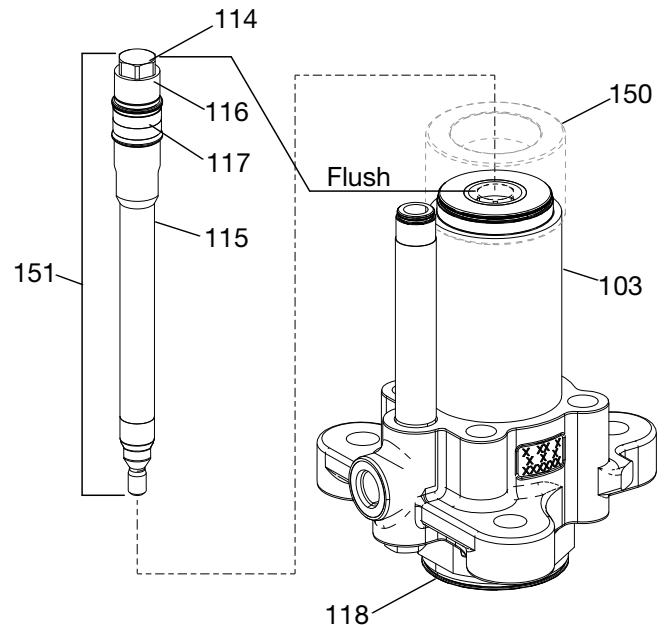


FIG. 24

16. Gently place inlet housing (106) on pump cylinder (103) and pump crossover tube (104). Ensure inlet housing bores are aligned with pump cylinder and pump crossover tube. Install with a rubber mallet.

NOTICE

To prevent damage to o-rings, ensure inlet housing (106) is evenly seated on main cylinder (103) before installing tie bolts (105).

17. Lubricate four tie bolts (105) threads with grease and install.

- 18. Torque tie bolts (105) in a star pattern to 10 ft-lbs (13.5 N•m). Then torque again to 50 ft-lbs (67.5 N•m). Torque a final time to 200 ft-lbs (271 N•m). See Fig. 25.
- 19. After torquing the four tie bolts (105) ensure the inlet housing (107) is evenly seated onto the pump cylinder (103) and pump crossover tube (104).

- 20. For 5cc-50cc pumps with rod adapter only: Clean rod adapter (121) threads with a wire brush and apply removable strength thread locker to displacement rod (115) threads. Install rod adapter on displacement rod. See Rod Adapter Torque Specification Table for rod adapter torque according to pump size.

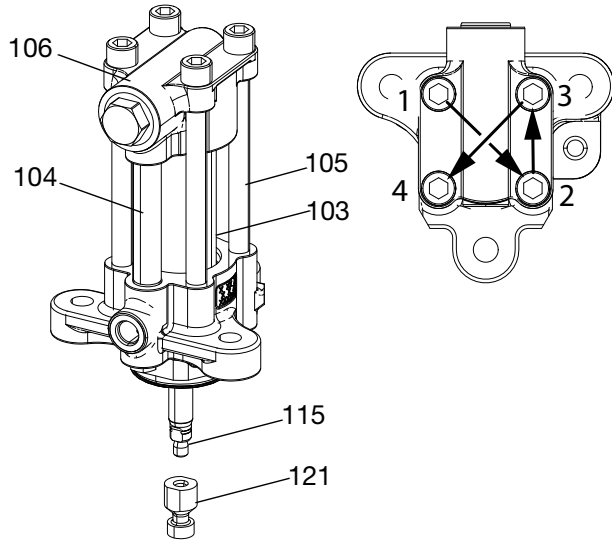


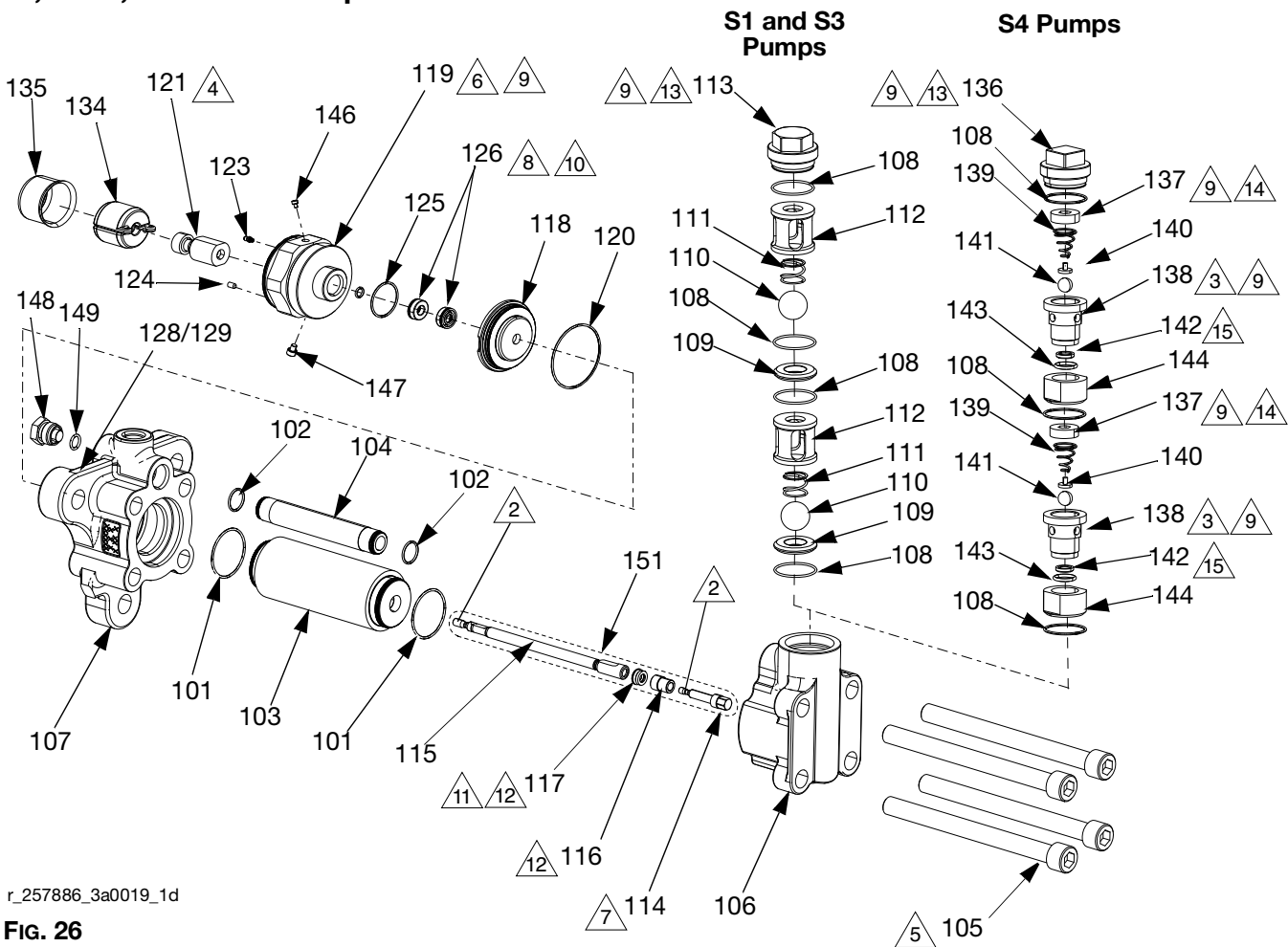
FIG. 25

Rod Adapter Torque Specification Table

Pump Size	Torque
5cc	38 in-lbs (3.2 ft-lbs) (4.3 N•m)
10cc	8.5 ft-lbs (11.5 N•m)
15cc	8.5 ft-lbs (11.5 N•m)
20cc	30 ft-lbs (40.6 N•m)
25cc	30 ft-lbs (40.6 N•m)
30cc	30 ft-lbs (40.6 N•m)
35cc	45 ft-lbs (60.75 N•m)
40cc	45 ft-lbs (60.75 N•m)
45cc	45 ft-lbs (60.75 N•m)
50cc	45 ft-lbs (60.75 N•m)

Parts

Complete Pump Assemblies for S1, S3, and S4 5cc, 10cc, and 15cc Pumps



r_257886_3a0019_1d

FIG. 26

1. Lubricate seals, o-rings, lead-in's and moving parts with grease.
- △ Apply one stripe of removable strength anaerobic sealant on threads.

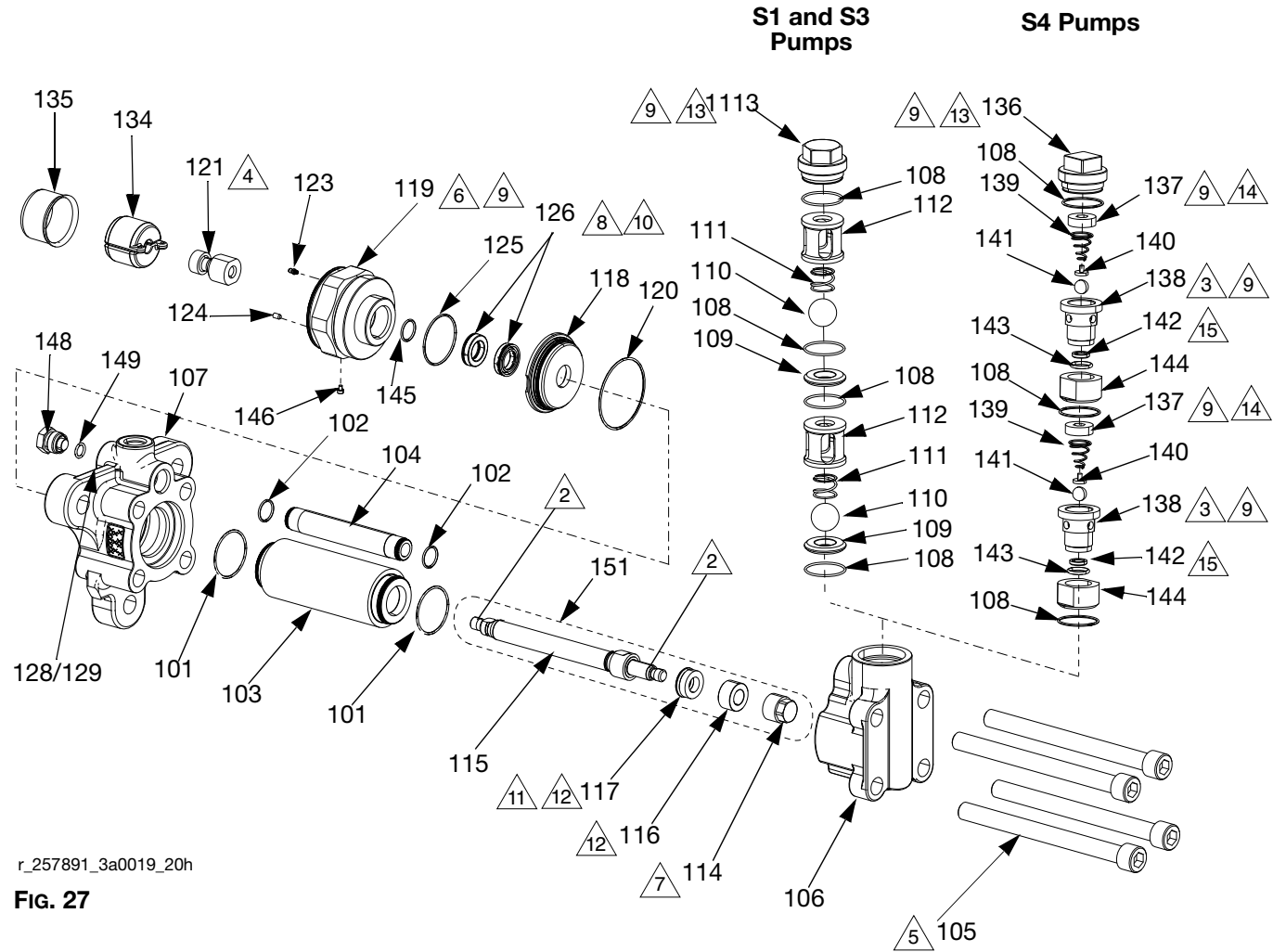
NOTICE

Specification sheets and Graco testing indicate that anaerobic sealant requires three days to fully cure. Failure to allow three days for full cure may result in parts coming loose during operation. If faster cure time is required, warm components to 104°F (40°C for 6 hours).

- △ Torque to 50 ft-lbs (67.5 N•m).
- △ Assemble and torque after displacement rod (151) is assembled through throat retainer (118). Torque to 45 ft-lbs (61.01 N•m).
- △ Torque tie bolts (105) in star pattern to 10 ft-lbs (13.5 N•m). Then torque again in star pattern to 50 ft-lbs (67.5 N•m). Finally torque again in star pattern to 200 ft-lbs (271 N•m).

- △ Torque to 200 ft-lbs. (271 N•m).
- △ See **Piston Retainer (114) Torque Specifications:** on page 17 for torque specification.
- △ Must be pressed straight into housing.
- △ Apply anti-seize lubricant to threads.
- △ Mount seals such that the non-spring end of one seal and the non-spring end of the other seal is joined.
- △ Ensure spring end of piston seal (117) faces displacement rod (115).
- △ Assemble piston bearing(116) and piston seal (117) onto piston retainer (114).
- △ Torque to 70 ft-lbs. (95 N•m).
- △ Torque to 30 ft-lbs. (41 N•m).
- △ The sharp corner of the outside diameter faces up towards the ball cage housing (138).

20cc, 25cc, 30cc, 35cc, 40cc, 45cc, and 50cc Pumps



r_257891_3a0019_20h

FIG. 27

- 1. Lubricate seals, o-rings, lead-in's and moving parts with grease.
- ▲ Apply one stripe of removable strength anaerobic sealant on threads.

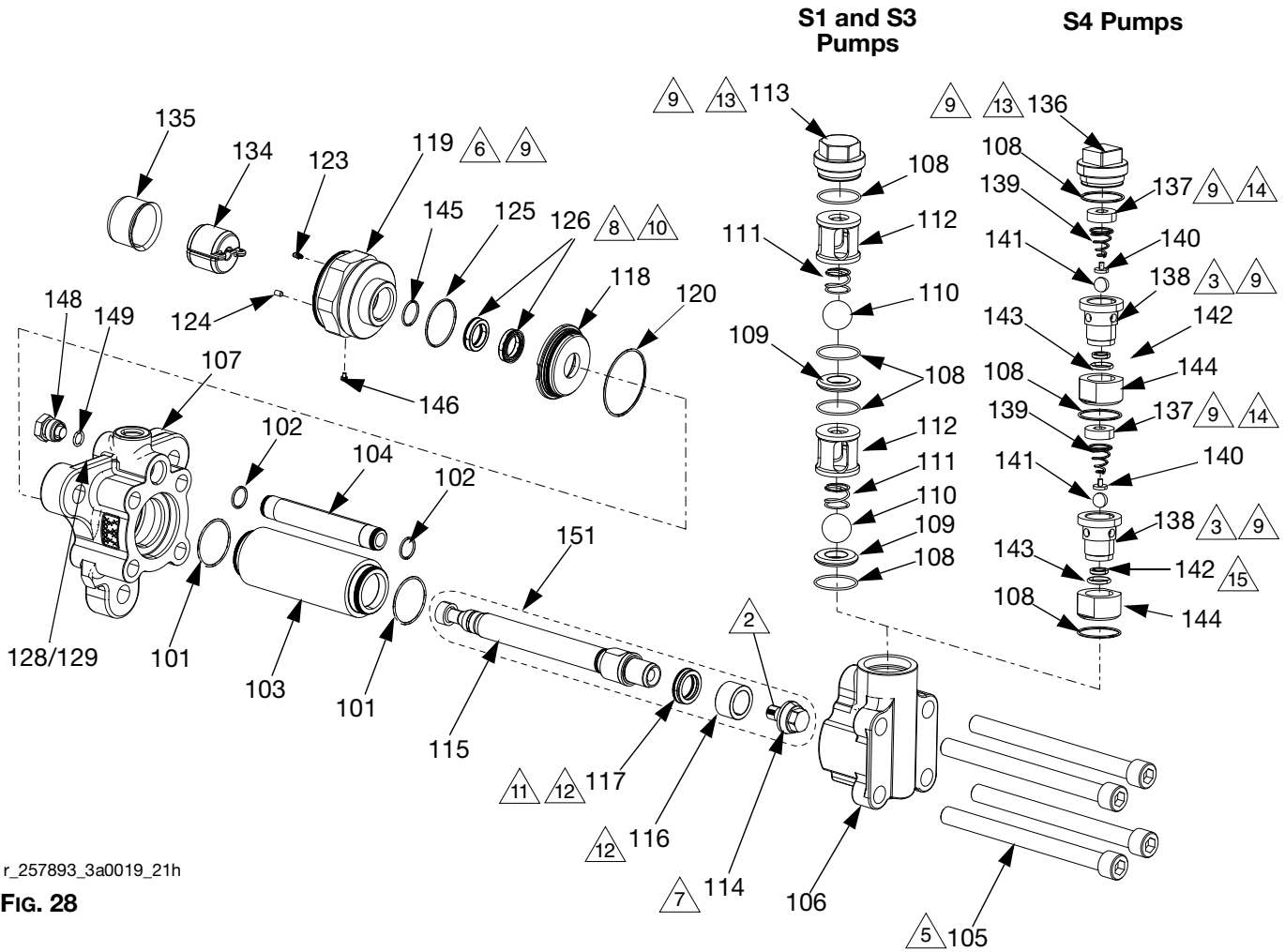
NOTICE

Specification sheets and Graco testing indicate that anaerobic sealant requires three days to fully cure. Failure to allow three days for full cure may result in parts coming loose during operation. If faster cure time is required, warm components to 104°F (40°C) for 6 hours.

- ▲ Torque to 50 ft-lbs (67.5 N•m).
- ▲ Assemble and torque after displacement rod (151) is assembled through throat retainer (118). Torque to 45 ft-lbs (61.01 N•m).
- ▲ Torque tie bolts (5) in star pattern to 10 ft-lbs (13.5 N•m). Then torque again in star pattern to 50 ft-lbs (67.5 N•m). Finally torque again in star pattern to 200 ft-lbs (271 N•m).

- ▲ Torque to 200 ft-lbs. (271 N•m).
- ▲ See **Piston Retainer (114) Torque Specifications:** on page 17 for torque specification.
- ▲ Must be pressed straight into housing.
- ▲ Apply anti-seize lubricant to threads.
- ▲ Mount seals such that the non-spring end of one seal and the non-spring end of the other seal is joined.
- ▲ Ensure spring end of piston seal (117) faces displacement rod (115).
- ▲ Assemble piston bearing(116) and piston seal (117) onto piston retainer (114).
- ▲ Torque to 70 ft-lbs. (95 N•m).
- ▲ Torque to 30 ft-lbs. (41 N•m).
- ▲ The sharp corner of the outside diameter faces up towards the ball cage housing (138).

60cc, 65cc, 70cc, 75cc, 80cc, 86cc, 90cc, 100cc, 105cc, 120cc, 140cc, 150cc, and 160cc Pumps



r_257893_3a0019_21h

FIG. 28

1. Lubricate seals, o-rings, lead-in's and moving parts with grease.

△ Apply one stripe of removable strength anaerobic sealant on threads.

NOTICE

Specification sheets and Graco testing indicate that anaerobic sealant requires three days to fully cure. Failure to allow three days for full cure may result in parts coming loose during operation. If faster cure time is required, warm components to 104°F (40°C) for 6 hours.

△3 Torque to 50 ft-lbs (67.5 N•m).

△5 Torque tie bolts (5) in star pattern to 10 ft-lbs (13.5 N•m). Then torque again in star pattern to 50 ft-lbs (67.5 N•m). Finally torque again in star pattern to 200 ft-lbs (271 N•m).

△6 Torque to 200 ft-lbs. (271 N•m).

△7 See **Piston Retainer (114) Torque Specifications:** on page 17 for torque specification.

△8 Must be pressed straight into housing.

△9 Apply anti-seize lubricant to threads.

△10 Mount seals such that the non-spring end of one seal and the non-spring end of the other seal is joined.

△11 Ensure spring end of piston seal (117) faces displacement rod (115).

△12 Assemble piston bearing(116) and piston seal (117) onto piston retainer (114).

△13 Torque to 70 ft-lbs. (95 N•m).

△14 Torque to 30 ft-lbs. (41 N•m).

△15 The sharp corner of the outside diameter faces up towards the ball cage housing (138).

S1 and S3 Complete Pump Parts List

S1 Pump Size 5cc, 10cc, 15cc, 20cc, 25cc, 30cc, 35cc, 40cc, 50cc, 60cc, 65cc, and 70cc

			Series		S1												
			Pump Size		5cc	10cc	15cc	20cc	25cc	30cc	35cc	40cc	45cc	50cc	60cc	65cc	70cc
			Model No.		L005S1	L010S1	L015S1	L020S1	L025S1	L030S1	L035S1	L040S1	L045S1	L050S1	L060S1	L065S1	L070S1
			Figure		FIG. 26				FIG. 27					FIG. 28			
Ref.	Part	Description	Quantity														
101	108822	PACKING, O-Ring, PTFE	2	2	2	2	2	2	2	2	2	2	2	2	2		
	106259		-	-	-	-	-	-	-	-	-	-	-	-	-		
102	111116	PACKING, O-Ring, PTFE	2	2	2	2	2	2	2	2	2	2	2	2	2		
103	---	CYLINDER, pump	1	1	1	1	1	1	1	1	1	1	1	1	1		
104	15V458	TUBE, cross	1	1	1	1	1	1	1	1	1	1	1	1	1		
105	122704	SCREW, CSH	4	4	4	4	4	4	4	4	4	4	4	4	4		
106	15Y165	HOUSING, inlet	1	1	1	1	1	1	1	1	1	1	1	1	1		
107	15X946	HOUSING, outlet	1	1	1	1	1	1	1	1	1	1	1	1	1		
108	107098	PACKING, O-Ring	4	4	4	4	4	4	4	4	4	4	4	4	4		
109	193395	SEAT, carbide	2	2	2	2	2	2	2	2	2	2	2	2	2		
110	107167	BALL, SST	2	2	2	2	2	2	2	2	2	2	2	2	2		
111	122756	SPRING, ballcheck	2	2	2	2	2	2	2	2	2	2	2	2	2		
112	15Y168	HOUSING, ball, cage	2	2	2	2	2	2	2	2	2	2	2	2	2		
113	15Y167	CAP, inlet valve, HX HD	1	1	1	1	1	1	1	1	1	1	1	1	1		
114	---	RETAINER, piston	1	1	1	1	1	1	1	1	1	1	1	1	1		
115	---	ROD, displacement	1	1	1	1	1	1	1	1	1	1	1	1	1		
116	---	BEARING, piston	1	1	1	1	1	1	1	1	1	1	1	1	1		
117	---	SEAL, piston	1	1	1	1	1	1	1	1	1	1	1	1	1		
118	---	RETAINER, throat	1	1	1	1	1	1	1	1	1	1	1	1	1		
119	---	CARTRIDGE, throat	1	1	1	1	1	1	1	1	1	1	1	1	1		
120	117286	O-Ring, retainer, throat	1	1	1	1	1	1	1	1	1	1	1	1	1		
121	---	ADAPTER, rod	1	1	1	1	1	1	1	1	1	1	-	-	-		
123	130883	FITTING, grease M5	1	1	1	1	1	1	1	1	1	1	1	1	1		
124	136249	SCREW, SHS, EXT tip M5 x 8	1	1	1	1	1	1	1	1	1	1	1	1	1		
125	108954	O-Ring	1	-	-	-	-	-	-	-	-	-	-	-	-		
	109115		-	1	1	1	1	-	-	-	-	-	-	-	-		
	107078		-	-	-	-	-	1	1	-	-	-	-	-	-	-	
	113082		-	-	-	-	-	-	-	1	1	1	1	1	1	1	
	121504		-	-	-	-	-	-	-	-	-	-	-	-	-	-	
126	---	SEAL, throat	2	2	2	2	2	2	2	2	2	2	2	2	2		
128	---	PLATE, ID	1	1	1	1	1	1	1	1	1	1	1	1	1		

Parts

			Series		S1												
			Pump Size		5cc	10cc	15cc	20cc	25cc	30cc	35cc	40cc	45cc	50cc	60cc	65cc	70cc
			Model No.		L005S1	L010S1	L015S1	L020S1	L025S1	L030S1	L035S1	L040S1	L045S1	L050S1	L060S1	L065S1	L070S1
			Figure		FIG. 26				FIG. 27				FIG. 28				
Ref.	Part	Description	Quantity														
129	---	SCREW, drive	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
134	15G923	COUPLER	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	198031		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
135	197340	COVER, coupler	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
145	103337	PACKING, O-ring	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	111710		-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
	103338		-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
	103610		-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
	115719		-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
	108195		-	-	-	-	-	1	1	-	-	-	-	-	-	-	-
	106553		-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
	555684		-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
	C38312		-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
	103413		-	-	-	-	-	-	-	-	-	-	-	1	1	-	-
	115929		-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	---		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	188555		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	110073		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	559013		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	103559		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
107563	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
102895	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
120901	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
146	133510	SCREW, sealing, M3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
147	133892	SCREW, sealing, M5	1	1	1	1	1	1	1	1	-	-	-	-	-	-	
148	198241	PLUG, port, pressure	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
149	121399	PACKING, O-ring	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
151	---	ROD, displacement	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

S1 Pump Size 75cc, 80cc, 86cc, 90cc, 100cc, 105cc, 120cc, 140cc, 150cc, and 160cc
S3 Pump Size 10cc and 20cc

Ref.	Part	Description	Quantity												
			S1											S3	
			Pump Size	75cc	80cc	86cc	90cc	100cc	105cc	120cc	140cc	150cc	160cc	10cc	20cc
			Model No.	L075S1	L080S1	L860S1	L090S1	L100S1	L105S1	L120S1	L140S1	L150S1	L160S1	L010S3	L020S3
Figure	FIG. 28											FIG. 26	FIG. 27		
101	108822	O-Ring, CYL	2	2	2	-	-	-	-	-	-	-	-	-	
	106259		-	-	-	2	3	2	3	3	3	3	-	-	
102	111116	O-Ring, tube	2	2	2	2	2	2	2	2	2	2	2	2	
103	---	CYLINDER	1	1	1	1	1	1	1	1	1	1	1	1	
104	15V458	TUBE, cross	1	1	1	1	1	1	1	1	1	1	1	1	
105	122704	SCREW, CSH	4	4	4	4	4	4	4	4	4	4	4	4	
106	15Y165	HOUSING, inlet	1	1	1	1	1	1	1	1	1	1	1	1	
107	15X946	HOUSING, outlet	1	1	1	1	1	1	1	1	1	1	1	1	
108	107098	O-Ring,	4	4	4	4	4	4	4	4	4	4	4	4	
109	193395	SEAT, carbide	2	2	2	2	2	2	2	2	2	2	2	2	
110	107167	BALL, SST	2	2	2	2	2	2	2	2	2	2	2	2	
111	122756	SPRING, ballcheck	2	2	2	2	2	2	2	2	2	2	2	2	
112	15Y168	HOUSING, ball, cage	2	2	2	2	2	2	2	2	2	2	2	2	
113	15Y167	CAP, inlet valve, HX HD	1	1	1	1	1	1	1	1	1	1	1	1	
114	---	RETAINER, piston	1	1	1	1	1	1	1	1	1	1	1	1	
115	---	ROD, displacement	1	1	1	1	1	1	1	1	1	1	1	1	
116	---	BEARING, piston	1	1	1	1	1	1	1	1	1	1	1	1	
117	---	SEAL, piston	1	1	1	1	1	1	1	1	1	1	1	1	
118	---	RETAINER, throat	1	1	1	1	1	1	1	1	1	1	1	1	
119	---	CARTRIDGE, throat	1	1	1	1	1	1	1	1	1	1	1	1	
120	117286	O-Ring, retainer, throat	1	1	1	1	1	1	1	1	1	1	1	1	
121	---	ADAPTER, rod	-	-	-	-	-	-	-	-	-	-	1	1	
123	130883	FITTING, grease M5	1	1	1	1	1	1	1	1	1	1	1	1	
124	136249	SCREW, SHS, EXT tip M5 x 8	1	1	1	1	1	1	1	1	1	1	1	1	
125	108954	O-Ring	-	-	-	-	-	-	-	-	-	-	1	1	
	109115		-	-	-	-	-	-	-	-	-	-	-	-	
	107078		-	-	-	-	-	-	-	-	-	-	-	-	
	113082		1	1	-	-	-	-	-	-	-	-	-	-	
	121504		-	-	1	1	1	1	-	-	-	-	-	-	
126	---	SEAL, throat	2	2	2	2	2	2	2	2	2	2	2	2	
128	---	PLATE, ID	1	1	1	1	1	1	1	1	1	1	1	1	

Parts

			S1										S3	
			S1										S3	
			75cc	80cc	86cc	90cc	100cc	105cc	120cc	140cc	150cc	160cc	10cc	20cc
			L075S1	L080S1	L860S1	L090S1	L100S1	L105S1	L120S1	L140S1	L150S1	L160S1	L010S3	L020S3
			FIG. 28										FIG. 26	FIG. 27
Ref.	Part	Description	Quantity											
129	---	SCREW, drive	2	2	2	2	2	2	2	2	2	2	2	2
134	15G923	COUPLER	2	2	2	2	-	-	-	-	-	-	2	2
	198031		-	-	-	-	2	2	2	2	2	2	-	-
135	197340	COVER, coupler	1	1	1	1	1	1	1	1	1	1	1	1
145	103337	PACKING, O-ring	-	-	-	-	-	-	-	-	-	-	-	-
	111710		-	-	-	-	-	-	-	-	-	-	1	-
	103338		-	-	-	-	-	-	-	-	-	-	-	-
	103610		-	-	-	-	-	-	-	-	-	-	-	1
	115719		-	-	-	-	-	-	-	-	-	-	-	-
	108195		-	-	-	-	-	-	-	-	-	-	-	-
	106553		-	-	-	-	-	-	-	-	-	-	-	-
	555684		-	-	-	-	-	-	-	-	-	-	-	-
	C38312		-	-	-	-	-	-	-	-	-	-	-	-
	103413		-	-	-	-	-	-	-	-	-	-	-	-
	115929		-	-	-	-	-	-	-	-	-	-	-	-
	---		1	-	-	-	-	-	-	-	-	-	-	-
	188555		-	1	-	-	-	-	-	-	-	-	-	-
	110073		-	-	1	1	-	-	-	-	-	-	-	-
	559013		-	-	-	-	1	1	-	-	-	-	-	-
103559	-	-	-	-	-	-	1	-	-	-	-	-		
107563	-	-	-	-	-	-	-	1	-	-	-	-		
102895	-	-	-	-	-	-	-	-	1	-	-	-		
120901	-	-	-	-	-	-	-	-	-	1	-	-		
146	133510	SCREW, sealing, M3	1	1	1	1	1	1	1	1	1	1	1	
147	133892	SCREW, sealing, M5	-	-	-	-	-	-	-	-	-	1	1	
148	198241	PLUG, port, pressure	1	1	1	1	1	1	1	1	1	1	1	
149	121399	PACKING, O-ring	1	1	1	1	1	1	1	1	1	1	1	
151	---	ROD, displacement	1	1	1	1	1	1	1	1	1	1	1	

S4 Pump Parts Lists**S4 Pump Size 5cc, 10cc, 15cc, 20cc, 25cc, 30cc, 35cc, 40cc, 50cc, 60cc, 65cc, and 70cc**

			Series	S4												
			Pump Size (cc)	5cc	10cc	15cc	20cc	25cc	30cc	35cc	40cc	45cc	50cc	60cc	65cc	70cc
			Pump Model No.	L005S4	L010S4	L015S4	L020S4	L025S4	L030S4	L035S4	L040S4	L045S4	L050S4	L060S4	L065S4	L070S4
Ref.	Part	Description	Figure	FIG. 26				FIG. 27					FIG. 28			
			Quantity													
101	108822	PACKING, O-Ring		2	2	2	2	2	2	2	2	2	2	2	2	2
	106259			-	-	-	-	-	-	-	-	-	-	-	-	-
102	111116	PACKING, O-Ring, PTFE		2	2	2	2	2	2	2	2	2	2	2	2	2
103	---	CYLINDER		1	1	1	1	1	1	1	1	1	1	1	1	1
104	15V458	TUBE, cross		1	1	1	1	1	1	1	1	1	1	1	1	1
105	122704	SCREW, CSH		4	4	4	4	4	4	4	4	4	4	4	4	4
106	15Y165	HOUSING, inlet		1	1	1	1	1	1	1	1	1	1	1	1	1
107	15X946	HOUSING, outlet		1	1	1	1	1	1	1	1	1	1	1	1	1
108	107098	O-Ring,		3	3	3	3	3	3	3	3	3	3	3	3	3
114	---	RETAINER, piston		1	1	1	1	1	1	1	1	1	1	1	1	1
115	---	ROD, displacement		1	1	1	1	1	1	1	1	1	1	1	1	1
116	---	BEARING, piston,		1	1	1	1	1	1	1	1	1	1	1	1	1
117	---	SEAL, piston		1	1	1	1	1	1	1	1	1	1	1	1	1
118	---	RETAINER, throat		1	1	1	1	1	1	1	1	1	1	1	1	1
119	---	CARTRIDGE, throat		1	1	1	1	1	1	1	1	1	1	1	1	1
120	117286	O-Ring, retainer, throat		1	1	1	1	1	1	1	1	1	1	1	1	1
121	---	ADAPTER, rod		1	1	1	1	1	1	1	1	1	1	-	-	-
123	130883	FITTING, grease M5		1	1	1	1	1	1	1	1	1	1	1	1	1
124	136249	SCREW, SHS, EXT tip M5 x 8		1	1	1	1	1	1	1	1	1	1	1	1	1
125	---	O-Ring		1	-	-	-	-	-	-	-	-	-	-	-	-
	109115			-	1	1	1	1	-	-	-	-	-	-	-	-
	107078			-	-	-	-	-	1	1	-	-	-	-	-	-
	113082			-	-	-	-	-	-	-	1	1	1	1	1	1
	121504			-	-	-	-	-	-	-	-	-	-	-	-	-
126	---	SEAL, throat		2	2	2	2	2	2	2	2	2	2	2	2	2
128	---	PLATE, ID		1	1	1	1	1	1	1	1	1	1	1	1	1
129	---	SCREW, drive		2	2	2	2	2	2	2	2	2	2	2	2	2
133	124078	CLAMP, coupler		1	1	1	1	1	1	1	1	1	1	1	1	1
134	15G923	COUPLER		2	2	2	2	2	2	2	2	2	2	2	2	2
	198031			-	-	-	-	-	-	-	-	-	-	-	-	-
135	197340	COVER, coupler		1	1	1	1	1	1	1	1	1	1	1	1	1

			S4													
			Series													
			Pump Size (cc)													
			5cc	10cc	15cc	20cc	25cc	30cc	35cc	40cc	45cc	50cc	60cc	65cc	70cc	
			Pump Model No.													
			L005S4	L010S4	L015S4	L020S4	L025S4	L030S4	L035S4	L040S4	L045S4	L050S4	L060S4	L065S4	L070S4	
			Figure	FIG. 26				FIG. 27					FIG. 28			
Ref.	Part	Description	Quantity													
136	17E794	CAP, inlet, valve, SQ,HD	1	1	1	1	1	1	1	1	1	1	1	1	1	
137	---	RETAINER, spring	2	2	2	2	2	2	2	2	2	2	2	2	2	
138	---	HOUSING, ball, cage	2	2	2	2	2	2	2	2	2	2	2	2	2	
139	---	SPRING, ballcheck	2	2	2	2	2	2	2	2	2	2	2	2	2	
140	---	RETAINER, housing, ball	2	2	2	2	2	2	2	2	2	2	2	2	2	
141	---	BALL, 0.500, silicon, NIT	2	2	2	2	2	2	2	2	2	2	2	2	2	
142	196832	SEAT, ball	2	2	2	2	2	2	2	2	2	2	2	2	2	
143	119740	PACKING, O-RING	2	2	2	2	2	2	2	2	2	2	2	2	2	
144	---	RETAINER, check, VA	2	2	2	2	2	2	2	2	2	2	2	2	2	
145	103337	PACKING, O-ring	1	-	-	-	-	-	-	-	-	-	-	-	-	
	111710		-	1	-	-	-	-	-	-	-	-	-	-	-	
	103338		-	-	1	-	-	-	-	-	-	-	-	-	-	
	103610		-	-	-	1	-	-	-	-	-	-	-	-	-	
	115719		-	-	-	-	1	-	-	-	-	-	-	-	-	
	108195		-	-	-	-	-	1	1	-	-	-	-	-	-	
	106553		-	-	-	-	-	-	-	1	-	-	-	-	-	
	555684		-	-	-	-	-	-	-	-	1	-	-	-	-	
	C38312		-	-	-	-	-	-	-	-	-	1	-	-	-	
	103413		-	-	-	-	-	-	-	-	-	-	1	1	-	
	115929		-	-	-	-	-	-	-	-	-	-	-	-	1	
	---		-	-	-	-	-	-	-	-	-	-	-	-	-	
	188555		-	-	-	-	-	-	-	-	-	-	-	-	-	
	110073		-	-	-	-	-	-	-	-	-	-	-	-	-	
	559013		-	-	-	-	-	-	-	-	-	-	-	-	-	
103559	-	-	-	-	-	-	-	-	-	-	-	-	-			
107563	-	-	-	-	-	-	-	-	-	-	-	-	-			
102895	-	-	-	-	-	-	-	-	-	-	-	-	-			
120901	-	-	-	-	-	-	-	-	-	-	-	-	-			
146	133510	SCREW, sealing, M3	1	1	1	1	1	1	1	1	1	1	1	1		
147	133892	SCREW, sealing, M5	1	1	1	1	1	1	1	-	-	-	-	-		
151	---	ROD, displacement	1	1	1	1	1	1	1	1	1	1	1	1		

S4 Pump Size 75cc, 80cc, 86cc, 90cc, 100cc, 105cc, 120cc, 140cc, 150cc, and 160cc

			S4									
			S4									
			75cc	80cc	86cc	90cc	100cc	105cc	120cc	140cc	150cc	160cc
			L075S4	L080S4	L860S4	L090S4	L100S4	L105S4	L120S4	L140S4	L150S4	L160S4
			FIG. 28									
Ref.	Part	Description	Quantity									
101	108822	PACKING, O-ring, PTFE	2	2	2	-	-	-	-	-	-	-
	106259		-	-	-	2	3	2	3	3	3	3
102	111116	PACKING, O-Ring, PTFE	2	2	2	2	2	2	2	2	2	2
103	---	CYLINDER	1	1	1	1	1	1	1	1	1	1
104	15V458	TUBE, cross	1	1	1	1	1	1	1	1	1	1
105	122704	SCREW, CSH	4	4	4	4	4	4	4	4	4	4
106	15Y165	HOUSING, inlet	1	1	1	1	1	1	1	1	1	1
107	15X946	HOUSING, outlet	1	1	1	1	1	1	1	1	1	1
108	107098	O-Ring,	3	3	3	3	3	3	3	3	3	3
114	---	RETAINER, piston	1	1	1	1	1	1	1	1	1	1
115	---	ROD, displacement	1	1	1	1	1	1	1	1	1	1
116	---	BEARING, piston,	1	1	1	1	1	1	1	1	1	1
117	---	SEAL, piston	1	1	1	1	1	1	1	1	1	1
118	---	RETAINER, throat	1	1	1	1	1	1	1	1	1	1
119	---	CARTRIDGE, throat	1	1	1	1	1	1	1	1	1	1
120	117286	O-Ring, retainer, throat	1	1	1	1	1	1	1	1	1	1
121	---	ADAPTER, rod	-	-	-	-	-	-	-	-	-	-
123	130883	FITTING, grease M5	1	1	1	1	1	1	1	1	1	1
124	136249	SCREW, SHS, EXT tip M5 x 8	1	1	1	1	1	1	1	1	1	1
125	108954	O-Ring	-	-	-	-	-	-	-	-	-	-
	109115		-	-	-	-	-	-	-	-	-	-
	107078		-	-	-	-	-	-	-	-	-	-
	113082		1	1	-	-	-	-	-	-	-	-
	121504		-	-	1	1	-	1	-	-	-	-
126	---	SEAL, throat	2	2	2	2	2	2	2	2	2	2
128	---	PLATE, ID	1	1	1	1	1	1	1	1	1	1
129	---	SCREW, drive	2	2	2	2	2	2	2	2	2	2
133	124078	CLAMP, coupler	1	1	1	1	1	1	1	1	1	1
134	15G923	COUPLER	2	2	2	2	-	-	-	-	-	-
	198031		-	-	-	-	2	2	2	2	2	2
135	197340	COVER, coupler	1	1	1	1	1	1	1	1	1	1

Parts

			Series	S4									
			Pump Size	75cc	80cc	86cc	90cc	100cc	105cc	120cc	140cc	150cc	160cc
			Pump Model No.	L075S4	L080S4	L860S4	L090S4	L100S4	L105S4	L120S4	L140S4	L150S4	L160S4
			Figure	FIG. 28									
Ref.	Part	Description	Quantity										
136	17E794	CAP, inlet, valve, SQ,HD	1	1	1	1	1	1	1	1	1	1	1
137	---	RETAINER, spring	2	2	2	2	2	2	2	2	2	2	2
138	---	HOUSING, ball, cage	2	2	2	2	2	2	2	2	2	2	2
139	---	SPRING, ballcheck	2	2	2	2	2	2	2	2	2	2	2
140	---	RETAINER, HSG, ball	2	2	2	2	2	2	2	2	2	2	2
141	---	BALL, 0.500, silicon, NIT	2	2	2	2	2	2	2	2	2	2	2
142	196832	SEAT, ball	2	2	2	2	2	2	2	2	2	2	2
143	119740	O-RING, check, VA	2	2	2	2	2	2	2	2	2	2	2
144	---	RETAINER, check, VA	2	2	2	2	2	2	2	2	2	2	2
145	103337	PACKING, O-ring	-	-	-	-	-	-	-	-	-	-	-
	111710		-	-	-	-	-	-	-	-	-	-	-
	103338		-	-	-	-	-	-	-	-	-	-	-
	103610		-	-	-	-	-	-	-	-	-	-	-
	115719		-	-	-	-	-	-	-	-	-	-	-
	108195		-	-	-	-	-	-	-	-	-	-	-
	106553		-	-	-	-	-	-	-	-	-	-	-
	555684		-	-	-	-	-	-	-	-	-	-	-
	C38312		-	-	-	-	-	-	-	-	-	-	-
	103413		-	-	-	-	-	-	-	-	-	-	-
	115929		-	-	-	-	-	-	-	-	-	-	-
	---		1	-	-	-	-	-	-	-	-	-	-
	188555		-	1	-	-	-	-	-	-	-	-	-
	110073		-	-	1	1	-	-	-	-	-	-	-
	559013		-	-	-	-	1	1	-	-	-	-	-
	103559		-	-	-	-	-	-	1	-	-	-	-
107563	-	-	-	-	-	-	-	1	-	-	-		
102895	-	-	-	-	-	-	-	-	-	1	-		
120901	-	-	-	-	-	-	-	-	-	-	1		
146	133510	SCREW, sealing, M3	1	1	1	1	1	1	1	1	1	1	1
147	133892	SCREW, sealing, M5	-	-	-	-	-	-	-	-	-	-	-
151	---	ROD, displacement	1	1	1	1	1	1	1	1	1	1	1

Various Kits

	Pump Size (cc)	5cc		10cc			15cc		20cc			25cc		30cc		35cc		40cc	
	Pump Model No.	L005S1	L005S4	L010S1	L010S4	L010S3	L015S1	L015S4	L020S1	L020S4	L020S3	L025S1	L025S4	L030S1	L030S4	L035S1	L035S4	L040S1	L040S4
	Figure	FIG. 26						FIG. 27											
Description	Kit No.																		Reference No's.
Shaft Adapter	25P039		258966	24U649		258966		258967	24U650			258967					258786		121
Cylinder O-ring Kt	259774																		101, 102
Cylinder Kit	262557		258925	24U651		258931		258937	24U650			258943		258949		24R310		258795	101, 102, 103, 150
Crossover Tube	24E557																		102, 104
Piston Retainer Kit	262260		258926	24U645		258932		258938				258943		258950		24R312		258796	114
Throat Retainer Kit	25U638		25U639			25U640		26B813				25U641		25U642		25U643		26B819	118, 120, 125, 145
Throat Cartridge Kit	25U619		25U620			25U622		26B814				25U624		25U625		25U626		26B820	119, 125, 145, 146, 147
Inlet Housing Kits	258792																		104, 106
Outlet Housing Kits	258791																		107, 128, 129
Displacement Rod Kits (without seal)	26D594		26D595	26D617		26D596		26D597	26D618			26D598		26D599		26D600		26D601	151

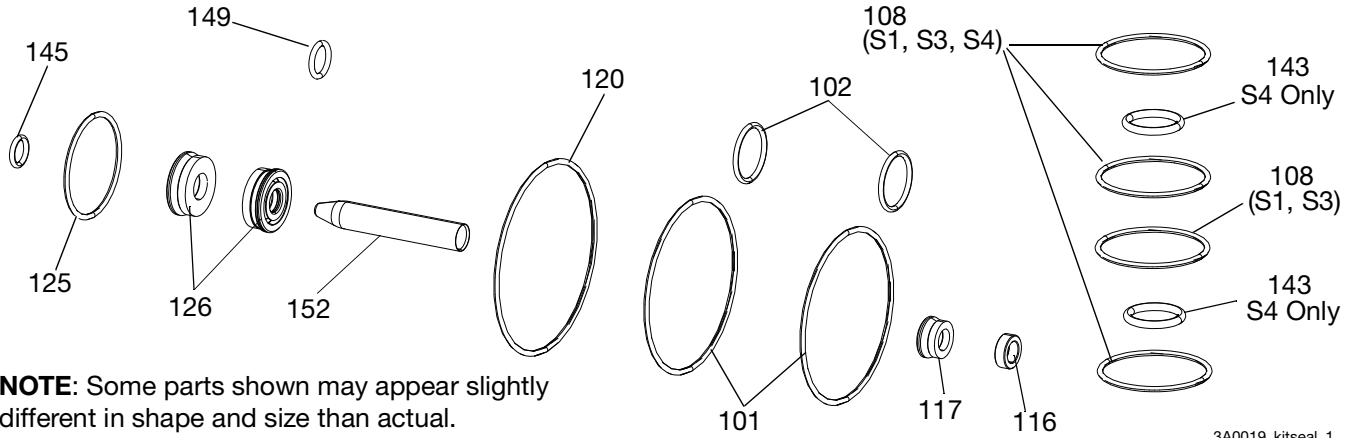
Parts

Pump Size (cc)	45cc		50cc		60cc		65cc		70cc		75cc		80cc		86cc		90cc		
Pump Model No.	L045S1	L045S4	L050S1	L050S4	L060S1	L060S4	L065S1	L065S4	L070S1	L070S4	L075S1	L075S4	L080S1	L080S4	L085S1	L085S4	L090S1	L090S4	
	FIG. 28				FIG. 29														
	Kit No.																		Reference No.
Shaft Adapter	258786		Not Included															121	
Cylinder O-ring kit	258774															258773	101, 102		
Cylinder Kit	24R311	258801	258807	24H998	25C252	24N821	258813	24H999	24T165	101, 102, 103, 150									
Crossover Tube	24E557															24E556	102, 104		
Piston Retainer Kit	24R313	258802	258808	24J012	25C256	24N822	258814	24J013	24T168	114									
Throat retainer kit	25U644	25U645	25U646	25U647	25U648	25U649	26B826	25U650	25U651	118, 120, 125, 145									
Throat Cartridge Kit	25U627	25U628	25U629	25U630	25U631	25U632	26B827	25U633	25UC63 4	119, 125, 145, 146, 147									
Displacement Rod Kits (Without seal)	26D602	26D603	26D604	25D605	26D606	26D607	26D608	26D605	26D610	151									

Pump Size (cc)	100cc		105cc		120cc		140cc		150cc		160cc	
Pump Model No.	L100S1	L100S4	L105S1	L105S4	L120S1	L120S4	L140S1	L140S4	L150S1	L150S4	L160S1	L160S4
	FIG. 29											
	Kit No.											Reference No.
Shaft Adapter	Not Included											121
Cylinder O-ring kit	258773											101, 102
Cylinder Kit	258819	24R011	258825	24T166	24T167	258831	101, 102, 103, 150					
Crossover Tube	24E556											102, 104
Piston Retainer Kit	258820	24R012	258826	24T169	24T170	258832	114					
Throat retainer kit	26B832	25U652	26B838	25U653	25U654	26B844	118, 120, 125, 145					
Throat Cartridge Kit	26B833	25U635	26B839	25U636	25U637	26B845	119, 125, 145, 146, 147					
Displacement Rod Kits (Without seal)	26D611	26D612	26D613	26D614	26D615	26D616	151					

Seal Kits

5cc, 10cc, and 15cc Pump Seal Kits

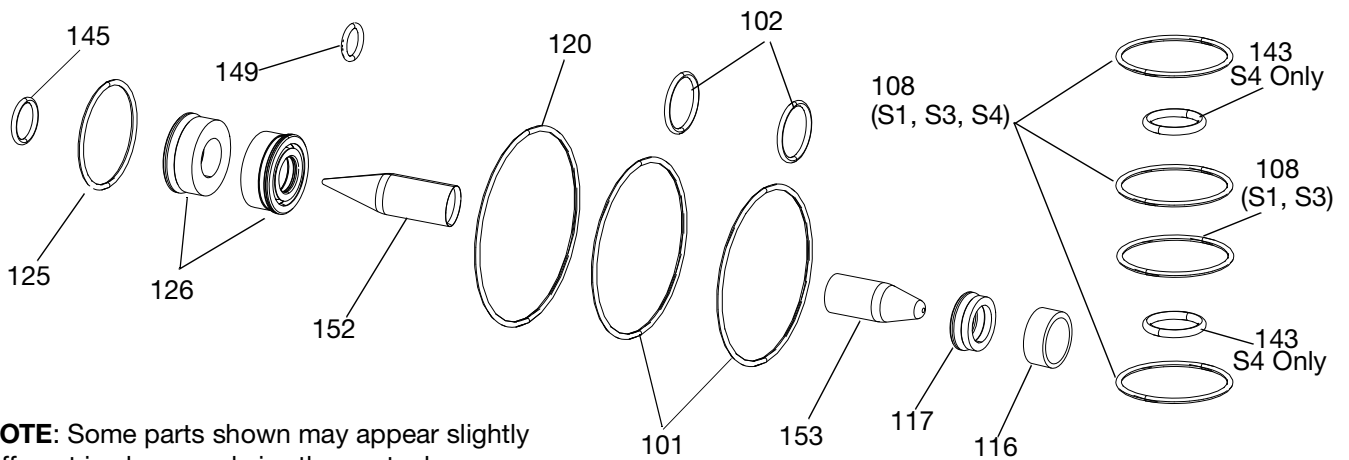


NOTE: Some parts shown may appear slightly different in shape and size than actual.

3A0019_kitseal_1

FIG. 29

20cc, 25cc, 30cc, 35cc, 40cc, 45cc, and 50cc Pump Seal Kits

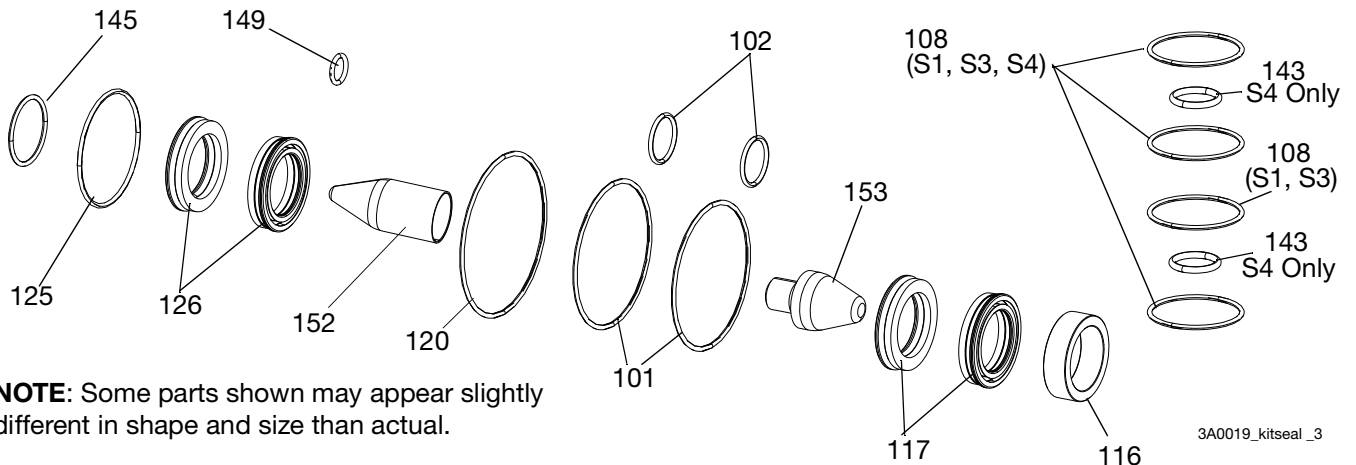


NOTE: Some parts shown may appear slightly different in shape and size than actual.

3A0019_kitseal_2

FIG. 30

60cc, 65cc, 70cc, 75cc, 80cc, 86cc, 90cc, 100cc, and 105cc Pump Seal Kits

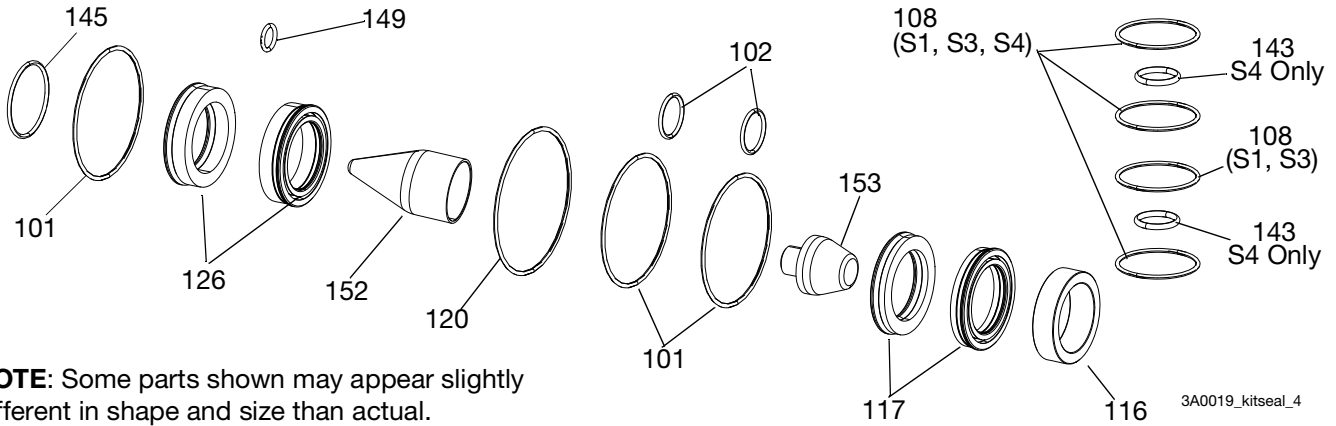


NOTE: Some parts shown may appear slightly different in shape and size than actual.

3A0019_kitseal_3

FIG. 31

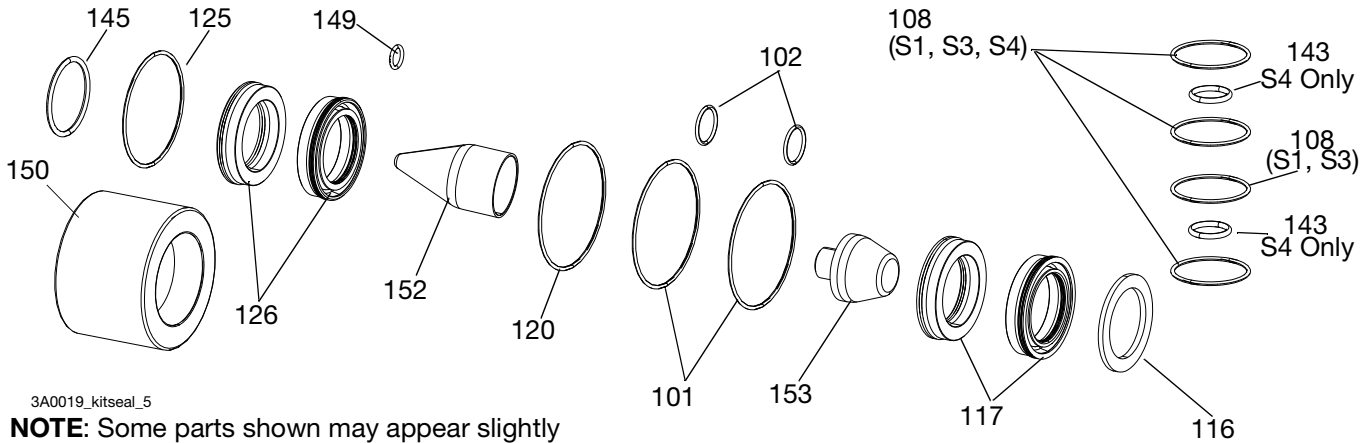
120cc, 140cc, and 150cc Pump Seal Kits



NOTE: Some parts shown may appear slightly different in shape and size than actual.

FIG. 32

160cc Pump Seal Kit



NOTE: Some parts shown may appear slightly different in shape and size than actual.

FIG. 33

Seal Kits Parts List

Note: See **S1 and S3 Complete Pump Parts List** page 23, and **S4 Pump Parts Lists** page 27 for part numbers.

Pump Size (cc)	5cc		10cc			15cc		20cc			25cc		30cc		35cc		40cc					
Pump Model No.	L005S1	L005S4	L010S1	L010S4	L010S3	L015S1	L015S4	L020S1	L020S4	L020S3	L025S1	L025S4	L030S1	L030S4	L035S1	L035S4	L040S1	L040S4				
Seal Kit Part No.	26D569		26D570			26D592		26D571		26D572			26D593		26D573		26D574		26D575		26D576	
	FIG. 29									FIG. 30												

Ref.	Description	Quantity																
101	PACKING, O-ring, PTFE	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
102	PACKING, O-ring, seat	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Pump Size (cc)	5cc		10cc			15cc		20cc			25cc		30cc		35cc		40cc					
Pump Model No.	L005S1	L005S4	L010S1	L010S4	L010S3	L015S1	L015S4	L020S1	L020S4	L020S3	L025S1	L025S4	L030S1	L030S4	L035S1	L035S4	L040S1	L040S4				
Seal Kit Part No.	26D569		26D570			26D592		26D571		26D572			26D593		26D573		26D574		26D575		26D576	

FIG. 29

FIG. 30

Ref.	Description	Quantity																		
		FIG. 29		FIG. 30																
108	PACKING O-ring	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
116	BEARING, piston	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
117	SEAL, piston	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
120	PACKING, O-ring	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
121	ADAPTER, rod	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
125	PACKING, O-ring	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
126	SEAL, throat	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
145	PACKING, O-ring	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
150	TOOL, displacement rod/cyl, 160, HW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
152	TOOL, installation, seal	-	-	1	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
153	TOOL, installation, rod	1	1	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
154*	ADHESIVE, anaerobic	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
155*	LUBRICANT, anti-seize	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

* Parts not shown in parts diagrams

Parts

Pump Size (cc)	45cc	50cc	60cc	65cc	70cc	75cc	80cc	86cc	90cc
Pump Model No.	L045S1 L045S4	L050S1 L050S4	L060S1 L060S4	L065S1 L065S4	L070S1 L070S4	L075S1 L075S4	L080S1 L080S4	L080S1 L080S4	L090S1 L090S4
Seal Kit Part No.	26D577	26D578	26D579	26D580	26D581	26D582	26D583	26D584	26D585

FIG. 30

FIG. 31

Ref.	Description	Quantity								
		45cc	50cc	60cc	65cc	70cc	75cc	80cc	86cc	90cc
101	PACKING, O-ring, PTFE	2	2	2	2	2	2	2	2	2
102	PACKING, O-ring, seat	2	2	2	2	2	2	2	2	2
108	PACKING O-ring	4	4	4	4	4	4	4	4	4
116	BERARING, piston	1	1	1	1	1	1	1	1	1
117	SEAL, piston	1	1	1	1	1	1	1	1	1
120	PACKING, O-ring	1	1	1	1	1	1	1	1	1
121	ADAPTER, rod	1	1	-	-	-	-	-	-	-
125	PACKING, O-ring	1	1	1	1	1	1	1	1	1
126	SEAL, throat	2	2	2	2	2	2	2	2	2
145	PACKING, O-ring	1	1	1	1	1	1	1	1	1
150	TOOL, displacement rod/cyl, 160, HW	-	-	-	-	-	-	-	-	-
152	TOOL, installation, seal	1	1	1	1	1	1	1	1	1
153	TOOL, installation, rod	-	-	1	1	1	1	1	1	1
154*	ADHESIVE, anaerobic	1	1	1	1	1	1	1	1	1
155*	LUBRICANT, anti-seize	1	1	1	1	1	1	1	1	1

* Parts not shown in parts diagrams

Pump Size (cc)	100cc	105cc	120cc	140cc	150cc	160cc
Pump Model No.	L100S1 L100S4	L105S1 L105S4	L120S1 L120S4	L140S1 L140S4	L150S1 L150S4	L160S1 L160S4
Seal Kit Part No.	26D586	26D587	26D588	26D589	26D590	26D591
	FIG. 31		FIG. 32		FIG. 33	

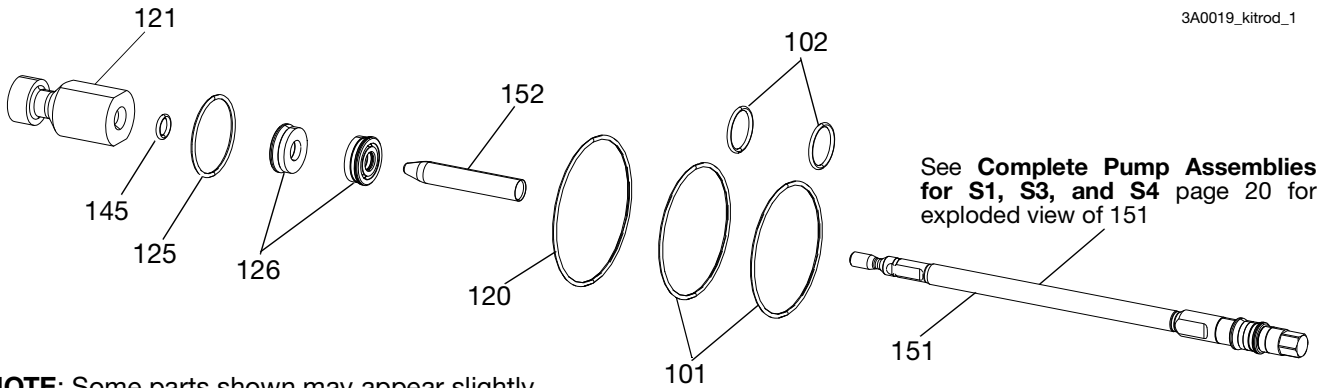
Ref.	Description	Quantity					
101	PACKING, O-ring, PTFE	2	2	2	2	2	2
102	PACKING, O-ring, seat	2	2	2	2	2	2
108	PACKING O-ring	4	4	4	4	4	4
116	BEARING, piston	1	1	1	1	1	1
117	SEAL, piston	1	1	1	1	1	1
120	PACKING, O-ring	1	1	1	1	1	1
121	ADAPTER, rod	1	1	-	-	-	-
125	PACKING, O-ring	1	1	1	1	1	1
126	SEAL, throat	2	2	2	2	2	2
145	PACKING, O-ring	1	1	1	1	1	1
150	TOOL, displacement rod/cyl, 160, HW	-	-	-	-	-	1
152	TOOL, installation, seal	1	1	1	1	1	1
153	TOOL, installation, rod	-	-	1	1	1	1
154*	ADHESIVE, anaerobic	1	1	1	1	1	1
155*	LUBRICANT, anti-seize	1	1	1	1	1	1

* Parts not shown in parts diagrams

Displacement Rod Kits

5cc, 10cc, and 15cc Pump Displacement Rod Kits

3A0019_kitrod_1

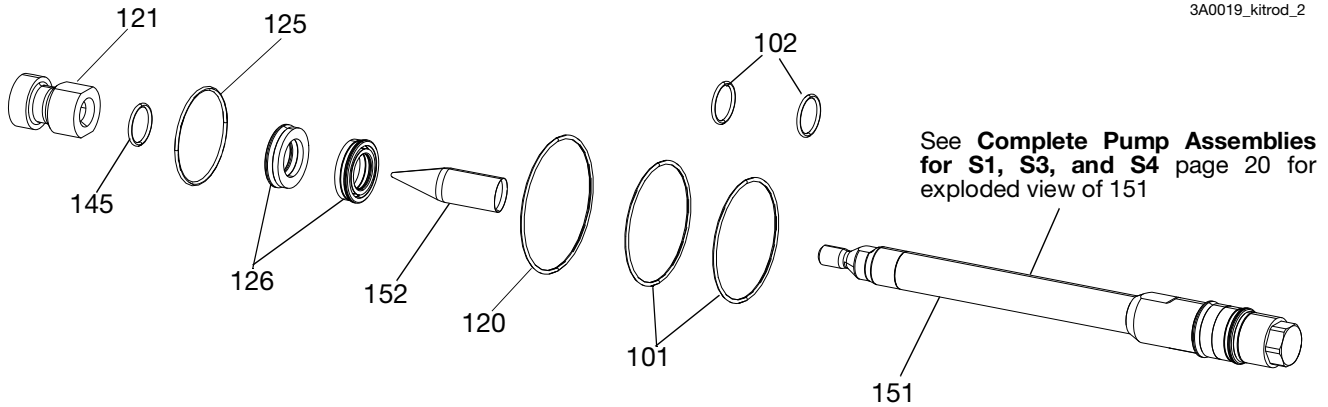


NOTE: Some parts shown may appear slightly different in shape and size than actual.

FIG. 34

20cc, 25cc, 30cc, 35cc, 40cc, 45cc, and 50cc Pump Displacement Rod Kits

3A0019_kitrod_2



NOTE: Some parts shown may appear slightly different in shape and size than actual.

FIG. 35

60cc, 65cc, 70cc, 75cc, 80cc, 86cc, 90cc, and 105cc Pump Displacement Rod Kits

3A0019_kitrod_3

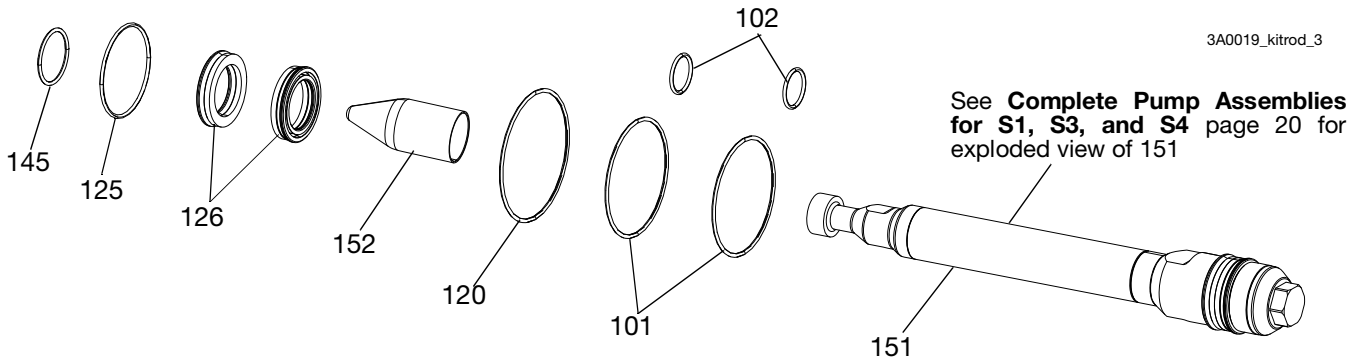
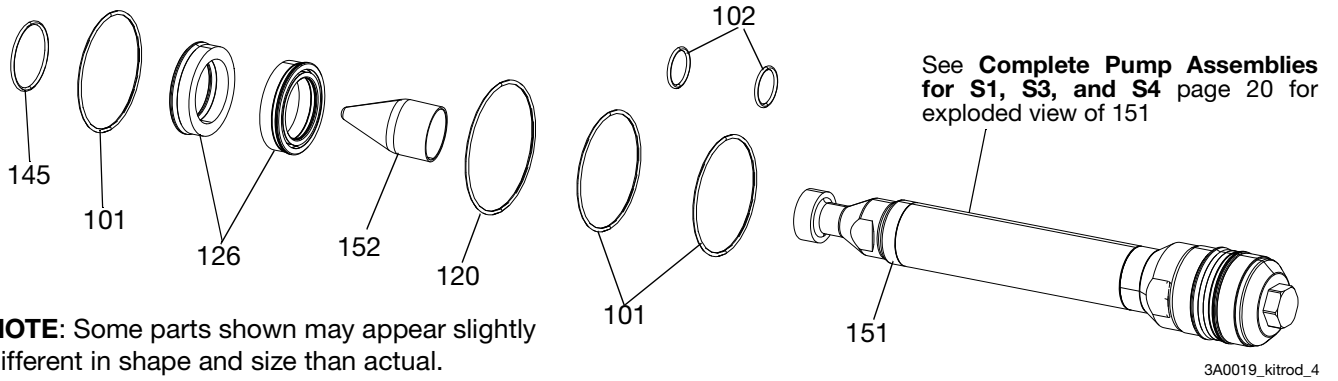


FIG. 36

100cc, 120cc, 140cc, and 150cc Pump Displacement Rod Kits



NOTE: Some parts shown may appear slightly different in shape and size than actual.

FIG. 37

160cc Pump Displacement Rod Kits

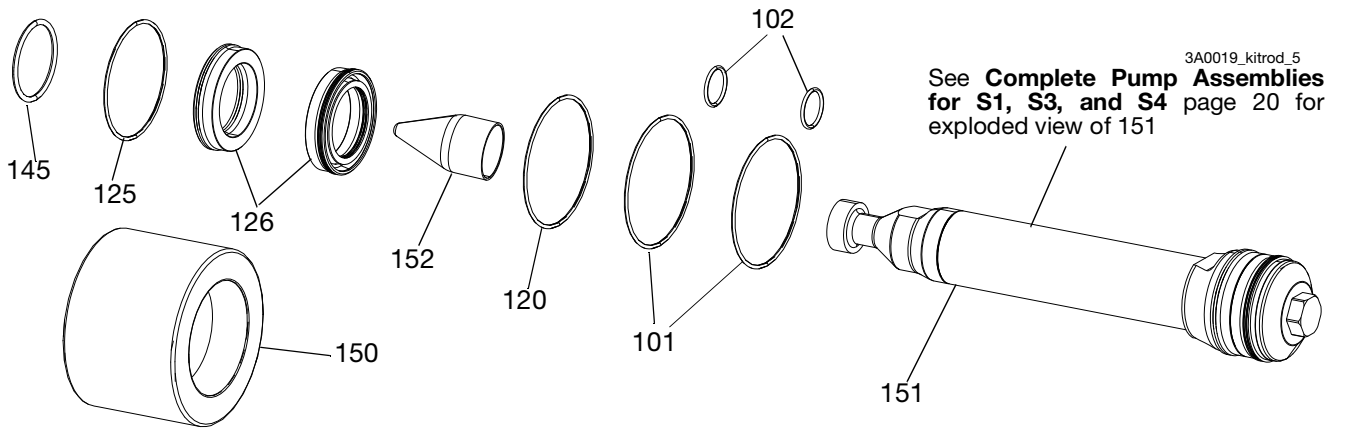


FIG. 38

Displacement Rod Kits Parts List

Note: See **S1 and S3 Complete Pump Parts List** page 23, and **S4 Pump Parts Lists** page 27 for part numbers

Pump Size (cc)	5cc		10cc			15cc		20cc			25cc		30cc		35cc		40cc	
Pump Model No.	L005S1	L005S4	L010S1	L010S4	L010S3	L015S1	L015S4	L020S1	L020S4	L020S3	L025S1	L025S4	L030S1	L030S4	L035S1	L035S4	L040S1	L040S4
Displacement Rod Kit Part No.	26D594		26D595		26D617	26D596		26D597		26D618	26D598		26D599		26D600		26D601	

FIG. 34

FIG. 35

Ref.	Description	Quantity																	
101	PACKING, O-ring, PTFE	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
102	PACKING, O-ring, seat	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
120	PACKING, O-ring	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
121	ADAPTER, rod	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
125	PACKING, O-ring	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
126	SEAL, throat	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
145	PACKING, O-ring	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
150	TOOL, displacement rod/cyl, 160, HW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
151	ROD, displacement	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
152	TOOL, installation, seal	-	-	1	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1
154*	ADHESIVE, anaerobic	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
155*	LUBRICANT, anti-seize	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

* Parts not shown in parts diagrams

Pump Size (cc)	45cc		50cc		60cc		65cc		70cc		75cc		80cc		86cc		90cc	
Pump Model No.	L045S1	L045S4	L050S1	L050S4	L060S1	L060S4	L065S1	L065S4	L070S1	L070S4	L075S1	L075S4	L080S1	L080S4	L080S1	L080S4	L090S1	L090S4
Displacement Rod Kit Part No.	26D602		26D603		26D604		26D605		26D606		26D607		26D608		26D609		26D610	
	FIG. 35				FIG. 36													

Ref.	Description	Quantity								
101	PACKING, O-ring, PTFE	2	2	2	2	2	2	2	2	2
102	PACKING, O-ring, seat	2	2	2	2	2	2	2	2	2
120	PACKING, O-ring	1	1	1	1	1	1	1	1	1
121	ADAPTER, rod	1	1	-	-	-	-	-	-	-
125	PACKING, O-ring	1	1	1	1	1	1	1	1	1
126	SEAL, throat	2	2	2	2	2	2	2	2	2
145	PACKING, O-ring	1	1	1	1	1	1	1	1	1
150	TOOL, displacement rod/cyl, 160, HW	-	-	-	-	-	-	-	-	-
151	ROD, displacement	1	1	1	1	1	1	1	1	1
152	TOOL, installation, seal	1	1	1	1	1	1	1	1	1
154*	ADHESIVE, anaerobic	1	1	1	1	1	1	1	1	1
155*	LUBRICANT, anti-seize	1	1	1	1	1	1	1	1	1

* Parts not shown in parts diagrams

Parts

Pump Size (cc)	100cc		105cc		120cc		140cc		150cc		160cc	
Pump Model No.	L100S1	L100S4	L105S1	L105S4	L120S1	L120S4	L140S1	L140S4	L150S1	L150S4	L160S1	L160S4
Displacement Rod Kit Part No.	26D611		26D612		26D613		26D614		26D615		26D616	
	FIG. 37		FIG. 36		FIG. 37				FIG. 38			

Ref.	Description	Quantity							
101	PACKING, O-ring, PTFE	2	2	2	2	2	2	2	2
102	PACKING, O-ring, seat	2	2	2	2	2	2	2	2
120	PACKING, O-ring	1	1	1	1	1	1	1	1
121	ADAPTER, rod	1	1	-	-	-	-	-	-
125	PACKING, O-ring	1	1	1	1	1	1	1	1
126	SEAL, throat	2	2	2	2	2	2	2	2
145	PACKING, O-ring	1	1	1	1	1	1	1	1
150	TOOL, displacement rod/cyl, 160, HW	-	-	-	-	-	-	-	1
151	ROD, displacement	1	1	1	1	1	1	1	1
152	TOOL, installation, seal	1	1	1	1	1	1	1	1
153	TOOL, installation, rod	-	-	1	1	1	1	1	1
154*	ADHESIVE, anaerobic	1	1	1	1	1	1	1	1
155*	LUBRICANT, anti-seize	1	1	1	1	1	1	1	1

* Parts not shown in parts diagrams

Check Valve Kits for S1 and S3 Pumps

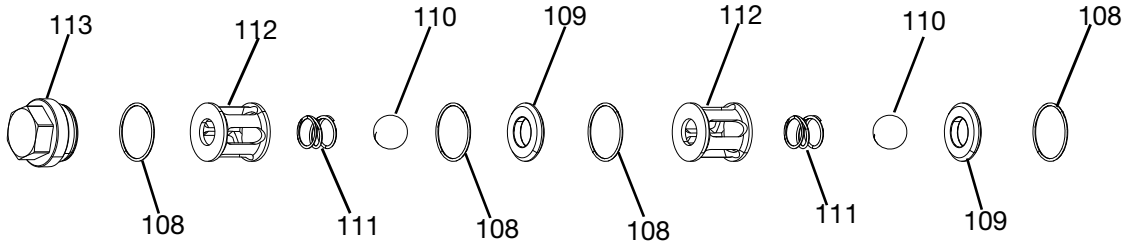


FIG. 39 3A8563_kit chkvlv 20cc

Check Valve Kits for S1 and S3 Pumps, Parts List

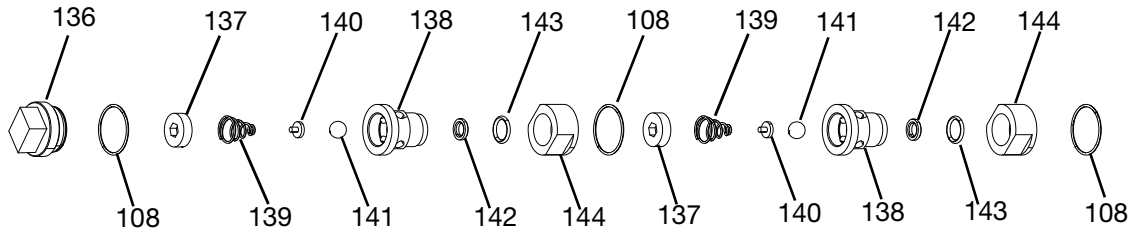
Note: For parts numbers see **S1 and S3 Complete Pump Parts List** page 23.

Ref.	Description	S1 and S3					
		Pump Type		S1 and S3			
		Kit Part No.	258783	258784	258785	258787	258783
Kit Type		Full†				Partial	Sharp Seat
		Quantity					
108	PACKING, O-ring	4	-	-	-	4	4
109	SEAT, carbide	2	-	-	-	2	2
110	BALL, SST 1 In. Dia.	2	-	-	-	2	2
111	SPRING, ball, check	-	1	-	-	-	2
112	HOUSING, cage, ball	-	-	1	-	-	2
113	CAP, inlet, valve	-	-	-	1	-	1
155*	LUBRICANT, anti-seize	-	-	-	1	-	1

* Parts not shown in parts diagrams.

† Kits 258783, 258784, 258785, and 258787 must all be ordered to make one full check valve kit.

Check Valve Kits for S4 Pumps



3A0019_kit chkvlv 20cc

FIG. 40

Check Valve Kits for S4 Pumps, Parts List

Note: For parts numbers see **S4 Pump Parts Lists** page 27.

Ref.	Description	S4		
		Pump Type		
		Kit Part No.	25B123	25B124
Kit Type		Full	Partial	Sharp Seat
		Quantity		
108	PACKING, O-ring	3	3	3
136	CAP, inlet, valve, SQ,HD	1	-	1
137	RETAINER, spring, pump	2	-	2
138	HOUSING, ball, cage	2	-	2
139	SPRING, conical, 1X0.85X0.281	2	2	2
140	RETAINER, housing, ball	2	2	2
141	BALL, 0.500, silicone-nitride, BLK	2	2	2
142	SEAT, lapped	2	2	2
143	O-RING	2	2	2
144	RETAINER, check valve	2	-	2
155*	LUBRICANT, anti-seize	1	-	1

* Parts not shown in parts diagrams.

O-Ring Inlet Kit, All Pump Sizes

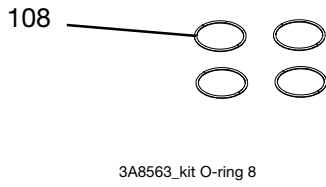


FIG. 41

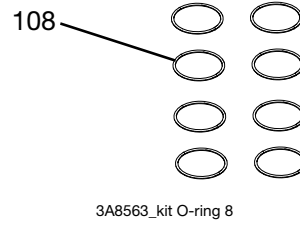


FIG. 42

O-Ring Inlet Kit, All Pump Sizes, Parts List

Pump Size	5cc, 10cc, 20cc, 40cc, 80cc, 100cc, 120cc, 160cc	
Kit Part No.	258775	258776
	FIG. 41	FIG. 42

Ref.	Part	Description	Quantity	
108	107098	PACKING, O-ring	4	8

Z-Pump Grease Cup Conversion Kits

The kits listed below are for converting older model Z-Pumps without grease cups. The older model Z-Pumps may have a wet cup configuration which has been obsoleted. See FIG. 43 page 46. If any of the obsoleted parts need replaced, a kit from the following list will replace the entire cup assembly.

Kit Number	Pump Size
25U516	5
25U517	10
25U518	15
25U519	20
25U520	25
25U521	30
25U522	35
25U523	40
25U524	45
25U525	50
25U526	60
25U527	65
25U528	70
25U529	75
25U530	80
25U531	86
25U532	90
25U533	100
25U534	105
25U535	120
25U536	140
25U537	150
25U538	160

Grease Cup Upgrade (Modifying Pump With Grease Cup Conversion Kit)

Disassemble obsolete components

1. Discard the throat seal components: Throat retainer (A), spacer (B), seal (C), cartridge (D), and O-ring (E),

after removing them from the outlet housing (107), see FIG. 43.

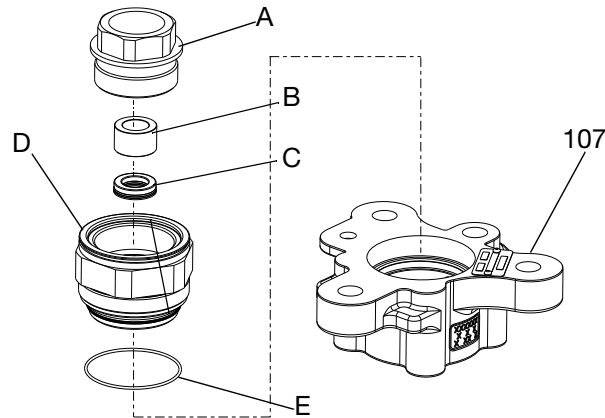


FIG. 43

Assemble new grease cup kit components

2. Install throat seals (126) back to back inside throat cartridge (119) with non-spring end of each seal together.
3. Install O-ring (145) inside throat retainer. (119).
4. Install throat retainer (118) onto throat cartridge (119).
5. Install O-ring (120) onto throat retainer (118).
6. install throat seal assembly into outlet housing (107). See FIG. 44.

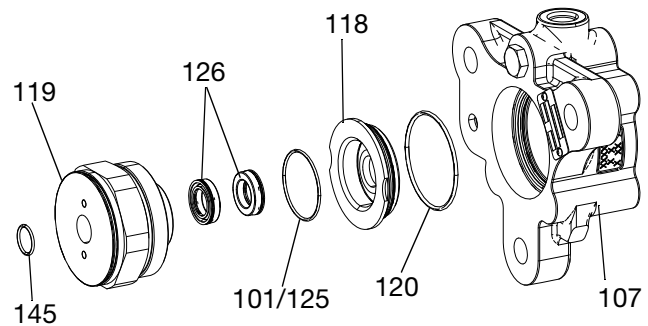


FIG. 44

7. Install O-Ring (101 or 125 depending on kit model) onto hub of throat cartridge (119).
8. Re-assemble as shown in **Displacement Rod Assembly** page 16.
9. Fill grease cup as shown in **Grease Cup Maintenance** page 10.

Appendix A - Early Series Pump Seal Kits

NOTE: See the **Operation**, page 10 and **Repair**, page 11 sections of this manual for general information related to Z-pumps. Appendix A provides seal kits that are available for early series pumps. For common sale able parts still available for early series pumps refer to the **Parts**, page 20 section of this manual.

Pump Series Identification

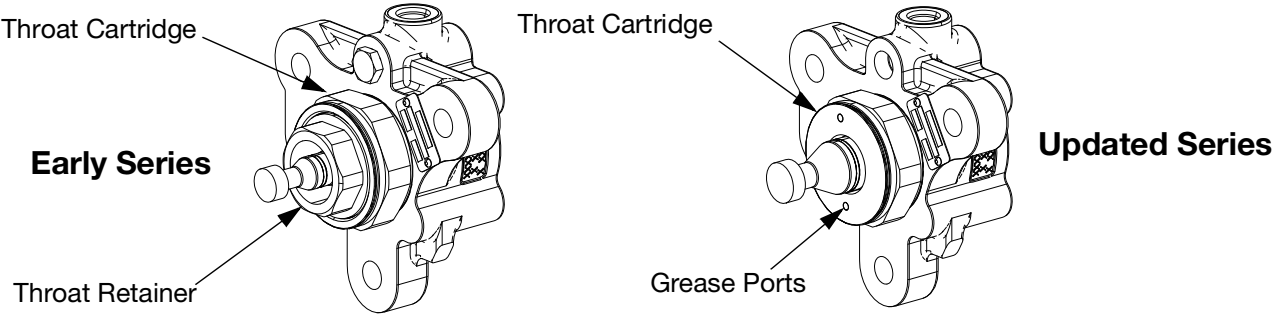
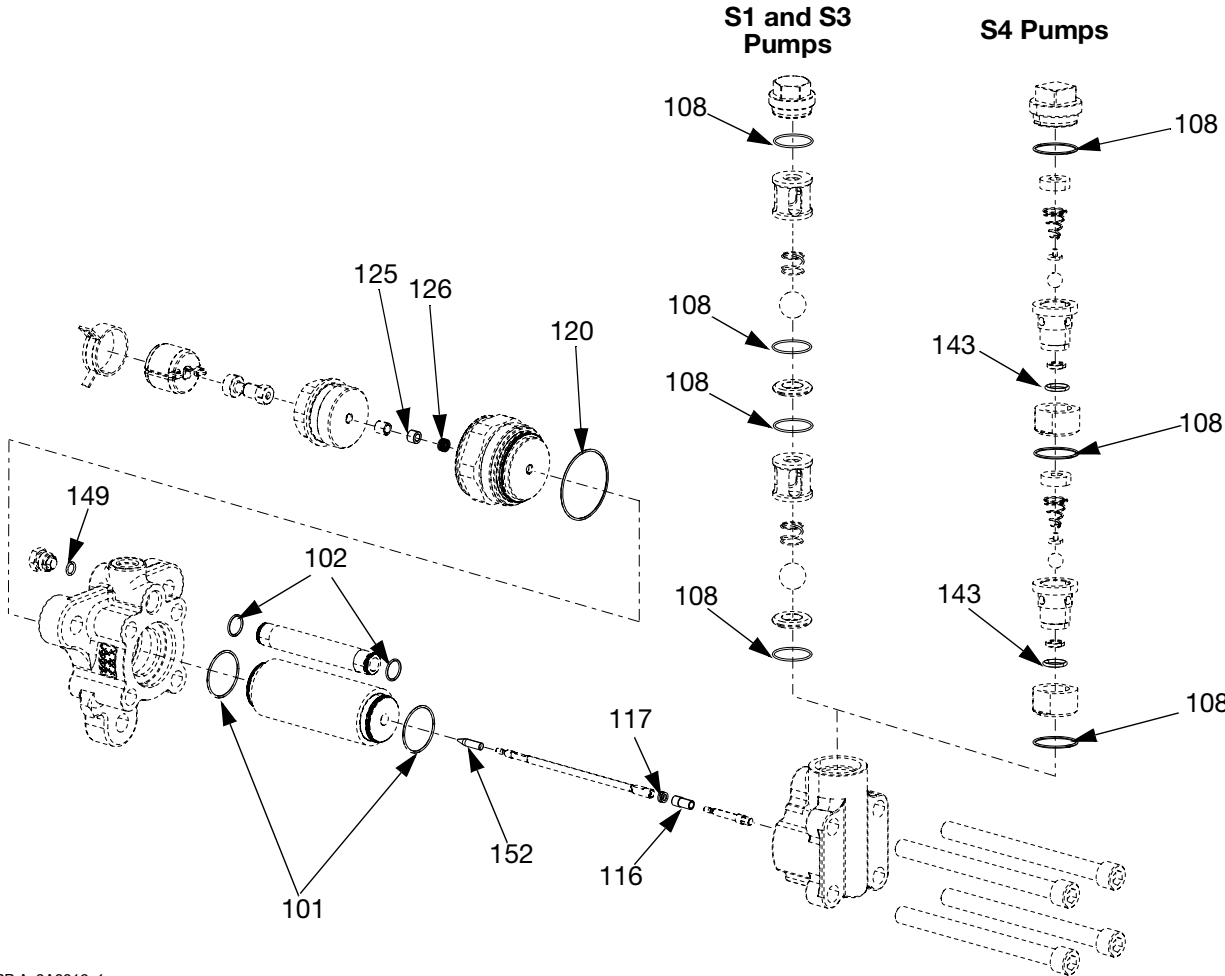


FIG. 45:

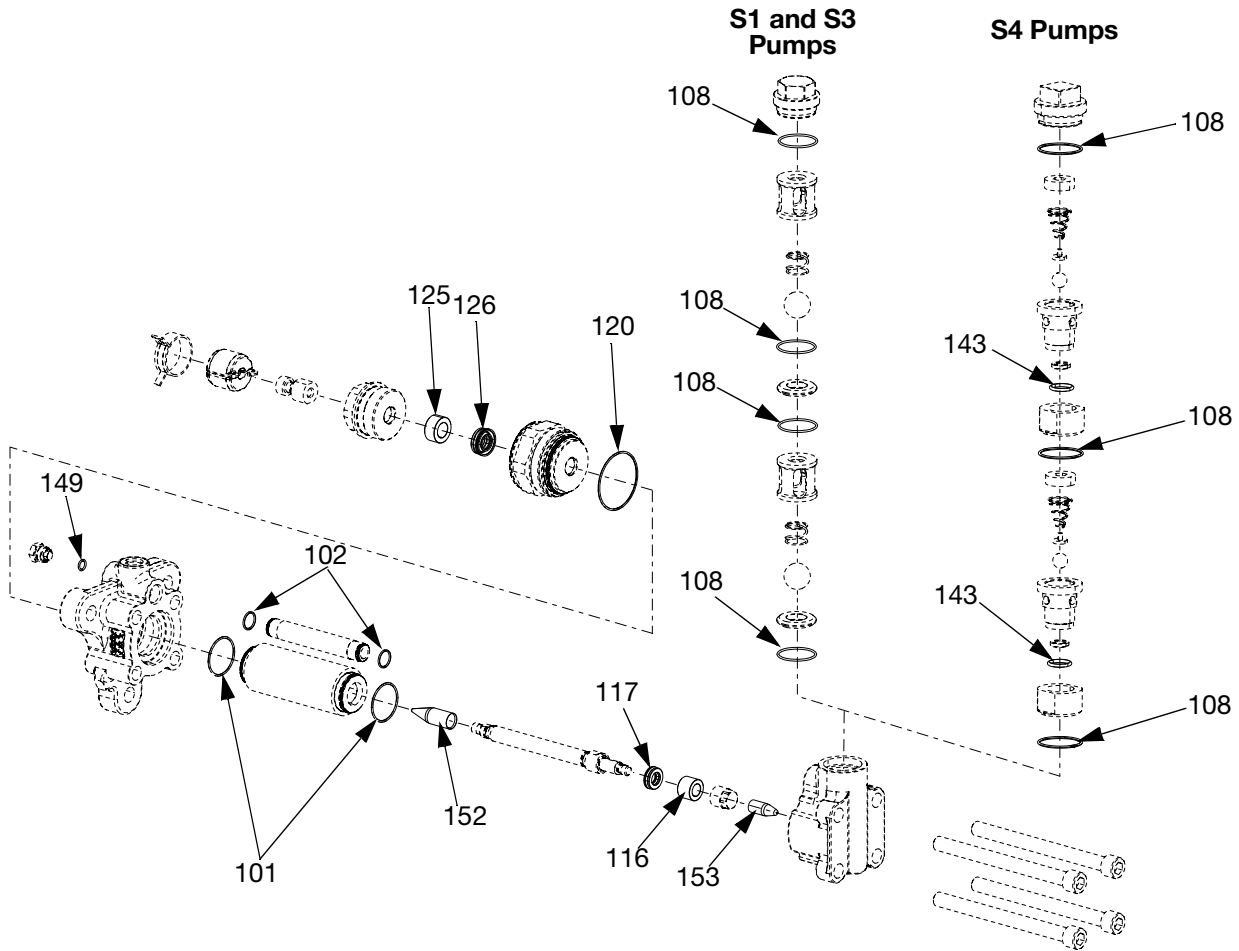
5cc, 10cc, 15cc, 20cc, 25cc, and 30cc Pumps



APP A_3A0019_1

FIG. 46:

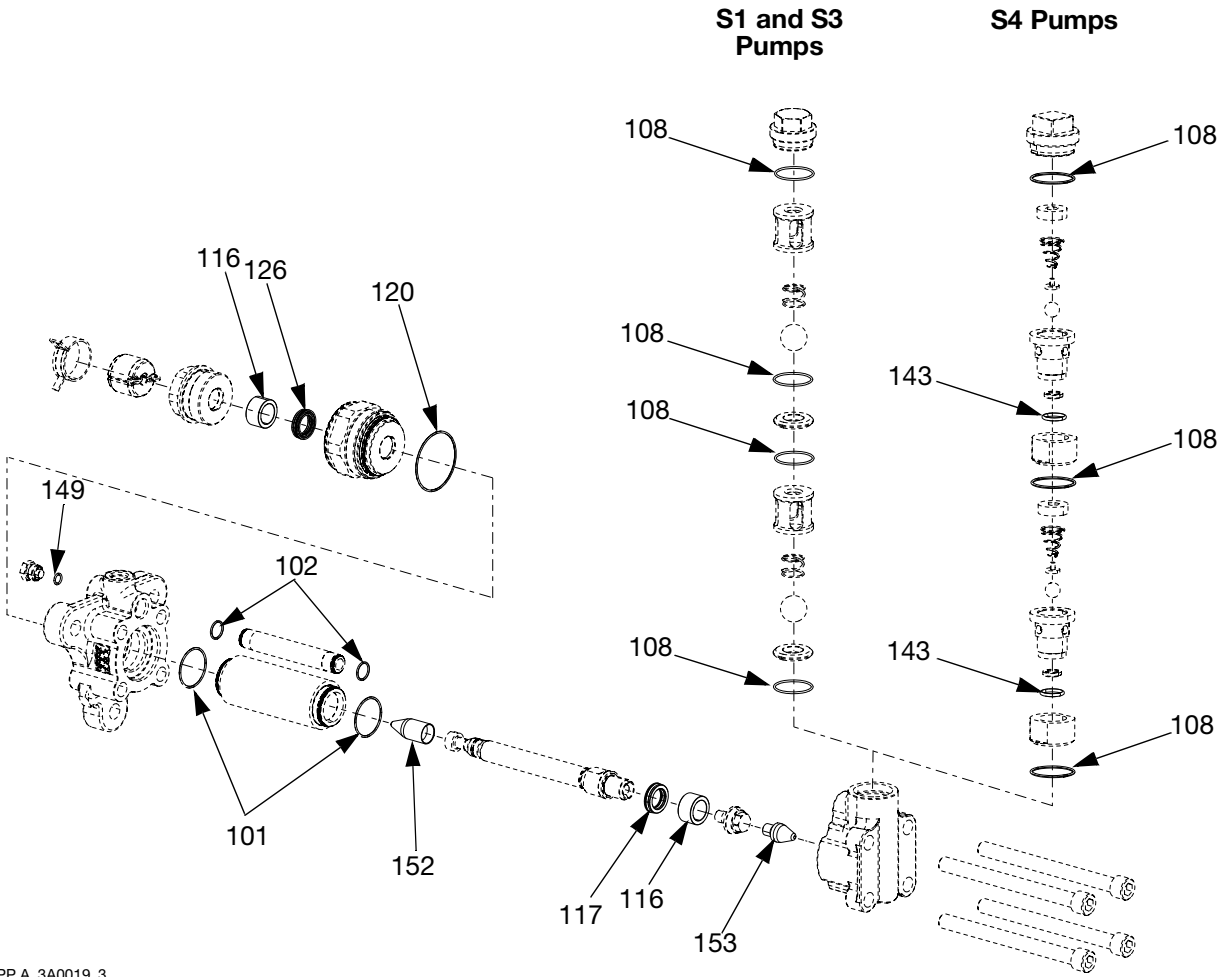
35cc, 40cc, 45cc, and 50cc Pumps



APP A_3A0019_2

FIG. 47:

60cc, 65cc, 70cc, 75cc, 80cc, 86cc, 90cc, 100cc, 105cc, 120cc, 140cc, 150cc, and 160cc Pumps



APP A_3A0019_3

FIG. 48:

Series A Pump Seal Kits Parts List

Pump Size (cc)		5cc S1	5cc S4	10cc S1	10cc S4	10cc S3	15cc S1	15cc S4	20cc S1	20cc S4	20cc S3	25cc S1	25cc S1	25cc S4	30cc S1	30cc S4	35cc S1	35cc S4	40cc S1	40cc S4					
Seal Kit Part No.		262561				25293		24U653		258929		258941		24U654		258941		258941		258947		24R307		258793	
		FIG. 46										FIG. 47													
Ref.	Description	Quantity																							
101	PACKING, O-ring, PTFE	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
102	PACKING, O-ring, PTFE	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
108	PACKING, O-ring, PTFE	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
116	BEARING, piston	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
117	SEAL, piston	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
120	PACKING, O-ring	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
125	THROAT, bearing	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
126	SEAL, throat	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
143	PACKING, O-ring	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
149	PACKING, O-ring	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
150	TOOL, cylinder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
152	TOOL, throat	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
153	TOOL, rod	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
154	THREADLOCKER, blue	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
155	ANTI-seize	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Pump Size (cc)		45cc S1	45cc S4	50cc S1	50cc S4	60cc S1	60cc S4	65cc S1	65cc S4	70cc S1	70cc S4	75cc S1	75cc S4	80cc S1	80cc S4	86cc S1	86cc S4	90cc S1	90cc S4						
Seal Kit Part No.		24R307				258799		258805		24J002		25C253		24N820		258811		24J003		24T162					
		FIG. 47								FIG. 48															
Ref.	Description	Quantity																							
101	PACKING, O-ring, PTFE	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
102	PACKING, O-ring, PTFE	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
108	PACKING, O-ring, PTFE	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
116	BEARING, piston	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
117	SEAL, piston	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
120	PACKING, O-ring	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Pump Size (cc)	45cc S1	45cc S4	50cc S1	50cc S4	60cc S1	60cc S4	65cc S1	65cc S4	70cc S1	70cc S4	75cc S1	75cc S4	80cc S1	80cc S4	86cc S1	86cc S4	90cc S1	90cc S4
Seal Kit Part No.	24R307		258799		258805		24J002		25C253		24N820		258811		24J003		24T162	
	FIG. 47						FIG. 48											

Ref.	Description	Quantity																	
125	THROAT, bearing	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
126	SEAL, throat	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
143	PACKING, O-ring	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
149	PACKING, O-ring	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
150	TOOL, cylinder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
152	TOOL, throat	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
153	TOOL, rod	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
154	THREADLOCKER, blue	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
155	ANTI-seize	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Pump Size (cc)	100cc S1	100cc S4	105cc S1	105cc S4	120cc S1	120cc S4	140cc S1	140cc S4	150cc S1	150cc S4	160cc S1	160cc S4
Seal Kit Part No.	258817		24R009		258823		24T163		24T164		258829	
	Fig. 48											

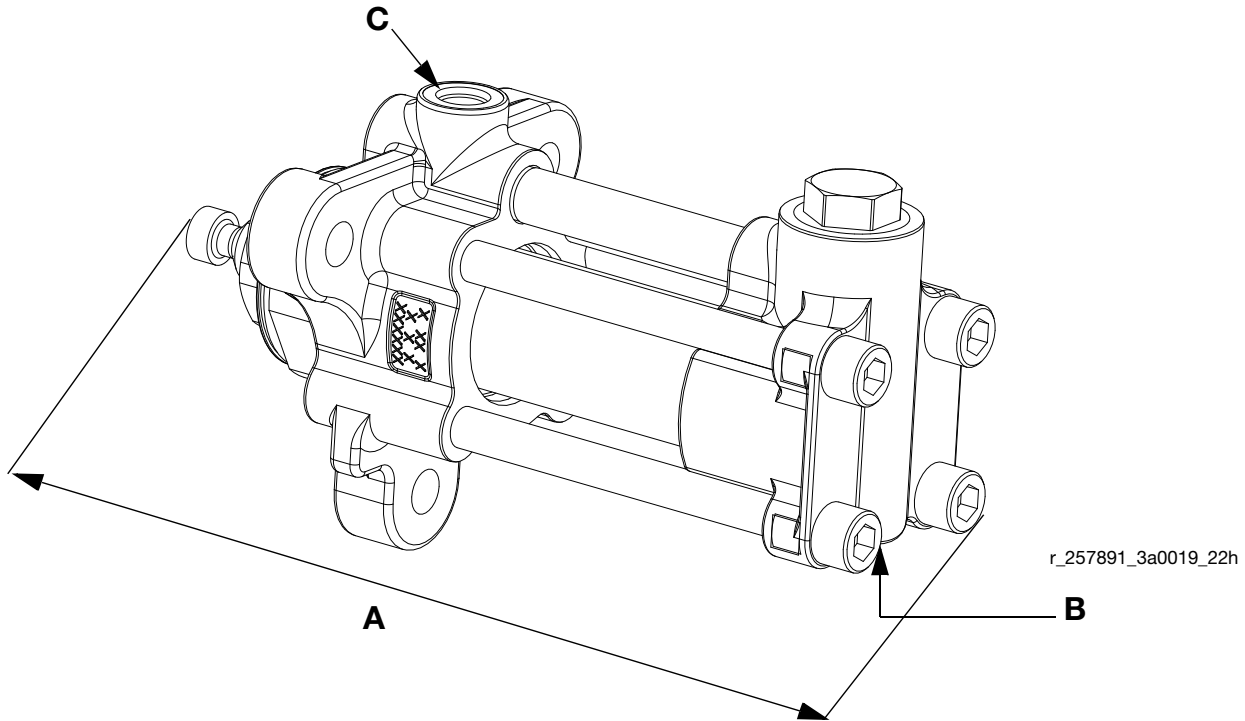
Ref.	Description	Quantity											
101	PACKING, O-ring, PTFE	2	2	2	2	2	2	2	2	2	2	2	
102	PACKING, O-ring, PTFE	2	2	2	2	2	2	2	2	2	2	2	
108	PACKING, O-ring, PTFE	4	4	4	4	4	4	4	4	4	4	4	
116	BEARING, piston	1	1	2	2	1	1	2	2	2	2	2	
117	SEAL, piston	1	1	1	1	1	1	1	1	1	1	1	
120	PACKING, O-ring	1	1	1	1	1	1	1	1	1	1	1	
125	THROAT, bearing	1	1	-	-	1	1	-	-	-	-	-	
126	SEAL, throat	1	1	1	1	1	1	1	1	1	1	1	
143	PACKING, O-ring	2	2	2	2	2	2	2	2	2	2	2	
149	PACKING, O-ring	1	1	1	1	1	1	1	1	1	1	1	
150	TOOL, cylinder	-	-	-	-	-	-	-	-	-	1	1	
152	TOOL, throat	1	1	1	1	1	1	1	1	1	1	1	

Appendix A - Early Series Pump Seal Kits

Pump Size (cc)		100cc S1	100cc S4	105cc S1	105cc S4	120cc S1	120cc S4	140cc S1	140cc S4	150cc S1	150cc S4	160cc S1	160cc S4
		258817		24R009		258823		24T163		24T164		258829	
Seal Kit Part No.		Fig. 48											
Ref.	Description	Quantity											
153	TOOL, rod	1	1	1	1	1	1	1	1	1	1	1	1
154	THREADLOCKER, blue	1	1	1	1	1	1	1	1	1	1	1	1
155	ANTI-seize	1	1	1	1	1	1	1	1	1	1	1	1

Dimensions

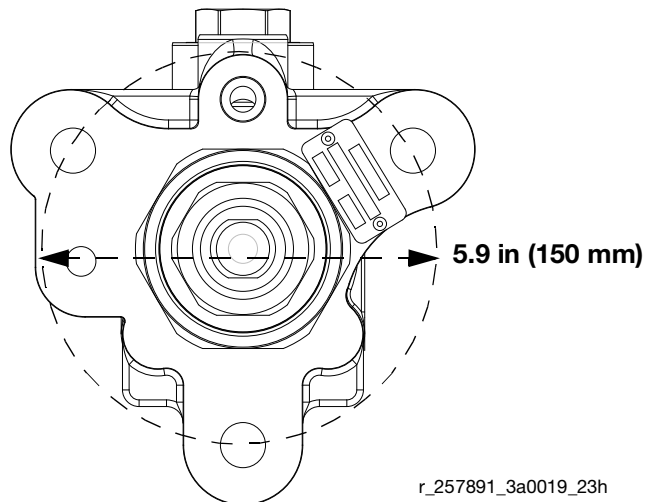
All pump sizes have the same dimensions.



A (Length) in. (mm)	B (Inlet) in. npt (f)	C (Outlet) SAE (f)
13.36 (339.34)	3/4-14	3/4-16

Outlet Housing Mounting Hole Layout

All pumps have the same outlet housing mounting hole layout.



Technical Specifications

Maximum working pressure	3500 psi (24MPa, 241 bar)
Maximum operating temperature	180° F (82° C)
Maximum cycle rate	65 cycles per minute
Minimum feed pressure at inlet	50 psi (0.35 MPa, 3.5 bar)
Weight	30 lbs (13.6 kg)
Wetted parts	SST, tungsten carbide, acetal, PTFE, UHMWPE, silicon nitride (S4 pumps only)

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 3A0019

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