

High-Pressure Grease Pump

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Description

The major components of the 7175-R4 mobile “Rockcrusher” grease pump consist of a:

- 40 pound (18.2 kg) capacity container
- pressure switch controlled drive motor
- helix arm/blade and helicoid flight priming mechanism*
- high-pressure control valve with z-swivel and 10 foot (3 m) hose assembly

The pump delivers 14 ounces (0.40 kg) of NLGI No. 1 grease [at 70 F (21 C)] each minute. Heavy fibrous grease is pumped at a rate of 5-1/2 ounces (0.16 kg) per minute.

Pressure Switch

A pressure switch maintains lubricant pressure between 3500 and 5000 psi (241-345 Bars). This switch assembly acts as the on/off switch during control valve operation.

Emergency Bypass System

A pressure relief valve operates as a back-up to the pressure switch.

* This is a positive-feed design that dispenses heavy grease at low temperatures.

Specifications

Sump

Capacity		Gear Oil
Ounces	Liter	
32	0.95	SAE 80W-90 (GL-5)

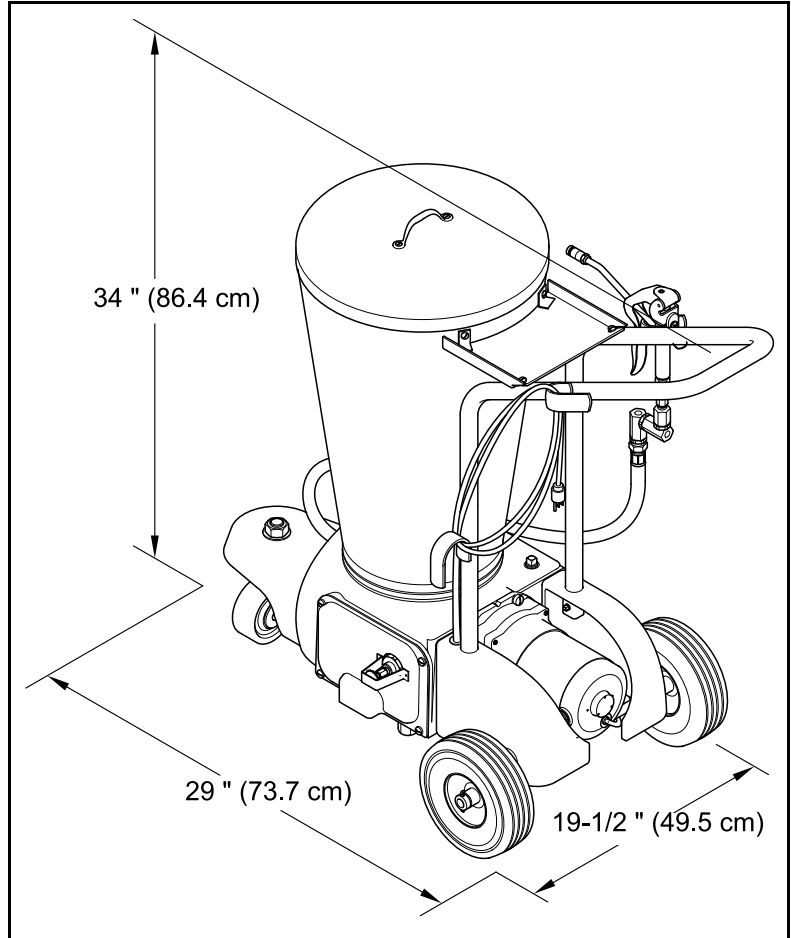


Figure 1 High-Pressure Grease Pump Model 7175-R4

Bleed/Prime Assembly

This bleeder allows the pump to be primed for initial start-up.

Motor

Size		Maximum Amperage	RPM (Full Load)	Volts
hp	kW			
3/4	0.56	8	12,000	120 @ 60 Hz

Table 1 High-Pressure Grease Pump Model 7175-R4 Specifications

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SER 7175-R4
 Revision (2-13)

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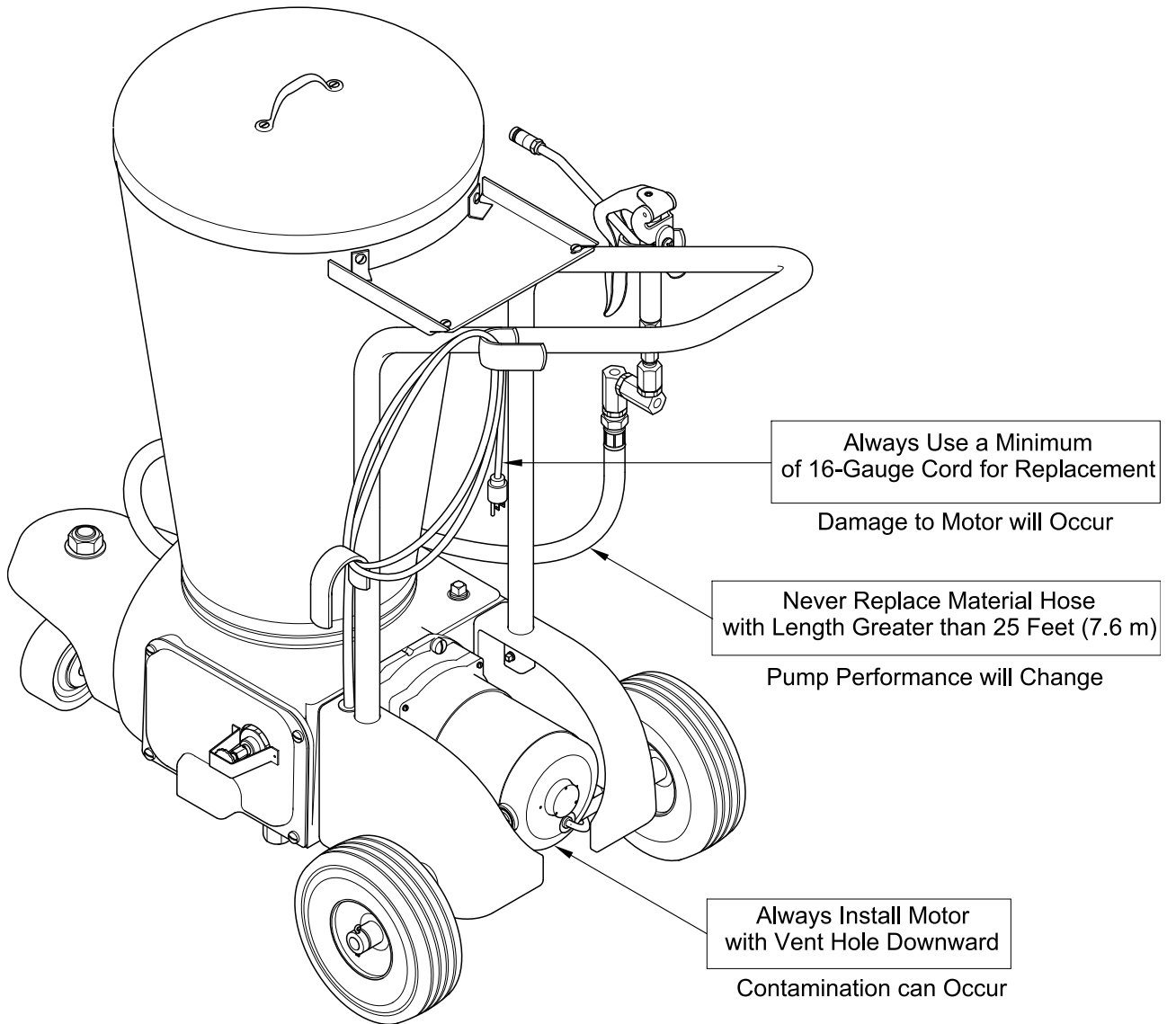
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Service Hints

Refer to the Overhaul Procedures for Details



Preventive Maintenance

Daily	Weekly	Monthly	Yearly
Wipe Exterior with Clean Cloth	<ol style="list-style-type: none"> 1. Inspect for Product and/or Oil Leakage 2. Check Sump Oil Level 	<ol style="list-style-type: none"> 1. Inspect Hose and all Rubber Components for signs of Deterioration 2. Tighten all Connections 3. Clean Valve Body Check Valve 	<ol style="list-style-type: none"> 1. Change Sump Oil 2. Inspect Motor Brushes 3. Lubricate Front Wheel Bearings (2)

Table 2 High-Pressure Grease Pump Model 7175-R4 Preventive Maintenance Schedule

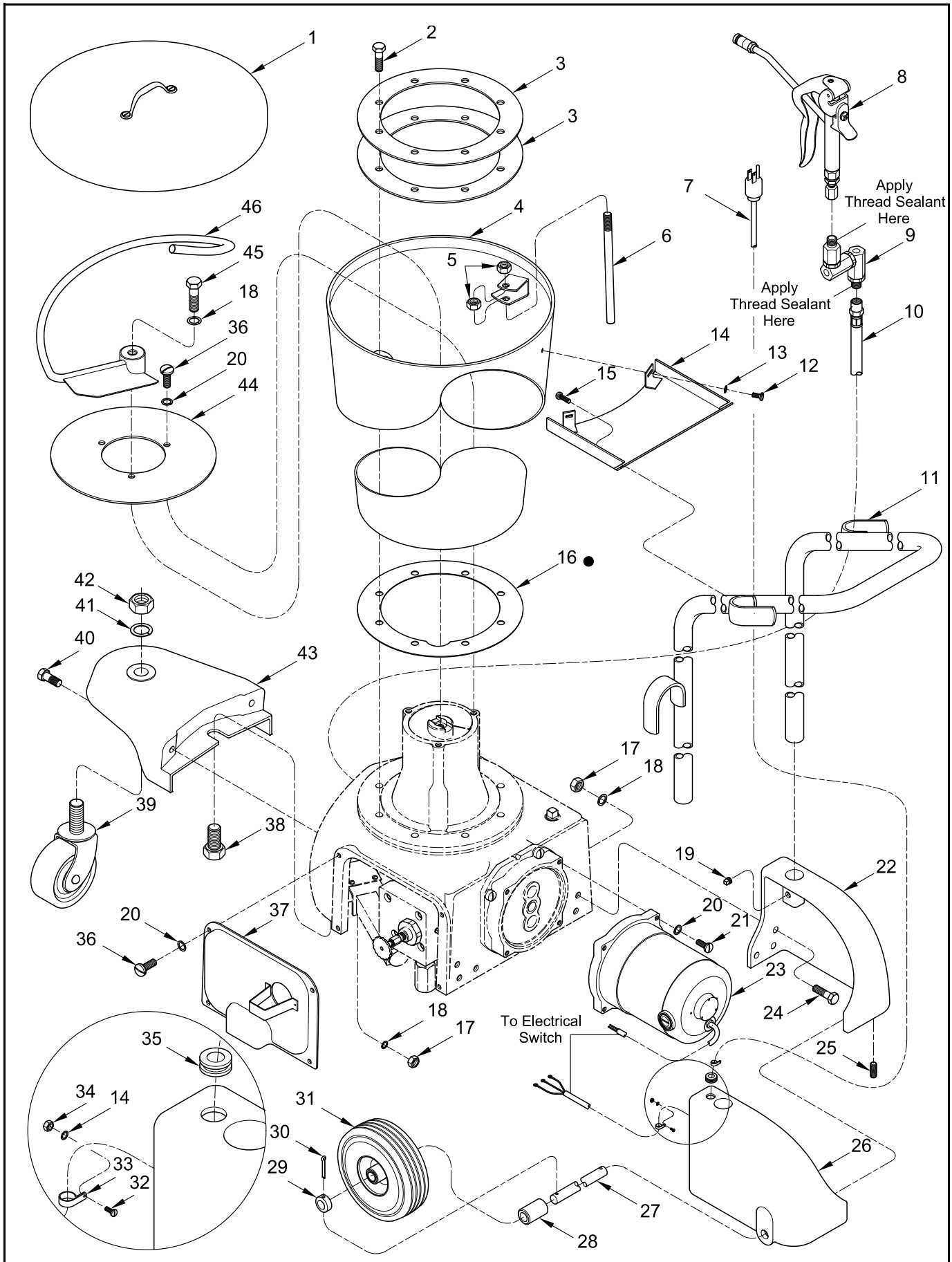


Figure 2-A High-Pressure Grease Pump - Exploded View

Item No.	Part No.	Description	Qty	Notes	Numeric Order Part # (Item #)
1	316896-B4	Cover and Handle Assembly	1		6320-3 (8)
2		Screw, 5/16" -18 x 1-1/4 "	8		11648 (45)
3		Ring, Reinforcement	2		12762 (42)
4	316890-B4	Container, 40 Pound (18.2 kg) Capacity	1		46187 (24)
5	77890	Nut, 1/2 " -13	4		46459 (40)
6		Rod	2		48490 (7)
7		Cord, Electrical, 115 V ac, 25 ' long (16-Gauge)	1	Contains 15 A Plug	B52752 (9)
8	6320-3	Valve, Control, High-Pressure	1	See SER 6320-3	76724 (21)
9	B52752	Swivel Assembly, 3/8 " OD x 3/8 " OD	1	See Figure 5	76784 (34)
10	317878-10	Hose, Material, High-Pressure, 3/8 " ID (10 ' Long)	1		76895 (13)
11	317108-B4	Handle Assembly	1		76925 (41)
12		Screw, 6-32 x 1/4 "	2		77783 (21)
13		Washer, Lock, 6	2		77890 (5)
14	316997-B4	Bracket Assembly	1		79078 (2)
15		Screw, 8-32 x 5/16 "	2		170246 (12)
16	316898	Gasket	2	●	170250 (32)
17		Nut, 3/8 "-16	8		170276 (15)
18		Washer, Lock, 3/8 "	13		170345 (36)
19		Setscrew, 3/8 " -16 x 1/2 "	2		170770 (25)
20	172207-1	Washer, Lock, 1/4 "	11		170860 (38)
21		Screw, 1/4 " -20 x 1 "	4		172207-1 (20)
22	316497-3	Support, Rear, RH	1		172207-3 (18)
23	337111	Motor Assembly, Electric (w/o Terminals)	1	See Figure 11	172211-1 (19)
24		Screw, 3/8 " -16 x 1-1/4 "	6		172212-17 (30)
25		Setscrew, 8 -32 x 1/2 "	1		316497-3 (22)
26	316498-3	Support, Rear, LH	1		316498-3 (26)
27	317254	Axle	1		316599 (35)
28		Spacer, 1 " OD x 0.64 " ID	2		316840 (29)
29	316840	Collar, Retaining	2		316878 (46)
30		Pin, Cotter, 1/8 " x 1-1/4 "	2		316880 (6)
31	317255-1	Wheel, 8" Dia. x 2-1/2 "	2		316890-B4 (4)
32		Screw, 6-32 x 3/8 "	2		316894 (44)
33		Clamp, Cable	2		316896-B4 (1)
34		Nut, 6-32	2		316898 (16)
35		Grommet	1		316997-B4 (14)
36		Screw, 1/4 " -20 x 1/2 "	7		317108-B4 (11)
37	318835-B4	Cover and Bracket Assembly	1		317253 (28)
38		Screw, 3/4 " -10 x 1"	1		317254 (27)
39	317279	Caster Assembly, 4 " Dia x 1-1/2 "	1		317255-1 (31)
40		Screw, 3/8 " -16 x 2-1/4 "	2		317278-2 (43)
41	76925	Washer, Lock, 3/4 "	1		317279 (39)
42	12762	Nut, 3/4 " -10	1		317878-10 (10)
43	317278-2	Bracket, Caster	1		318285 (3)
44		Disc	1		318835-B4 (37)
45		Screw, 3/8 " -24 x 2-1/4 "	1		336501 (33)
46	316878	Blade and Helix Arm Assembly	1		337111 (23)

Legend:
Part numbers left blank (or in *italics*) are not available separately
● designates a repair kit item

Repair Kit

Part No.	Kit Symbol	Description	Notes
398730-2	●	Kit, Major Repair	Includes items on Figures 2-A, 2-B, 2-C, and 2-D

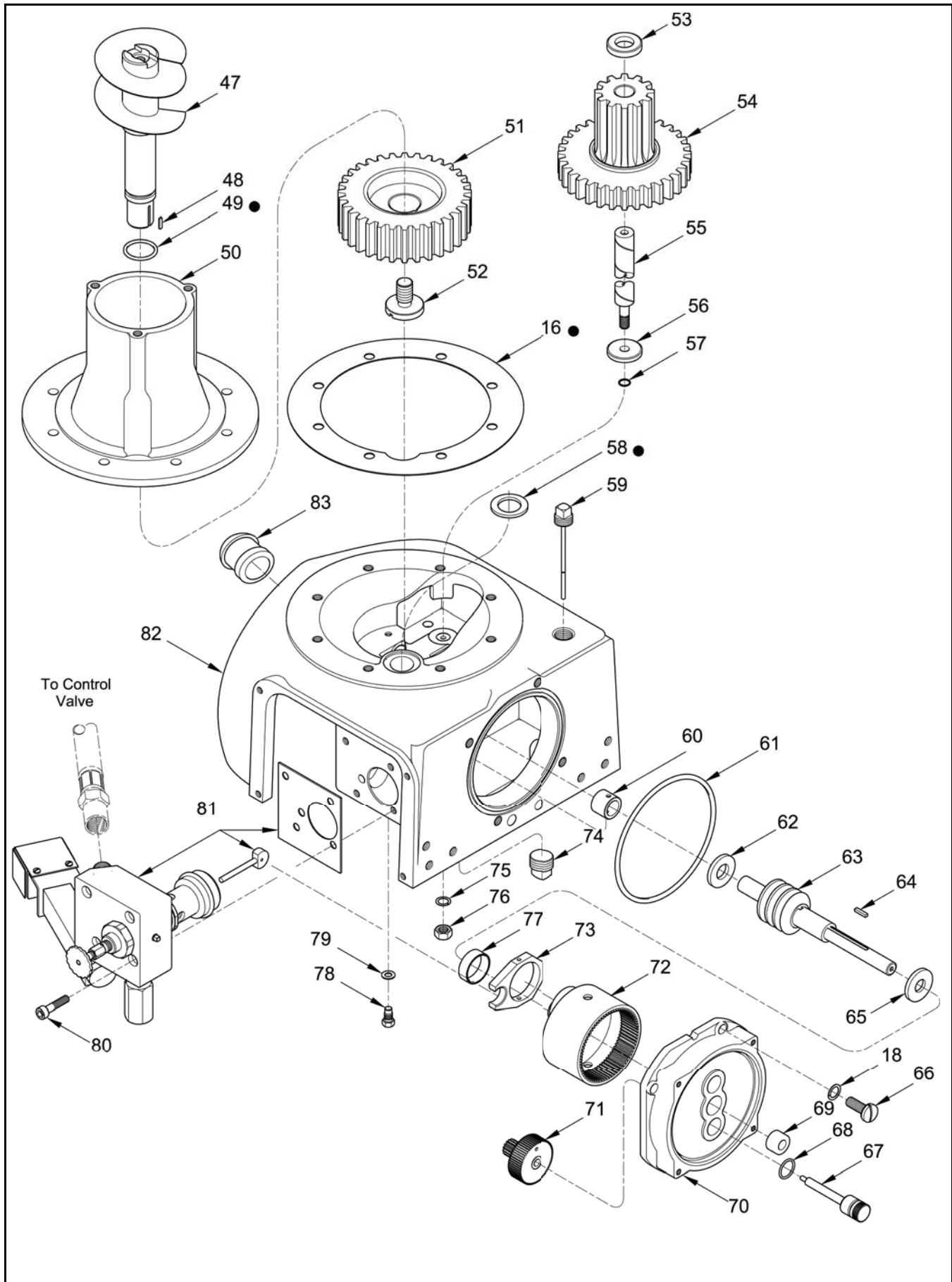


Figure 2-B High-Pressure Grease Pump- Exploded View

Item No.	Part No.	Description	Qty	Notes	Numeric Order Part # (Item #)
47	316874	Shaft and Helicoid Flight Assembly	1		13041 (76)
48	316899	Key, 1/8 " x 3/16 " x 5/8 " Long	1		14623 (75)
49	171001-15	O-Ring, 3/4 " ID x 1 " OD	1	●	50389 (79)
50		Housing, Helicoid	1		75808 (66)
51		Gear	1		171001-9 (57)
52		Screw, Special, 7/16 " -14 x 1/2 "	1		171001-11 (68)
53		Spacer, 1-1/8 " OD x 0.626 " ID x 0.250 " Thk.	1		171001-15 (49)
54	316887	Gear Train, Intermediate	1		171003-27 (61)
55		Shaft	1		171568 (80)
56	316845	Washer, Thrust, 1-1/4 " OD x 0.437 " ID x 0.218 " Thk.	1		
57	171001-9	O-Ring, 7/16 " ID x 5/8 " OD	1		311732 (74)
58		Gasket	1	●	316152-2 (70)
59		Dipstick	1		316153 (71)
60	316881	Bearing	1		316155 (67)
61	171003-27	O-Ring, 4-7/8 " ID x 5-1/8 " OD	1		316156 (73)
62		Washer, Thrust, 1-5/16 " OD x 0.687 " ID x 0.125 " Thk.	1		316159 (77)
63	316843	Worm and Shaft Assembly	1		316540 (81)
64	316884	Key, 1/8 " x 3/16 " x 1-3/16 " Long	1		316558 (83)
65	320507	Washer, Thrust, 1-1/4 " OD x 0.635 " ID x 0.156 " Thk.	1		316838-4 (82)
66		Screw, 3/8 " -16 x 1-1/4 "	4		316843 (63)
67	316155	Shaft	2		316844 (55)
68	171001-11	O-Ring, 9/16 " ID x 3/4 " OD	2		316845 (56)
69	317979	Seal, Oil	1		316847 (53)
70		Body, Gear	1		316848 (51)
71	316153	Gear, Planetary	2		316874 (47)
72	316883	Gear, Ring	1		316876 (50)
73	316156	Link, Connecting	1		316881 (60)
74		Plug, Pipe, Drain	1		316883 (72)
75		Washer, Lock, 7/16 "	1		316884 (64)
76		Nut, 7/16 " -20	1		316887 (54)
77	316159	Spacer, 1-1/4 " OD x 1.036 " ID	1		316889 (78)
78		Setscrew, 5/16 " -18	1		316892 (62)
79		Gasket	1		316897 (58)
80		Screw, 5/16 " -18 x 2 "	4		316899 (48)
81	316540	Pressure Switch and Valve Body Assembly	1	See Figure 2-C	316980 (52)
82		Base	1		317112 (59)
83	316558	Grommet	1		317979 (69)
					320507 (65)
Legend: Part numbers left blank (or in <i>italics</i>) are not available separately ● designates a repair kit item					

Repair Kit

Part No.	Kit Symbol	Description	Notes
398730-2	●	Kit, Major Repair	Includes items on Figures 2-A, 2-B, 2-C, and 2-D

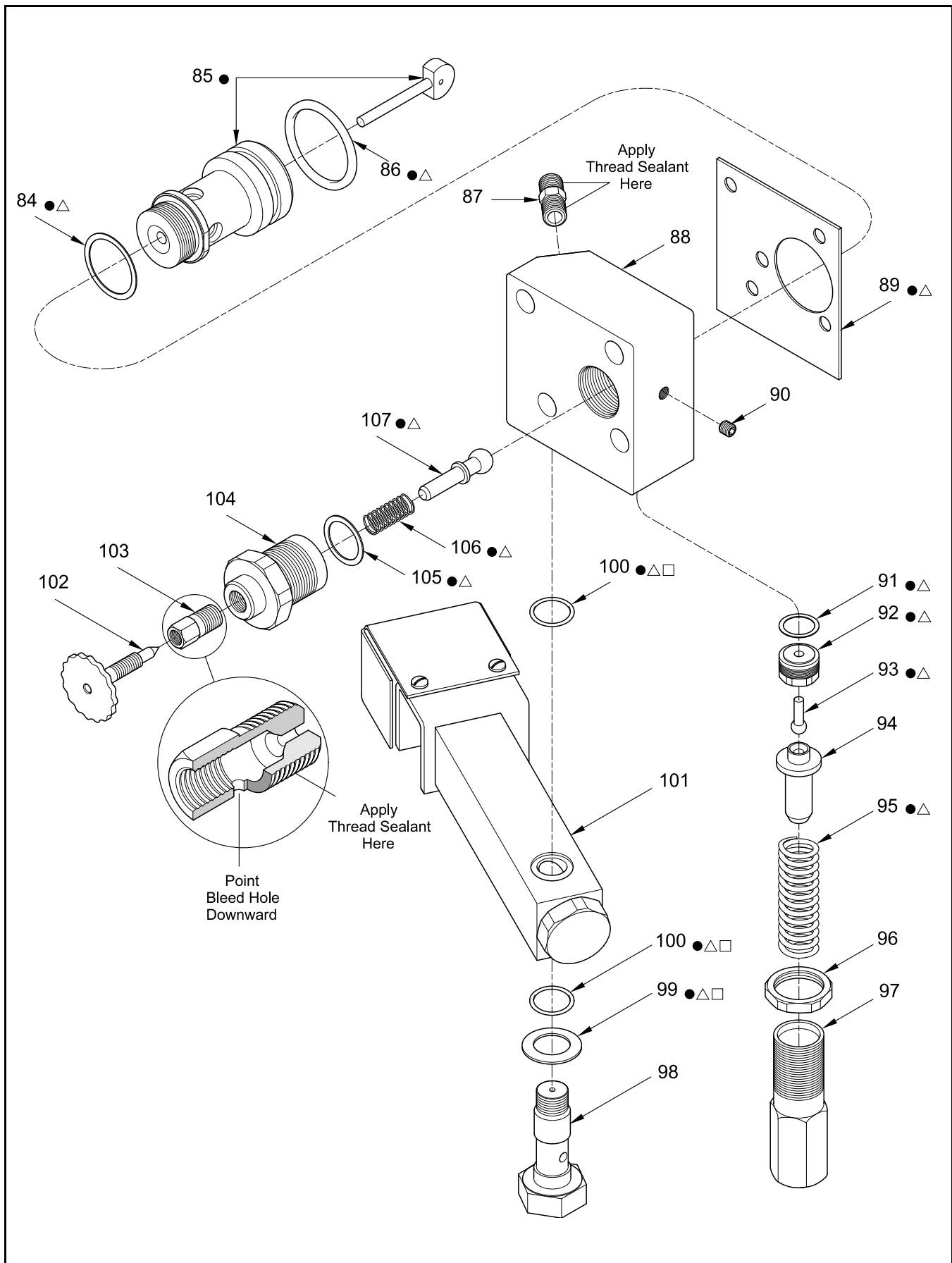


Figure 2-C Pressure Switch and Valve Body Assembly - Exploded View

Item No.	Part No.	Description	Qty	Notes	Numeric Order Part # (Item #)
84	314834	Gasket, 1-1/4 " OD (Copper)	1	●△	17831 (90)
85	314808	Piston and Cylinder Assembly	1	●	43379 (87)
86	171001-20	O-Ring, 1-5/16 " OD x 1-1/16 " ID	1	●△	47124 (103)
87	43379	Adapter, 1/2 " -27 x 1/4 " NPTF (m)	1		171001-12 (100)
88	316536	Body, Valve	1		171001-20 (86)
89	316544	Gasket	1	●△	302225 (102)
90	17831	Plug, 1/8 " NPTF (m)	1		314808 (85)
91		Gasket, 0.687 " OD (Copper)	1	●△	314821 (104)
92		Seat, Valve, 3/4 " -20	1	●△	314834 (84)
93		Valve, Relief, Emergency Bypass	1	●△	316535 (107)
94	318987	Retainer, Valve	1		316536 (88)
95		Spring, 3 " Long	1	●△	316544 (89)
96		Locknut, 1-1/16 " -20	1		316545 (101)
97		Housing, Spring, 1-1/16 " -20	1		316546 (91)
98	320383	Bolt, Clamp, 9/16 " -18	1		316551 (106)
99	316631	Gasket, 1.03 " OD (Aluminum)	1	●△□	316631 (99)
100	171001-12	O-Ring, 13/16 " OD x 5/8 " ID	2	●△□	317078 (96)
101	316545	Switch Assembly, Pressure	1		See Figure 2-D 318141 (105)
102	302225	Screw, Bleed Valve, 1/4 " -32	1		318987 (94)
103	47124	Seat, Bleed Valve, 1/4 " -32 x 1/8 " NPTF (m)	1		318988 (95)
104	314821	Adapter, 1 " -20 x 1/8 " NPTF (f)	1		318989 (97)
105		Gasket, 0.92 " OD (Aluminum)	1	●△	318990 (93)
106		Spring, 1-1/4 " Long	1	●△	318991 (92)
107		Valve, Check, Pump	1	●△	320383 (98)
Legend: Part numbers left blank (or in <i>italics</i>) are not available separately ●△□ designates a repair kit item					

Repair Kits

Part No.	Kit Symbol	Description	Notes
393804	*	Kit, Switch Repair	Includes items on Figures 2-C & 2-D
398730-2	●	Kit, Major Repair	Includes items on Figures 2-A, 2-B, 2-C, & 2-D
393678	△	Kit, Repair, Valve Assembly	
393679	□	Kit, Repair, Pressure Switch Assembly	Includes items on Figures 2-C & 2-D

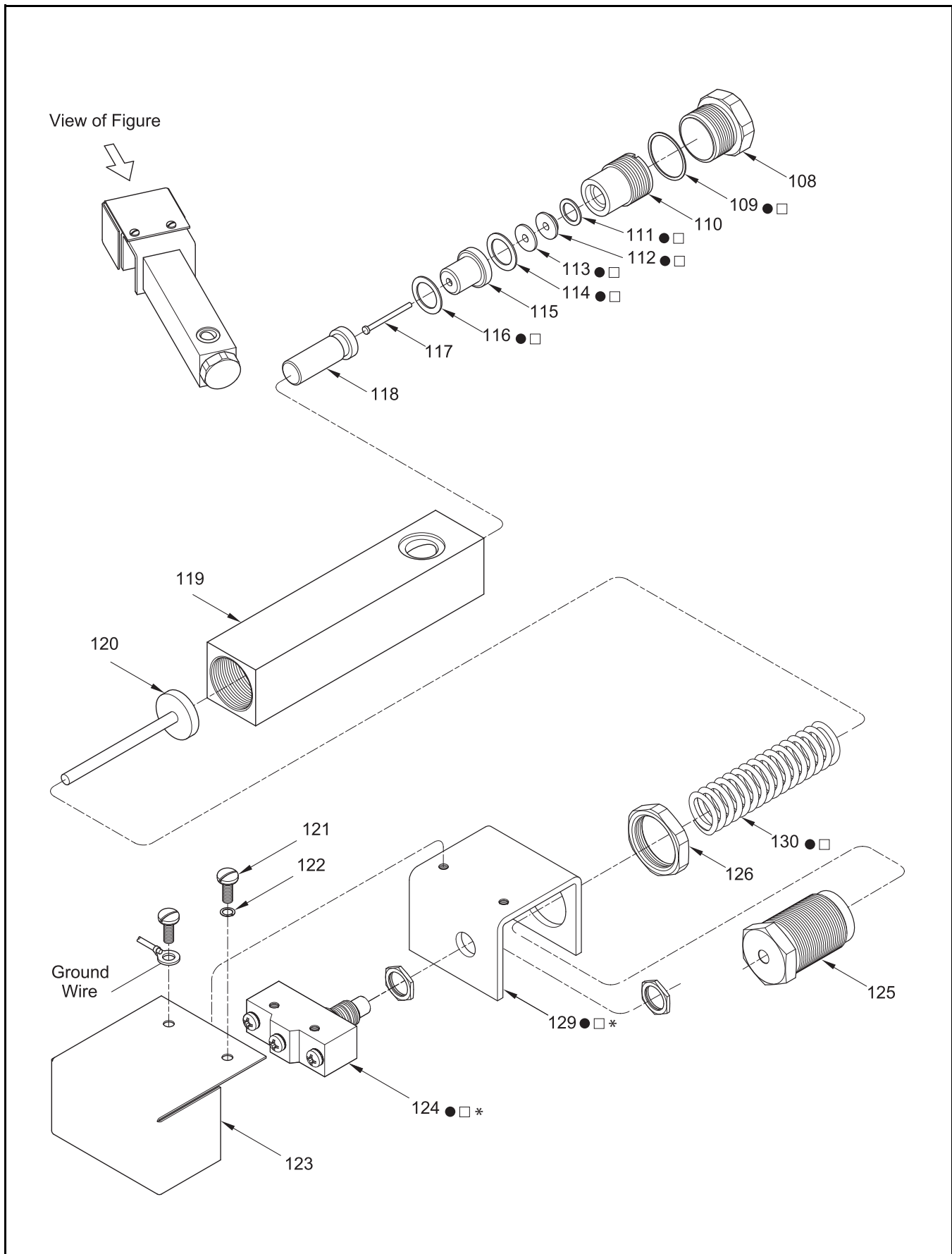


Figure 2-D Pressure Switch Assembly - Exploded View

Item No.	Part No.	Description	Qty	Notes	Numeric Order Part # (Item #)
108	316598	Plug, 1-1/16 " -20	1		61463 (122)
109	318139	Gasket (Aluminum)	1	● □	76895 (127)
110	316597	Screw, 13/16 " -20	1		170308 (121)
111		Washer, 0.307 "	1	● □	171730-2 (128)
112		Packing (Rubber)	1	● □	305184 (112)
113		Packing (Leather)	1	● □	305195 (111)
114		Washer, 0.506 " ID x 0.738 " OD (Copper)	1	● □	305207 (113)
115		Bushing	1		305208 (115)
116		Gasket, 0.570 " ID x 0.757 " OD (Copper)	1	● □	305210 (125)
117		Pin (Chrome)	1		305359 (114)
118	316549	Actuator	1		306127 (116)
119	336660	Body, Switch	1		316548-1 (129)
120	317938	Pilot and Disc Assembly	1		316549 (118)
121	170308	Screw, 10 -32 x 5/16 "	2		316597 (110)
122		Washer, Lock, 10	2		316598 (108)
123		Housing, Switch	1		316632 (123)
124		Switch, Electrical	1	● □*	317078 (126)
125		Screw, 1-1/16 " -20	1		317938 (120)
126	317078	Locknut, 1-1/16 " -20	1		318139 (109)
127		Washer, Lock, 6	2		335949-1 (124)
128		Screw, 6 -40 x 1/4 "	2		336660 (119)
129		Bracket	1	● □*	336661 (117)
130	336662	Spring, 3.41 " Long	1	● □	336662 (130)

Legend:Part numbers left blank (or in *italics*) are not available separately

● □ designates a repair kit item

Repair Kits

Part No.	Kit Symbol	Description	Notes
398730-2	●	Kit, Major Repair	Includes items on Figures 2-A, 2-B, 2-C, & 2-D
393679	□	Kit, Repair, Pressure Switch Assembly	Includes items on Figures 2-D & 2-C
393804	*	Kit, Switch Repair	Includes items on Figures 2-D & 2-C

Overview of Product Flow

Power Train

The motor on the 7175-R4 pump assembly drives the gear train mechanism. See **Figure 3**.

The gear train transfers power to the Helicoid Arm and Blade Assembly and the Helicoid Flight Assembly. These components rotate to pull product from the container, into the Helicoid Housing, and into the Base.

From the passageway in the Base product is pumped into the Valve Body via the Piston and Cylinder assembly. See **Figure 4**.

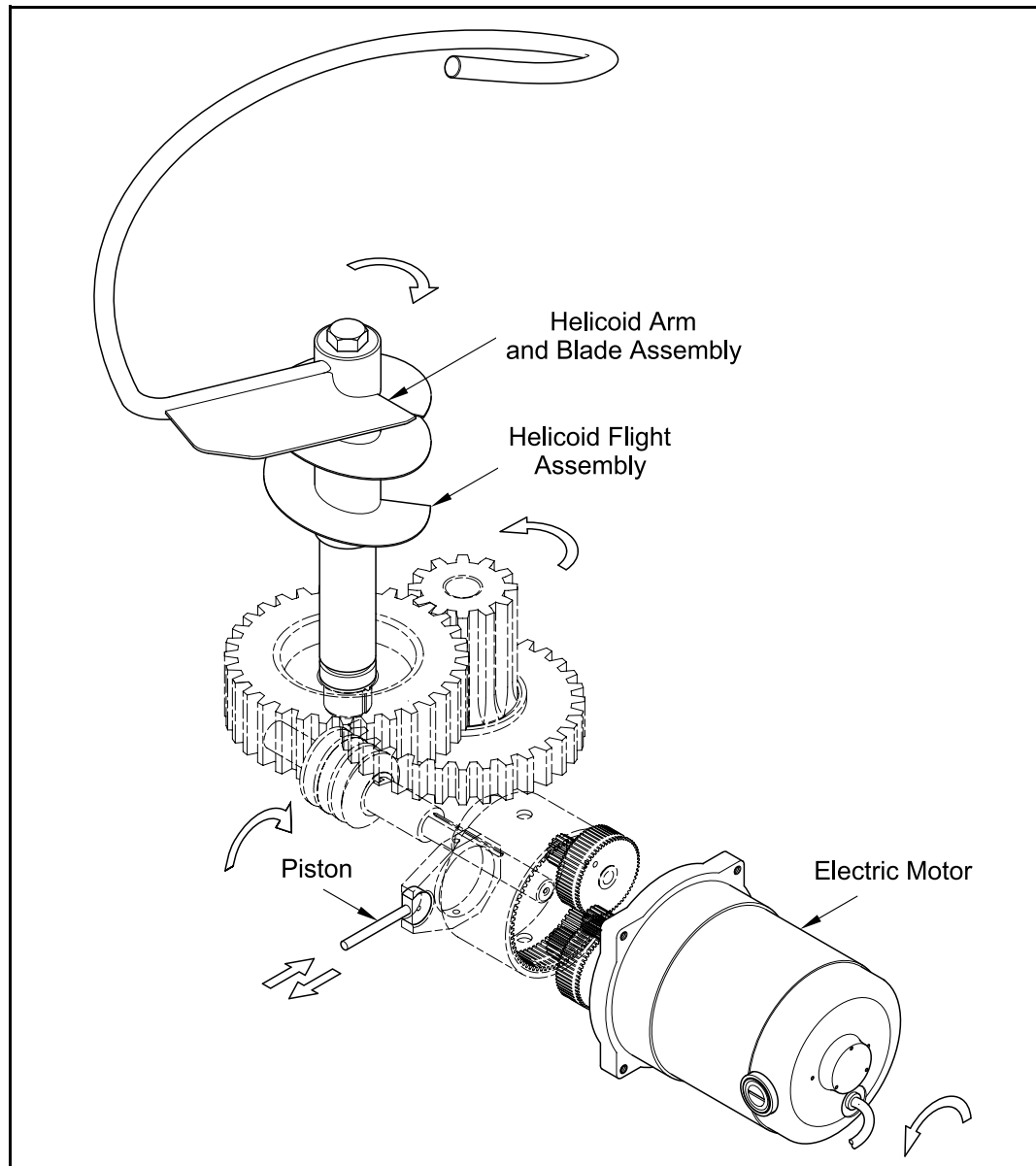


Figure 3 *High-Pressure Grease Pump Power Train*

Valve Body

The Valve Body contains several ports and passageways. During normal operation, product enters and fills all the ports* indicated in **Figure 4**.

* Product exits Port E only when the Emergency Bypass mechanism is operating.

Product Flow

Product is forced down the opening in the **Helicoid Housing** and into the passageway in the **Base**. The **Piston** delivers the product through the **Cylinder** and into the **Valve Body** at Port A.

Control Valve

When the Control Valve is open, product flows through the **Valve Body** to the Control Valve port (Port F).

Pressure Switch

Product exits the **Valve Body** at Port D and fills the Pressure Switch. Pressure actuates the Electrical Switch which shuts power off to the motor.

Emergency Bypass

Should the Pressure Switch fail, pressure in the Emergency Bypass port (Port B) unseats a Relief Valve that allows the product to exit the **Valve Body** at (Port E) and recirculate.

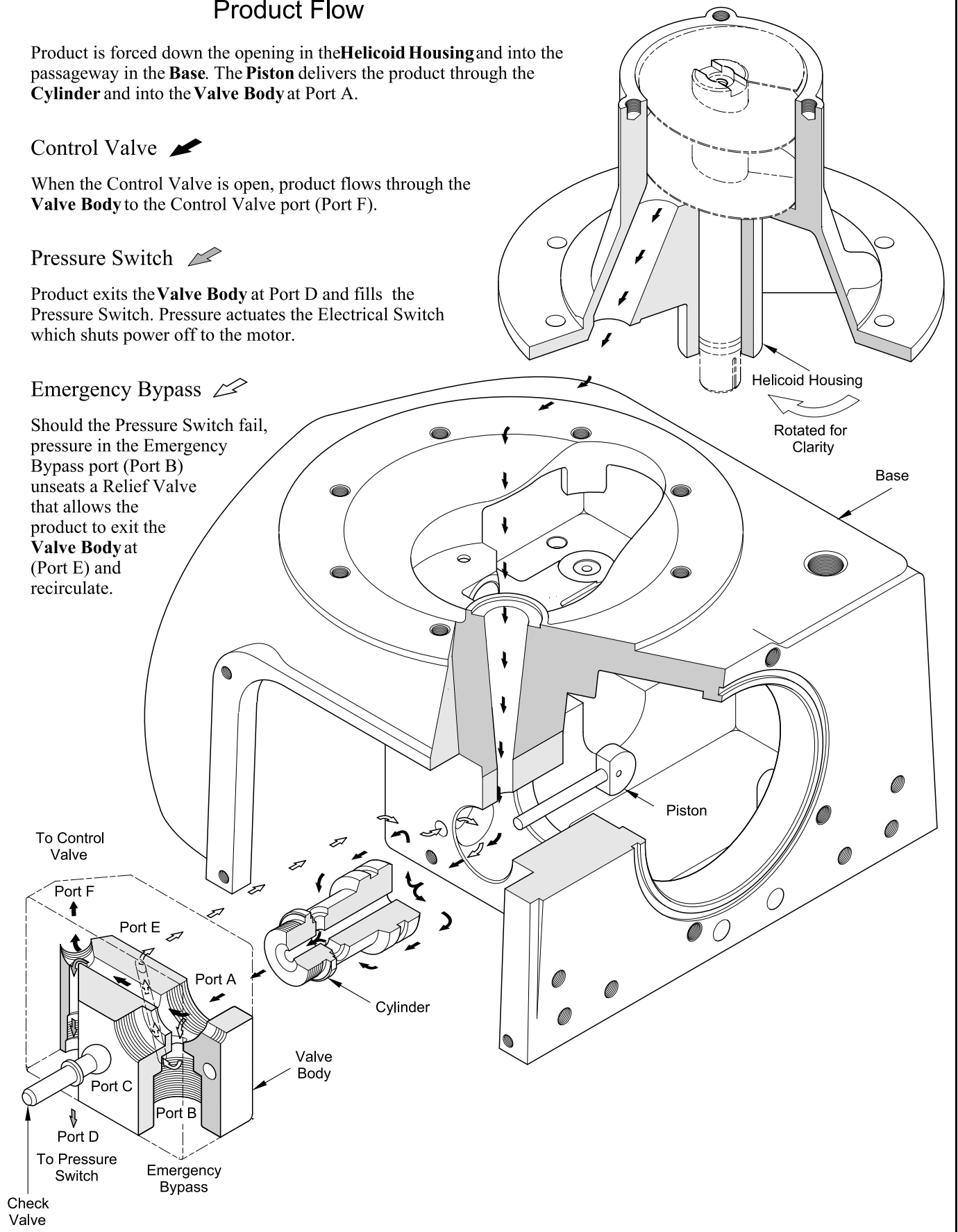


Figure 4 High-Pressure Grease Pump Wetted-Path

Pressure Switch Port

Product in the pressure switch port (Port D) enters the pressure actuated electrical switch assembly via Clamp Bolt (98). See **Figure 2-C**.

The pressure switch assembly acts as an automatic on/off switch. The electrical switch portion of the assembly is normally-closed.

When pressure within the pump is below the low pressure limit set at the pressure switch assembly, the electrical switch remains closed. With the electrical switch closed, the pump continues to operate.

Once pressure within the pump meets the high pressure setting, it opens the pressure switch and the pumps stops.

Emergency Bypass Port

Normally, when the control valve is closed, the pressure rise opens the electrical switch and the pump stops. Should any portion of the pressure switch fail, the pump will continue to run and pressure will increase.

Pressure in the emergency bypass port (Port B) unseats Relief Valve (93) [See **Figure 2-C**] and allows product to flow out of the Valve Body. Product re-enters the Base and returns to the Piston and Cylinder Assembly.

CAUTION

Do not allow the pump to continue to operate in this mode. Damage to the motor and drive train components can occur. Remove the electrical cord from the outlet.

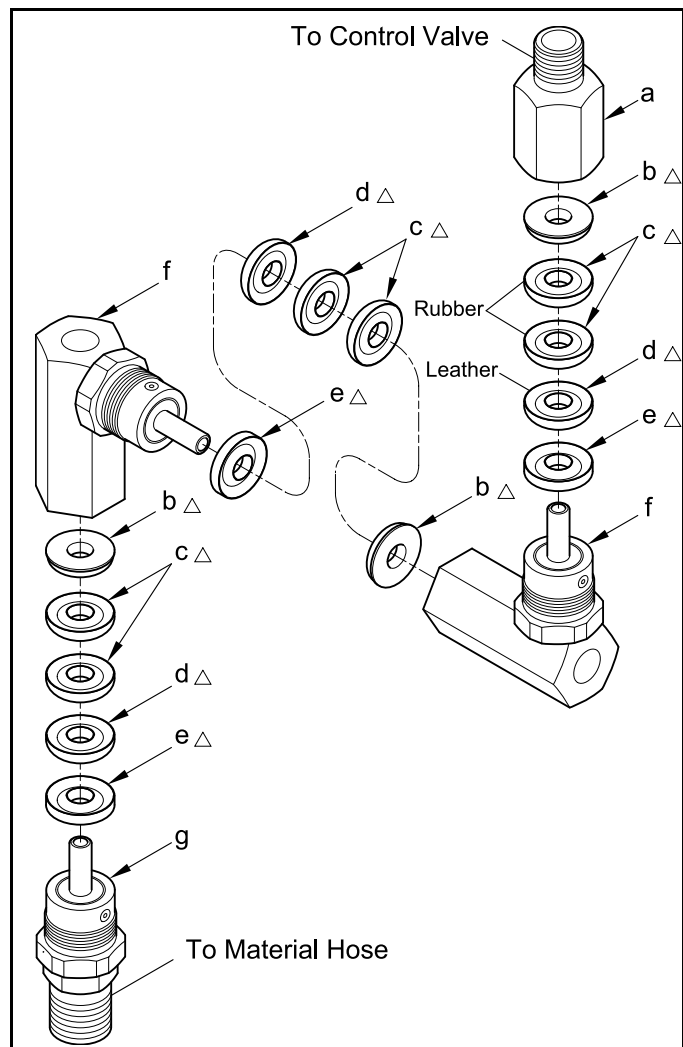
Bleed/Prime Assembly Port

This port (Port C) allows any air trapped within the wetted-path (up to the Valve Body) to escape to atmosphere.

Priming

With air in this portion of the system, product may move slowly from the Base into the Valve Body. To accelerate product flow, open Bleed Valve Screw (102) on the bleed assembly. See **Figure 2-C**.

This allows the Piston to deliver product directly into the Valve Body and out Bleed Valve Seat (103). Once product flows continuously, seat the Bleed Valve Screw.



Item No.	Part No.	Description	Notes	Qty
a		Adapter, Swivel, 1/4 " NPTF (m)		1
b		Ring, Support, Male	△	3
c		V-Packing (Rubber)	△	6
d		V-Packing (Leather)	△	3
e		Ring, Support, Female	△	3
f		Body and Stud Assembly		2
g		Adapter, Swivel, 1/2 " -27		1

Legend:
 Part numbers left blank are not available separately
 △ designates a repair kit item

Repair Kit

Part No.	Kit Symbol	Description
398719-1	△	Kit, Repair [Quantity for two (2) Z-Swivels]

Figure 5 High-Pressure Z-Swivel - Exploded View

IMPORTANT: Prior to performing any maintenance procedure, the following safety precautions must be observed. Personal injury may occur.



WARNING

Do not use halogenated hydrocarbon solvents such as methylene chloride or 1,1,1-trichloroethane in this pump. An explosion can result when aluminum and/or zinc-plated parts in the pump come in contact with halogenated hydrocarbon solvents.

Release all pressure within the system prior to performing any procedure.

- **Disconnect the electrical cord from the 120 V ac source.**
- **Into an appropriate container, operate the control valve to discharge remaining pressure within the assembly.**

Never point a control valve at any portion of your body or another person. Accidental discharge of pressure and/or material can result in injury.

Read each step of the instructions carefully. Make sure a proper understanding is achieved before proceeding.

Remove and Replace

NOTE: These procedures address the most common repairs made to the pump.

For information on pump **Overhaul**, see page 17.

Motor

NOTE: Refer to **Figures 2-A** and **2-B** for component identification on the Motor components.

IMPORTANT: Make sure the Electrical Cord is removed from the outlet.

1. Remove Screws (21) and Lock Washers (20) that secure Electric Motor (23) to Gear Body (70).
 - Remove the Motor from the Gear Body. Refer to the section entitled **Motor Overhaul** for details on the motor.

IMPORTANT: Inspect the condition of the teeth on the armature shaft. If signs of wear are visible, follow steps 2-7 to ensure correct gear alignment.

If the condition of the teeth are satisfactory, refer to steps 6 and 7.

2. Remove Screws (66) and Lock Washers (18) that secure the Gear Body to Base (82).
 - Remove the Gear Body from the Base.

Inspect the condition of Planetary Gears (71) and Ring Gear (72). Replace as necessary. Refer to the section entitled **Disassembly** for procedures.

3. Position the Planetary Gears in the Base as illustrated in **Figure 6**. This setting prevents wear on the motor's armature shaft.

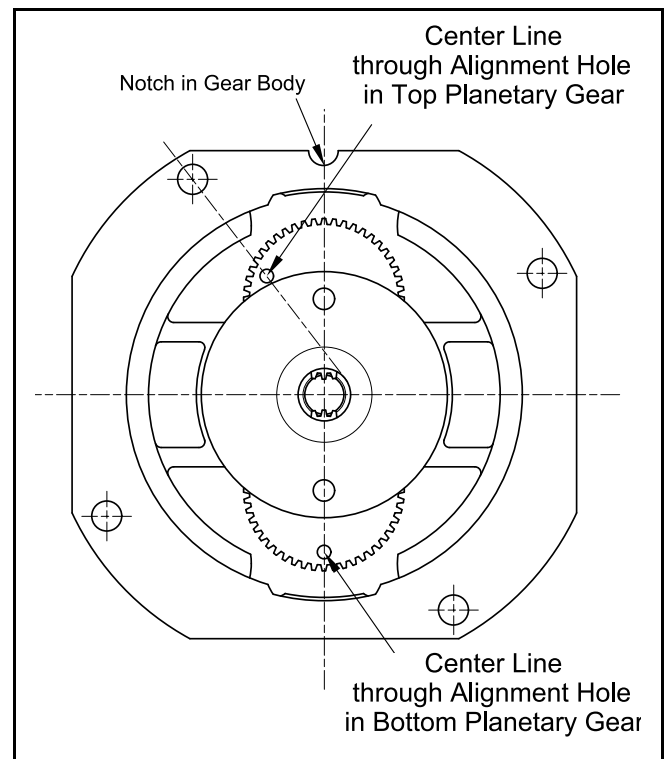


Figure 6 Position of Planetary Gears in Gear Body

IMPORTANT: Make sure the Planetary Gears do not move during installation of the Gear Body assembly.

4. Install the Gear Body assembly onto the Worm and Shaft Assembly (63), Ring Gear and onto the Base.
 - Make sure O-Ring (61) is positioned properly.
5. Install Lock Washers (18) and Screws (66) that secure the Gear Body to the Base.
 - Tighten the Screws securely.

6. Install the Motor shaft into the Gear Body.
 - Carefully rotate the Motor as necessary to properly engage the Planetary Gears.
7. Install Lock Washers (20) and Screws (21) that secure the Motor to the Gear Body.
 - Tighten the Screws securely.

IMPORTANT: If the teeth on the armature shaft were worn, drain the gear sump and refill with SAE 80W-90 (GL-5) oil.

Pressure Switch

NOTE: Refer to **Figures 2-C** and **2-D** for component identification on the Pressure Switch.

IMPORTANT: Make sure:

- the Electrical Cord is removed from the outlet.
- to operate the Control Valve into the Container to release any pressure within the pump

1. Position the pump at an angle to access the Pressure Switch Assembly.
 2. Remove Clamp Bolt (98) that secures Pressure Switch Assembly (101) to Valve Body (88).
 3. Inspect the condition of O-Rings (100) and Gasket (99).
 - Replace as necessary.
- If the Pump or the Switch Kit was purchased after APR 2011 then skip to step number 7.
4. Remove Screws (121) and Lock Washer (122) that secure Switch Housing (123) to Bracket (129).
 - Remove the Switch Housing.
 5. Remove the four wires from Electrical Switch (124).
 6. Remove Screws (128) and Lock Washers (127) that secure the Electrical Switch to the Bracket.
 - Remove the Electrical Switch.

Note: Refer to pages 19-20 for pressure switch disassembly to remove the bracket(129). Note the caution on page 20 to remove the screw(125).

7. Remove electrical switch.
8. Install first lock nut on the switch (See fig. 8) until it bottoms on the threads. Place the switch through the small hole in the bracket then install the second lock nut to secure it.

9. Install the two black wires, one to the common and the other to the normally closed terminals on the switch.
10. Join the two white wires using a butt splice connector. See **Figure 7**.
 - Tighten each screw securely.

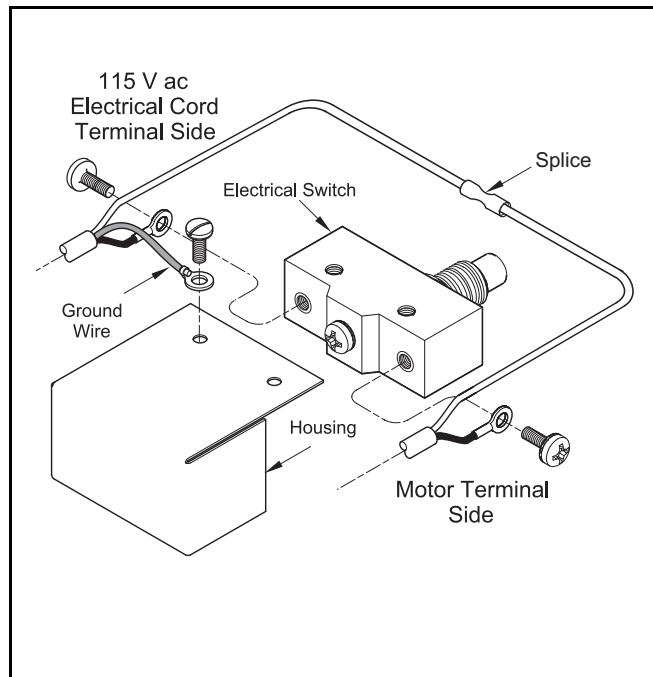


Figure 7 Electrical Switch Wire Connections

11. Thread the plunger of the Electrical Switch through the smaller hole of the bracket.
12. Install and tighten the locknut on the plunger to secure the Switch Housing to the Bracket.
 - Make sure to install the ground wire.
 - Tighten each Screw securely.
13. Install O-Rings (100) onto the top and bottom of Pressure Switch Assembly (101).
14. Install Gasket (99) onto Clamp Bolt (98).
15. Install the Clamp Bolt to secure the Pressure Switch Assembly to the Valve Body.
 - Position the Switch Assembly at an angle that fits freely underneath Base (82).
 - Tighten the Clamp Bolt securely.
16. Test the pump.
 - Refer to the section entitled **Operation and Adjustments**.

Initial Preparation

NOTE: These procedures prepare the pump for overhaul. Refer to **Figures 2-A** and **2-B** for component identification.

IMPORTANT: Make sure:

- the Electrical Cord is removed from the outlet.
- to operate the Control Valve into the Container to release any pressure within the pump

1. Remove Cover and Handle Assembly (1) from Container (4).
2. Remove all of the product from the Container.
3. Place a collection container underneath Base (82).
4. Remove Drain Plug (74) from the Base.
 - Allow the Base to drain completely.
5. Remove Electrical Cord (7) and the Material Hose Assembly from Handle Assembly (11).

Pump Overhaul

Breakdown

NOTE: Breakdown procedures are a combination removal and disassembly process. Certain subcomponents are removed before complete disassembly occurs.

Refer to the section entitled **Disassembly** for details on the following subassemblies:

- Planetary Gear Body
- Valve Body
- Pressure Switch

For details on the Motor, refer to the section entitled **Motor Overhaul**.

Container and Accessories

NOTE: Refer to **Figures 2-A, 2-B, 2-C,** and **2-D** for component identification on the following breakdown procedures.

1. Remove Screws (12) and Washers (13) that secure Bracket Assembly (14) to the Container.
2. Loosen Setscrews (19) that secure the Handle Assembly to Rear Supports (22 and 26).
 - Remove the Handle and Bracket Assembly.
3. Remove Nuts (5) from both Rods (6) as required.

4. Remove Screw (45) and Washer (18) that secures Blade and Helix Arm Assembly (46) to Shaft and Helicoid Flight Assembly (47).
 - Remove the Blade and Helix Arm Assembly.

5. Remove Screws (36) and Lock Washers (20) that secure Disc (44) to Helicoid Housing (50).
 - Remove the Disc.

6. Remove Screws (2) that secure the Reinforcement Rings (3) and Container to the Helicoid Housing.
 - Remove Reinforcement Rings and Container.

7. Remove the Helicoid Housing assembly from the Base.

Helicoid Housing Assembly

8. Remove Gasket (16) from the Helicoid Housing.

NOTE: Do not lose Key (48) during next step.

9. Remove Screw (52) that secures Gear (51) to Shaft and Helicoid Flight Assembly (47).
 - Remove the Gear.

10. Remove Key (48).

11. Remove the Shaft and Helicoid Flight Assembly from the Helicoid Housing.

12. Remove O-Ring (49) from the Shaft.

Base Assembly Peripherals

13. Remove Gaskets (16) and (58) from the Base.

14. Remove Screws (36) and Lock Washers (20) that secure Cover and Bracket Assembly (37) to the Base.
 - Remove the Cover and Bracket Assembly.

15. Turn the pump assembly upward and face the bottom.

Pressure Switch and Valve Body Assembly

16. Loosen Material Hose (10) from Pressure Switch and Valve Body Assembly (81).
 - Do not remove the Material Hose at this time.

17. Remove Clamp Bolt (98) that secures Pressure Switch Assembly (101) to Valve Body (88).

18. Remove O-Rings (100) from the Switch Assembly.

19. Remove Gasket (99) from the Clamp Bolt.

20. Remove Screws (121) and Lock Washer (122) that secure Switch Housing (123) to Bracket (129).
 - Remove the Switch Housing.

21. Remove the four wires from Electrical Switch (124).
 - Remove the Pressure Switch assembly.
22. Remove Screws (80) that secure Valve Body (88) to the Base.
23. Gently pry the Valve Body from the Base.
 - Use a flat-head screwdriver or other suitable tool.
 - Use care not to damage Gasket (89).
24. Remove the Material Hose from Adapter (87) on the Valve Body.

Additional Base Assembly Peripherals

25. Remove Setscrew (78) and Gasket (79) that secures Bearing (60) to the Base.
26. Remove Nut (76) and Lock Washer (75) that secures Shaft (55) to the Base.
27. Turn the pump assembly upright.
28. Remove Grommet (83) from the Base as required.

Motor and Body Assembly

29. Remove Screws (21) and Lock Washers (20) that secure Motor (23) to Gear Body (70).
 - Remove the Motor.
30. Remove Screws (66) and Lock Washers (18) that secure the Gear Body to the Base.
 - Remove the Body assembly.

Gear Train Assembly

31. Remove the Intermediate Gear Train and Shaft assembly from the Base.
32. Remove Spacer (53) from Shaft (55).
33. Remove the Shaft from Intermediate Gear Train (54).
34. Remove Thrust Washer (56) and O-Ring (57) from the Base.
35. Remove Piston (85) from its Cylinder.

NOTE: Do not lose Key (64) during next step.

36. Remove Ring Gear (72) [with attached components] from Worm and Shaft assembly (63).
37. Remove the Worm and Shaft assembly from Bearing (60).
38. Remove Thrust Washers (62) and (65) from the Worm and Shaft assembly.

39. Separate Connecting Link (73) and Spacer (77) from the Ring Gear.
40. Remove Bearing (60) from the Base.
 - Use care not mar the internal surface of the Bearing.

Disassembly

Planetary Gear Body

1. Remove both Shafts (67) that secure Planetary Gears (71) to Gear Body (70).
 - Use a punch and hammer.
2. Remove the Planetary Gears from the Gear Body.
3. Remove O-Rings (68) from each Shaft.
4. Remove Oil Seal (69) from the Gear Body.
 - Use an appropriate size socket and a small hammer.

Valve Body

NOTE: Refer to **Figure 2-C** for component identification.

5. Remove Gasket (89) from Valve Body (88).
6. Remove O-Ring (86) from Cylinder (85).
7. Unscrew the Cylinder from the Valve Body.
8. Remove Gasket (84) from the Valve Body.
9. Loosen Locknut (96).

***IMPORTANT:** Record the position of Spring Housing (97). Count and record the number of turns required to remove the Spring Housing from the Valve Body.*
10. Unscrew Spring Housing (97) from the Valve Body.
11. Remove Valve Retainer (94) from Spring (95).
12. Remove Relief Valve (93) from Valve Seat (92).
13. Unscrew the Valve Seat from the Valve Body.
 - Use care not to mar the surface of the ball seat.
14. Remove Gasket (91).
15. Unscrew Adapter (104) from the Valve Body.
16. Remove Gasket (105).
17. Remove Stem and Ball Assembly (107) and Spring (106) from the Valve Body.
18. Unscrew Bleed Valve Screw (102) from Bleed Valve Seat (103).

19. Unscrew the Bleed Valve Seat from the Adapter.
20. Unscrew Plug (90) from Valve Body as needed.

Pressure Switch

NOTE: Refer to **Figure 2-D** for component identification.

21. Loosen Locknut (126).

IMPORTANT: Record the distance from the top of the screw(125) and bottom of the bracket (129). Distance should be approximately 7/8" (22.2 mm). Refer to Figure 8.
22. Remove Screw (125) from Switch Body (119) and Bracket (129).

IMPORTANT: Overcome the spring tension during removal of the screw(125)

23. Remove Screws (128) and Lock Washers (127) that secure Electrical Switch (124) to the Bracket.
 - Remove the Electrical Switch.
24. Remove Spring (130) and Pilot and Disc Assembly (120) from the Switch Body.
25. Unscrew Plug (108) from the Switch Body.
26. Remove Gasket (109) from the Switch Body.
27. Remove Screw (110) from the Switch Body.
 - Use a wide blade tool.
28. Remove Leather Packing (113), Rubber Packing (112), and Washer (111) from the Screw.
29. Remove Copper Washer (114), Bushing (115), and Copper Gasket (116) from the Switch Body.
30. Remove Chrome Pin (117) from the Bushing.
31. Remove Actuator (118) from the Switch Body.

Clean and Inspect

1. Clean all metal parts in a modified petroleum-based solvent. The solvent should be environmentally safe.

2. Inspect all parts for wear and/or damage.
 - Replace as necessary.

Gear Train

3. Inspect the teeth of all gears for signs of wear. Use a magnifying glass to detect any score marks.
 - Replace as necessary.
4. Closely inspect the mating surfaces of all components for any imperfections.
 - Ensure a smooth and clean contact is obtained when assembled.

Assembly

NOTE: Prior to assembly, certain components require lubrication in clean oil. Refer to **Table 3** for details.

This section applies to the following sub-assemblies:

- Planetary Gear Body
- Pressure Switch
- Valve Body

For details on the Motor, refer to the section entitled **Motor Overhaul**.

Planetary Gear Body

NOTE: Refer to **Figure 2-B** for component identification.

1. Install and seat Oil Seal (69) [identification outward] into the front of Gear Body (70).
 - Use an appropriate size socket and a small hammer.
2. Install Planetary Gears (71) into the Gear Body.
3. Install O-Rings (68) onto each Shaft (67).
4. Lubricate each Shaft with grease.
5. Install and seat both Shafts that secure the Planetary Gears to the Gear Body.
 - Use a hammer.

IMPORTANT: Prior to installation, position the Planetary Gears in the Base as illus-

Item No. on Figure 2-B	Description	Item No. on Figure 2-C	Description	Item No. on Figure 2-D	Description
49	O-Ring, 3/4 " ID x 1 " OD	86	O-Ring, 1-5/16 " OD x 1-1/16 " ID	112	Packing (Rubber)
57	O-Ring, 7/16 " ID x 5/8 " OD	100	O-Ring, 13/16 " OD x 5/8 " ID	113	Packing (Leather)
61	O-Ring, 4-7/8 " ID x 5-1/8 " OD				
68	O-Ring, 9/16 " ID x 3/4 " OD				

Table 3 Components Lubricated with Clean Oil

trated in **Figure 6**. This setting prevents wear on the Armature shaft of the motor.

Pressure Switch

NOTE: Refer to **Figure 2-D** and **Figure 8** for component identification.

1. Position Switch Body (119) vertically with the product delivery hole upward.
2. Install and seat Actuator (118) [small diameter first] into the Switch Body.
 - NOTE:** Do not mix Copper Gasket (116) and Copper Washer (114). Copper Gasket (116) is slightly larger.
3. Install and seat Copper Gasket (116) into the Switch Body.
4. Install Chrome Pin (117) into the small outside diameter end of Bushing (115).
5. Install Copper Washer (114) onto the opposite end of the Bushing.
6. Install and seat Leather Packing (113), Rubber Packing (112) [small diameter first], and Washer (111) onto the Chrome Pin and onto the Bushing.
7. Install and seat the Bushing assembly (small diameter end first) into the Switch Body.
8. Install the Screw into the Switch Body.
 - Tighten the Screw sufficiently to properly crush the Gaskets.
 - Use a wide blade tool.
9. Install Gasket (109) into the Switch Body.

- Tighten securely.
11. Turn the Switch Body end for end.
 12. Install Pilot and Disc assembly (120) [large diameter first] into the Switch Body.
 13. Install Spring (130) into the Switch Body.
 14. Thread Locknut (126) onto Screw (125).

IMPORTANT: Overcome Spring pressure during installation of Screw (125).

15. Install Screw through Bracket (129) and into the Switch Body.
 - Make sure the Screw contacts the oblong side of the Bracket.
 - Thread the Screw until the Pilot and Disc assembly protrudes to the previously recorded distance.

NOTE: If unsure of the distance, set the Screw to create a gap of 1/4 " (6.4 mm). See **Figure 8**.

16. Tighten the Locknut securely.
17. Thread plunger of the Electrical Switch(124) through the Bracket(129). Thread the locknut onto the plunger and tighten to secure the switch to the bracket.

Valve Body

NOTE: Refer to **Figure 2-C** for component identification.

18. Position the Valve Body as illustrated in **Figure 2-C**.
19. Install Gasket (105) into the front of the Valve Body.

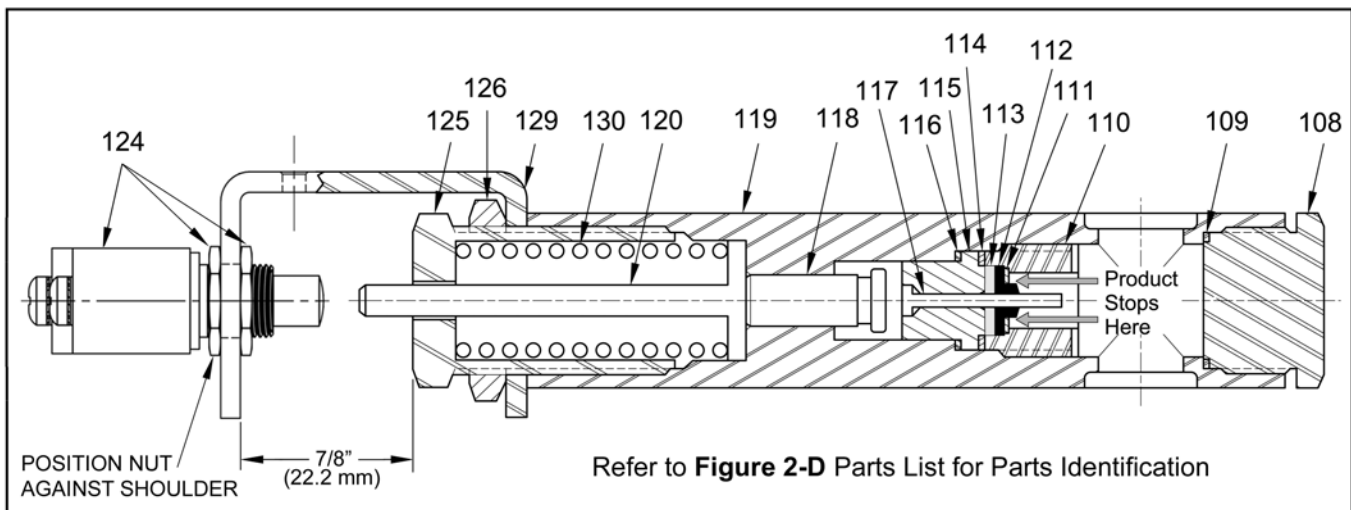


Figure 8 Pressure Switch Assembly - Section View

20. Install Adapter (**104**) into the Valve Body.
 - Tighten securely.

IMPORTANT: Do not apply thread sealant to the first two (2) threads of any connection. Contamination can occur.

21. Screw Bleed Valve Seat (**103**) [w/ thread sealant] into the Adapter.
 - Make sure the hole points downward.
22. Screw Bleed Valve Screw (**102**) into the Bleed Valve Seat until it seats.
23. Install and seat Gasket (**91**) into the right side bottom port of the Valve Body.

CAUTION

Begin to install Valve Seat (92) into Valve Body by hand. Cross threading can occur.

24. Screw Valve Seat (**92**) into the Valve Body.
 - Tighten securely.
25. Install Relief Valve (**93**) [stem first] into the Valve Seat.
26. Install Spring (**95**) into Spring Housing (**97**).
27. Thread Locknut (**96**) onto the Spring Housing.
28. Install Valve Retainer (**94**) [stem first] into the Spring.

IMPORTANT: Overcome Spring pressure during installation of the Spring Housing assembly.

29. Screw the Spring Housing assembly (to the depth of the previously recorded position) into the Valve Body.
 - Do not tighten the Locknut at this time.
30. Flip the Valve Body over.
31. Install and seat Spring (**106**) into Adapter (**104**).
32. Install Stem and Ball Assembly (**107**) [stem end first] into the Spring.
33. Install O-Ring (**86**) onto Cylinder (**85**).
34. Position Copper Gasket (**84**) onto the Valve Body.
35. Screw the Cylinder into the Valve Body.
 - Tighten securely to properly crush the Copper Gasket.

36. Position Gasket (**89**) to the Valve Body.
 - Hold in place with spots of grease.

Rebuild

NOTE: Refer to **Figures 2-A, 2-B, 2-C, and 2-D** for component identification on all Rebuild procedures.

Gear Train Assembly

1. Install Thrust Washer (**56**) and O-Ring (**57**) onto the bottom of Shaft (**55**).
 2. Install Intermediate Gear Train (**54**) {large diameter downward] onto the top of the Shaft.
 3. Install the Gear and Shaft assembly into the Base.
 - Make sure the Shaft seats properly.
 4. Install Bearing (**60**) [hole nearest end outward] into Base (**82**).
 - Make sure the hole aligns properly.
 5. From underneath the Base, install Lock Washer (**75**) and Nut (**76**) to secure the Shaft to the Base.
 - Tighten securely.
 6. Install Setscrew (**78**) and Gasket (**79**) to secure the Bearing to the Base.
 - Tighten securely.
 7. Install Plug (**74**) into the Base as required.
 - Tighten securely.
 8. Position the Base upright.
 9. Install Thrust Washer (**62**) onto the short end of the Worm and Shaft assembly.
 10. Install Thrust Washer (**65**) and Key (**64**) onto the long end of the Worm and Shaft assembly.
 11. Install the Worm and Shaft assembly [short end first] into the Bearing while engaging Intermediate Gear Train (**54**).
 - Make sure to keep the Key upright.
 12. Install Connecting Link (**73**) onto the eccentric of Ring Gear (**72**).
 13. Install Spacer (**77**) onto the Ring Gear.
- ### Valve Body, Gear Body, and Motor
14. Install Piston (**85**) into its Cylinder.
 15. Install the Valve Body assembly onto the Base.
 - Make sure Gasket (**89**) does not shift position.
 16. Install Screws (**80**) that secure the Valve Body

assembly to the Base.

- Tighten the Screws securely in an alternate pattern.

17. Hold Piston (85) in position to receive the Connecting Link on the Ring gear assembly.
18. Install the Ring Gear assembly onto the Worm and Shaft assembly while joining the Piston to the Connecting Link.
 - Make sure to align the keyway in the Ring Gear with the Key on the Worm and Shaft assembly.
19. Install O-Ring (61) into the Base.
 - Spot the O-Ring with grease to prevent movement.

CAUTION

Make sure the Planetary Gears are oriented properly (see Figure 6) and do not move during installation of the Gear Body assembly. Damage to components can occur.

20. Install the Gear Body assembly [notch upward] into the Shaft and Ring Gear.
21. Install Lock Washers (18) and Screws (66) that secure the Gear Body to the Base.
 - Tighten the Screws securely.
22. Install Motor (23) [vent hole downward] into the Gear Body.
 - Rotate the Motor as necessary to properly engage the Planetary Gears.
 - Guide the Terminal wire through the hole in the bottom of the Base and above Axle (27).
23. Install Lock Washers (20) and Screws (21) that secure the Motor to the Gear Body.
 - Tighten the Screws securely.
24. Install Grommet (83) [small diameter end first] into the front of the Base.

IMPORTANT: Do not apply thread sealant to the first two (2) threads of any connection. Contamination can occur.
25. Screw the Material Hose onto the 1/2 "-27 end of Adapter (87) [w/ thread sealant].
 - Tighten the Hose securely.
26. Guide Material Hose (10) through the Grommet.
27. Turn the pump assembly upward and face the bottom.
28. Screw the 1/4 " NPTF end of the Adapter [w/ thread

sealant] into the Valve Body.

- Tighten the Adapter securely.

Electrical Connection

29. Install Electrical Cord (7) through Grommet (35) in Rear Support (26) if removed.
 - Make sure to orientate Cable Clamp (33) properly.
 - Guide the Electrical Cord through the hole in the bottom of the Base and above Axle (27).
30. Install the four wires onto Electrical Switch (124). See **Figure 7**.
 - Tighten each screw securely.
31. Align Switch Housing (123) to Bracket (129) on the pressure switch.
32. Install Screws (121) to secure the Switch Housing to the Bracket.
 - Make sure to install the ground wire from the Electrical Cord.
 - Tighten the Screws securely.

Combine Pressure Switch with Valve Body

33. Install O-Rings (100) onto the top and bottom of Pressure Switch Assembly (101).
34. Install Gasket (99) onto Clamp Bolt (98).
35. Install the Clamp Bolt to secure the Pressure Switch Assembly to the Valve Body.
 - Position the Pressure Switch Assembly at an angle that fits freely underneath Base (82).
 - Tighten the Clamp Bolt securely.

Initial Test

36. Position the pump assembly upright once again.
37. Fill the Base with clean SAE 80W-90 (GL-5) gear oil to the fill mark on the Dipstick.
38. Check for leaks.
 - Correct as necessary.
39. Plug the Electrical Cord into a 120 V ac outlet.

The motor should energize and the gear train should operate. If either does not function properly, refer to the **Troubleshooting Chart**.
40. Check for leakage once again.
 - Correct as necessary.
41. Unplug the Electrical Cord.
42. Install Gasket (58) onto the Base.
43. Install Gasket (16) onto the Base.

- Make sure to position the cutout at Gasket (58).

44. Install Spacer (53) onto Shaft (55).

Helicoid Housing

45. Install O-Ring (49) onto the Shaft of Helicoid Flight Assembly (47).
46. Install the Shaft and Helicoid Flight Assembly into Helicoid Housing (50).
47. Install Gear (51) [concave upward] onto the Shaft.
 - Make sure to align the keyway in the Gear with the keyway on the Shaft.
48. Install Key (48) into the Shaft.
49. Install Screw (52) that secures the Gear to the Shaft and Helicoid Flight Assembly.
 - Tighten the Screw securely.
50. Install the Helicoid Flight assembly into the Base.
 - Make sure to align the teeth on both gears.
 - Make sure to align the delivery port on the Helicoid housing with the port on the Base.
51. Install Gasket (16) onto the Helicoid Housing.

Container and Accessories

52. Install Container (4) [weldnuts toward rear] and Reinforcement Rings (3) onto the Helicoid Housing.
53. Install Screws (2) that secure the Reinforcement Rings, Container, and the Helicoid Housing to the Base.
 - Tighten the Screws securely in an crisscross pattern.
54. Align Disc (44) to the hole pattern on the Helicoid Housing.
55. Install Lock Washers (20) and Screws (36) that secure the Disc to the Helicoid Housing.
 - Tighten the Screws securely.

Initial Priming

NOTE: Fill the center of the Helicoid Housing with gear oil. Oil allows the pump to prime quickly. *

To open the priming mechanism:

56. Turn the **Bleed Valve Screw** counterclockwise. See **Figure 9**.

CAUTION

Do not operate the pump longer than 2 minutes. Should pressure settings be incorrect, damage to components can occur.

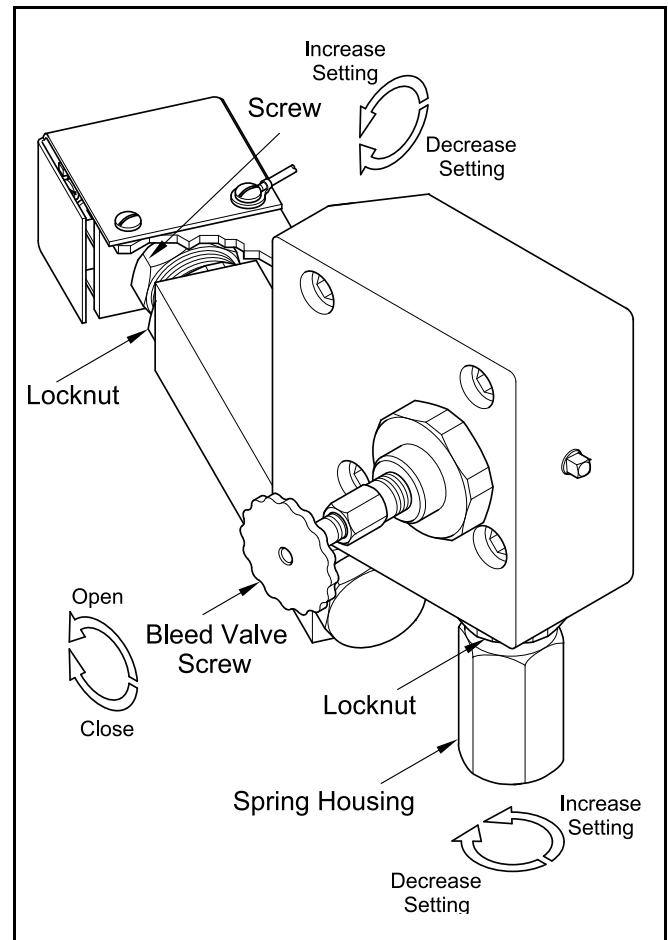


Figure 9 Priming Mechanism, Pressure Switch, and Emergency Bypass Mechanism Adjustments

* If the Container is not empty, attempt to prime the pump with product.

57. Plug the Electrical Cord into a 120 V ac outlet.
58. View the orifice at the Bleed Valve for product.

If the pump will not prime, refer to the **Troubleshooting Chart** for details.

Once the stream of product runs free of bubbles:

59. Turn the **Bleed Valve Screw** completely clockwise.
 - This closes the priming mechanism.
60. Unplug the Electrical Cord.

Complete the Rebuild Assembly

61. Install Blade and Helix Arm Assembly (46) into the Helicoid Flight Assembly.
 - Make sure the components are aligned properly.
62. Install Washer (18) and Screw (45) to secure the Blade and Helix Arm Assembly to the Shaft of the Helicoid

Flight Assembly.

- Tighten the Screw securely.

63. Position Nut (5) within the Container bracket.
64. Screw Rod (6) from the bottom of the bracket, into the Nut and secure the Rod with an additional Nut.
65. Install Handle Assembly (11) to Rear Supports (22 and 26).
 - Do not tighten Setscrews (19) at this time.
66. Align Bracket Assembly (14) to the Handle Assembly.
67. Install Screws (15) to secure the Bracket Assembly to the Handle Assembly.
 - Do not tighten the Screws at this time.
68. Install Washers (13) and Screws (12) to secure the Bracket Assembly to the Container.
 - Tighten all Screws securely.

IMPORTANT: Do not apply thread sealant to the first two (2) threads of any connection. Contamination can occur.

69. Screw the 1/2 " -27 end of Z-Swivel (9) [with thread sealant] into the Material Hose as necessary.
 - See **Figure 5**.
 - Tighten securely.
70. Screw the Z-Swivel (9) [with thread sealant] onto Control Valve (8).
 - Tighten securely.

Final Priming*

CAUTION

Do not operate the pump longer than 2 minutes. Should pressure settings be incorrect, damage to components can occur.

71. Add product to the Container.

NOTE: Do not allow air to mix with the product during the filling process. Pump may lose prime.

72. Place the Control Valve assembly into a collection container.
73. Plug the Electrical Cord into a 120 V ac outlet.

IMPORTANT: Do not allow the Container to run dry of oil. Pump prime will be lost.

* If product was used for initial priming, it is not necessary to eliminate oil from the system.


74. Allow the pump to run until product appears and is free of air.
75. Unplug the Electrical Cord.

Operation and Adjustments

Check Pressure Settings

1. Plug the Electrical Cord into a 120 V ac outlet to start the pump.

If the pump does not start or cycles intermittently, refer to the **Troubleshooting Chart**.



WARNING

Use the high-pressure gauge assembly to check pressure settings. The use of an alternate tool may cause personal injury.

2. Attach the Control Valve to the high-pressure test gauge assembly (special tool). See **Figure 10**.
 - Check to ensure the **Bleed Screw** is closed.
3. Operate the Control Valve and allow the pump to turn off.

Pressure Switch Off Setting

4. Once the pump stops read the gauge.

The reading must be between 4800 and 5400 psi (331-372 Bars).

If the pump continues to cycle, refer to the **Troubleshooting Chart**.

*IMPORTANT: The Pump may not shut off because product is recirculating the Emergency Bypass loop. Tighten the **Spring Housing** (Increase Setting) into the Valve Body. See **Figure 9**.*

Pressure Switch Adjustment

If the reading is too low:

5. Unplug the Electrical Cord.

6. Loosen the **Locknut** on the pressure switch **Screw**. See **Figure 9**.
7. Tighten the **Screw** into the Switch Body.
 - This increases the amount of tension on the Spring.

If the reading is too high:

8. Loosen the **Screw** from the Switch Body.
9. Tighten the **Locknut** on the Pressure Switch.

Check for Leakage

View the gauge for 30 seconds for pressure drop. A decrease greater than 100 psi (6.9 Bars) indicates leakage and requires troubleshooting.

Pressure Switch On Setting

10. Plug the Electrical Cord into the outlet.
11. While Holding the Control Valve open, open the **Bleed Screw** slightly on the gauge assembly.
12. Read the gauge once the pump turns on.

The reading must be between 3200 and 3900 psi (220.7-269 Bars).

If the reading is not to specifications, replace Pressure Switch Spring (130). See **Figure 2-D**.

13. Close the **Bleed Screw** on the gauge assembly.

Emergency Bypass Mechanism Adjustment

14. Once again, operate the Control Valve and allow the pump to turn off.
15. Loosen the **Locknut** on the **Spring Housing**, if necessary. See **Figure 9**.
16. Slowly loosen the **Spring Housing** from the Valve Body until the pump starts.

Product is now recirculating in the emergency bypass loop.

17. Unplug the Electrical Cord.
18. Remove the Control Valve from the high-pressure test gauge assembly.
19. Tighten the **Spring Housing** (Increase Setting) into the Valve Body two (2) turns.

This approximates a pressure setting of 6500 psi (448.3 Bars).

20. Tighten the **Locknut**.

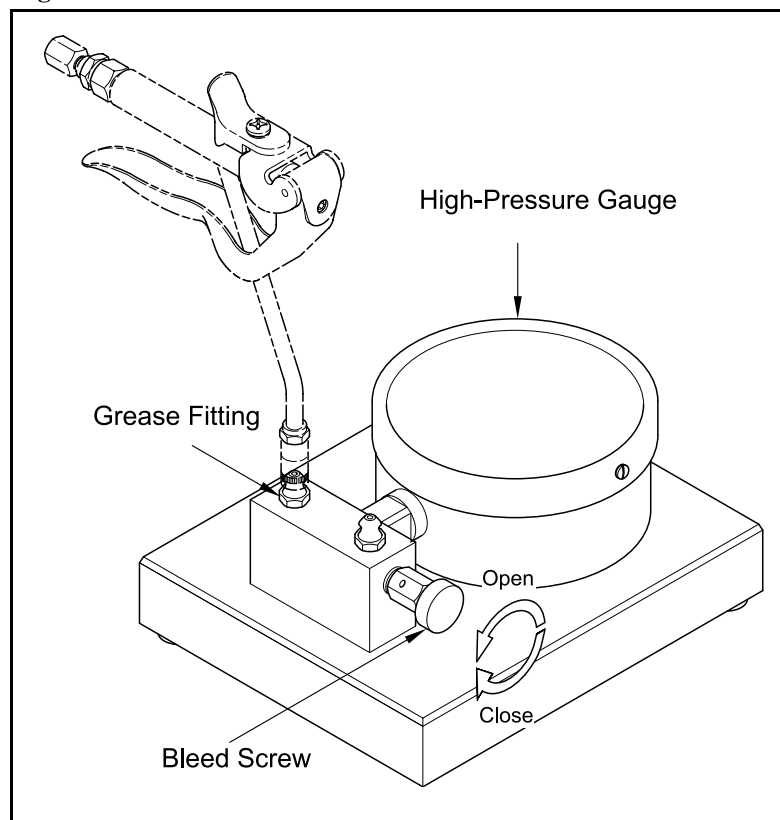


Figure 10 High-Pressure Test Gauge Assembly - Model 5287

Motor Overhaul

NOTE: For information on motor removal, refer to the section entitled **Remove and Replace Motor**.

Disassembly

NOTE: Refer to **Figure 11** for component identification.

1. Remove Bushing (7) from Motor Housing (18).
 - Use a flat-head screwdriver and small hammer.
 - Remove the Bushing from the wire.
2. Unscrew Caps (9) from Brush Holder Assembly (11).

IMPORTANT: Record the direction of Brush and Spring Assembly (10). Brushes wear unevenly and must be replaced in the proper direction in their respective Holder.

3. Remove each Brush and Spring Assembly from the Brush Holder Assembly.
4. Remove Screws (1) that secure End Housing (2) to Motor Housing (18).
 - Remove the End Housing.
5. Remove Loader Spring Washer (3) from Armature (5).
6. Remove the Armature from the Motor Housing.

CAUTION

Use a puller to remove Bearings (4) from the Armature shaft. Alternate methods of removal can cause damage to components.

7. Pull the Bearings from each end of the Armature shaft.
8. Remove Retaining Ring (6) from the Armature shaft.
9. Remove Screws (14) that secure Baffle (15) to the Motor Housing.
 - Remove the Baffle and Spacer (13).
10. Remove Terminal Wire Connectors (17) from each Brush Holder assembly (11).
 - Use needle-nose pliers.
11. Remove Field Assembly (16) from the Motor Housing.
12. Remove Washers (12) from each Brush Holder assembly.

13. Remove Setscrews (8) that secure the Brush Holder assembly to the Motor Housing.
14. Remove the Brush Holder assembly.
 - Position an appropriate size socket on the assembly from inside the Motor Housing. Place an extension on the socket through the opposite opening in the Housing. Tap the extension with a small hammer.

Clean and Inspect

1. Clean all metal parts in a modified petroleum-based solvent. The solvent should be environmentally safe.
2. Inspect all parts for wear and/or damage.
 - Replace as necessary.
3. Closely inspect the teeth on the Armature shaft for signs of wear.
 - Make sure the teeth are free of nicks.

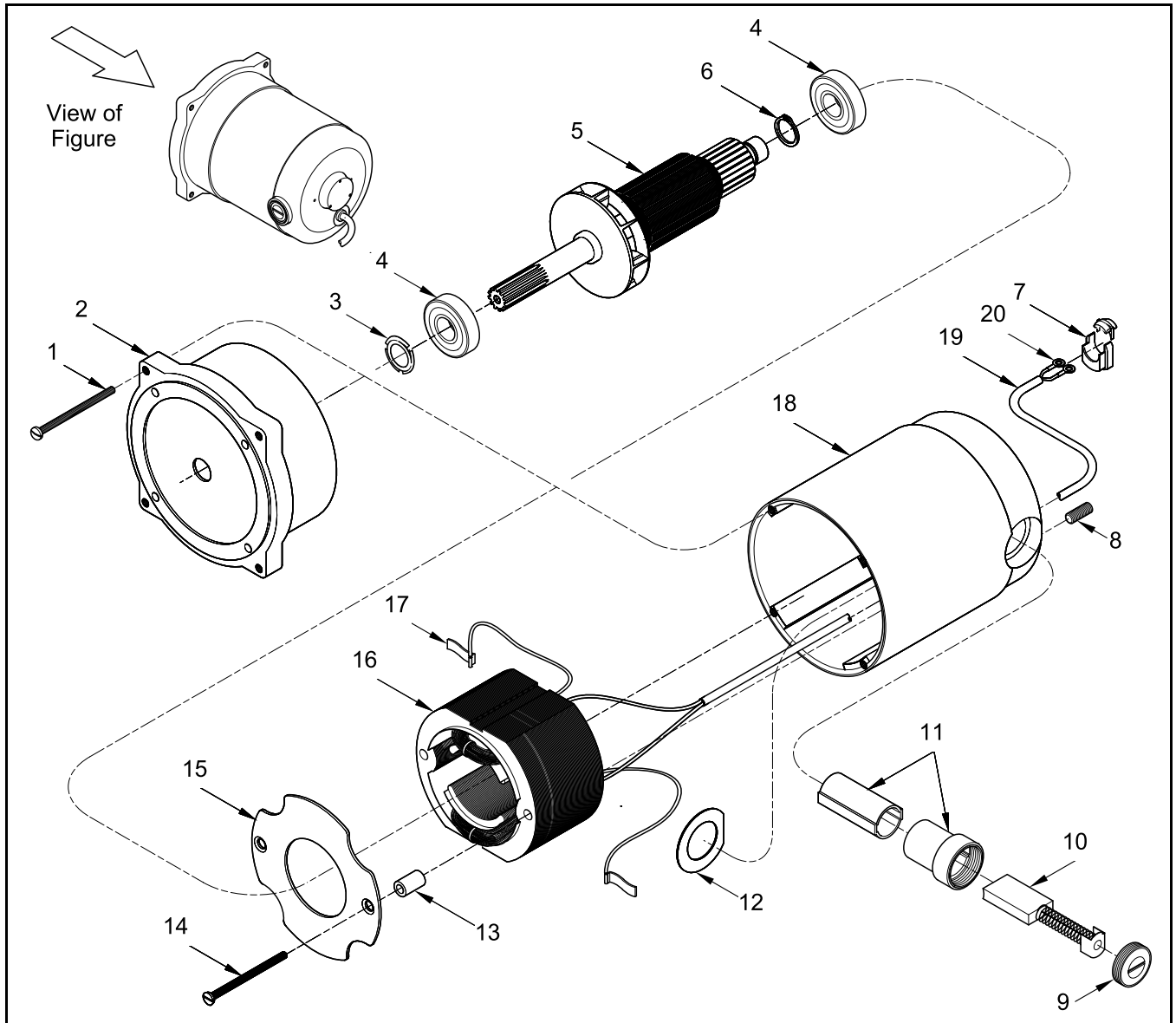
*IMPORTANT: Should the teeth on the Armature shaft show excessive wear, inspect the Gear Body for worn and/or misaligned gears. Refer to section entitled **Remove and Replace Motor** for details.*

4. Discard any Brush and Spring Assembly (10) that is less than 3/16 " [4.8 mm] long. Replace Brushes as a set.

Assembly

NOTE: Refer to **Figure 11** for component identification.

1. Install and seat each Brush Holder assembly (11) into Motor Housing (18).
 - Make sure the grooved slots run parallel with the length of the Motor Housing.
2. Install Setscrews (8) into the Motor Housing.
 - Tighten the Setscrews securely.
3. Install Washers (12) onto each Brush Holder assembly.
 - Make sure the flat side faces the bottom of the Motor Housing.
4. Guide the main wire of Field assembly (16) through the bottom access hole in the Motor Housing.
5. Position Terminal Wire Connectors (17) toward each Brush Holder while installing the Field Assembly.
 - Make sure the Field Assembly holes align properly with the Motor Housing.



Item No.	Part No.	Description	Qty	Item No.	Part No.	Description	Qty
1		Screw, 8-32 x 2 "	4	11		Holder Assembly, Brush	2
2		Housing, End	1	12		Washer	2
3		Washer, Loader Spring (Special)	1	13		Spacer	2
4		Bearing	2	14		Screw, 10-24 x 3-1/2 "	2
5		Armature	1	15		Baffle	1
6		Ring, Retaining	1	16		Field Assembly	1
7		Bushing	1	17		Connector	2
8		Setscrew, 10-24	2	18		Housing, Motor	1
9	393483-6	Cap	2	19		Cord	1
10	393483-7	Brush and Spring Assembly	2	20		Terminal (not part of assembly)	2

Legend:
Part numbers left blank are not available separately

Figure 11 Motor - Exploded View

6. Slide and seat the Terminal Wire Connectors into each Brush Holder assembly.
 - Make sure the dimple on the Connector faces downward.
 - Use needle-nose pliers.
7. Align Spacers (13) and Baffle (15) with the holes in the Field Assembly.
8. Install Screws (14) to secure the Baffle to the Motor Housing.
 - Tighten the Screws securely.
9. Install Retaining Ring (6) onto the shaft of Armature (5).
10. Press each Bearing onto the ends of the Armature shaft.
 - Make sure to fully seat each Bearing.
11. Install the Armature assembly into the Motor Housing.
 - Make sure the Bearing seats properly.
12. Install Loader Spring Washer (3) over the Armature shaft.
13. Install End Housing (2) onto the Armature.
 - Make sure the Bearing seats properly.
 - Make sure the End Housing holes align properly with the Motor Housing.
14. Install Screws (1) to secure the End Housing to the Motor Housing.
 - Tighten the Screws securely.
15. Install the appropriate Brush and Spring Assembly (10) into its proper Brush Holder Assembly.
 - Make sure the direction of the Brush is correct.
16. While seating the Brush and Spring Assembly, screw Caps (9) into the Brush Holder Assembly.
17. Install Bushing (7) over the wire and into the Motor Housing.
 - Make sure the small diameter faces the Motor Housing.
 - Use a punch and small hammer.

CAUTION

Use a press to install Bearings (4) onto the Armature shaft. Alternate methods of installation can cause damage to components.

Troubleshooting Chart

Pump Indications	Possible Problems	Solution
Pump does not start	1. Defective Electrical Switch (124) 2. Motor terminal wires not contacting Electrical Switch (124) 3. Defective Electrical Cord (7) 4. Motor not operating properly 5. Gear train jammed and/or contains loose components	1. Replace Electrical Switch (124) 2. Secure terminal wires to Electrical Switch (124) 3. Replace Electrical Cord (7) 4. Inspect motor and rebuild or replace as required 5. Inspect gear train
Pump will not prime	1. Air within the fluid-wetted path 2. Pump leaking internally	1. Remove grease from fluid-wetted path and fill with oil 2. See Internal Leaks
Pump cycles continuously, or intermittently	1. Pressure Switch Assembly (101) not adjusted correctly and/or Emergency Bypass mechanism not adjusted correctly 2. Defective Electrical Switch (124) 3. Pump leaking internally 4. Pump leaking externally	1. Adjust settings 2. Replace Electrical Switch (124) 3. See Internal Leaks 4. See External Leaks

Troubleshooting Chart - Continued

Pump Indications	Possible Problems	Solution
External Leaks		
Product leakage visible at Pressure Switch Assembly (101)	<ol style="list-style-type: none"> 1. Clamp Bolt (98) not sufficiently tight 2. Worm or damaged O-Rings (100) 3. Damaged Gasket (99) 4. Pressure Switch Plug (108) not sufficiently tight 5. Damaged Gasket (109) 6. Screw (110) not sufficiently tight 7. Worm or damaged Packings (112) and /or (113) 8. Damaged Gaskets (114) and/or (116) 	<ol style="list-style-type: none"> 1. Tighten Clamp Bolt (98) 2. Replace O-Rings (100) 3. Replace Gasket (99) 4. Tighten Plug (108) 5. Replace Gasket (109) 6. Tighten Screw (110) 7. Replace Packings (112) and /or (113) 8. Replace Gaskets (114) and/or (116)
Product leakage visible at Valve Body (88)	<ol style="list-style-type: none"> 1. Valve Body Screws (80) not sufficiently tight 2. Damaged Gasket (89) 3. Clamp Bolt (98) not sufficiently tight 4. Bleed Screw Adapter (104) not sufficiently tight 5. Damaged Gasket (105) 6. Bleed Valve Seat (103) not sufficiently tight and/or incorrect or no sealant 7. Adapter (87) not sufficiently tight and/or incorrect or no sealant 8. Plug (90) not sufficiently tight 	<ol style="list-style-type: none"> 1. Tighten Screws (80) 2. Replace Gaskets (84) 3. Tighten Clamp Bolt (98) 4. Tighten Adapter (104) 5. Replace Gasket (105) 6. Apply thread sealant* to Bleed Valve Seat (103) and tighten the Seat into Adapter (104) 7. Apply thread sealant* to Adapter (87) and tighten the Adapter into Valve Body (88) 8. Tighten Plug (90)
Product leakage visible at Bleed Valve Screw (102)	<ol style="list-style-type: none"> 1. Bleed Valve Screw (102) open 2. Damaged Bleed Valve Screw (102) 3. Damaged Bleed Valve Seat (103) 	<ol style="list-style-type: none"> 1. Close Bleed Valve Screw (102) 2. Replace Bleed Valve Screw (102) 3. Replace Bleed Valve Seat (103)
Product leakage visible at Base (82)	<ol style="list-style-type: none"> 1. Base Screws (2) not sufficiently tight 2. Damaged Gasket (58) 3. Damaged Gasket (16) 	<ol style="list-style-type: none"> 1. Tighten Screws (2) 2. Replace Gasket (58) 3. Replace Gasket (16)
Sump oil leakage visible at Base (82)	<ol style="list-style-type: none"> 1. Gear Body Screws (66) not sufficiently tight 2. Worm or damaged O-Ring (61) 3. Shaft Nut (76) not sufficiently tight 4. Worm or damaged Shaft O-Ring (57) 5. Setscrew (78) not sufficiently tight 6. Damaged Gasket (79) 7. Drain Plug (74) not sufficiently tight 	<ol style="list-style-type: none"> 1. Tighten Screws (66) 2. Replace O-Ring (61) 3. Tighten Nut (76) 4. Replace O-Ring (57) 5. Tighten Setscrew (78) 6. Replace Gasket (79) 7. Tighten Drain Plug (74)
Sump oil leakage visible at Gear Body (70)	<ol style="list-style-type: none"> 1. Worm or damaged Oil Seal (69) 2. Worm or damaged Shaft O-Rings (68) 	<ol style="list-style-type: none"> 1. Replace Oil Seal (69) 2. Replace O-Rings (68)
Internal Leaks		
Pump does not prime or cycles continuously, or intermittently	<ol style="list-style-type: none"> 1. Foreign material between Pump Check Valve (107) and Cylinder (85) 2. Cylinder (85) not sufficiently tight 3. Damaged Gasket (84) 4. Worn or damaged Pump Check Valve (107) 5. Worn or damaged Piston and Cylinder Assembly (85) 6. Worn or damaged Spring (106) 7. Foreign material between Emergency Bypass Relief Valve (93) and Valve Seat (92) 8. Valve Seat (92) not sufficiently tight 9. Damaged Gasket (91) 10. Worn or damaged Emergency Bypass Relief Valve (93) 11. Worn or damaged Valve Seat (92) 12. Worn or damaged Spring (95) 	<ol style="list-style-type: none"> 1. Locate and eliminate source of foreign material. 2. Tighten Cylinder (85) 3. Replace Gasket (84) 4. Replace Pump Check Valve (107) 5. Replace Piston and Cylinder Assembly (85) 6. Replace Spring (106) 7. Locate and eliminate source of foreign material. 8. Tighten Valve Seat (92) 9. Replace Gasket (91) 10. Replace Emergency Bypass Relief Valve (93) 11. Replace Valve Seat (92) 12. Replace Spring (95)
Product mixes with sump oil	<ol style="list-style-type: none"> 1. Worm or damaged Piston and Cylinder O-Ring (86) 2. Worm or damaged Piston and Cylinder Assembly (85) 3. Damaged Shaft and Helicoid Flight Assembly O-Ring (49) 	<ol style="list-style-type: none"> 1. Replace O-Ring (86) 2. Replace Piston and Cylinder Assembly (85) 3. Replace O-Ring (49)
* Do not apply thread sealant to the first two (2) threads. Contamination can occur.		

Changes Since Last Printing

Deleted 305174 Gasket

