

Proportioning Pumps

312068F

Proportioning pumps and hydraulic cylinders used on Hydraulic Proportioners.



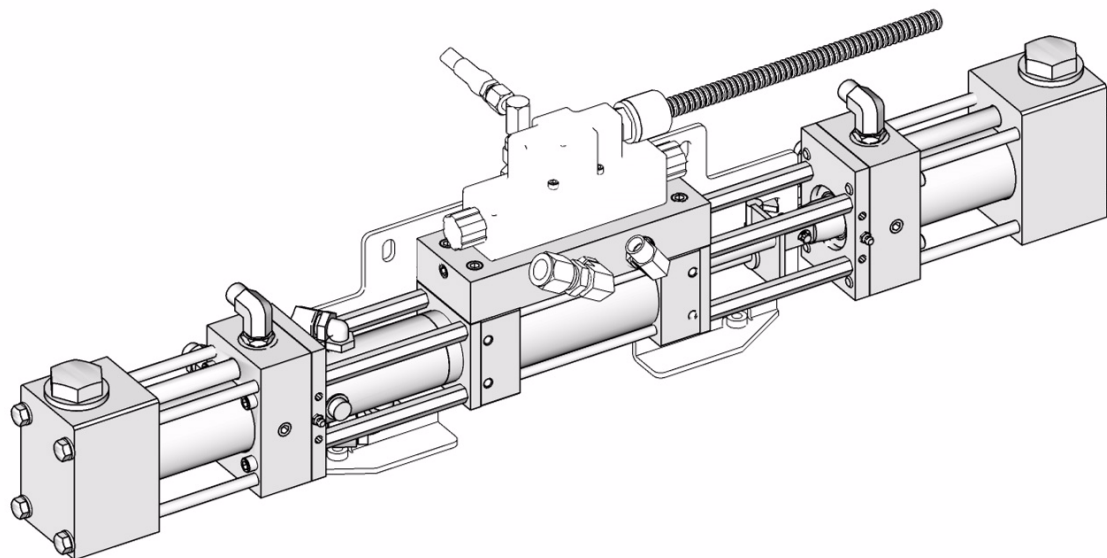
Important Safety Instructions

Read all warnings and instructions in this manual and in manuals 312062 and 312063. Save both sets of instructions.

Model 247576: 2000 psi (13.8 MPa, 138 bar) Maximum Working Pressure

All other models: 3500 psi (24.0 MPa, 240 bar) Maximum Working Pressure

See page 2 for model information.



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Models

Part, Series	Cylinder Size
247371, A	#30
247372, A	#40
247373, A	#48
247374, A	#60
247375, A	#80
P7758-255773, A	#80
247577, A	#88
247376, A	#96
247377, A	#120
247576, A	#140





Repair

Flushing

						
Flush equipment only in a well-ventilated area. Do not spray flammable fluids. Do not turn on heaters while flushing with flammable solvents.						

- Flush out old fluid with new fluid, or flush out old fluid with a compatible solvent before introducing new fluid.
- Use lowest possible pressure when flushing.
- To flush entire system, circulate through gun fluid manifold (with manifold removed from gun).
- Always leave some type of fluid in system. Do not use water.

Pressure Relief Procedure

						
Trapped air can cause the pump to cycle unexpectedly, which could result in serious injury from splashing or moving parts.						

1. Select **Park** on Pump Control Switch if available, or turn off.
2. Turn off feed pumps.
3. Trigger gun to relieve pressure.
4. Close gun inlet valves.
5. Close fluid supply inlet valves.
6. Service spray gun. See corresponding spray gun manual.

Preventive Maintenance

When pumps are functioning properly, it is not unusual for a trace amount of resin to seep past the pump packing onto the resin pump shaft. Routinely inspect shaft and wipe away any residue when the proportioner is turned off. Disassemble and clean the proportioning pumps annually. Inspect the pistons and cylinder for marks or scratches, which may cause leakage and damage to packings. Replace all packings, o-rings, expanders, and packing springs annually.

Pump Base Disassembly



Disassemble and clean pump base annually.

1. Relieve pressure, page 2.
2. Turn OFF the main disconnect and lock out power at the source.
3. Remove pump cap (19) from pump base (23), and remove o-ring (6):
 - a. Remove outlet ball (4) and o-ring (9).


- b. Remove inlet ball cage (14), spring (22) and inlet ball (10).
- c. Remove inlet ball seat (11) and o-ring (9) from bottom of cavity.
- d. Thoroughly clean all metal parts in a compatible solvent and inspect for wear or damage. Inspect each ball and seat for nicks or scratches; replace as required.
- e. Replace all o-rings. Kit 261859 contains all o-rings for pump base rebuild.

Pump Base Reassembly

1. Install inlet valve in pump base by inserting o-ring (9), inlet ball seat (11), ball (10), spring (22), and inlet ball cage (14) into pump base cavity. See **Parts** on page 14.
2. Install outlet valve in pump base:
 - a. Install o-ring (9) and valve ball (4) into the cavity.
 - b. Install the o-ring (6) on pump cap (19). Install and tighten cap to pump base. Torque to 75 ft-lb (101.3 N•m).

Piston and Cylinder Seals



 Piston Seal and Cylinder Seal Repair Kits are available. See Table 1 on page 15 to order the correct kits for your pump. Also see kit manual 312071.

Disassembly

1. Relieve pressure, page 2.
2. Turn OFF the main disconnect and lock out power at the source.
3. Disconnect the pump inlet and outlet lines; see your proportioner repair manual. Remove the four screws (30) holding the pump outlet flange (26) to the hydraulic cylinder. Disconnect pump from drive and take pump assembly to a workbench.
4. Remove the four bolts (8) and washers (5). See **Parts** on page 14.
5. Remove the flange retainer (27), gasket (17), bushing (13), and adapter ring (29).
6. Use a soft-faced mallet to help separate pump base (23) and outlet flange (26) from cylinder (12). Remove crossover tube (24)
7. Remove piston from cylinder bore. Remove piston cap bolt (25), then slide bushing (18) and u-cup seal (15) from rod.
8. Thoroughly clean all parts in a compatible solvent and inspect for wear or damage. Replace as required.

Reassembly

CAUTION

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

1. Install piston rod seal; ensure u-cup faces piston rod as shown in FIG. 1.



FIG. 1: U-Cup Orientation

2. Assemble piston head to piston rod. Tighten piston head; see Torque Specification table for torque according to pump size.



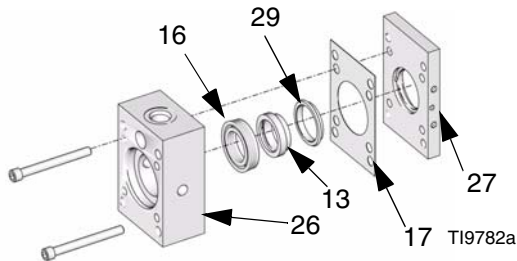
FIG. 2: Piston Head and Rod

Torque Specification

Pump Size	Torque
30	130 in-lb (14.7 N•m)
40, 48, 60	22 ft-lb (29.7 N•m)
80, 88, 96, 120, 140	45 ft-lb (60.8 N•m)

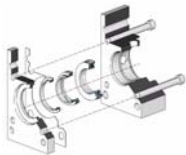
3. Assemble the piston parts on the piston shaft, using the new parts in the piston seal kit. Apply supplied thread locker to piston bolt and torque to spec on **Parts** drawing, page 14.

- Using supplied bolts in the cylinder seal kits, press seal (16) into outlet flange (26). Ensure seal faces cylinder. Assemble bushing (13) throat seal (29) and flange adapter (29) into flange retainer (27) and fasten to outlet flange.



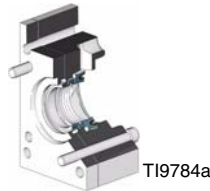
- Ensure plate is parallel with block. Carefully tighten screws until plate is flush with block. Be sure to press seal straight into bore.

Seal Alignment



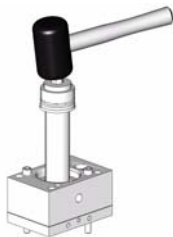
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Pressed Seal



TI9784a

- Insert piston rod (28) through throat seal (29) on front of block.



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- Place assembly on a spacer, such as a 2 in. (51 mm) wide roll of tape, and tap piston rod (28) through throat seal (29) and bearing.

CAUTION
Keep rod straight to prevent damage to throat seal.



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- Assemble o-rings (1) to cylinder (12), and lubricate with grease.
- Tap cylinder (12) onto piston rod (28) as shown in the following figure. Be careful to not score piston seal. Continue tapping cylinder until it seats in bore of outlet flange (26).

Use grease to aid in insertion of piston rod into cylinder.



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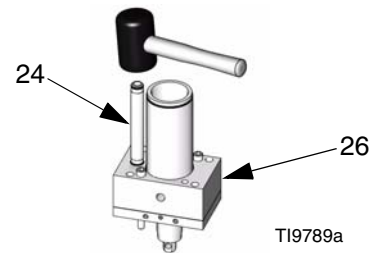
Cylinder Assembly



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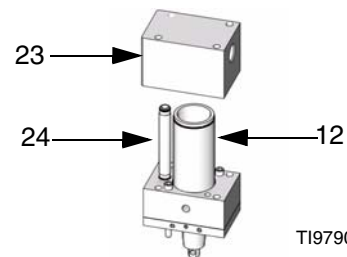
Seat Cylinder in Bore

- Assemble o-rings (2) to crossover tube (24) and lubricate with grease. Insert crossover tube into outlet flange (26). Softly tap crossover tube into bore until it seats.



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- Carefully align cylinder (12) and crossover tube (24) to bores in pump base (23). Tap pump base until the cylinder is fully seated in bore.




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- Install four bolts (8) and washers (5). Torque to 45 ft-lb (60.8 N•m).

Hydraulic Cylinder



 For repairs, order Hydraulic Cylinder Repair Kit 296875.

Disassembly

Tools Required

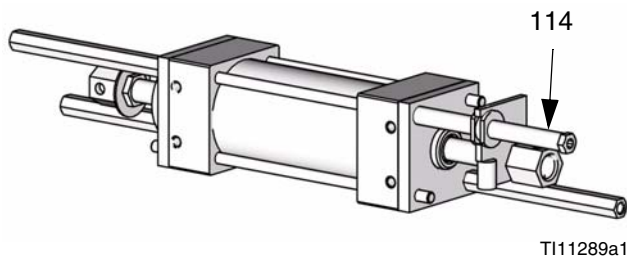
- Two - 1 in. open-end wrench
- Two - 1/2 in. open-end wrench
- O-ring pick


1. Relieve pressure, page 2.
2. Turn OFF the main disconnect and lock out power at the source.

CAUTION

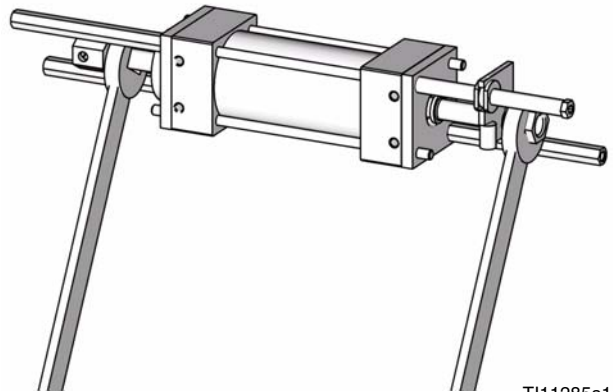
In the following step, attach the clamps to the port blocks of the assembly. Attaching clamps to any other part of the assembly may result in significant damage when breaking loose the baffle jam nut and clevis.

3. Clamp the hydraulic cylinder to a flat surface using c-clamps or another strong clamping device, ensuring that the cylindrical spacer (114) is to the right.
4. Using the 1/2 in. open-end wrenches, loosen and remove four hexagonal spacers (113) to create room to rotate the clevises.



 The clevises and the baffle jam nut were installed with high strength thread sealant. The following steps will require significant force to break loose the baffle jam nut and clevises.

5. Using the 1 in. open-end wrench and the 1 in. impact wrench, rotate the baffle jam nut away from the right clevis until one of them breaks loose.



If the left clevis and baffle jam nut break loose from the hydraulic piston shaft:

6. Remove the clevis and baffle jam nut.
7. Remove the lubricator adapter (120).
8. Loosen and remove the remaining hex spacers (113) and smooth spacer (114), keeping the tie rods in place.
9. Remove the left retainer plate (101).
10. Remove the tie rods (115).
11. Remove the left port block and rod bushing assembly.
12. Slide the piston and everything attached to it out the right side of the cylinder by holding the assembly by the cylinder and pushing the left end of the piston shaft against a flat surface.
13. Using a c-clamp, secure the port block (116) of the remaining assembly.
14. Keeping the piston shaft from rotating using a 1/2 in. wrench on the piston shaft flats and using a 1 in. impact wrench on the right clevis, break loose and remove the right clevis.
15. Remove the activator plate (119) and modified bushing (118).
16. Remove the retainer plate (101).
17. Remove the right port block and rod bushing assembly.

18. Remove the rod bushings (103) from the port blocks (116).
19. Using the o-ring pick, remove all rings and seals.

If the right clevis breaks loose from the hydraulic piston shaft:

6. Remove the right clevis.
7. Remove the activator plate (119) and modified bushing (118).
8. Remove the right retainer plate (101).
9. Remove the tie rods (115).
10. Remove the right rod bushing and port block assembly.
11. Slide the piston and everything attached to it out the left side of the cylinder by holding the assembly by the cylinder and pushing the right end of the piston shaft against a flat surface.

12. Using a c-clamp, secure the port block (116) of the remaining assembly.
13. Break the baffle jam nut (122) loose from the hydraulic piston shaft.
14. Keeping the piston shaft from rotating using a 1/2 in. wrench on the piston shaft flats and using a 1 in. impact wrench on the left clevis, break loose and remove the left clevis.
15. Remove the left retainer plate (101).
16. Remove the left port block and rod bushing assembly.
17. Remove the rod bushings (103) from the port block (116).
18. Using the o-ring pick, remove all rings and seals.

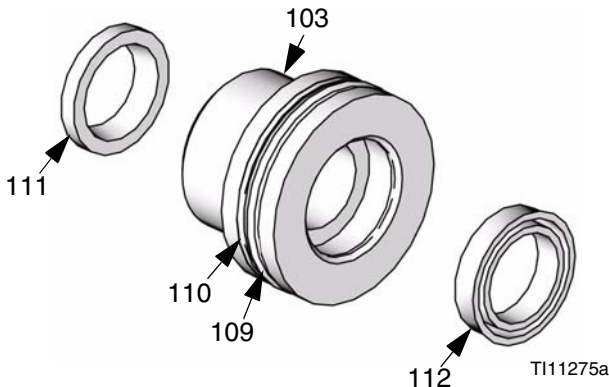
Reassembly

Tools Required

- Torque wrench set to 15 ft-lb (20 N•m) with 1 in. open-end attachment and 1/2 in. socket attachment
- 1 in. open-end wrench
- 1/2 in. open-end wrench
- Rod tool 15T066 included in repair kit 298785

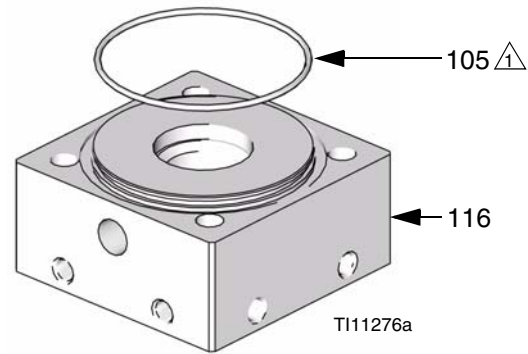
Assemble Rod Bushing to Port Block


1. Insert black o-ring (109) into the outside groove of rod bushing (103).
2. With the wide end of the rod bushing facing down, insert white back-up ring (110) above o-ring (109) in the same groove.
3. With the lip facing out, push one rod wiper (111) into the small end and one shaft seal (112) into the big end of the rod bushing.



4. Place port block (116) on a flat surface with the large opening facing up.
5. Using your hands, push the wide end of the rod bushing into port block (116).

6. On the side opposite the rod bushing, place o-ring (105) around the extruding circle.

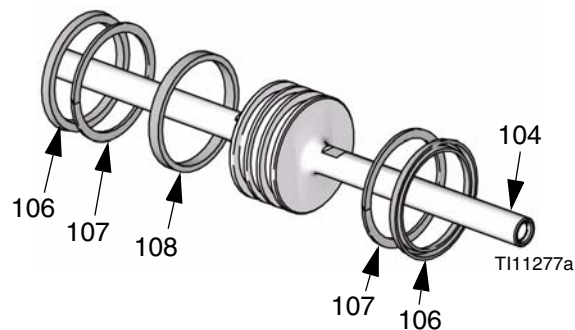


 Apply lithium grease to o-ring.

7. Repeat the steps above to assemble the second rod bushing/port block assembly.

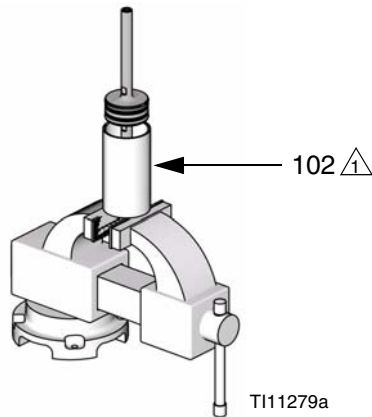
Assemble Hydraulic Piston and Insert in Cylinder

8. Place wear ring (108) in the center channel of hydraulic piston (104).
9. With the lip facing away from the center channel, place one u-cup seal (106) in each of the remaining two channels of the hydraulic piston.
10. Place one back-up ring (107) in the same channel as each of the u-cup seals on the side facing the center channel.



Insert Piston into Cylinder

- Slide the hydraulic piston into the cylinder (102). If necessary, rest the cylinder on a vise or similar surface while pushing the piston into it.



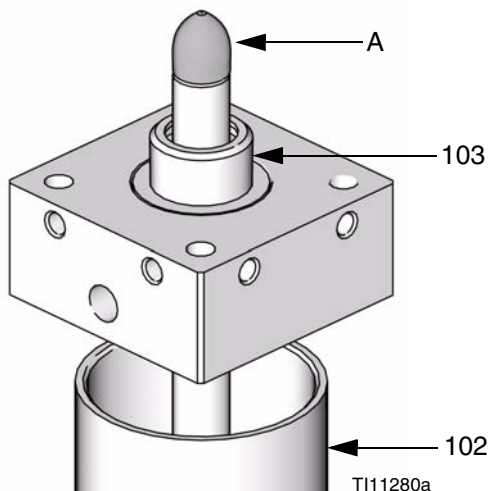
⚠ Apply lithium grease to the inside of each end of the cylinder.

Assembling Items onto Piston Shaft

CAUTION

In the following step, the rod tool must be used to avoid scratching the shaft seal.

- Place the rod tool (A) in one end of the hydraulic piston shaft (104).
- With the rod bushing (103) facing away from the cylinder (102), slide the port block and rod bushing assembly over the rod tool and onto the shaft.

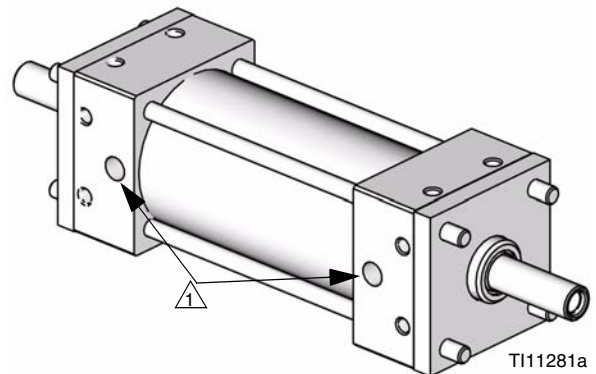


- Remove the rod tool from the shaft.

- Repeat with the other port block on the opposite end of the hydraulic piston shaft.

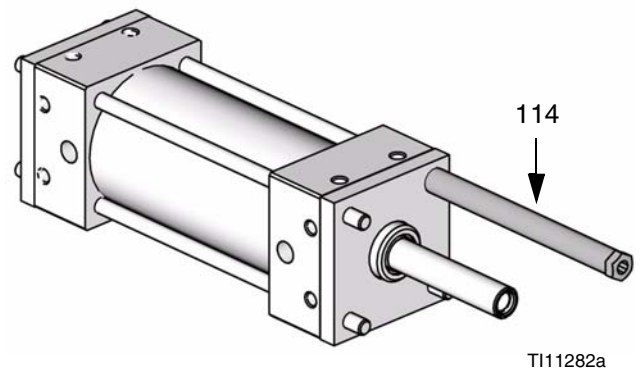
Attaching Retainer Plates and First Four Spacers

- Place the assembly on a flat surface with the port hole on the two port blocks facing the same direction.
- Slide one retainer plate over the end of each port block.
- Insert one tie rod into each of the four holes in the port blocks and retainer plates. Keep an equal amount of threads showing through the retainer plate on each side.
- Rotate the assembly so that the port holes are now facing in towards your body and place the assembly on a flat surface.




⚠ Make sure the port holes are facing in towards your body.

- Using the far, top tie-rod, attach cylindrical spacer (114) to the right side of the assembly.



- Attach one hexagonal spacer (113) to the other end of the tie rod. Do not tighten.

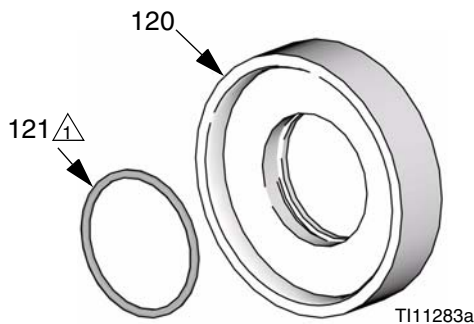
- Attach one hexagonal spacer to each end of the bottom, near tie-rod. Do not tighten.


 In the following step, the port holes need to be facing down, with the cylindrical spacer (114) facing right.

- Secure the assembly to a flat surface using two c-clamps, or other strong clamping devices, to prevent the assembly from twisting. The assembly will remain secured to the flat surface for the remainder of the assembly procedure.
- With the assembly secured, torque the spacers against each other to 15 ft-lb (20 N•m).

Installing Lube Adapter

- Push o-ring (121) into the inside groove of the cylinder lube adapter (120).



 Apply lithium grease to the o-ring.

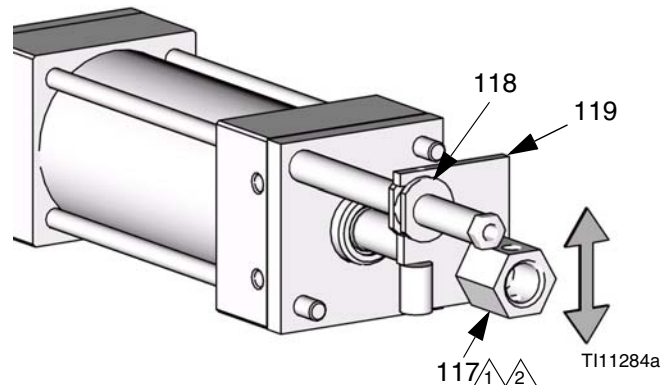
- With the lip of the adapter facing left, slide the adapter onto the left end of the hydraulic piston shaft.


Installing Hex Clevises and Baffle Jam Nut


- With the hex-side of the baffle jam nut facing away from the hex-head of the clevis, spin the baffle jam nut (122) onto the hex clevis (117). Leave one to

two threads between the head of the clevis and the nut.

- Apply high strength thread sealant (124) to the threads of both hex clevises (117).
- Apply primer (123) to the threads with the thread sealant.
- Attach modified bushing (118) to the activator plate (119).
- Insert the clevis (117) without the baffle jam nut (122) into the corner hole of the activator plate (119).
- Slide the modified bushing over the cylindrical spacer (114) and screw the clevis (117) into the right end of the hydraulic piston shaft (104).
- Spin the clevis (117) and baffle jam nut (122) onto the left end of the hydraulic piston shaft finger-tight, ensuring a gap of one to two threads between the baffle jam nut and the head of the left clevis.
- Rotate the right clevis until the cross-holes form a vertical line.



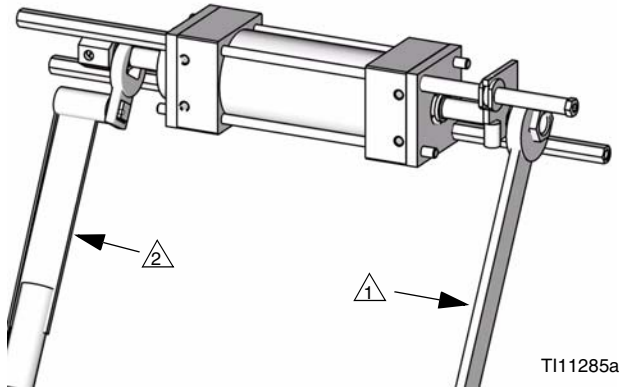
 Apply high strength thread sealant to threads of both hex clevises.

 Apply primer to the threads with the thread sealant to speed curing.

CAUTION

In the following step, do not overtorque.

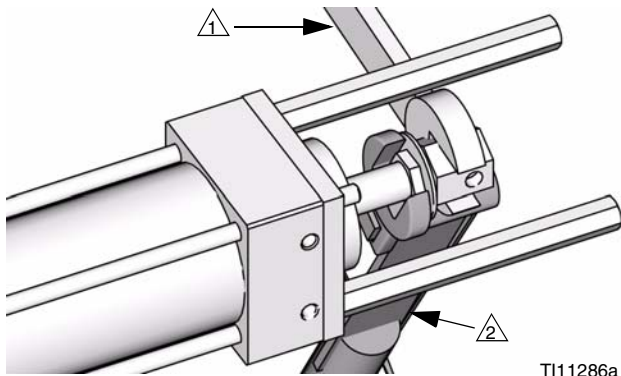
35. Hold the right clevis stationary with a 1 in. open-end wrench and, by turning the baffle jam nut with a 1 in. torque-wrench, torque the right clevis to 15 ft-lb (20 N•m) against the activator plate.



- 1 Hold stationary.
- 2 Rotate to torque the right clevis.

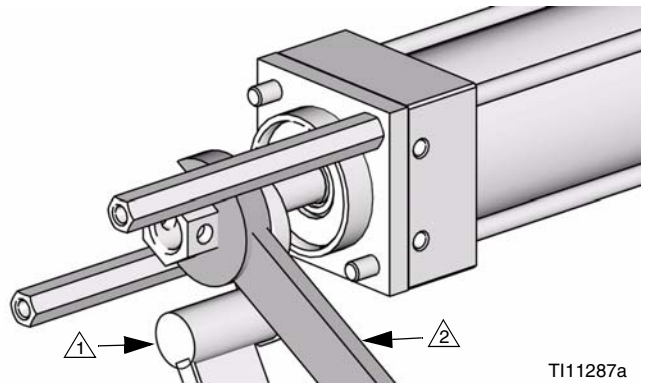
In the following step, do not unscrew the left clevis more than necessary.

36. Hold the left clevis stationary with a 1 in. wrench and break the baffle jam nut loose from the hydraulic piston shaft.



- 1 Hold stationary.
- 2 Rotate to break baffle jam nut loose from piston shaft.

37. Hold the baffle jam nut stationary and rotate the left clevis so the cross-holes form a horizontal line, keeping one to two threads between the clevis head and the nut.

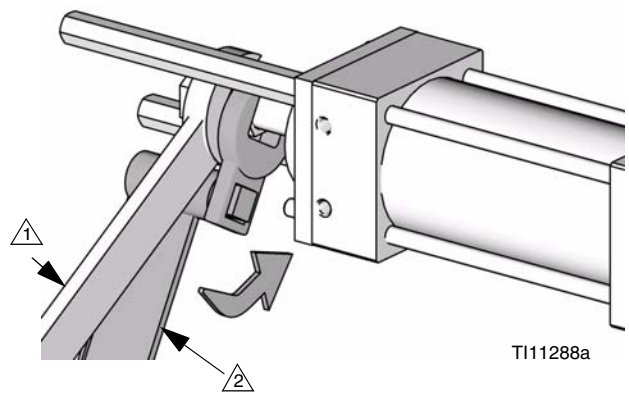


- 1 Hold baffle jam nut stationary.
- 2 Rotate to position cross-holes in a horizontal line.

CAUTION

In the following step, do not overtorque.

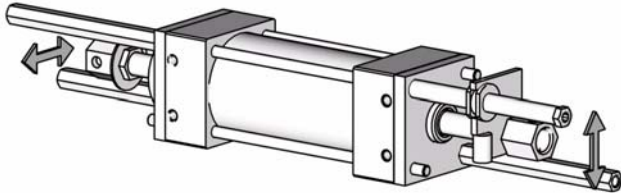
38. Hold the left clevis stationary with a 1 in. open-end wrench to keep the cross-holes horizontal and torque the baffle jam nut against the hydraulic piston shaft to 15 ft-lb (20 N•m) using a torque wrench.



- 1 Hold stationary.
- 2 Rotate to torque the baffle jam nut to 15 ft-lb (20 N•m) against the hydraulic piston shaft, which torques the left clevis.

Repair

39. Double check that the left clevis cross-holes are horizontal and the right clevis cross-holes are vertical.



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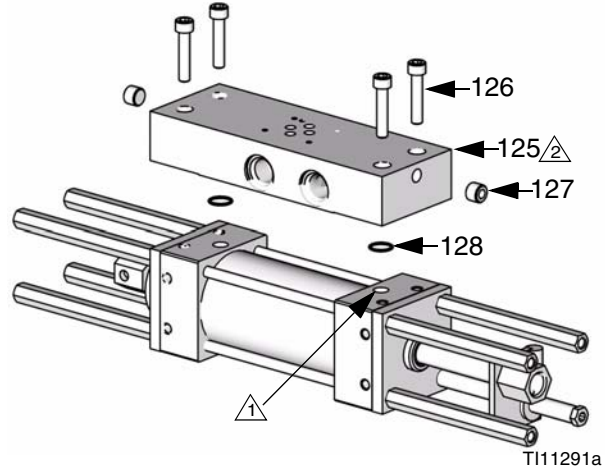
Installing Final Four Spacers

40. Preventing the tie rod (115) from spinning with one hand, spin one spacer (113) onto one end until it butts against the retainer plate (101). Repeat for opposite end of tie rod.
41. Hold one spacer with the 1/2 in. open-end wrench and the other with the 1/2 in. torque wrench and torque to 15 ft-lb (20 N•m).
42. Repeat with the final two spacers.

Assembling Manifold

43. Insert pipe plugs (127) into manifold (125).

44. Insert o-rings (128) into bottom holes of manifold.
45. With the port holes facing the manifold, attach the manifold to the port blocks using the four screws (126).



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⚠ Have the port holes facing the manifold.

⚠ On Model P7758-255773, rotate manifold 180 degrees about the vertical axis.

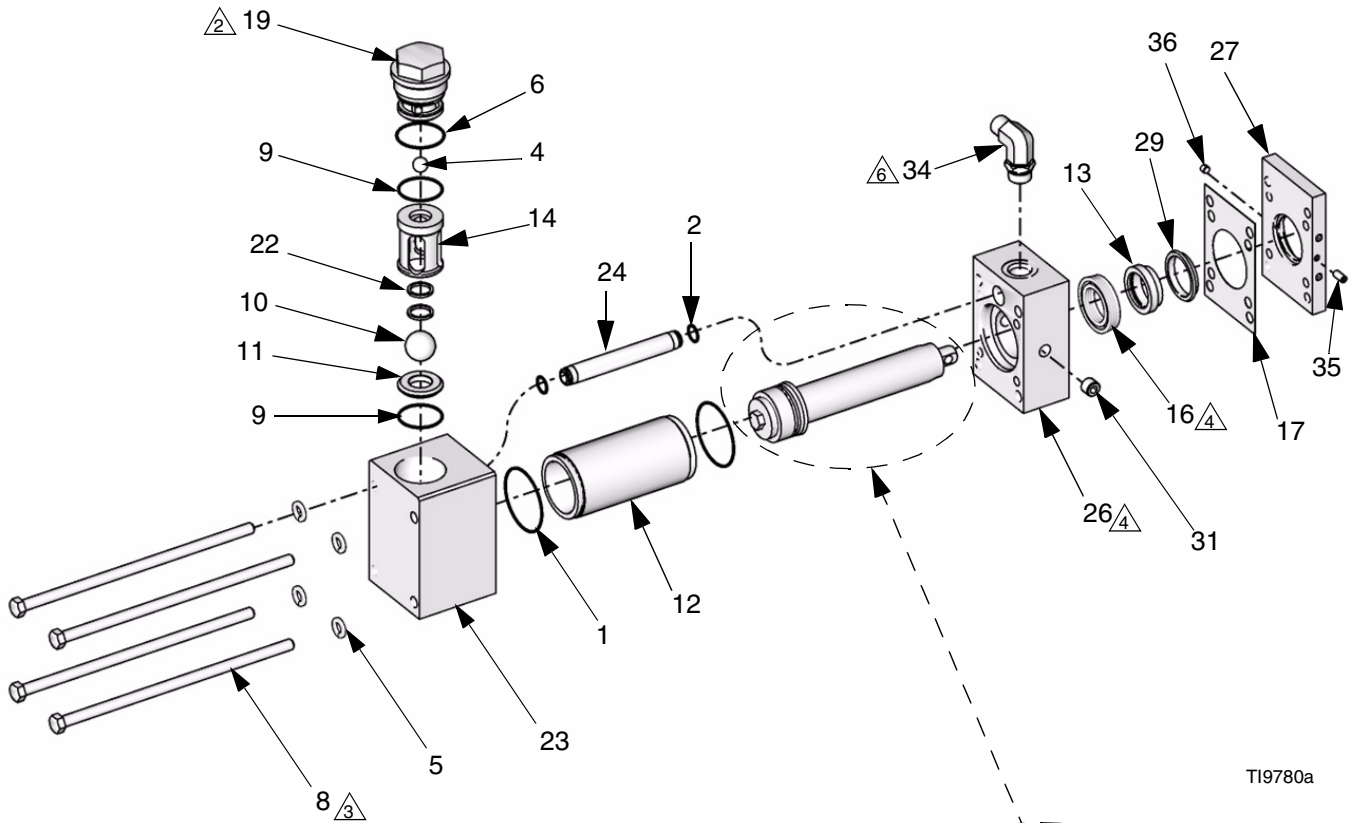


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Parts

Piston and Cylinder Seals

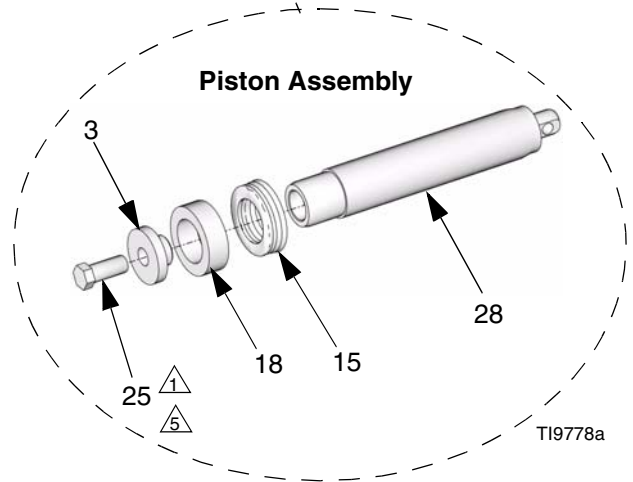
A Side Shown



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B side of pump is same as A side except items 31, 34, 35, and 36 are reversed.

- ① Apply supplied sealant to threads
- ② Torque to 75 ft-lb (101.3 N•m)
- ③ Torque to 45 ft-lb (60.8 N•m)
- ④ Seal must be pressed straight into housing
- ⑤ See Torque Specification table for torque according to pump size
- ⑥ Part not used on Model P7758-255773



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Item 25 Torque Specification

Pump Size	Torque
30	130 in-lb (14.7 N•m)
40, 48, 60	22 ft-lb (29.7 N•m)
80, 88, 96, 120, 140	45 ft-lb (60.8 N•m)

Ref.	Part	Description	Qty	Ref.	Part	Description	Qty
1*		O-RING, PTFE	2	16*		SEAL, throat, u-cup	1
2*		O-RING, TPE	2	17*		GASKET	1
3♦		CAP, piston	1	18*		BUSHING, piston, acetal	1
4	105445	BALL, valve, outlet, SST; 1/2 in. (13 mm) diameter	1	19	261867	CAP, ball guide	1
5	261866	WASHER, flat, packing support (4 pack)	1	22	261897	SPRING, valve	1
6*		O-RING, PTFE	1	23	261903	PUMP, base	1
8	261865	SCREW, hex hd cap; 3/8-24 x 9.0 in. (228 mm) (4 pack)	1	24	261898	TUBE, crossover	1
9*		O-RING, PTFE	2	25*		SCREW, hex hd cap	1
10	107167	BALL, valve, inlet, SST; 1 in. (25 mm) diameter	1	26♦		FLANGE, outlet	1
11	193395	SEAT, ball, inlet, carbide	1	27	261875	RETAINER, flange	1
12♦		CYLINDER	1	28♦		ROD, piston; includes cap (ref. 3)	1
13*		BUSHING, throat, acetal	1	29♦		ADAPTER, throat	1
14	261899	GUIDE, inlet ball, with outlet ball seat	1	31	295225	PLUG, pipe, flush	1
15*		SEAL, piston, u-cup	1	34	120401	ELBOW, 3/4-16 unf x 1/2 in. (13 mm) O.D. tube (not used on Model P7758-255773)	1
				35	295229	FITTING, grease; 1/4-28	1
				36	M70430	SCREW, set; 1/4-28 x 3/16 in.	1

- ♦ Refer to Table 1 for part number.
- * Refer to Table 2 for part number.
- * Refer to Table 3 for part number.
- ♦ Parts included in Kit 261859 (purchase separately).

Table 1. Proportioning Pump Parts Matrix

Part Ref.	Pump Sizes and Part Numbers								
	#30	#40	#48	#60	#80	#88	#96	#120	#140
3	261889	261886	261886	261886	261883	261883	261883	261883	261883
12	261896	261895	261894	261893	261892	247582	261891	261890	247583
26	261902	261902	261902	261902	261901	261901	261901	261901	261901
28	261882	261881	261880	261879	261878	247584	261877	261876	247585
29	261874	261873	261872	261871	261870	247586	261869	261868	247587

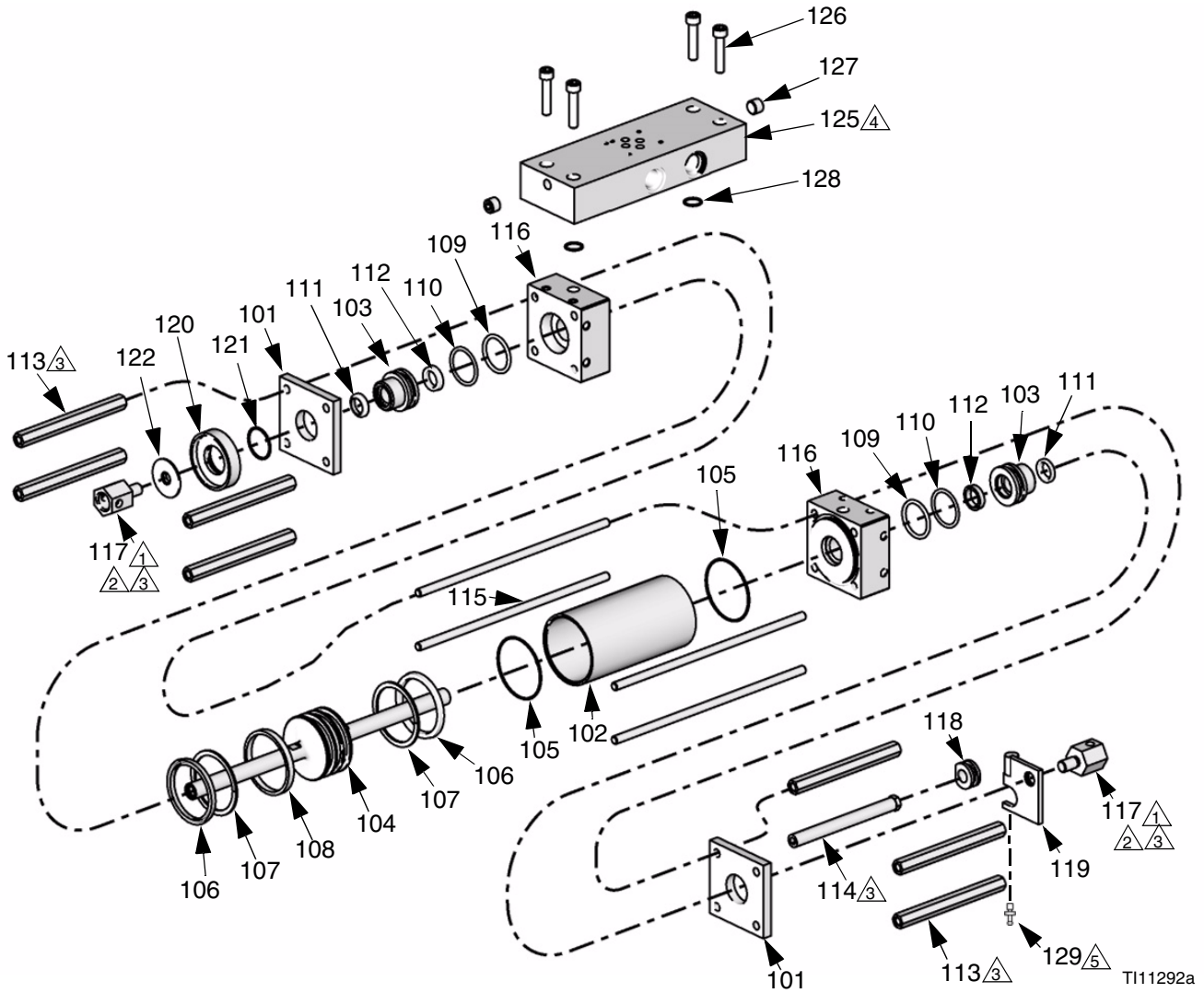
Table 2. Cylinder Seal Kits; Includes Parts 13, 16, 17

Pump	Proportioning Pump Size	Kit
247371	30	261858
247372	40	261857
247373	48	261856
247374	60	261855
247375	80	261854
247577	88	247580
247376	96	261853
247377	120	261852
247576	140	247581

Table 3. Piston Seal Kits; Includes Parts 15, 18, 25

Pump	Proportioning Pump Size	Kit
247371	30	261851
247372	40	261850
247373	48	261849
247374	60	261848
247375	80	261847
247577	88	247578
247376	96	261846
247377	120	261845
247576	140	247579

Hydraulic Cylinder



- ① Apply high strength thread sealant to threads.
- ② Apply primer to threads to speed curing.
- ③ Torque to 15 ft-lb (20 N•m). See assembly section for correct procedure.
- ④ On Model P7758-255773, rotate manifold 180 degrees about the vertical axis.
- ⑤ Part used only on Model P7758-255773.

Ref.	Part	Description	Qty.	Ref.	Part	Description	Qty.
101	295029	PLATE, retainer	2	119	261507	PLATE, activator (used on Model 295027)	1
102	295030	CYLINDER	1		42430-4	PLATE, activator (used on Model P7758-255773)	1
103◆	295031	BUSHING, rod	2	120	298111	ADAPTER, lube, cylinder	1
104	295028	PISTON, hydraulic	1	121	177156	O-RING	1
105◆	295640	O-RING	2	122	295852	NUT, jam, baffle	1
106◆	295641	SEAL, u-cup	2	123	070299	SOLVENT, catalyst, liquid	1
107◆	295642	RING, back-up	2	124	070289	SEALANT, anaerobic	1
108◆	295643	RING, wear	1	125	298040	MANIFOLD, hydraulic	1
109◆	158776	PACKING, o-ring	2	126	113467	SCREW, cap, socket head	4
110◆	295644	RING, back-up	2	127	295225	PLUG, pipe, flush	2
111◆	295645	WIPER, rod	2	128	112793	O-RING	2
112◆	295646	SEAL, shaft	2	129	OP307-2	LINK PIN	1
113	295032	SPACER, proportioner pump	7		-1000	(used only on Model P7758-255773)	
114	295033	SPACER, reverse switch pump	1				
115	295034	ROD, tie	4				
116	295035	BLOCK, port	2				
117	261503	CLEVIS, hex, proportioner	2				
118	261501	BUSHING, modified	1				
	1501-7-2	BUSHING (used on Model P7758-255773)	1				

◆ *Parts are also included in Hydraulic Cylinder Repair Kit 296785 which can be purchased separately. Rod tool 15T066 is also included in the kit.*



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Technical Data

Category	Data
Maximum working pressure	<i>Model 247576:</i> 2000 psi (13.8 MPa, 138 bar) <i>All other models:</i> 3500 psi (24.0 MPa, 240 bar)
Maximum fluid temperature	190°F (88°C)
Viscosity range	250-1500 centipoise
Maximum material inlet pressure	400 psi (2.7 MPa, 27 bar)
Wetted parts	Carbon Steel, Stainless Steel, Chrome, PTFE, Acetal, UHMWPE

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