



## Duplex Ceramic Plunger Pump Model

# 17

### SPECIFICATIONS

U.S. Measures

#### Model 17.006

Flow ..... 1.3 GPM  
Stroke ..... 0.260"  
Shaft ..... 5/8" Hollow

#### Model 17.015

Flow ..... 1.5 GPM  
Stroke ..... 0.270"  
Shaft ..... 5/8" Hollow

#### Model 17.007

Flow ..... 1.6 GPM  
Stroke ..... 0.310"  
Shaft ..... 5/8" Hollow

#### Model 17.012

Flow ..... 2.0 GPM  
Stroke ..... 0.360"  
Shaft ..... 5/8" Hollow

#### Model 17.022

Flow ..... 2.2 GPM  
Stroke ..... 0.370"  
Shaft ..... 5/8" Hollow

#### Model 17.025

Flow ..... 2.5 GPM  
Stroke ..... 0.440"  
Shaft ..... 5/8" Hollow

#### Model 17.013

Flow ..... 3.0 GPM  
Stroke ..... 0.500"  
Shaft ..... 5/8" Hollow

#### Model 17.005

Flow ..... 3.0 GPM  
Stroke ..... 0.500"  
Shaft ..... 5/8" **SOLID**

### FEATURES

#### Superior Design

- A hollow shaft for convenient direct mounting on 5/8" motor shaft.
- Hardened crowned cam follower for balanced load carrying.
- Oversized sealed bearings for cooler running and durability.
- Inlet and discharge valve assemblies interchangeable for easier maintenance.
- Self-lubrication, low friction seal for extended life.
- Close tolerance concentricity of ceramic plungers maximizes seal life.

#### Quality Materials

- All stainless steel valves are heat treated and seats are roller burnished for positive seal and extended seal life.
- Polished "solid ceramic" plungers result in extended seal life.
- Extra hard finish of ceramic plunger is durable and abrasion resistant.

#### Easy Maintenance

- Valves and seals can easily be serviced without removing pump from base or disconnecting plumbing.
- Base may be removed without removing cylinder head.
- Preset seals means no adjustment and lower maintenance costs.

### LUBRICATION

All models come **pregreased** from the factory with a Lithium base, high temperature NLGI No. 2 grease.

Thereafter, grease every **100 hours of operation**, at least two shots of grease or until appearance of grease on bearing face.

### COMMON SPECIFICATIONS

Discharge Pressure (up to 2.5 GPM) .....	1000 PSI
Discharge Pressure (up to 3.0 GPM) .....	750 PSI
R.P.M. ....	1800 R.P.M.
Bore .....	0.75"
Inlet Pressure .....	Flooded to 60 PSI
Maximum Temperature .....	160F
Inlet Port .....	1/2"
Discharge Port .....	1/2"
Dimensions (with mounting bracket) .....	5-1/16"x5-3/4"x5-9/16"
Weight .....	12 lbs.

### HORSEPOWER REQUIREMENTS

FLOW GPM	PRESSURE		
	PSI 600	PSI 800	PSI 1000
1.3	.53	.72	.89
1.5	.65	.86	1.08
1.6	.66	.88	1.09
2.0	.82	1.09	1.38
2.2	.96	1.28	1.50
2.5	1.02	1.38	1.72
3.0	1.24	1.65	N/A

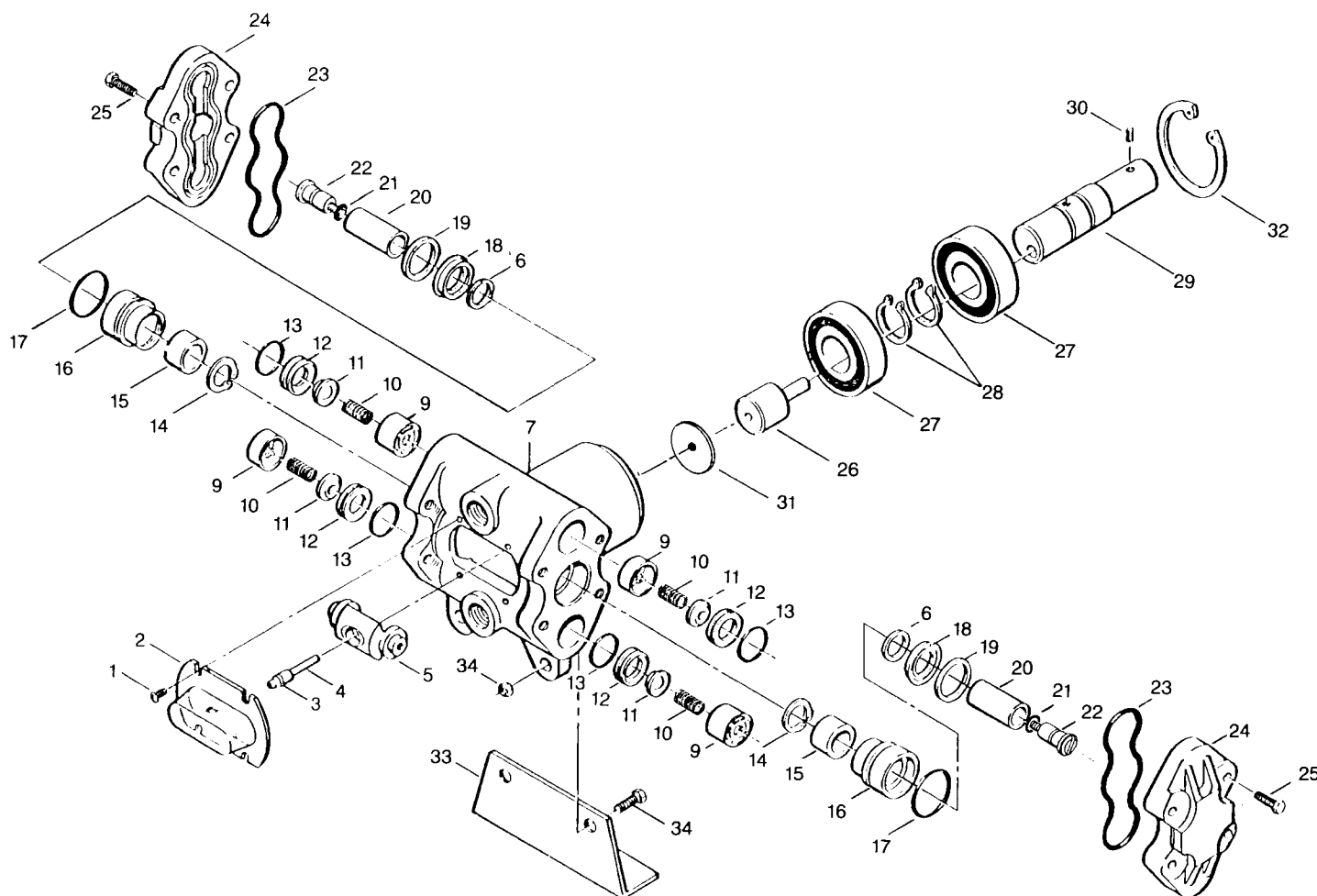
**"Customer confidence is our greatest asset"**

**EXPLODED VIEW**

May 1996

**PLUNGER PUMP**

Model 17

**PARTS LIST**

ITEM	PART NO.	DESCRIPTION	QTY	ITEM	PART NO.	DESCRIPTION	QTY
1	937724 Z	Phillips Head Screw (8-32" x 1/4")	4	26	937682	Cam Follower	1
2	937712	Cover, Grease Fitting	1	27	920217	Bearing	2
3	937702	Grease Fitting	1	28	920219 S	Snap Ring	2
4	937701	Grease Extension	1	29	937755	Crankshaft 1.3 GPM Hollow, Keyway	1
5	937753	★ Connecting Rod	1		937726	Crankshaft 1.5 GPM Hollow, Keyway	1
6	937719 T	Back-up Ring, Hi-Pressure Seal	2		937756	Crankshaft 1.6 GPM Hollow, Keyway	1
7	937759 CI	Body	1		937749	Crankshaft 2.0 GPM Hollow, Keyway	1
9	926606 N	Spring Retainer	4		937740	Crankshaft 2.2 GPM Hollow, Keyway	1
10	43751 S	Valve Spring	4		937757	Crankshaft 2.5 GPM Hollow, Keyway	1
11	937737 S	Valve	4		937750	Crankshaft 3.0 GPM Hollow, Keyway	1
12	919450 S	Valve Seat	4		937758	Crankshaft 3.0 GPM Solid, Keyway	1
13	931351 B	O-Ring, Valve Seat	4	30	937731	Set Screw (1/4-20 x 1/4)	1
14	937707 Z	Retaining Ring	2	31	937778 N	Spacer, Washer (3.0)	1
15	937751 BB	● Plunger Bearing	2	32	918249 S	Retaining Ring	1
16	937754 BB	● Seal Case	2	33	919972	Mounting Bracket	1-2
17	931352 B	O-ring, Seal Case	2	34	926794	Hex Nut & Bolt Assembly	1
18	937705 B	Hi-Pressure Seal	2	—	937715	Seal Kit	1
19	937706 BB	Retaining Washer	2			(Incls 6,14,15,17,18,19)	
20	937742 C	★ Solid Ceramic Plunger	2	—	937714	Valve Assembly (one of each)	4
21	931354 B	★ O-ring, Plunger Retainer	2			(Incls 9,10,11,12,13)	
22	937752 S	★ Plunger Retainer	2	—	937716	Plunger Assembly	1
23	926615 B	O-ring, Manifold Head	2			(★Incls, 5,20,21,22)	
24	937748 CI	Manifold Head	2	—	939000	Valve Kit (Incls 9,10,11,12,13)	1
25	937711 Z	Hex Head Screw	8	—	30696	Valve Seat Removal Tool	1

★ Replaced as set when servicing models prior to 2/89. ● Replace as set when servicing models prior to 12/91.

**MATERIAL CODES (Not Part of Part Number)** B=Buna-N BB=Brass C=Ceramic CI=Cast Iron N=Nylon S=304SS T=Teflon Z=Zinc Plated

## BEFORE INSTALLATION

1. Leave plastic port plugs in place until ready to connect lines.
2. Use a flexible Inlet Supply Hose of a minimum 1/2" I.D. and preferably 5/8" I.D.
3. For hollow shaft models make sure the motor has a 5/8" straight shaft.
4. If pump will not be bolted down, use a torque arm to keep it from rotating. Free end of torque arm must bear against a rigid surface
5. Support accumulator and other heavy accessories on a separate panel to avoid damaging motor bearing.
6. Suction strainer should be 80 mesh.
7. Be certain the nozzle is properly sized for the system requirements and does not exceed 1000 PSI pump rating.

NOTE: Always **read your system pressure at the pump**, not at the nozzle, gun or anywhere after the pump pressure regulating device.

8. If vacuum and pressure gauges are not used provide a fitting so they can be installed for troubleshooting.
9. Mount an accumulator in the discharge line close to the pump to dampen pulsations in the systems.
10. A relief valve, regulating valve or unloader valve must be in the discharge line of the system to relieve excessive pressure should clogging occur.
11. By-pass flow can be returned:

**To the Reservoir:** This should be done only when a single liquid is pumped, If detergents are added by means of an injector, for example, this would contaminate the reservoir.

**To the Floor Drain:** This is used when the valve functions only as a safety device to retrieve the outlet line should clogging occur.

**To the Pump Inlet:** This procedure is not recommended and should be limited to a maximum **THREE MINUTE CONTINUOUS BY-PASS**. This by-passed liquid will increase in temperature rapidly and may cause damage to the pump.

## OPERATION

1. Before starting, open all valves in the piping system. Then start pump. If the pump does not prime, remove the nozzle until the pump delivers full flow. Filling inlet line before starting will avoid priming problems.
2. Pump requires a flooded inlet. Liquid level must not fall below top of inlet.
3. Do not operate pumps with a liquid temperature above 160°.
4. Limit pressure to 1000 PSI measured at the pump and limit operating speed to 1800 RPM.

## MAINTENANCE

1. Clean strainer often to prevent restricted inlet flow and cavitation damage to the pump.
2. Regrease cam follower bearing every 100 hours of operation. Apply a small amount of grease on outer race of cam follower bearing.
3. After operation with chemicals, thoroughly flush pump with clear water.

## SERVICING THE VALVES

### Disassembly

1. Remove the four Hex Head Screws from the manifold head.
2. Separate Manifold Head and o-ring from the pump body. Both the Inlet and Discharge valve assemblies will be exposed.

NOTE: Two valve assemblies are on each side of the pump. The **inlet** valve assembly is at the **bottom** and the **discharge** valve assembly is at the **top**. The parts are identical, but the order is reversed.

3. Using a valve seat removal tool, lift the Valve Seat from the discharge valve assembly.
4. Remove the o-ring from the valve seat.
5. Remove the valve, spring and retainer from the chamber.
6. Next remove the retainer, spring and valve from the inlet valve chamber.
7. If the valve seat remains snug in the chamber, apply a few drops of penetrating oil around the edge of the seat and let sit a few minutes. Then use the valve seat removal tool to pull valve seat out.
8. Remove o-ring from Valve Seat.

### Reassembly

1. Examine Valve and Seat for pitting, grooves or excessive scale build-up and replace as needed.
2. Examine O-ring for cuts or distortion and replace as needed.
3. Examine Spring for breaks or fatigue and replace as needed.
4. Lubricate and install new o-ring on valve seat.
5. Place Retainer into top discharge chamber **with center spring guide facing out**.
6. Insert new Spring into Retainer.
7. Place new valve over spring with **dish side facing in towards the pump valve chamber**.
8. Press new Valve Seat with o-ring installed in groove into chamber until completely seated.
9. Start the inlet chamber in reverse order by pressing Valve Seat with o-ring in groove into chamber until completely seated.
10. Place Valve over Valve Seat with **dish side facing away from valve chamber**.
11. Place Spring over valve.
12. Press Retainer into valve chamber with **center spring guide towards chamber**.
13. Place o-ring into groove of manifold head and mount onto pump body.
14. Thread the four hex head screws onto manifold head and torque to specifications.
15. Repeat these steps for other side of pump.

## SERVICING THE SEALS

### Disassembly

1. Remove the manifold head as described under servicing the valves.
2. Remove the Retaining Washer from the center seal chamber.
3. Unthread and remove the Plunger Retainer from the end of the plunger. Ceramic plunger will generally remain with retainer as loctite has been applied under the plunger during assembly.
4. Using a screwdriver, pry the Hi-Pressure Seal and Back-up Ring from the seal chamber.
5. Remove Plunger from retainers, examine o-ring under plunger for wear and replace as needed.
6. Examine Ceramic Plunger for cracks, chips or wear and replace as needed.

### Reassembly

1. Lubricate and install new o-ring onto Plunger Retainer.
2. Apply a generous amount of green loctite 601 to the O.D. of o-ring on Plunger Retainer and to the I.D. of the ceramic plunger and gently push Plunger Retainer into Ceramic Plunger. Wipe excess loctite from plunger end.
3. Apply green loctite 601 to exposed threaded end of plunger retainer and thread retainer into connecting rod. Torque to specifications.

NOTE: Exercise caution when threading plunger retainer into connecting rod. Do not apply force. Slightly alter position of drive assembly to line up tapped connecting rod end with plunger retainer and permit smooth unrestricted threading.

NOTE: Allow loctite to cure for 10 minutes before operation.

4. Lubricate O.D. of ceramic plunger and slip back-up ring and new Hi-Pressure Seal with **o-ring facing away from pump body** onto plunger until completely seated in seal chamber of pump.
5. Carefully slip seal retainer over plunger and snug up to hi-pressure seal.
6. Replace manifold head and hand tighten hex head screws. Then torque to specifications.

## TORQUE CHART

Description	Thread	Tool	Torque
Manifold Screws	3/8 - 16 UNC	9/16"	20 Ft./Lbs.
Plunger Retainer	1/4 - 20 UNC	Flat Head Screwdriver	20 Ft./Lbs.
Cover Screws	8 - 32 UNC	Phillips Head Screwdriver	1.3 Ft./Lbs.

## SERVICING THE CRANKSHAFT & BEARINGS

### Disassembly

1. Remove the Manifold Head and Plungers as previously described.
2. Remove the Phillips Head Screws and the Grease Fitting cover from the face of the pump body.
3. Pull the Grease Fitting and Extension from the Cam Follower using a needle nose pliers.
4. Using a snap ring pliers, remove the Retaining Ring from the front of the Bearing.
5. Insert a flat headed brass bar through the center of the Connecting Rod and drive out the Drive Assembly.
6. Remove the Connecting Rod from the pump body.
7. Use an arbor press and yoke for support and remove outer Bearing from Drive Shaft.
8. Remove both Snap Rings and press inner Bearing from Drive Shaft.
9. Examine the Cam Follower, Bearings and Drive Shaft for wear and replace as needed.
10. With a wooden dowel drive out Seal Case, Plunger Bearing and Retaining Ring. Inspect bearing for roughness and seal case for wear, grooves or scoring and replace as needed.

### Reassembly

1. Install both snap rings into grooves on drive shaft.
2. Press inner bearing onto drive shaft and snug up to snap rings.
3. Press outer bearing onto drive shaft and snug up to snap rings.
4. Apply loctite 601 to the I.D. of pump body bearing housing and push drive assembly into body.
5. Place the connecting rod over the exposed cam follower.  
NOTE: Carefully guide drive assembly into pump body and into connecting rod. Then line up connecting rod tapped end in center of seal chamber to assure proper alignment of ceramic plunger and plunger retainer.
6. Install retaining ring in the groove in the pump body.
7. Lubricate the O.D. of the seal case and install the new o-ring.
8. Press the new plunger bearing into the small I.D. of the seal case and install snap ring into groove.
9. Proceed with SEAL REASSEMBLY and VALVE REASSEMBLY as previously described.
10. Use a socket to gently drive the grease fitting and extension into the end of the drive shaft.
11. Replace cover and screws and torque to specifications.

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