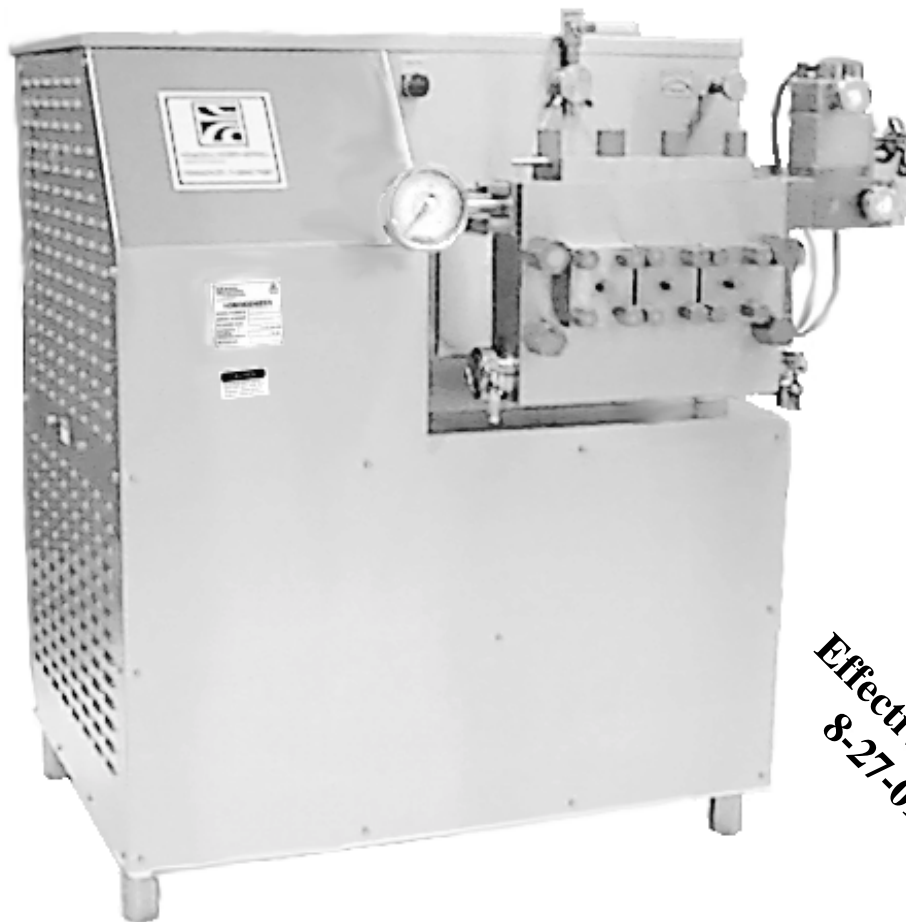




**Waukesha
Cherry-Burrell**
® An SPX Process Equipment Operation

WILLIAMS
WC
CARVER CO.

**Read and understand this manual prior to operating or
servicing this Homogenizer**



*Effective Date
8-27-01*

Waukesha Cherry-Burrell Homogenizer

**Operation
Maintenance
Parts List**

MODEL SERIAL NUMBER
SALES ORDER NUMBER

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Effective Date 8-27-01

Publication 95-03018

Warranty & Receiving Information

Waukesha Cherry-Burrell Warranty

Seller warrants its products to be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. This warranty shall not apply to products which require repair or replacement due to normal wear and tear or to products which are subjected to accident, misuse or improper maintenance. This warranty extends only to the original Buyer. Products manufactured by others but furnished by Seller are exempted from this warranty and are limited to the original manufacturer's warranty.

Seller's sole obligation under this warranty shall be to repair or replace any products that Seller determines, in its discretion, to be defective. Seller reserves the right either to inspect the products in the field or to request their prepaid return to Seller. Seller shall not be responsible for any transportation charges, duty, taxes, freight, labor or other costs. The cost of removing and/or installing products which have been repaired or replaced shall be at Buyer's expense.

Seller expressly disclaims all other warranties, express or implied, including without limitation any warranty of merchantability of fitness for a particular purpose. The foregoing sets forth Seller's entire and exclusive liability, and Buyer's exclusive and sole remedy, for any claim of damages in connection with the sale of products. In no event shall Seller be liable for any special consequential incidental or indirect damages (including without limitation attorneys' fees and expenses), nor shall Seller be liable for any loss of profit or material arising out of or relating to the sale or operation of the products based on contract, tort (including negligence), strict liability or otherwise.

SHIPPING DAMAGE OR LOSS

If your equipment is lost or damaged in transit, file a claim at once with the delivering carrier and ask for an inspector to view the damage. The carrier has signed the Bill of Lading acknowledging that the shipment has been received from WCB in good condition. WCB will assist you in every way in collecting claims for loss, or damage, however, WCB is not responsible for the collection of claims or replacement of materials. (See "Introduction" for detailed information on receiving and inspecting your equipment).

HIDDEN DAMAGE OR WARRANTY CLAIM

If during installation, you discover damage, contact the Shipper immediately. Notify your Distributor of the problem. In warranty claims you must have a returned goods authorization from the manufacturer before any returns will be accepted. Your Distributor will help you with a warranty problem. (See WARRANTY.)

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Safety

READ AND UNDERSTAND THIS MANUAL PRIOR TO INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT.

Warnings, cautions and notes are contained in this manual. To avoid serious injury and/or possible damage to equipment, pay attention to these messages.

WARNING Hazards or unsafe practices which COULD result in severe personal injury or death and how to avoid it.

CAUTION Hazards or unsafe practices which COULD result in minor personal injury, product or property damage.

NOTE Important information pertaining directly to the subject information to be aware of when completing the task.

WARNING

To avoid electrocution, ALL electrical work should be done by a Registered Electrician, following Industry Safety Standards. All power must be OFF and LOCKED OUT during installation.

WARNING

To prevent injury from unexpected operation, disconnect and exhaust all utilities before making any repairs or adjustments.

WARNING

Product contained within the equipment may be caustic or under pressure. Shut off valve and drain product from equipment before disconnecting piping.

Specific Hazards

The following information supplements the preceding GENERAL SAFETY INSTRUCTIONS and provides specific safety information on hazardous conditions which are inherent in any HOMOGENIZER.

A HOMOGENIZER has high speed moving parts and works with fluids under pressure. These fluids may be hot, chemical solutions, abrasive or otherwise harmful if contacted. This creates certain unavoidable hazards. Safe installation, operation, and maintenance requires proper training of all personnel and their supervisors

Our objective in providing instructions and warnings is to identify each area of potential hazards and its level of severity and to guide each worker for safe operation, service and maintenance procedures.

Waukesha Cherry-Burrell equipment is designed to provide minimum operator access to hazardous areas while providing adequate access for service by trained personnel. Hazardous areas are provided with guards. The mere existence of a guard should alert the worker to the presence of a hazard. Never operate or test run the equipment with a guard removed, unless under the supervision of properly trained and authorized personnel. Then use extreme caution to avoid the hazard.

Electrical Hazard

A HOMOGENIZER is normally powered by electric motors. This creates a hazard of electrical shock which could cause SEVERE INJURY or even LOSS OF LIFE. To minimize the risk from this inherent hazard:

- All electric/electronic installation maintenance, and service must be performed by trained and authorized electricians only.
- All electric/electronic installation must comply with all applicable codes and standards including those established by OSHA.
- Make installation suitable for a wet environment, including:
 - A power disconnect which can be locked in power-off position and key removed. This will allow maintenance or service to be performed with no possibility of power being accidentally turned on.
- Protection of all electric connections within a sealed junction box: Proper grounding of motor.
- Protection from flooding. Do not install in an area which could fill with water to a level which would contact motor.

- DO NOT perform any maintenance or service on motor or any other electrical devices unless electric power source has been turned off and LOCKED OUT using a locking device for which only the person performing the work has the key

Processing Hazard

Some HOMOGENIZER applications may require processing of high temperature fluids and/or the use of high temperature cleaning/sanitizing solutions. Homogenizing high temperature fluids creates a hazard of burns to personnel working in the area from contact with the equipment or with leaking fluid.

To minimize the risk from this hazard:

- All installation, maintenance, and service of piping, valves and other controls must be performed by trained and authorized plumbers only. This applies to process piping and cleaning/sanitizing piping.
- All plumbing installation must comply with all applicable codes and standards including those established by OSHA.
- All high temperature lines must be labeled, leak free and insulated or otherwise protected from direct contact by personnel.
- Never disconnect any lines or fittings (whether process or cleaning/sanitizing) nor disassemble HOMOGENIZER until it is known that the line is not under pressure and the fluid inside is not hot or otherwise harmful.

Cleaning/Sanitizing Chemical Hazard

Cleaning and sanitizing a HOMOGENIZER for use with food products may require the use of chemical solutions. Many of the commonly used chemical solutions are potentially harmful to personnel if contacted. The hazard is especially severe for eyes, skin, or inhalation. All personnel working with such solutions must be thoroughly trained in their safe handling and disposal following use as required by the OSHA Hazardous Materials Standard.

- During automatic cleaning and sanitizing:
- Check all line connections in cleaning circuit to be certain they are connected and tightened before starting.
- Never disconnect any lines, fittings or disassemble HOMOGENIZER until it is known that automatic cleaning sequence is completed and no chemical solutions or high temperature fluids are present.
- When using manual cleaning methods:
- Turn off power source and LOCK OUT before doing any disassembly of HOMOGENIZER.

- Equip all personnel using cleaning/sanitizing solutions with protective clothing, including eye protection.
- Thoroughly train all personnel using cleaning/sanitizing solutions in their safe; handling and disposal after use.
- Never use toxic and/or flammable solvents for cleaning.

Important Cautions

The following important cautions describe ways to avoid incorrect operating procedures which will cause serious damage to your HOMOGENIZER.

If internal pressure exceeds the HOMOGENIZER block or seal rating, HOMOGENIZER damage and/or leakage is likely to occur.

- BEFORE operating HOMOGENIZER, review HOMOGENIZER maximum pressure rating and the system in which the HOMOGENIZER will be operated. If the system differential pressure is unknown, install gauges and start with reduced low rate to insure operation below the maximum pressure rating.

Prevent Cavitation

Cavitation is a condition within the HOMOGENIZER which results in extreme hydraulic forces which can cause severe damage to HOMOGENIZER components. Cavitation makes a characteristic - rattling noise. It is caused by operation with too low fluid pressure at the HOMOGENIZER inlet or high air content in the product. To prevent damage from cavitation, install and operate HOMOGENIZER so that positive suction head available to the HOMOGENIZER equals or exceeds amount required.

- Decrease temperature of liquid being HOMOGENIZED
- Increase pressure of liquid at HOMOGENIZER inlet
- Decrease suction line length and remove restrictions such as elbows, valves, etc.
- Increase suction line size (diameter)
- Reduce HOMOGENIZER flow rate (decrease speed) Reduce fluid viscosity Decrease vacuum in fluid supply vessel

Protect Parts From Damage

The product contact parts of the HOMOGENIZER are precision manufactured for close operating clearances. This includes the plungers, sleeves, block, valves, covers and seal components. Do not allow foreign material (nuts, bolts, weld slag) to enter HOMOGENIZER. Handle these parts with

care to prevent any damage (nicks or burrs). Damaged areas may cause more serious damage to mating parts when HOMOGENIZER is reassembled and/or operated.

To help prevent damage:

- Do not operate HOMOGENIZER for Initial flushing of system lines after installation; foreign material may enter HOMOGENIZER and cause damage.
- Place a rubber mat or other similar protection under HOMOGENIZER before disassembly to protect parts which may be accidentally dropped.
- Keep parts separated and protected when disassembled. Do not throw together loosely in a container.
- Do not use hard metal prying or hammering tools when assembling or disassembling HOMOGENIZER. Use soft faced tools such as plastic, wood, or rawhide.
- Do not inter mix parts from their original location.

Protect Surfaces to Prevent Corrosion

Even stainless steel is subject to corrosive attack when abused. Therefore:

NEVER use steel wool or a wire brush to clean stainless steel surfaces. Iron particles will embed and cause corrosion pits. Use non-metallic brush or scrub pads for stubborn soil.

*NEVER allow prolonged contact of sanitizing solutions or other corrosive cleaning chemicals with stainless steel. Use sanitizers only immediately prior to processing. Do not use sanitizers on exterior non-product contact surfaces.

Change of Application

Do not use the HOMOGENIZER for an application other than that for which it was originally supplied without first reviewing the new application with your authorized Waukesha Cherry-Burrell sales representative. Incorrect application may cause severe damage to HOMOGENIZER parts. Correct application requires that consideration be given to all of the following:

- Product viscosity
- Product temperature
- Product particulates (size, quantity, abrasiveness)
- Product purity requirements
- Product chemical nature
- Source (inlet) pressure
- Discharge pressure

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Introduction

This manual contains installation, operation and maintenance information for:

Waukesha Cherry-Burrell Homogenizer/ High Pressure Pumps.

Types

High Pressure Pumps

A high pressure pump with a relief/by-pass includes a standard homogenization valve.

Two Stage Actuation System

The power unit, filter, cooler and pressure control valve are identical to those of the single stage actuator system.

In addition to the above components, the two stage system requires a manifold block containing a relief valve and two threaded screws containing .016" diameter orifices.

The two stage hydraulic actuation system can set a specific desired homogenization pressure at each homogenization valve independent of the other valve.

Equipment Features

These positive-displacement pumps are used as Homogenizers or as High-Pressure Pumps. They are of sanitary design, and can deliver a constant volume regardless of the pressure changes on the discharge. Depending on Model, Plunger size and RPM, pressures up to 7500 PSI can be attained.

Headblocks contain cylinders to allow easy plunger diameter substitutions. The Homogenizer is driven by a single motor. All Models use a multiple V-belt driven sheave/

reducer combination to produce the speed required for the crankshaft.

Homogenizer/Pump Identification

The Homogenizer specifications are located on the serial number plate. Figure 3 and Figure 1

WARNING

Do not exceed the specifications listed on these labels.

Equipment Applications

Operating requirements and conditions determine the proper machine for a specific application. If it becomes necessary to change applications, check first with a Waukesha Cherry-Burrell representative to ensure that the machine is correctly sized and configured for the next use.

NOTE: Severe machine damage can result if a unit is incorrectly sized for the application.

Waukesha
Cherry-Burrell

811 SUGAR CREEK ROAD
DELAVER, WI 53115

HOMOGENIZER

MODEL NUMBER

SERIAL NUMBER

PLUNGER SIZE

CAPACITY U.S. GAL/HR

MAXIMUM OPERATING PRESS. P.S.I.

MOTOR H.P.

READ AND UNDERSTAND MAINTENANCE
MANUAL BEFORE OPERATING.

Figure 1 Serial Number Plate

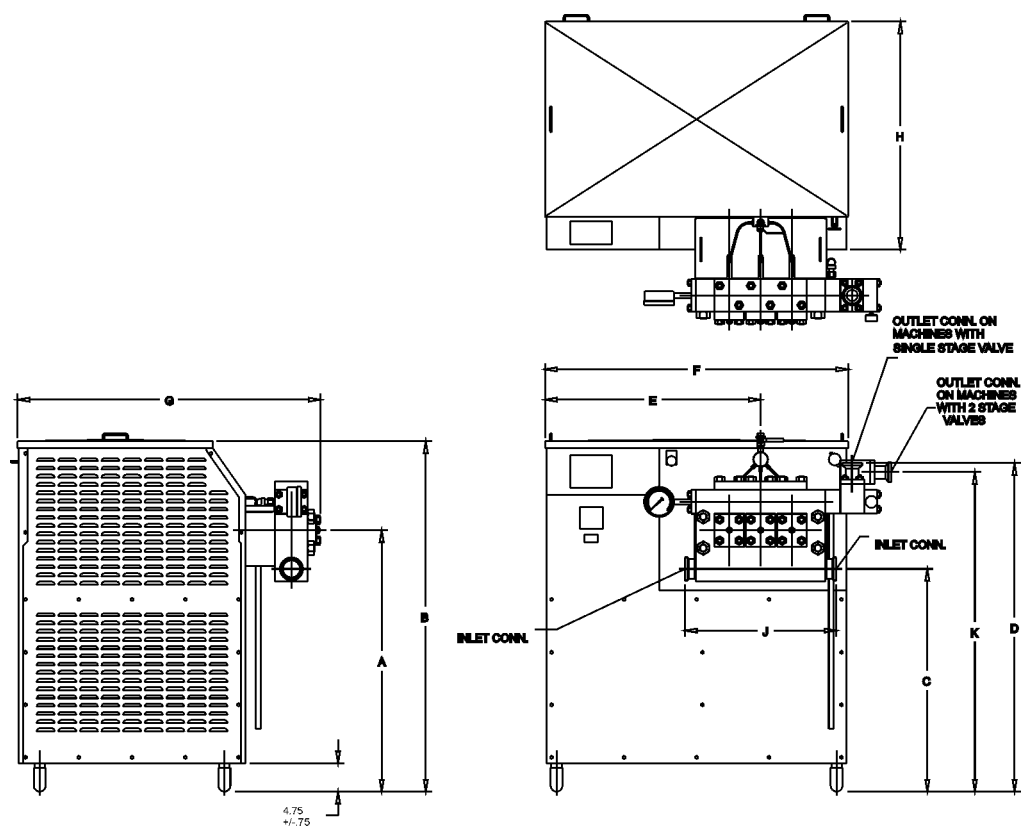


Figure 2 Foot Print

Table 1: Basic Dimensions and Shipping Weights

Model	A	B	C	D	E	F	G	H	J	K
500LV	33.59	44.88	30.09	41.22	26.50	38.00	32.13	30.50	17.00	40.30
500	33.59	44.88	30.09	41.22	26.50	38.00	32.13	30.50	17.00	40.30
1000	34.75	46.88	31.00	43.19	29.13	42.00	42.04	30.50	20.25	41.77
2000	40.13	54.88	34.75	50.07	33.38	47.00	42.04	34.50	22.00	48.65
3000	43.88	58.88	37.38	55.13	36.25	51.00	51.66	38.50	25.38	53.63
5000	46.38	62.88	39.88	57.63	48.00	68.00	51.66	42.50	35.88	56.13

Table 2: Unit Shipping Weights

Model	LBS.
500LV	1,420
500	1,420
1000	2,575
2000	3,555
3000	5,140
5000	8,210

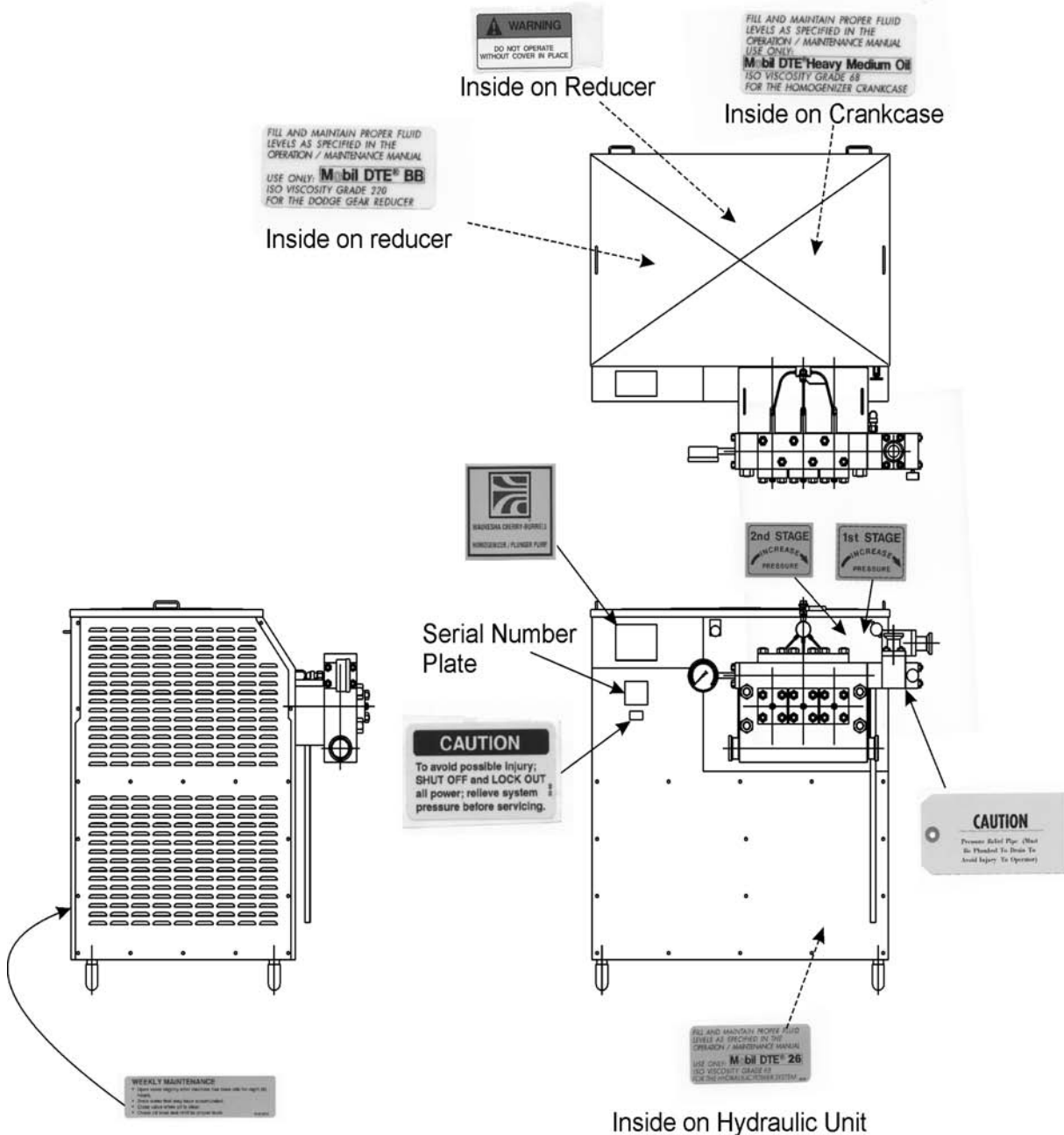


Figure 3 Location of Labels.

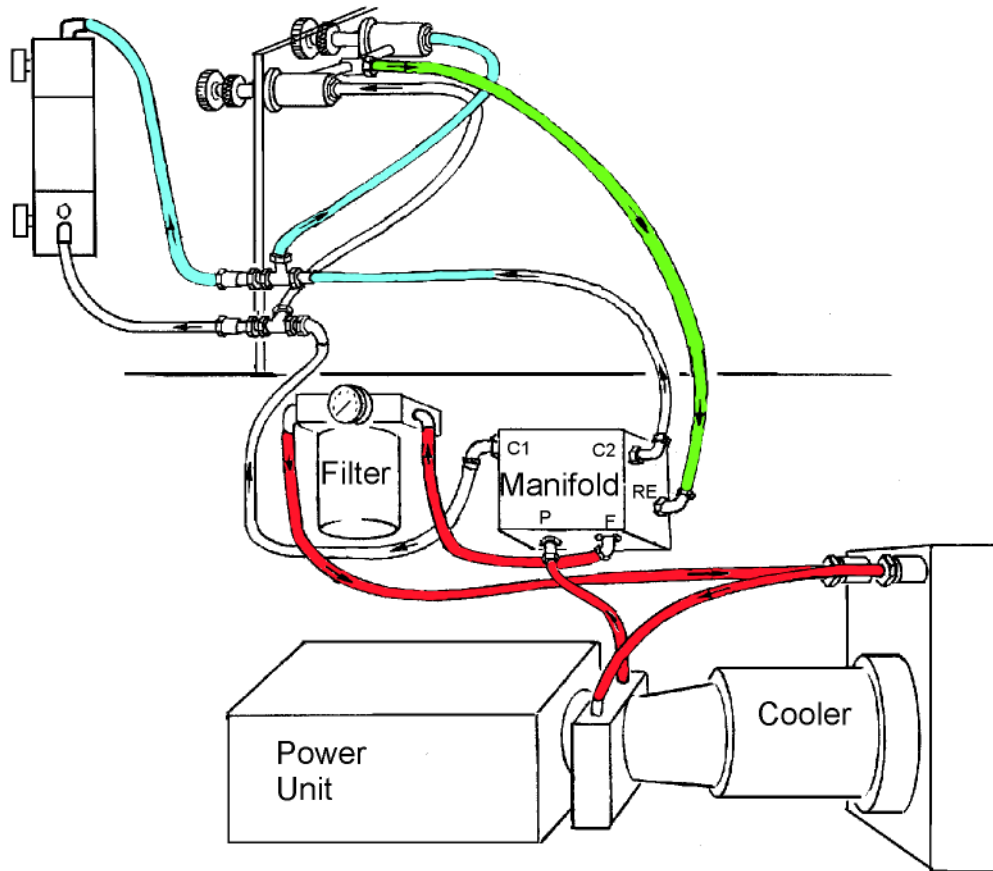


Figure 4 System Hydraulic Flow

System Pressure (Pressure To The Manifold Block)

The relief valve in the manifold block is set at the factory to produce 1800 PSI (200 PSI below the relief valve pressure in the power unit). The manifold relief valve must always be set at least 100 PSI above the maximum required hydraulic oil pressure applied to the homogenization valve pistons and cylinders. With both of the outside panel pressure control

valves turned fully counterclockwise, oil from the hydraulic pump flows into the manifold and is split evenly, through the orifices, to both hydraulic cylinders mounted on the headblock. The oil pressure being applied is zero. By adjusting the pressure control valves (slowly) clockwise, oil flow decreases and oil pressure increases. This pressure is applied to the piston and cylinder for the homogenization valve generating homogenization pressure.

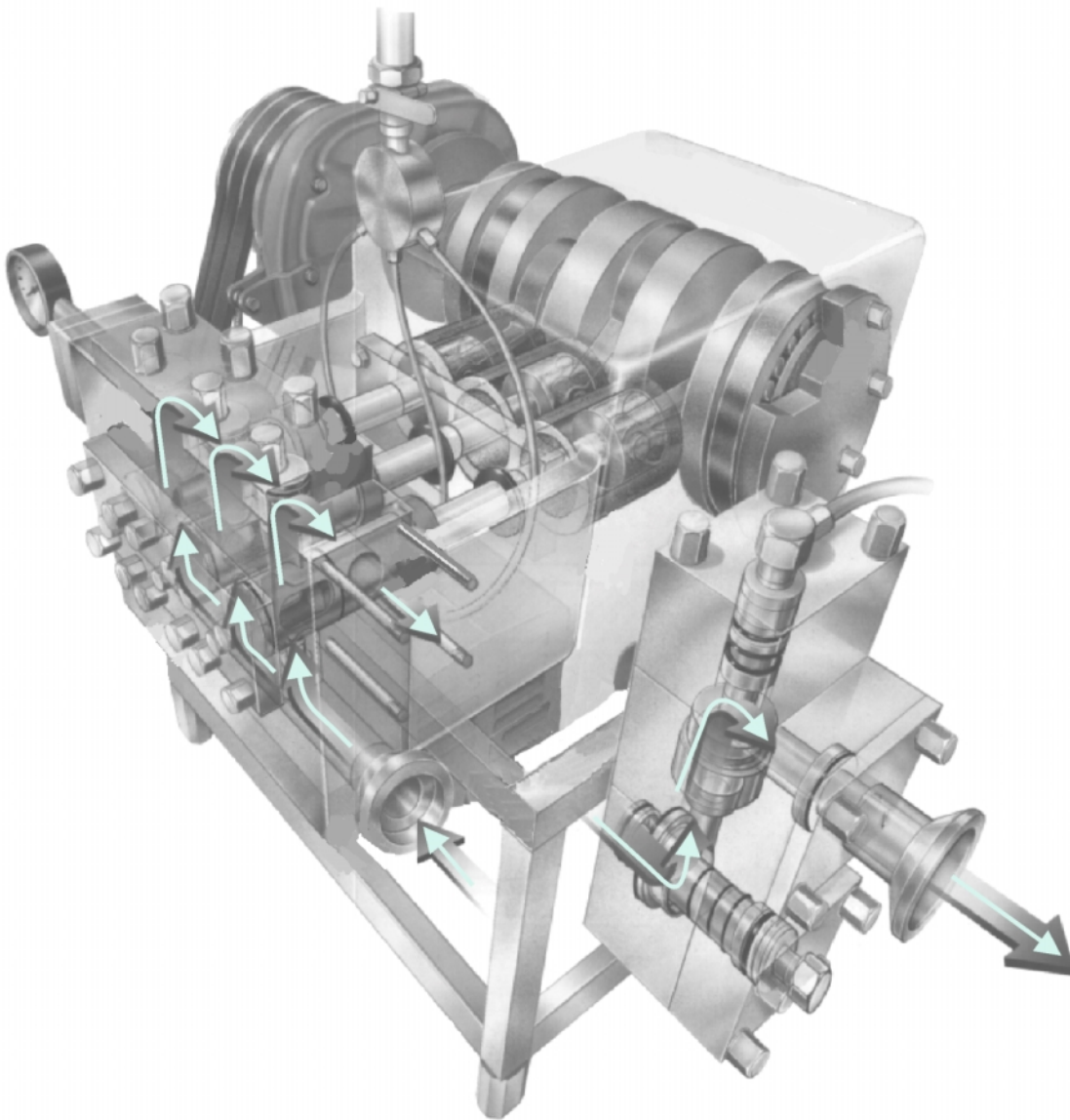


Figure 5 Product Flow

Specifications

Headblock

Forged 15-5PH Stainless Steel

Plungers

Tungsten Carbide (Ceramic Optional)

"V" Ring plunger seals

(Injection cooling/flushing of plunger seals)

Valve Seats

Integral seats with poppet valves (Standard)

Hardened seats with poppet valves (Optional)

Crankcase

Splash lube

Water/Oil separator

Table 3: Crankcase Oil Capacity

MODEL	CAPACITY
500&LV	8 qt.
1000	20 qt.
2000	28 qt.
3000	36 qt.
5000	44 qt.

Drive

Standard 1750 RPM Motor

Single Reduction Belted sheaves

5:1 Speed Reducer

Table 4: Reducer Oil Capacity

MODEL	TYPE	CAPACITY
500&LV	TX405T	2.125 qt.
1000	TXT505T	3.875 qt.
2000	TXT705T	7.5 qt.
3000	TXT705T	7.5 qt.
5000	TXT905T	16.25 qt.

To Change output flow:

- Change plunger diameter
- Change of crankshaft speed
i.e.; driver and driven sheaves
- Apply variable frequency drive

Valve Assemblies

Single or double staged valve assemblies

Manual or hydraulic valve actuators (Manual limited to Models 500 to 2000).

Over-pressurization Safety Rupture Disc.

Analog Pressure Gauge

Pressure gauge is set for operation at 40° F. to 300° by the **Manufacturer**. Do not add glycerin to gauge. (Pressure transducer and digital meter optional)

Flows

GPH (Gallons per Hour) 100-5000

Pressure Capability

2500 PSI for all flows

5000 TO 7500 PSI at reduced flows.

Table 5: Pressure and Configuration Chart

Models in max. GPH	Max. Motor Size (HP)	Plunger stroke length (in)	Max. RPM	No. of Plungers	Max. plunger Diameter (in)	Pressure at Maximum Plunger	Minimum Plunger Diameter (in)	Pressure at Minimum Plunger
500LV	20	1.5	300	3	1.1875	3500	0.75	7500
500	20	2	300	3	1.1875	3500	0.875	7500
1000	30	3	300	3	1.375	2500	1.250	6600
2000	60	3	300	3	1.9375	2500	1.50	5000
3000	100	4	300	3	2.0625	2500	1.500	5000
5000	150	4	300	5	2.0625	2500	1.500	5000

Unit Shipping weights

Model 500 & 500LV
1420 lbs

Model 1000
2575 lbs

Model 2000
3555 lbs

Model 3000
5140 lbs

Model 5000
8210 lbs

Installation

Location And Setting

NOTE: Always lift the homogenizer from under the frame. Lift points are under the frame only.

Arrange the unit to allow adequate room for the operator to service all sides of the machine. Assure adequate floor support for the weight of the homogenizer. See Table 1, "Basic Dimensions and Shipping Weights," on page 16.

The homogenizer is fully assembled when received. There is oil in the crankcase and the hydraulic unit is full. Belts are tight and need further tightening after machine has been run for a period of time. Covers are in place.

Remove the homogenizer from its skids and place in the position you have selected.

The homogenizer must be set level (Legs are adjustable $\pm 0.75"$ to aid in final leveling). Turn counterclockwise to extend. See Figure 6



Figure 6 Homogenizer Feet

If not level, the crankcase oil level sight glass will give false oil readings. See Figure 7



Figure 7 Oil Level Indicator

NOTE: Prior to shipment, your homogenizer has been fully inspected and test run under load to meet performance requirements stated on the order. This can be considered the break-in period. A short test run after installation is required to inspect for leaks and proper pressures prior to production. (A copy of the Manufacturers test is available on request. Please state serial number of machine.)

Electrical

Customer Supplied Items

The following items need to be supplied by the customer:

- Start/stop Switch
- Motor Starter
- Soft Start Controller (Optional, but strongly recommended for 60HP and larger motors.)

Electrical Connections

A competent electrician should make all electrical connection to the machine in accordance with the following directions:

Remove the top panel by lifting it up.

Remove the hex head bolts which attach the rear panel and remove the rear panel. See Figure 8 for proper wiring connections. (A three wire control is recommended.)

Check the main drive motor data plate before making any connection so that power connections are correct. (Emergency Switch is located on the front panel.)

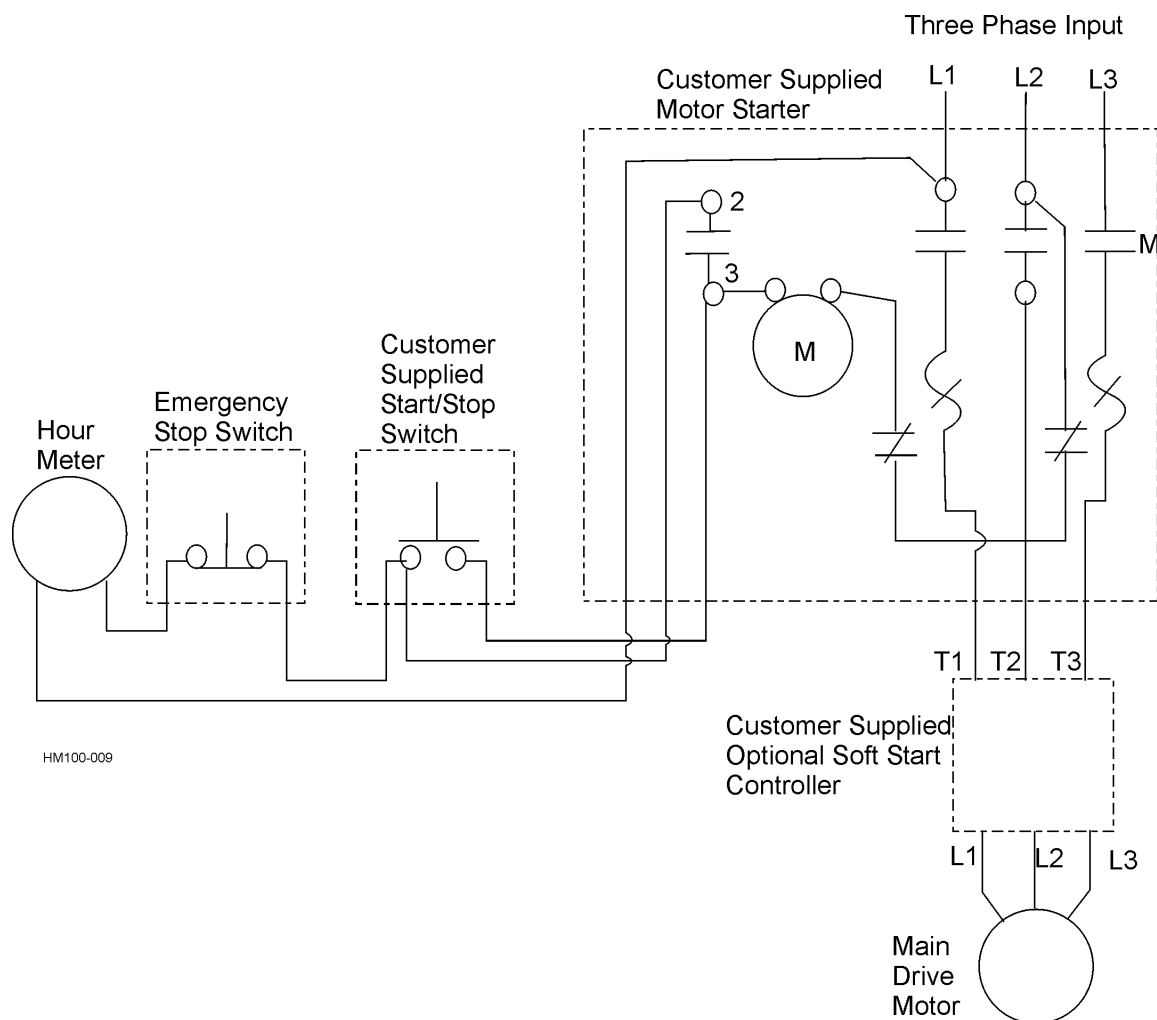


Figure 8 Field Wiring Diagram

Rotation Note

The homogenizer motor must rotate the crankshaft in the direction of the arrow on the crankcase. If the drive motor rotates incorrectly, the oil flow will not be correct for the system and the entire drive assembly will fail rapidly. See Figure 9

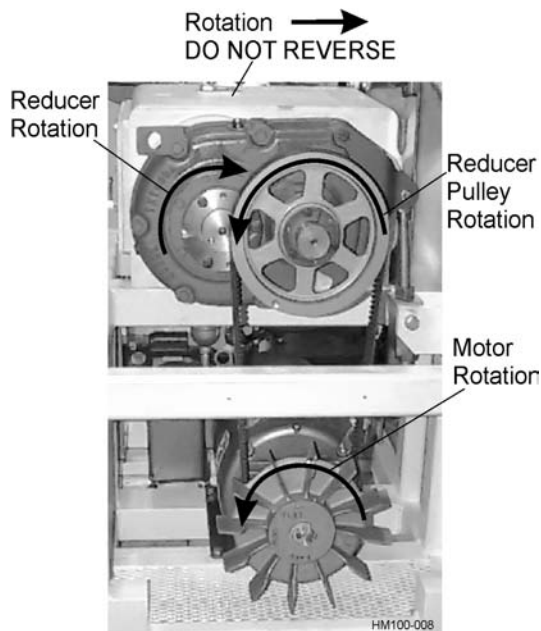


Figure 9 Reducer Rotation

NOTE: Check Belt Tension- 1/2" deflection at center of each belt (pressed with thumb). Adjust accordingly. See “Installing and Adjusting Belts” on page 77.

Three Wire Control Circuit

The circuit is completed through:

- The normally closed emergency STOP switch. (supplied with machine).
- The START/STOP switch at the starter (Supplied by Customer)
- The holding contact (2 -3) at the starter.

Stop Motors

Push the Emergency Stop switch in or push the Stop switch in at the motor starter.

Restart

Activate Start switch at motor starter and pull the Emergency switch to the ON position (Twist to Lock)

WARNING

To avoid serious injury, the serviceman involved, must lockout the start/stop switch.

Digital Pressure Indicator Wiring

This optional feature is local on the factory supplied machine.

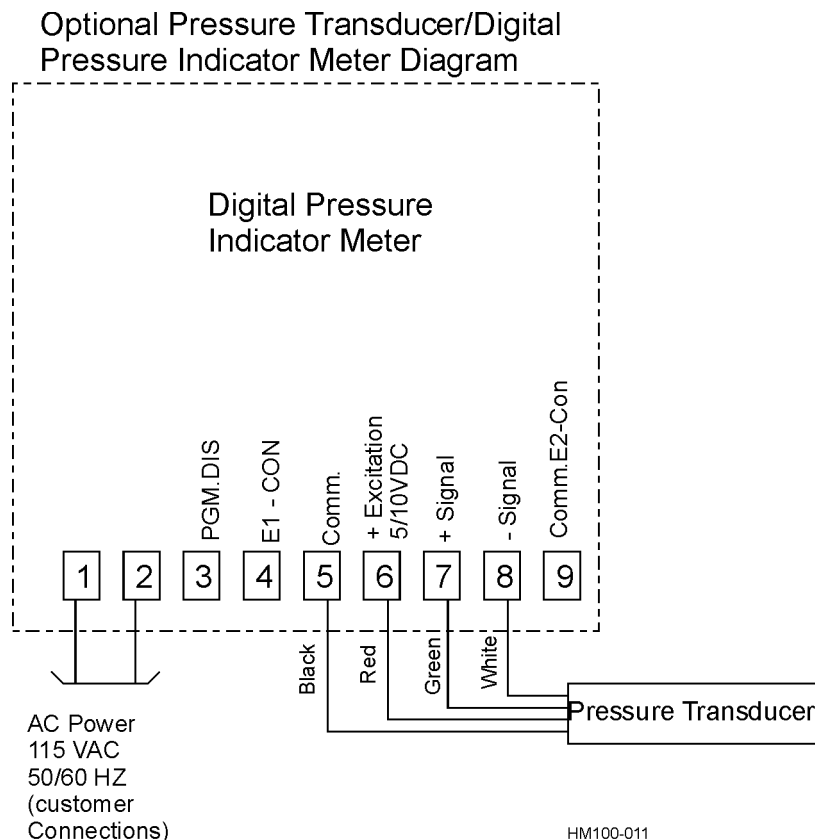


Figure 10 Pressure Transducer Wiring

Hydraulic Power Unit Motor Wiring

CAUTION

To prevent a high pressure spike, motor to hydraulic power unit must turn ON after the homogenizer is operating under full flow.

Equipment

- 1/2 HP 1725 RPM
1/60/115/208-220 V
(Standard)

NOTE: Contact your Waukesha Cherry-Burrell representative for additional motor options if need.

Piping Connections

Supply

Connect a soft water supply line to the 1/2" IPS valve on the seal flush header. See Figure 11. This water is used to keep the plungers clean and free of abrasive material during operation. Water having high lime content

should not be used. Such water will deposit lime on the plungers shortening seal life.

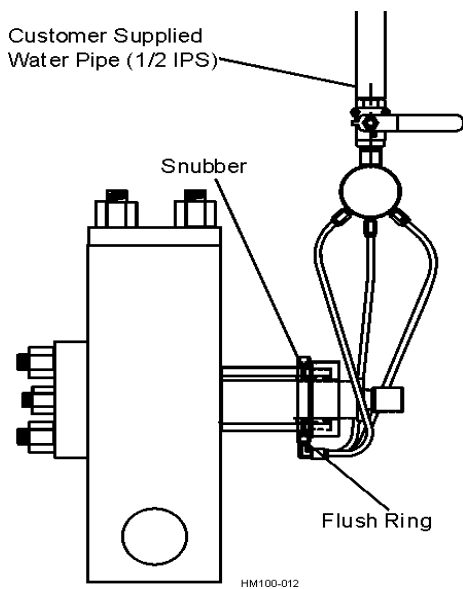


Figure 11 Flush Ring/Snubber

NOTE: This valve must be adjusted to cause a small stream of water to flow out of the top snubber of each flush ring, prior to starting the homogenizer. The flow should not be so great as to cause spraying or splashing.

Flush Drain

Connect a water drain line to the elbow extending from the bottom of the crankcase frame (below the seal flush area). See Figure 12

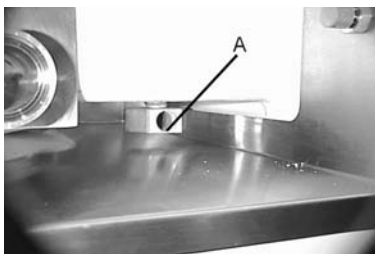


Figure 12 Location of Water Drain Pipe

Connect a sanitary product line to the right-hand and left-hand suction fitting at the bottom of the fluid block. See Figure 13 For ideal flow, both should be used for product source.

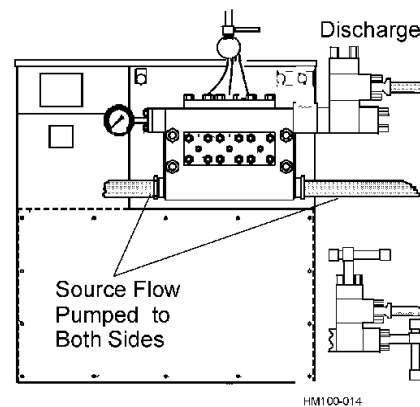


Figure 13 Source/Discharge Flow

NOTE: Piping to the inlet must be the same size as the inlet, straight and at least as long as 10 pipe diameters. (Example: 1-1/2" inlet pipe x 10 = 15" in length) A stuffing pressure of 25-35 PSIG is recommended for "water-like" fluids. For fluids with higher viscosities, more stuffing pressure may be required.

Table 6: Heavy I-Line Connections Sizes

Homogenizer Model	Inlet Size in inches	L in inches	Outlet Size in inches
500-500LV	1-1/2	15	1-1/2
1000	1-1/2	15	2
2000	2	20	2
3000	3	30	2-1/2
5000	3	30	2-1/2

L= minimum straight length required

Connect a sanitary product line to the discharge fitting. If two stage homogenization is performed, this fitting is on the top of the second stage homogenizing valve. The discharge line should be kept the same size as this fitting, or larger. It should be well supported to prevent strain from vibration and weight of line. This line must be without restriction. See Figure 14.

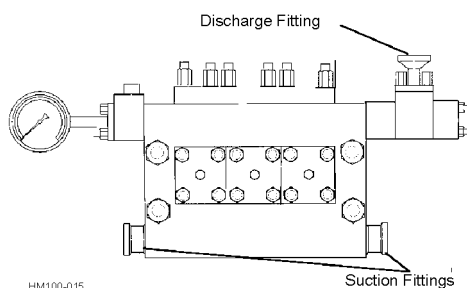


Figure 14 HeadBlock Product Connections

Aseptic Installation Connections

Remote aseptic homogenizing valves See Figure 15 permit a high pressure pump to be located in the non-aseptic portion of an aseptic processing system. It pumps the product

through a heating section where the product is sterilized.

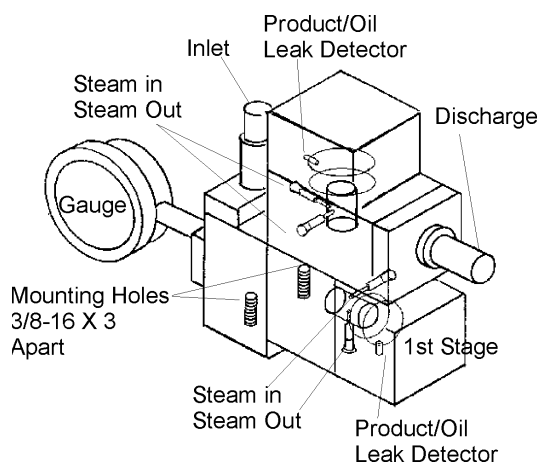


Figure 15 Remote Aseptic Homogenizing Valve

The product is then cooled to the proper homogenizing temperature and then homogenized in an aseptically designed homogenizing valve (one or two stage) after which the product is pumped through a final cooler(s) prior to packaging. The high pressure pump supplies all the pressure to pump the product through the system including the required homogenizing pressure. Steam lines and condensate lines (inlet/outlet) are to be connected to the valve(s) for steam sealing those areas where outside contamination might occur.

Motor Installation

When installing a new motor or removing the homogenizer from storage check the following:

- After uncrating, check for any damage that may have occurred in handling.
- The motor shaft should turn freely by hand. Repair or replace any loose or broken parts before attempting to use the motor.
- Check to be sure that motor has not been exposed to dirt, grit, or excessive moisture in shipment or storage prior to installation.
- Clean and dry the windings as required.
- Never start a motor that has been wet. Thoroughly dry the motor prior to starting.

Operation

Run and Test

It is recommended that each new machine be test run with water prior to first product operation. To avoid damage to the machine, follow the procedure outlined.

NOTE: Be sure cylinder block is completely and correctly assembled. Check plungers to make sure they are drawn up tightly. Make sure the crank case is filled to the proper oil level.

Test Procedure

Manual Homogenizing Valve

To test the Manual homogenizing valve --Turn the regulating tee handle/s counterclockwise.

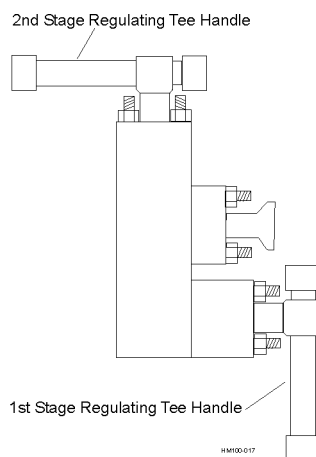


Figure 16 Manual Adjustment

Hydraulic Homogenizing Valve

To test the Hydraulic Homogenizing Valve do the following

1. Turn the 1st and 2nd stage controls counterclockwise to minimum pressure and lock in place.

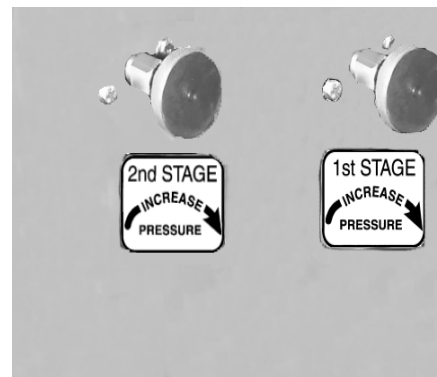


Figure 17 Hydraulic Homogenizing Valve

2. Open the flush valve on the water line enough to cause a small flow of water from each snubber.
3. Open the supply valve permitting product flow to the machine. (Start feeding pump if part of supply system.)
4. Start the homogenizer motor, then start the hydraulic actuator motor (if equipped).

CAUTION

Never start the machine with pressure on the first or second stage valve. Shock loads will cause serious damage to the machine.

5. Check suction lines for air leaks.
6. Permit unit to run for 30 minutes without pressure on the valves.
7. When using a single stage valve, turn the valve slowly to permit the pressure to build gradually.

For initial test/startup If using a two-stage system, adjust the 2nd stage valve first, to indicate 500 psi on the gauge. Adjust the 1st-stage valve pressure to 1000 psi on the gauge. (Do not change the 2nd stage valve setting unless you completely release all pressure on the 1st-stage valve.)

Lock hydraulic valves in place when adjustment is completed.

This procedure assures accurate adjustment of the pressure. Allow unit to run at this pressure for duration of test period and then proceed with step 8. Refer to “Stopping and Restarting” on page 33

8. Check for leakage at the front of the headblock or at the inside ends of the cylinder. Back off the pressure of the 1st stage valve, then 2nd stage valve before stopping machine. Replace suspected seals or O-rings.
9. After the test run has been completed, shift to production run or shut down machine. See “Cleaning” on page 35

NOTE: Pressure gauge is set for operation at 40° F. to 300° by the **Manufacturer**. Do not add glycerin to gauge.

Operation Start-Up

- For **Manual homogenizing valves** turn Tee handles to regulate pressure.
- For **Hydraulic homogenizing valves** do the following turn knob to regulate

pressure and lock in place with locknut. See Figure 18.

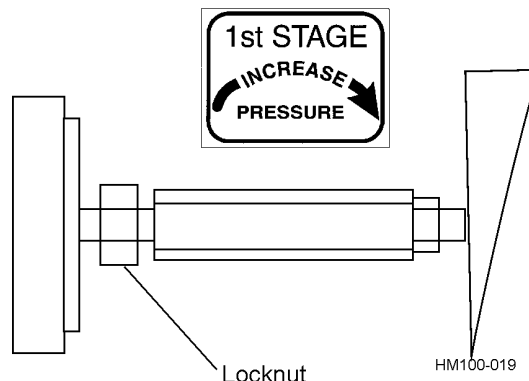


Figure 18 Location of Locknut

1. Turn manual homogenization control handle/s counterclockwise or turn the hydraulic control knobs fully counterclockwise. (Loosen locknut, if tight) See Figure 18
2. Open water flush to cause a small flow of water from each snubber on flush ring. See Figure 19

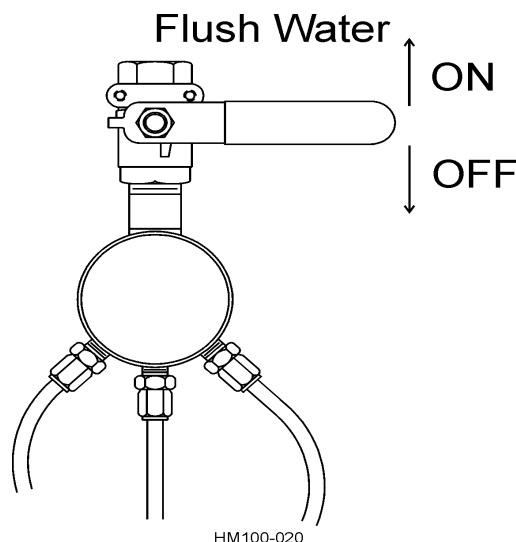


Figure 19 Flush Control

3. Open supply tank valve on the supply tank, thus permitting the product to flow to the machine. (Or turn ON Feeding pump)
4. Start the homogenizer Main motor, then the hydraulic actuator motors if equipped.

CAUTION

Never start the machine with pressure on the first- or second-stage valve. Shock loads will cause serious damage to the machine

5. Check suction lines for air leaks. The fluid being pumped must not contain air.
6. Adjust the 2nd stag homogenizing valve (if used),

Lock the knob in place with the locknut when this pressure is once set, it should not be changed unless all pressure is relieved from the first-stage valve (Only second-stage pressure should show on the gauge. See Figure 20



Figure 20 Gauge Now Set to show only 2nd Stage setting

7. Adjust the first-stage homogenizing valve to show the desired total pressure (first stage pressure plus the secondstage pressure) on the gauge. Make adjustment slowly, allowing pressure to build gradually. Keep the gauge

under observation for a brief period to make certain the pressure remains at the desired reading. Lock the first stage valve in place. See Figure 21

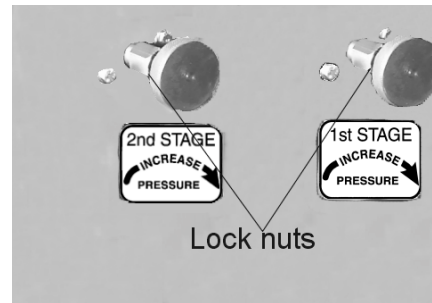


Figure 21 Location of Valve Locknuts

Stopping and Restarting

When it is necessary to interrupt a product run, the machine should be operated as follows:

1. Turn the 1st stage homogenizing valve handle or knob counterclockwise to relieve pressure.
2. Turn the 2nd stage homogenizing valve handle or knob counterclockwise to relieve all pressure.
3. Shut hydraulic power unit off (if hydraulic actuator system).
4. Shut off homogenizer main drive motor. Shut feeding pump off.

NOTE: When product is again flowing to the machine, start the homogenizer, hydraulic actuator and reset homogenizing valves as

described in steps 5 through 7 under "See "Operation Start-Up" on page 32.

WARNING

Do not allow the machine to continue running with pressure set when product is flowing to machine in surges.

The suction manifold of the fluid block must be completely flooded at all times during pressure operation.

Shut-Down

When a product run is completed and the machine is to be shut down in preparation for cleanup, proceed as follows:

1. Unscrew 1st stage, then 2nd stage valve controls (handles) (if two-stage operation) to remove any pressure.
2. Press the STOP buttons to stop the homogenizer, then the hydraulic power unit.
3. Shut the flush water valve off.

Cleaning

CAUTION

Handle parts with care. Nicks appearing on the working surfaces will prevent satisfactory operation and should be removed. It is suggested that a suitable portable rack, tray, or truck be provided for the storing and handling of cylinder and valve parts. Use necessary care in handling heavy parts and gloves for parts with possible cutting edges.

The following preliminary cleaning procedure is suggested prior to dismantling the headblock assembly:

1.
 - Pump lukewarm water (100°F) through the headblock until the discharge becomes clear.
 - Use an acceptable cleaning compound at the strength and temperature recommended by your chemical supplier. Do not use cleaning compounds containing chlorine or non-compatible acids.

CAUTION

Wear protective clothing and gloves as dictated by the cleaning solutions and temperatures.

- Flush with cold water.
- Rinse with 170° F. water.

2. Dismantle the headblock components according to the disassembly directions given in the following “Headblock Assembly” on page 49.
3. Take all parts removed from the headblock and carefully wash in a suitable wash tank.

CAUTION

Handle all parts carefully to avoid dents and nicks which prevent parts from fitting properly.

4. Air dry all parts after washing and rinsing.
5. Store the parts on a suitable rack or table where they will remain clean and dry.
6. Wash all ports and passages in the headblock with a brush. Use a pail of washing solution, dipping the brushes in this solution, frequently.
7. Rinse headblock with cold water followed by a hot water (180°F) rinse.

Care of Stainless Steel

The stainless steel components in Waukesha Cherry-Burrell equipment are machined, welded and assembled by skilled craftsmen using manufacturing methods that preserve the corrosion-resistant quality of the stainless steel.

WARNING

Hydrochloric acid, even with inhibitors added, is not recommended for cleaning stainless. (Inhibitors are specific compounds that are added to cleaning chemicals to diminish their corrosive effect on metals. Most inhibitors are proprietary, and recommendations for their use are available from the supplier).

Retention of corrosion-resistant qualities under processing conditions requires regular attention to the precautions listed below.

NOTE: Corrosion resistance is greatest when a layer of oxide film is formed on the surface of stainless steel; should this film be disturbed or destroyed, stainless steel becomes active and much less resistant to corrosion.

1. Regularly check all electrical devices connected to the equipment in any way for stray currents caused by improper grounding, damaged insulation or other defects.
Corrosion: "Pitting" often occurs when stray currents come in contact with moist stainless steel.
2. Never leave rubber mats, fittings, wrenches, etc. in contact with stainless steel.
Corrosion: Pitting or galvanic action. Objects retard complete drying, preventing air from reforming the protective oxide film. Galvanic corrosion occurs when two dissimilar metals touch when wet.
3. Use water conditioner when the water supply contains foreign matter which may cause discoloration or deposits.
Corrosion: Pitting, deposits, discoloration. Deposits counteract the best cleaning practices and cause corrosion of the best quality stainless steel.
4. Immediately rinse equipment after use with warm water until the rinse water is clear. Clean the equipment (manual or CIP) as soon as possible after rinsing.
Corrosion: Discoloration, deposits, pitting. Product deposits often cause Pitting beneath the particles.
5. Use only recommended cleaning compounds. Purchase chemicals from reputable and responsible chemical manufacturers familiar with stainless steel

processing equipment. They continuously check the effects of their products on stainless steel.

6. Use cleaning chemicals exactly as specified by the manufacturer. Do not use excessive concentrations, temperatures or exposure times.

Corrosion: Pitting, discoloration, stress-cracks. Permanent damage often occurs from excessive chemical concentrations, temperatures, or exposure times.

7. For manual cleaning, use only soft non metallic brushes, sponges or pads. Brush with the grain on polished surfaces; avoid scratching the surface.

Corrosion: Pitting, scratches. Metal brushes or sponges will scratch the surface and promote corrosion over a period of time. Metal particles allowed to remain on a stainless steel surface will cause pitting.

8. Use chemical bactericides exactly as prescribed by the chemical manufacturer in concurrence with local health authority. Use the lowest permissible concentration, temperature and exposure time possible. Flush immediately after bactericidal treatment. In no case should the solution be in contact with stainless steel for more than 20 minutes.

Corrosion: Protective film destroyed. Chlorine and other halogen bactericides can destroy the protective film. A few degrees increase in temperature greatly increases chemical activity and accelerates corrosion.

9. Regularly inspect the joints in pipelines. Be sure all connections are tight fitting without binding.

Corrosion: Crevice corrosion. Small crevices caused by improperly seated gaskets will promote crevice corrosion. Stainless steel under stress will develop stress cracking, especially in the presence of bactericides containing chlorine.

10. Regularly inspect equipment for surface corrosion (i.e. pitting, deposits, stress cracks, etc.). If deposit or color corrosion is detected, remove it immediately using mild scouring powder and detergents. Rinse thoroughly and allow to air dry. Review production and cleaning procedures to determine the cause.

NOTE: If corrosion is not removed, the protective film cannot be restored and corrosion will continue at an accelerated rate.

Maintenance

Weekly Maintenance

Open oil drain valve slightly after machine has been idle for eight (8) hours.

Drain water that may have accumulated.

Close valve when oil is clear.

Check oil level and refill to proper level.

Maintain the oil level at the sight glass centerline. Figure 22.



Figure 22 Recommended Oil Level

Lubrication

NOTE: First oil change should occur after 50 to 60 hours of operation.

Crankcase Oil Capacity

Model 500 & 500LV - 8 Quarts

Model 1000 - 20 Quarts

Model 2000 - 28 Quarts

Model 3000 - 36 Quarts

Model 5000 - 44 Quarts

Recommended Oil

Mobile DTE Heavy Medium, ISO Viscosity Grade 68, Rust and Oxidation Inhibited. (does not become corrosive in the presence of water.)

Part Number 449-6044

Reducer

Use Mobile DTE BB ISO Grade 220 R & O (Rust and oxidation inhibited) gear oil. (Part Number 000 140 001)

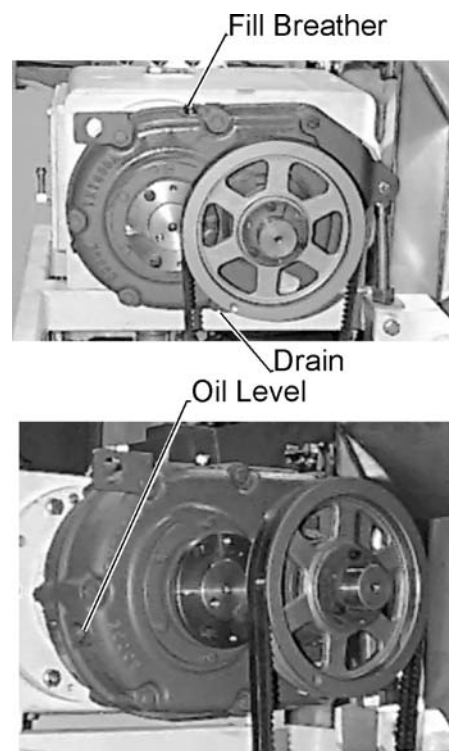


Figure 23 Reducer Oil Replacement

For average industrial operating conditions, change lubricant every 1000 hours of operation or every 6 months, whichever occurs first. Drain reducer and flush with kerosene; clean magnetic drain plug and refill to proper level with new lubricant.

CAUTION

Too much oil can cause overheating and too little will result in gear failure. Check oil level regularly.

Under extreme operating conditions, such as rapid rise and fall of temperature, dust, dirt, chemical particles, chemical fumes, or oil temperatures above 200° F, the oil should be changed every 1 to 3 months depending on severity of conditions.

Hydraulic Pump System

The hydraulic system contains 1.75 gallons of Mobile DTE 26 hydraulic oil ISO Viscosity 55 (SSU at 210° F.) (Part Number 9400-0220)

This system is fully operational at the time of shipping. Refill the tank with oil to the level indicated by the sight glass.

To bleed air from the system, open the plug above the hose connector Figure 24. This should be done when the pump is running.

Loosen Plug To Release Air

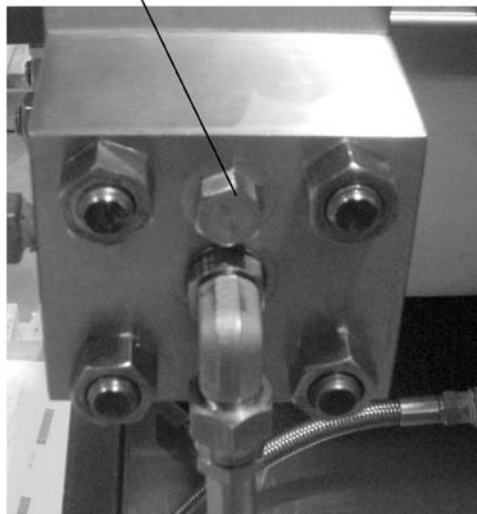


Figure 24 Air Bleed

NOTE: Turn off pump before tightening the plug.

Service Tip: Observing the pressure of the filter while running normally will give you what the standard should be. At a later date a

pressure increase means the filter is plugged and needs to be replaced.

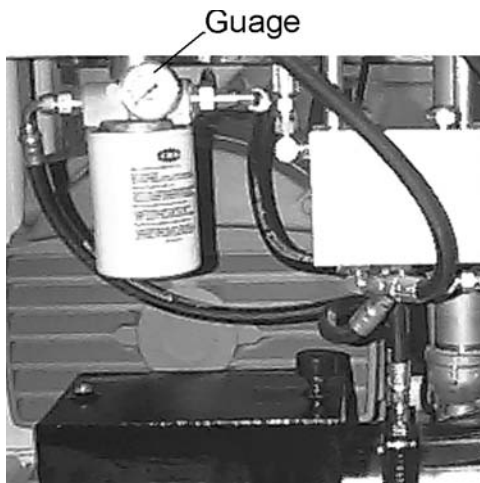


Figure 25

Electric Motors

Refer to Motor Manufacturers instruction for proper lubrication intervals.

Crankcase

See Figure 26.

Changing the Oil

1. Drain oil when the machine is hot and the machine has stopped. See Figure 26.

WARNING

To prevent burn injuries, take necessary cautions to avoid contact with the hot oil.

2. First oil change after 50 to 60 hours of operation.
3. Subsequent oil changes after 1000 hours of operation. Check oil condition when draining water from crankcase.

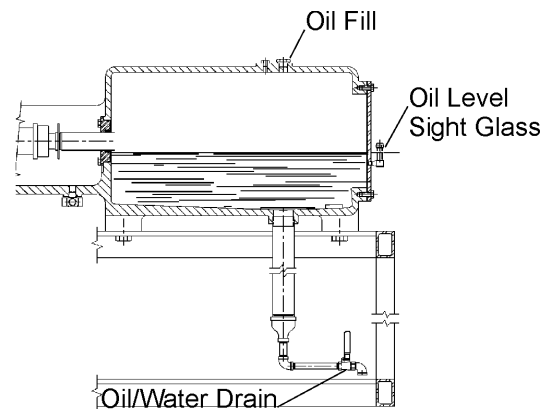


Figure 26 Oil Drain Location

Maintaining Homogenizing Valves

NOTE: Handle valves, valve plugs and valve seats with extreme care to avoid nicks and scratches.

Valve assembly wear is caused by:

- High fluid velocity (Required to facilitate homogenization.)
- Cavitation
- Abrasiveness of fluid being pumped.

The plug and seat of the homogenizer valve assembly should be lapped after the first 1,000 hours (sooner if the fluid being pumped is abrasive). Lap the plug and seat together regularly to avoid severe wear and prolong life.

NOTE: Valve seat and plug assemblies are mated. They are not to be interchanged with others. The plug and the seat are numbered the same. When inspecting, cleaning and

reassembling, match the numbers to avoid homogenizing problems.)

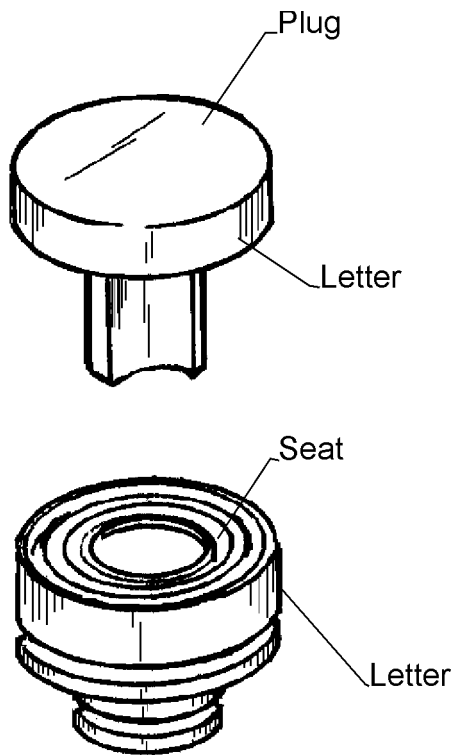


Figure 27 Plug and Seat Assembly

Cylinder and Plunger Component Removal and Service

The following procedure is designed to aid in the clean, inspect and/or replace cylinder/plunger components. Headblock remains secured to the crankcase

TOOLS REQUIRED: Socket Wrench set, Top plug puller, Cylinder puller, Cylinder seal puller, Valve tongs, O-ring tool, spanner wrench.

1. Shut off product.
2. Shut off and lockout main drive motor power.
3. Shut off and lockout Hydraulic motor.
4. Shut off water flush.
5. Remove source and discharge connections.
6. Remove plunger/cylinder guard cover (lift up). See Figure 28.

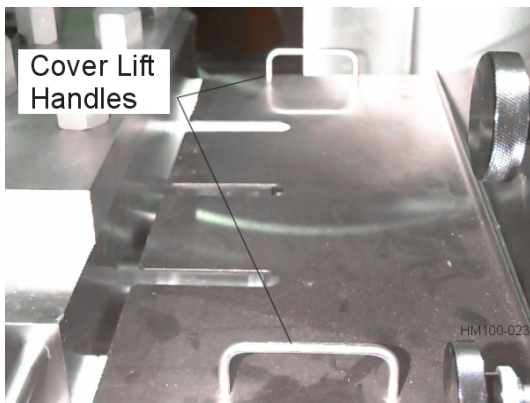


Figure 28 Location of Cover Lift Handles

7. Use spanner wrench to loosen cylinder nut (clockwise, facing headblock front). See Figure 29.

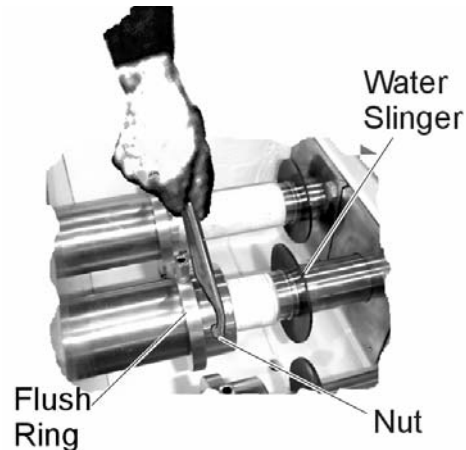


Figure 29 Remove Nuts

8. Turn nut until it is completely off cylinder threads.
9. Slide nut back to water slinger. (The water slinger is not movable.)
10. Rotate reducer sheave on the drive by hand to move the water slinger in far enough to allow the nut and flush ring to slide onto the plunger. See Figure 30

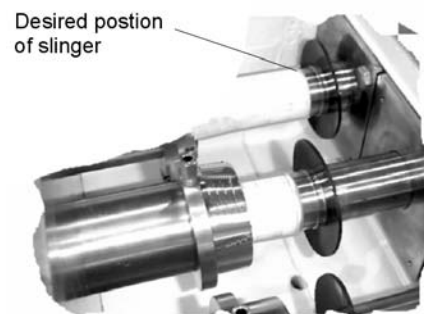


Figure 30 Slinger to Position Indicated

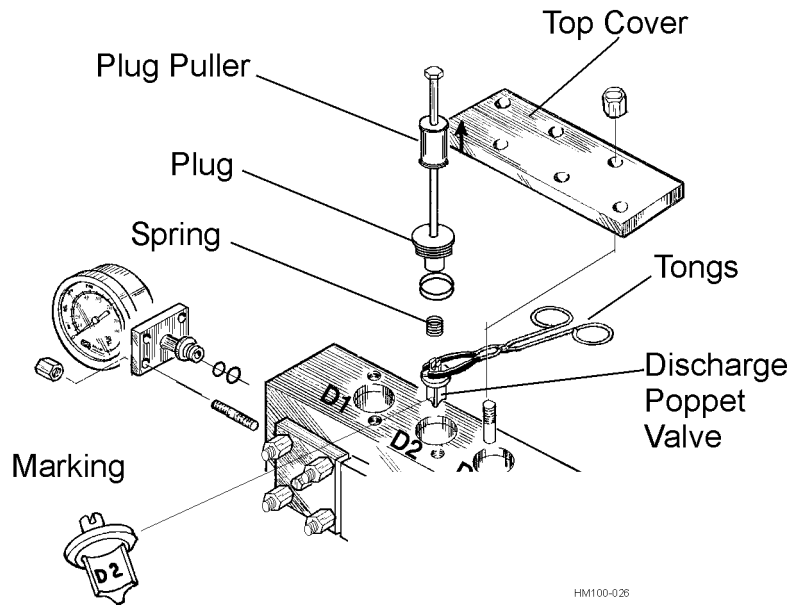


Figure 31 Remove Homogenizer Valves

11. Remove top cover of headblock. See Figure 31.
12. Use top plug puller to remove top plugs. (Screw in end of puller and use slide hammer to pull top plug from headblock. See Figure 31)
13. Using tongs carefully lift springs and discharge valves out of headblock. See Figure 31

NOTE: Valve assemblies consist of a spring and valve. Valves and plugs are marked with headblock cylinder location number (D1, D2, etc.). Because valves are lapped to their respective seats, each valve must remain with headblock location (D1, D2, ect.).

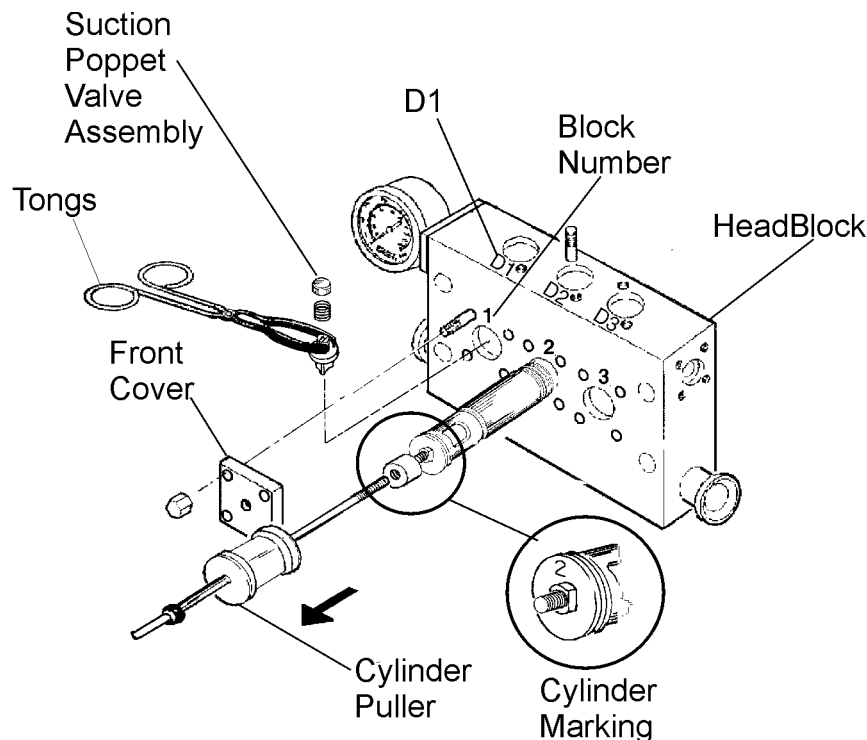


Figure 32 Front Cylinder Block

Cylinder Removal

1. Remove the front covers from each cylinder. (Four nuts, each) See Figure 32.
2. Screw the end of the puller onto the threaded stud on the cylinder front. Using the cylinder puller, remove the cylinder.
3. Use the Cylinder Puller to carefully pull out the entire cylinder. Check the back of the cylinder to make sure the nut is disengaged and the flush ring can be slid off as the cylinder is pulled out. The nut

and the flush ring will now be hanging on the plunger.

CAUTION

The plungers are now exposed and can be damaged if accidentally hit with a tool.

NOTE: The front of each cylinder has a match number on it that corresponds to the position in the headblock (1, 2, etc.)

4. Lift out the suction valve assemblies (cap, spring and valve) with the tongs.

Cylinder Seal Removal

The following instructions are intended to aid in the removal of the cylinder seal set from inside cylinder.

The following items must be removed before the cylinder seal set can be removed from inside cylinder.

- Front covers
- Nut and Flushing ring (Use the spanner wrench to remove the nut, if needed.)
- Cylinder. (Use the cylinder puller to remove the cylinder.)

NOTE: Cylinders, valves, plungers and seal packing are marked with matching numbers to allow placement in the proper cylinder hole in the headblock. (See Figure 31, Figure 32, and Figure 34)

1. The seal puller adjusting screw should be screwed out until the three pins are recessed.
2. Place spacer inside cylinder.
3. Place the seal puller inside the cylinder and push it in as far as it will go. (It will bottom out against the end of the cylinder.) See Figure 33
4. Turn the knob clockwise while holding the tool in place. The pins will extend into the space between the bottom adapter and the cylinder shoulder. Continue turning the knob and the seal assembly will be pushed out of the cylinder.
5. Screw the knob counterclockwise to retract the pins and remove seals. See Figure 33

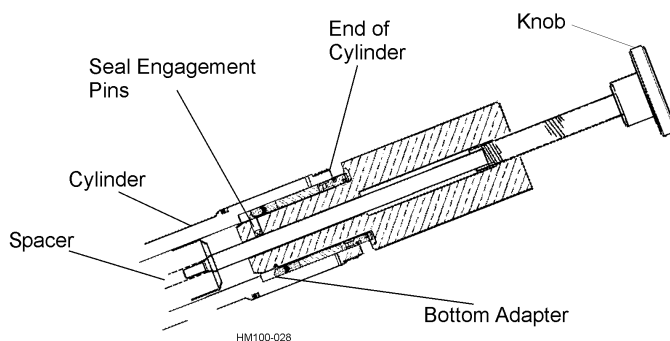


Figure 33 Seal Puller

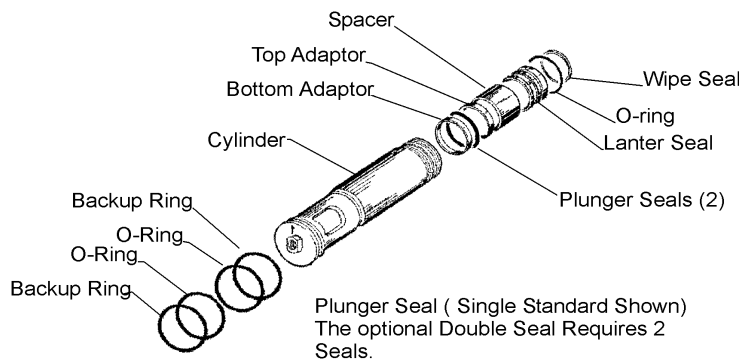


Figure 34 Cylinder Components

Plunger Replacement

NOTE: Cylinders must be removed before the plungers can be removed. See “Cylinder Removal” on page 45.

To remove the plunger, loosen the two setscrews in the plunger stub. See Figure 35.

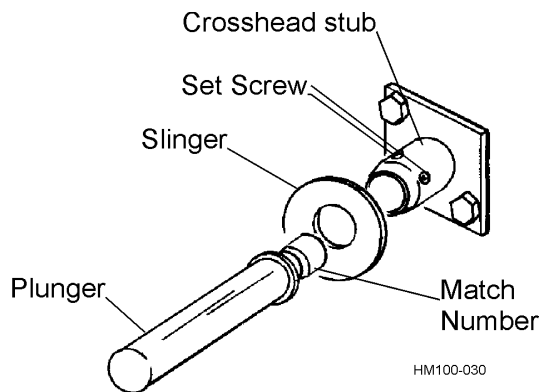


Figure 35 Plunger Removal

Pull the slinger forward out of the stub slot and insert the plunger removal tool in that slot as shown in Figure 36.

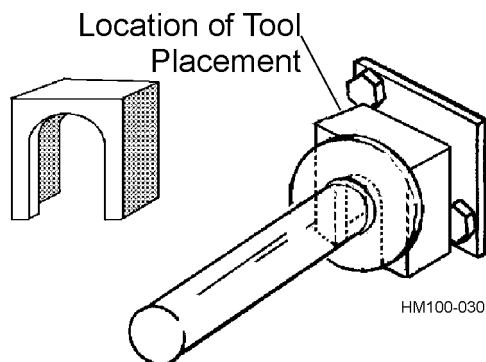


Figure 36 Plunger Removal Tool

Turn the reducer sheave to back the plunger up and the tool will push the plunger out of the stub.

NOTE: Each plunger contains a match number on the end (1,2, etc.) This number

matches the crosshead number. When replacing plungers, cylinder and valves, they must be placed in the same position in the headblock as they were. (If new parts are used they must be etched with the number of the headblock position. See Figure 35)

NOTE: do not over tighten plunger set screws.

Headblock Removal

To remove the headblock do the following:

1. Remove the pressure gauge (four nuts).

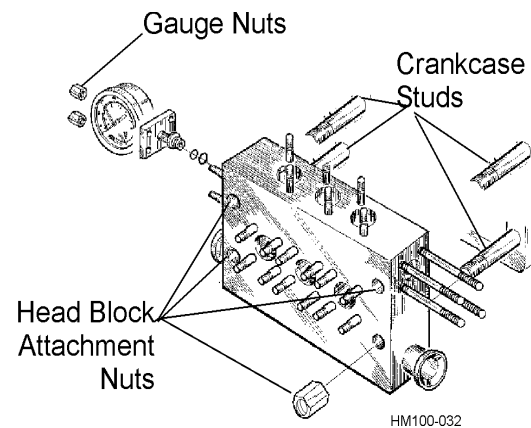


Figure 37 Blockhead Removal

2. Remove four nuts holding 1st stage homogenizing valve actuator block. See Figure 38

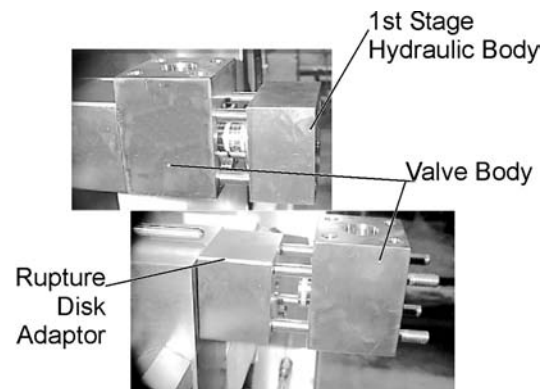


Figure 38 Valve Bodies

3. Remove hydraulic hoses, if necessary.
4. Slide actuator block off studs.
5. Remove homogenizing valve assembly (single stage) and, if double stage, remove the entire assembly.
6. Slide the rupture disc adapter off the studs. It is not necessary to remove the rupture disc unless repairing a ruptured disc or replacing it with a different pressure disc. See Figure 38
7. To avoid damage to the plungers, remove them from the plunger stubs, if necessary. See "Plunger Replacement" on page 47.

Loosen the two set screws on each stub and slide the plunger out.

Clean and wrap them to avoid damage to the plunger surface.
8. Place plungers, cylinders and valves together according to their numbered position (1, 2, 3, etc.)
9. Remove the four nuts holding the headblock to the crankcase. See Figure 37
10. Place lifting straps through the ports and slide the headblock off the crankcase studs.
11. Clean the crankcase studs and coat with anti-seize compound before installing headblock. See Figure 37.

Valve And Seat Maintenance

Valve seats are part of the headblock. Both valves and seat surfaces become work-hardened from the continual action of the valves. These surfaces may also erode due to the abrasiveness of the fluid.

Inspection

Inspect after first 1000 hours of operation, or sooner if pumping abrasive fluid.

Frequently observing the condition of the seats and valves best determines when a lapping operation should be performed. Periodic lapping is necessary, as indicated by the condition of the valves and seats.

Look for any suggestion of roughness at the mating surface between the valve and seat or any evidence of fluid backflow. It is essential to maintain a uniform seating surface around the valve and the seat, even though this surface may be quite narrow. Small indentations may result from continual action of the valves or due to the abrasiveness of the fluid, any indentations should be removed by retouching. Properly lapped surfaces of poppet valves and seats will appear uniformly dull (gray).

NOTE: By lapping the valves frequently, fluid backflow is eliminated. Cutting action (wire drawing) on the seats and valves will also be eliminated and the need to lap a great amount of material will be avoided.

Short life of valves and seats is caused by:

- Poor suction conditions.
- Improper maintenance.
- Abrasive characteristics of product.
- Not using springs.
- Air in the product.

Lapping Valves

Periodic lapping prevents possibility of:

- Bypassing or slippage. (Resulting in loss of fluid output.)
- Uneven pumping with consequent poor operating efficiency.
- Improper or rough valve action which can damage valves and seats.

To properly lap the valves, the block can be removed or remain installed. A valve grinding tool is available for lapping valves. See Figure 39. One end fits over the top of the valve.

NOTE: Valves must be installed in the proper locations in the cylinder block. Each valve is etched with its location. (S1=bottom left when facing front of headblock) See Figure 40

1. To lap the valves the valve must be removed from the seats.
2. Apply valve compound (supplied with tool) to face of valve. See Figure 39

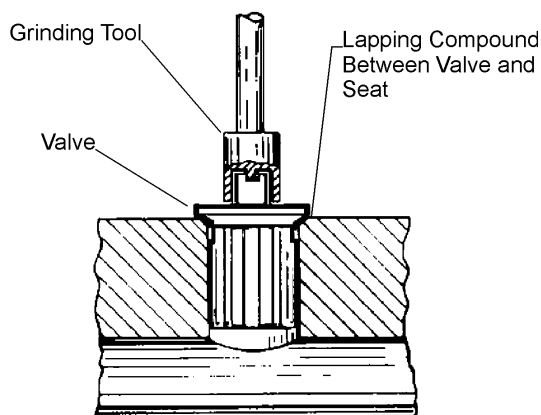


Figure 39 Lapping Compound

3. Place the valve back into the seat. See Figure 39

4. Using the lapping tool apply a very light pressure to and turn the grinding tool. This should be sufficient to lap the valve to seat. See Figure 40.

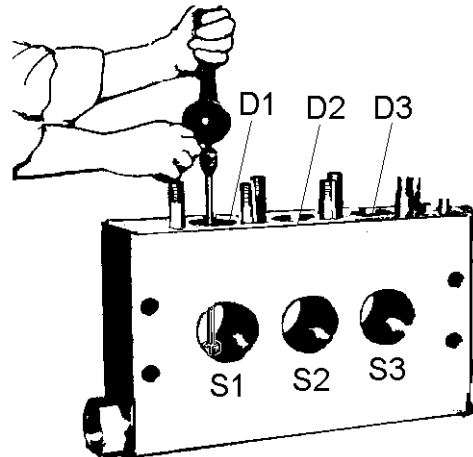


Figure 40 Lapping the Valve Seats

Headblock Assembly

When assembling the headblock make sure the following is complete before assembly:

- All the individual parts are clean, including the headblock. (Lapping of seats should be finished, if necessary)
- The plungers are fastened in place and cylinder nuts and flush rings are hanging on plungers. (When replacing plungers, each plunger has a number that matches the cylinder marking on the headblock, 1, 2, 3, etc. If installing a new plunger/plungers, mark them with the cylinder port numbers.)

1. Install the Cylinders/Seals See Figure 41 for seal identification and order. Coat O-ring seals with an acceptable lubricant.

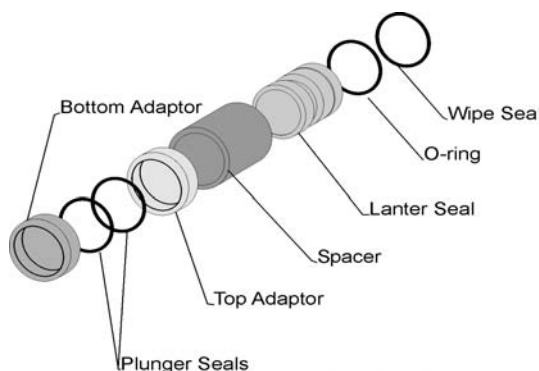


Figure 41 Cylinder Seals

NOTE: Instal Valve Assemblies (Poppet Valves) (Valve markings match the port number and position on the headblock, S for suction - lower, D for discharge- top.) See Figure 42

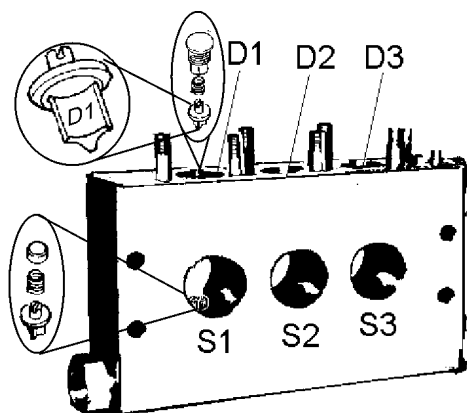


Figure 42 Valve and Block Markings

2. Carefully insert the correctly marked valve in the suction port (lower) with the tongs.
3. Place a spring over the valve top and a cap over the spring. Follow this procedure with each suction valve.

4. When installing the cylinder, position it with the stamped number on top. Match this number on front of cylinder with the headblock port number. Use lubricant on the O-rings. See Figure 43

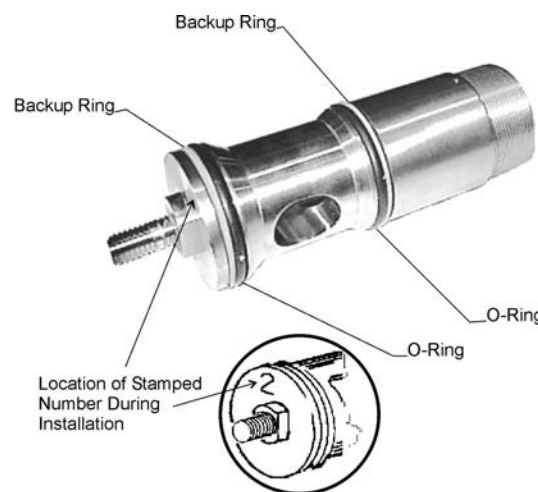


Figure 43 Rings and Cylinder Number Location

5. Insert the cylinder carefully into the port, aligned over the plunger and push it in evenly by hand. See Figure 44. (Turn the drive reducer sheave to allow the plunger to be moved back into the crankcase.) When necessary, use a plastic hammer to tap the cylinder in.



Figure 44 Install Cylinder by Hand

NOTE: Make sure to maintain the rectangular end in a vertical position. The outer front of

the cylinder should be flush with the face of the headblock.

NOTE: Use the cylinder alignment tool notch over the end and against the stud to correct the vertical end.

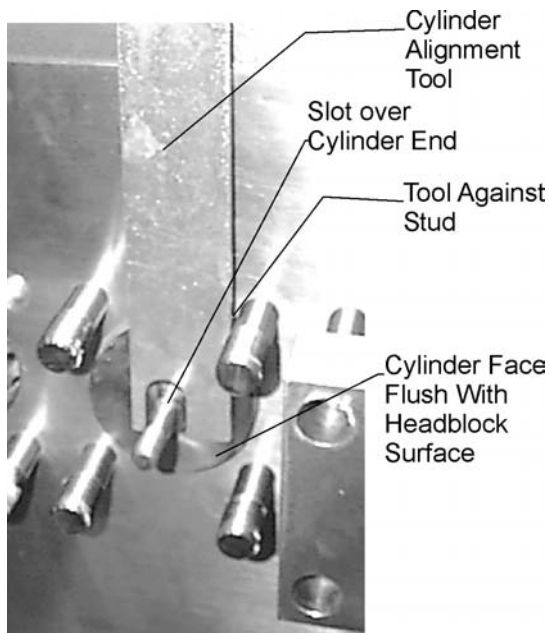


Figure 45 *Cylinder Alignment Tool*

6. Place a front cover over each cylinder end.
7. Coat all studs with anti-seize compound.
8. Tighten the nuts to torque value in chart.
9. Slide flush ring onto cylinder so flush hole in ring is directly over flush hole in cylinder. The flushing ring covers the hole in the top of the cylinder. See Figure 46.
10. Coat cylinder threads with anti-seize compound. See Figure 46.

11. Place the nut over the cylinder and tighten it in place. (BY HAND ONLY) See Figure 46.

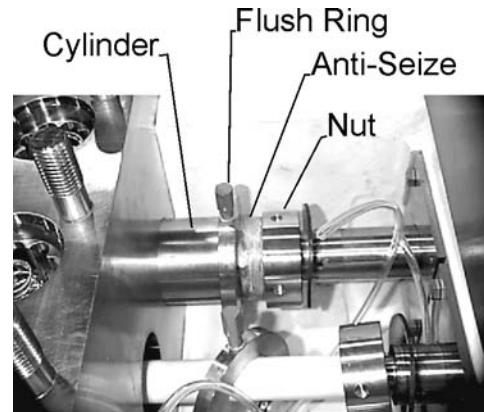


Figure 46 *Location of Flush Ring and Nut*

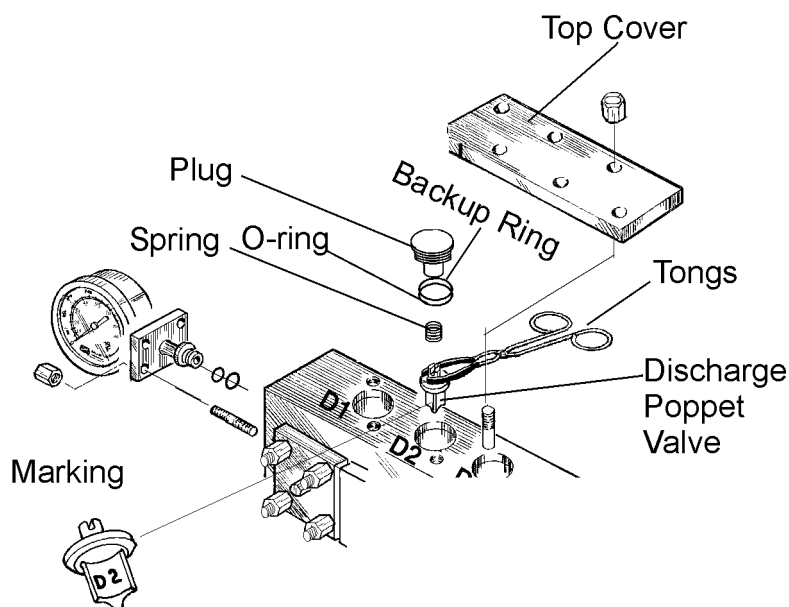


Figure 47 Installing Discharge Valves

12. Use tongs to lower matching numbered of each of the discharge valves (D1, D2, etc.) into top port. See Figure 47
13. Place spring over valve top. See Figure 47.
14. Lubricate the top plug O-ring and backup ring. (O-ring is installed closest to the narrow end of the plug with backup ring behind it.) See Figure 48.
15. Insert the top plug, evenly into the port. Follow this procedure in all the ports.
16. Apply anti-seize compound to all studs.
17. Place the top cover over all the plugs.
18. Fasten the top covers in place with nuts and torque to value in chart.



Figure 48 Top Plug

15. Insert the top plug, evenly into the port. Follow this procedure in all the ports.

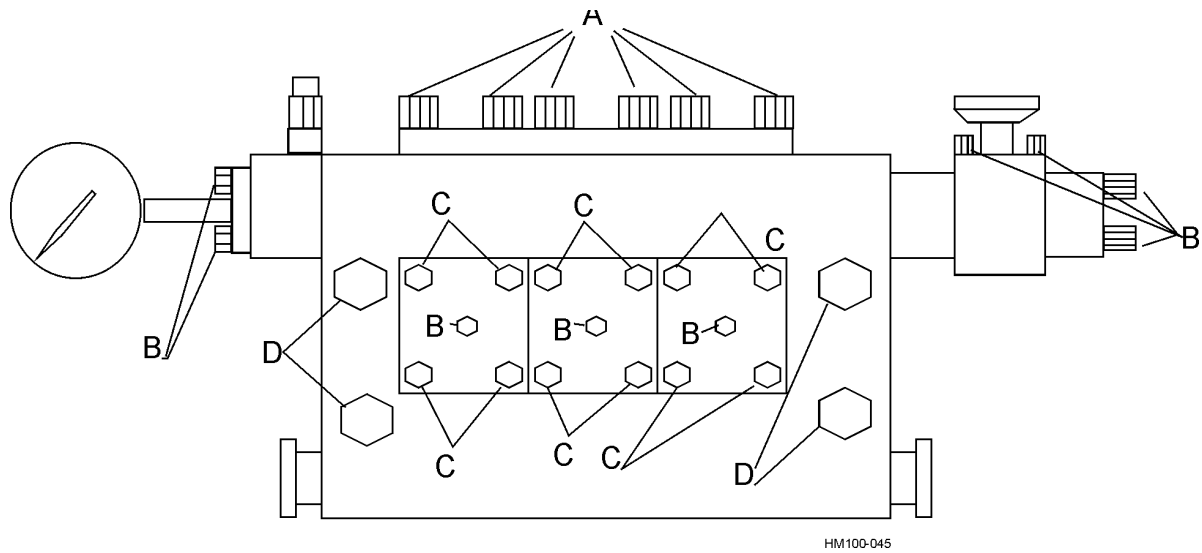


Figure 49 Nut Torque Values

Table 7: Callout Values From Figure 49

NUT SIZE	MODEL					TORQUE FT LBS
	500&500LV	1000	2000	3000	5000	
1/2-1/3	B	B	B			100
5/8-11	A,C			B	B	150
3/4-10		C	C	C	C	200
7/8-9	D	A	A	A	A	250
1-1/4-7		D	D	D	D	400

Servicing The Rupture Disc

The rupture disc is used as a pressure relief device in waukesha homogenizer/high pressure pump. The rupture disc is located in the adapter next to the valve body.

Rupture Disc Removal

1. Turn the machine off and locked out.
2. Product must be stopped and the headblock drained.
3. Locate the pressure relief pipe and unscrew it from the elbow.
4. Hold a wrench on the holddown nut and remove the elbow.
5. Remove the holddown nut.
6. Remove ring and burst disc. Do not damage seating surfaces. Remove all residue from seating surface.
7. Remove any foreign materials from the new rupture disc. Handle disc carefully and keep it clean. **Do not get fingerprints on disc surface.**

NOTE: Use disc of same rating as one removed.

8. Place disc into opening with crown surface facing out.
9. Clean ring and place against rupture disc with inner radius side against disc.
10. Screw in holddown nut and torque to **100 ft-lbs.**

CAUTION

Excessive tightening will cut the disc and result in premature failure, but inadequate tightening will cause leakage.

11. Replace the elbow and tighten to a downward pointing direction. Hold wrench on holddown nut to prevent applying additional torque to it.
12. Attach the pressure relief pipe and tighten it in place.

CAUTION

Plumb the pipe to a drain to avoid Operator injury if venting occurs.

13. Before further operation, evaluate and correct reason that caused disc failure.

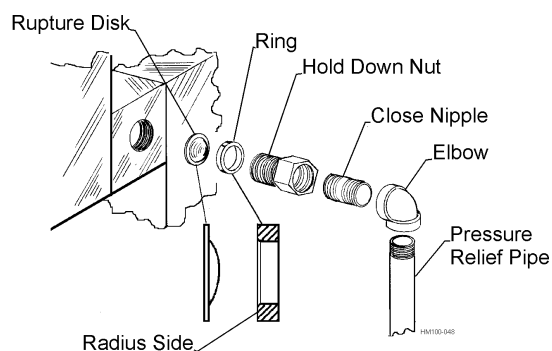


Figure 50 Rupture Disk Assembly for Models 1000 and 3000 ONLY

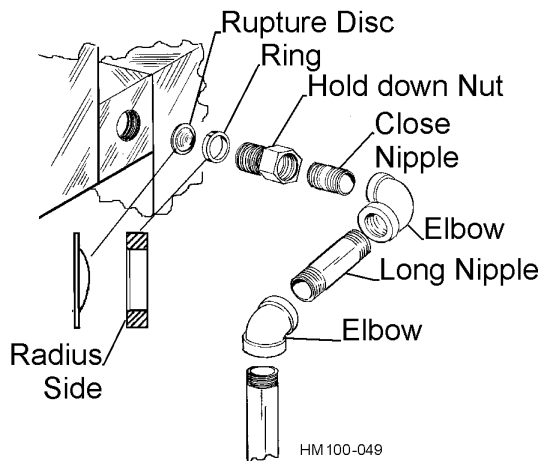


Figure 51 Rupture Disk Assembly for Models 2000 and 5000, 500 and 500LV ONLY

WARNING

This is a pressure device. You may be injured by a loud noise, venting liquids or gases or flying debris. Use a pressure relief extension pipe to vent noise, and drain toxic or inflammable liquids to a safe place.

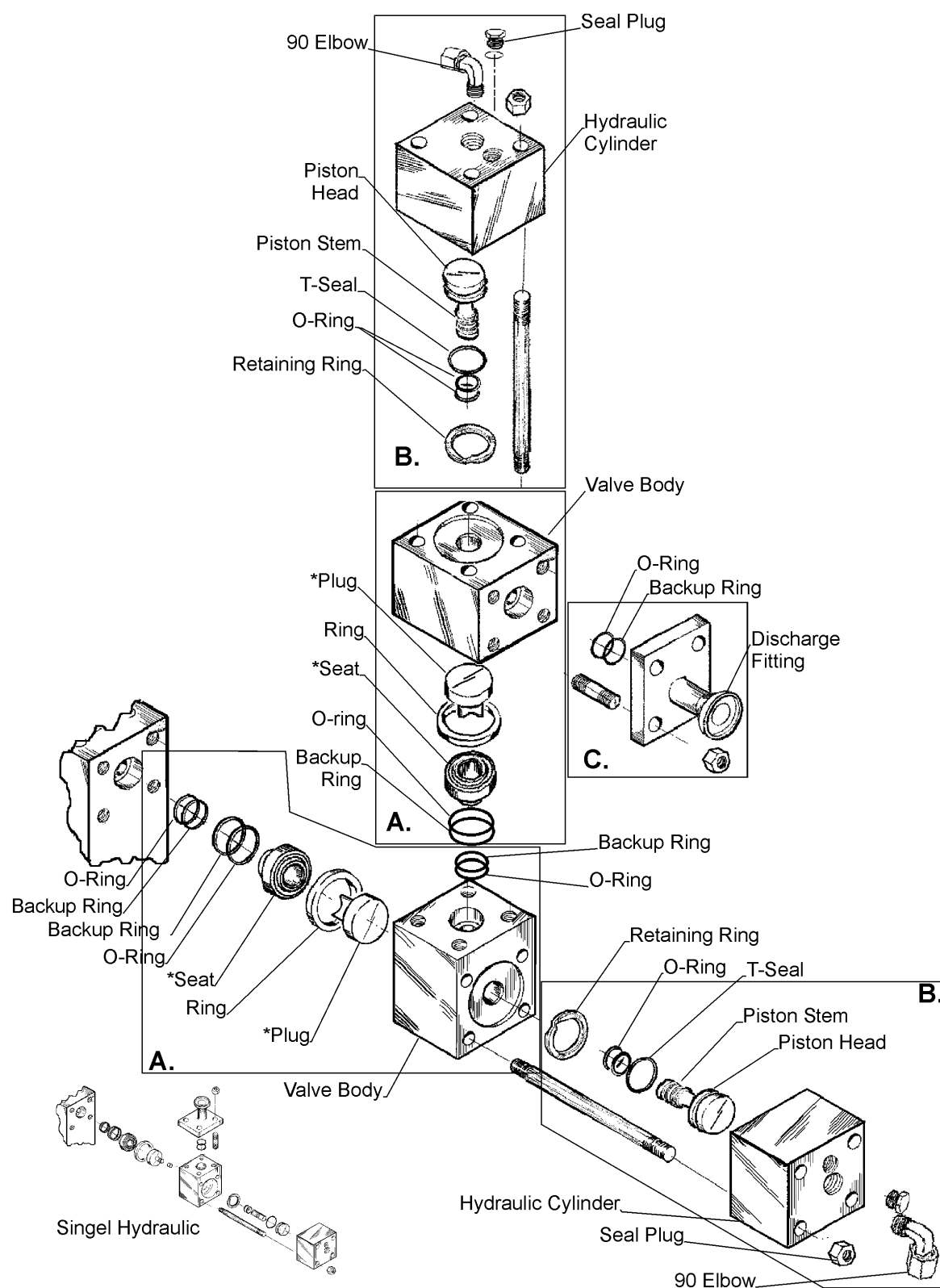


Figure 52 Hydraulic Homogenizing Valve

2nd Stage Homogenizing Valve Assembly

NOTE: Handle valves, valve plugs and valve seats with extreme care to avoid nicks and scratches.

1st Stage valve assembly is similar to 2nd stage, but the discharge fitting orientation is different. (Use an approved lubricant on all seals)

Assembly Of Section Marked A. In Figure 52.

1. Place smaller backup ring on the small end of seat.
2. Place O-ring in front of the backup ring.
3. Turn seat around and place the larger backup ring over seat end.
4. Place O-ring on the seat in front of the backup ring.
5. Insert ring in valve body; place plug and seat assembly into body.

NOTE: The homogenizing valve assembly is made up of a *matched plug and seat.

6. Slide body over mounting studs and engage rupture disc adapter.
7. Place O-rings (2) on piston stem.
8. Insert piston stem assembly into valve body.

Assembly Of Section Marked B. In Figure 52.

1. Place T-seal on piston head.
2. Insert this assembly into the valve hydraulic cylinder.

3. Secure with retaining ring.
4. Slide hydraulic cylinder assembly onto studs and engage valve body.

NOTE: ** O-rings are installed between the pressure and the back-up ring

5. Secure with hex nuts. Torque 1/2-13 hex nuts to 100 ft.lbs and 5/8-16 hex nuts to 150 ft lbs.
6. Install 90° elbow and plug.

Assembly Of Section Marked C. In Figure 52.

1. Install a backup ring on the end of the discharge fitting and O-ring in front of the backup ring.
2. To construct a 1st stage valve, attach the discharge fitting to the top of the 1st assembled valve body A. Torque 1/2-13 hex nuts to 100 ft.lbs and 5/8-16 hex nuts to 150 ft lbs.
3. To finish the 2nd stage valve, repeat steps A and B (as illustrated). Attach the discharge fitting to the side of the 2nd assembled valve body A.
4. Torque 1/2-13 hex nuts to 100 ft.lbs and 5/8-16 hex nuts to 150 ft lbs. (See illustration)

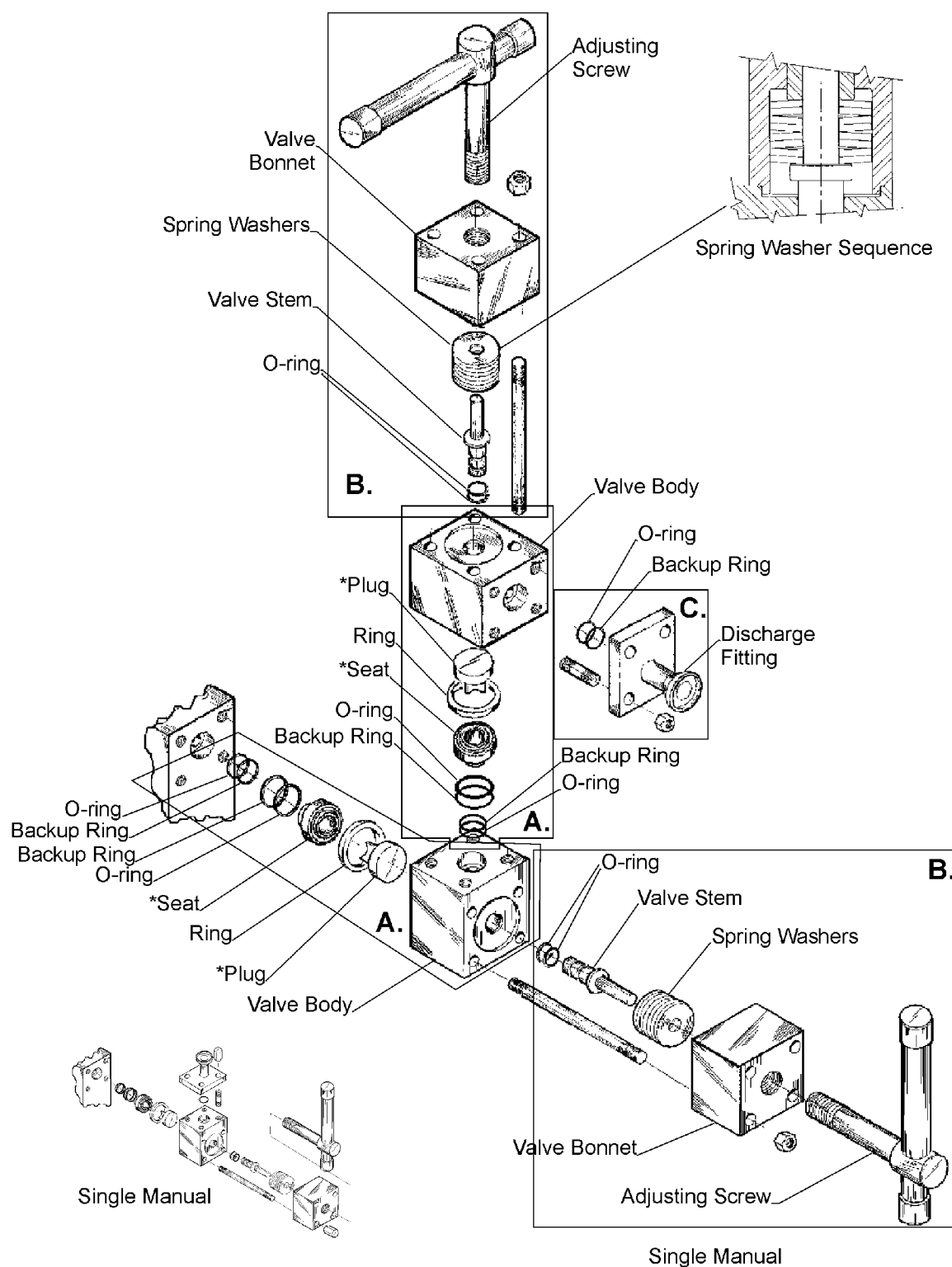


Figure 53 Manual Homogenizing Valve

2nd Stage Manual Homogenizing Valve Assembly

NOTE: Handle valves, valve plugs and valve seats with extreme care to avoid nicks and scratches. (Use an approved lubricant on all seals)

Assembly Of Section Marked A. in Figure 53.

1. Place smaller backup ring on the small end of seat.
2. Place **O-ring in front of the backup ring.
3. Turn seat around and place the larger backup ring over seat end.
4. Place **O-ring on the seat in front of backup ring.
5. Insert ring in valve body; place *seat and *plug assembly into body.

NOTE: The homogenizing valve assembly is made up of a matched plug and seat.

6. Slide body over mounting studs and engage rupture disc adapter.

Assembly Of Section Marked B. in Figure 53.

1. Place spring washers assembly in valve bonnet.
2. Place O-rings (2) on valve stem.
3. Insert valve stem assembly into the valve body.
4. Slide valve bonnet assembly onto studs and engage valve body.

5. Secure with hex nuts. Torque 1/2-13 hex nuts to 100 ft. lbs and 5/8-16 hex nuts to 150 ft lbs.

NOTE: **O-rings are installed between the pressure side and the backup ring.

Assembly Of Section Marked C. in Figure 53.

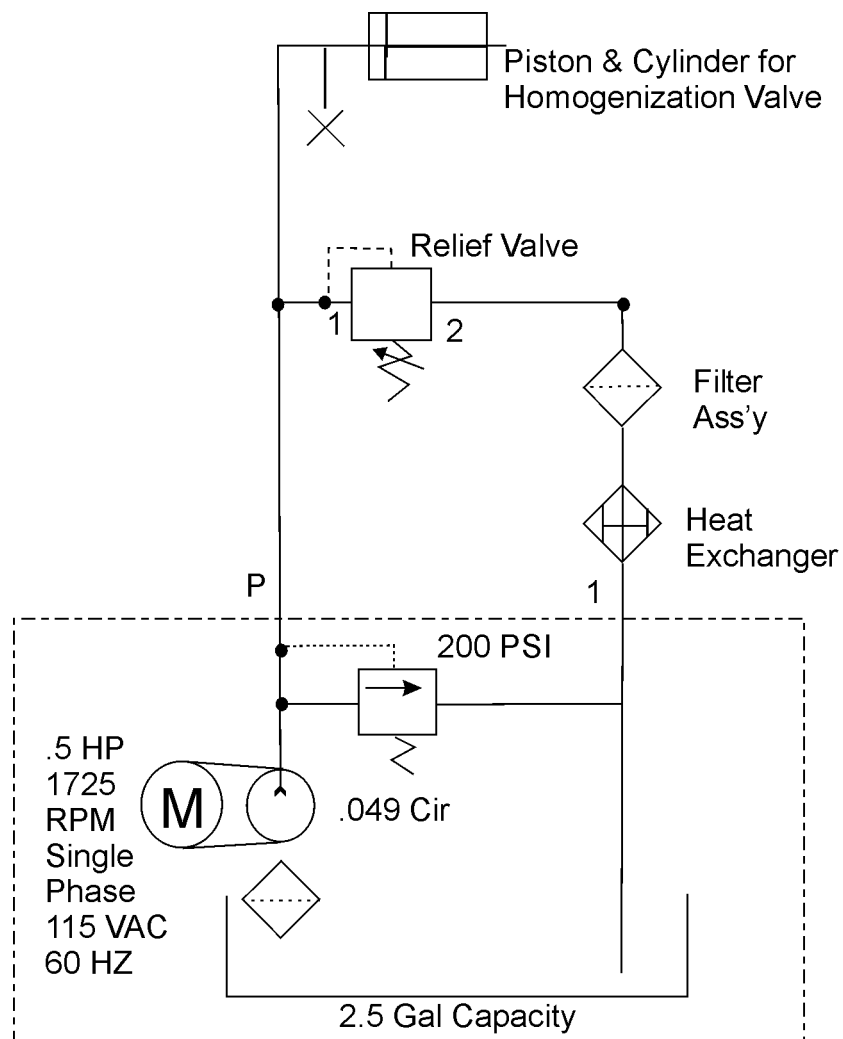
1. Install a backup ring on the end of the discharge fitting.
2. Install an O-ring in front of the backup ring.

To construct a 1st stage valve,

Attach the discharge fitting to the top of the assembled valve system. (See single manual illustration.)

1. To finish 2nd stage valve, repeat the above A and B steps. Secure with hex nuts. Torque 1/2-13 hex nuts to 100 ft. lbs and 5/8-16 hex nuts to 150 ft lbs.

Mount the discharge end on the 2nd valve body assembly so it faces the same direction as the 1st stage valve bonnet. Install adjusting screw handles. (Turn clockwise to increase pressure.)



Single Hydraulic Actuator

Figure 54 Single Hydraulic Actuator

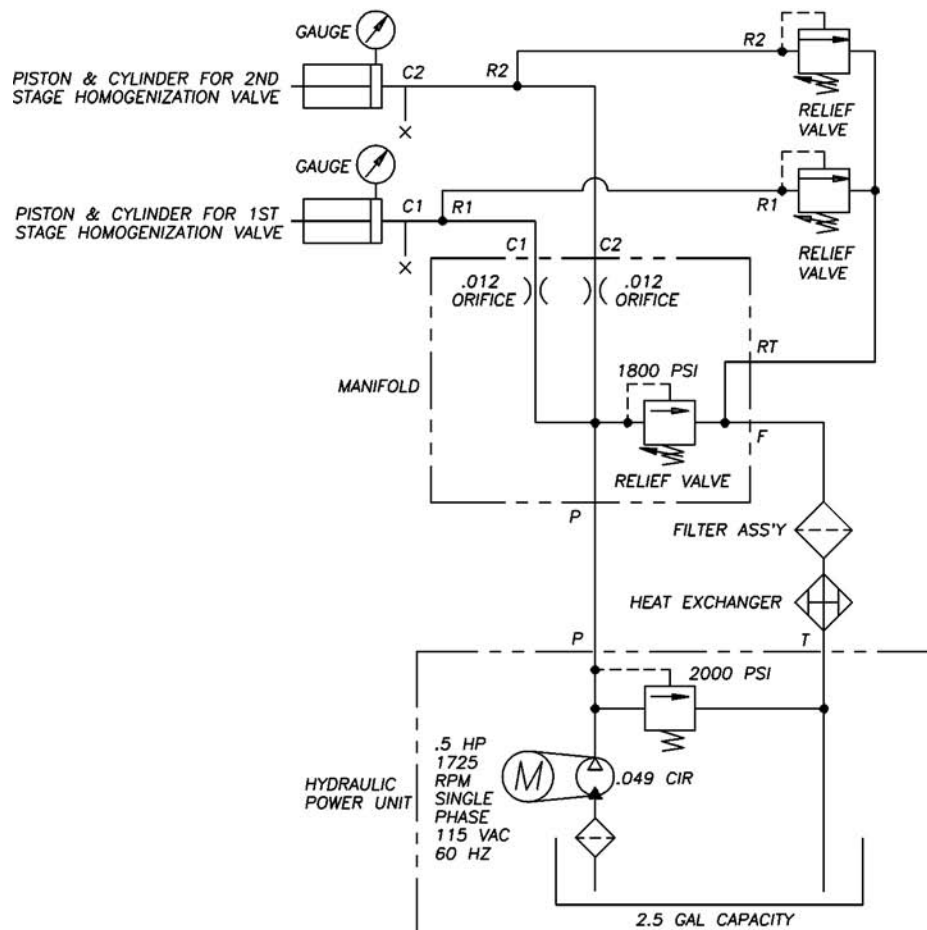
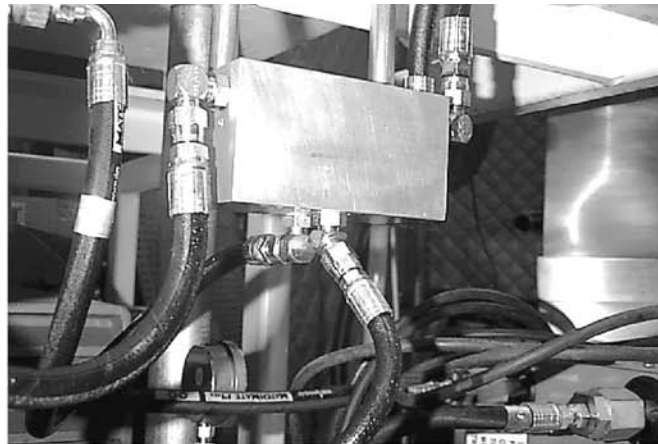


Figure 55 Two Stage Hydraulic Actuator Circuit

Servicing the Crankcase

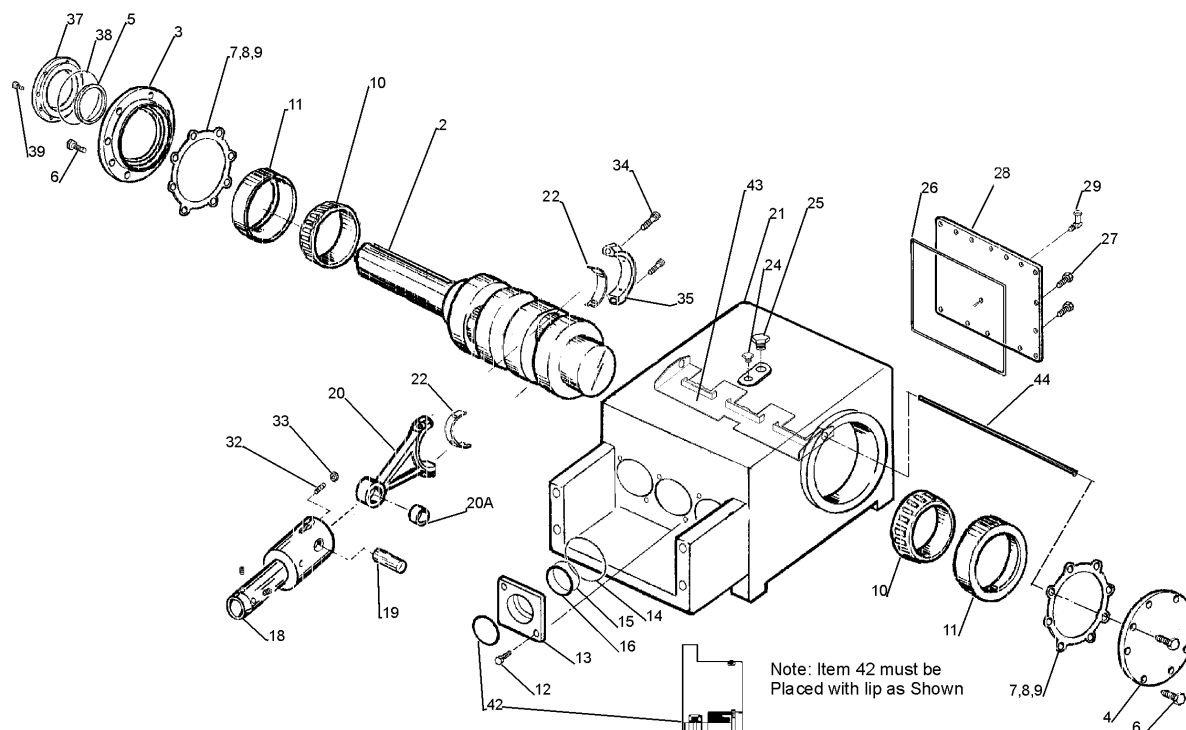


Figure 56 Crank Case

Table 8: Callouts for Figure 56

2 Crankshaft	15 Retaining Ring-smalley Wh Series	28 Cover - Crankcase
3 Cap - Crankshaft Seal Holder	16 Seal-parker Model 4300 Bs 2500 Size-375	29 Vented Oil Level Gauge- 1/8" Mpt
4 Cap - Crankcase	18 Crosshead Assembly	32 Set Screw
5 Cr Seal - Style Crw1 Crankshaft	19 Pin-wrist	33 Jam Nut
6 Hex Hd Capscrew Grade 5	14 O -ring	34 Socket Head Capscrew
7 Shim -.005 Thick	20 Connecting Rod Assembly (Includes 20a)	35 Cap
8 Shim -.007 Thick	20a Bearing, Wrist Pin	37 Holder - Crankshaft Seal
9 Shim -.020 Thick	21 Crankcase	38 O-ring
10 Bearing-cone Timken Type Ts Single-row	22 Journal Bearing (Two Per Rod)	39 Hex Hd Capscrew
11 Bearing-cup Timken Type Ts Single-row	24 Vented Plug	42 Double Lip Wiper Seal
12 Hex Hd Capscrew As	25 Drain/level Plug	43 Oil Ramp
13 Carrier- Oil Seal	26 Gasket-gortex 1/8" Wide	44 Support Rod
14 O -ring	27 Hex Hd Capscrew	

Drive Disassembly

1. The following procedure is intend as an aid in the disassembly of the drive assembly.
2. Drain the crankcase oil. Remove top, rear and side panels.
3. Disassemble headblock. See “Headblock Assembly” on page 49.
4. Remove plungers and oil seal carriers. Use 1/4-20 bolts to push off carrier, if needed See Figure 57.

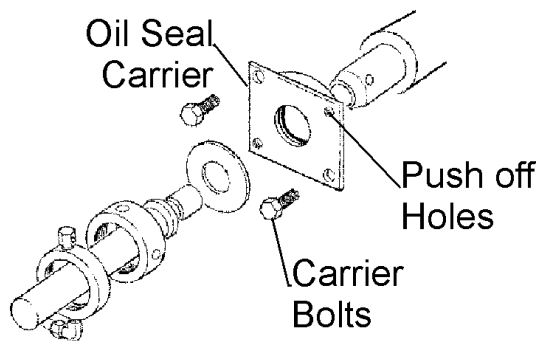


Figure 57 Removal of Oil Seal

5. Loosen Belt tension by turning adjusting nuts and remove the V-belts. See Figure 58

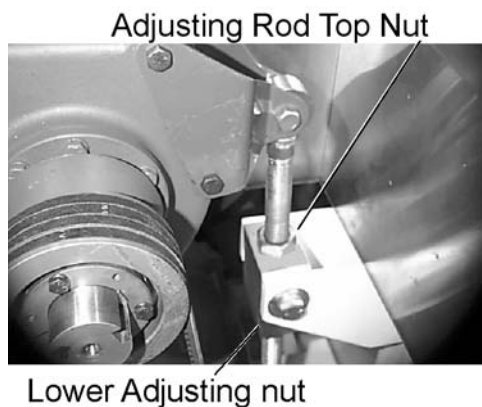


Figure 58 Loosen Belt Tension

6. Remove taperlock bushings.

Reducer Taper Lock Bushing

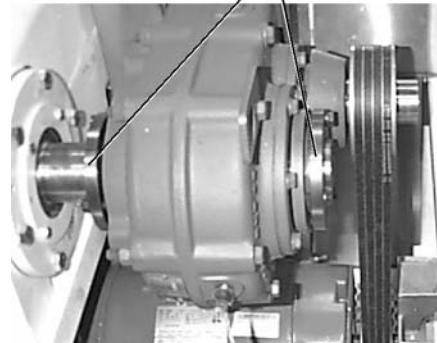


Figure 59

7. Using a hoist slide reducer off crankcase shaft.

WARNING

To avoid injury use a hoist to lift the reducer from the crankcase shaft.

8. Remove back cover bolts, gasket and cover.

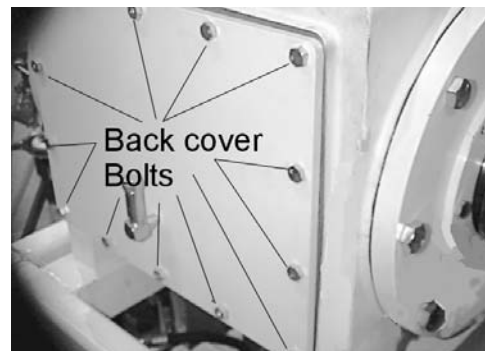


Figure 60

9. Remove connecting rod socket head capscrews and caps. Push connecting rods forward as far as they will go. (See Figure 56 item 34, 35.)

NOTE: Caps have numbers to match to connecting rods during assembly.

10. Block up crankshaft inside of crankcase, between bottom of crankcase and cheeks of crankshaft, to prevent crankshaft from dropping down when bearing caps are removed.
11. Remove shaft seal holder, bearing caps and shims from both sides of crankcase.

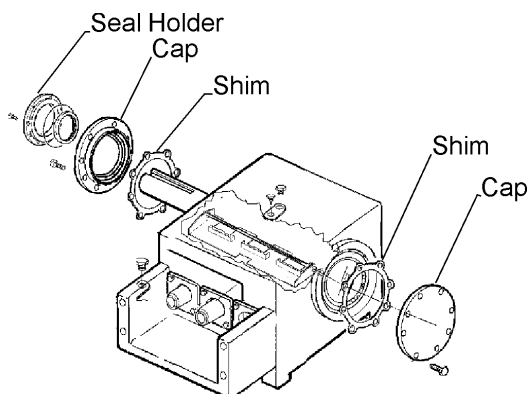


Figure 61 Cap and Shim Removal

12. The oiler support rod is held in place by the attaching bolts. Thread a long 1/4-20 bolt into the end of the rod and slide it out.

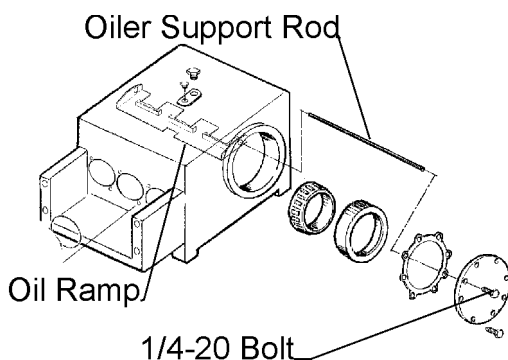


Figure 62

13. Slide the oil ramp out the back of crankcase.
14. Carefully remove the roller bearing cups. (note the bearings will remain on the shaft

due to the fact that they are pressed on) (See Figure 56 item 10 and 11). Place the bearings and shims with the caps so they will be reinstalled in their original positions, (if same roller bearings and crankshaft are to be reinstalled.)

15. To avoid interference with removal of crankshaft, pull out plunger stubs (end of cross heads) to make sure cross heads are forward as far as possible - cross heads will project somewhat out front of frame. See Figure 63.

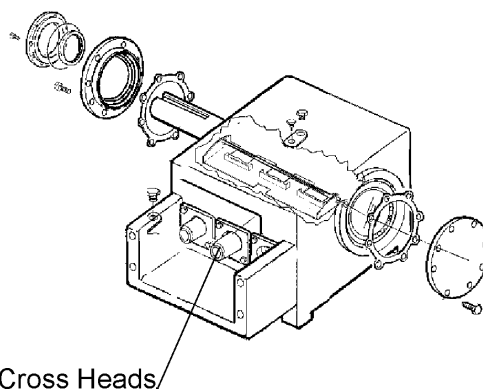


Figure 63 Pull Cross Heads

16. Crankshaft may now be pulled out through bore at either side of frame, however, it is more convenient to remove through the bore at the drive side of the crankcase.
17. Connecting rod and crosshead assemblies may now be removed through rear opening

of crankcase. (Observe rod numbering and replace in same hole in crankcase.)

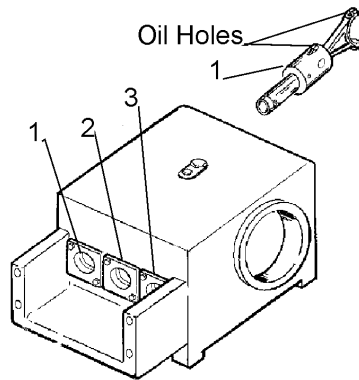


Figure 64

Bearing Replacement

Journal bearings are precision insert type, similar to automotive bearings, and are nonadjustable. When worn, they are simply replaced.

Replacement will rarely be required with proper attention to lubrication. **Even with such attention, it is recommended that they be replaced after 36500 hours of service.**

NOTE: Inadequate attention to lubrication or operation with insufficient oil will require more frequent replacement. In such cases, the bearings should be examined to make sure they are in good condition.

Most of the wear on these journal bearings occurs on the half which is in the rod (rather than the half in the cap). This half must not be permitted to wear, or become damaged, to the extent that the tin lining of the journal bearing is worn through or melted (running without sufficient oil). The steel back could then become the bearing surface and damage the crankshaft.

To remove the journal bearings, pry them out of connecting rods and connecting rod caps. (See Figure 56 item 20, 22 and 35) Keep cap and rod together: to be installed in the same opening as removed from.

Reinstall new bearings in the rod and the cap.

Crosshead Wrist Pin And Connecting-rod Bearing Replacement

Back off the crosshead pin set screws and press out the wrist pin. See Figure 65



Figure 65 Wrist Pin Set Screws

Disassemble connecting rod from crosshead.

NOTE: Do not replace only bearings or only wrist pins. Both parts should be replaced at the same time.

Replacing Wrist Pin Bearings

Press out old bearings. Press in new bearings

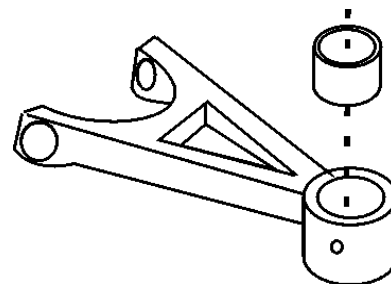


Figure 66 Press Out Bearing

Ream or bore to 32 finish:

part- 100458 Model 500 1.002/1.0015 inches

part - 100459 Model 1000 1.377/1.3765 inches

part-100460 Model 2000 1.752/1.7515 inches

part- 100461 Model 3000 2.002/2.0015 inches

part - 100461 Model 5000 2.002/2.0015 inches

Also drill .38 DIA oil hole and thru one wall of new bearing.

When assembling the parts, be sure the spots on the wrist pin for the set screws, are in line with the holes in the crosshead.

Apply coat of PermaBond Threadlocker.

Tighten the set screws and their lock nuts firmly.

Plunger Stub Replacement

Disassemble crosshead from connecting rod. Because of problems in obtaining perfect alignment in the field replacement, plunger stubs and cross heads are supplied by the factory only as a complete assembly

NOTE: Oil holes in the connecting rod must installed so they line up with the oil slot in the crosshead. See Figure 67.

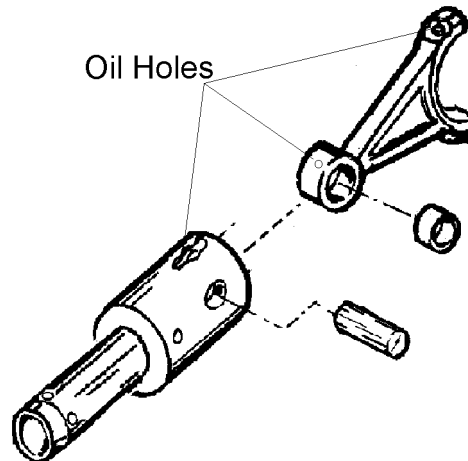


Figure 67 Oil Hole Locations

Main (Crankshaft) Roller Bearing Replacement

1. Thoroughly clean crankshaft & crankcase housing at area of bearing assembly.
2. Heat up both bearing cones that assemble to crankshaft to 300 degrees F max. for approx. 30 min. for models 500 thru 2000 and for approximately 45 min. for models 3000 and 5000. take extreme care that bearings are never heated above 300 degrees F otherwise they will become unsuitable for use.
3. Place crankshaft in vertical position and place heated bearing cone on shaft.
4. Tap the bearing cone down to crankshaft shoulder. until bearing bottoms out on crankshaft shoulder. Hold the hot cone solid against the cold shoulder on the crankshaft until the cone grabs on to the crankshaft. The hot cone will pull away

from the cold shoulder unless it is held in position. See Figure 68

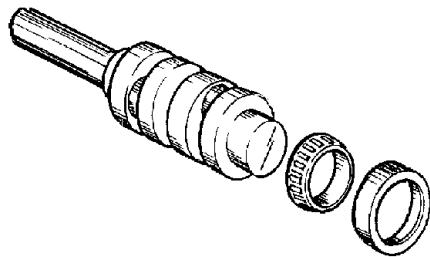


Figure 68 Bearing Installation

5. After the parts are cooled, use feeler gauges to make sure the cone is fully seated against the shoulder.
6. Flip crankshaft over and assemble other bearing the same way.
7. Let crankshaft & bearings cool to touch.

Drive Assembling Procedure

The following procedure is intended to aid in the assembly of the drive.

NOTE: If the crank shaft and the bearings have not been replaced the old shims may be used. If drive shaft or one/both of the bearings have been changed new shims are required.

1. Apply lubrication to and install the connecting rod - crosshead - plunger stub assemblies in the crankcase in their same respective positions as when disassembled.

These parts are numbered for proper position in headblock. See Figure 69

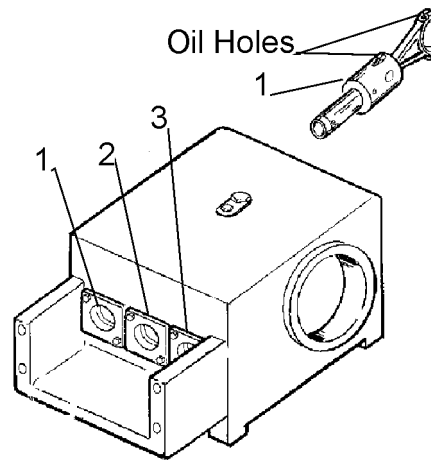


Figure 69 Numbering of the Bore and Head Block.

2. Push assemblies forward as far as possible in crankcase bores.
3. Carefully install crankshaft in crankcase opposite of disassembly See "Crankcase" on page 41. steps 18 thru 12.
4. Before installing bearing end caps and cups, check numbers and be sure correct shims are being used.

IMPORTANT

If original bearings and original crankshaft are being reinstalled, use the same shims in the same positions as originally. If either or both the bearings or crankshaft have been changed, new shims may be required. See "Shimming Method for When New Bearings or Shaft are Installed" on page 68.

5. If either or both the bearings or crankshaft have been changed, new shims may be required. See "Shimming Method for When New Bearings or Shaft are Installed" on page 68.

6. Apply light coat of silicone to both sides of shims. Place shims at one side of the crankcase and tighten the bearing end cap.
7. On other end cap apply light coat of silicone to both sides of shims. Place shims at one side of the crankcase and tighten carefully. Check drag as the shaft is rotated back and forth by hand. Torque screws according to Table 9 on page 68.
5. Install the cap bolts, and torque evenly in a crossing pattern, Use torque values in Table 9 on page 68.
6. Loosen bolts on non-drive end and remove every other bolt.

NOTE: To ensure proper bearing seating rotate the crankshaft continuously at drive end while doing the following bolt torque procedure Note this procedure requires two people.

Table 9: Torque Values

MODEL	BEARING END CAP SCREW TORQUE RATING
500	70 ft lb.
1000	150 ft lb.
2000	150 ft lb.
3000	150 ft lb.
5000	150 ft lb.

Shimming Method for When New Bearings or Shaft are Installed

This method of setting tapered roller bearings is achieved through the measurement of a shim gap with specified set-up load applied. With a known load applied, a shim gap measurement is made. This measurement provides reference point from which the final shim pack thickness is determined.

1. Place assembled crankshaft with bearing cones into crankcase housing.
2. On non-drive end, install bearing cup & then end cap.
3. On the drive end, install bearing cup, one shim (.015 for model 500 and 0.020 for models 1000 thru 5000).
4. Install both end caps.



Figure 70 Torquing Screws

7. Torque bolts on non-drive end to 1st torque value in final torque chart and record gap for all bolts. **For example See Figure 73. For blank charts see Figure 74 and Figure 75.**
8. Mark location of gap reading. The reading must be precisely taken at consistent points.
12. Using a straight edge, draw a straight line in measured gap graph connecting as many points as possible. It is more important that the line goes through the middle points then the end points.
13. Draw a vertical line in measured gap graph at intersection of line drawn in step 12 and the 240 in-lbs torque value for model 500 or 60 ft-lbs torque value for models 1000 thru 5000.

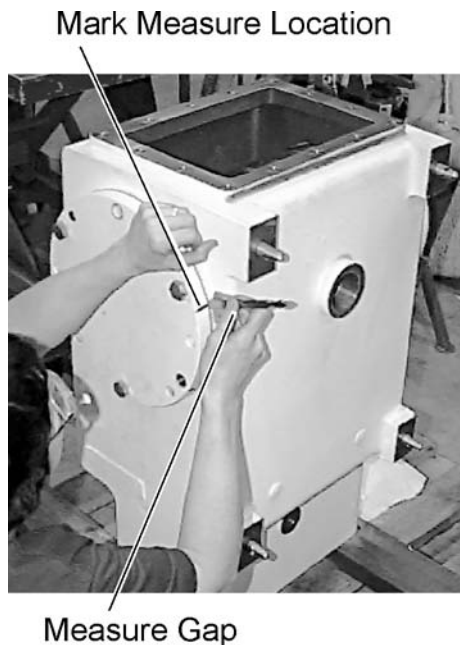


Figure 71 Measuring the Gap

9. Repeat for all torque values, writing down the gap readings taken at the same marked locations.

NOTE: Keep end caps even by torquing bolts with largest gaps first.

10. Calculate measured gap averages for all bolts at each torque value and record this value in torque chart See Figure 74 on page 72 or See Figure 75 on page 73.
11. Plot points in measured gap graph for each measured gap averages.

14. Fill out the gap figure chart (Figure 72) as follows: **For example See Figure 73. For blank charts see Figure 74 and Figure 75.**

- Fill in **gap value** listed as the intersection of the line drawn that is the average gap determined by the values recorded and the horizontal line at 240 in-lbs for model 500 or 60 ft-lbs for models 1000 thru 5000.

- Fill in **deflection**:

Deflection is the difference of gap from start of the line drawn that is the average gap determined by the values recorded -- straight line in chart and the gap value at 240 in lbs for model 500 or 60 ft-lbs for models 1000 thru 5000.

- Fill in **thickness of shim installed** at opposite end (drive end).
- Total items (1) gap, (2) deflection and (3) shim installed on opposite end

This value is the **Bearing assembled length**.

- The **desired end play** is .002 for all models.
- Fill in **total shim required** by adding items Bearing assembled length and End play (.002).
- Determine the **shim needed at each end** by dividing total shim required by 2. (round value up if necessary to get an achievable total shim thickness for each end).

1. Gap value at intersection of line drawn and horizontal line at 240 in-lbs	_____
2. Fill in Deflection :	_____
3. Fill in thickness of shim installed at opposite end (drive end).	_____
4. Total items gap, deflection and shim installed on opposite end	1. gap + 2. deflection + 3. shim (Above 3 items) = _____
5. Desired End Play	<u>.002</u>
6. Total shim required	5. Desired End Play + Value in 4. _____
7. Shim to install at each end	Value in 6. divided by 2 (6/2) = _____

Figure 72 Equation for Determining Shims

(Models 1000, 2000, 3000, 5000)

Measured Gaps at Bolt
(Models 1000, 2000, 3000, 5000)

	1	2	3	4	AVG
10	.035	.028	.026	.031	.030
20	.030	.026	.025	.026	.027
30	.025	.022	.021	.024	.023
40	.021	.020	.022	.020	.021
50	.019	.018	.018	.018	.018
60	.015	.014	.016	.016	.015
70	.012	.011	.014	.015	.013
80	.011	.010	.011	.013	.011
90	.010	.008	.009	.011	.009
100	.007	.006	.008	.009	.007

FINAL TORQUE CHART

1. Gap at 60 FT-LBS .016
2. Deflection .016
3. Shim Installed at Opp. End .020
4. Solid "Bearing Assembled Length" (1+2+3) .052
5. Desired End Play .002
6. Total Shim Required (4+5) .054
7. Shim at Each End (6/2) .027

GAP FIGURE CHART

FINAL SHIM THICKNESS
FOR EACH END USING
STANDARD SHIMS

MEASURED GAP GRAPH

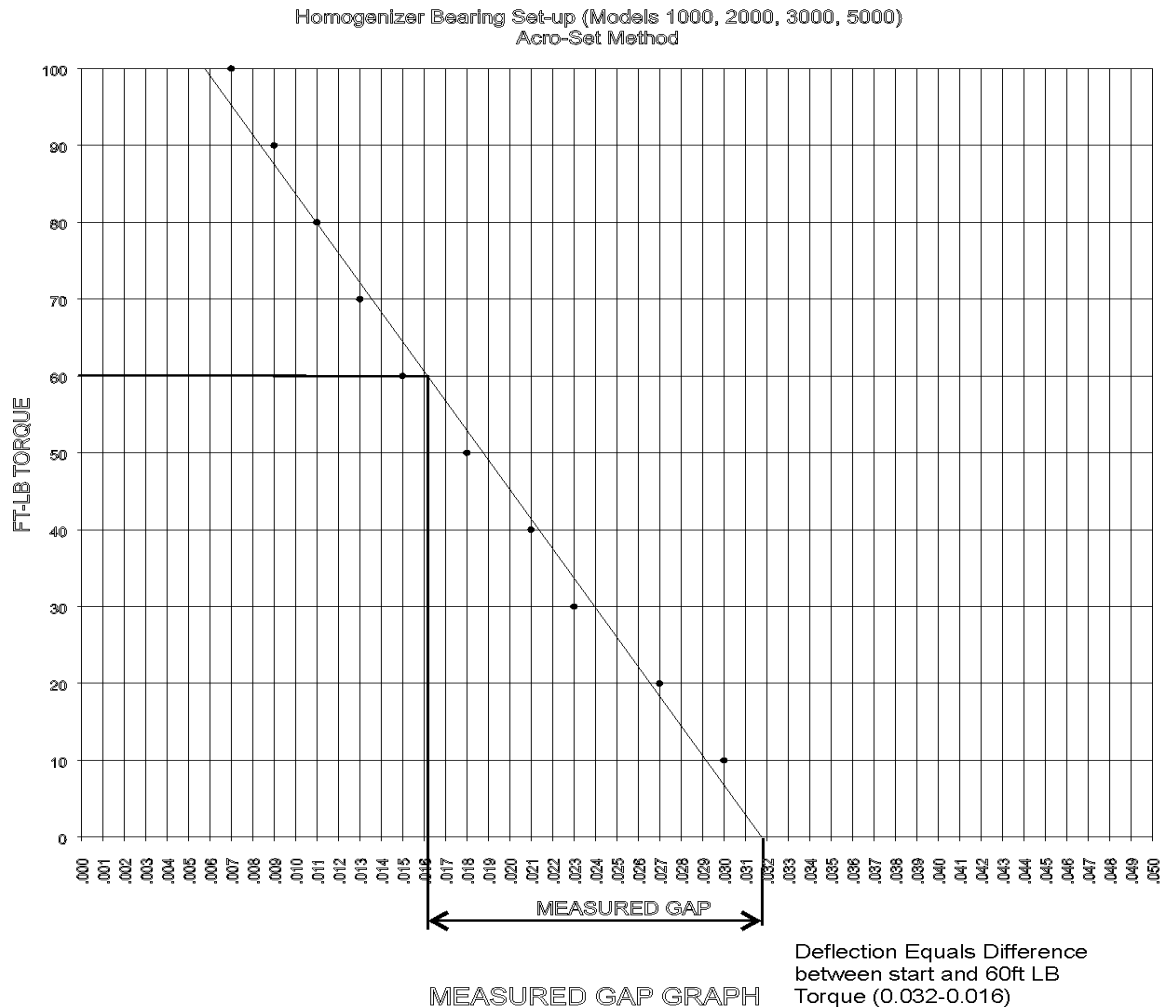


Figure 73 Torque Chart Example For Models 1000, 2000, 3000, and 5000

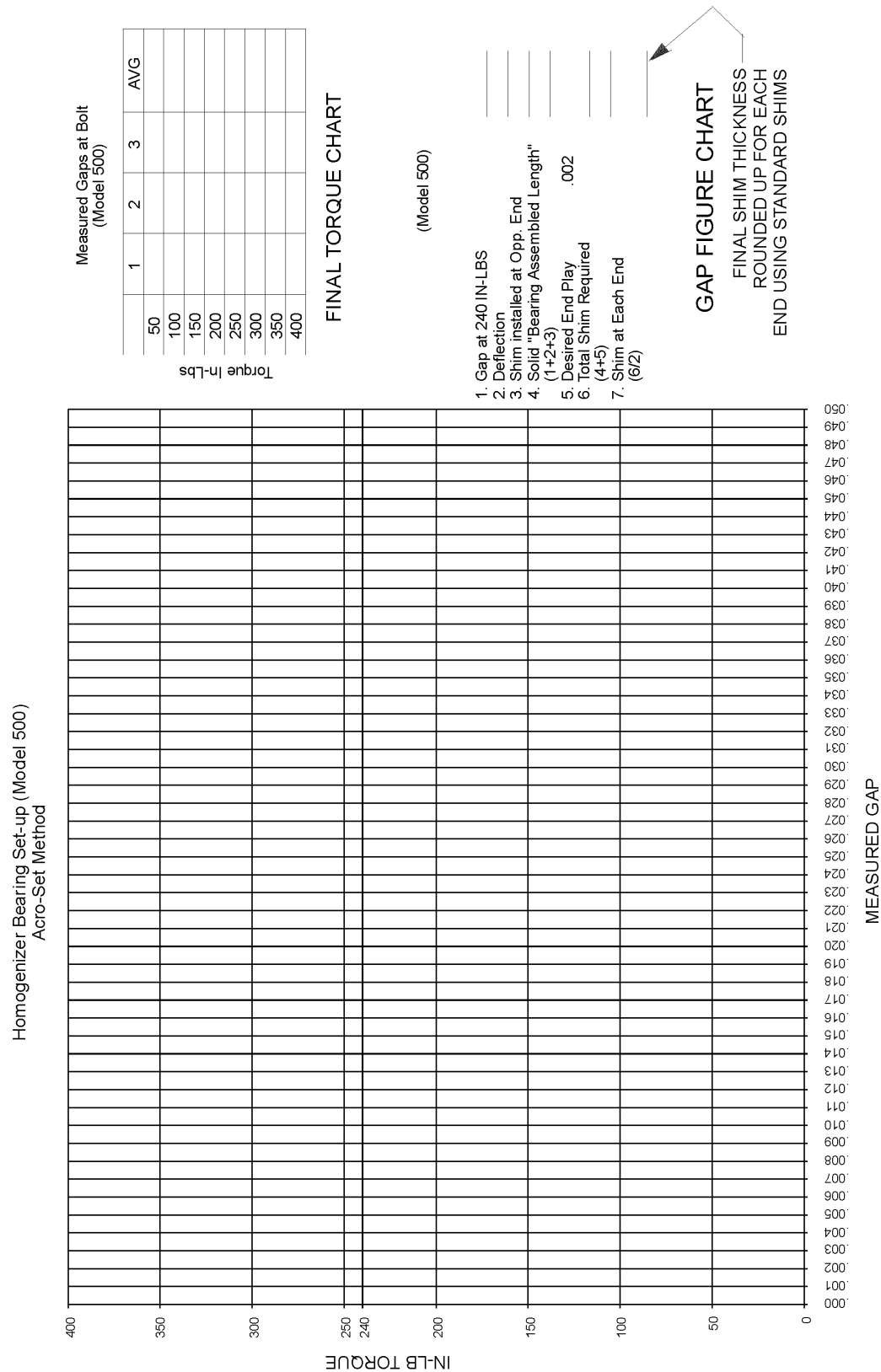


Figure 74 Blank Chart for 500 Model

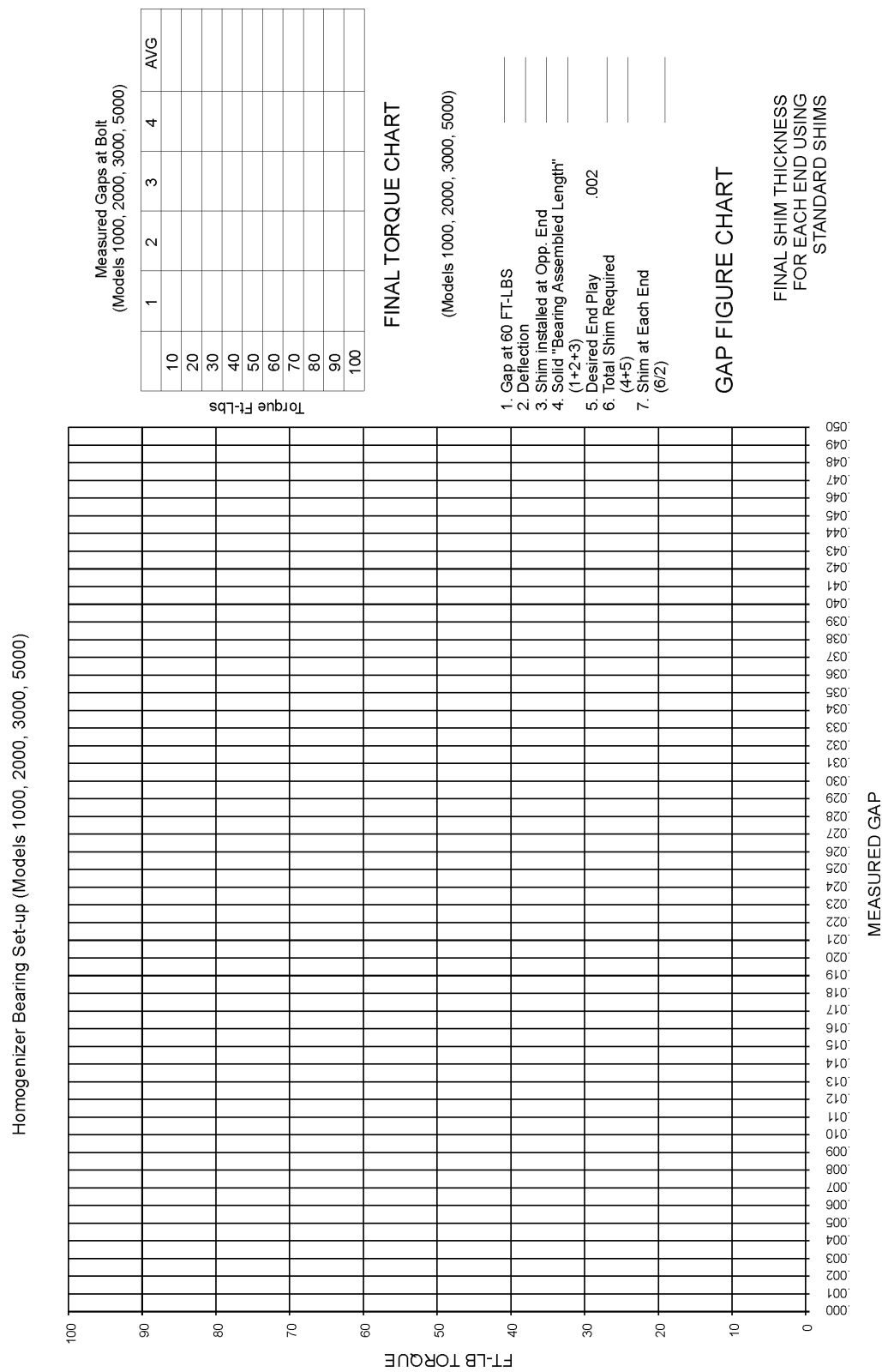


Figure 75 Blank Chart for Models 1000, 2000, 3000, 5000

15. Remove both end caps and install required shims for both ends. Shims on both ends should be equal in total thickness. When this is not possible, make thickness as close as possible to each other.
16. Install end caps for both ends.
17. Install all bolts, and torque evenly in a crossing pattern, both end caps using torque values in Table 9 on page 68.

Installing Rods

1. Pull rod number 1 to the crank throw and center the rod on the crosshead.

CAUTION

Avoid bumping and marring the ground surfaces. Any damage to surface may reduce service life of bearings.

2. Make sure the rod does not drag on the side of the crankshaft.

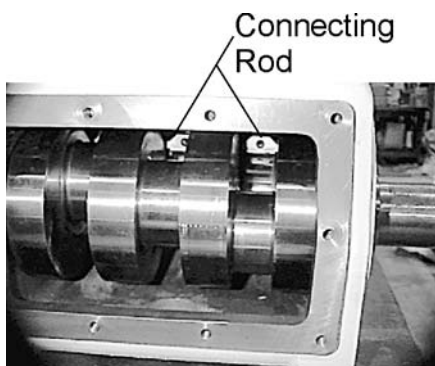


Figure 76 Connecting Rod Alignment

3. Assemble caps with oil holes up, on connecting rods so numbers stamped on

caps and rods mate directly opposite each other.

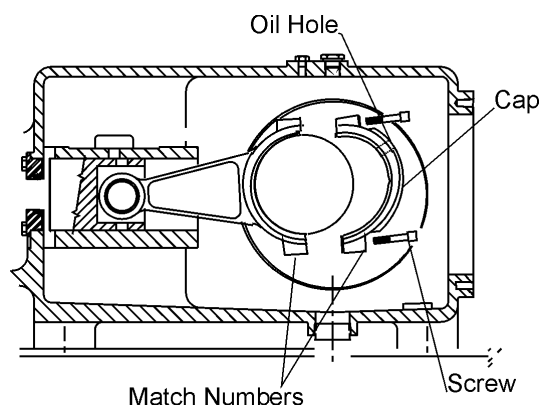


Figure 77 Caps to Connecting Rod

4. Install and torque connecting rod screws.

Table 10: Torque Rating Chart

Model	Connecting Rod Screw Torque Value
500	24 ft lb.
1000	60 ft lb.
2000	60 ft lb.
3000	85 ft lb.
5000	85 ft lb.

Installing Oil Ramp

To install the oil ramp do the following:

1. Remove end cap bolt. See Figure 78

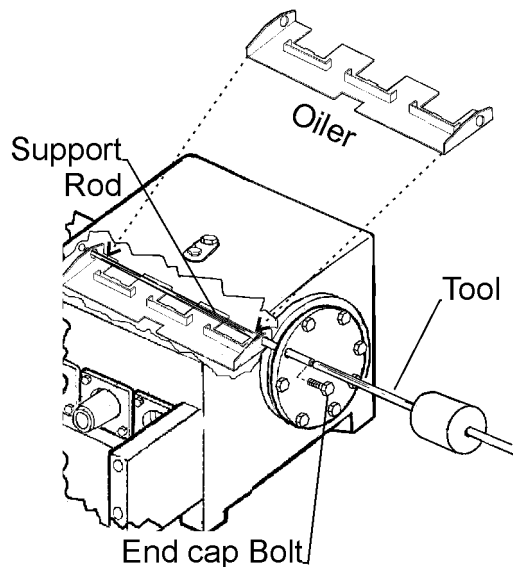


Figure 78 Installing Oil Ramp

2. Place ramp in back of crankcase on top of crankshaft. See Figure 78
3. Use a long 1/4-20 bolt or tool #101342 (Top Plug Slide Hammer) lightly threaded into the support rod.
4. Insert support rod through bolt hole and oil ramp holes.
5. Insert other end of rod into the open bolt hole on opposite side. Hold the rod in place with one hand and unscrew the 1/4-20 fastener from the support rod.
6. Insert the capscrew in the endcap and torque in place. See Table 9 on page 68 of correct torque values.

Install Crankcase on Frame.

1. Use heavy lift straps and lifting equipment.

2. Fasten crankcase in place with capscrews and washers. Tighten bolts securely.
3. Attach and tighten oil drain pipe and drain valve.

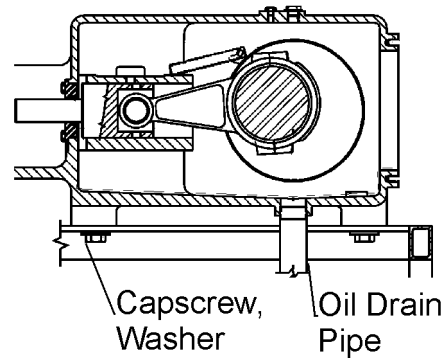


Figure 79 Install Crankcase

4. Do not use lubricants when installing tapered bushings on the crankshaft. Tighten evenly.

Installing Back Cover and Drive Seal

Install back cover and Gortex® gasket with hex head capscrews.



Figure 80 Installing Back Cover.

Install seal holder and seal. Tighten all screws evenly to a medium tension, then retighten.

will be in the same position as when removed.

Seal and Seal Holder

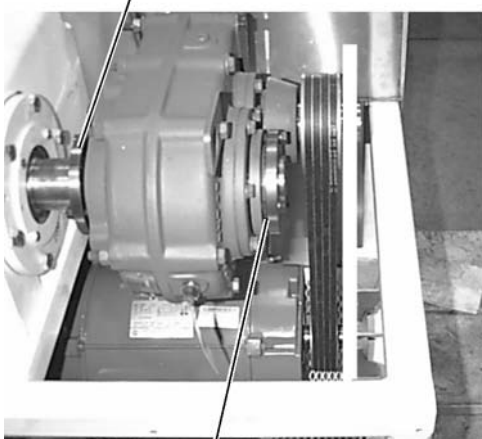


Figure 81 Installing the Shaft Seal and Seal Holder

Installing the Reducer

1. Install taper lock bushing on crank shaft.

Rear Tapper Lock Bushing



Front Tapper Lock Bushing

Figure 82 Tapper Lock Bushings

2. Using a hoist position the reducer close to the edge of the crank case.
3. Install the 2nd half of the taper lock bushing. Insert the adjustment rod in the tensioner pivot block. If the nuts on the tensioner have not been moved the reducer

Adjusting Rod Top Nut



Lower Adjusting nut

Figure 83 Adjustment Rod

4. Torque reducer taper lock bushing in place. See Figure 82. Refer to Table 11: for correct torque values.

Table 11: Reducer Bushing Torque Rate

Model	Ft lbs
500	30
1000	30
2000	67
3000	67
5000	75

5. Install drive sheave on reducer. See Figure 84
6. Use a straight edge to align the reducer sheave with the motor sheave. See Figure 84

NOTE: It may be necessary to remove the fan to achieve the alignment. Loosen the two set

screws in the fan hub and slide off shaft. See Figure 84

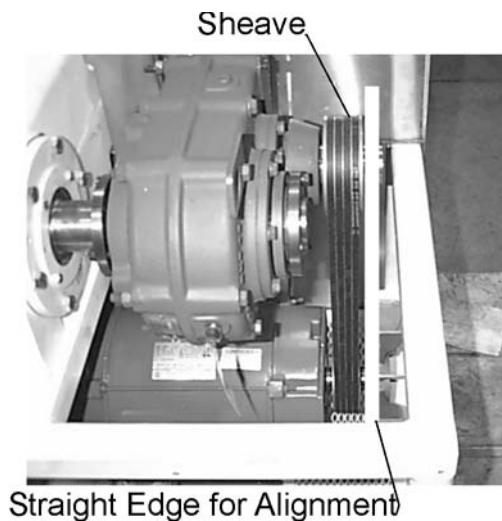


Figure 84 Sheave Installation and Alignment

7. Holding the sheave in place, lock the sheave in place by torquing sheave bushing screws See Table 12: for correct torqued values.

NOTE: The sheave bushing is identified by the letters stamped on the face of the bushing.

Table 12: Sheave Bushing Torque Value

Bushing no.	Screw Size	Torque ft-lb.
SH	1/4-20	9
SDS	1/4-20	9
SK	5/16-18	15
SF	3/8-16	30
E	1/2-13	60
F	9/16-12	110
J	5/8-11	135
M	3/4-10	225

Installing and Adjusting Belts

1. Adjust belt tension by tightening the top hex nut to push the reducer upward. Belt tension should allow a 1/2" deflection at the center of each belt. (Pushed with thumb.) See Figure 85.
2. Turn bottom nut tight to lock when adjustment is established.

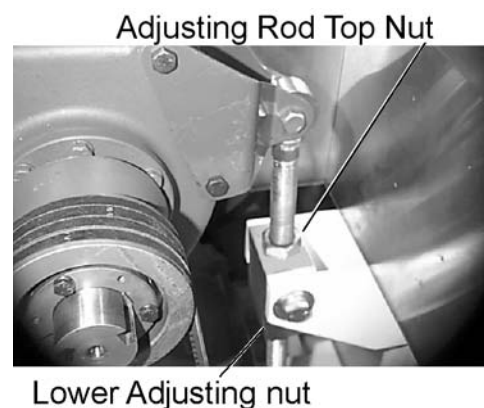


Figure 85 Adjusting the Belt Tension

Fill Crank Case Oil

Refill crankcase to proper level using Mobile DTE Heavy Medium oil, ISO Viscosity Grade 68, rust and oxidation inhibited. (Part Number 449-6044)

Table 13:

Model	Capacity Qts
500/500lv	8
1000	20
2000	28
3000	36
5000	44

Installing Headblock

The next step is the assembly and installation of the head block. See “Headblock Assembly” on page 49.

Storage Procedures

The following suggestions will insure machinery runs properly after it is returned from storage (or shipping). Care must be taken to ensure that the methods described are fully implemented.

Motors

To keep clean:

- Store-indoors or fully wrapped to eliminate airborne dust and dirt.
- Keep motors dry.

To keep dry:

Store in a dry area indoors.

Maintain even temperatures to prevent condensation.

Treat unpainted flanges, shafts and fittings with a rust inhibitor.

Check insulation resistance before putting motor into service.

Keep Bearings Lubricated

Once per month, rotate shaft several turns to distribute grease in bearings. If unit has been stored for more than a year, lubricate before start-up.

WARNING

Failure to follow instructions and safe electrical procedures could result in serious injury or fatality. Disconnect all power before servicing. Install and ground unit according to local and national code. Consult qualified personnel if necessary or repairs are needed.

Homogenizer

Storage of homogenizers requires the same attention as motors.

O-rings and lip seals must be fully lubricated to prevent setting or drying-out.

Threaded parts (nuts, bolts and all threaded connections must be coated to prevent seizing and oxidation.

Exposed metal should be coated with a rust prohibitive.

Lubricate plungers. Drain water/oil from drain until only oil; refill crankcase to proper level.

Cover all openings. Wrap the unit to prevent dust and dirt from entering and mount on a

solid wood base. Finish crating if store room is unavailable.

Store in clean, dry place with even temperatures and low humidity.

Installation of Homogenizer After Storage

When removing the homogenizer from storage perform and check the following before starting the equipment.

- Unwrap and remove from crate.
- Thoroughly disassemble and clean headblock. Inspect O-rings and seals; replace as needed.
- Lubricate as in “Keep Bearings Lubricated” on page 78.
- Assemble and perform all adjustments prior to placing in service.
- Check crank case for water contamination, drain oil and refill to proper level.
- Check oil in crankcase, reducer and hydraulic tank.

Parts Lists

Frame And Panel Assembly

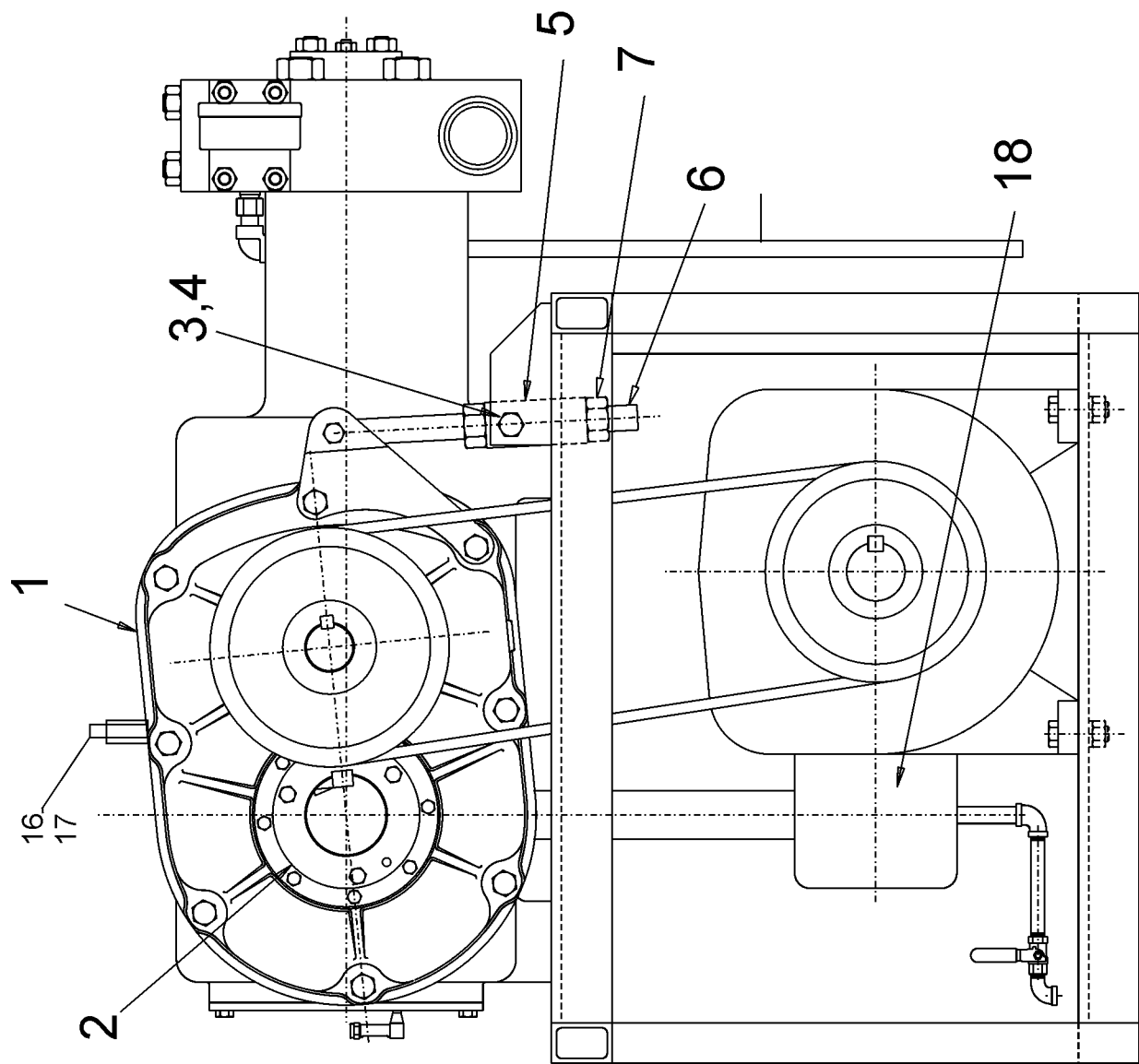
ITEM	DESCRIPTION	PART NO.	QTY
1	FRAME ASSEMBLY	100075	1
2	LEG - ADJUSTABLE	100079	4
3	PANEL-HOUSING TOP	100083	1
4	PANEL-HOUSING LEFT SIDE	100088	1
5	PANEL-HOUSING RIGHT SIDE	100093	1
6	PANEL - HOUSING BACK	100098	1
7	PANEL-HOUSING FRONT	100103	1
9	SCREW-HHC SS 1/4-20 X 5/8" LG	30-181	66
9a	WASHER PLAIN 1/4 SS	43-144	66
10	LABEL	33-30A	1
11	SWITCH - EMERGENCY STOP STANDARD	103994	1
	SWITCH - EMERGENCY STOP EXPLOSION PROOF	105171	1
12	PLATE-EMERGENCY STOP	103995	1
13	DRIVE SCREW HD	30-608	4
14	NAMEPLATE - DRAIN	4487810	1
15	GAUGE-PRESSURE 0 TO 1000	100405	1
	GAUGE-PRESSURE 0 TO 5000	100407	1
	GAUGE-PRESSURE 0 TO 7500	100409	1
15	PRESSURE TRANSDUCER/TRANSMITTER		
	0 TO 1000	100417	1
	0 TO 5000	100418	1
	0 TO 7500	100419	1
	0-5000 mA 100 FEET WIRE	111090	1
16	DIGITAL PRESSURE METER - OPTIONAL	100108	1
17	*CLAMP	100110	1
18	*GROMMET	100111	1
19	*ADHESIVE BACKED CLIP	100112	3
20	NAME PLATE - HOMOGENIZERS	590-2364	1
	NAMEPLATE - PLUNGER PUMP	590-2365	1
21	CAUTION PLATE	33-62	5
22	COVER - PLUNGER AREA	101340	1
23	**FERRULE 14WI	141201406	1
24	**CLAMP 13IS	3023019	1

ITEM	DESCRIPTION	PART NO.	QTY
25	**GASKET 40I BUNA	20-106	1
26	**FERRULE 14WI	1412015061 ***	2
27	**CAP-MALE 16AI-14I	3-73X ***	1
28	**CLAMP 13IS	3023022 ***	2
29	**GASKET 40I BUNA	20-107***	2
34	OIL HOLE COVER	105173	1
35	THUMBSCREW SS 1/4-20 X .5 LG	30-580	2
35a	WASHER PLAIN 1/4 SS	43-144	2
37	WARNING LABEL	33-84	1
38	HANDLE WITH SCREWS	105899	4
39	LOCKWASHER #8	43-20	8
40	SCREW - HHC SS #8-32 X .375	30-593	8
41	HOLE PLUG - SS (EXPLOSION PROOF SWITCH)	78-147	1
42	SCREW - HHC (EXPLOSION PROOF SWITCH)	30-206	4
43	LOCKWASHER SS (EXPLOSION PROOF SWITCH)	43-22	4
44	NUT - HEX (EXPLOSION PROOF SWITCH)	36-53	4

*** NOT FOR ASEPTIC

** (FOR HOMOGENIZERS ONLY)

Motor and Drive Assembly

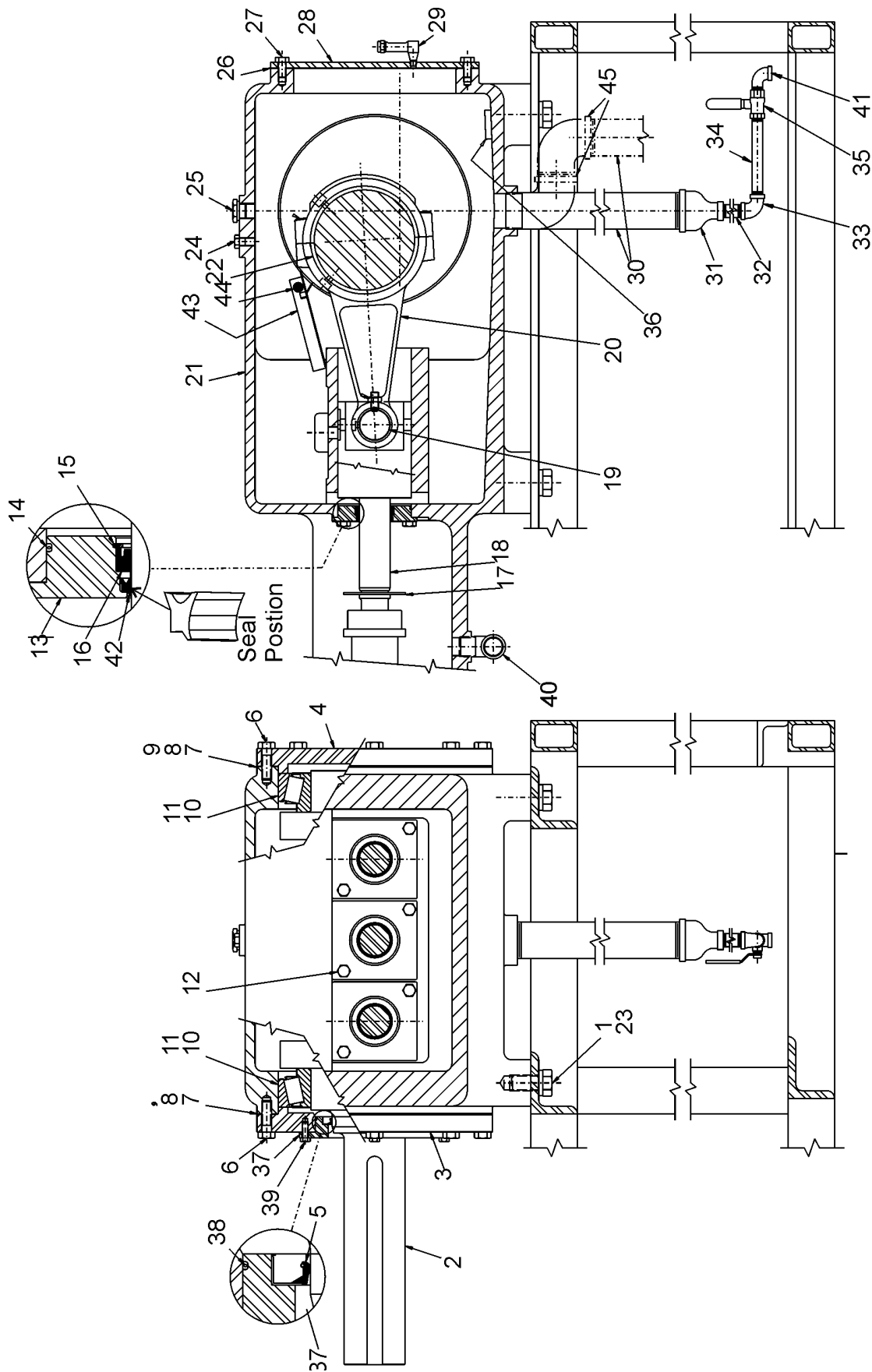


Motor and Drive Assembly

ITEM	DESCRIPTION	PART NO.	QTY .
1	Speed Reducer - Single Reduction	100168	1
2	Tapered Bushing Assembly	102855	1
3	SCREW, HEX HEAL CAP ZINC PLT	30-412	2
4	LOCK WASHER ZINC PLT	43-146	2
5	PIVOT-REDUCER TENSIONER	100172	1
6	ROD END - TORQUE ARM	100972	1
7	NUT-HEX, ZINC PLT	36-105	2
8	LABEL - CRANKCASE	33-76	1
9	LABEL - CRANKCASE	33-77	1
18	METER, HOUR 60HZ 120Vac	112627	1
	METER, HOUR 50 HZ 120Vac	112628	

MOTOR HP	MOTOR SHAFT	MOTOR FRAME	MOTOR PLATE	FAN PART NUMBER
100	2.875"	404T	not required	100966
75	2.375"	365T	101053	100965
60	2.375"	364T	101053	100965
50	2.125"	326T	101054	100964
40	2.125"	326T	101054	100964
30	1.875"	286T	101055	100963
25	1.875"	284T	101055	101963

Crank Case Assembly

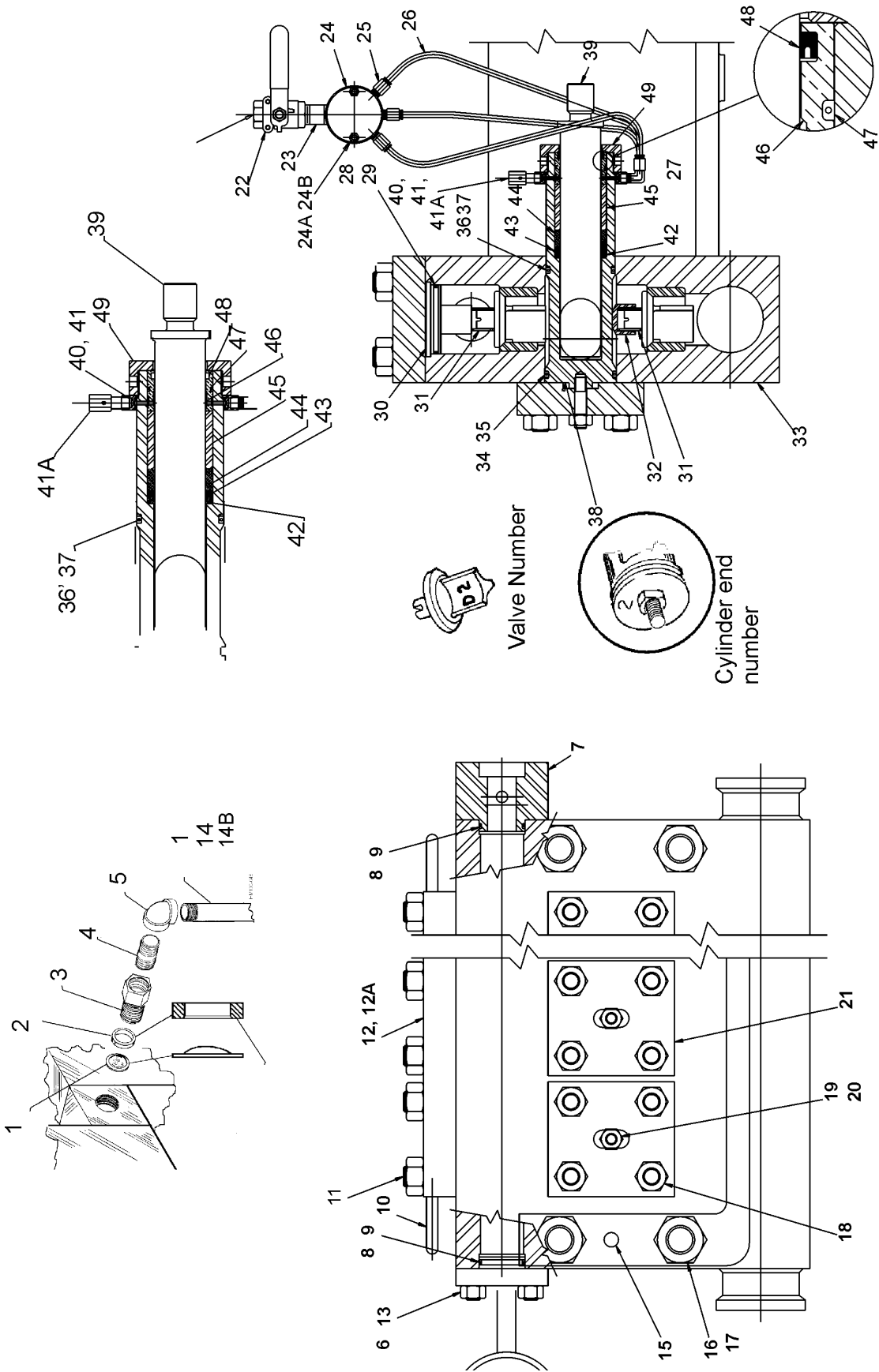


Crank Case Assembly

ITEM	DESCRIPTION	PART NO.	QTY
1	SCREW-HEX HD CAP CRANKCASE MOUNT	30-459	4
2	CRANKSHAFT	100116	1
3	CAP - CRANKSHAFT SEAL HOLDER	100121	1
4	CAP - CRANKCASE	100125	1
5	CR SEAL - STYLE CRW1 CRANKSHAFT	100986	1
6	SCREW-HEX HD CAP GRADE 5 CRANKCASE END CAPS	30-462	16
7	SHIM - .005 THICK	100487	
8	SHIM - .007 THICK	100492	
9	SHIM - .020 THICK	100497	
10	BEARING-CONE TIMKEN TYPE TS SINGLE-ROW	100502	2
11	BEARING-CUP TIMKEN TYPE TS SINGLE-ROW	100506	2
12	SCREW-HEX HD CAP SS OIL SEAL CARRIER	30-497	6
13	CARRIER- OIL SEAL	100129	3
14	O-RING	N70157	3
15	RETAINING RING-SMALLEY WH SERIES	43-215	3
16	SEAL-PARKER MODEL 4300 BS 2500 SIZE-375	100135	3
17	SLINGER-WATER	100138	3
18	CROSSHEAD ASSEMBLY	100142	3
19	PIN-WRIST	100146	3
20	CONNECTING ROD ASSEMBLY(Includes item 20A)	100150	3
21	CRANKCASE	100154	1
22	JOURNAL BEARING (TWO PER SET)	100454	6
23	LOCKWASHER	43-153	4
24	VENTED PLUG	CD0 046 100	1
25	DRAIN/LEVEL PLUG	78-86	1
26	GASKET-GORTEX 1/8" WIDE	35850	64
27	SCREW-HEX HD CAP CRANKCASE BACK COVER	30-241	14
28	COVER - CRANKCASE	100164	1

ITEM	DESCRIPTION	PART NO.	QTY
29	VENTED OIL LEVEL GAUGE- 1/8" NPT	100981	1
30	OIL DRAIN PIPE-2" IPS SCH 80 GALVANIZED	11-121	1
31	REDUCER-2" IPS X 1/2" IPS 150# GALVANIZED	78-109	1
32	OIL DRAIN PIPE-1/2" IPS SCH 80 GALVANIZED	11-145	1
33	90' REDUCING ELBOW-1/2" IPS X 3/8" IPS 150# GALV.	78-110	1
34	OIL DRAIN PIPE-3/8" IPS SCH 80 GALVANIZED	11-129	1
35	BRASS BALL VALVE-3/8" IPS	100984	1
36	MAGNET-CERAMIC 5	100985	3
37	HOLDER - CRANKSHAFT SEAL	100955	1
38	O-RING	N70169	1
39	SCREW-HEX HD CAP CRANKSHAFT SEAL HOLDER	30-186	4
40	ELBOW-SHORT STREET 1"	78-141	1
41	ELBOW-SHORT STREET 3/8 IPS 150#	78-138	1
42	DOUBLE LIP WIPER SEAL TYPE H	105572	3
43	OIL RAMP	100159	1

Headblock Assembly



For items 39 to 49 see page 90

Headblock Assembly

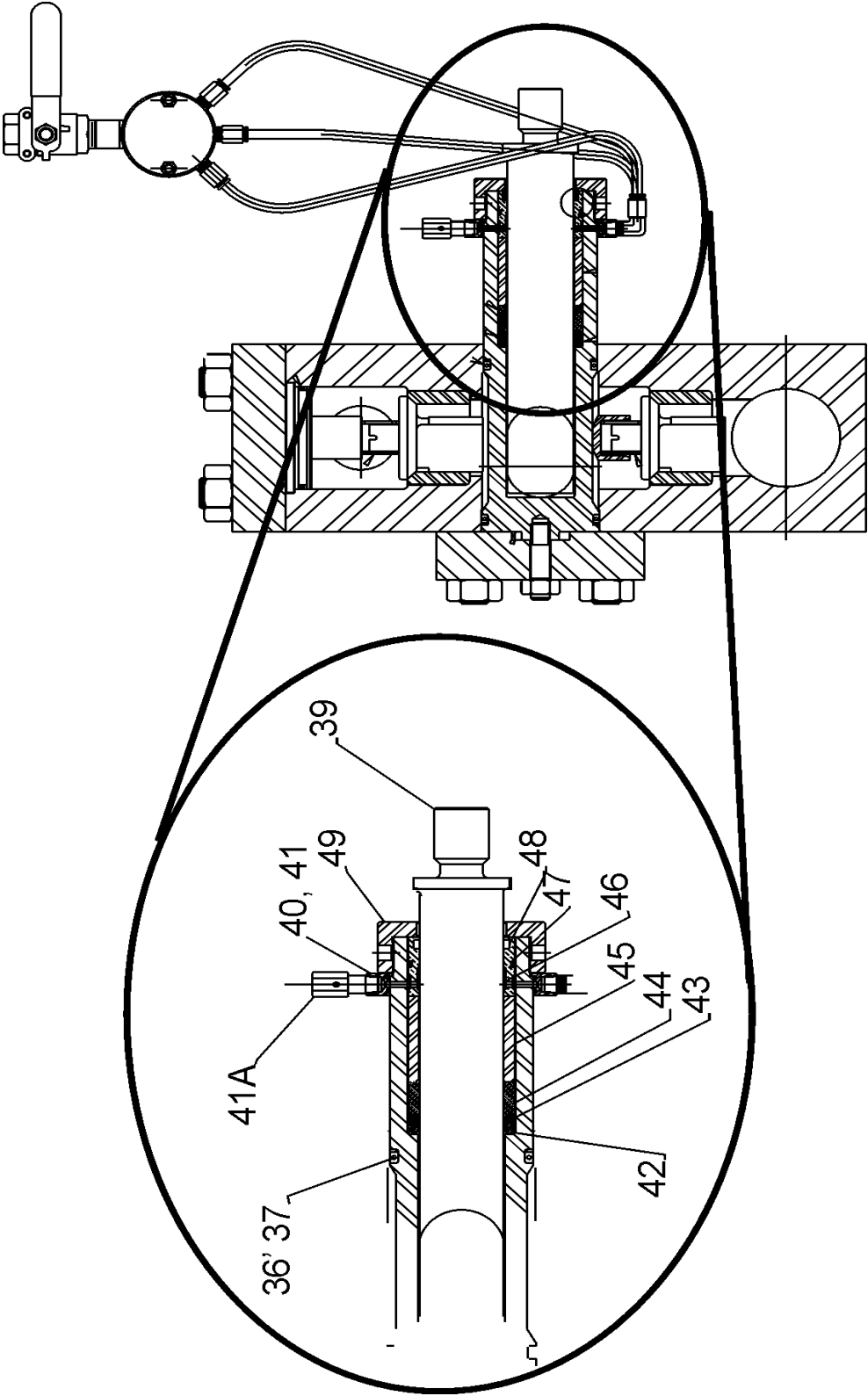
ITEM	DESCRIPTION	PART NO.	QTY
1	RUPTURE DISC- SIZED TO HEADBLOCK DESIGN LIMITATION	100994	1
2	RING-RUPTURE DISC (FOR LESS THAN 7500 PSI)	101002	1
3	NUT-RUPTURE DISC HOLDDOWN	100266	1
4	NIPPLE-CLOSE 1/2" IPS SCH 80 304 SS	11-131	1
5	ELBOW-90° 1/2" 3000# 304 SS	78-112	1
6	NUT- HEX	107483	4
7	ADAPTER-RUPTURE DISC	101359	1
8	BACKUP RING	BUR224	2
9	O-RING	N70224	2
10	HANDLE-HEADBLOCK COVER-TOP	100271	2
11	NUT, HEX	107485	6
11A	*STUD -	100468	6
12	COVER HEADBLOCK TOP	100275	1
13	STUD - GAUGE (HOMOGENIZERS ONLY)	100379	4
14	NIPPLE, 1/2" IPS SCHED 80 304 SS THD	11-136	1
14B	CAUTION TAG	33-85	2
15	DOWEL PIN	30-501	2
16	NUT-HEX	107488	4
17	STUD - HEADBLOCK AND CRANKCASE	100280	4
18	NUT-HEX	107484	12
19	NUT-HEX	107482	3
20	STUD-CYLINDER PULLER	100282	3
21	COVER-HEADBLOCK FRONT (NOT ASEPTIC)	103938	3
22	BALL VALVE 1/2" FEMALE NPT	312-1402X	1
23	NIPPLE 1/2" IPS X 2.00" LG 304 SS	11-116	1
24	HEADER-SEAL FLUSH	100288	1
24A	SCREW, HHCS ZP 1/4-20 X .75	30-287	2
24B	LOCK WASHER, 1/4	"43-106	2
25	MALE CONNECTOR .25" OD X 1/8" IPS (NOT ASEPTIC)	78-88	3
26	TUBING-CLEAR .25" OD 90 DUROMETER (NOT ASEPTIC)	87-1023	60

ITEM	DESCRIPTION	PART NO.	QTY
27	MALE ELBOW-90° .25" OD X 1/8" IPS (NOT ASEPTIC)	78-87	3
28	BACKUP RING	BUR232	3
29	O-RING	N70232	3
30	PLUG-HEADBLOCK TOP, POPPET ONLY	100297	3
31	SPRING-COIL, POPPET VALVE ONLY	4484680	6
32	CAP-SUCTION VALVE SPRING	4484730	3
33	HEADBLOCK - INTEGRAL SEAT	100301	1
	HEADBLOCK - HARDENED SEAT	104609	1
34	BACKUP RING	BUR335	3
35	O-RING	N70335	3
36	O-RING	N70334	3
37	BACKUP RING	BUR334	3
38	CYLINDER - 1. 500 PLUNGER DIA	100321	3
	CYLINDER - 1. 625 PLUNGER DIA	100728	3
	CYLINDER - 1.750 PLUNGER DIA	700730	3
	CYLINDER - 1.875 PLUNGER DIA	100732	3
	CYLINDER - 1.9375 PLUNGER DIA	100733	3
	CYLINDER - 2.000 PLUNGER DIA	100734	3
	CYLINDER - 2.0625 PLUNGER DIA	100324	3

Recommended Spares

1	RUPTURE DISC- SIZED TO HEADBLOCK DESIGN LIMITATION	100994	1
8	BACKUP RING	BUR224	3
9	O-RING	N70224	12
28	BACKUP RING	BUR232	3
29	O-RING	N70232	12
31	SPRING-COIL, POPPET VALVE ONLY	4484680	3
34	BACKUP RING	BUR335	3
35	O-RING	N70335	12
36	O-RING	N70334	12
37	BACKUP RING	BUR334	3
38	CYLINDER -		1

Headblock Assembly



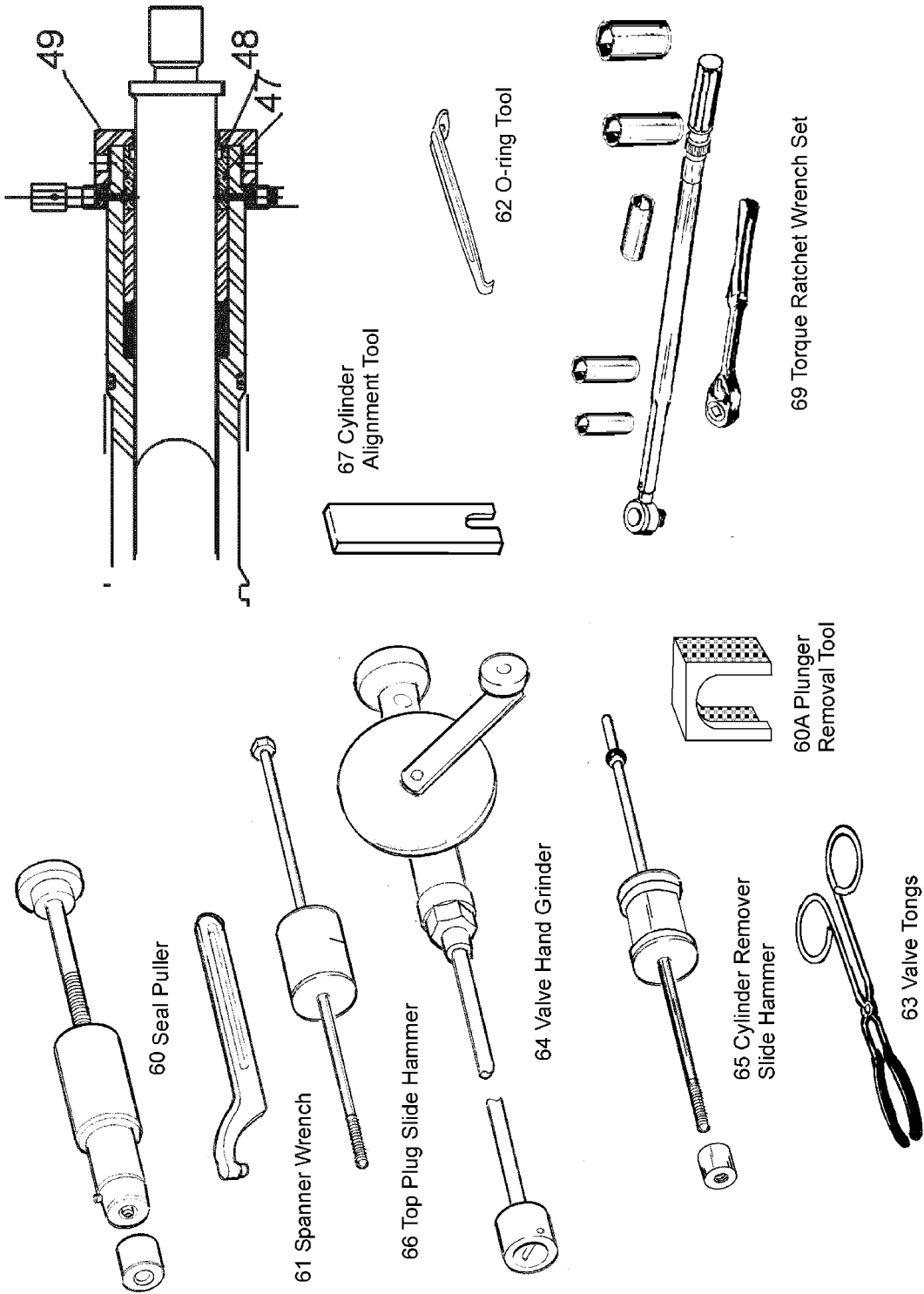
ITEM	DESCRIPTION	PART NO.	QTY .
43** OPT	SEAL-PLUNGER 2.000" PLUNGER DIA FDA	101030	6
	SEAL-PLUNGER 2.0625" PLUNGER DIA FDA	101031	6
44*S TD	ADAPTER-TOP DOUBLE SEAL 1.500" PLUNGER	105934	3
	ADAPTER-TOP DOUBLE SEAL 1.625" PLUNGER	105936	3
	ADAPTER-TOP DOUBLE SEAL 1.750" PLUNGER	105938	3
	ADAPTER TOP DOUBLE SEAL 1.875" PLUNGER	105940	3
	ADAPTER TOP DOUBLE SEAL 1.9375" PLUNGER	105941	3
	ADAPTER-TOP DOUBLE SEAL 2.000" PLUNGER	105942	3
	ADAPTER-TOP DOUBLE SEAL 2.0625" PLUNGER	105943	3
44* OPT	ADAPTER-TOP SGLE SEAL 1.500" PLUNGER	101121	3
	ADAPTER-TOP SGLE SEAL 1.625" PLUNGER	101123	3
	ADAPTER-TOP SGLE SEAL 1.750" PLUNGER	101125	3
	ADAPTER TOP SGLE SEAL 1.875" PLUNGER	101127	3
	ADAPTER TOP SGLE SEAL 1.9375" PLUNGER	101128	3
	ADAPTER-TOP SGLE SEAL 2.000" PLUNGER	101129	3
	ADAPTER-TOP SGLE SEAL 2.0625" PLUNGER	101130	3
45	SPACER 1.500" PLUNGER DIA	100864	3
	SPACER 1.5625" PLUNGER DIA	100866	3
	SPACER 1.625" PLUNGER DIA	100868	3
	SPACER 1.750" PLUNGER DIA	100872	3
	SPACER 1.875" PLUNGER DIA	100876	3
	SPACER 1.9375" PLUNGER DIA	100877	3
	SPACER 2.000" PLUNGER DIA	100878	3
	SPACER 2.0625" PLUNGER DIA	100879	3
46*	RING-LANTERN 1.500" PLUNGER DIA	100809	3
	RING-LANTERN 1.625 " PLUNGER DIA	100811	3
	RING-LANTERN 1.6875 " PLUNGER DIA	100812	3
	RING-LANTERN 1.750 " PLUNGER DIA	100813	3
	RING-LANTERN 1.875" PLUNGER DIA	100815	3
	RING-LANTERN 1.9375" PLUNGER DIA	100340	3
	RING-LANTERN 2.000" PLUNGER DIA	100816	3
	RING-LANTERN 2.0625" PLUNGER DIA	100341	3

** Select qty. of 3 when using optional single plunger seal.

*Recommended Spare

ITEM	DESCRIPTION	PART NO.	QTY .
398 OPT	PLUNGER 1.500" DIA CERAMIC-	100606	3
	PLUNGER 1.625" DIA CERAMIC-	100608	3
	PLUNGER 1.750" DIA CERAMIC-	100610	3
	PLUNGER 1.875" DIA CERAMIC-	100612	3
	PLUNGER 1.9375" DIA CERAMIC-	100613	3
	PLUNGER 2.000" DIA CERAMIC-	100614	3
	PLUNGER 2.0625" DIA CERAMIC-	100615	3
39* STD.	PLUNGER 1.500" DIA TUNGSTEN CARBIDE	100655	3
	PLUNGER 1.625" DIA TUNGSTEN CARBIDE	100657	3
	PLUNGER 1.750" DIA TUNGSTEN CARBIDE	100659	3
	PLUNGER 1.875" DIA TUNGSTEN CARBIDE	100661	3
	PLUNGER 1.937" DIA TUNGSTEN CARBIDE	100662	3
	PLUNGER 2.000" DIA TUNGSTEN CARBIDE	100663	3
	PLUNGER 2.0625" DIA TUNGSTEN CARBIDE	100664	3
40*	RING-SEAL FLUSH	100328	1
41*	O-RING	N70041	6
41A	SNUBBER	104130	3
42*	ADAPTER-BOTTOM 1.500" PLUNGER DIA	100839	3
	ADAPTER-BOTTOM 1.625" PLUNGER DIA	100841	3
	ADAPTER-BOTTOM 1.750" PLUNGER DIA	100843	3
	ADAPTER-BOTTOM 1.875" PLUNGER DIA	100845	3
	ADAPTER-BOTTOM 1.9375" PLUNGER DIA	108332	3
	ADAPTER-BOTTOM 2.000 PLUNGER DIA	100846	3
	ADAPTER-BOTTOM 2.0625 PLUNGER DIA	100333	3
43(*) ** STD	SEAL-PLUNGER 1.500" PLUNGER DIA	105143	6
	SEAL-PLUNGER 1.625" PLUNGER DIA	105145	6
	SEAL-PLUNGER 1.750" PLUNGER DIA	105147	6
	SEAL-PLUNGER 1.875" PLUNGER DIA	105149	6
	SEAL-PLUNGER 1.9375" PLUNGER DIA	105150	6
	SEAL-PLUNGER 2.000" PLUNGER DIA	105151	6
	SEAL-PLUNGER 2.0625" PLUNGER DIA	105152	6
43(*) ** OPT	SEAL-PLUNGER 1.500" PLUNGER DIA FDA	101022	6
	SEAL-PLUNGER 1.625" PLUNGER DIA L FDA	101024	6
	SEAL-PLUNGER 1.750" PLUNGER DIA FDA	101026	6
	SEAL-PLUNGER 1.875" PLUNGER DIA FDA	101028	6
	SEAL-PLUNGER 1.9375" PLUNGER DIA L FDA	101029	6

Headblock Assembly Tools



Headblock Assembly Tools

ITEM	DESCRIPTION	PART NO.	QTY
47	O-RING 1.500" PLUNGER DIA	N70133	3
	O-RING 1.625" PLUNGER DIA	N70135	3
	O-RING 1.750" PLUNGER DIA	N70137	3
	O-RING 1.875" PLUNGER DIA	N 70139	3
	O-RING 1.9375" PLUNGER DIA	N 70140	3
	O-RING 2.000" PLUNGER DIA	N70141	3
	O-RING 2.0625" PLUNGER DIA	N70142	3
48	SEAL-WIPER 1.500" PLUNGER DIA	101077	3
	SEAL-WIPER 1.625" PLUNGER DIA	101079	3
	SEAL-WIPER 1.750" PLUNGER DIA	101081	3
	SEAL-WIPER 1.875" PLUNGER DIA	101083	3
	SEAL-WIPER 1.9375" PLUNGER DIA	101084	3
	SEAL-WIPER 2.000" PLUNGER DIA	101085	3
	SEAL-WIPER 2.0625" PLUNGER DIA	101086	3
49	NUT, 1.500" PLUNGER DIA	100351	3
	NUT, 1.625" PLUNGER DIA	100778	3
	NUT, 1.750" PLUNGER DIA	100780	3
	NUT, 1.875" PLUNGER DIA	100782	3
	NUT, 1.9375" PLUNGER DIA	100783	3
	NUT, 2.000" PLUNGER DIA	100784	3
	NUT, 2.0625" PLUNGER DIA	100354	3
60	SEAL PULLER 1.500 " PLUNGER DIA	101179	3
	SEAL PULLER 1.625" PLUNGER DIA	101181	1
	SEAL PULLER 1.750" PLUNGER DIA	101183	1
	SEAL PULLER 1.875" PLUNGER DIA	101185	1
	SEAL PULLER 1.9375" PLUNGER DIA	101186	1
	SEAL PULLER 2.000" PLUNGER DIA	101187	1
	SEAL PULLER 2.0625" PLUNGER DIA	101188	1
60A	TOOL - PLUNGER REMOVAL	107353	1
61	SPANNER WRENCH-FIXED HEAD	100979	1
62	TOOL - O-RING	AD0 096 001	1
63	TONGS - VALVE NEOPRENE-CUSHIONED PRONGS	101344	1
64	TOOL - VALVE REGRINDING OSCILATING HAND GRINDER	101392	1

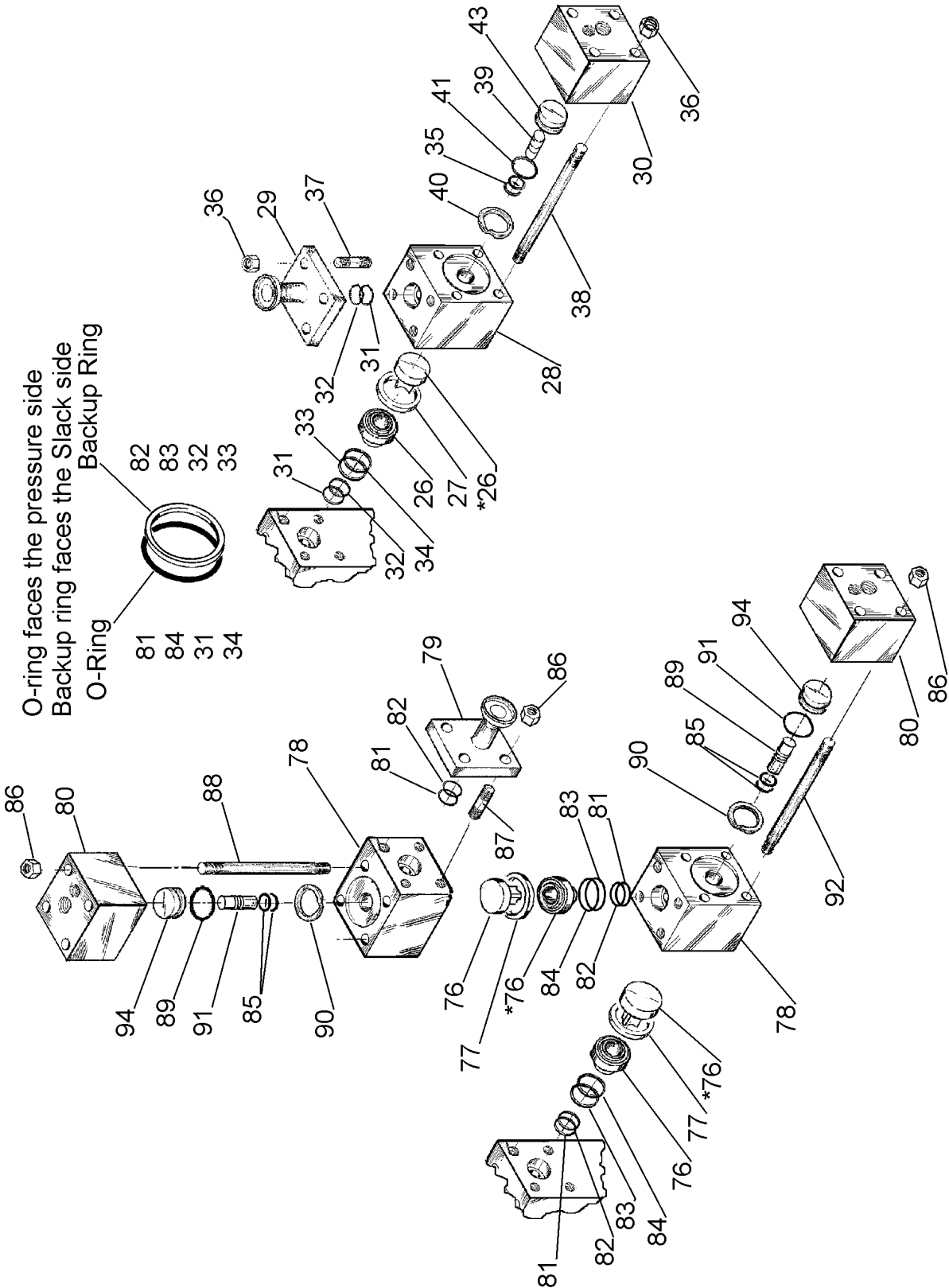
ITEM	DESCRIPTION	PART NO.	QTY
65	SLIDE HAMMER - CYLINDER REMOVER	101334	1
66	SLIDE HAMMER - HEADBLOCK TOP PLUG REMOVER	101342	1
67	TOOL - CYLINDER ALIGNMENT	101380	1
68	TORQUE RATCHET WRENCH KIT	101639	1

* not shown

Recommended Spares

47	O-RING PLUNGER	12
48	SEAL-WIPER PLUNGER	12
49	NUT, PLUNGER	1

Homogenizing Valve Assemblies



Homogenizing Valve Assemblies

Waukesha Cherry-Burrell

Parts Lists

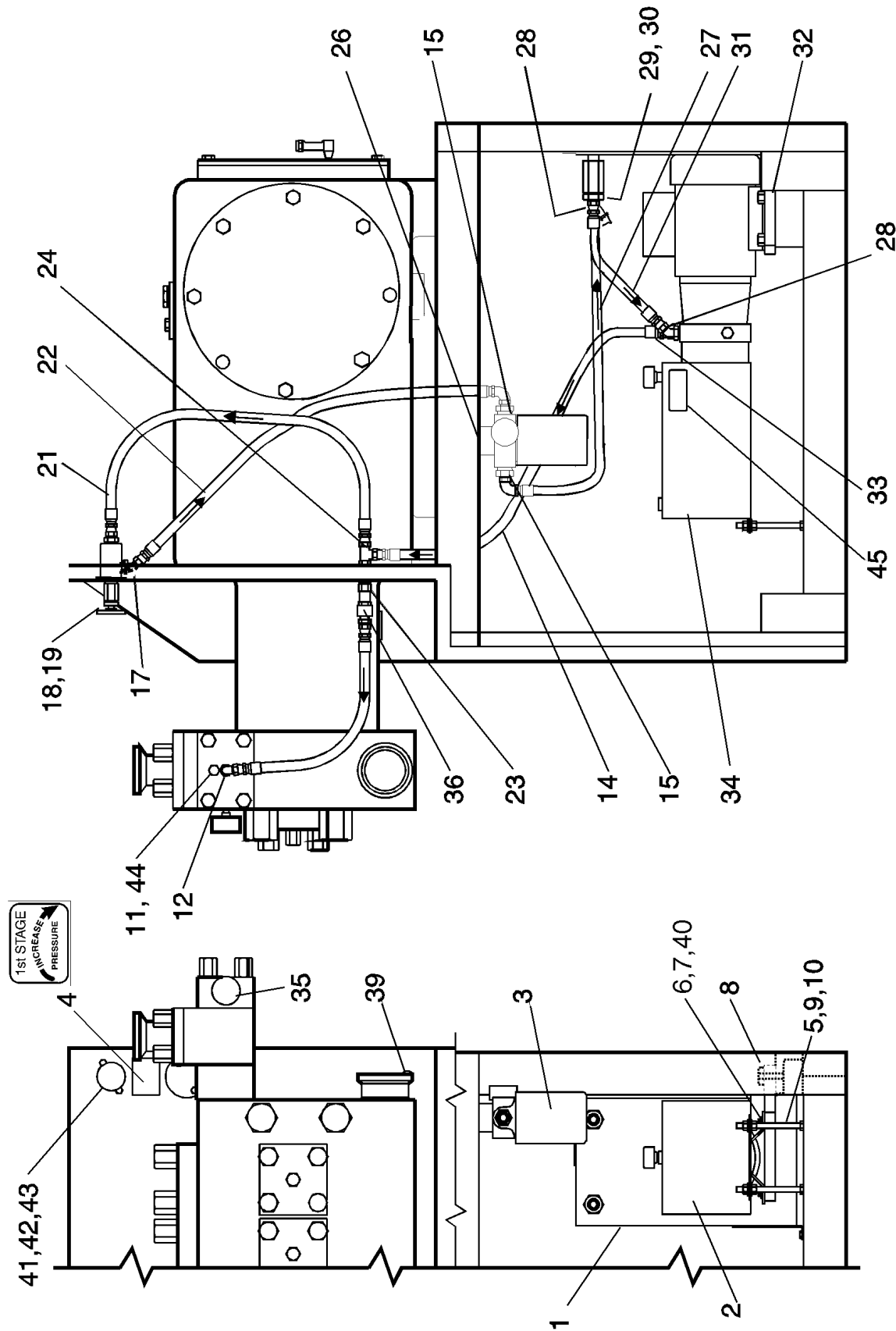
ITEM	DESCRIPTION	PART NO.	QTY
26	VALVE 17-4PH SS 1000 CAPACITY	100931	
	VALVE 17-4PH SS 2000 CAPACITY	100932	
	VALVE 17-4PH SS 2000 CAPACITY	100368	
	VALVE TUNGSTEN CARB 1000 GPH	100179	
	VALVE TUNGSTEN CARB 2000 GPH	100180	1
	VALVE TUNGSTEN CARB 3000 GPH	100181	1
27	RING, 17-4PH SS 1000 GPH CAPACITY	100943	1
	RING, 17-4PH SS 2000 GPH CAPACITY	100944	1
	RING, 17-4PH SS 3000 GPH CAPACITY	100370	1
	RING,TUNGSTEN CARBIDE 1000 GPH	100227	1
	RING, TUNGSTEN CARBIDE 2000 GPH	100228	1
	RING,TUNGSTEN CARBIDE 3000 GPH	100229	1
28	BODY- VALVE	105883	1
	BODY -VALVE ASEPTIC	105886	1
29	FITTING-#15I PRODUCT DISCHARGE	100373	1
30	CYLINDER-HYDRAULIC ACTUATOR	105874	1
31*	O-RING	N70224	2
32*	BACK-UP RING	BUR224	2
33*	BACK-UP RING	BUR232	1
34*	O-RING	N70232	1
35*	O-RING	N70214	2
	O-RING EPDM ASEPTIC	E70218	2
36	NUT-HEX	107483	8
37	STUD-PRODUCT DISCHARGE FITTING	100379	4
38	STUD-BODY	100466	4
39	STEM - PISTON-HYDRAULIC ACTUATOR	105896	1
40	RETAINING RING-SMALLEY WH SERIES	43-219	1
41*	T- SEAL	100394	1
43	HEAD - PISTON HYDRAULIC ACTUATOR	105893	1
76	VALVE, 17-4PH SS 1000 GPH CAPACITY	100931	2
	VALVE, 17-4PH SS 2000 GPH CAPACITY	100932	2
	VALVE, 17-4PH SS 3000 GPH CAPACITY	100368	2
	VALVE, TUNGSTEN CARBIDE 1000 GPH CAPACITY	100179	2
	VALVE, TUNGSTEN CARBIDE 2000 GPH CAPACITY	100180	2

ITEM	DESCRIPTION	PART NO.	QTY
76	VALVE, TUNGSTEN CARBIDE 3000 GPH CAPACITY	100181	2
77	RING, 17-4PH SS 1000 GPH CAPACITY	100943	2
	RING, 17-4PH SS 2000 GPH CAPACITY	100944	2
	RING, 17-4PH SS 3000 GPH CAPACITY	100370	2
	RING, TUNGSTEN CARBIDE 1000 GPH CAPACITY	100227	2
	RING, TUNGSTEN CARBIDE 2000 GPH CAPACITY	100228	2
78	RING, TUNGSTEN CARBIDE 3000 GPH CAPACITY	100229	2
	BODY, VALVE	105883	2
79	BODY, VALVE ASEPTIC	105886	2
	FITTING-# 15I PRODUCT DISCHARGE CAPACITY	100373	1
80	CYLINDER-HYDRAULIC ACTUATOR	105874	2
81*	O-RING	N70224	3
82*	BACK-UP RING	BUR224	3
83*	BACK-UP RING	BUR232	2
84*	O-RING	N70232	2
	O-RING ASEPTIC	E70218	4
85*	O-RING	N70214	4
86	NUT-HEX	107483	12
87	STUD-PRODUCT DISCHARGE FITTING	100379	4
88	STUD-BODY	100396	4
89	PISTON-HYDRAULIC ACTUATOR	105896	2
90	RETAINING RING-SMALLEY WH SERIES	43-219	2
91*	T-SEAL	100394	2
92	STUD-BODY	100466	4
94	HEAD - PISTON HYDRAULIC ACTUATOR	105893	2

*Recommended Spares Single Stage

**Recommended Spares Doublestage

Homgenizing Actuator Assembly (Single Stage)



Homogenizing Actuator Assembly (Single Stage)

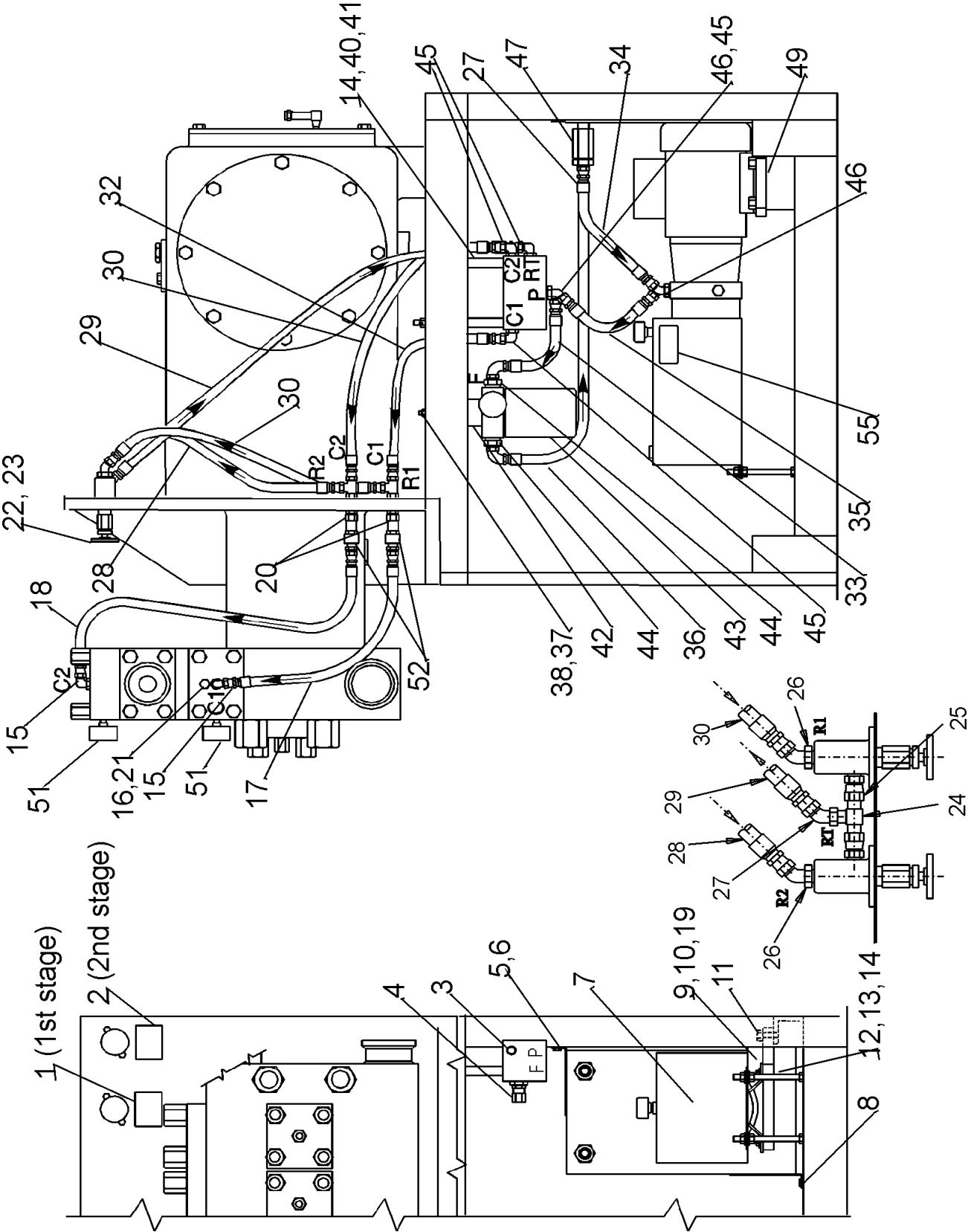
ITEM	DESCRIPTION	PART NO.	QTY
1	HEAT EXCHANGER #RM-25	101039	1
2	SCREW-HEX HD CAP 1/4-20 X .75	"30-287	2
3	FILTER WITH INDICATOR #SP15-SAHVI	101040	1
4	LABEL- 1ST STAGE HOMOGENIZING VALVE	33-67	1
5	WASHER-FLAT 3/8	43-191	4
6	SCREW-HEX HD CAP 5/16- 18 X 1.25	"30-347	4
7	WASHER - FLAT 5/16	"43-145	8
8	SCREW-HEX HD CAP 1/2- 13 X 1.25	"30-192	2
9	SCREW-HEX HD CAP 3/8- 16 X 4.00	"30-348	2
10	NUT-HEX 3/8 - 16	36-83	4
11	PLUG-SAE #4 #4GP SS	78-102	1
12	ELBOW-90° SAE #6 #J6GE SS	78-103	1
13	HOSE-3/8 SS WIRE BRAIDED 22.0-LGTH	74-139	1
14	HOSE-3/8 RUBBER 35.0-LGTH	74-25	1
15	ADAPTER-3/4 MPT #2021-12-6S	78-92	2
16	THREADED ROD-1/4-20 UNC-2A 18-8 SS	104112	2
17	ELBOW-45° 1/4 MPT #2023-4-6S	78-100	1
18	RELIEF VALVE #8820-01-CR-21	101041	1
19	SCREW-HEX HD CAP 1/4-20 X .50" SS	30-62	2
20	ADAPTER 1/4 MPT #2021-4-6S	78-101	1
21	HOSE- 3/8 RUBBER 28.0-LG TH	74-14	1
22	HOSE-3/8 RUBBER 29.0-LGTH	74-12	1
23	UNION-BULKHEAD 3/8 #J6BU SS	78-139	1
24	TEE- 37° FLARE #203101 - 6 - 6S	78-126	1
25	NUT-REGULAR HEX ZINC	36-100	2
26	SPACER-FIL TER	100399	1
27	HOSE-3/8 RUBBER 29.0-LGTH	74-12	1
28	ELBOW-45° SAE #6 #2061 -6-6S	78-94	1
29	ADAPTER-SAE #12 #202702-12-6S	78-97	1
31	HOSE-3/8 RUBBER 12.0-LGTH	74-19	1
32	PLATE-HYDRAULIC ACTUATOR MOTOR	100400	1
33	ADAPTER-SAE #6 #202702-6-6S	78-93	1

ITEM	DESCRIPTION	PART NO.	QTY
34	HYDRAULIC POWER UNIT-GS 1/60/115-208-220 V	101042	1
	HYDRAULIC POWER UNIT-GS 1/50/110-220 V	101003	1
	HYDRAULIC POWER UNIT 3/50-60/208-230-EXPLOSION PROOF	105172	1
35	GAUGE - OIL PRESSURE 0-3000 PSI	105550	1
36	COUPLING - QUICK DISCONNECT MALE AND FEMALE HALVES	78-140	1
39	HOLE PLUG	78-127	1
40	NUT - HEX 5/16-18	36-101	4
41	COVER	104001	1
42	SCREW - HHCS SS 1/4-20 X .625 LG.	30-181	2
43	NUT HEX SS 1/4-20	36-53	2
44	O-RING	N90012	1
45	LABEL - HYDRAULIC POWER UNI	33-78	1
46	ELBOW -90 deg 37 DEG FLARE	2071-6-65	1

Recommended Spares

44	O-RING	N90012	6
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Homogenizing Actuator Assembly (Double Stage)



Homgenizing Actuator Assembly (Double Stage)

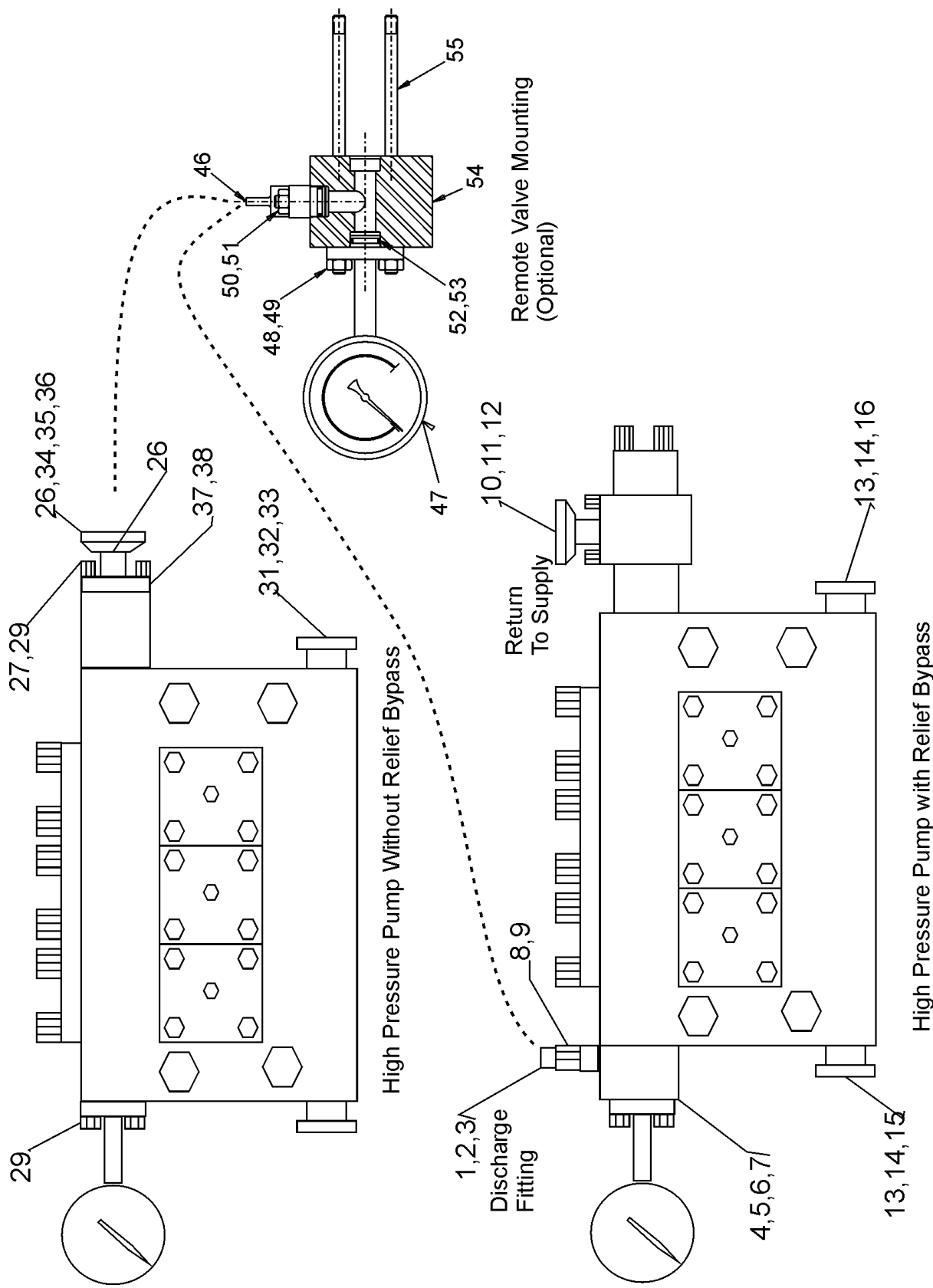
ITEM	DESCRIPTION	PART NO.	QTY
1	LABEL - 2ND STAGE HOMOGENIZING VALVE	33-68	1
2	LABEL - 1ST STAGE HOMOGENIZING VALVE	33-67	1
3	ORIFICE -HEX HD SOC HD SETSCREW 3/8-16	30-560	2
4	VALVE-PRESSURE RELIEF RV6- 10-C-0-25/18	101638	1
5	MANIFOLD-2 STAGE HYD. ACTUATION	105670	1
6	HEX NUT 318-16	36-83	1
7	HEAT EXCHANGER #RM-25	101039	1
8	SCREW-HEX HD CAP 1/4-20 X .75	30-287	2
9	SCREW- HEX HD CAP 5/ 16 - 18 X 1.25	30-347	4
10	WASHER-FLAT 5/ 16	43-145	4
11	SCREW-HEX HD CAP 1/2-13 x 1 25	30-192	2
12	WASHER-FLAT 3/8	"43-191	4
13	SCREW-HEX HD CAP 3/8- 16 X 4.00	30-348	2
14	NUT- HEX 3/8-16	36-83	4
15	ELBOW-90° SAE #6 #J6GE SS	78-103	2
16	PLUG-SAE #4 #4GP STAIN STL	78-102	2
17	HOSE-3/8 STAIN STL WIRE BRAIDED 22.0-LG	74-139	1
18	HOSE-3/8 STAIN STL WIRE BRAIDED 30.0-LG	74-141	1
19	HEX NUT 5/16-18	36-101	4
20	UNION-BULKHEAD 3/8 #J6BU SS	78-139	2
21	O-RING	N90012	2
22	RELIEF VALVE #8820-01-CR-21	101041	2
23	SCREW-HEX HD CAP 1/4-20 x .50 SS	30-62	4
24	TEE-37' FLARE #2033- 6 - 6-25	78-119	1
25	ADAPTER 1/4 MPT #2018-4-6S	78-115	2
26	ELBOW-45° 1/4 MPT #202	78-100	2
27	ELBOW-45° SAE #6 #2070-6-65	78-116	1
28	HOSE-3/8 RUBBER 18.0-LGTH	74-18	1
29	HOSE-3/8 RUBBER 40.0-LGTH	74-22	1
30	HOSE-3/8 RUBBER 18.0-LGTH	74-18	1
31	HOSE-3/8 RUBBER 28.0-LGTH	74-14	1

ITEM	DESCRIPTION	PART NO.	QTY
32	HOSE-3/8 RUBBER 18.0-LGTH	74-7	1
33	HOSE-3/8 RUBBER 25.0-LGTH	74-16	1
34	HOSE-3/8 RUBBER 12.0-LGTH	74-19	1
35	HOSE-3/8 RUBBER 18.0-LGTH	74-7	1
36	HOSE-3/8 RUBBER 29.0-LGTH	74-12	1
37	NUT-REGULAR HEX ZINC	36-100	2
38	THREADED ROD- 1/4-20 UNC-2A 18-8 SS	104112	2
40	THREADED ROD-3/8-16 UNC-2A 316 SS	114114	2
41	PIPE - 3/8 IPS SCH 40 304 SS	104116	2
42	SPACER-FILTER	100399	1
43	FILTER WITH INDICATOR #SP15 -SAHV1	101040	1
44	ADAPTER-3/4 MPT #2021-12-6S	78-92	2
45	ELBOW-90° SAE #6 #2062-6-6S	78-91	4
46	ELBOW-45° SAE #6 #2061 -6-6S	78-94	3
47	ADAPTER-SAE #12 #202702-12-6S	78-97	2
48	TEE 37° FLARE	78-126	2
49	PLATE-HYDRAULIC ACTUATOR MOTOR	100400	1
50	HYDRAULIC POWER UNIT- GS 1/60/115-208-220V	101042	1
	HYDRAULIC POWER UNIT-GS 1/50/110-220V	101003	1
	HYDRAULIC POWER UNIT-3/50-60/208-230-450V EXPLOSION PROOF	105172	1
51	GAUGE - OIL PRESSURE 0-3000 PSI	105550	2
52	COUPLING - QUICK DISCONNECT	78-140	2
55	LABEL - HYDRAULIC POWER UNIT	33-78	1

Recommended Spares

21	O-RING	N90012	2
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High Pressure Pump Assemblies



High Pressure Pump Assemblies

High Pressure Pump With Relief/Bypass

ITEM	DESCRIPTION	PART NO.	QTY
1	FITTING-.750 O.D. 5800 MAX. WORKING PRESSURE	101375	1
	FITTING- 1.000 O.D.4700 MAX. WORKING PRESSURE	101376	1
2	O-RING	N70214	1
3	BACK-UP RING	BUR214	1
4	ADAPTER - GAUGE & OUTLET	100268	1
5	O-RING	N70224	1
6	BACK-UP RING	BUR224	1
7	STUD - GAUGE & OUTLET	100705	4
8	STUD - PRODUCT DISCHARGE9	100465	2
9	NUT-HEX CAP	107483	2
10	CLAMP ASSEMBLY - 13IS	3023019	1
11	GASKET - 40I BUNA	20- 106	1
12	FERRULE - 14WI	29-507XCB	1
13	CLAMP ASSEMBLY - 13IS	3023022	2
14	GASKET - 40I BUNA	20-107	2
15	FERRULE - 14WI	29 -50BXCB	2
16	CAP-MALE 16AI-14I	3-73X	1

High Pressure Pump Without Relief/Bypass

ITEM	DESCRIPTION	PART NO.	QTY
26	FITTING - .750 O.D. 5800 MAX. WORKING PRESSURE	101361	1
	FITTING- 1.000 O.D. 4200 MAX. WORKING PRESSURE	101362	1
	FITTING-2.50 #15I 200 MAX. P.S.I. @ 250° F.	100373	1
27	STUD - RUPTURE DISC & OUTLET	100705	4
28	NUT-HEX	107483	4
29	STUD - GAUGE	100379	4
30	FERRULE - 14WI	29-508XCB	2

ITEM	DESCRIPTION	PART NO.	QTY
31	CAP-MALE 16AI-14I	3-73X	1
32	CLAMP ASSEMBLY - 13IS	3023022	2
33	GASKET - 40I BUNA	20-107	2
34	*FERRULE- 14WI	29-507XCB	1
35	*CLAMP ASSEMBLY- 13IS	3023019	1
36	*GASKET-40I BUNA	20-106	1
37	O-RING	N70224	1
38	BACK-UP RING	BUR224	1

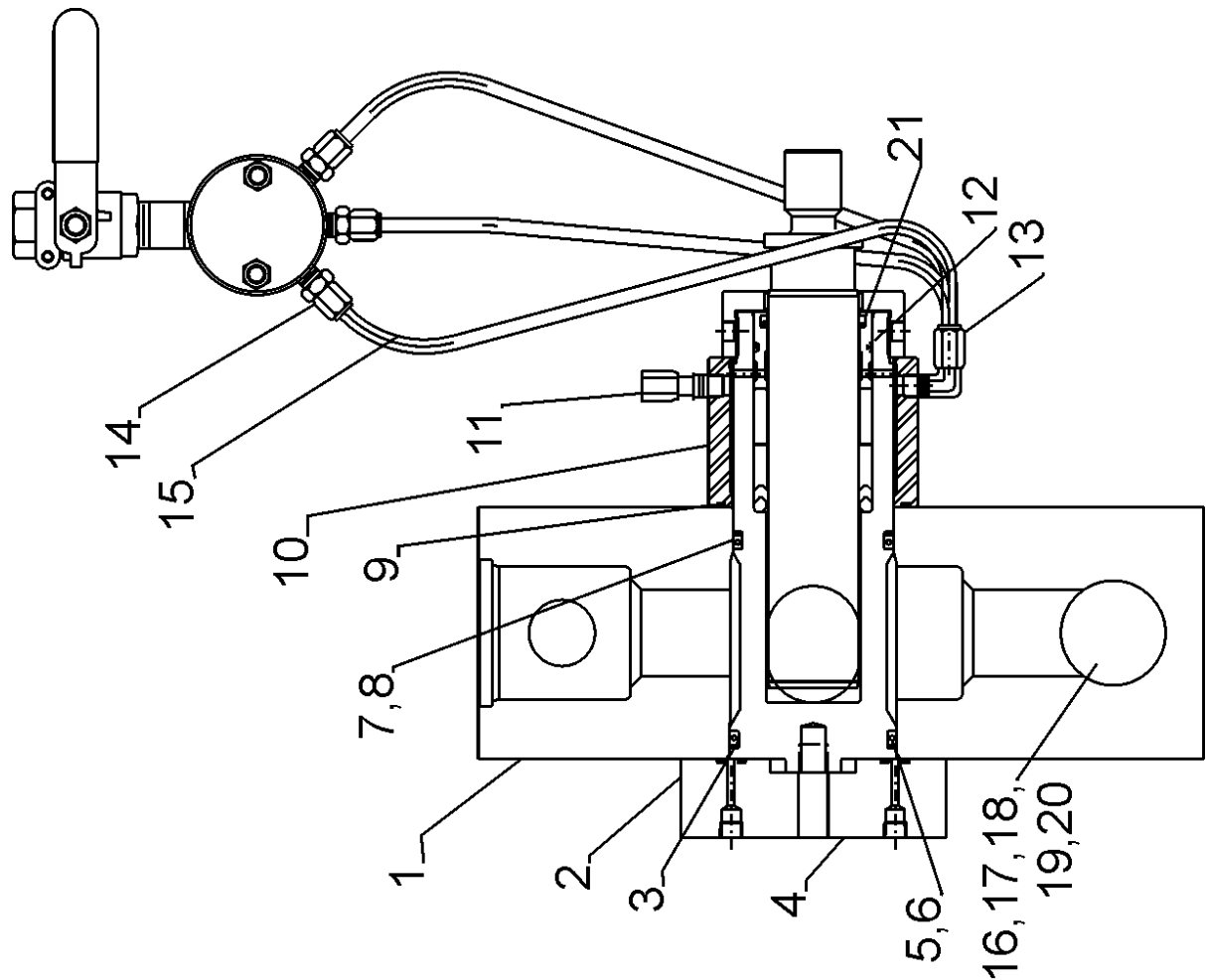
High Pressure Pump Remote Valve Mounting

ITEM	DESCRIPTION	PART NO.	QTY
46	FITTING-.750 O.D. 5800 MAX. WORK PSI	101375	1
	FITTING- 1.000 O.D. 4700 MAX. WORKPSI	101376	1
47	GAUGE-PRESSURE 0 TO 1000	100404	1
	GAUGE-PRESSURE 0 TO 5000	100406	1
	GAUGE-PRESSURE 0 TO 7500	100408	1
48	NUT-HEX	107482	4
49	STUD - GAUGE	100281	4
50	NUT-HEX	107483	2
51	STUD-PRODUCT INLET	100465	2
52	O-RING	N70214	2
53	BACK-UP RING	BUR214	2
54	ADAPTER-REMOTE VALVE MOUNTING	100269	1
55	STUD - BODY	100369	4

Recommended Spares

2	O-RING	N70214	12
3	BACK-UP RING	BUR214	3
5	O-RING	N70224	12
6	BACK-UP RING	BUR224	3
37	O-RING	N70224	12
38	BACK-UP RING	BUR224	3

Aseptic Pump Features



Aseptic Pump Features

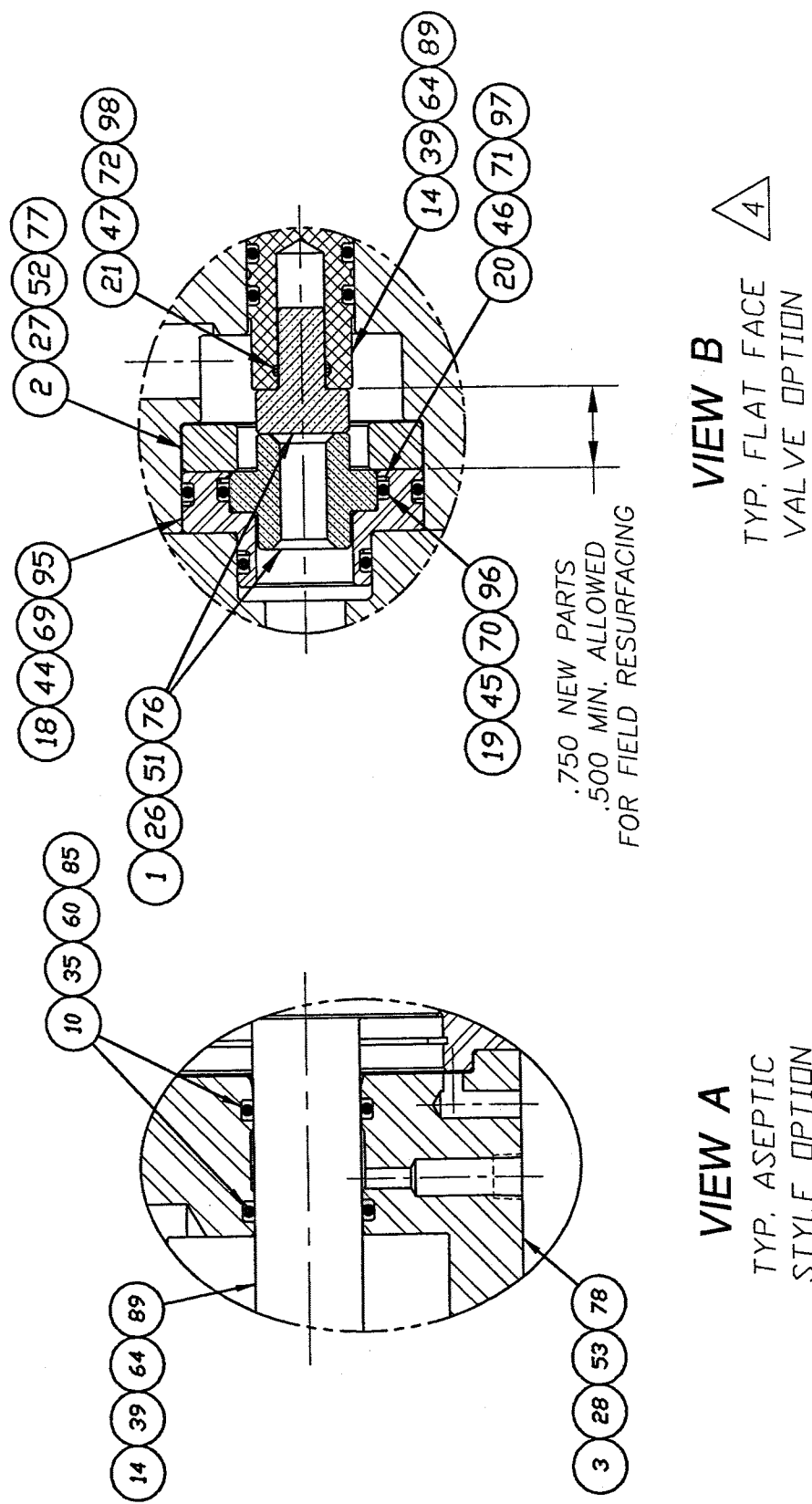
ITEM	DESCRIPTION	PART NO.	QTY
1	HEADBLOCK - INTEGRAL SEAT POPPET VALVE ONLY	105387	1
	HEADBLOCK - HARDENED SEAT POPPET VALVE ONLY	105388	1
2	O-RING EPDM	E70153	3
3	O-RING EPDM	E70144	3
4	COVER-HEADBLOCK FRONT ASEPTIC	105858	3
5	O-RING EPDM	E70335	3
6	BACK-UP RING TEFLON	BRT335	3
7	BACK-UP RING TEFLON	BRT334	3
8	O-RING EPDM	E70334	3
9	O-RING EPDM	E70153	3
10	COLLAR-ASEPTIC CYLINDER	105859	3
11	O-RING EPDM	E70041	3
12	O-RING 1.500 PLUNGER DIA	E70133	3
	O-RING 1.625 PLUNGER DIA	E70135	3
	O-RING 1.750 PLUNGER DIA	E70137	3
	O-RING 1.875 PLUNGER DIA	E70139	3
	O-RING 1.9375 PLUNGER DIA	E70140	3
	O-RING 2.0005 PLUNGER DIA	E70141	3
	O-RING 2.0625 PLUNGER DIA	E70142	3
13	MALE ELBOW-90° .25 OD X 1/8 IPS	78-137	3
14	MALE STRAIGHT ADAPTER .25 OD X 1/8 IPS	78-136	3
15	TUBING-TEFLON GREEN .25 OD	87-1138	60
16	FERRULE #14WNI 316L SS	29-643X	2
17	GASKET #4OIV	20-107V	2
18	O - RING	V70242	2
19	CLAMP #131S	3023025	2
20	ADAPTER 1/16 MPT X 1/8 FPT	78-71	2
21	SEAL-WIPER EPDM 1.500" PLUNGER DIA	104527	3
	SEAL-WIPER EPDM 1.625" PLUNGER DIA	104529	3
	SEAL-WIPER EPDM 1.750" PLUNGER DIA	104531	3
	SEAL-WIPER EPDM 1.875" PLUNGER DIA	104533	3
	SEAL-WIPER EPDM 1.9375" PLUNGER DIA	104534	3
	SEAL-WIPER EPDM 2.000" PLUNGER DIA	104535	3

ITEM	DESCRIPTION	PART NO.	QTY
21	SEAL-WIPER EPDM 2.0625" PLUNGER DIA	104536	3

Waukesha Cherry-Burrell

Parts Lists

Flat Face Tc homogenizing valves



Flat Face Tc homogenizing valves

ITEM	DESCRIPTION	PART NO.	QTY
26	VALVE 17-4PH SS 1000 GPH CAPACITY	100931	1
	VALVE 17-4PH SS 2000 GPH CAPACITY	100932	1
	VALVE 17-4PH SS 3000 GPH CAPACITY	100368	1
	VALVE-SEAT 174PH SS FLAT FACE VALVE OPTION BOTH SEAT & PLUG REQD.	112765	1
	VALVE-PLUG 17-4PH SS FLAT FACE VALVE OPTION BOTH SEAT & PLUG REQD.	112764	1
	VALVE TUNGSTEN CARBIDE 1000 GPH CAPACITY	100179	1
	VALVE TUNGSTEN CARBIDE 2000 GPH CAPACITY	100180	1
	VALVE TUNGSTEN CARBIDE 3000 GPH CAPACITY	100181	1
27	VALVE-PLUG TUNGSTEN CARBON BOTH SEAT & PLUG REQD.\	113408	1
	VALVE-PLUG TUNGSTEN CARBON BOTH SEAT & PLUG REQD.	113407	1
	RING 17-4PH SS 1000 GPH CAPACITY	100943	1
	RING 17-4PH SS 2000 GFH CAPACITY	100944	1
	RING 17-4PH SS 3000 GPH CAPACITY	100370	1
	RING 17-4PH SS FLAT FRACE VALVE OPTION	100370	1
	RING TUNGSTEN CARBIDE 1000 GPH CAPACITY	100227	1
	RING TUNGSTEN CARBIDE 1000 GPH CAPACITY	100228	1
28	RING TUNGSTEN CARBIDE 3000 GPH CAPACTIY	100229	1
	RING TUNGSTEN CARBIDE FLAT FACE VALVE OPTION	100229	1
35	BODY-VALVE STANDARD	105883	1
	BODY-VALVE ASEPTIC	105886	1
39	O-RING	N70214	2
	O-RING EPDM ASEPTIC	E70218	2
39	STEM-PISTON HYDRAULIC ACTUATOR STANDARD	105896	1
	STEM-PISTON HYDRAULIC ACTUATOR ASEPTIC	105898	1

ITEM	DESCRIPTION	PART NO.	QTY
39	STEM-PISTON -FLATFACE VALVE OPTION	112763	1
	STEM-PISTON - ASEPTIC -FLAT FACE VALVE OPTION	113412	1
44	ADAPTER SEAT FLAT FACE VALVE OPTION	112762	1
45	O-RING FLAT FACE VALVE OPTION	N70227	1
46	BACK-UP RING FLAT FACE VALVE OPTTON	BUR227	1
47	O-RING FLAT FACE VALVE OPTTON	N70013	1
76	VALVE 17-4SS 1000 GPH CAPACITY	100931	2
	VALVE 17-4 SS 2000 GPH CAPACITY	100932	2
	VALVE 17-4 SS 3000 GPH CAPACITY	100368	2
	VALVE-SEAT 17-4PH SS FLAT FACE VALVE OPTION BOTH SEAT & PLUG REQD.	112765	2
	VALVE-PLUG 17-4PH SS FLAT FACE VALVE OPTION BOTH SEAT & PLUG REQD.	112764	2
	VALVE TUNGSTEN CARBIDE 1000 GPH CAPACITY	100179	2
	VALVE TUNGSTEN CARBIDE 2000 GPH CAPACITY	100180	2
	VALVE TUNGSTEN CARBIDE 3000 GPH CAPACITY	100181	2
77	VALVE-SEAT TUNGSTEN CARBIDE FLAT FACE VALVE OPTION BOTH SEAT & PLUG REQD.	113408	2
	VALVE-PLUG TUNGSTEN CARBIDE FLAT FACE VALVE OPTION BOTH SEAT & PLUG REQD.	113407	2
	RING 17-4 SS 1000 GPH CAPACITY	100943	2
	RING 17-4 SS 2000 GPH CAPACITY	100944	2
	RING 17-4 SS 3000GPHCAPACITY	100370	2
	RING 17-4 PH FLAT FACE VALVE OPTION	100370	2
	RING TUNGSTEN CARBIDE 1000GPH CAPACITY	100227	2
	RING TUNGSTEN CARBIDE 2000 GPH CAPACITY	100228	2
77	RING TUNGSTEN CARBIDE 3000 GPH CAPACITY	100229	2

ITEM	DESCRIPTION	PART NO.	QTY
	RING TUNGSTEN CARBIDE FLAT FACE VALVE OPTION	100229	2
78	BODY-VALVE STANDARD	105883	2
	BODY-VALVE ASEPTIC	105886	2
85	O-RING	N70214	4
	O-RING EPDM ASEPTIC	E70218	4
89	STEM-PISTON HYDRAULIC ACTUATOR STANDARD	105896	2
	STEM-PISTON HYDRAULIC ACTUATOR ASEPTIC	105898	2
	STEM-PISTON-FLAT FACE VALVE OPTION	112763	2
	STEM-PISTON -ASEPTIC-FLAT FACE VALVE OPTION	113412	2
95	ADAPTER SEAT FLAT FACE VALVE OPTION	112762	2
96	O-RING FLAT FACE VALVE OPTION	N70227	2
97	BACK-UP RING FLAT FACE VALVE OPTION	BUR227	2
98	O-RING FLAT FACE VALVE OPTION	N70013	2



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